SITE MANAGEMENT PLAN

WORK ASSIGNMENT D004440-1

CAMP PHARSALIA **SITE NO. 7-09-013**
PHARSALIA (T) **CHENANGO (C), NY**

Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 Broadway, Albany, New York

Alexander B. Grannis, Commissioner

DIVISION OF ENVIRONMENTAL REMEDIATION

URS Corporation
77 Goodell Street
Buffalo, New York 14203

May 2009

SITE MANAGEMENT PLAN

for the

CAMP PHARSALIA SITE
NYSDEC SITE NO. 7-09-013
TOWN OF PHARSALIA, CHENANGO COUNTY, NEW YORK

Prepared For:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
625 BROADWAY, ALBANY, NEW YORK

Submitted By:

URS CORPORATION – NEW YORK
77 GOODELL STREET
BUFFALO, NEW YORK

MAY 2009

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1.0 INTRODUCTION

This *Site Management Plan* (*SMP*) describes the long-term monitoring and maintenance requirements for the Camp Pharsalia site. This plan has been prepared for the New York State Department of Environmental Conservation (NYSDEC) by URS Corporation – New York (URS) under Work Assignments D004440-1 and D004440-1A.

This SMP contains 7 sections. The remainder of this section provides background information for the project and discusses the purpose of this plan. Section 2.0 provides background information for the site. Section 3.0 briefly describes the remedial actions that have been completed. Section 4.0 describes the groundwater monitoring program for the site. Section 5.0 lists the periodic maintenance activities that are to be conducted at the site. Section 6.0 provides the schedule for the activities described in this plan. Section 7.0 lists the references used in the preparation of this plan.

The Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP) for this work are contained in the appendices to this SMP.

1.1 PROJECT BACKGROUND

The Camp Pharsalia site is site number 7-09-013 on the NYSDEC's registry of inactive hazardous waste sites. The site investigation was performed between 2001 and 2003. A *Record of Decision* (*ROD*) was issued in March 2003, and amended in May, 2007. Additional background information for the site and a summary of the completed remedial actions are provided in Sections 2.0 and 3.0.

1.2 PURPOSE OF PLAN

The purpose of this *SMP* is to provide guidance for post-remediation monitoring and maintenance activities at the Camp Pharsalia site. This document shall be considered a working plan that shall be updated and revised if site conditions change.

2.0 SITE BACKGROUND

The site is located within the Camp Pharsalia Incarceration Facility, an active New York State Department of Correctional Services (NYSDCS) facility, located in the Town of Pharsalia, Chenango County (Figure 1), New York. The 25-acre property is owned by the NYSDEC, but operated by NYSDCS. The inactive hazardous waste site occupies approximately 0.25 acres, in the southwest portion of the property. The site consistsed of a one story wood-framed former wood treatment building (removed in the recent remedial action) and surrounding grassy area. The site is immediately bordered by the correctional facility to the north, an old Civilian Conservation Corps Truck Trail on the east, and state-owned land on the south and west. The surrounding land is rural, and primary uses are residential and agricultural. The nearest private residence is approximately one-quarter mile northeast of the site.

The treatment plant was constructed for a dip tank process. The plant operated from approximately 1960 to 1977. Seasoned wood poles were staged on the east end of the treatment building. The logs were moved by an overhead hoist into the treatment building and placed in the dip tank. The top of the dip tank was at floor level. Wood was treated using a pentachlorophenol (PCP) solution consisting of approximately one part PCP, to eleven parts fuel oil.

After treatment, the poles would be raised from the dip tank and remain over the tank for approximately four hours. This would allow most of the unabsorbed product to drip back into the dip tank. The poles were then moved to one of the areas designated for the storage of treated posts outside the treatment building. Drums of PCP were reportedly stored on the west side of the treatment building. The fuel oil used in the treatment process was stored inside the treatment building in tanks.

3.0 REMEDIAL INVESTIGATION AND DESIGN

In October of 1997 the NYSDEC Division of Operations requested that the NYSDEC Division of Environmental Remediation (DER) perform an environmental investigation at Camp Pharsalia.

The DER completed a Preliminary Investigation (PI) at Camp Pharsalia in 1999. The PI consisted of the excavation of 13 test pits, the installation and sampling of 5 monitoring wells and the collection of 33 surface soil, 3 sediment and 25 subsurface soil samples. The investigation found PCP in the soil directly below the treatment building and the area extending to the west of the building. The soil under the building was also tested for dioxin, a common impurity in PCP, which was found to be above cleanup criteria. Based on these findings, in December of 1999, the NYSDEC listed the Camp Pharsalia site on the State's Registry of Inactive Hazardous Waste Disposal Sites. The site was designated a Class 3 site, which is defined as a site which "Does not present a significant threat to the public health or the environment - action may be deferred."

In 2001, the NYSDEC initiated a Remedial Investigation (RI)/Feasibility Study (FS) for the Camp Pharsalia site. The RI was developed to build on the information generated during the PI and to help fully delineate the extent of contamination known to exist. The results of the RI were presented in the document Remedial Investigation Report for the Camp Pharsalia Site, dated February 26, 2003. Based on the results of the RI, a Feasibility Study Report was prepared in February 26, 2003. The FS evaluated numerous remedial options for the Camp Pharsalia site, and determined the selected remedy.

In March 2003, a Record of Decision (ROD) was issued for the site. As discussed in the FS and ROD, the NYSDEC had selected Containment with Low Permeability Cover System (i.e., by capping) as the remedy for this site. A ROD Amendment (dated May, 2007) was issued on June 4, 2007, modifying the selected remedy so that, instead of containing the waste on site with a low permeability cap, the waste was to be excavated, then transported and disposed of off-site.

The primary elements of the revised remedy, as listed in the amended ROD, are presented below.

1. Demolition and off-site disposal of the former treatment building and its contents;
2. Excavation and off-site disposal of approximately 860 cubic yards of contaminated soil, and extraction, containment, and off-site disposal of contaminated groundwater as necessary to dewater the excavation;
3. Site restoration by bringing in approved backfill, grading to ensure proper drainage, placement of additional topsoil as necessary, and seeding;
4. Implementation of a groundwater monitoring program to observe the effectiveness of the remedy;
5. Development of a site management plan to provide the details of the groundwater monitoring plan; and
6. Imposition of an institutional control in the form of an environmental easement that shall require compliance with the approved site management plan; restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the Chenango County Health Department; and the property owner to complete and submit to the Department a periodic certification of institutional controls.

The first three elements comprise the remedial activities completed during July and August 2008 by Horizon Environmental Services under contract to the NYSDEC (Contract No. D006613). That remedial action is documented in *Camp Pharsalia Remedial Excavation, Final Remediation Report* (URS, February 2009). The fifth of those elements defines the purpose of this report.

4.0 GROUNDWATER MONITORING PROGRAM

The monitoring program shall commence after approval of this plan and shall be conducted annually. It may be ended once the NYSDEC determines that it has demonstrated the effectiveness of the remedial action (see Section 3.0). During the performance of this program, the chemical parameters for the program may be modified after the first or second monitoring event if the results do not exceed the comparison criteria.

4.1 SCOPE

The groundwater monitoring program will comprise the annual sampling of the 5 monitoring wells remaining on site: PMW-1 through PMW-4, and PMW-6. Monitoring well PMW-5 was abandoned during the site remediation.

The location of the six wells originally installed on site is shown on two figures contained in Appendix A:

- Figure 6B from the final Remedial Investigation Report (Shaw, February 6, 2003).
- The survey of the site perfomed by Joanne Darcy Crum, LS from the final Pre-Design Investigation Report for the Remedial Design (URS, December 2007).

Note that in the reports and figures developed by and for URS, the wells are referred to without the "P" prefix (i.e., PMW-1 is referred to as MW-1).

Also shown in that appendix is the Final Survey Record Drawings from the Final Remediation Report for the site (URS, February 2009). This drawing shows only the contours and grading of the site after remedial excavation and restoration, and does not show any monitoring wells. It is provided for context only.

4.2 MONITORING WELL DOCUMENTATION

The boring log and well construction diagram for PMW-6 is contained in Appendix B.

The construction data for monitoring wells PMW-1 through PMW-4 cannot be located. The information that is necessary for the performance of this *SMP* includes, at a minimum, the depth and diameter of the well casing. That, and any other necessary information, for those wells shall be gathered at the beginning of the first sampling event and shall be recorded for future reference on the blank well construction forms included in Appendix B.

Note that it shall be assumed, to meet the intent of sampling at the mid-point of the screened interval, that the screen of those wells is located over the bottom 10 feet of the well depth.

4.3 MONITORING WELL DEVELOPMENT

The monitoring wells shall be developed during the first sampling event at the site. The wells shall be developed by pumping and surging using a combination of surge block agitation and over-pumping until a minimum of five (5) well volumes has been removed and the turbidity reading is less than 50 nephelolometric turbidity units (<50 NTU) and pH, temperature, and specific conductivity readings have reached steady state. If it is determined that sediment has infiltrated and fouled the well screen of existing wells, they shall be rehabilitated following the same well development methods.

After each well volume is purged, a water quality meter shall be used to measure the turbidity, temperature, conductivity, and pH until the water is relatively sediment free and the parameters have reached a steady state. All data shall be recorded on Well Development Logs presented in the *FSP* in Appendix D.

4.4 WATER LEVEL GAUGING

Water levels in the monitoring wells shall be measured using an electronic water level indicator prior to purging and sampling. This data shall be used to determine required purge volumes prior to groundwater sampling and to determine direction of groundwater flow. A complete discussion of procedures is included in the *FSP* in Appendix D.

4.5 GROUNDWATER SAMPLE COLLECTION

Groundwater wells shall be purged prior to sampling in order to collect representative groundwater samples. Sampling shall commence immediately after purging or as soon as recharge has occurred. To the extent practicable, well locations shall be sampled in order of increasing groundwater contamination concentrations in order to minimize the potential for cross-contamination. A complete discussion of purging procedures is presented in the *FSP*.

All five monitoring wells shall be sampled during each monitoring event using low-flow purging and sampling techniques. The wells shall be purged using a suction lift pump (i.e., ISCO peristaltic pump, or equivalent) at a rate of less than one liter per minute (low-flow). Purging indicator parameters such as pH, conductivity, dissolved oxygen, oxygen/reduction potential, turbidity, and temperature are monitored continuously by the flow through cell. Purging shall require the removal of approximately one to three well volumes of standing water. Wells shall be purged until the indicator parameters measured during purging stabilize within the criteria described in the *FSP* in Appendix D. These parameters shall be recorded on purge logs presented in the *FSP*.

4.6 GROUNDWATER SAMPLE ANALYSIS

Following purging, groundwater samples shall be collected in appropriate laboratory grade containers. A complete discussion of sampling procedures is presented in the *FSP* in Appendix D. Samples shall be properly labeled and stored as outlined in *FSP*. The analytical program including chemical parameters, methods, and quality assurance/quality

control (QA/QC) samples is summarized in Table 4-1. Table 4-2 represents preservation requirements and holding times. A data usability assessment shall be performed on the laboratory data from each sampling event.

4.7 QA/QC REQUIREMENTS

The QA/QC requirements that shall be followed are in the *Quality Assurance Project Plan* (*QAPP*). A copy of the *QAPP* is provided as an attachment in Appendix E. The QA/QC protocol is intended to provide guidance to:

- Clearly define the level of QC required;
- Compile QC criteria required by the analytical methodology; and
- Clearly define the QA/QC requirements identified.

The QC elements are important in determining the precision and accuracy of the test results and to what extent the field samples are representative of the actual field conditions. The QA/QC samples that shall be obtained in the field and/or prepared by the laboratory are:

- Field duplicates – determined from the number of primary samples;
- Matrix spike/matrix spike duplicates/matrix duplicates – prepared by the laboratory;
- Method blanks – prepared by laboratory; and
- Sample cooler temperature blanks placed in the cooler to check sample temperatures upon receipt in the laboratory.

4.8 SAMPLE HANDLING AND RECORDKEEPING

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve

to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples. A complete discussion of Chain-of-custody procedures is in the *FSP* in Appendix D.

