Honeywell

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July 10, 2012

To: Harry Warner, NYSDEC, Region 7 (1 bound)
Diane Carlton, NYSDEC, Region 7 (1 PDF)
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Re: Letter of Transmittal – Onondaga Lake Repository Addition

The below document has been approved by the New York State Department of Environmental Conservation (NYSDEC) and is enclosed for your document holdings:

- Quality Assurance Project Plan, Air Quality Monitoring Program – Onondaga Lake Dredging, Sediment Management and Water Treatment (OL AQM QAPP), dated June 2012

Sincerely,

John P. McAuliffe /dmc

John P. McAuliffe, P.E.
Program Director, Syracuse

Enc.

cc: Timothy J. Larson, P.E., Project Manager

Honeywell

Honeywell
301 Plainfield Road
Suite 330
Syracuse, NY 13212
315-552-9700
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July 11, 2012

Timothy J. Larson, P.E.
Project Manager
NYSDEC – Division of Environmental Remediation
Remedial Bureau D, 12th Floor
625 Broadway
Albany, NY 12233-7013

RE: Quality Assurance Project Plan, Air Quality Monitoring Program, Onondaga Lake Dredging, Sediment Management and Water Treatment Project (OL AQM QAPP), Dated June 2012

Dear Mr. Larson:

Enclosed is the Quality Assurance Project Plan prepared by O'Brien & Gere. Per your letter dated June 22, 2012, your approval letter will be attached to the copies distributed to the document repositories selected for this site.

Please contact Scott Manchester at O'Brien & Gere (315-956-6410) or me should you have any questions regarding the information presented herein.

Sincerely,

John P. McAuliffe / Dme

John P. McAuliffe, P.E.
Program Director, Syracuse

Enc. (2 copies, 1 CD)

cc: R. Nunes – USEPA, NYC (1 copy, 2 CDs)
J. Gregg – NYSDEC (electronic copy)
M. Sergott – NYSDOH, Troy (1 copy, 1 CD)
J. Davis – NYSDOL, Albany (1 copy)
Fred Kirschner – AESE, Inc. (electronic copy)
Brian D. Israel, Esq., - Arnold & Porter (electronic copy)
Alma Lowry – Onondaga Nation (electronic copy)
Joseph J. Heath, Esq., Onondaga Nation (1 copy)
Thane Joyal, Esq. – Onondaga Nation (electronic copy)
Jeanne Shenandoah – Onondaga Nation (1 copy, electronic copy)
Curtis Waterman – Onondaga Nation (1 copy)
Michelle McDonald – Honeywell (1 copy, CD)
T. Drachenberg – Parsons (electronic copy)
Scott Manchester – O'Brien & Gere (electronic copy)

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New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau D, 12th Floor
625 Broadway, Albany, New York 12233-7013
Phone: (518) 402-9676 • **Fax:** (518) 402-9020
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Joe Martens
Commissioner

June 22, 2012

Mr. John P. McAuliffe, P.E.
Program Director, Syracuse
Honeywell
301 Plainfield Road, Suite 330
Syracuse, NY 13212

Re: Quality Assurance Project Plan, Air Quality Monitoring Program, Onondaga Lake Dredging, Sediment Management and Water Treatment Project (OL AQM QAPP), Dated June 2012

Dear Mr. McAuliffe:

We have received and reviewed the above-referenced document, transmitted on your behalf by Scott Manchester (O'Brien & Gere) in an email to my attention dated June 21, 2012, and find that the document has addressed our previous comments. Therefore, the version of the OL AQM QAPP attached to Scott Manchester's June 21, 2012 email is approved.

Please distribute copies of the OL AQM QAPP, including this approval letter, to the list of document repositories selected for this site.

Sincerely,

Timothy

Timothy J. Larson, P.E.
Project Manager

ec: B. Israel, Esq, - Arnold & Porter
J. Gregg – NYSDEC
J. Davis - NYSDOL, Albany
J. Heath, Esq.
T. Joyal, Esq.
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M. Sergott - NYSDOH, Troy
F. Kirschner
C. Waterman
A. Lowry
T. Drachenberg - Parsons

PROJECT PLAN

Quality Assurance Project Plan

Air Quality Monitoring Program

Onondaga Lake Dredging, Sediment Management and Water Treatment Project

Honeywell

June 2012

O'BRIEN & GERE

PROJECT PLAN

1163 | 45153

Quality Assurance Project Plan

Air Quality Monitoring Program

Onondaga Lake Dredging, Sediment Management and Water Treatment Project

Honeywell

MARK DISTLER, SENIOR VICE PRESIDENT
O’Brien & Gere Engineers, Inc.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1. INTRODUCTION

1.1 DOCUMENT PURPOSE

An air quality monitoring (AQM) program is planned for the Onondaga Lake Dredging, Sediment Management & Water Treatment Project (Onondaga Lake remediation project or Project) to be conducted by Honeywell International and its contractors. The AQM program is described in the Project's Community Health & Safety Plan (CHASP)[1]. The purpose of this Quality Assurance Project Plan (QAPP) is to detail the AQM quality control and quality assurance (QA/QC) procedures that will be used to maintain data accuracy and completeness. This document pertains to AQM for the protectiveness of the community and does not pertain to air monitoring associated with the protection of Project workers (a separate program).

1.2 PROGRAM SCHEDULE

The AQM program will be conducted from the start of Lake dredging in 2012 to its substantive completion, approximately four years later. AQM will consist of real-time monitoring and routine sampling. Real-time monitoring will be conducted 24-hours per day 7 days per week during the dredging operations season each year, anticipated to be each April through November (8 months per year). Air sampling will also be conducted every 6th day throughout each operations year (12 months per year). Monitoring duration of selected compounds may be reduced or eliminated pending regulatory agency approval if emissions are demonstrated to be under control and perimeter concentrations are consistently below criteria.

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[1] "Draft Onondaga Lake, Remediation Operations, Community Health & Safety Plan", Honeywell, March 2012.

2. PROGRAM ORGANIZATION

2.1 LEAD REGULATORY AGENCY

Regulatory oversight of the Onondaga Lake remediation project and thus the AQM program will be the responsibility of the New York State Department of Environmental Conservation (NYSDEC). The NYSDEC Project Manager is Mr. Timothy Larson, who will be responsible to review and approve this QAPP, on the behalf of NYSDEC. Mr. Larson will also be responsible for the NYSDEC's oversight of the AQM program's implementation and adherence to the procedures defined herein.

2.2 RESPONSIBLE PARTY

Honeywell is responsible for implementation of the Onondaga Lake Project.

2.3 DESIGN & CONSTRUCTION CONSULTANT

Parsons Corporation is responsible for the design and implementation of the Project. Implementation will consist of coordination and oversight of all dredging operations at the lakeshore, pipeline transport, and Sediment Consolidation Area (SCA) operations. Program operations oversight will be the responsibility of the Parsons Project Manager, Paul Blue, who will report directly to Honeywell, and will work in close cooperation with the AQM contractor for the successful implementation of the AQM plan. Mr. Blue will be provided field operations support by the Parsons Site Manager, Alan Steinhoff. Mr. Steinhoff will report to Mr. Blue and be responsible for implementation and proper execution of all program operations. Both Mr. Blue and Mr. Steinhoff will receive daily AQM reports. Mr. Steinhoff and his operations staff will communicate continually with the AQM field staff throughout the Project's execution. They will apply emissions controls on operations activities and/or curtail operations if and when the AQM network shows excursions above action levels or perimeter limits. The communication between the Project's operations and AQM teams is critical to the Project's success.

2.4 AIR MONITORING CONSULTANT

O'Brien & Gere Engineers, Incorporated is responsible for the implementation of the Project's AQM program. O'Brien & Gere will report directly to the Honeywell Program Manager, Bob Rule, and will work in close support with the Parsons operations team. Implementation of the AQM program will include daily AQM system operations, data management and reporting, quality assurance (QA) and quality control (QC). The following people will play lead roles in the AQM program.

2.4.1 Portfolio Lead

Christopher Calkins is the O'Brien & Gere leader for the Honeywell Syracuse Portfolio. His role is to ensure the program is delivered in a manner consistent with Honeywell's Portfolio Strategy. The Portfolio Lead will oversee the project from this perspective and have regular engagement with Honeywell and the O'Brien & Gere Project Officer and Project Manager.

2.4.2 Project Officer

Mark Distler is the O'Brien & Gere Project Officer for the AQM program. His role is to ensure the program's goals for data quality, safety, schedule, and performance are met or exceeded. The Project Officer will have an executive role to oversee the implementation of this QAPP, and look for ways to improve the team's performance through system audits of the program. He is also responsible for the program's adherence with corporate policies and project delivery standards.

2.4.3 Project Manager

Scott Manchester is the O'Brien Gere Project Manager for the AQM program. He will be responsible for the successful execution of the program by monitoring technical, quality, and schedule aspects. In addition, the Project Manager will coordinate project activities relative to cost and schedule, and be a technical resource to resolve operational questions and concerns. Technical staff will report to the Project Manager, who will coordinate regular project meetings with the operations manager and field staff. The Project Manager will report to the Project Officer.

2.4.4 Technical Resource Lead

Christopher Finke is the O'Brien & Gere Technical Resource Lead for the AQM program. He will oversee day-to-day technical operations, initially train and continually direct the AQM operators, provide supplemental field support, assure implementation of field QA/QC procedures, procure and maintain inventory of field equipment and expendables, and maintain overall data quality and completeness. He will also be responsible for daily/routine data review and reporting, and will report to the Project Manager.

2.4.5 Quality Assurance (QA) Manager

Karen Storne is the O'Brien & Gere QA Manager for the AQM program's VOC sampling. She will report directly to the Project Manager and will be responsible for review of sample analysis data packages and validation of laboratory data by evaluating adherence of laboratory QA/QC requirements described herein.

2.5 ANALYTICAL LABORATORY

The analytical laboratory will be responsible for performing analyses of air samples collected for the project. The analytical laboratory to perform the services will be determined prior to project start, and may change during the 4-year project. However, any selected laboratory will meet the analytical requirements for this project as set forth in this QAPP. Each laboratory will identify staff to fulfill the roles of Laboratory Project Manager, Laboratory Director, Laboratory QA Manager and Laboratory Sample Management Supervisor.

