LTEVS PERFORMANCE TESTING PLAN

CLAREMONT POLYCHEMICAL SUPERFUND SITE
OLD BETHPAGE, NEW YORK

PREPARED FOR:

UNITED STATES ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT

PREPARED BY:

DOW ENVIRONMENTAL

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DOW ENVIRONMENTAL
CLAREMONT POLYCHEMICAL SUPERFUND SITE

[✓ Approved]

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TABLE OF CONTENTS

SECTION PAGE

List of Tables

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 Scope of Work

This Performance Testing Plan has been prepared by Dow Environmental Inc. (DEI) to define low temperature enhanced volatilization (LTEV) operations and air monitoring procedures to be implemented at the Claremont Polychemical Superfund Site. There is a potential for air emissions containing volatile organic compounds (VOC) to be generated during this phase of remedial activity. The purpose of this Performance Testing Plan is to define the procedures for evaluating the efficiency of the Low Temperature Enhanced Volatilization System (LTEVS) operations. Testing and reporting will be performed in accordance with the guidelines outlined in the job specifications. Any deviation from the specifications will require prior approval of the USACOE and the NYSDEC.

1.2 Summary of Activities

Activities to be completed at the Claremont Polychemical Superfund Site include:

SITE WORK
- Clearing and Grubbing
- Grading and Excavation
- Utilities Installation

BUILDING DECONTAMINATION
- Asbestos Removal
- Debris Removal
- Decontamination

THERMAL TREATMENT

- Mobilization and Testing of the LTEV
- Thermal Treatment
- On Site Disposal

GROUNDWATER TREATMENT

- Treatment Plant Building
- Groundwater Collection
- Plant O&M

2.0 REGIONAL SETTING

This section provides an overview of the climatic and topographic conditions at the site that will be factored into the air quality impact evaluation.

2.1 Climate and Topography

The Claremont Polychemical site (9.5 acres) is located in Central Long Island at 501 Winding Road, Old Bethpage, New York and contains one 35,000 SF one story building situated in a broad, low-lying valley which trends north-south. The valley is approximately 2 miles wide and slopes gently southward towards the Great South Bay. The site is relatively flat with elevations ranging from 160 ft to 117 ft above mean sea level along the eastern and southwestern boundaries, respectively. Steep slopes, approximately 20 to 25 ft high, bound the site to the east and south suggesting that the property was once a borrow pit of some kind. The Old Bethpage Landfill creates approximately 200 ft of relief to the west of the site. The groundwater flow gradient is from the northwest to the southeast. At the southwest corner of the site are the Park Stables, to the east is a trucking and crane company, to the north is a recycler/waste hauler, and to the west is the Bethpage State Park.

The Claremont Polychemical site is located in the coastal weather region of New York. The surrounding area receives about 48 in of rain a year with the least falling in February and the most falling in June. The average temperature is 52°F, with lows in January and highs in July.
The prevailing wind direction is from the northwest during most of the year, except during summer when winds are from the south and southwest predominantly.

3.0 REGULATORY REQUIREMENTS

Air quality standards established by the Federal government and by the State of New York are to be used as the primary Applicable or Relevant and Appropriate Requirements (ARARs) for the control of emissions during the operation of the LTEVS. These standards, in addition to other pertinent guidelines, are discussed below.

3.1 Federal Standards

The federal regulations that pertain to the excavation and treatment of contaminated soil are the following:

1. Clean Water Act - Stormwater (40 CFR 122)
2. Clean Air Act - National Ambient Air Quality Standards (40 CFR 50)
3. OSHA - (29 CFR 1910 & 1926)
4. RCRA - Hazwaste Regs (40 CFR 260 series) (including Subpart X). The LTEVS is in essential compliance with RCRA, Subpart X requirements.
5. DOT - (49 CFR series)

In previous federal remediation projects, EPA has required stack testing for Products of Incomplete Combustion (PICs) and Principal Organic Hazardous Constituents (POHCs). Of the PICs and the POHCs that could be generated during treatment at the Claremont Site, the compounds of greatest concern would be dioxins (TCDD) and furans (TCDF). It can be assumed that if the formation of these compounds are appropriately inhibited or if they are destroyed then the rest of the PICs and POHCs will also be adequately treated. The formation of TCDD and TCDF are currently believed to occur when chlorinated hydrocarbons are reformed, over a relatively short period of time (e.g, as in boiler applications), after they have passed through a high temperature zone (i.e., as in a flame zone).

The production of dioxins and furans is inhibited in thermal desorption (i.e., LTEV) for two primary reasons. First, chlorinated compounds are not generally "cracked" to their elements or free radical states as they are in the case of thermal incineration. In LTEV the compounds are volatilized intact and are then catalytically oxidized, thus inhibiting the potential to form PICs. Secondly, based on usage of catalysts in several plants in Europe (e.g., the Bayer AG plant in Dormangan, Germany), even if PICs were formed during the desorption process they would be removed in the catalyst to levels below the stringent European standard of <0.1 ng/m^3 T.E. (STP).

3.2 State and Local Standards

This plan has been written in accordance with the guidelines contained in the New York State Air Guide - 1 and based on the New York State Department of Environmental Conservation Process, Exhaust, or Ventilation System Application for Permit to Construct or Certificate to Operate which has already been submitted to, and been reviewed by, the USACOE and the NYSDEC.

Additional New York State regulations which are potentially applicable to the LTEVS include:

Part 201:

- A valid permit to construct is required prior to commencement of construction;
- Owner must operate source in accordance with all conditions of the permit to construct or certificate to operate; and
- Operate and maintain air pollution control equipment in compliance with applicable regulations:
    - Compile and maintain records and provide report upon request of all equipment maintenance or start-up activities when expected to result in violation of applicable emissions standard.
    - Report malfunction resulting in violation of applicable emissions standard within 72 hours of occurrence.

Part 202:

- Notify commissioner in writing not less than 30 days prior to emissions testing. Allow free access for commissioner to observe tests;

- Test report must be provided in triplicate within 60 days of completion of testing; and

- In ozone nonattainment area, submit emissions statement to Department (as specified in Part 202-2.3) if exceed facility reporting thresholds (Table 1, Part 202-2.1).

Part 211:

- Opacity restrictions.

Part 212:

- Limitation of particulate emissions of 0.050 grains/dscf.

Part 225:

- Limitations of fuel sulfur content for oil or coal (not applicable).