Samples shall be collected in appropriate laboratory containers as outlined in Table 4-2. The sample containers shall be properly wrapped in protective material (such as bubble wrap) and placed in laboratory provided coolers. The sample containers shall be shipped on ice following procedures outlined in the FSP. Sample containers shall be shipped to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory via overnight carrier on the same day they are collected following proper Chain-of-custody protocol. NYSDEC Analytical Services Protocol (ASP) Category B data deliverables shall be provided by the laboratory.

4.9 CONTINGENCY MONITORING

Contingency monitoring shall be implemented if a significant increase (i.e., an increase in concentration of greater than 3 standard deviations) in existing groundwater quality occurs over a period of two consecutive sampling events. Contingency monitoring shall consist of the following elements:

- Within 90 days of triggering the contingency monitoring measures, a minimum of one sample from the monitoring point in question, and from monitoring points immediately adjacent to that point, and downgradient shall be collected and analyzed for the parameters listed in Table 4-1.
- If results of contingency sampling and analysis confirm elevated contaminant concentrations in one or more of the wells sampled, the sampling frequency for all affected wells shall be increased to once every quarter (i.e., once every three months).
- If the results of contingency sampling confirm the concentrations of parameters are at or below site specific guidance values for two consecutive sampling events, the NYSDEC shall be notified of this finding and, if approved by the department, monitoring shall return to an annual basis.

If results indicate a persistent decrease in water quality (e.g., increased contaminant concentrations as demonstrated by four consecutive quarterly sampling events), a contingency plan shall be developed in coordination with the NYSDEC, which may include the following:

- An assessment of possible remedial measures shall be initiated within 90 days unless it can be demonstrated that a source other than the site caused the contamination, or that the significant increase resulted from error in sampling, analysis, or natural variation in groundwater quality. A report of these findings shall be submitted for approval to the department. If it can be successfully demonstrated that the site is not the source of the contamination, then monitoring may return to an annual basis if the parameters are at or below existing water quality (i.e., no significant increases in contaminant concentrations). If the site is determined to be the source of the contamination, then corrective measures shall be implemented if necessary.
- If a significant increase in contamination is found, at least one additional monitoring well shall be installed (as appropriate) at the site boundary in the direction of contaminant migration, and sampled for parameters outlined in Table 4-2.
- If it is determined by the sampling of the additional well(s) that contaminants have migrated off-site, then all persons who own land or reside on the land that is directly over any part of the plume of contamination shall be notified.

4.10 DATA EVALUATION AND REPORTING

Following each sampling event and after receipt of the NYSDEC ASP Category B analytical data package, an appropriately trained chemist shall independently validate the analytical data packages in accordance with the applicable USEPA Region II Data Validation Guidelines. Upon completion of the data validation, a NYSDEC Data Usability Summary Report (DUSR) shall be generated, which identifies any QC non-conformances and discusses how they impact the usability of the data.

An annual report shall be prepared for the NYSDEC that provides the following information:

1. Site name and address;
2. Consultant performing the sampling;
3. Regulatory Agency involved;
4. Summary of activities completed, which shall include a description of field procedures performed in accordance with this plan, a description of any discrepancies relative to this plan, a summary of field measurements, a description and summary table of water level data, and a groundwater elevation contour map;
5. Summary table of the analytical results;
6. Discussion of the QA/QC results and implications;
7. Discussion of significant observations or problems encountered;
8. Comments, conclusions and recommendations based on an evaluation of the analytical results;
9. Summary of site maintenance activities (see Section 5.0); and
10. List of Attachments/Appendices (tables, figures, completed field forms, analytical data packages, etc.).

Annual reports shall be submitted within 90 days of the final sampling event. Four copies of all reports shall be submitted to the NYSDEC. All reports shall be bound reports or an equivalent acceptable electronic format.

TABLE 4-1
SUMMARY OF SAMPLES AND ANALYTICAL PROCEDURES

Parameter	Method Number / Reference[1]	Field QA/QC Samples		
		MS/MSD/MD*	Field Duplicate	Trip Blanks
TCL Semivolatile Organic Compounds (SVOCs)	8270C	1/1/0	1	NA
Dioxin/Furans	8290A	1/1/0	1	NA
TAL Metals	6010B/7470A	1/0/1	1	NA

NOTES:
1 - NYSDEC Analytical Services Protocol (ASP), June 2000 Edition
-- - Not Applicable
MS/MSD/MD – Matrix spike/matrix spike duplicate/matrix duplicate
* - Laboratory Batch QC shall be requested
QA/QC – Quality Assurance/Quality Control
TCL – Target Compound List
TAL – Target Analyte List
NA – Not applicable

TABLE 4-2
ANALYTICAL METHODS, SAMPLE CONTAINER AND PERSEVERATION REQUIREMENTS, AND ANALYTICAL HOLDING TIMES

Matrix/Parameter	Method Number / Reference[1]	Container	Recommended Sample Volume	Preservation	Holding Time*
TCL Semivolatile Organic Compounds (SVOCs)	8270C	Glass	2x1 L Amber	Cool 4°C	5 days for extraction, 40 days for analysis
Dioxin/Furans	8290A	Glass	2x1 L Amber	Cool 4°C	10 days for extraction, 40 days for analysis
TAL Metals	6010B/7470A	High Density Polyethylene (HDPE)	1x500 mL	HNO_3 to pH < 2	6 months, except mercury – 26 days

NOTES:
1 - NYSDEC Analytical Services Protocol (ASP), June 200 Edition
* - All holding times are from validated time of sample receipt (VTSR) at the laboratory unless otherwise noted.
TCL – Target Compound List
TAL – Target Analyte List

5.0 SITE MAINTENANCE PROGRAM

This section describes the inspection and maintenance procedures for the remediated site. The inspections and any site maintenance activities shall be documented on an inspection form (see Appendix C). The completed inspection form(s) shall be included in the annual report.

5.1 ROUTINE INSPECTIONS

The only components of the remedial action that require inspection are the monitoring wells installed during the RI/FS. The wells shall be inspected annually, immediately prior to the groundwater sampling.

The wells shall be checked for the following items:

- Signs of damage to the casing or collar;
- Condition of well label;
- Degraded condition of the lock and cover;
- Degraded condition of the weep hole from casing
- Vegetation overgrowth; and
- Evidence of tampering.

5.2 MAINTENANCE ACTIVITIES

Problems or deficiencies identified during the routine site inspections shall be corrected as soon as practical. The information in this section addresses only the basic maintenance procedures necessary to repair the problem. All maintenance activities shall be documented on the site inspection form.

All work shall be performed to the same standards and quality as outlined in the original construction specifications, unless otherwise deemed necessary for successful maintenance. The cause of the problem shall be identified and addressed in the maintenance corrective action. The corrective action shall be appropriate and intended to minimize the likelihood that the problem shall reoccur. Elimination of the cause may require a greater amount of work than simply repairing the problem area with the specified routine maintenance procedure.

5.2.1 Routine Maintenance

Monitoring Well Maintenance shall be performed as needed during each site inspection or groundwater monitoring event. The routine maintenance activities for the monitoring wells includes: maintaining access to the wells; controlling vegetation (i.e. weeding without use of herbicides or pesticides) surrounding wells; and replacing damaged or missing well caps or locks.

5.2.2 Intermittent Maintenance

The maintenance activities that are anticipated to be needed occasionally are described in this section. These activities shall be performed on an as-needed basis when indicated by the results of the routine site inspections. When possible, these intermittent activities shall be performed during the site inspection. However, in some cases it may be necessary to schedule a separate site visit to conduct these intermittent maintenance activities. If a separate site visit is needed to complete the maintenance activity, the NYSDEC Project Manager shall be apprised of the need before returning to the site to affect the repairs.

5.2.3 Contingency Maintenance

Shall any problem occur that is not addressed in the previous sections, contingency maintenance measures shall be implemented by following these guidelines:

1. Within 48 hours of detection, notify the NYSDEC Project Manager of the nature of the problem.
2. Perform temporary corrective measures as soon after detection as possible to keep the problem from worsening.
3. Within 7 days of detection, prepare and distribute a Corrective Action Plan that addresses the following:

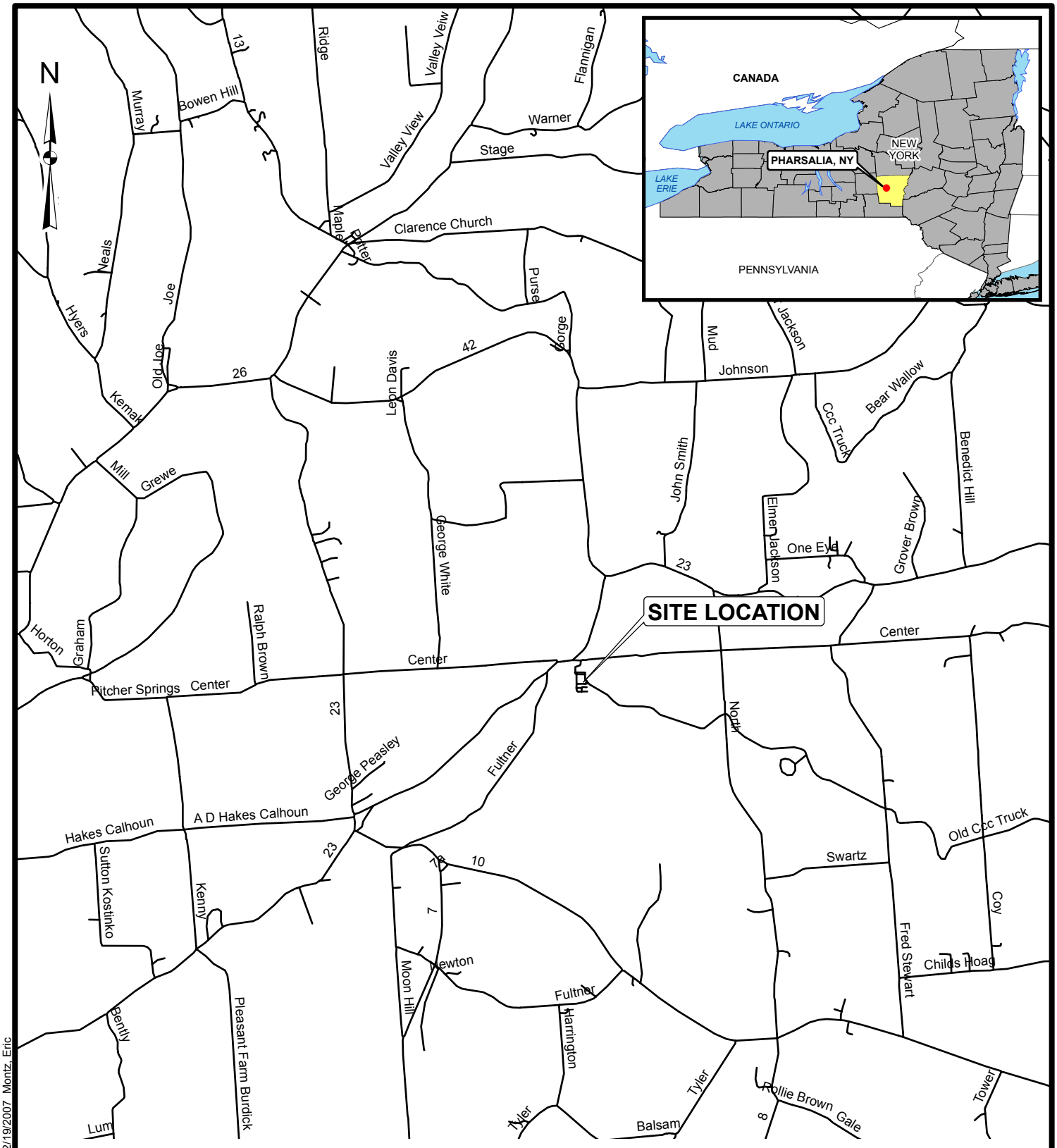
    - The nature and extent of the problem;
    - The apparent cause of the problem;
    - Temporary corrective measures taken;
    - Recommended corrective action;
    - Recommended schedule of implementation; and
    - Recommended monitoring schedule for repaired area.

The Corrective Action Plan shall be submitted to the NYSDEC Project Manager and other parties identified by the NYSDEC Project Manager. Within an additional 7 days, all appropriate parties shall agree upon the Corrective Action Plan and its schedule of implementation. The contingency action shall be monitored and reported in accordance with the requirements of the approved Corrective Action Plan.