2.5.1 Laboratory Project Manager

Primary responsibility for communicating project quality to Honeywell and/or O'Brien & Gere rests with the Laboratory Project Manager. Project quality will include delays and anomalies identified by the Laboratory Manager in sample receipt, analysis and reporting. The Laboratory Project Manager will also be responsible for overseeing submittal of final analytical reports to O'Brien & Gere.

2.5.2 Laboratory Director and Laboratory QA Manager

The Laboratory Director will be responsible for signatory approval of the analytical reports. The Laboratory QA Manager will be responsible for overview of the laboratory QA, overview of the QA/QC documentation, and conducting detailed data review. The Laboratory QA Manager will decide if laboratory corrective actions are required in addition to seeing that laboratory SOPs are followed. Independent internal QA will be provided by the Laboratory QA Manager prior to release of data to O'Brien & Gere.

2.5.3 Laboratory Sample Management Supervisors

The Laboratory Sample Management Supervisors will be responsible for the following tasks:

- Receive, inspect and record condition of incoming sample containers
- Sign appropriate documents and verify chain-of-custody and its correctness
- Notify Laboratory Project Manager of sample receipt and inspection
- Assign unique identification number and customer number, and enter each into sample receiving log
- Initiate samples transfer to laboratory sections, control/monitor access/storage of samples and extracts.

3. AIR MONITORING PARAMETERS AND CRITERIA

3.1 POTENTIAL EMISSION SOURCES

The Onondaga Lake remediation project (Project) includes dredging the lake bottom; installing a sediment cap; habitat re-establishment; and the transport, treatment, and secure containment of dredged materials. Both dredging activities and cap construction will be conducted from barges on the lake. The proposed Project area to be dredged, lakeshore area, dredge transport pipeline and SCA area are shown in Figure 3.1-1. Dredged materials will be pumped via a double-walled pipeline through non-residential areas to a lined Sediment Processing Area (SPA) for removal of oversized material and initial dewatering. The sediment will then be pumped through pipes to the adjacent, lined Sediment Consolidation Area (SCA) for containment and dewatering. Sediments will be pumped into geotextile tubes for dewatering where they will be contained and isolated long-term within the lined containment area.

Water removed from the dredged sediment will be pumped through pipes to the adjacent water treatment plant (WTP), where it will be treated to levels established by NYSDEC and Onondaga County. The treated water will then be pumped to Onondaga County's Metropolitan Syracuse Wastewater Treatment Plant, where it will go through an additional treatment step prior to discharge back into Onondaga Lake.

Potential air emission sources will be in the areas of the lakeshore operations and SCA operations at locations where exposed sediment or water removed from the sediment is exposed to ambient air. Potential for air emissions are not anticipated along the dredge transport pipeline, where dredged sediment is not exposed to ambient air. The following identifies potential project emission sources:

Lakeshore

- Dredge area water surface
- Debris handling area
- Stockpile area

SCA

- SPA[2]
- WTP[2]
- SCA Basins
- Geotextile tubes and drainage system

Other remedial construction projects in the Honeywell Syracuse Portfolio are anticipated to occur during the Project. Some of these projects include ground intrusive activities that may be potential sources for air emissions of some of the same compounds as the Project. Air quality for these other projects will be evaluated as necessary using separate AQM programs.[3] Therefore, the AQM operators will be made aware of other projects near the Lakeshore and SCA and will be in communication with operators of the other projects so that their emissions can be considered and not included as background concentrations.

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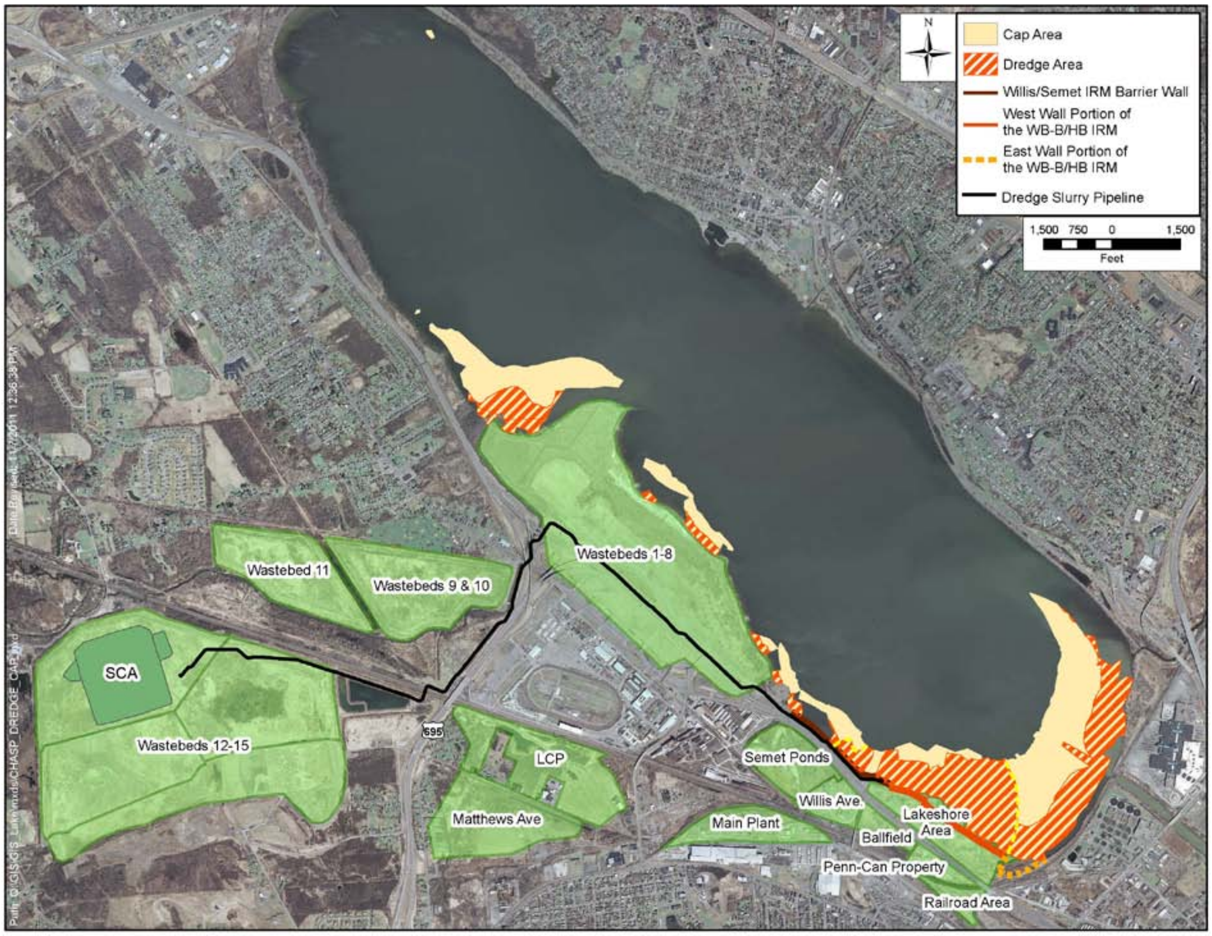
[2] Emissions from these sources will be captured and directed to control units (carbon vessels).

[3] AQM programs for other projects in the Honeywell Syracuse Portfolio may utilize data from one or more fixed SCA or Lakeshore AQM stations if station location is appropriate.

Figure 3.1-1 Project Area



3.2 COMMUNITY RECEPTORS AND WIND ROSES

The nearest community receptors to the Project consist primarily of private residential properties. The nearest residential communities and residential receptor boundary around the project site are shown in Figure 3.2-1.

The Project's SCA site is bordered to the north by CSX Railway, south by private undeveloped land, east by residential and commercial properties, and west by Honeywell property. The nearest off-site receptors to the SCA consist of residences approximately 2000 feet to the north and west, and 4500 feet south and southeast of the work site. The nearest residential receptors to the lakeshore operations are located 1,500 feet to the south and southwest, 2500 feet north, and over 3000 feet east of the nearest portions of the work site.

Annual wind roses for the SCA and Lakeshore project sites[4] were reviewed for the five-year period from 2007 through 2011. The most recent wind roses for 2011 are presented in Figure 3.2-2. A shown in Figure 3.2-2, prevailing winds in the Lakeshore area are primarily from the west. Winds at the SCA are also predominantly from the west, but with more variation especially from the southwest to northwest directions.

---

[4] From 10-meter meteorological stations operated by Honeywell, and located on Wastebed 13 next to the SCA and near Willis Avenue and the Lakeshore (see Figure 3.1-1 for locations).