- Continuous monitoring of SO_x required, except for installation where gaseous fuel is the only fuel burned (as is the case for the LTEVS installation; therefore, not applicable).

3.2.1 Ambient Air Quality Monitoring

Continuous emissions monitoring will be conducted during the testing of the LTEVS for the following target contaminants which have either established federal and state ambient air quality standards or operational standards.

1. O_2
2. CO_2
3. CO
4. NO_X
5. Total Hydrocarbons

SO_X will also be evaluated for the Performance Test using USEPA Method 20. If HCl, NO_X or SO_X is found to be within regulatory limits during the Performance Test, then such parameter(s) will not be monitored during normal operations.

4.0 AIR EMISSION ESTIMATES

4.1 Emission Rates For Target Compounds

Potential air emissions of target compounds are calculated to be far less than 150 lbs per year during the remediation of the 3,900 yds^3 of tetrachloroethylene (PCE) contaminated soil.

This estimate was based on the following assumptions:

- The use of average historical soil concentrations of VOC as 12.5 ppm.
- That 12.3 ppm VOC will be removed during treatment and volatilized to the gas stream with a maximum of 0.2 ppm VOC remaining in the soil.
- The assumption that 5,850 tons of contaminated soil can be processed at a rate of up to 18 tons per hour for a total running time of 325 hours.
- A LTEV system destruction/removal efficiency of 99.99%.

Estimated emission rates for various contaminants appear in Table 4.1, along with their overall emission quantities over the anticipated duration of the project.

Table 4.1
Claremont Polychemical Superfund Site
Estimated LTEVS Emission Rates for Target Compounds

Chemical Contaminant	Hour Emissions (lbs/hour)	Annual Emissions (lbs/year)
Tetrachloroethylene	4.43×10^{-5}	1.44×10^{-2}
Nitrogen Dioxide	0.553	179.73
Sulfur Dioxide	0.07	22.75
Particulate Matter		0.05 grains/dscf
Hydrogen Chloride	2.14×10^{-4}	6.96×10^{-2}

4.2 Air Guide - 1 Requirements

In accordance with "New York State Air Guide - 1 (1991 Edition)" and the referenced Title 6 Chapter III Subchapter A "Prevention and Control of Air Contamination and Air Pollution - Official Compilation of Codes, Rules, and Regulations of the State of New York", Part 231-1.2 "Applicability", and Part 231-1.6 "Air Quality Impact Evaluation" the following is noted:

Part 231-1.2

(a) (1) Not Applicable (Permit to construct was not approved before 11-15-92).
    (2) Not Applicable (tied to (3) below).
    (3) Not Applicable (not a major facility and does not exceed the "de minimis" emission limits of section 231-1.9 of this subpart).
    (4) Not Applicable (Emissions do not exceed 100 tons per year as listed in the paragraph).
(b) Not Applicable (lead is not a constituent in the listing of contaminants and is not expected to be emitted at 0.6 tons per year).
(c) Not Applicable (no existing facility).

Part 231-1.6

(a) (1) Evaluation of C_a, C_p , and C_{st} completed.
(b) Not Applicable (emissions not greater than "de minimis").
(c) Not Applicable (per (b) above).

Calculations using Standard Point Source Method for Predicting an Impact at Maximum Point of Concentration From Air Guide-1 (see Appendix A).

5.0 PERFORMANCE TEST MONITORING PROGRAM

This section describes the Performance Testing Plan for the LTEVS to be used at the Claremont Polychemical Superfund Site. The Performance Testing Plan is presented in terms of the constituents to be monitored, the monitoring phases, meteorological monitoring, air monitoring, air monitoring methods, and quality assurance/quality control (QA/QC).

5.1 Constituents to be Monitored

The following constituents will be monitored from the vent stack during the Performance Test:

- O_2, CO_2, CO, NO_x, and THC using continuous emissions monitoring systems (CEMS);
- SO_x emissions will be evaluated using fuel gas analyses of sulfur species. (Note: The fuel source for the LTEVS, propane, is expected to contain negligible concentrations of sulfur species; therefore, continuous monitoring of SO_x is not practical for this application);
- Tetrachloroethylene (PCE) will be measured from two points in the system to demonstrate control efficiency: a) in the combined vent upstream of the catalytic oxidation units and b) in the vent stream to the atmosphere; and
- HCl emissions will be measured from the vent stream to the atmosphere.

Upon successful demonstration of the control efficiency of the system and assuming that all applicable emissions limitations are met, only O_2, CO_2, and CO will be monitored continuously during operation of the LTEVS. Table 5.1 shows the estimated emissions levels for PCE, HCl, NO_X, and SO_X.

Table 5.1
Claremont Polychemical Superfund Site
Estimated Emissions Levels for LTEVS

CONSTITUENT	ESTIMATED EMISSIONS LEVEL, LB/HR	OTHER REQUIREMENTS
Tetrachloroethylene	4.14×10^{-5}	99.99% control efficiency
HCl	2×10^{-4}	
NO_x	0.553	
SO_x	0.07	

Samples of scrubber effluent (blowdown) will be collected during performance testing and analyzed for PCE and for total metals. Both waste feed and treated soils will be sampled and analyzed during Performance Testing. Only treated wastes will be sampled and analyzed during normal operations.

5.2 Soil Pretesting

Soil from the spill area will be selected, sampled, and analyzed in accordance with the guidelines outlined in Table 5.2.

Table 5.2
Claremont Polychemical Superfund Site
Soil Pretesting Protocol

- Select soil samples having the least favorable physical characteristics for processing.
- Collect soil samples and screen for principal organic hazardous constituent (Tetrachloroethylene - PCE).
- If site logistics prevent the timely identification of performance test soil with the desired PCE concentration, then the DRE will be calculated. Soils will not be spiked to achieve higher levels of contamination in waste feed.

5.3 Performance Test Plan

Table 5.3 outlines the test plan to be followed during the Performance Test, including:

- Waste feed sampling and analysis;
- Air emissions monitoring; and
- Residuals sampling and analysis.

Performance testing will consist of two days of continuous running, during which time two tests consisting of three one hour runs each will be performed. Continuous running includes about 16.5 to 18 hours per day of processing time with the remainder of the day used for maintenance and, when applicable, fine tuning of the LTEV system. The first test will be performed at a lower treated soil exit temperature in the range of 400 to 450°F. The second test will be performed at a higher treated soil exit temperature in the range of 500 to 550°F.