6.0 SCHEDULE

The first round of groundwater sampling shall be conducted after acceptance of this *SMP*. Groundwater sampling and analysis shall continue annually, until the NYSDEC determines that it has demonstrated the effectiveness of the remedial action (see Section 3.0).

Routine site inspection and maintenance activities shall begin after acceptance of this *SMP*, and shall be performed for the duration of the groundwater sampling program.



SOURCE: ArcGIS Street Maps

0 5,500 11,000 Feet

J:\11174439.00000\DBGIS\Site Location.mxd 12/19/2007 Montz, Eric

URS

CAMP PHARSALIA, NY
SITE LOCATION MAP

FIGURE 1

APPENDIX A
WELL LOCATION DRAWING

WELL ID	TOC
PMW-1	994.91
PMW-2	987.27
PMW-3	985.44
PMW-4	990.58
PMW-5	990.27
PMW-6A	987.50

PMW-6A 984.90

PMW-2 982.67

PMW-3 979.70

PMW-5 985.21

PMW-4 985.46

PMW-1 991.69

DRV PIPE

TREATMENT BUILDING

FIREWOOD PILES

FIREWOOD PILES AND MISC WOOD DEBRIS

15" PIPE

18" PIPE

SB 1 SB 2 SB 3 SB 4 SB 5 SB 6 SB 7 SB 8 SB 9 SB 10 SB 11 SB 12 SB 13

PB-1 PB-2 PB-3 PB-4 PB-5 PB-6 PB-7 PB-8 PB-9

SS 1 SS 2 SS 3 SS 4 SS 5 SS 6 SS 7 SS 8 SS 9

PSS-1 PSS-2 PSS-3 PSS-4 PSS-5 PSS-6 PSS-7 PSS-8 PSS-9 PSS-10 PSS-11 PSS-12 PSS-13 PSS-14 PSS-15 PSS-16 PSS-17 PSS-18 PSS-19 PSS-20 PSS-21 PSS-22 PSS-23 PSS-24 PSS-25 PSS-26 PSS-27 PSS-28 PSS-29 PSS-30 PSS-31 PSS-32 PSS-33

PTP-1 PTP-2 PTP-3 PTP-4 PTP-5 PTP-6 PTP-7 PTP-8 PTP-9

982 984 986 988 990 995 1000

REFERENCE:

BASED ON MAP PREPARED BY MODI ENGINEERS AND LAND SURVEYORS.

LEGEND

- MONITORING WELL
- SOIL BORING
- SURFACE SOIL SAMPLE
- HISTORIC SURFACE SOIL SAMPLE
- HISTORIC SEDIMENT SAMPLE
- HISTORIC TEST PIT
- HISTORIC SOIL BORING
- GROUNDWATER CONTOUR LINE
- 991.69 GROUNDWATER ELEVATION

APPROXIMATE SCALE

0 25 50 FEET

Shaw E&I, Inc.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

FIGURE 6B

GROUNDWATER CONTOUR MAP 11/02

CAMP PHARSALIA

PHARSALIA

CHENANGO COUNTY, NEW YORK

DRAWING NUMBER	830271B17
APPROVED BY	
CHECKED BY	
DRAWN BY	SSH/DMC 11-21-02
OFFICE	ALBANY, NY

L:\project\830271\Pharsalia R\830271B17.dwg
Plot Date/Time: 12/16/02 01:34pm Image: .
Format Revised: 12/15/99 Xref: .

NORTH

HORIZONTAL DATUM: NAD83/96
N.Y.S. PLANE COORDINATE
SYSTEM , CENTRAL ZONE

VERTICAL DATUM:
NAVD88/GEOID03

125
anchor bolt in water tower

116
MW–2
EL = 1833.31

127
MW–6
EL = 1829.15

CURRENT ELEVATIONS FOR MW'S ARE TOP OF CASING NOT RISERS

124
top bolt in hydrant

115
MW–3
EL = 1832.63

112
TT – 2
EL = 1832.94

114
TT – 1
EL = 1833.90

110
TT – 3
EL = 1831.76

109
TT – 3
EL = 1832.69

98
Control
EL = 1834.54

TREATMENT PLANT

111
TT – 2
EL = 1833.25

128
MW–5
EL = 1837.02

113
TT – 1
EL = 1833.79

118
MW–1
EL = 1839.55

117
MW–4
EL = 1836.89

tie saw mill

WOOD PILE

99
Control
EL = 1844.82

POLE BARN

100
Tack with flagging

25′ 0′ 25′ 50′ 75′

Scale 1″ = 25′

LEGEND

⊙	Monitoring well	◆	Fire Hyrant
△	Survey Control Point	———	Test Trench

A TEST TRENCH LOCATION SURVEY FOR

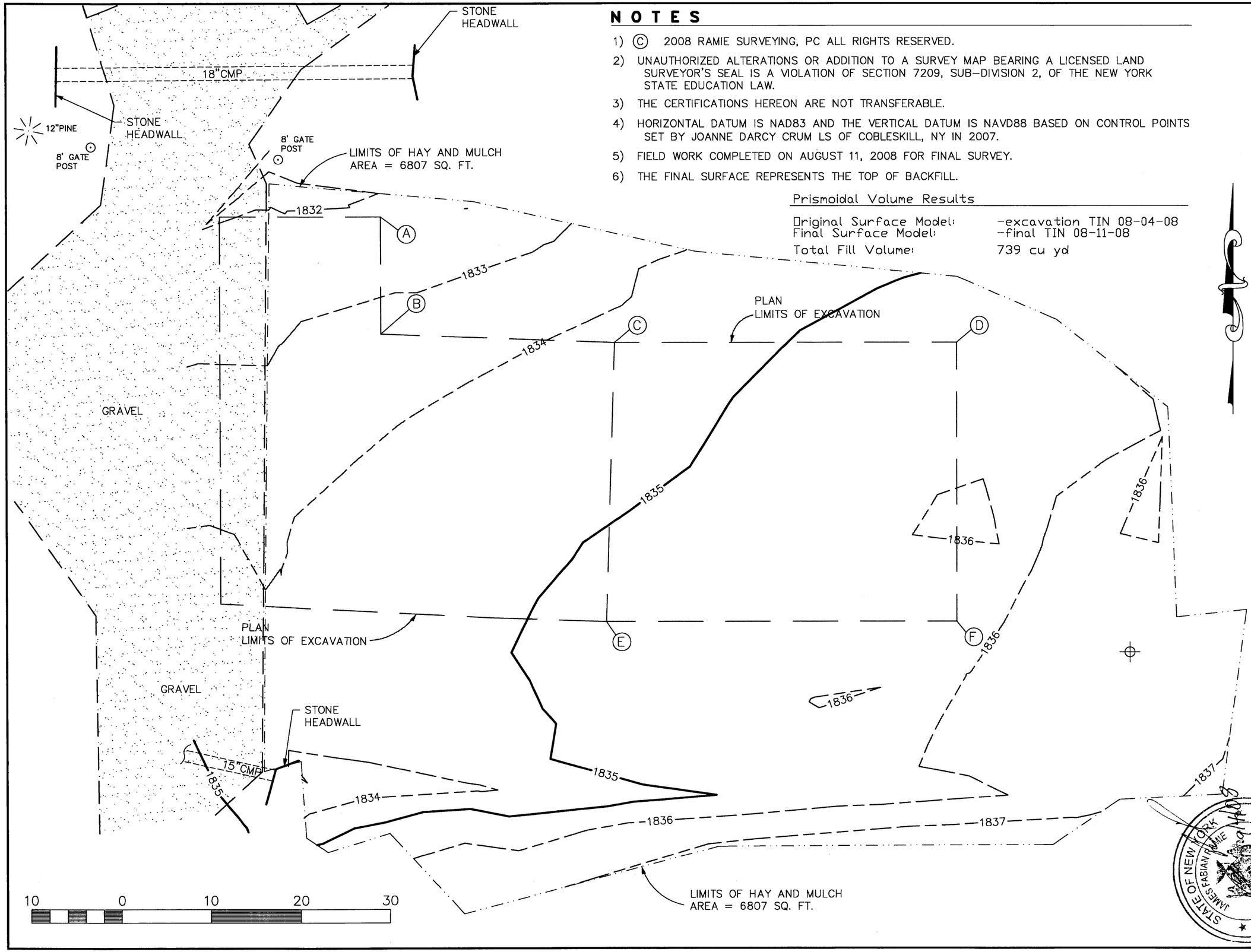
URS CORPORATION–NEW YORK
URS PROJECT No. D004440–1

CAMP PHARSALIA

COUNTY OF CHENANGO STATE OF NEW YORK
SCALE 1" = 25.00′ 24 JULY 2007

JOANNE DARCY CRUM, L.S. 49673
COBLESKILL, NEW YORK 12043

MAP A/34/07



NOTES

1) © 2008 RAMIE SURVEYING, PC ALL RIGHTS RESERVED.
2) UNAUTHORIZED ALTERATIONS OR ADDITION TO A SURVEY MAP BEARING A LICENSED LAND SURVEYOR'S SEAL IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2, OF THE NEW YORK STATE EDUCATION LAW.
3) THE CERTIFICATIONS HEREON ARE NOT TRANSFERABLE.
4) HORIZONTAL DATUM IS NAD83 AND THE VERTICAL DATUM IS NAVD88 BASED ON CONTROL POINTS SET BY JOANNE DARCY CRUM LS OF COBLESKILL, NY IN 2007.
5) FIELD WORK COMPLETED ON AUGUST 11, 2008 FOR FINAL SURVEY.
6) THE FINAL SURFACE REPRESENTS THE TOP OF BACKFILL.

Prismoidal Volume Results

Original Surface Model:	-excavation TIN 08-04-08
Final Surface Model:	-final TIN 08-11-08
Total Fill Volume:	739 cu yd

STATE OF NEW YORK JAMES FABIAN RAMIE 050371 LICENSED LAND SURVEYOR

RAMIE SURVEYING, P.C.
6437 COLLAMER ROAD
EAST SYRACUSE, NEW YORK 13057
PH: 315 458-8980 FAX: 315 458-8978

R/S

TOWN OF PHARSALIA
CHENANGO COUNTY
STATE OF NEW YORK

FINAL SURVEY
OF
CAMP PHARSALIA SITE NO. 7-09-013
FOR
HORIZON ENVIRONMENTAL SERVICES

SCALE 1"=10'	DESIGNED BY JPR		
	DRAWN BY JPR		
	FILE NO. 08019PAR		
DATE 09-03-08	SHEET 1	OF 1	
JOB NO. 08.19			

APPENDIX B

WELL CONSTRUCTION SHEETS

(To Be Filled-in with Well Construction Data During the First Sampling Event)

INTERNATIONAL TECHNOLOGY CORPORATION

Drilling Log

Monitoring Well PMW-6

Project Camp Pharsalia | Owner New York State Dept. of Environmental Cons.

Location Chenango county, New York | Proj. No. 830271

Surface Elev. NA | Total Hole Depth 16.0 ft. | North | East

Top of Casing NA | Water Level Initial NA | Static ▼ 7.5 ft. | Diameter 4.25 in.

Screen: Dia 2 in. | Length 10.5 ft. | Type/Size PVC/0.010 in.