Figure 3.2-1 Nearest Residential Communities

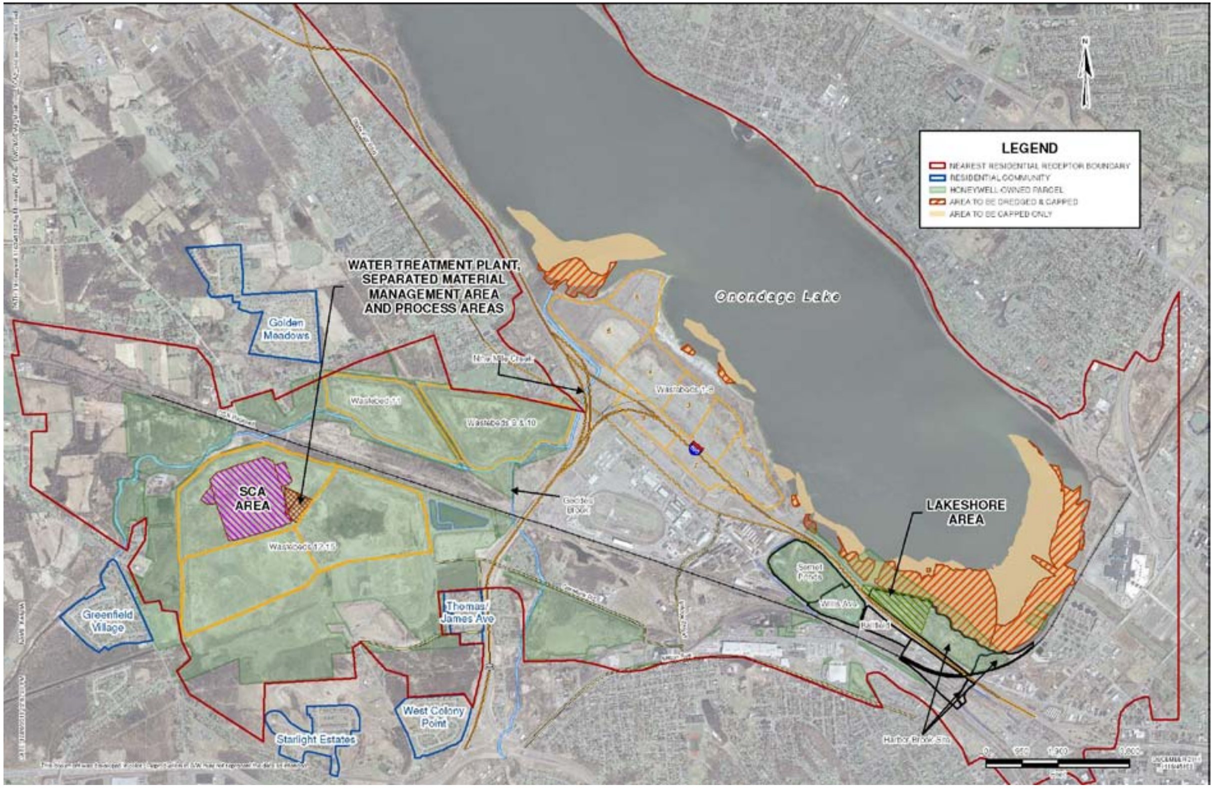
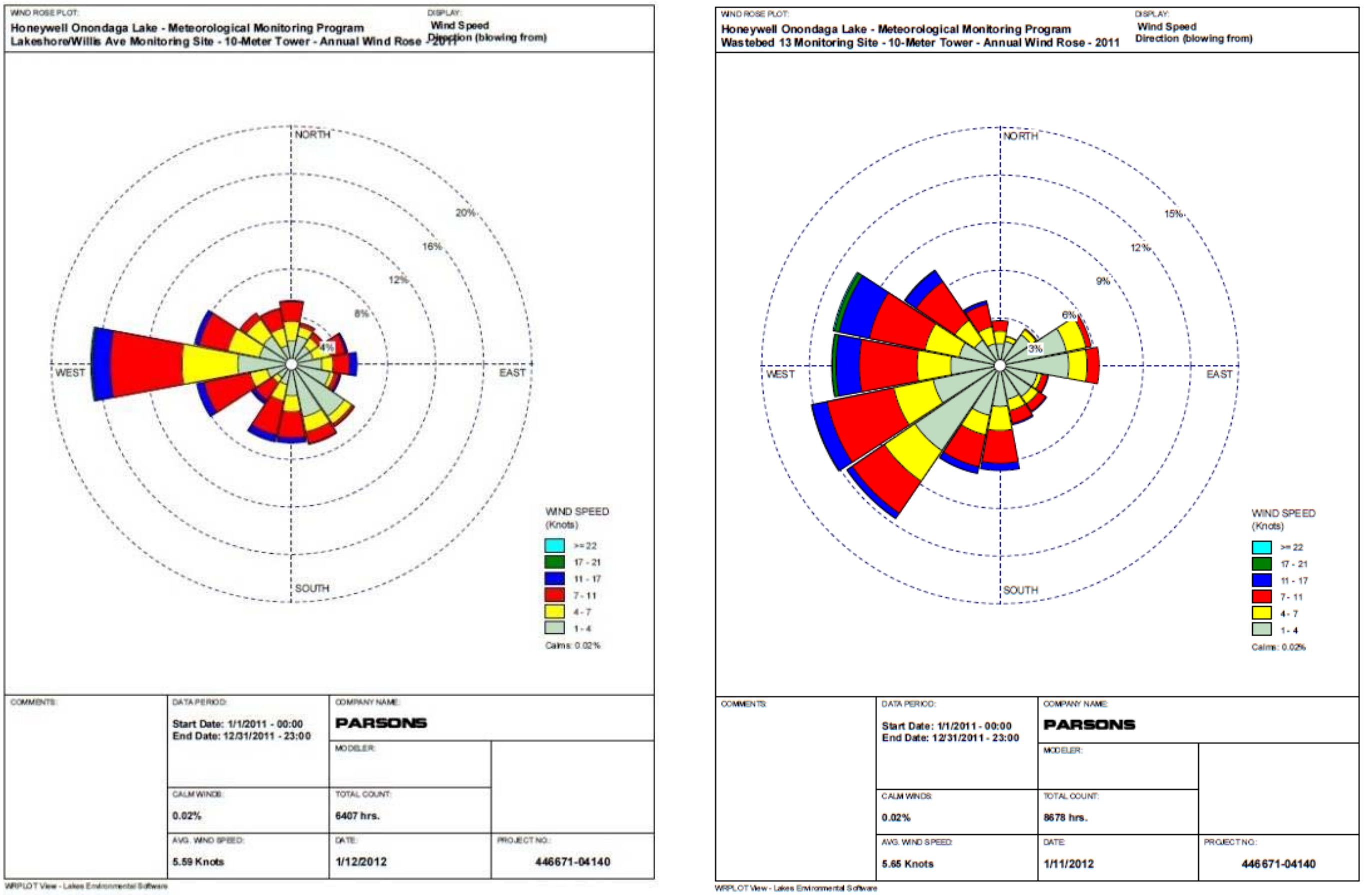


Figure 3.2-2 2011 Wind Roses – Honeywell Syracuse Meteorological Stations



WIND ROSE PLOT:
Honeywell Onondaga Lake - Meteorological Monitoring Program
Lakeshore/Willis Ave Monitoring Site - 10-Meter Tower - Annual Wind Rose - 2011

DISPLAY:
Wind Speed
Direction (blowing from)

COMMENTS:

DATA PERIOD:
Start Date: 1/1/2011 - 00:00
End Date: 12/31/2011 - 23:00

COMPANY NAME:
PARSONS

MODELER:

CALM WINDS:
0.02%

TOTAL COUNT:
6407 hrs.

AVG. WIND SPEED:
5.59 Knots

DATE:
1/12/2012

PROJECT NO.:
446671-04140

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT:
Honeywell Onondaga Lake - Meteorological Monitoring Program
Wastebed 13 Monitoring Site - 10-Meter Tower - Annual Wind Rose - 2011

DISPLAY:
Wind Speed
Direction (blowing from)

COMMENTS:

DATA PERIOD:
Start Date: 1/1/2011 - 00:00
End Date: 12/31/2011 - 23:00

COMPANY NAME:
PARSONS

MODELER:

CALM WINDS:
0.02%

TOTAL COUNT:
8678 hrs.

AVG. WIND SPEED:
5.65 Knots

DATE:
1/11/2012

PROJECT NO.:
446671-04140

WRPLOT View - Lakes Environmental Software

3.3 AIR MONITORING PARAMETERS AND LOCATIONS

AQM will consist of 1) real-time monitoring at the SCA and Lakeshore work zone perimeters, and 2) speciated VOC sampling at the SCA work zone perimeter. Air monitoring will also be supported by the two Project meteorological stations discussed in Section 3.2.

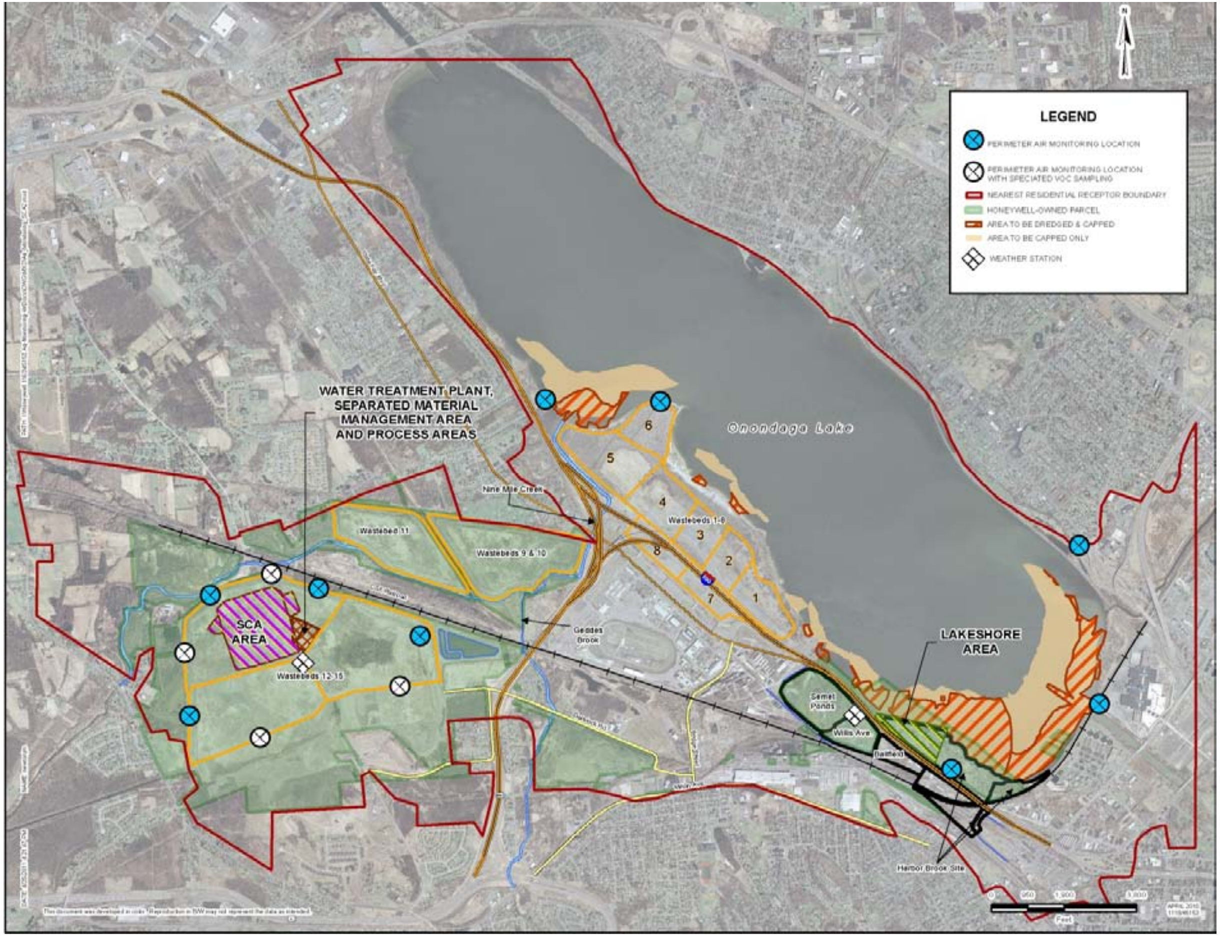
Real-time monitoring will consist of 1) continuous air monitoring for dust and total volatile organic compounds (TVOCs), and 2) routine survey air monitoring for mercury, hydrogen sulfide, and odors. Routine air monitoring for noise will be also performed, but at the SCA work zone perimeter only. Speciated VOC sampling will consist of collecting of whole air (SUMMA® canister) samples following the United States Environmental Protection Agency (USEPA) 6th day sample schedule at four of the fixed stations at the SCA work zone perimeter. The samples will be analyzed by an off-site laboratory for targeted analytes.