Table 5.3
Claremont Polychemical Superfund Site
LTEV Performance Test Procedure

DESCRIPTION		FREQUENCY OF SAMPLING/ MONITORING	OFF SITE TESTING	PARAMETERS	TEST METHOD(S)
Waste Feed		*1 Composite Sample per 1 Hr. Test Run *2 Grab Samples per Composite Sample (taken @ appx. 15 min &45 min)*	1 Composite Sample per Test Run *(i.e., 3 Samples per Test)*	PCE	Method 8260
		Continuous Monitoring @ Control Panel	Continuous Monitoring @ Control Panel	Waste Feed Rate	LTEV Continuous Weight Belt
Air Emissions		Continuous Emissions (CEMs)	None	Total Hydrocarbon (THCs)	Method 25A
				Oxygen (O_2)	Method 3A
				Carbon Dioxide	Method 3A
				Carbon Monoxide	Method 10
				Nitrogen Oxides	Method 7E
		1 Sample/Test Run *(samples collected from stack)*	1 Sample/Test Run	Moisture	Method 4
				Volume/Velocity	Methods 1,2
				HCl	Method 26A
				Particulate Matter	Method 5
				VOC.	Method 18
		2 Samples/Test Run *(1 Sample from Upstream of Catalyst and 1 Sample Downstream of Catalyst)*	2 Samples/Test Run	PCE	SW 846 Method 0030
Residuals	Treated Soils	*1 Composite Sample per 1 Hr. Test Run *5 Grab Samples per Composite Sample (taken from treated soil pile)*	1 Composite Sample per Test Run *(i.e., 3 Samples per Test Condition)*	PCE	Method 8260
		* 1 Composite Sample per 3 Hr. Test *1 Grab Sample per each 1 hr. Test Run*	1 Composite Sample per Test Run *(i.e., 3 Samples per Test Condition)*	TCLP	Method 6010A
	Scrubber Blowdown	* 1 Composite Sample per 1 Hr. Test Run *2 Grab Samples per Composite Sample (taken @ 30 min & 60 min)*	1 Composite Sample per Test Run *(i.e., 3 Samples per Test Condition)*	PCE	Method 8260
				TCLP	Method 6010A

* Grab samples will be collected separately and composited at the analytical laboratory.

The Performance Test will demonstrate the ability of the LTEV system to meet the soil treatment and backfill criteria, emissions requirements, and will establish a range of standard operating conditions. The results of the test will show:

- Treated soil residual PCE level less than 200 μg/kg.
- Continuous soil treatment for 2 days.
- All performance criteria outlined in Table 5.4 are met.
- Treated soil fulfills backfill criteria.
- All alarms and interlocks are working properly.

Treated soil waste feed rates, discharge temperatures, catalyst inlet temperature, catalyst exit temperature, drum draft, and scrubber water conductivity will be continuously monitored during testing. These are the primary operational parameters that will be monitored in order to determine optimal parameters to be used during continuous operation of the LTEV system.

5.3.1 Air Emissions Monitoring Plan

The following two subsections (5.3.2 and 5.3.3) describe the test matrix and sampling/analytical methods to be used for air emissions monitoring of the LTEV system during (a) the Performance Test, and (b) LTEV operation.

5.3.2 Analytical Test Plan

The constituents to be monitored (Section 5.1), the sampling/analytical methods used, and the number of test runs performed during the Performance Test are shown in the test matrix (Table 5.5).

Table 5.4

Claremont Polychemical Superfund Site

Performance Criteria for LTEVS

- Treated soil shall contain no more than 200 μg/kg of PCE.
- All applicable air emission criteria will be met.
- The system shall be capable of treating 3,900 cubic yards of contaminated soil.
- All contaminated soil processing will be complete within the project contract period.
- All excavated soils will be pretreated to an appropriate size and, if required, with appropriate blending for efficient operation of the LTEVS.
- The LTEVS will be equipped with a VOC removal unit to meet 99.99% control efficiency of PCE.
- Fugitive dust will be controlled by keeping the LTEV unit under negative pressure using induced draft fans.
- Continuous emissions monitoring equipment will be used to monitor for O_2, CO_2, CO, NO_X, and THC during the performance test and used to monitor O_2, CO_2, and CO during normal operations.
- HCl will be monitored only during the performance test to assure that regulatory limits are not being exceeded.
- There shall be no visible fugitive emissions of solids, liquids or gases from the LTEV units.
- "Clean" fuel (i.e., propane) will be used as a heat source for the LTEVS units.
- The conveyor portion of the LTEVS will be controlled to minimize dust generation and meet regulatory requirements.
- There will be an automatic cut off system to stop waste feed to the LTEV when conditions deviate from critical limits established during performance testing.

Table 5.5

Claremont Polychemical Superfund Site

Performance Test Matrix for Air Emissions Measurements

Day	Test Condition	Run Number	PCE Method 0030		Outlet Sample Point						
			Inlet[b]	Outlet[c]	VOC. Method 18	HCl Method 26A	CEMS[a]	Moisture Method 4	Velocity Traverse Method 1	Volumetric Flow Method 2	Total Particulate Matter Method 5
1	400-450°F	1	✓	✓[e]	✓	✓	[f] ✓	✓[d]	✓	✓	✓
		2	✓	✓	✓	✓	✓	✓	✓	✓	✓
		3	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	500-550°F	1	✓	✓[e]	✓	✓	[f] ✓	✓[d]	✓	✓	✓
		2	✓	✓	✓	✓	✓	✓	✓	✓	✓
		3	✓	✓	✓	✓	✓	✓	✓	✓	✓

[a] For NO_x, CO, CO_2, O_2, and THC.

[b] Inlet to catalytic oxidation unit.

[c] Vent stack to atmosphere (downstream of scrubber).

[d] For each set of measurements, 3-10 minute runs will be performed to avoid saturation. The start time of the runs will be concurrent with the outlet runs (see footnote e).

[e] For each set of measurements, 3-40 minute runs will be performed.

[f] For each set of measurements, 3-60 minute runs will be performed.