Casing: Dia 2 in. | Length 5.5 ft. | Type PVC

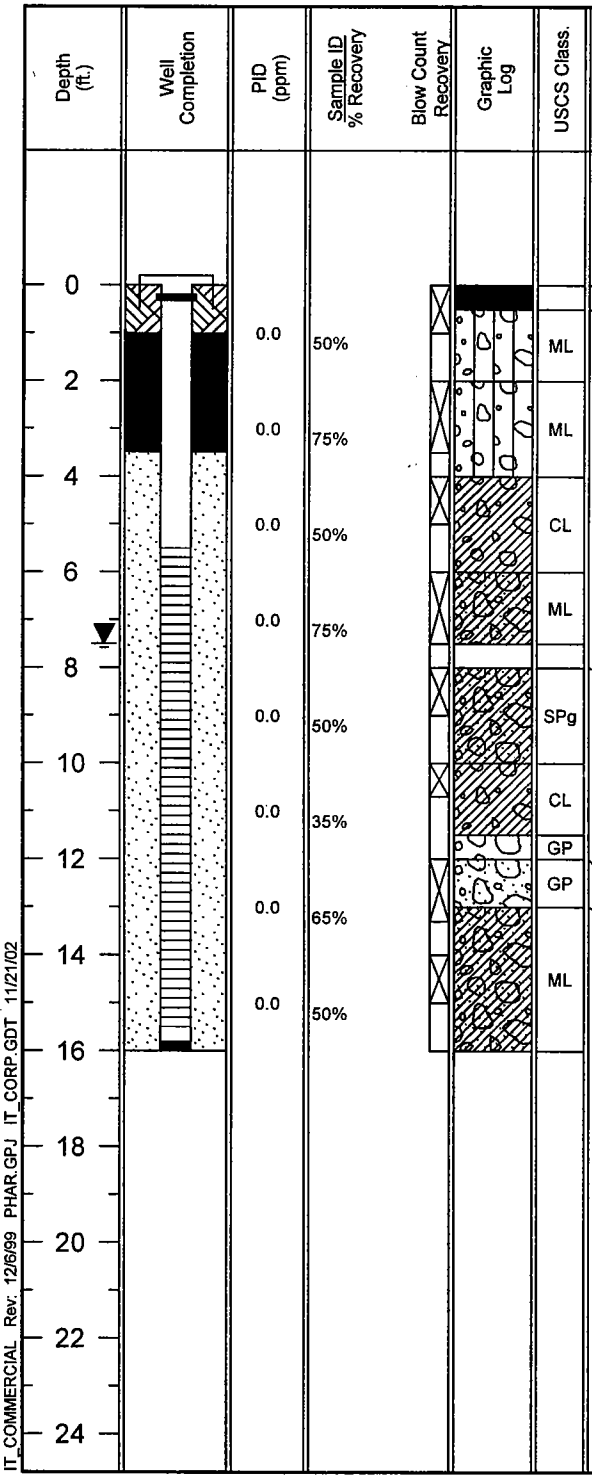
Fill Material OO Morie sand, bentonite, grout. | Rig/Core

Drill Co. Parratt Wolff | Method Hollow Stem Auger

Driller | Log By J. LaRock | Date 10/16/02 | Permit # NA

Checked By | License No.

COMMENTS



Description

(Color, Texture, Structure)

Geologic descriptions are based on ASTM Standard D 2487-93 and the USCS.

0-0.5' Asphalt.

0.5-2.0' Gray-brown, silt and subangular pepples, trace fine grain, sand, dry.

2.0-4.0' Gray-brown, silt and subangular pepples, trace fine grain, sand, dry.

4.0-6.0' Reddish brown - brown silt and clay, some subrounded pepples, inversely grades with depth to brown, fine grain, sand, little subangular cobble, moist.

6.0-7.5' Tan till; tan, coarse grain sand and silt, some subangular pepples, wet.

7.5-8.0' No recovery.

8.0-10.0' Brown Till; Brown coarse to fine grain sands and silt, some subangular pepples; dense, dry.

10.0-11.5' High plasticity clay and silt, some subrounded pepples, dry.

11.5-12.0' Subrounded gravels and subangular rock fragments, trace fine grain, sand, moist.

12.0-13.0' Brown, coarse to fine grain sands and silt, wet.

13.0-16.0' Brown, high density till; Brown clay and silt, little coarse grain sand, little subrounded pepples, dry.

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

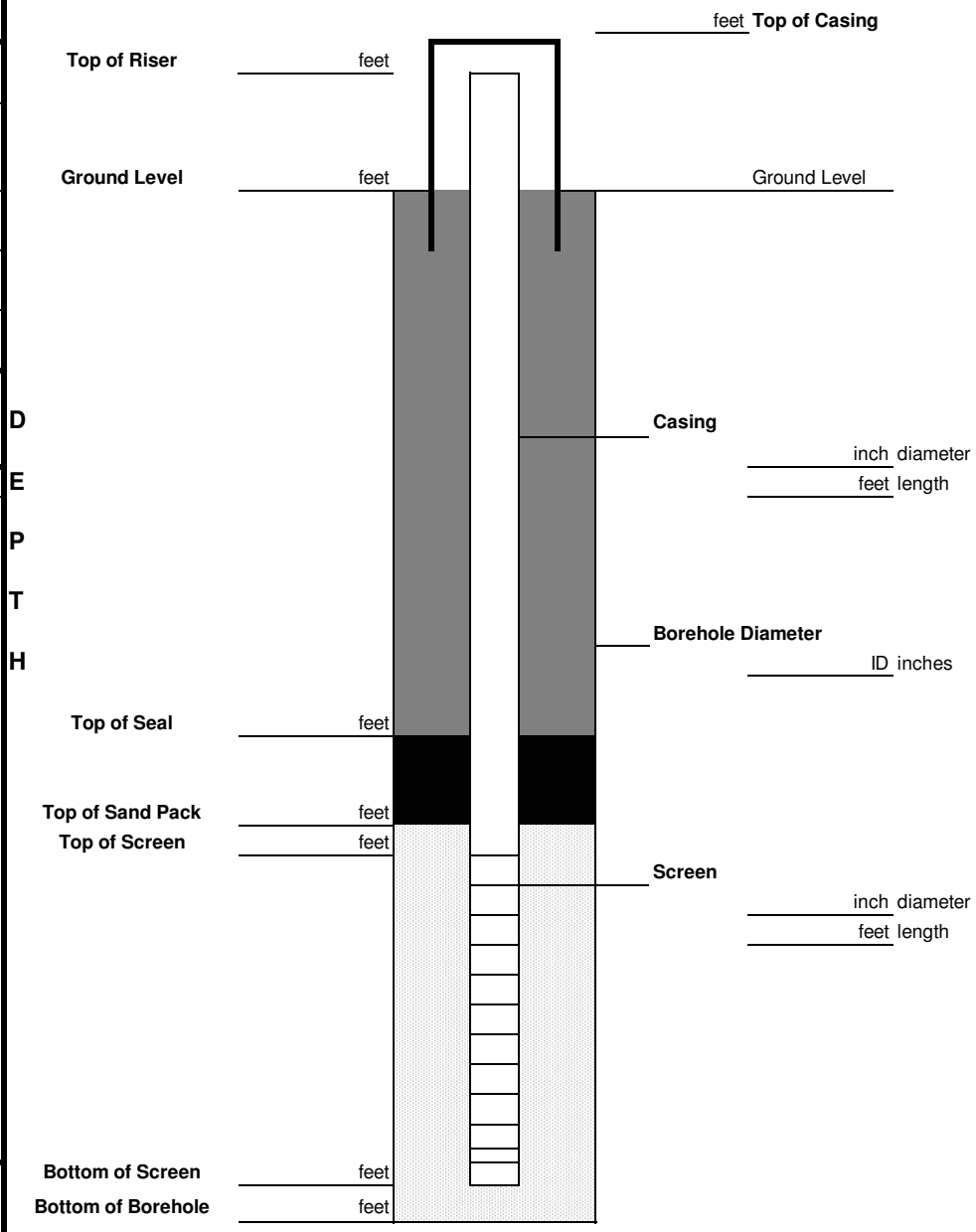
Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface:	**Type:**	**Type:** **Setting:**
Monitor:	**Slot Size:** 0.020"	**SEAL MATERIAL** **Type 1:** **Setting:** **Type 1:** **Setting:**

COMMENTS:

LEGEND

- Cement Grout
- Bentonite Seal
- Sand Pack

Client:	Location:	Project No.:
	MONITORING WELL CONSTRUCTION DETAILS	**Well Number:**

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

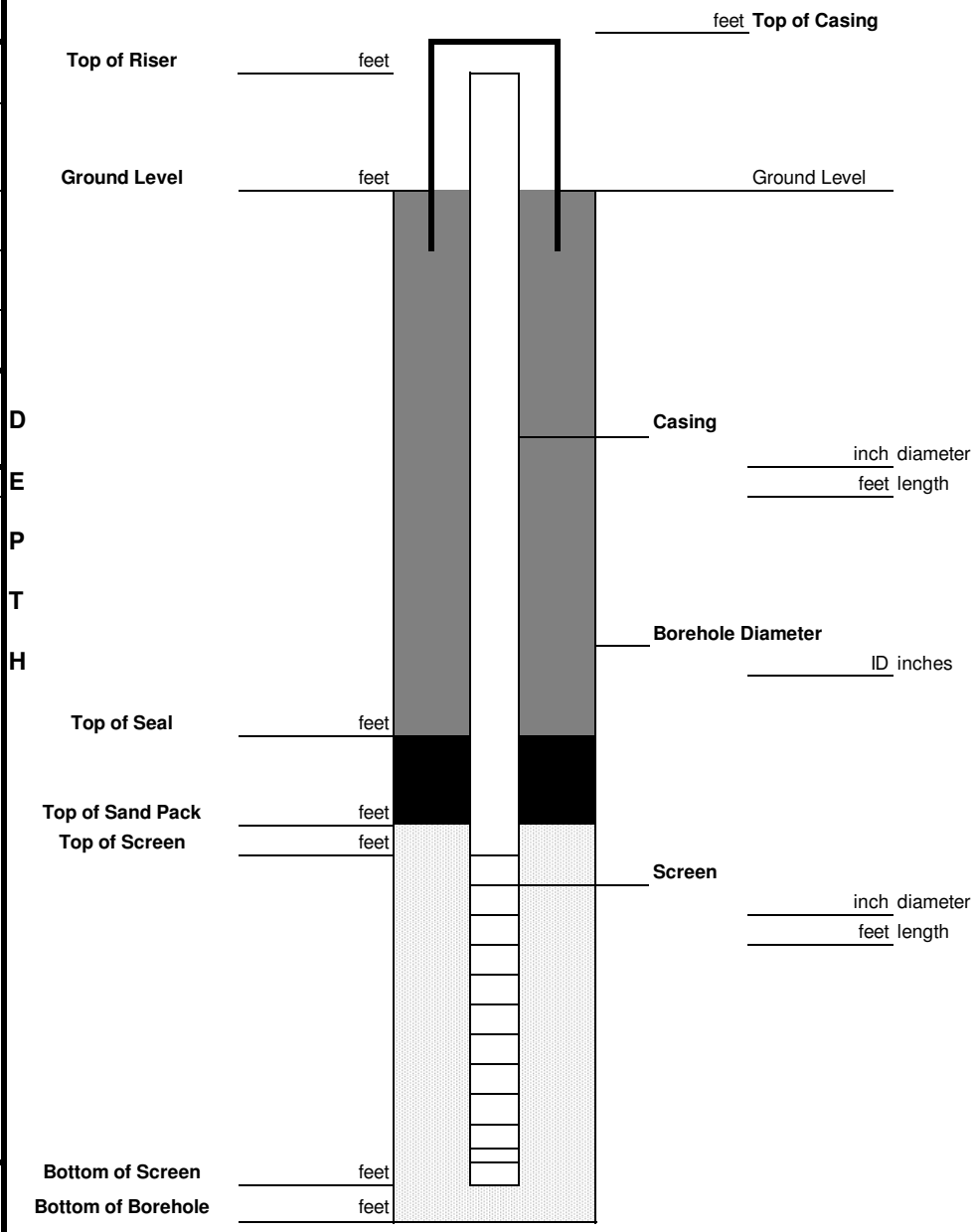
Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface:	**Type:**	**Type:** **Setting:**
Monitor:	**Slot Size:** 0.020"	**SEAL MATERIAL** **Type 1:** **Setting:** **Type 1:** **Setting:**

COMMENTS:

LEGEND

- Cement Grout
- Bentonite Seal
- Sand Pack

Client:	Location:	Project No.:
	MONITORING WELL CONSTRUCTION DETAILS	**Well Number:**