A summary of the monitoring parameters and locations is presented in Table 3.3-1. Fixed air monitoring and sampling locations are shown in Figure 3.3-1. Monitoring locations of selected compounds may be reduced or eliminated pending NYSDEC approval if emissions are demonstrated to be under control and perimeter concentrations are consistently below criteria.

Table 3.3-1 Air Monitoring Parameters and Locations

Parameter	Monitoring Type	Location and Number of Monitoring Sites
Dust	Real-time, continuous	SCA: 8
TVOCs	Real-time, continuous	SCA: 8 Lakeshore: 2 to 3
Mercury	Real-time; survey	SCA: 8 Lakeshore: 2 to 3
Hydrogen Sulfide	Real-time; survey	SCA: 8 Lakeshore: 2 to 3
Odors	Real-time; survey	SCA: 8 Lakeshore: 2 to 3
Noise	Real-time; survey	SCA: 8
Speciated VOCs	24-hour integrated whole air sample; off-site laboratory analysis for project-specific (target) VOCs	SCA: 4
Meteorological	Real-time, continuous	SCA: 1 at Wastebed 13; Lakeshore: 1 at Semet Ponds

Figure 3.3-1 Fixed Air Monitoring and Sampling Locations



3.3.1 Continuous Real-time Monitoring - Dust and TVOCs

Continuous real-time monitoring will be conducted for airborne dust (as PM_{10})[5] and total volatile organic compounds (TVOCs) at eight fixed AQM stations around the SCA work zone perimeter[6]. TVOC monitoring will be conducted at two or three of five fixed AQM stations at the Lakeshore work zone depending on the active dredge location. Monitoring equipment at each fixed station will be enclosed in lockable weather-protective environmental enclosures. Dust measurements will be made using the Thermo-Fisher ADR-1500 (ADR) real-time aerosol monitor. The ADR-1500 utilizes a photometric light-scattering detector that continuously measures airborne dust at concentrations from 1 microgram per cubic meter (µg/m^3) to over 100 milligrams per cubic meter (mg/m^3). Dust monitoring will be curtailed during periods of rain and moderate snow, because water drawn into the monitor's sample inlet can damage the monitor (in addition, airborne dust is significantly reduced during rain periods). TVOC measurements will be made using the Rae Systems MiniRAE 3000. The MiniRAE 3000 utilizes a UV-light photo-ionizing detector (PID) that continuously measures TVOC concentrations from 0.1 to 15,000 parts per million (ppm). More discussion of the monitoring equipment is provided in Section 5.3.1.

Data from each dust and TVOC monitor will be time-averaged and recorded at each fixed station by a Campbell Scientific CR800 digital data logger. The data logger will record readings from the dust and TVOC monitors every

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[5] PM_{10} – Particulate matter less than ten microns in size.
[6] The fixed stations will be at the same eight locations used for the 2010 to 2012 Construction AQM Program

5 seconds, and average the readings into 1-minute and 60-minute time-weighted averages. The monitors also record time-averaged concentrations to internal non-volatile memory[7].

Instantaneous and time-averaged data will then be continuously transmitted[8] via cellular phone line to a central computer (PC) located in a trailer or building at the SCA (Central Station) as well as a portable PC located at the Lakeshore. Incoming data will be displayed in near real-time on an aerial site map(s) on the SCA Central Station PC and Lakeshore PC and also on a dedicated wall-mounted LCD panel display at the Central Station.

3.3.2 Routine Survey Monitoring - Mercury, Hydrogen Sulfide, Odors and Noise

Routine survey monitoring will also be performed by conducting manual measurements once approximately every 6 hours (four times over a 24-hour period) at the fixed air monitoring stations. Mercury vapor, hydrogen sulfide, and odors will be measured at the SCA and Lakeshore fixed AQM stations; noise will be measured at the SCA AQM stations only.

Mercury vapor measurements will be made using a portable low-level real-time mercury analyzer. It is anticipated the Jerome J505 will be used, with a detection range of 0.05 $\mu g/m^3$ to 500 $\mu g/m^3$ and a minimum resolution of 0.01 $\mu g/m^3$. Hydrogen sulfide (H_2S) measurements will be made using a Jerome 631-X real-time H_2S analyzer. The 631-X is portable and will provide real-time H_2S readings over range of 3 to 50,000 ppb with a minimum resolution of 1 ppb[9].This monitoring may be discontinued upon NYSDEC approval if monitoring results are consistently low.

Odors will be measured using a Nasal Ranger® portable field olfactometer. The olfactometer is a handheld instrument that allows an operator to breathe odors that are diluted from 2 to 60 times with purified charcoal-filtered air. The odor level will be determined by the “Dilution-to-Threshold Ratio” (D/T) which is the volume of carbon-filtered air divided by the volume of odorized air that are required to first smell an odor. The D/T is quantified in “odor units” (OU), and the olfactometer is factory preset to measure discrete D/T levels at 60, 30, 15, 7, 4, and 2 OU. Note that odors can be detected at less than 2 OU, but are not quantifiable by olfactometer.

Noise monitoring will be conducted using an ANSI Type II (or better) digital sound level meter, anticipated to be a Casella CEL 254. At each fixed station, the sound level will be measured over a continuous period of approximately 1 minute. The average observed response recorded will be compared with the SCA operational guidelines of 65 dBA or below at the SCA site perimeter. If readings above 65 dBA due to on-site noise sources are observed, the source will be identified and noise readings will be taken at the nearest SCA work zone perimeter fenceline. More discussion of the monitoring equipment is provided in Section 5.3.2.

3.3.3 Speciated VOC Sampling

Individual VOCs (speciated) will be sampled and evaluated in comparison with project-specified 12-month average air quality criteria. Sampling will be conducted at four of the eight fixed monitoring locations along the SCA perimeter, as shown in Figure 3.3-1. Consistent with State and Federal air monitoring programs for long-term (12-month) evaluations, samples will be collected over a 24-hour period every sixth day, following the USEPA sixth day sampling calendar. Samples will be analyzed by an off-site laboratory. Sample results will be used to derive background-corrected concentrations and 12-month block averages for each monitoring location for direct comparison with the 12-month average criteria for each VOC. More discussion of the sampling and analysis methods is provided in Section 5.3.3.

3.3.4 Meteorological Parameters (WS, WD, T, RH, BP, PCP)

Weather conditions will be measured continuously at two Honeywell 10-meter meteorological stations – one located in the SCA work zone in the center of the Wastebeds 12-15 (Wastebed 13 Station) and one located near the Lakeshore work zone at the Semet Ponds, along Willis Avenue (Lakeshore Station). Station locations are

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[7] The dust and TVOC monitor internal memory will be used a tertiary backup data source if data on the Central Station PC and Campbell data logger secondary backup data source is not available.

[8] Typically about once every 15 seconds.

[9] Other compounds that may potentially result in a false positive response by the Jerome 631-X H_2S monitor are most mercaptans (thiols), chlorine, ammonia, and NO_2.

presented in Figure 3.3-1. Each weather station will continuously record wind speed, wind direction, air temperature, relative humidity, and barometric pressure. Precipitation will be measured at the Wastebed 13 station during periods of non-freezing weather. During periods when temperatures are below freezing, precipitation data will be recorded from the meteorological station located at Hancock Airport in Syracuse, approximately 8 miles east-northeast from the Honeywell SCA. Five-minute time-weighted averages of data from each Honeywell station will be continuously displayed on the Central Station and Lakeshore PCs. One-hour time-weighted averaged data will be saved each day at the Central Station PC. More discussion of the monitoring equipment is provided in Section 5.3.4.

3.4 MONITORING DURATION AND FREQUENCY

Real-time air monitoring will be conducted during the active dredging season from April through November. Speciated VOC sampling will be conducted throughout the year (dredge season and the non-dredge season). A summary of the monitoring duration, frequency of measurement for each parameter, and the format of the measurement data is presented in Table 3.4-1.

Table 3.4-1 Real-time Monitoring Duration and Frequency

Parameters	Monitoring Duration[a]	Frequency[a]	Data Format
Dust	Dredge season – April to November	24 hours/day; 7 days/week	Hourly averages[b]
TVOCs	Dredge season – April to November	24 hours/day; 7 days/week	Hourly averages[b]
Speciated VOCs	12 months per year	Every 6th day	24-hour averages
Mercury	Dredge season – April to November	4 measurements/day at each fixed station (every 6 hours)	Instantaneous reading; 1-hour average if above Investigate Level
Hydrogen Sulfide	Dredge season – April to November	4 measurements/day at each fixed station (every 6 hours)	Instantaneous reading; 1-hour average if above Investigate Level
Odors	Dredge season – April to November	4 measurements/day at each fixed station (every 6 hours)	Instantaneous reading
Noise	Dredge season – April to November	4 measurements/day at each fixed SCA station (every 6 hours)	Instantaneous reading
Meteorological	During all air monitoring	Coincident with air monitoring or sample events (24 hours/day; 7 days/week)	Hourly averages

[a] Monitoring duration and frequency of selected compounds may be reduced or eliminated pending NYSDEC approval if emissions are demonstrated to be under control and perimeter concentrations are consistently below criteria. Monitoring may be continued after the end of the dredge season if deemed warranted through discussions with NYSDEC.
[b] Time-weighted average reported from continuous (5-second) data.

3.5 AIR MONITORING CRITERIA AND RESPONSE

3.5.1 Short-term Criteria

Results of real-time AQM parameters (all parameters except speciated VOCs) will be compared to short-term (1-hour) air quality work perimeter limits. These limits are based on NYSDEC's short-term guideline concentrations (SGCs)[10] as well as the NYSDOH guidance.[11]

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[10] NYSDEC Policy DAR-1: *Guidelines for the Control of Toxic Ambient Air Contaminants*
[11] NYSDOH generic community air monitoring plan

In addition to the work perimeter limits, action levels (investigation and control) have been established to trigger investigation and control of emission sources prior to reaching work perimeter limits, and thus reduce the likelihood of work perimeter limit excursions. Short-term air quality criteria and the response associated with each criterion are presented in Table 3.5-1, along with the respective monitor's detection limit (ability to measure well below action levels).