For PCE, one set of three runs will be conducted during each test period using SW846 Method 0030. Two sample points [upstream of the catalytic oxidizer (i.e., uncontrolled) and at the vent to atmosphere (i.e., controlled)] will be measured to provide a determination of control efficiency for PCE. The controlled and uncontrolled samples will be collected concurrently, so that minor variations in unit operation are not a factor in determining control efficiency. Based on the predicted concentrations of PCE in the streams, the sampling time per run for Method 0030 will be 10 minutes for the uncontrolled sample point (to avoid saturation of the absorbent at higher concentrations) and 40 minutes for the controlled sample point (approximately 5 times the detection limit of the method).

For HCl, one set of three 60-minute runs will be conducted for each test condition using Method 26A. The sampling point for HCl will be the vent stream to the atmosphere in order to compare the measured emissions levels with the levels shown in the permit to construct.

For particulate matter, one set of three 60 minute runs will be conducted for each test condition using Method 5. For VOCs, one sample will be collected in a Tedlar bag or canister during each test run, in accordance with Method 18.

For SO_X, a maximum emissions rate will be determined using fuel analysis by ASTM Method D3246 after fuel tank loading and prior to the test period. NO_X, CO, THC, CO_2, and O_2 will be continuously monitored during each of the test runs. EPA Method 1 procedures will be used to determine the number and location of sampling traverse points required for each sample location, and EPA Method 2 will be used to perform volumetric flow rate determinations. In addition, the average moisture content of the source gas will be measured using the EPA Method 4 procedures or collected as part of the Method 26A sampling train. An overview of each method is provided below.

SW846 Method 0030. The volatile organics sampling train (VOST) Method 0030 found in SW846 will be used to sample for PCE. This method utilizes Tenax and Tenax/Charcoal traps to absorb volatile organic compounds (bp < 100°C) from the sample stream. After sampling, the Tenax traps are sent to a laboratory for analysis using thermal desorption purge-and-trap by gas chromatography/mass spectrometry (Method 5040). In accordance with the method, three runs are conducted for a single test condition.

For the sampling point upstream of the catalytic oxidation unit, the sampling time per run will be 10 minutes in duration to avoid saturation of the absorbent. For the outlet exhaust sampling point, the sampling time per run will be 40 minutes in duration at a sampling rate of 1 liter per minute. The 40 minute sampling period was established based on the expected emissions rate of PCE to provide a level that is at least 5 times the detection limit of the method. A total of three runs will be performed for each test condition.

The typical sampling duration for SW846 Method 0030 is 20 minutes as discussed in the method. Because of the low levels of PCE expected downstream of the catalyst, the sampling duration has been lengthened to 40 minutes to provide an expected level that is 5 times the detection limit of the method for PCE. A level that is 5 times the DL of the method should be more than adequate to avoid a result that is below the detection limit.

However, for the high expected level of PCE upstream of the catalyst, the typical 20 minute sampling duration would likely result in saturation of the absorbent, producing results that are biased low. Therefore, to avoid saturation, it is recommended that the sampling time be limited to 10 minutes which is well above the DL of the method but below the upper limit of the method.

EPA Method 26A. Method 26A is an isokinetic procedure to absorb gaseous hydrogen halides and halogens in alkaline or acidic solutions. Method 5 type impingers are used for collecting the HCl sample. The isokinetic method is used when water droplets are present, such as after a scrubber, where it is necessary to account for the bias of the halides in the scrubber water. Samples are recovered in the field and sent to a laboratory for ion chromatography analysis.

A continuous HCl monitor (e.g., TEI Model 15 HCl Analyzer) uses a dilution method for monitoring the gas stream, and does not have a sufficiently low detection limit to monitor the expected HCl levels during LTEV operations. Therefore, continuous monitoring of the HCl level in the exhaust is not practical.

EPA Method 1. The number and location of sampling traverse points necessary for isokinetic sampling will be determined according to EPA Method 1 protocol. EPA Method 1 parameters are based upon the length of duct separating the sampling ports from the closest downstream and upstream flow disturbances. The minimum number of traverse points for a circular duct less than 24 inches is 4 (8 total sampling points). Traverse point locations are determined for each sample port depending on the distances to duct disturbances. Method 1 procedures will be implemented where isokinetic sampling is required.

EPA Method 2. Volumetric flow rate will be measured according to EPA Method 2. A Type K thermocouple and S-type pilot tube will be used to measure flue gas temperature and velocity, respectively. Method 2 procedures will be implemented where isokinetic sampling is required. The velocity measured during the Performance Test will be compared to the unit's velocity meter located between the catalyst and quench systems. This comparison will be used to develop a method for calculating velocity from the stack during normal operations based on readings from the control panel continuous velocity monitor.

EPA Method 4. The average moisture content of the sample gas will be determined using EPA Method 4. Before sampling, the initial weight of the impingers are recorded. When sampling is completed, the final weights of the impingers are recorded, and the weight gain is calculated. The weight gain and the volume of gas sampled are used to calculate the average moisture content (percent) of the sample gas. Since the stack gas is always expected to be saturated, the Method 4 data can be used in developing the method for calculating flow rate using data from the control panel continuous velocity monitor.

EPA Method 5. Particulate matter is sampled isokinetically from the exhaust and collected on a glass fiber filter. The particulate mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after removal of uncombined water.

EPA Method 18. Volatile organic compounds (C_1-C_{6+}) will be measured using EPA Method 18 by collecting an exhaust sample in a Tedlar bag or canister. The major organic components of a gas mixture are separated by gas chromatography (GC) and individually quantified by flame ionization or other appropriate detection principals.

Continuous Emissions Monitoring. CEMS which meet EPA performance specifications will be used for continuous monitoring of NO_x, CO, CO_2, THC, and O_2. The CEMS configuration is comprised of four sub-systems, including:

- Sample gas extraction and transfer equipment;
- Conditioned sample gas analysis instrumentation (NO_x, CO, CO_2, and O_2);
- Unconditioned sample gas analysis instrumentation (THC); and
- Calibration and QA standards delivery equipment.

The sample gas conditioning equipment is used to remove particulates, moisture, and other condensibles from the sample gas stream prior to measurement via a series of glass condensers/chillers.

Measurement of O_2 and CO_2 will be conducted according to the specifications of EPA Method 3A ("Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources"). For O_2 analysis, Amtek LS or an equivalent will be used. For CO_2, a Servomex 1400 or equivalent will be used.

Measurement of NO_X will be conducted according to the specifications of EPA Method 7E ("Determination of Nitrogen Oxides Emissions from Stationary Sources"). The NO_X analysis instrument will be a TECO Model 42 or equivalent.