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

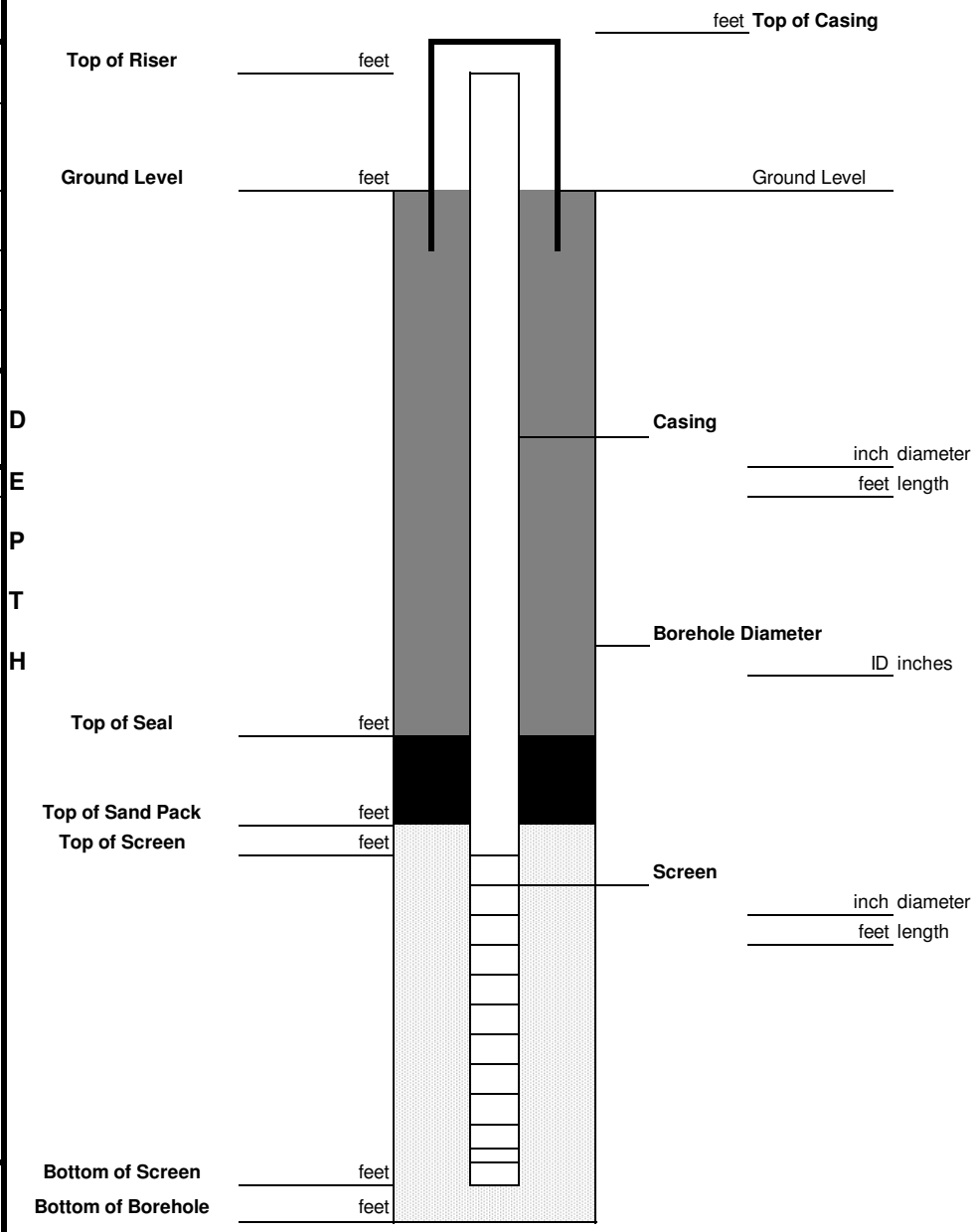
Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface:	**Type:**	**Type:** **Setting:**
Monitor:	**Slot Size:** 0.020"	**SEAL MATERIAL** **Type 1:** **Setting:** **Type 1:** **Setting:**

COMMENTS:

LEGEND

- Cement Grout
- Bentonite Seal
- Sand Pack

Client:	Location:	Project No.:
	MONITORING WELL CONSTRUCTION DETAILS	**Well Number:**

DRILLING SUMMARY

Geologist:

Contractor:

Operator:

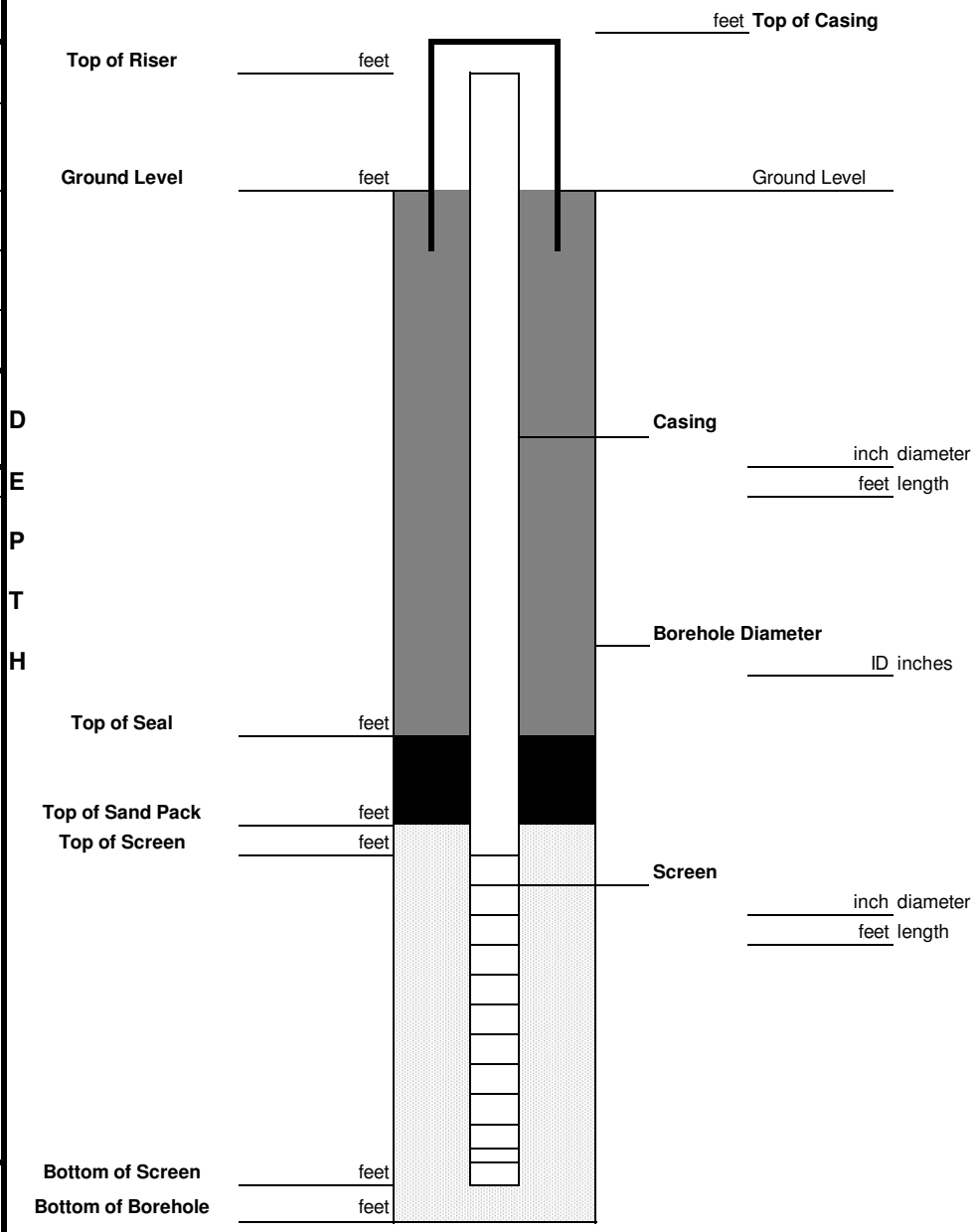
Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL	SCREEN MATERIAL	FILTER MATERIAL
Surface:	**Type:**	**Type:** **Setting:**
Monitor:	**Slot Size:** 0.020"	**SEAL MATERIAL** **Type 1:** **Setting:** **Type 1:** **Setting:**

COMMENTS:

LEGEND

- Cement Grout
- Bentonite Seal
- Sand Pack

Client:	Location:	Project No.:
	MONITORING WELL CONSTRUCTION DETAILS	**Well Number:**

APPENDIX C
SITE INSPECTION FORM

CAMP PHARSALIA SITE
NYSDEC SITE NO. 7-09-013

SITE INSPECTION LOG SHEET

Date:		**Inspector:**	
Weather:		**Signature:**	
Temperature:		**Company:**	
Season (circle one):	Winter	Spring	Summer Fall

WELL INSPECTION LOG SHEET

Well ID:		**Time:**	
Date:		**Inspector:**	
Weather:		**Signature:**	
Temperature:		**Company:**	
Season (circle one):	Winter	Spring	Summer Fall

Area	Item Inspected	Comments (attach additional sheet if needed)	Additional Maintenance Needed?	Inspector's Initials
Well Exterior	Casing and collar		Yes / No	
	Well label		Yes / No	
	Lock and Cover		Yes / No	
	Weep hole		Yes / No	
	Vegetation		Yes / No	
	Tampering		Yes / No	
	Other		Yes / No	
Well Interior	Well cap		Yes / No	
	Well riser		Yes / No	
	Annular space		Yes / No	
	Sediment accumulation		Yes / No	
	Other		Yes / No	

APPENDIX D
FIELD SAMPLING PLAN

FIELD SAMPLING PLAN

for the

CAMP PHARSALIA
SITE MANAGEMENT PLAN

Prepared For

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION

Prepared By

URS CORPORATION
77 GOODELL ST.
BUFFALO, NEW YORK 14203

FINAL

MARCH 2008
Rev. March 2009

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FIELD SAMPLING PLAN

APPENDICES

1.0 INTRODUCTION

This Field Sampling Plan (FSP) is designed to provide detailed step-by-step procedures for the field activities outlined in the Site Management Plan (SMP) for the Camp Pharsalia site. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with the Quality Assurance/Quality Control measures outlined in the Quality Assurance Project Plan (QAPP), which also is attached to the SMP.

2.0 GROUNDWATER MONITORING

2.1 GENERAL PROGRAM

The groundwater monitoring program will be performed as the principal component of the Site Management Plan (SMP). The parameters, sampling locations, and sampling frequency are described in the text of the SMP.

2.2 GROUNDWATER MONITORING

Summary: To collect representative groundwater samples, groundwater wells must be adequately purged prior to sampling. Purging will require the removal of three to five volumes of standing water in rapidly recharging wells and at least one volume from wells with slow recharge rates. Shallow wells in which the screen intersects the water table should require a minimum amount of purging since the groundwater would flow through the screen and not be entrapped in the casing. Deeper wells should be purged more thoroughly since they may be located in confined aquifers and water may rise up into the casing. A thorough purging would require the removal of several volumes of this trapped water to ensure that representative groundwater is brought into the well for sampling. Sampling should commence immediately after purging as soon as adequate recharge has occurred.

2.2.1 Standard Monitoring Well Purging Procedure

Procedure:

1. The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using PID. If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.

2. Using an electronic water level detector, the water level below top of casing will be measured. Knowing the total depth of the well, it will be possible to determine the volume of water in the well. The end of the probe will be soap-and-water-washed and deionized-water-rinsed between wells.

3. Calibrate field instruments (e.g., pH, specific conductance, PID, turbidity).

4. Purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity). New dedicated equipment will be used for each well.

5. Purge well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity - 3% full scale range; pH - 0.10 pH unit; temperature - 0.2°C, and turbidity <50 NTU.

6. Purging of three well volumes is not necessary if the indicator parameters are stable. However, at least one (1) well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.

7. Indicator parameters of pH, conductivity, dissolved oxygen, oxygen/reduction potential, turbidity, and temperature must be measured continuously using the flow cell.

8. Well purging data are to be recorded in the field notebook and on the Well Purge Log (Attachment A).

9. Dispose of sampling equipment as per Section 11.0.

2.2.2 Low Flow Sampling Procedures

Summary: To collect representative groundwater samples, monitoring wells must be adequately purged prior to sampling. Low volume sampling equipment and procedures will be used to purge the wells and retrieve groundwater samples. Purging will require the removal of one to three volumes of standing water by pumping at a rate of less than one (1) liter per minute. Drawdown must not exceed ten percent of the standing water column. Sampling should commence immediately after purging.

Procedure: Monitoring well purging will be completed using the low-flow purging technique as follows:

1) The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using PID. If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.