Table 3.5-1 Short-term Air Quality Criteria and Monitor Detection Limits

Parameter	Short-Term Air Quality Criteria[a]			Monitor Detection Limit
	Investigate Level[b]	Control Level[c]	Work Perimeter Limit[d]	
TVOCs	2 ppm	3 ppm	5 ppm	0.1 ppm
Mercury	0.3 µg/m^3	0.4 µg/m^3	0.6 µg/m^3	0.05 µg/m^3
Hydrogen Sulfide	6 ppb	8 ppb	10 ppb	3 ppb
Dust (as PM_{10})	100 µg/m^3	125 µg/m^3	150 µg/m^3	1 µg/m^3

[a] These criteria apply to Project-related concentrations only (background-corrected)
[b] Investigate Level - Identify the source(s)
[c] Control Level – Apply controls/countermeasures
[d] Work Perimeter Limit – Restrict/stop the source's operations and reassess work

One hour average measurements will be evaluated with respect to the short-term criteria after correcting the measurement for background (see SOP 300-200 in Appendix B). If an investigate level for any parameter is reached at a downwind station, the measurement will be evaluated with respect to background, the emissions source(s) identified, and the perimeter concentrations closely watched for potential increases. If a control level is reached due to on-site operations (i.e., background-corrected), controls and/or countermeasures will be applied to the emission source(s) responsible for the concentration increase, and the perimeter concentrations will be closely watched. If the work perimeter limit is reached due to on-site operations, then work related to the operation will stop or be restricted until perimeter concentrations are reduced. Once the perimeter concentrations decrease below the work perimeter limit, the emission source will be reassessed before restarting or removing restrictions. In addition, if a downwind measurement exceeds the perimeter limit and the background-corrected concentration is between the investigate level and the control level, responses will be taken commensurate with an excursion of the control level. Such a situation will be reported as an excursion of the investigate level, not of the perimeter limit, and the response will be noted on specified forms (Section 5.5), reports (Section 13.1), and the website graphs (Section 13.2). If an upwind (offsite) source is found impacting air quality conditions, NYSDEC will assess the source to determine if actions are feasible and necessary.

For continuous real-time parameters (TVOCs and dust), levels at the work perimeter limit, control level and investigate level will trigger alarms when received by the Central Station PC and text notifications will be sent to dedicated portable cell phones AQM operators will have for this purpose. Additional alarms will also trigger audible alarms and text notifications to alert AQM operators of certain instrument malfunctions and 1-minute readings above the investigate level. A summary of alarms is presented in Table 3.5-2.

Table 3.5-2 Alarms for Real-time Continuous Monitoring

Parameter	Alarm Type	Averaging Period	Level
Dust	Early Warning	1-minute	100 µg/m^3
	Investigate Level	1-hour	100 µg/m^3
	Control Level	1-hour	125 µg/m^3
	Work Perimeter Limit	1-hour	150 µg/m^3
	Negative Zero Drift	1-minute	<0 µg/m^3
TVOCs	Early Warning	1-minute	2 ppm
	Investigate Level	1-hour	2 ppm
	Control Level	1-hour	3 ppm
	Work Perimeter Limit	1-hour	5 ppm
	Zero Drift	Instantaneous	0.5 ppm
	Pump Error	Instantaneous	Code ID
	Sleep	Instantaneous	Code ID
Data Logger	Connectivity	Instantaneous	Status ID

Results of each real-time routine survey measurement (mercury, H_2S, odor, and noise) will be documented onto the Daily Perimeter Inspection Field Form (provided as an attachment to the Routine Daily Site Procedures SOP 200.100 included in Appendix B). If any single measurement of mercury or H_2S is observed at or above the project investigate level, then additional measurements will be made to evaluate an extended averaging period up to 1-hour while upwind operational activities will be investigated. Also, since H_2S is recognizable below the investigate limit (down to 5 ppb[12]) as a rotten-egg type odor, observations of such odors during readings of H_2S will also be recorded onto the Daily Perimeter Inspection Field Form.

There are no standards for odors; therefore, there are no action levels or perimeter limit. However, when odors are detected downwind of Project operations during routine inspections of the AQM stations, odor level measurements will be made. Additional measurements will be made at other downwind locations, such as at the Honeywell property line or in the community. These measurements and/or observations will be used to evaluate the potential for an off-site odor nuisance condition. The source of odors contributing to a nuisance condition will be investigated and mitigated, as appropriate.

A control level noise is 65 A-weighted decibels (dBA), which was adopted from NYSDEC guidance.[13] If Project-related noise levels at the SCA work perimeter exceed this action level, then changes will be made to the noise source(s) to reduce its noise to below 65 dBA. Follow-up monitoring will be conducted to confirm the control effectiveness.

3.5.2 Long-term Criteria

12-month background-corrected averages of speciated VOC concentrations will be compared to long-term air quality criteria established by USEPA in its development of the Human Health Risk Assessment (June 2010[14]) for the Project emissions. A summary of the 12-month air quality criteria to be used for the project is presented in Table 3.5-3. Background-corrected 12-month averages for each analyte will be calculated for each station as the arithmetic average of all background-corrected sample results over the previous 12-month period. Average

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[12] Iowa State University – University Extension, "The Science of Smell Part 1:Odor perception and physiological response", May 2004.

[13] Assessing and Mitigating Noise Impacts", NYSDEC, (www.dec.ny.gov/permits/6224.html)

[14] http://www.epa.gov/region02/superfund/npl/onondagalake/healthriskassess.pdf

trends will be reviewed to assess potential needs for controls and/or countermeasures. Compliance with 12-month limits will be made after one year of sampling data has been collected. The first 12-month period will begin with the start of air monitoring of dredging operations. Subsequent 12-month block averages will be calculated after each additional 12 months of data has been collected. Assuming the Project begins in mid-July 2012, the first 12-month average will be calculated for a 12-month period from July 2012 to July 2013. Subsequent 12-month averages will be calculated for July to July periods ending 2014, and 2015.

Table 3.5-3 Speciated VOC Work Perimeter Limits and Anticipated Reporting Limits

VOC Species	Work Perimeter Limit[a] (µg/m³)	Anticipated Reporting Limit[b] (µg/m³)
Acetone	28,000	13
Benzene	1.9	0.17
2-Butanone	5,000	16
Carbon Tetrachloride	0.97	0.08
Chlorobenzene	110	1.23
Chloroform	0.64	0.07
1,2-Dichlorobenzene	360	1.61
1,4-Dichlorobenzene	1.3	0.16
1,1-Dichloroethane	9.1	0.22
1,2-Dichloroethane	0.56	0.05
1,1-Dichloroethene	70	0.11
t-1,2-Dichloroethene	63	1.07
Ethyl Benzene	25	0.23
Methyl t-Butyl Ether	56	0.96
Methylene Chloride	31	1.85
Naphthalene	2	0.28
Tetrachloroethene	3	0.18
Toluene	5,000	1
1,2,4-Trichlorobenzene	9	0.99
Trichloroethene	7.3	0.14
1,1,1-Trichloroethane	1,000	0.29
1,2,4-Trimethylbenzene	31	1.31
1,3,5-Trimethylbenzene	290	1.31
Vinyl Chloride	3.3	0.07
Xylenes	100	0.46

[a] Criteria represent 12-month averages above background levels

[b] Anticipated reporting limit provided from the contracted lab, assuming its standard sample pressurization. Actual reporting limits will vary depending on the final canister vacuum and the laboratory's need for additional pressurization to meet calibration requirements.

µg/m³ – micrograms per cubic meter

Background correction will be accomplished by use of the following equation:

Background-corrected VOC Concentration = Analytical Sample Result – Background VOC Concentration

Where:

- Background VOC Concentration = Highest Analytical Sample Result at Upwind Speciated VOC Stations
- Upwind Speciated VOC Stations = Stations not downwind of Project activities for any hour during the sampling event.

Wind direction sectors from which SCA monitoring stations will be downwind of the SCA/SPA/WTP have been determined and are presented in SOP 300-200 in Appendix B. If a station is in a downwind sector for one or more hours during the 24-hour sampling event (based on hourly average wind direction), then the station will be designated as a downwind station (stations with no hours in a downwind sector will be designated as upwind). The total percentage of hours each station is downwind during the sampling event will also be determined.

If a sampling event does not have at least one upwind station, then background for that sampling event will be assigned a value of one-half the analytical reporting limit for each analyte. All speciated VOC concentrations reported as not detected will be assigned a value of one-half the reporting limit for purposes of averaging. In addition, stations that are considered non-downwind during a sampling event will be assigned a value of one-half the sample's reporting limit, regardless of their analytical sample result. The assignment for non-downwind stations is for purposes of averaging their own concentration only, and not for determining values for background subtraction of downwind stations. Background subtraction of downwind stations will be made using the actual analytical result of the non-downwind station.

4. QA OBJECTIVES

4.1 DQO PROCESS

The Data Quality Objective (DQO) Process, as it has been applied to this program, comprises the following steps, consistent with guidance presented in the United States Environmental Protection Agency (USEPA) *Guidance for the Data Quality Objectives Process* (EPA QA/G-4), February 2006a. The DQO process establishes the acceptance criteria, which serve as the basis for collecting data of sufficient quality and quantity to support the goals of the program.