Measurement of CO will be conducted according to the specifications of EPA Method 10 ("Determination of Carbon Monoxide Emissions from Stationary Sources"). The CO analysis instrument will be a TECO Model 48 or equivalent.

Measurement of THC will be made on a wet basis from an unconditioned sample gas stream according to the specifications of EPA Method 25A ("Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer"). The THC analysis instrument will be a JUM VE-7 or equivalent.

5.3.3 LTEV Operations

During normal operation of the LTEVS, after completion of the Performance Test, continuous monitoring of CO, CO_2, and O_2 will be performed. Assuming that HCl, NO_x, and SO_x levels are found to be within the permitted levels during the Performance Test, no additional monitoring will be implemented during operation of the LTEV system. Likewise, if the control efficiency for PCE is within the permitted level (99.99%), no additional testing will be conducted for PCE from the exhaust.

5.3.4 Waste Feed/Residuals Test Plan

During the Performance Test, grab samples from treated soils will be collected approximately 5 to 8 minutes after the grab samples of waste feed are obtained. Since soil residence time in the desorption chamber is about 4 to 8 minutes, with a residence time of 1 to 2 minutes in the discharge auger, this approach is most likely to result in sampling of the same soils before and after treatment. All soil pretreatment grab samples will be collected from the cold feed belt or from the loader bucket immediately prior to placement in the hopper. Grab samples will be composited by analytical laboratory personnel at the lab as opposed to the compositing being conducted on site. Post-treatment grab samples will be collected at the exit of the moisturizing auger in a 5 gallon metal container and held until the soil is cool enough to be safely placed in sample containers by sampling personnel. As with the pretreatment samples, post-treatment samples will be composited by the laboratory.

It is expected that very low concentrations of metals will be found in residuals during the Performance Test. If these levels are shown to be within regulatory limits, then testing for metals from the residuals will not be performed during normal operations. However, if these levels are found to be of concern during the Performance Test, they will continue to be monitored during normal operations until the levels are shown to be reduced to acceptable levels.

PCE in the waste feed and in the treated soils will be monitored during the Performance Test to establish that the performance criteria of 200 μg/kg of PCE is achieved. VOCs and PCE in scrubber blowdown will be monitored to establish that the catalyst is performing properly and to demonstrate that contaminants are not being collected in the quench and scrubber. Waste feed will also be analyzed for sulfur to assure that it is not a source for the production of unacceptable levels of sulfur dioxides.

Destruction Removal Efficency (DRE) will be demonstrated in the Performance Test to be 99.99 percent, as a comparison between PCE contamination in the soil versus stack emissions. The level of PCE in the contaminated soil could potentially be well below the expected levels used to calculate the sampling time needed for SW846 Method 0030 to provide results above the detection limit of the method. If the PCE level in the soil is very low (at least 5 times lower than expected) and DRE cannot be measured, then it will be calculated. Soils will not be spiked with PCE from off site sources to demonstrate DRE.

5.4 Meteorological Monitoring

A meteorological monitoring program will be an integral part of the Claremont Polychemical air monitoring program. The data obtained will be used to estimate the potential migration of target compounds by using a diffusion model. A Davis Instruments Weather Monitor II meteorological system has been installed for the air monitoring program. Sections 5.4.1, 5.4.2, and 5.4.3 address siting criteria for the meteorological monitoring station sensors, monitoring duration, and system parameters, respectively.

5.4.1 Siting of the Meteorological Station

The primary objective of instrument siting is to obtain measurements that are representative of the area. Representative data are obtained by adhering to guidelines for minimum sensor height above the surface, and distances from natural and manmade obstructions.

The meteorological station will be located on level and open terrain away from interferences. Interferences are unwanted local effects that distort the actual conditions at the site. Interferences may be buildings that disrupt the normal flow of winds or direct solar radiation that falsely elevates ambient air temperature readings. Conventions have been adopted by the U.S. EPA to aid in the collection of comparable data by avoiding interferences. These conventions will be adhered to for parameters that are dependent on height, such as wind speed, wind direction, relative humidity, temperature, and precipitation. Table 5.6 summarizes these conventions.

Table 5.6
Claremont Polychemical Superfund Site
Recommended System Accuracies and Resolutions(a)

METEOROLOGICAL VARIABLE	SYSTEM ACCURACY	MEASUREMENT RESOLUTION
Wind Speed	±0.2 m/s	0.1 m/s
Wind Direction	±5 degrees	1 degree
Ambient Temperature	±0.5°C	0.1°C
Dew Point Temperature	±1.5°C	0.1°C
Precipitation	±10% of observed	0.3 mm
Pressure	±3 mb (0.3 kPa)	0.5 mb
Time	±5 minutes	---

(a) U.S. EPA, June 1987. On-Site Meteorological Program Guidance for Regulatory Modeling Applications. EPA-450/4-87-013. Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina 27711.

5.4.2 Duration of Meteorological Monitoring

The meteorological data will be collected starting at least two weeks prior to the initiation of baseline monitoring. Data will be collected for the duration of the remedial activity. If a significant lag occurs during the remedial activity, meteorological monitoring may be ceased until resuming treatment work.

5.4.3 Meteorological Monitoring Parameters

The meteorological system for the site will monitor the following parameters: wind speed, wind direction (with sigma theta), ambient temperature, precipitation, and barometric pressure. The meteorological equipment specifications will comply with the recommended accuracies, resolution, and response characteristics outlined in Tables 5.6 and 5.7.

The meteorological data will be recorded continuously by a data logger and/or a strip chart recorder and will be available in hourly averages to site personnel.

The meteorological equipment installation and operation specifications will be performed according to the manufacturer's recommendations and the U.S. EPA's On-site Meteorological Program Guidance for Regulatory Modeling Applications (U.S. EPA 450/4-87-013, June 1987).

Table 5.7
Claremont Polychemical Superfund Site
Recommended Response Characteristics For Meteorological Sensors

METEOROLOGICAL VARIABLE	SENSOR SPECIFICATION(a)
Wind Speed	Starting speed ≤0.5 m/s; Distance constant @ 5m
Wind Direction	Starting speed ≤0.5 m/s at 10° deflection; Damping Ratio 0.4 to 0.7; Delay distance ≤5 m
Temperature	Time Constant ≤1 minute
Dew Point Temperature	Time Constant ≤30 minutes; operating temperature range -30°C to +30°C

(a) U.S. EPA, June 1987. On-Site Meteorological Program Guidance for Regulatory Modeling Applications, EPA-450/4-87-013, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711, Table 5-2.