2) Using an electronic interface probe/water level detector, the water level below top of casing will be measured. The depth of the well will be measured to determine the volume of water in the well. The bottom of the well will also be checked for DNAPL using the interface probe/water level indicator. The end of the probe will be decontaminated between wells**.**

3) Calibrate field instruments (e.g., pH, specific conductance, PID, turbidity).

4) Purge the required water volume (i.e., until stabilization of pH, temperature, specific conductivity, and turbidity) using a low-flow pump (e.g., Solinst or Geopump) and dedicated HDPE tubing. New dedicated tubing will be used for each well.

5) Purge the well until the water quality parameters have stabilized. The stabilization criteria are: specific conductivity - 3% full-scale range; pH - 0.10 pH unit; dissolved oxygen – 10%, Turbidity – 10% and oxidation/reduction (redox) potential - +/- 10 units.

6) Purging of three well volumes is not necessary if the indicator parameters are stable. However, at least one (1) well volume must be purged before sampling can begin. During purging, it is permissible to by-pass the flow cell until the groundwater has cleared.

7) Indicator parameters of pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, turbidity, and temperature must be measured continuously using the flow cell.

8) Well purging data are to be recorded in the field notebook and on the Low Flow Purge Log (Attachment A).

2.2.3 Sample Collection Procedures

Procedure:

1. After well purging is completed, a sample will be collected into the appropriate containers.
2. Direct water flow toward the inside wall of the sample container to minimize volatilization. Fill volatile sample containers so no headspace (air bubbles) is present. If containers are pre-preserved, do not overfill sample containers. Note if effervescence is observed.
3. All sample bottles will be labeled in the field using a waterproof permanent marker (Section 8.0).
4. Samples will be collected into sample bottles (Table 3-2) (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. A chain-of-custody record will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free prior to shipping.
5. Remove pump and disconnect valves and tubing, as necessary. If a submersible pump was used, it must be decontaminated prior to and between each use. Clean pump by flushing 10 gallons of potable water through the pump. Rinse with deionized water after flushing the pump.
6. Well sampling data are to be recorded in the field notebook and on the Well Purging Log (Attachment A).

Reference: ASTM *Standard Practice for Design and Installation of Groundwater Monitoring Wells in Aquifers* D5092-04.

2.3 WATER LEVEL MONITORING PROCEDURES

Summary: Determination of groundwater depths in monitoring wells is necessary to calculate required purge volumes prior to groundwater sampling. Determination of groundwater depths in piezometers is necessary to determine the direction of groundwater flow.

Water levels in monitoring wells scheduled to be sampled during the field work will be measured using an electronic water level indicator. Initially, measurements will be taken following well

development until the well has recovered to anticipated static conditions. Water levels will also be measured in the piezometers as specified in the Project Management Work Plan. Water level measurement procedures are presented below.

Procedure:

1. Clean the water level probe and the lower portion of cable following standard decontamination procedures (Section 7.0) and test water level meter to ensure that the batteries are charged.
2. Lower the probe slowly into the monitoring well until the audible alarm indicates water.
3. Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference.
4. Repeat the measurement for confirmation and record the water level.
5. Remove the probe from the well slowly, drying the cable and probe with a clean "Chem Wipe" or paper towel.
6. Replace the well cap and lock protective cap in place.
7. Decontaminate the water level meter (Section 7.0) if additional measurements are to be taken.

Reference: ASTM *Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)* D4750-87(2001)

2.3.1 Field Documentation

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, purge forms and notebooks used during field activities will be submitted to the NYSDEC as part of the final report.

The field sampling team will maintain sampling records that include the following data:

1. Sample Identification

2. Date and time of sample collection
3. Identity of samplers
4. Sampling methods and devices
5. Purge volumes
6. Chain of Custody and shipping information

3.0 FIELD DOCUMENTATION

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, purge forms and notebooks used during field activities will be submitted as part of the final report.

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

1. Sample Identification
2. Date and time of sample collection
3. Sampling depth
4. Identity of samplers
5. Sampling methods and devices
6. Purge volumes (groundwater)
7. Groundwater purge parameters
8. Chain of custody and shipping information

4.0 SAMPLING EQUIPMENT CLEANING PROCEDURES

Summary: To assure that no outside contamination will be introduced into the samples/data, thereby invalidating the samples/data, the following cleaning protocols will apply for all non-dedicated equipment used to collect samples/data during the field investigations.

Procedure:

1. Thoroughly clean equipment with laboratory-grade soap and water, until all visible contamination is gone.
2. Rinse with water, until all visible evidence of soap is removed.
3. Rinse several times with deionized water.
4. Air dry before using.
5. If equipment will not be used immediately, wrap in aluminum foil.

5.0 SAMPLE LABELING

Summary: In order to prevent misidentification and to aid in the handling of environmental samples collected during the field investigation, the following procedures will be used:

Groundwater Sample Procedure:

1) Affixed to each sample container will be a non-removable (when wet) label. Apply label and wrap with 2-inch cellophane tape to cover the label. The following information will be written on each label with permanent marker:

- Site name
- Sample identification
- Project number
- Date/time
- Sampler's initials
- Sample preservation
- Analysis required

2) Each sample of each matrix will be assigned a unique identification alpha-numeric code. An example of this code and a description of its components are presented below:

Examples

1. MW-1
   MW-1 = Monitoring Well 1

List of Abbreviations

Monitor Type

MW = Monitoring Well

Sample Type

GW	=	Groundwater
AB	=	Ambient Blank
TB	=	Trip Blank
RB	=	Rinse Blank
FD	=	Field Duplicate
MS	=	Matrix Spike
MSD	=	Matrix Spike Duplicate

Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the date of collection, the letters FD (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example, the first field duplicate collected on January 22, 2008 would be assigned the following sample number using the code shown below:

YYYYMMDD-FD-1 = 20080122-FD-1

Subsequent duplicates collected on the same day would be assigned FD-2, FD-3 etc.

6.0 SAMPLE SHIPPING

Summary: Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this Remedial Design follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

1. The chain-of-custody (COC) record (Appendix A) should be completely filled out, with all relevant information.
2. The original COC goes with the samples. It should be placed in a Ziplock bag and taped inside the sample cooler. The sampler should retain a copy of the COC.
3. Place inert cushioning material such as vermiculite or bubble-wrap in the bottom of the cooler.
4. Place the bottles in the cooler in such a way that they do not touch (use cardboard dividers or bubble-wrap).
5. Pack the cooler with ice in doubled Ziplock plastic bags.
6. Pack the cooler with cushioning material.
7. Tape the drain shut.
8. Wrap the cooler completely with strapping tape at two locations securing the lid. Do not cover any labels.

9. Place the lab address on top of cooler. For out-of-town laboratory, add the following: Put "This side up" labels on all four sides and "Fragile" labels on at least two sides. Affix numbered custody seals on front right and left of cooler. Cover seals with wide, clear tape.

10. Ship samples via overnight carrier the same day that they are collected. Samples must be maintained at 4 degrees Celsius (C) ± 2ºC throughout the shipping duration.

ATTACHMENT A TO FSP

FIELD ACTIVITY FORMS

WELL DEVELOPMENT LOG

URS Corporation

PROJECT TITLE: _____ WELL NO.: _____

PROJECT NO.: _____

STAFF: _____

DATE(S): _____

			WELL ID.	VOL. (GAL/FT)
1. TOTAL CASING AND SCREEN LENGTH (FT.)	=		1"	0.04
2. WATER LEVEL BELOW TOP OF CASING (FT.)	=		2"	0.17
3. NUMBER OF FEET STANDING WATER (#1 - #2)	=	0.0	3"	0.38
4. VOLUME OF WATER/FOOT OF CASING (GAL.)	=	0.17	4"	0.66
5. VOLUME OF WATER IN CASING (GAL.)(#3 x #4)	=	0.0	5"	1.04
6. VOLUME OF WATER TO REMOVE (GAL.)(#5 x ___)	=	0	6"	1.50
7. VOLUME OF WATER ACTUALLY REMOVED (GAL.)	=		8"	2.60

OR

$V=0.0408 \times (\text{CASING DIAMETER})^2$

	ACCUMULATED VOLUME PURGED (GALLONS)										
PARAMETERS											
pH											
SPEC. COND. (umhos)											
APPEARANCE											
TEMPERATURE (°C)											

COMMENTS:

LOW FLOW GROUNDWATER PURGING/SAMPLING LOG

Project: _____ Site: _____ Well I.D.: _____

Date: _____ Sampling Personnel: _____ Company: URS Corporation

Purging/ Sampling Device: _____ Tubing Type: _____ Pump/Tubing Inlet Location: Screen midpoint

Measuring Point: Below Top of Riser Initial Depth to Water: _____ Depth to Well Bottom: _____ Well Diameter: _____ Screen Length: _____

Casing Type: PVC Volume in 1 Well Casing (liters): _____ Estimated Purge Volume (liters): _____

Sample ID: _____ Sample Time: _____ QA/QC: _____

Sample Parameters: _____

PURGE PARAMETERS

TIME	pH	TEMP (^{0}C)	COND. (mS/cm)	DISS. O_2 (mg/l)	TURB. (NTU)	Eh (mV)	FLOW RATE (ml/min.)	DEPTH TO WATER (btor)
Tolerance:	0.1	---	3%	10%	10%	+ or - 10	---	

Information: WATER VOLUMES--0.75 inch diameter well = 87 ml/ft; 1 inch diameter well = 154 ml/ft; 2 inch diameter well = 617 ml/ft; 4 inch diameter well = 2470 ml/ft (vol $_{cyl} = \pi r^2 h$)

Remarks:

APPENDIX E

QUALITY ASSURANCE PROJECT PLAN

GENERIC QUALITY ASSURANCE PROJECT PLAN

PREPARED FOR:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
625 Broadway
Albany, New York 12233

PREPARED BY:

URS CORPORATION
77 GOODELL STREET
BUFFALO, NEW YORK 14203

MARCH 2007
Rev. MAY 2009

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GENERIC QUALITY ASSURANCE PROJECT PLAN

ACRONYMS AND ABBREVIATIONS

ASP	Analytical Services Protocol
°C	degree centigrade
CLP	Contract Laboratory Program
COC	chain of custody
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Approval Program
FAP	Field Activities Plan
FD	field duplicate
IDL	instrument detection limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MD	matrix duplicate
MDL	method detection limit
mg/L	milligrams per liter
mg/kg	milligrams per kilograms
MS	matrix spike
MSB	matrix spike blank
MSD	matrix spike duplicate
NEIC	National Enforcement Investigations Center
NIST	National Institute of Standards and Technology
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCB	polychlorinated biphenyl

PMWP	Project Management Work Plan
PQO	Project Quality Objective
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	relative percent difference
TCLP	toxicity characteristic leaching procedure
µg/kg	micrograms per kilograms
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
VTSR	validated time of sample receipt chain-of-custody

1.0 INTRODUCTION

This Generic Quality Assurance Project Plan (QAPP) provides an overview of quality assurance/quality control (QA/QC) procedures that are required for all work assignments issued to the Consultant by the New York State Department of Environmental Conservation (NYSDEC).Each individual site and/or work assignment will have additional quality requirements that will be addressed in a site-specific addendum to this Generic QAPP.

2.0 PROJECT/SITE DESCRIPTION

The scope of the project and a description of the site shall be provided in the Project Management Work Plan (PMWP) and the Field Activities Plan (FAP) for each work assignment.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

For each work assignment, key the Consultant's personnel and their responsibilities are identified in the site-specific PMWP. Also included is an organization chart that shows the project organization reporting structure and lines of communication.

3.1 Project Manager

The Consultant's Project Manager for each work assignment will be responsible for technical and financial management of the project, and for overall coordination and review of component work activities. The Consultant's Project Manager will serve as the initial and primary contact with NYSDEC throughout the project, and will be responsible for successful implementation of the project's QA/QC activities. The Consultant's Project Manager may delegate a portion of the tasks required for successful implementation of the PMWP to a qualified individual, the Site Manager, who will be on site during field activities (i.e., investigations, remedial action, O&M activities, etc.). The Site Manager will work under the direction of the Consultant's Project Manager, and will be responsible for implementing applicable QC procedures in the field and verifying that all other Consultant field personnel adhere to these procedures and perform all activities as described in the project work plans.