The process consists of the following seven iterative steps for the DQO process:

- Step 1 - State the problem – The purpose of the Onondaga Lake Dredging, Sediment Management & Water Treatment Program is to remove material from Onondaga Lake thorough a dredging process. Program operations have the potential to emit air contaminants. The purpose of the AQM program is to measure and evaluate air contaminant levels during the dredging, sediment management and water treatment processes via air sampling and laboratory analysis or via real-time monitoring using real-time monitors. The AQM program will identify the presence of constituents in the air at concentrations that exceed short or long-term air quality criteria, where applicable.
- Step 2 - Identify the goal of the program – The activities defined in this QAPP will be utilized to identify the presence of constituents in the air at concentrations that exceed regulatory criteria.
- Step 3 - Identify information inputs - The primary required data types will be as follows: 1) analytical results from air samples collected at the SCA perimeter and analyzed by an off-site laboratory, and 2) air monitoring data collected and analyzed in real-time at fixed monitoring locations at the SCA and Lakeshore work perimeters.
- Step 4 - Define the boundaries of the study – AQM activities are expected to be performed over a four-year period from Summer 2012 to Fall 2015 at the SCA and Lakeshore work perimeters. The locations for air sampling at the Site are shown in Figure 3.3-1.
- Step 5 - Develop the analytic approach – The results of real-time measurements and sample analyses will be compared to air quality criteria (action levels and work perimeter limits). When results exceed criteria, response actions will be taken as defined in Section 3.5.
- Step 6 - Specify performance or acceptance criteria – Data must be of known quality to withstand scientific and legal challenges relative to its intended purpose. Therefore data quality objectives are established to define the acceptability of the program's data with respect to accuracy, precision, sensitivity, completeness, representativeness, and comparability. Based on evaluation of the data in terms of, precision, sensitivity, completeness, representativeness, and comparability, a completeness objective of 85 percent of the data set has been established for both speciated VOC sampling and real-time monitoring parameters over 3-month periods. If the completeness objective is not met, additional sampling may be warranted.
- Step 7 - Develop the plan for obtaining data – Air monitoring and sample collection, and analysis with respect to AQM Program criteria will be performed as described in this QAPP.

4.2 FIELD QA/QC SAMPLES

A brief description of field QA/QC samples that will be submitted for laboratory analysis or used for real-time monitors, as applicable, is presented in the following sections. Detailed field sampling procedures are presented in Section 5.

4.2.1 Blanks

Field blanks and trip blanks will not be collected or analyzed for this project as they are not applicable to real-time monitors and not required by the speciated VOC sampling method but the sampling canisters are required by this QAPP to be individually certified-clean by the laboratory prior to sample collection.

4.2.2 Duplicates/Collocation

Collection of field duplicate samples for speciated VOCs provides for the evaluation of the laboratory's precision performance by comparing analytical results of two samples from the same location (collocation). Duplicate samples for speciated VOCs will be collected from two AQM stations once per month and sent to the laboratory blind (with two different sample identifications). There will be a total of 24 collocated samples collected per 12-month period. Dust monitor precision will be determined using a collocated monitor operated for at least one two-hour period per month at each fixed AQM station. TVOC monitor precision will be assessed by simultaneously challenging each sampler and a collocated sampler with 5 ppm gas[15]. For mercury and hydrogen sulfide, precision checks using a collocated monitor will be performed at least twice per month.

4.3 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSIS

For laboratory analysis data, accuracy or bias will be assessed through the analysis of spiked solutions and the analysis of standards with known concentrations. Measure of precision will be obtained through the evaluation of duplicate samples and collocated monitors. Control limits for the duplicate sample precision have been established at ±25 relative percent difference (RPD). For results that are less than or equal to five times the reporting limit (RL) for analytical samples, the difference criterion of ±2 times the RL will be applied to evaluate field precision. Precision goals for real-time monitoring will be ±15% calculated on a quarterly basis (average of all precision determinations made during a 3-month period) or <±2 times the monitor's detection limit for readings less or equal to three times the monitor's detection limit.. Collocated monitor precision will be determined using the following equations:

$$\text{Precision (RPD)} = \frac{\text{(Primary Sampler – Collocated Sampler) x 100}}{\text{½ (Primary Sampler + Collocated Sampler)}}$$

Where: RPD = Relative percent difference

or:

Difference = Primary Sampler – Collocated or duplicate Sampler

Sensitivity pertains to the capability of the analytical method or real-time monitor to discriminate between the action levels and perimeter limits. As indicated in Tables 3.5-1 and 3.5-3, the real-time monitor detection limits and anticipated sample analysis reporting limits are well less than the air quality criteria, thereby providing adequate sensitivity to achieve the objective of the sampling.

Table 4.3-1 Accuracy and Precision Acceptance Criteria[a]

Parameter	Accuracy[b]	Precision
Dust	±5% of observed	±15 % or 2 µg/m^3
TVOCs	±3 % at 5 ppm	±15 % or 0.2 ppm
Mercury	±15% at 0.3 µg/m^3	±15 % or 0.10 µg/m^3
Hydrogen Sulfide	±3 ppb at 50 ppb	±15 % or 6 ppb
Speciated VOCs	[c]	25%[d]

µg/m^3 – micrograms per cubic meter; ppm – parts per million; ppb – parts per billion
[a] Criteria represent quarterly averages
[b] Manufacturers stated accuracy.
[c] Assessed through LCS and standards.
[d] or Difference if analyte concentrations are five times the RL or lower.

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[15] Actual TVOC concentrations are not expected to be high enough to provide an adequate upper scale challenge of the monitor's precision; therefore calibration gas will be used to challenge the monitors at the work perimeter limit value.

4.4 COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

Completeness (or data capture) is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under ideal conditions. Data capture goals for this project are taken from USEPA recommendations[16] for manual methods (speciated VOC sampling) and automated monitoring methods (real-time parameters). Data capture goals for both speciated VOC sampling and real-time monitoring parameters will be 85 percent calculated over 3-month periods[17], using the following equation:

$$\text{Data Capture (\%)} = \frac{\text{Number of valid data points}}{\text{Number of possible data points}} \text{ X } 100$$

Representativeness expresses the degree to which the data accurately and precisely represent:

- A characteristic of a population;
- Parameter variations at a sampling point;
- A process condition; and
- An environmental condition.

Representativeness is a qualitative parameter that is dependent on the proper design of the sampling field activities and proper laboratory protocol. Representativeness will be satisfied by ensuring proper monitoring, sampling, and analytical procedures are followed, and that the regulatory agencies review and approve this QAPP.

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned data will be comparable depends on the similarity of monitoring, sampling and analytical methods. The procedures used to obtain the planned data, as documented in this QAPP, are expected to provide comparable data.

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[16] National Air Toxics Trends Stations (NATTS) Quality Assurance Guidance Document - Quality Management Plan Final, September 2005.
http://www.epa.gov/ttn/amtic/files/ambient/airtox/nattsqmp.pdf)

[17] It is anticipated that annual data capture will exceed 90 percent.

5. MONITORING PROCEDURES

5.1 MONITORING STATION SITING

As presented in Figure 3.3-1, air monitoring will be conducted at eight fixed AQM stations along the SCA work perimeter and two to three stations at five locations at the Lakeshore work perimeters. Three Lakeshore AQM stations will be located along the southeast end of Onondaga Lake when dredging is conducted at the southeast end of the Lake. Two stations will be located at the central west side of the lake when dredging is conducted there. The SCA stations are already installed and have been operating during the Project's construction since September 2010. The Lakeshore stations will be installed prior to the commencement of dredging in July 2012 (lease agreements for non-owned property have been secured); the station siting was pre-approved by NYSDEC.[18])

AQM station locations were selected so that there is a station located upwind as well as downwind of the potential emission sources (identified in Section 3.1) as well as between potential emission sources and the nearest off-site residential areas (identified in Section 3.2). Additional considerations used to select station locations consist of security and atmospheric conditions.

Security - To limit potential for tampering with the AQM stations, appropriate precautions will be considered. As discussed in Section 3.3.1, monitoring instruments and data loggers will be in lockable enclosures. Lakeshore AQM stations in non-secure areas will be enclosed by lockable chain-link fencing and, as feasible, located in areas removed from heavily used public walkways and travel routes.

Atmospheric Conditions - Atmospheric conditions play an important role in establishing the representativeness of an ambient air monitoring program. Conditions most often considered in siting include wind direction, wind speed and atmospheric stability. Wherever possible, site selections consider locations away from buildings, trees, bushes and other obstacles that may block or alter normal wind flow. Therefore, the selected station locations are in open areas, at least 6 feet from obstructions, the minimum recommend by USEPA.[19]

5.2 DATA/SAMPLE DESIGNATION

5.2.1 Real-time Parameters

Real-time data from each AQM station will be designated by a location identifyer (Location ID) and the date and time of collection. Location IDs, dates and times will be recorded automatically for continuous AQM data via an electronic data logger, and manually for routine AQM on the Daily Perimeter Inspection Field Form, provided in Appendix B as an attachment to the Routine Daily Procedures SOP 200.100. Management and reporting of these data are described in Section 9.1. Figure 5.2-1 below presents the Location IDs for each AQM station.

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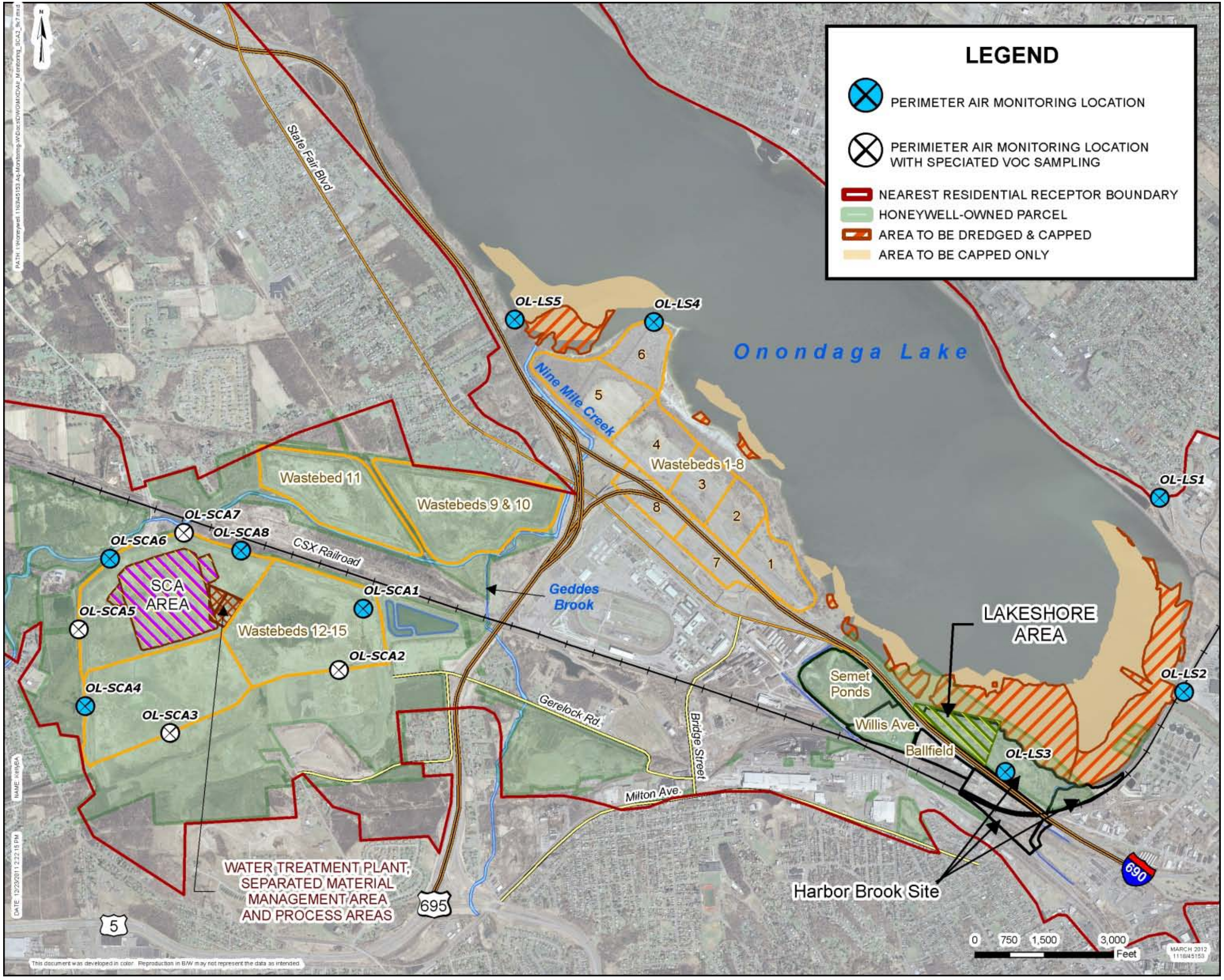
[18] Email from Reginald Parker of NYSDEC to Mark Distler of O'Brien & Gere, dated August 18, 2011.