5.5 Performance Testing of Sources

Before remedial action can begin in full operation, performance testing will be performed for the exhaust gas in the common stack used for both of the LTEV units using the U.S. EPA Methods and the requirements listed in Tables 5.1, 5.3, and 5.5.

Engineering analysis of the treatment system and results of performance testing, combined with expert engineering judgment, are commonly used to indicate appropriate operating controls for a given unit such that the unit effectively treats the contaminants of concern while operating under conditions that are protective of human health and the environment.

Testing for contaminants of concern and control of key parameters, some of which can be monitored continuously, are necessary to characterize each LTEV unit, and to ensure that such unit(s) are operated within the conditions demonstrated during the Performance Test.

A complete system performance evaluation or Performance Test is normally performed to:

- Demonstrate that the treatment unit can meet performance levels (e.g., ARARs and site-specific clean-up goals);
- Demonstrate that the unit will be operated in a manner that is protective of human health and the environment; and
- Establish operational performance criteria to ensure compliance with performance levels.

If the results indicate that the emission criteria can not be met consistently under steady state conditions, DEI will submit revised operating protocols within 3 days to demonstrate how any identified deficiencies will be corrected.

Stack sampling for analysis at an off-site laboratory for the LTEVS will be as indicated in Table 5.3. This sampling and testing program will ensure continuous compliance with all applicable air emissions regulations.

5.6 Quality Assurance and Quality Control

The goal of the quality assurance/quality control (QA/QC) procedures is to ensure the collection of samples representative of the stream, control of data quality during sample collection and analysis, and the use of valid data handling procedures to provide a link between the analytical results and the physical conditions they represent. The QA/QC checks and procedures described in this section are an integral part of the overall sampling scheme. The acceptance criteria, control limits and corrective action to be followed are summarized in Table 5.8.

Table 5.8

Summary of Acceptance Criteria, Control Limits, and Corrective Action

Criteria	Control Limits	Corrective Action
Manual Sampling		
Final Leak Rate (after each port)	$\leq$0.02 acfm or 4% of sampling rate whichever is less	Adjust sample volume for port
Dry Gas Meter Calibration	Post average factor (γ) agree $\pm$5% of pre-factor	Adjust sample volumes using the γ that gives smallest volume
Individual Correction Factors (Y_i)	Agree within 2% of average factor	Redo correction factor
Average Correction Factor	1.00 $\pm$1%	Adjust the dry gas meter and recalibrate
Intermediate Dry Gas Meter	Calibrated every 6 months against EPA standard	--
CEM Measurements		
Linearity Multipoint Calibration (four points)	Response should be within 2% of span value	Adjust instrument, redo multipoint
Daily Drift (zero and span)	$\pm$2.0% of span	Data not adjusted for drift
Sampling System Bias	$\pm$5% of span	Check heat tracing and/or clean sample line
QC Check (midrange)	$\pm$2.0% of span	Redo initial calibration
Response Time	Less than 1 minute	Increase sample flow rate
Line Leak Check	$<0.5\%$ O_2	Locate and repair leak, recheck
Manifold Leak Check	$<0.5\%$ O_2	Locate and repair leak, recheck
NO_2 to NO Conversion Efficiency	$>90\%$ conversion	Replace convertor, recheck

The data quality objectives for the LTEVS Performance Testing appear in Table 5.9.

Table 5.9

Claremont Polychemical Superfund Site

Data Quality Objectives for the LTEVS Performance Testing

Measurement	Accuracy,%	Precision, %	Completeness,%
Particulate Matter	+/- 30	+/- 20	90
Volatile Organic Compounds	70 - 130	RSD < 50	90
PCE	50 -150	50 - 150	90
NO_x, THC, CO, CO_2, O_2	+/- 5	+/- 2	90
HCl	± 30	± 20	90

All data will be reviewed and independently validated by the Contractor's Analytical QA Officer before preparation of the final air monitoring phase reports.

5.6.1 Quality Assurance for CEMS

Quality assurance for the CEMS will be conducted according to the applicable specifications of the Title 40-Subpart 60, Appendix F of the Code of Federal Regulations entitled, "Quality Assurance Procedures".

Applicable specifications of this appendix that will be used to assess and assure the quality of the CEMS data obtained include:

- Calibration procedures;
- Calibration drift;
- Relative accuracy; and
- Relative error.

Calibration Procedures. The CEMS will be calibrated before and after each test using vendor certified gas standards of the component(s) of interest in a nitrogen or air mixture. Procedures for calibration will be as follows:

- Zero Gas -- Introduce zero gas (i.e., concentration of 0.0% of the range of each specific instrument) and electronically adjust the instrument output to reflect a zero concentration measurement.
- Span Gas -- Introduce span gas (i.e., concentration of approximately 80-90% of the range of the specific instrument) and electronically adjust the instrument output to reflect the span concentration measurement.
- Response Factor -- Calculate the response factor of each instrument based on the instrument specific zero and span adjusted measurements.

Relative Accuracy and Error. Directly after completion of instrument calibration, an instrument specific QC standard (i.e., known concentration gas at the approximate concentration expected in the source gas for each target species) will be introduced through the entire CEMS and measured by the corresponding instrumentation. The calculated percent difference between the measured concentration of the QC standard and the known concentration of the QC standard for each species measured is the relative error value.

Calibration Drift. Directly after the completion of the test run, the instrument specific QC standards will again be introduced through the entire CEMS and measured by the corresponding instrumentation. The percent drift of each instrument is determined by calculating the percent difference between the pre-sampling and post-sampling measured values for the QC standards.

5.6.2 Quality Assurance for Manual Methods

Quality control procedures for the manual sampling and analysis methods will consist of some, if not all, of the following procedures in accordance with the method: field blank samples, field spiked samples, replicate samples, matrix spike, and laboratory control sample. A field blank for each type of sampling medium will be used for 10 percent of the sampling activities. These blanks will be sent to the field and handled exactly as actual sample media, but then returned without having been used to collect a sample. The analytical laboratory will perform spike sample analyses at a frequency of one in 20.

All applicable quality assurance procedures specified in EPA Methods 26A, 1, 2, 4, 5, and 18 and SW846 Method 0030 will be followed. These include nozzle and pilot calibrations, temperature readout certification, pre- and post-test dry gas meter calibration, and sample train leak check provisions.