3.2 Project Chemist

The Consultant's Project Chemist is responsible for verifying that the analytical laboratories adhere to the QA/QC requirements specified in this Generic QAPP and the requirements identified in the site-specific addendum to this Generic QAPP. The Consultant's Project Chemist will be the point of contact for the Laboratory's Project Manger, and will personally communicate with the Laboratory's Project Manger to verify that all sample analyses are being performed such that the resulting data will be of sufficient quality for its intended purpose.

Laboratories providing analytical testing services to the Consultant in support the work assignment are identified in the site-specific addendum to this QAPP. All laboratories to be used for the work assignment hold applicable New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certifications for the analyses to be performed. Copies of the applicable ELAP certifications for each laboratory to be used during the work assignment are provided in the site-specific addendum to this Generic QAPP. Each laboratory maintains its own QA/QC program and employs the required staff to implement this program. The QA Officer for each laboratory is responsible for verifying that all sample analyses are performed in accordance the analytical methods, laboratory QA/QC procedures, this Generic QAPP and the site-specific QAPP addendum).

3.3 Independent Technical Reviewer

All work of a substantive nature or identified as a deliverable will undergo an independent technical review (ITR) by experienced and qualified personnel. The Project Manager is responsible for identifying and selecting reviewers that are independent from the actual work or decision making on the tasks or activities being reviewed and who possess technical qualifications sufficient for conducting an in depth review. A written record of the review and resolution of the review findings will be maintained in the project files.

The ITR is used as a management tool to assess:

- Compliance with referenced standards;
- The potential for erroneous assumptions, data, calculations, methods, or conclusions;
- Compliance with the standard of professional practice;
- The basis of and compliance with input and design requirements, design criteria, and design calculations;
- That the appropriate detail/or and calculation checks (i.e., QC) and internal project team reviews have been performed;

- The soundness of the technical approach and results; and,

- That the work was completed in compliance with the requirements of the Work Assignment.

4.0 PROJECT QUALITY OBJECTIVES

4.1 Background

Project quality objectives (PQOs), such as those described in the *Uniform Federal Policy for Quality Assurance Project Plans* (USEPA, 2005), define the type, quantity, and quality of data that are needed to answer specific environmental questions and support proper environmental decisions. More specifically, the PQOs:

- Define the environmental problem;
- Identify target analytes/contaminants of concern and concentration levels;
- Establish the analytical techniques to be used (field-screening, on-site, and/or off-site);
- Establish the appropriate sampling techniques to be used;
- Establish project sampling/analytical measurement performance criteria (where applicable) for precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity; and
- Determine the number of samples needed for each analytical group/matrix/concentration level.

PQOs are provided in the site-specific QAPP addendum and in the project Field Activities Plan.

4.2 Project Quality Objectives For Chemical Data Measurement

The data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS) will be measured (when applicable) from data collected from chemical analyses of samples collected during the work assignment.

4.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in the field and/or laboratory handling procedures. Precision is evaluated using analyses of matrix spike/matrix spike duplicate/matrix duplicate (MS/MSD/MD) and field duplicate (FD) samples. These provide a measure not only of sampling and analytical precision, but also of analytical precision based on the reproducibility of the analytical results. Relative percent difference (RPD) is used to evaluate precision. RPD criteria for all analyses being performed as part of the work assignment are provided in the site-specific QAPP addendum, where applicable.

4.2.2 Accuracy

Accuracy measures the analytical bias of a measurement system. Sources of measurement error may include the sampling process, field contamination, sample preservation and handling, sample matrix, and sample preparation and analysis techniques. Sampling accuracy may be assessed by evaluating the results of equipment rinsate blanks and trip blanks. These data help to assess the potential contamination contribution from various outside sources.

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. Accuracy can be estimated based on the recovery of spiked analytes in the MS/MSD and laboratory control samples (LCS) or matrix spike blanks (MSB). MS/MSD analyses, which will give an indication of matrix effects that may be affecting target compound identification and quantitation, are also a good gauge of method efficiency. Accuracy criteria for all analyses being performed as part of the work assignment are provided in the site-specific QAPP addendum where applicable.

4.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter that is most concerned with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigation objectives. The sampling procedures, as described in the project Field Sampling Plan, have been selected with the goal of obtaining representative samples for the media of concern.

4.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. An objective for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples, and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, and sensitivity) because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that the analytical methods and procedures be explicitly followed.

4.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that were expected to be obtained under normal conditions. To meet project needs, it is important that appropriate QC procedures be maintained to verify that valid data are obtained. The completeness goal for data collected as part of the work assignment is 90%, unless otherwise specified in the site-specific QAPP addendum. If this goal is not met, then NYSDEC and the Consultant's project personnel will determine what, if any, further actions need to be taken.

4.2.6 Sensitivity

Sensitivity, as it pertains to analytical methods/instrumentation, is defined as the lowest concentration that can be distinguished from background noise. Sensitivity is measured by method detection limit (MDL) determinations, which are performed by laboratories for each analyte and matrix following procedures specified in 40 CFR Part 136, Appendix B. The MDL is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. Instrument detection limits (IDLs) are similar to MDLs although the analytical procedures used for IDL determinations do not include the preparation/extraction procedures that are used for MDL determinations and environmental sample analyses. Therefore, IDLs provide a measure of sensitivity under ideal conditions, and do not take into account effects of sample matrix and/or other factors that may affect sensitivity. MDLs (and/or IDLs) for the parameters to be analyzed as part of the work assignment are presented in the site-specific addendum to this Generic QAPP.

5.0 SAMPLING LOCATIONS AND PROCEDURES

Proposed sampling locations and sampling procedures are provided in the site-specific Field Activities Plan.

6.0 SAMPLE CUSTODY AND HOLDING TIMES

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody (COC) procedures. Chain-of-custody procedures are essential for presenting sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this work assignment will follow the COC guidelines of National Enforcement Investigations Center (NEIC) Policies and Procedures, prepared by the NEIC of the USEPA Office of Enforcement.

6.1 Custody Definitions

- Chain-of-Custody Officer - The employee responsible for oversight of all COC activities is the Site Manager (or his/her designee).

- Under Custody - A sample is "Under Custody" if:

  - It is in one's possession, or
  - It is in one's view, after being in one's possession, or
  - It was in one's possession and one placed it under lock, or
  - It is in a designated secure area.

6.2 Responsibilities

The Site Manager will be responsible for monitoring all COC activities and for collecting legally admissible COC documentation for the permanent project file, and will perform to following tasks:

- Review sample labels or tags, closure tapes, and COC records.

- Train all field sampling personnel in the methodologies for carrying out COC activities and the proper use of all COC and record documents.

- Monitor the implementation of COC procedures.

- Submit copies of the completed COC records to the Project Chemist.

6.3 Chain-of-Custody

Chain-of-custody is initiated in the laboratory when the empty sample containers are shipped for use in the field. When the empty containers are received from the laboratory, they will be checked for any breach of custody including, but not limited to, incomplete COC records, broken COC seals, or any evidence of tampering. Filled sample containers will be returned to the laboratory using appropriate COC procedures. Upon receipt of the samples, the laboratory sample custodian will check for any breach of custody. The Laboratory Project Manager shall notify the Consultant's Project Chemist immediately if there are any problems with the COC documentation.

6.4 Sample Containers and Holding Times

Sample container and preservation requirements and analytical holding times for the analytical methods being used for the work assignment are provided in the site-specific QAPP addendum. All holding times begin with the validated time of sample receipt (VTSR) at the laboratory, except where noted otherwise in the site-specific QAPP addendum.

7.0 ANALYTICAL PROCEDURES

The specific analytical methods to be used for the analysis of samples collected during the work assignment, and the quality control criteria to be followed by each laboratory when performing the analyses, are identified in the site-specific QAPP addendum.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing and analysis procedures, laboratory and field instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

8.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from sources traceable to National Institute of Standards and Technology, or other reliable commercial sources to ensure the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished as per the methods referenced on Table 1. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well-documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacture specifications. Calibration is conducted with two American Society of Testing Materials Class 1 weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and properly document results in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is

not compromised and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (4°C ± 2°C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System – Laboratories performing water/solid/waste sample analyses must maintain a sufficient supply of analyte-free water for all project needs. The grade of the water must be of the highest quality in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses, and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis by the laboratory.

Air Supply System – Laboratories performing air/soil vapor sample analyses must maintain a sufficient supply of analyte-free air for all project needs. The grade of air must be of the highest quality in order to eliminate false-positives from the analytical results. Appropriate documentation of the quality of the air supply system(s) will be performed on a regular basis by the laboratory.

Sample Containers - All sample containers supplied by the laboratories shall meet the requirements of the analytical methods being used and/or the requirements specified in the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Pre-cleaned sample containers may be purchased by the laboratory and provided for sample collection as long as the containers meet the requirements of each analytical method and/or the NYSDEC Analytical Services Protocol (most current), whichever is more stringent. Documentation of sample cleaning procedures and/or certifications provided by vendors shall be maintained by the laboratories.

Air Sampling Canisters - All Summa (or equivalent) canisters supplied by the laboratories for this work assignment (if applicable) must be cleaned following the requirements of the analytical methods. The canisters shall be individually or batch certified analyte-free to a level below the laboratory quantitation limit for each analyte. Documentation showing the certification of the canisters shall be submitted in each laboratory report package.

8.2 Laboratory Instruments

Calibration of laboratory instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet the project-required quantitation limits for each analytical method. Each instrument for organic analysis shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s) and/or any additional requirements identified in the site-specific QAPP addendum. Calibration of laboratory instruments will be performed according to the analytical methods required for the work assignment, as identified in the site-specific QAPP addendum.

Calibration of an instrument must be performed prior to the analysis of any samples (initial calibration) and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still properly calibrated. If the contract laboratory cannot meet the method-required calibration requirements, corrective action shall be taken as discussed in Section 11.0. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the report case narrative, and submitted with the analytical results.

8.3 Field Instruments

Various types of portable instruments may be used in the field during this work assignment, which may include one or more of the following: multi-purpose meters capable of measuring pH, conductivity, dissolved oxygen, oxidation/reduction (redox) potential, and/or temperature; photoionization detectors and/or flame ionization detectors used to monitor organic vapors; dust monitors to measure concentrations of particulates; multi-gas meters and analyte-specific devices (e.g. Drager tubes/chips) for health and safety purposes; and helium detectors used for leak-checking during soil vapor sample collection. Other instruments may also be used as needed based on the requirements of the work assignment. The instruments expected to be used in the field during the work assignment are identified in the site-specific QAPP addendum. All calibration and maintenance of field instrumentation shall be performed according the manufacturer's requirements or as otherwise indicated in the site-specific QAPP addendum, and shall be documented by the Site Manager.

9.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect that sample matrix may have on data being generated. Two types of internal checks are performed - batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the laboratory will be determined by the analytical methods and any other requirements identified in the site-specific QAPP addendum. Acceptable criteria and/or target ranges for these QC samples are also identified in the site-specific QAPP addendum.

QC results that vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers to the analytical data, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples, including any project-specific QC samples, will be analyzed as discussed below.

9.1 Batch QC

Method Blanks - A method blank is defined as laboratory demonstrated analyte-free water, solid, or humidified ultra pure zero air that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch or as required by the analytical methods. Concentrations of all analytes in the method blanks should be below the quantitation limits identified in the site-specific QAPP addendum. The Laboratory Project Manager shall contact the CONSULTANT'S Project Chemist to determine the appropriate course of action if analyte concentrations in any blank are greater than the quantitation limit.

Laboratory Control Samples (LCS) – An LCS, or matrix spike blank (MSB), is an aliquot of laboratory demonstrated analyte-free water, solid, or humidified ultra pure zero air spiked (fortified) with all, or a representative group, of the analytes being analyzed. The LCS (or MSB) recoveries and RPD are a measure of precision and accuracy that are used to verify that the analysis being performed

is in control. LCS (or MSB) analyses shall be performed for each matrix as required by the methods identified in the site-specific QAPP addendum. Acceptance criteria for LCS (or MSB) analyses are also specified in the site-specific QAPP addendum.