[19] "Ambient Monitoring Guidelines for the Prevention of Significant Deterioration (PSD)", USEPA, EPA-450/4-87-007.

Figure 5.2-1 Fixed AQM Station Location IDs



5.2.2 Speciated VOCs

Speciated VOC samples will have location and sample IDs numbered sequentially in the same fomat as other Honeywell environmental monitoring programs. Sample IDs will reference the Chain-of-Custody number following the format presented in Table 5.2-1.

Table 5.2-1 Speciated VOC Sample ID Format

Location Description	Location ID	Sample ID[a]
SCA Perimeter	OL-SCA2	SCA-XXXX-01
	OL-SCA3	SCA-XXXX-02
	OL-SCA5	SCA-XXXX-03
	OL-SCA7	SCA-XXXX-04

[a] XXXX corresponds to the 4-digit chain of custody number used for the sample event.

Location IDs for field duplicate samples will be designated as “SCA-FD-OL-XXXX1-“ and “SCA-FD2-OL-XXXX2”, where OL-XXXXn is the location ID and XXXX is the Chain-of Custody number for the sample event. Sample ID formating of duplicate samples will follow the same guidelines as primary samples, that is they will contain the same sequential sample event number.

5.3 MONITORING EQUIPMENT

5.3.1 Real-Time Continuous Monitoring

The continuous real-time monitoring system layout for dust and TVOCs is presented in Figure 5.3-1. The Thermo-Fisher Scientific ADR-1500 dust monitor and the RAE Systems MiniRAE 3000 TVOC monitor[20] will be used. At each AQM station, real-time data from the monitors will be sent via digital and/or analog output signals across wired connections to a Campbell Scientific CR800 digital data logger, where the data will be time-averaged and stored in non-volatile memory. All instrumentation at each AQM station will operate off of direct current (DC) provided by two 70-watt solar panels and two 85-amp-hour batteries. The solar panels will also be utilized to provide DC power to charge the batteries. The batteries, when charged to capacity, are designed to fully operate a station for up to 10 days. Figure 5.3-2 shows a typical continuous monitoring station installed at the SCA.

As depicted in Figure 5.3-1, instantaneous and time-averaged data will be transmitted from the data logger at each station via Raven XT CDMA cellular modem to the Central Station PC located within a trailer or building at the SCA work area. In addition, data from each station will also be transmitted to a portable PC located at the Lakeshore work zone (Lakeshore PC). Data at the Central Station and Lakeshore PCs will be managed using Campbell Scientific Loggernet data acquisition software (Loggernet).

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[20] Newer models or monitors with equivalent or better specifications may be substituted with prior approval by NYSDEC.

Figure 5.3-1 Data Acquisition and Communication – SCA and Lakeshore AQM Network

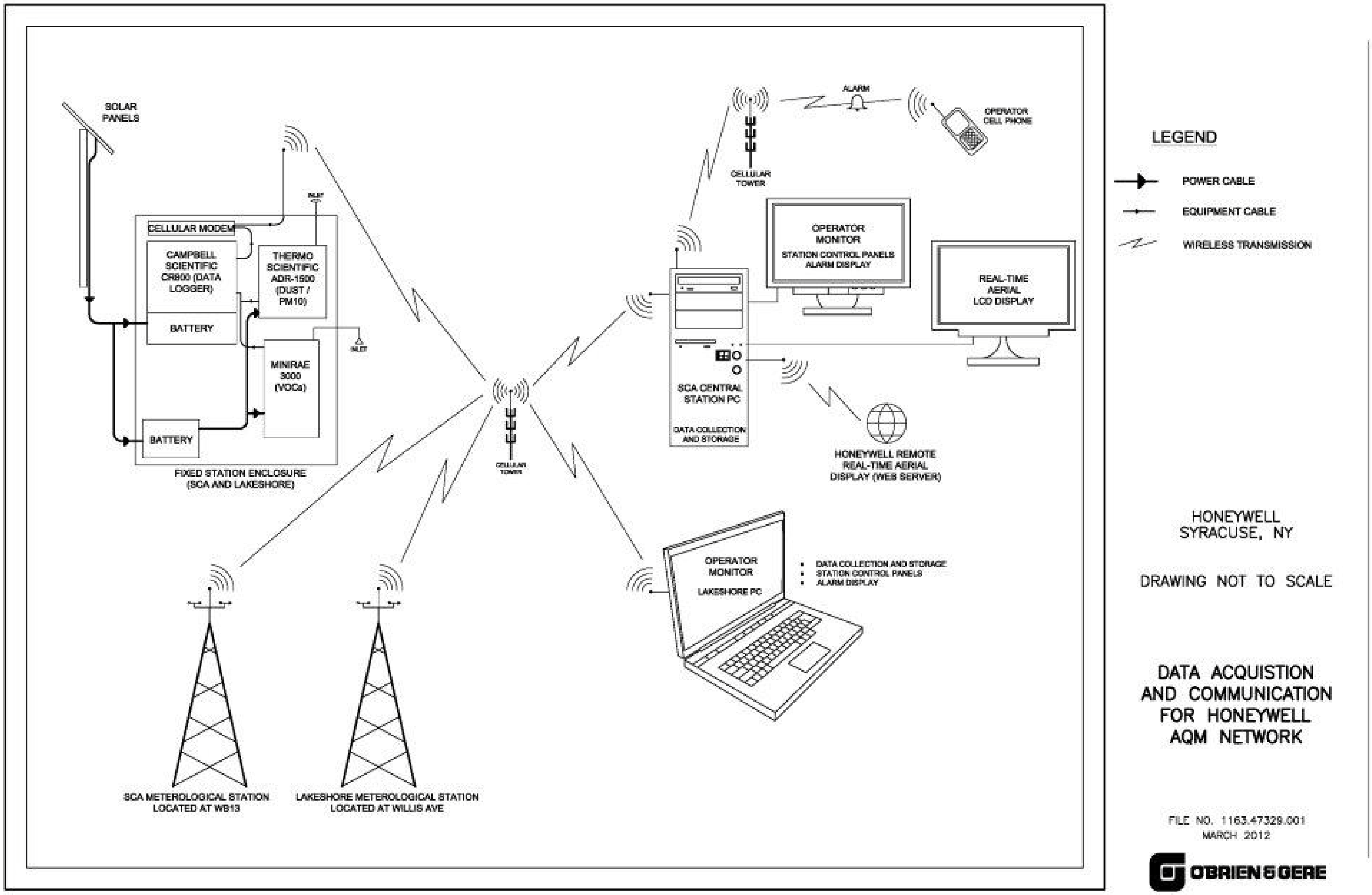

Figure 5.3-2 Typical AQM Station – Showing Solar Panels, Weather-proof Data logger Enclosure, and ADR Omni-directional Inlet

The Central Station PC will provide real-time (near instantaneous) results of continuous AQM parameters for immediate response to Project emissions. As discussed in Section 3.5.1, the Central Station PC will also provide audible and visual alarm notification when time-averaged TVOC or dust data exceed investigate level, control level, or perimeter limits. In addition, the alarms will also notify the operator of certain instrument malfunctions. The same alarm notifications will be sent via text message from the Central Station PC to dedicated cellular phones carried by the AQM operators.

The ADR-1500 dust monitor is a photometric light-scattering instrument that continuously measures airborne particulate from 1 to over 100,000 micrograms per cubic meter (μg/m^3). Dust enters the monitor through an omni-directional sample inlet located above the AQM station roof. Once in the inlet, the dust-laden air sample goes through a PM_{10} cyclone attachment that filters out airborne particulate of aerodynamic diameters greater than 10 microns.

The MiniRae 3000 TVOC monitor is a UV-light photo-ionizing detector (PID) that continuously measures TVOCs from 0.1 to 15,000 parts per million (ppm). The sample inlet to the monitor is located on the side of each AQM station facing down and containing a dust and moisture filter and 35mm polypropylene funnel to prevent precipitation from entering the monitor. Each PID will utilize a 10.6 eV lamp for photo-ionization.

Both monitors will be enabled to log 60-minute time-weighted average data to internal memory. If necessary, these data can be manually downloaded from the monitors as a back-up data source to the data logger. Table

5.3-1 below presents the specifications of the monitors. Specifications for the ADR and PID are provided in Appendix C.