SW846 Method 0030 Quality Control Procedures. Quality control procedures found in Method 0030 and analytical Method 5041 will be followed for the samples collected using the VOST technique. Triplicate samples and a field blank will be collected from the site. Laboratory blanks and method spikes will also be analyzed. All procedures specified in the method will be followed.

EPA Method 5. Calibration of the balance used to determine the mass collected in the cyclone rinses, the filter, and the impinger solution and rinses will be checked with NIST Glass weights before and after each weighing session. Ten percent of the samples and blanks will be reweighed by a second person as a QC check.

EPA Method 8. Volatile organic compounds will be determined by GC and GC/MS analysis of gaseous samples from a Tedlar bag or canister. QC procedure will include calibration checks and duplicate sample analyses.

EPA Method 26A. Quality control procedures found in Method 26A will be followed for sample preparation and collection, field recovery, and laboratory analysis. Triplicate samples and a field blank will be collected from the field. Laboratory blanks and method spikes will also be analyzed.

Other Manual Methods. Quality control procedures for EPA Methods 1,2, and 4 will include calibration of the flow measurement apparatus and leak checks of the sampling equipment. All procedures specified in the methods will be followed.

5.6.3 Sample Tracking and Documentation Procedures

Sample handling procedures, including labeling, preserving, storing, and shipping, will be conducted in such a manner as to ensure the integrity of the samples and to provide a link between the analytical results and the conditions they represent. Accurate documentation of field sampling procedures, sampling and process data, and sample collection and handling records will be maintained throughout the project. All sampling data, including sample times, locations, identification codes, and other pertinent and specific sample or process information will be recorded in the bound field logbook as per Section 5.1 of the Field sampling Plan (FSP) of the Sampling and Analysis Plan (SAP).

A master logbook will be kept for tracking and identifying samples collected during field activities. Information on sample volumes, sampling duration, process conditions, and notes or comments will be entered by hand in this logbook (see Section 5.1 of the FSP).

Each sample will be given a unique log number containing five fields which will identify the site, method, run number, and sample replicate or spike sample designation. See Section 5.3 of the FSP for more information. The Remedial Task will be LTEV and the Sample Location as defined in Table 4-1 of the FSP is either 2, 3, or 5 for soil samples and 4 for the scrubber blowdown liquid. Samples sent from the field to a laboratory for analysis will be accompanied by a chain of custody form. This form will accompany the samples until their final disposition (see Section 5.4.3 of the FSP).

Samples collected for PCE and HCl analysis will be transported to the laboratory via overnight express courier for next day delivery.

6.0 DATA MANAGEMENT AND REPORTING

6.1 Air Monitoring Documentation

Complete and detailed documentation of field and laboratory QA/QC activities will be a key factor in the air monitoring program. Required documentation will include the following:

- Field logs;
- Sample information sheets;
- Calibration data records;
- Chain-of-custody forms; and
- Sample analysis sheets.

A field log will be used by the field technician to maintain a record of sample identification numbers, dates deployed, and sample conditions. Notes will also address equipment condition, sampling problems or equipment failures, observed weather conditions, and unusual Site activities. Copies of field logs from each sampling phase will be included in the respective Air Monitoring Program Reports described in Section 6.3 and with the Daily QC report.

Sample information sheets (equivalent to those in the respective standard methods) will be completed for each sample by the field technician. The information included will be similar to that required for field log entries. However, the sample information sheets will be sample-specific and will be considered the primary sample collection documentation. Conversely, the field log is back-up of documentation sources and presents information on a chronological basis. Copies of each sample information sheet will be submitted as part of the daily QC report unless an action level trigger is exceeded. In the latter case, the information sheet will be delivered to the Project Manager at the earliest opportunity. Appendix C contains a copy of a Field Sampling Data Sheet.

Calibration data records (as specified in the respective standard methods) will document required periodic calibrations and any other maintenance activities for individual instruments. Calibration data records will be submitted with the Daily QC Report.

Chain-of-custody forms will be initiated by the analytical laboratory when issuing sample containers. The chain-of-custody will be continued through container acquisition and sampling and returned to the analytical laboratory upon submittal of samples. Individuals who receive and handle each sample assure sample integrity until delivery to the laboratory. Information to be recorded on the chain-of-custody forms includes the date, time, sample identification, sampling method, individuals who handle each sample and the analysis requested. The chain-of-custody is maintained by the laboratory through final analysis and recording of the results.

Within 72 hours of sample receipt by the laboratory, verbal analytical results shall be provided to DEI. The results will be confirmed in a written sample analysis sheet with one original and three copies provided to DEI within 48 hours of providing the verbal results. Used VOC sampling canisters must be certified clean, by the laboratory, before re-use.

6.2 Meteorological Data

Fifteen minute and hourly average meteorological data will be generated by the internal data logger of the Davis Instruments Weather Monitor II meteorological monitoring station. The hourly averages will be printed and saved onsite for reference and used by DEI and USACOE personnel. The data sheets will include wind speed, wind direction, precipitation, temperature, and barometric pressure.

The data will be scanned for validity by using out of range tests and no variability in measurements over a time except for precipitation. Appendix B provides a screening criteria for meteorological data.

6.3 Monitoring Program Reports

The Air Monitoring Program Reports will be submitted to the USACOE within 30 days of the conclusion of a sampling and testing activity. Each report will provide a tabular summary of monitoring results and all associated QA/QC documentation and laboratory data. All occurrences of air concentrations in excess of the established action level trigger, will be identified. In addition, a discussion of mitigating measures that were applied in response to any action level exceedences will be provided.

The performance test report will include a comprehensive description of the QA/QC procedures that were followed during the Performance Tests. The QA/QC section of the report will include a discussion of whether the data quality objectives were met. A discussion of any deviation from the test plan, either pertaining to test conditions, test methods, or QA/QC procedures, will be documented.