9.2 Matrix-Specific QC

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Samples – MS/MSD samples consist of an aliquot of a sample that is spiked (fortified) with known concentrations of specific compounds as stipulated by the methodology. The MS/MSD samples are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery (%R) for each analyte and the RPD between the concentrations of each analyte in the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs samples will be collected and analyzed at the frequency identified in the site-specific QAPP addendum. Acceptance criteria for MS/MSD analyses are also specified in the site-specific addendum to this Generic QAPP.

Matrix Duplicates (MD) - The matrix duplicate (MD) is a second aliquot of a sample that is prepared and analyzed in a manner identical to that used for the parent sample. Collection of matrix duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. A matrix duplicate may be performed instead of the matrix spike duplicate. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of soil samples, the analytical results are not always reproducible.

9.3 Additional QC

Additional QC samples that may be collected as part of the work assignment are described in this section. The specific number and type of QC samples to be collected are identified in the site-specific QAPP addendum.

Equipment/Rinsate Blanks – An equipment or rinsate blank is used to indicate potential contamination from sample instruments used to collect and transfer samples, and also serves as a measure of potential contamination from ambient sources during sample collection. When collecting solid or water samples, the equipment blank is a sample of laboratory demonstrated analyte-free water passed over and/or through cleaned sampling equipment. The water must originate from one common source within the laboratory and must be the same water used by the laboratory when performing the analyses (i.e., for method blanks). Equipment blanks should be collected, transported, and analyzed in the same manner as the samples acquired that day. Equipment blanks typically are not required when using dedicated and/or disposable sampling equipment.

Field Blanks – A field blank is used to indicate potential contamination from sample collection containers and/or from ambient sources during sample collection. The field blank is collected by pouring laboratory demonstrated analyte-free water directly into clean sample collection containers. The water must originate from one common source within the laboratory and must be the same water used by the laboratory when performing the analyses (i.e., for method blanks). Field blanks should be collected, transported, and analyzed in the same manner as the samples acquired that day. Field blanks typically are collected only when ambient conditions may present a risk of contamination to field samples.

Trip Blanks - Trip blanks are only required when collecting aqueous samples for volatile organics or dissolved gas analyses. They are not required for non-aqueous matrices or for analysis of any other parameters. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. Trip blanks accompany the empty sample containers that are shipped from the laboratory into the field, and then back to the laboratory along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the laboratory with the same set of containers they accompanied to the field.

Field Duplicates – A field duplicate (FD) sample pair consists of two independent samples that are collected at approximately the same time and place, using the same collection methods. Both are containerized, handled, and analyzed in an identical manner. Field duplicates are useful in documenting the precision of the sampling process, and also provide a measure of analysis precision.

Field duplicates are typically labeled so that the laboratory cannot determine or identify the location from which the field duplicate was collected.

10.0 CALCULATION OF DATA QUALITY INDICATORS

10.1 Precision

Precision is evaluated using results from field or matrix duplicate, MS/MSD, and/or LCS/LCSD (MSB/MSBD) analyses. The RPD between the concentrations detected in the above-listed sample pairs is calculated using the following formula:

$$RPD = \left| \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \right| x\,100\%$$

where:

X_1 = *Measured value of sample, MS, or LCS (MSB)*

X_2 = *Measured value of field (or matrix) duplicate, MSD, or LCSD (MSBD)*

RPD criteria for the work assignment are specified in the site-specific QAPP addendum.

10.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. Analytical accuracy is expressed as the percent recovery (%R) of a compound or analyte that has been added to the environmental sample or laboratory demonstrated analyte-free matrix at known concentrations before analysis. Accuracy will be determined from MS, MSD, LCS (MSB) samples as well as from surrogate compounds that are added to samples prior to extraction and analysis (typically used for organic fractions only). Accuracy is calculated using the following formula:

$$\%R = \frac{(X_s - X_u)}{K} x\,100\%$$

where:

X_s - *Measured value of the spike sample*

X_u - *Measured value of the unspiked sample*

K - *Known amount of spike in the sample*

Accuracy criteria for the work assignment are specified in the site-specific QAPP addendum .

10.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\%\ Completeness = \frac{(N - X_n)}{N}\ x\ 100\%$$

where:

N - *Number of valid measurements expected to be obtained*

X_n - *Number of invalid measurements*

11.0 CORRECTIVE ACTIONS

The Site Manager will discuss with and receive approval from the Consultant's Project Manager or NYSDEC prior to taking any corrective actions in the field that may need to be implemented in order to meet project objectives. The Site Manager will document any corrective actions taken in the Field Log Book.

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

11.1 Incoming Samples

The laboratory shall document problems noted during sample receipt. The Laboratory Project Manager will contact the Consultant's Project Chemist as soon as possible if any problems are encountered. All corrective actions shall be documented thoroughly.

11.2 Sample Holding Times

If any sample extractions and/or analyses exceed method holding time requirements, the Laboratory Project Manager will contact the Consultant's Project Chemist immediately for problem resolution. All corrective actions shall be documented thoroughly.

11.3 Instrument Calibration

Sample analysis shall not be allowed until all laboratory instrumentation is properly calibrated in accordance with method requirements. If any initial/continuing calibration standards fail to meet

the required criteria, recalibration must be performed and, if necessary, all samples going back to the previous acceptable continuing calibration standard must be reanalyzed.

11.4 Quantitation Limits

The laboratory must make every attempt to meet all quantitation limits identified in the site-specific QAPP addendum. It should be noted that these limits are based on undiluted samples analyses and are not adjusted for moisture content (soil/solid samples). Sample-specific quantitation limits may be affected by any dilution that is needed because of elevated analyte concentrations, moisture content (soil/solids), and/or matrix interferences. If difficulties arise in achieving the required quantitation limits due to a particular sample matrix, the Laboratory Project Manager will contact the the Consultant's Project Chemist for problem resolution. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory shall report results from both the initial analyses and secondary dilution analyses. Dilution should only be used to bring target analytes within the linear range of calibration. If samples are analyzed at a dilution with no target analytes detected, the Laboratory Project Manager shall contact the the Consultant's Project Chemist so that appropriate corrective actions can be initiated.

11.5 Method QC

All QC samples, including blanks, matrix spikes, matrix spike duplicates, matrix duplicates, surrogate recoveries, laboratory control samples, and other method-specified QC samples, shall meet the acceptance criteria specified in the site-specific QAPP addendum. Failure to these criteria will result in the possible qualification of all affected data. When the criteria are not met, the affected sample(s) should be reanalyzed within the required holding times to verify the presence or absence of matrix effects. It should be noted that reanalysis is not always required. The Laboratory Project Manager shall contact the Consultant's Project Chemist to discuss possible corrective actions should unusually difficult sample matrices be encountered. The laboratory shall follow the requirements of the analytical methods and any instructions provided by the the Consultant's Project Chemist when determining if samples require reanalysis. If matrix effect is confirmed, the corresponding data shall

be flagged accordingly using the flagging symbols and criteria as defined by the data validation guidelines identified in Section 12.2, or as otherwise identified for the work assignment.

11.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review, calculation and/or reporting errors exist, the laboratory will be requested to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

12.0 DATA REDUCTION, VALIDATION, AND USABILITY

Unless otherwise noted in the site-specific QAPP addendum, NYSDEC ASP Category B deliverable requirements (or equivalent) will be required for documentation and reporting of all data. Where applicable, the standard NYSDEC Data Package Summary Forms should be completed by the analytical laboratories and included in the deliverable data packages.

12.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either graphic or printed tabular form. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Results for aqueous samples will be reported in concentration units of micrograms per liter (µg/L) or milligrams per liter (mg/L). Results for solid samples will be reported in concentration units of micrograms per kilogram (µg/Kg) or milligrams per kilogram (mg/Kg) and adjusted for moisture content. Results for soil vapor and indoor/outdoor air samples will be reported in concentration units of parts per billion-volume (ppbv) or micrograms per cubic meter (µg/m^3) at standard temperature and pressure (i.e., 25 °C and 1 atmosphere).

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or other reliable commercial sources. Data reduction will be performed by individuals experienced with a particular analysis and knowledgeable of requirements.

12.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use.

Data validation will be performed by the Consultant's Project Chemist and/or an environmental chemist under his/her supervision. All analytical samples collected will receive a

limited data review. This review will include a review of holding times, completeness of all required deliverables, review of QC results (blanks, instrument tunings, calibration standards, calibration verifications, surrogates recoveries, spike recoveries, replicate analyses, and laboratory controls) to determine if the data are within the protocol-required limits and specifications, a determination that all samples were analyzed using established and agreed upon analytical protocols, an evaluation of the raw data to confirm the results provided in the data summary sheets, and a review of laboratory data qualifiers. The methods identified in the site-specific QAPP addendum, as well as the general guidelines presented in one or more of the following USEPA Region II documents, will be used to aide the chemist during the data review. The specific USEPA Region II validation guidelines to be followed will vary based on the required analytical parameters for each work assignment, and will be documented in the Data Usability Summary Report (Section 12.3).

- Validating Volatile Organic Compounds by SW-846 Method 8260B, HW-24, Revision 1, June 1999;
- Validating Semivolatile Organic Compounds by SW-846 Method 8270C, HW-22, Revision 2, June 2001;
- Validating Pesticide/Polychlorinated Biphenyl (PCB) Compounds by SW-846 Method 8080A, HW-23, Revision 0, May 1995;
- Validating PCB Compounds by SW-846 Method 8082, HW-23B, Revision 1.0, May 2002;
- Validating Chlorinated Herbicides by Gas Chromatography, HW-17, Revision 1.3, November 1994;
- Contract Laboratory Program (CLP) Organics Data Review and Preliminary Review, HW-6, Revision 12, March 2001;
- Evaluation of Metals Data for the CLP Program, Standard Operating Procedure (SOP) HW-2, Revision 13, September 2005;
- Validating Canisters of Volatile Organics in Ambient Air, SOP HW-18, Revision 0, August 1994; and

- Toxicity Characteristic Leaching Procedure (TCLP) Data Validation, SOP HW-7, Revision 3, 1994.

12.3 Data Usability

Unless otherwise specified in the project-specific addendum to this Generic QAPP, a Data Usability Summary Report (DUSR) (NYSDEC *Draft DER-10 Technical Guidance for Site Investigation and Remediation, Appendix 2B*, December 2002) will be submitted to NYSDEC, and will describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems will be identified and their effect on the data will be discussed. The DUSR will also include recommendations on resampling/reanalysis.

13.0 PREVENTIVE MAINTENANCE

The laboratory is responsible for maintaining its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs will be available for inspection by auditing personnel.

Maintenance of field instrumentation will be performed as needed by the vendor and/or the Consultant's personnel according to the manufacturer's requirements.

14.0 PERFORMANCE AND SYSTEMS AUDITS

Audits are evaluations of laboratory QA/QC procedures, and are performed before or shortly after systems are operational, and on an ongoing basis thereafter. Problems detected during these audits shall be reviewed by the Laboratory QA Manager and other laboratory management personnel, and corrective action shall be instituted as necessary.

14.1 Performance Audits

Performance audits are conducted by introducing control samples into the data measurement, reduction, and reporting processes. These control samples may include performance evaluation samples, or field samples spiked with known amounts of analytes. In addition to conducting internal reviews and performance audits as part of its established quality assurance program, the laboratory is required to take part in regularly-scheduled performance audits/evaluations from state and federal agencies. They are typically conducted as part of the certification process and to evaluate laboratory performance and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance, and to take appropriate corrective actions as needed.

14.2 Systems Audits

Systems audits are thorough, on-site qualitative audits of facilities, equipment/instrumentation, personnel, training procedures, record keeping, data review/management, and reporting aspects of a system. They provide a qualitative measure of the data produced by one section of, or the entire, measurement process. The audits are performed against a set of requirements, which may include laboratory standard operating procedures, a quality assurance project plan or work plan, a standard method, and/or a project statement of work. The primary objective of the systems audits is to verify that all procedures are being performed according to the requirements specified above. Systems audits are performed internally by the Laboratory QA Manager, and also by external parties such as state and

federal regulatory agencies and private-sector clients. Typically, state and federal agencies perform systems audits in conjunction with performance audits/evaluations during the laboratory certification process. As part of its QA program, the Laboratory QA Manager shall also conduct periodic checks and audits of the analytical, data reduction, and reporting systems. The purpose of these is to verify that the systems are operating properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits assist in determining or detecting where problems are occurring.

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