APPENDIX A

CALCULATIONS USING STANDARD POINT SOURCE METHOD FOR PREDICTING AN IMPACT AT THE MAXIMUM POINT OF CONCENTRATION FROM AIR GUIDE-1

CLAREMONT POLYCHEMICAL SUPERFUND SITE

CALCULATIONS USING STANDARD POINT SOURCE METHOD FOR PREDICTING AN IMPACT AT THE MAXIMUM POINT OF CONCENTRATION- FROM NEW YORK STATE AIR GUIDE-1

Tetrachloroethylene (Perchloroethylene), (PCE)
CAS Registry Number 00127-18-4

SCG (ug/m^3) = 81,000.0	(T) SGC Derived from ACGIH TLV-TWA (90-91)
AGC (ug/m^3) = 7.5 E-02	(D,U) $^{(D)}$ AGC derived by NYSDEC, Division of Air Resources, Bureau of Air Toxics Assessment Section $^{(U)}$ AGC is the ambient air concentration which correspondsto an excess cancer risk of one in one million after life-time exposure

APPENDIX A: High = 99+ DRE and MAAAI < AGC and MOHSTI < SCG

III.C.3 Must have BACT due to (U) designation and must be under 10^{-5} risk (per Sec. III.C.3.a)
Moderate - receives an initial rating of "B" (per 6 NYCRR 212, Appendix 414)
Assuming 3,900 yds^3 of soil @ 3,000 lbs/yd^3 = 11,700,000 lbs or 5,850 tons
(5,850 tons) / (18 tons per hour (tph)) = 325 hrs of operation

III.A. (325 hrs of operation) X (4.1×10^{-5} lbs/hr PCE) = 0.0133 lbs of PCE during ops.
Passed because is < 1 lb

III.B. Annual Impact ($4.1 X 10^{-5}$ lbs/hr PCE) X (8,760 hrs/yr) = 0.3592 lbs of PCE Annually
Passed because is < 1 lb

IV.A. Short Term Air Quality (SGC) Allowable = $5.057 X 10^{-6}$ lbs/ft^3
Passed Emissions per unit = $1.380 X 10^{-10}$ lbs/ft^3

VI.B.3. AGC = ($7.5 X 10^{-2}$ ug/m^3) ($7.5 x 10^{-2}$ ug/m^3) X ($1 X 10^{-6}$ g/ug) = $7.5 X 10^{-8}$ g/m^3
($7.5 X 10^{-8}$ g/m^3) / (1,000 g/kg) = ($7.5 X 10^{-11}$ kg/m^3)
($7.5 X 10^{-11}$ kg/m^3) X (16.018 m^3 -lbs/kg-ft^3) = $1.2014 X 10^{-9}$ lbs/ft^3

Passed

APPENDIX B:

III.A.2. Maximum Actual Annual Impact C_a
C_a (ug/m^3) = 0.482 Q_a / (h_e X 2.16) assumes Q_a in lbs/yr and h_e in ft
C_a (ug/m^3) = (0.482 X 0.3592) / (40 ft X 2.16) = 0.3409 and AGC = $7.5 X 10^{-2}$ ug/m^3

III.A.3. Maximum Potential Annual Impact C_p
C_p (ug/m^3) = (4218 X Q) / (h_e X 21.6) = (4218 X ($4.1 X 10^{-5}$ lbs/hr)) / (40 ft X 2.16)
C_p (ug/m^3) = 0.0020 or $2 X 10^{-3}$ ug/m^3

C_p < AGC and C_a > AGC

Unit is to operate appx. 325 hrs on soil, therefore, annual emissions should reflect 325 hrs / 8,760 hrs = 0.0371 or 3.71%
Hence the annual emissions are actually (4.1 X 10^{-5} lbs/hr) X (325 hrs) = 0.0133 lbs/yr or conversely
C^a = ((0.482) X (9 X 10^{-3} lbs/yr)) / (40 ft X 2.16)
C_a = 5.03 X 10^{-6} ug/m^3

III.A.4. Maximum Short-Term Impact C_{st}

C_{st} (ug/m^3) = C_p 420
0.8400 ug/m^3 = (2 X 10^{-3}) X (420)
h_s / h_b = Stack height h_s / Building height h_b = 40 ft / 12 ft = 3.33
therefore C_{st} = 0.8400 ug/m^3 / 2 = 0.4200 ug/m^3
Stack exit velocity = V_{fm} = (q_m in cfm) / (A in ft^2)
5,723.7428 cfm / 5.5851 ft^2 = 1,024 ft/min = 17.08 ft/sec.

Operations:
325 hrs
12 hrs/day
27.08 days
Fall 100%

APPENDIX B

SCREENING CRITERIA FOR METEOROLOGICAL DATA

DRAFT

SCREENING CRITERIA FOR METEOROLOGICAL DATA

PARAMETER	SCREENING CRITERIA
Wind Speed	> 20 m/s (1 hour average) Unchanged for 12 or more consecutive hours (within ±0.5 m/s)
Wind Direction	Any reported with calm or no wind speed Same 10° sector for 18 or more consecutive hours
Air Temperature	> 45°C < -35°C > +5° or -5° change/1 hour Unchanged for 12 or more consecutive hours (within ±0.5°C)
Dew Point	> air temperature at that hour (same location) > +3°C or < -3°C change/1 hour Unchanged for 12 or more consecutive hours (within 0.5°C) = air temperature for 12 or more consecutive hours (within 0.1°C)
Pressure	> 1,096 mb (sea level) < 940 mb (sea level) > + 6 or < -6 mb change/3 hours
Rainfall	> 15 cm/24 hours < 5 cm/3 months

Source: U.S. EPA. 1983. Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV, Meteorological Measurements. EPA-60/4-82-060. Research Triangle Park, North Carolina. February.

APPENDIX C

FIELD SAMPLING DATA SHEET

FIELD SAMPLING DATA SHEET

A. General Information

Site Name/Location: ______________________________

Sampling Date: ______________________________

Shipping Date: ______________________________

Sampling Station ID: ______________________________

Canister ID: ______________________________

Canister Cleaning Certification: ____________________

Sampler No.: ______________________________

Field Operator: ______________________________

B. Sampling Information

Type of Sample: ______________________________

Sampling Flow Rate, cm^3/min: ______________________

Clock time

Start, Hrs: ____ Stop, Hrs: ____ Min Elapsed: ____

Pressure Gauge Reading

Start, mm Hg: ____
Stop, mm Hg: ____

Ambient Temperature

Start, °C: ____
Stop, °C: ____

Barometric Pressure

Start, mm Hg: ____
Stop, mm Hg: ____

FIELD SAMPLING DATA SHEET

PAGE 2 OF 2

C. Laboratory Information

Data Received: ______________________________

Received By: ______________________________

Analysis Method: ______________________________

Date of Analysis: ______________________________

Analyzed By: ______________________________

Results: ______________________________

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D. Comments

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