Table 5.3-1 Dust and TVOC Monitor Specifications

	Dust (PM_{10}) Monitor Thermo-Fisher ADR-1500 (ADR)	TVOC Monitor Rae Systems MiniRae 3000 (PID)
Range	1 to 100,000 μg/m^3	0.1 to 15,000 ppm
Resolution	0.1 μg/m3	0.1 ppm
Sample Rate	1 second	1 second
Accuracy (stated)	5% of reading	5% of reading
Temperature Range	14 to 122 deg. F	-4 to 122 deg. F
Power Requirements	300 mA @ 12 VDC (w/ heater)	200 mA @ 6 VDC
PID Duty Cycling (cleans lamp)	NA	Yes: 50 to 100%
Dust Inlet Heater for High Humidity	Standard; internal; automatic	-
Zero Type	Manual	Manual

5.3.2 Real-time Survey Monitoring

5.3.2.1 Mercury

Mercury vapor measurements will be conducted using a Jerome J505 low-level mercury analyzer. The Jerome J505 uses atomic fluorescence spectroscopy for mercury analysis and provides near real-time readings. The J505 has a detection limit of 0.05 μg/m^3, a range of 0.05 to 500 μg/m^3, and a resolution of 0.01 μg/m^3. For low level measurements of mercury (0.05 to 0.1 ug/m^3), the Jerome J505 takes 28-second time integrated measurements. Specifications for the J505 are presented in Appendix C.

5.3.2.2 Hydrogen Sulfide

Hydrogen sulfide (H_2S) monitoring will be conducted using a Jerome 631-X real-time H_2S analyzer. The Jerome 631-X uses a patented gold film sensor to register changes in electrical resistance due to H_2S concentrations. The 631-X is portable and will provide real-time readings up to once every three seconds over range of 3 to 50,000 ppb. The 631-X has a minimum resolution of 1 ppb and accuracy of 3 ppb (at the investigate and control levels of 6 and 10 ppb, respectively). Specifications for the 631-X are presented in Appendix C.

5.3.2.3 Odors

Odors, if noticeable, will be measured using a Nasal Ranger® portable field olfactometer. The olfactometer is a handheld instrument that allows an operator to breathe odors diluted from 2 to 60 times with purified charcoal-filtered air. Odor levels are determined by the "Dilution-to-Threshold Ratio" (D/T), which is the volume of carbon-filtered air divided by the volume of odorized air required to first smell an odor. The D/T is quantified in "odor units" (OU), and the olfactometer is factory preset to measure at the following D/T levels at 60, 30, 15, 7, 4, and 2 OU. Specifications for the Nasal Ranger are presented in Appendix C.

5.3.2.4 Noise

Noise monitoring will be conducted using an ANSI Type II digital sound level meter such as the Casella CEL 254 sound level meter or equivalent. The CEL 254 has an accuracy of +/- 1 dB and a range of 30 to 135 dB. The sound level meter will be set-up to collect A-weighted sound levels using a slow response. Specifications of the CEL 254 are presented in Appendix C.

5.3.3 Speciated VOC Sampling

Speciated VOC samples for TO-15 analysis will be collected using stainless steel 6-Liter SUMMA® canisters. Each canister will be equipped with a vacuum gage and a flow metering valve set to collect air samples at approximately 4 cubic centimeters per minute (cc/min). A stainless steel ambient air adapter ("sampling cane") will be attached upstream of the flow-metering valve. Operations field staff will provide and install a 35mm polypropylene funnel onto the sample inlet to prevent precipitation from entering the canister.

5.3.4 Meteorological Monitoring

Meteorological parameters will be measured continuously at meteorological stations located near center of Wastebeds 12-15 (Wastebed 13 Meteorological Monitoring Station) for SCA monitoring stations and near the Semet Ponds, along Willis Avenue (Lakeshore Meteorological Monitoring Station) for Lakeshore monitoring stations. Wind speed, wind direction, air temperature, relative humidity, and barometric pressure sensor and precipitation gage specifications are provided in Table 5.3-3. Each of these towers uses a Campbell Scientific CR1000 digital data logger for data averaging and storage, and a cellular modem for transmitting data to the Central Station PC.

Table 5.3-3 Meteorological Monitor Specifications

Meteorological Station	Parameter	Sensor	Range	Accuracy
Wastebed 13 and Lakeshore	Wind Speed	Climatronics F460 Model 100075-G0-H0	0 to 125 mph	±0.15 mph for speeds from 0.3 mph to 15 mph/ ±1% of speed from 15 mph to 125 mph
	Wind Direction	Climatronics F460 Model 100076-G0-H0	0-360°	±2°
	Temperature	Climatronics Model 100093	-22 to 122°F	±0.27°F
	Relative Humidity	Climatronics Model 102425 RH Probe,	0 to 100 %	±3% to ±5%
	Barometric Pressure	Climatronics Model 102270	23.62 to 32.48 in Hg	±0.25% Full Scale
	Precipitation[a]	Climatronics Model 100097-1-G0 (8-inch)	0 to +2000 W/m2	± 10 %

[a] During periods of freezing weather, precipitation data will be based on readings taken at from the meteorological station located at Hancock Airport.

[b] Lakeshore/Willis Ave Meteorological Monitoring Site does not record precipitation data. Precipitation data reported for SCA monitoring will be used for Lakeshore monitoring.

5.4 SAMPLE COLLECTION PROCEDURES

5.4.1 Real-Time Continuous Monitoring

Instantaneous readings from continuous (dust and TVOC) monitors will be recorded by a Campbell Scientific CR800 data logger once every 5 seconds, where they will be time-averaged and stored in non-volatile data logger memory as 1-minute and hourly data records. Approximately once every 15 seconds, newly collected data will be telemetered from each data logger via cellular modem to the Central Server PC and Lakeshore PC, each of which will also store the data.

Daily operation of the continuous real-time monitoring system will utilize the Campbell Scientific Loggernet data acquisition software (Loggernet) for data retrieval and viewing near real-time and time-weighted averages (1-minute and 1-hour) and issuance of alarm notifications for exceedances of investigate levels, control levels, and work perimeter limits.

Operations will also utilize Campbell Scientific RTMC Pro (RTMC) and RTMC Web Server software, which will run on the Central Station PC. RTMC will provide the operator access to the following:

- Control (start/stop)of dust and TVOC monitors at each SCA and Lakeshore AQM station
- Viewing of all real-time, 1-minute and 1-hour averaged data on the Central Station PC
- Viewing of 5-minute time-averaged data from both meteorological stations
- Alarm notification of TVOC and dust levels and certain instrumentation problems (Table 3.5-2).

Procedures for the start-up and operation of Central Station PC including Loggernet, RTMC and Web Server are detailed in the Standard Operating Procedure (SOP) for Routine Daily AQM Procedures (SOP 200.100). Procedures for the operation, calibration, and maintenance of ADRs and PIDs are detailed in SOPs 100.100 and 100.200, respectively. These SOPs are presented in Appendix B.

Alarm notification will include audible and visual alerts at the Central Station PC and text messaging sent to dedicated AQM operator cellular phones. The intent of these notifications is to alert site operators to potential short-term (1-minute or 1-hour) AQM criteria exceedances before they happen, and to advise operators of instrument malfunctions. Alarm response procedures are detailed in SOP 200.100, which includes the appropriate Excursion Flowchart that will be followed. In general, the excursion response procedure consists of the following operator action steps:

1. Determine the alarming AQM station and instrument. The Central Station PC RTMC aerial tab displays real-time data for the active stations, as well as a distinct alarm tab. Review of these two tabs will inform the operator of the alarming AQM station, the real-time concentrations , whether there is an instrument malfunction, or if there is a cellular communication problem.
2. Determine if the alarm is from a downwind AQM station. The operator will note both upwind and downwind TVOC and dust concentrations at the time of the alarm and will background correct the exceedance value and compare it to criteria.
3. Determine the cause of the alarm by investigating the AQM station.
4. Perform instrument troubleshooting and/or repair to resolve the alarm. If concentrations are above AQM criteria due to SCA or Lakeshore operations, proceed with response action:
    a. notify the Project construction manager or supervisor in the area of the suspected source (SCA or Lakeshore),
    b. take photographs of the apparent source,
    c. continue to monitor as Project personnel performs designated response action (apply controls/countermeasures, restrict/stop source), and
    d. report and document the criteria excursion in the Excursion Tracking Log.

5.4.2 Real-time Survey Monitoring

Real-time survey monitoring will be conducted for mercury, H_2S, odors, and noise, and will be performed once every six hours (four times over a 24-hour period) during routine AQM station inspections (described in Section 8.0) at each fixed AQM station. AQM operator will determine which AQM stations are downwind. During periods of highly variable and no definable wind direction, all stations will be designated as downwind stations. Downwind designations will be documented on the Daily Perimeter Inspection Field Form.

5.4.2.1 Mercury and H_2S

Monitoring for mercury and H_2S will consist of discrete survey-type measurements (not time averaged) at each AQM station location. Measurements of mercury and H_2S will be conducted using the portable monitors described in Sections 5.3.2.1 and 5.3.2.2. and will consist of a single confirmatory measurement at each location. These measurements will be performed in accordance with SOP 200.100 and will be documented on the Daily Perimeter Inspection Field Form. Operation of the mercury and H_2S monitors will be performed according to the instrument specific SOPs (Appendix B): SOP 100.400 and SOP 100.500, as well as the instrument operation manuals.

5.4.2.2 Odors

Monitoring for odors will consist of one odor measurement at each AQM station during routine site inspections, approximately every six hours. If odors are not discernable, a measurement of "not detected" (ND) will be documented on the Daily Perimeter Inspection Field Form. If odors due to Project-related activities are observed during routine inspections, measurements will be made at the AQM station to quantify the odor level. Additional odor measurements may be performed to further quantify the odor, which may include odor measurements at the Honeywell property boundary downwind of the source and/or in the community. All odor measurements will be documented on the Daily Perimeter Inspection Field Form.

Odor measurement data will be correlated with community complaints so community odors can be predicted based on odor measurements at the work perimeter, and so odor control can be pro-actively applied to avoid community complaints.

5.4.2.3 Noise

Noise monitoring will consist of one sound level measurement (A-weighted) at each SCA AQM station during routine station inspections, approximately every six hours. The frequency of measurements may be reduced or curtailed with NYSDEC approval if monitoring repeatedly demonstrates that noise guidelines are not being reached. Sound levels will be measured over a period of approximately 1 minute. The average observed sound level will be recorded onto the Daily Perimeter Inspection Field Form. Results will be compared with the noise action level of 65 dBA. If readings above 65 dBA due to a Project noise source, the source will be identified and noise readings will be taken at the nearest SCA property boundary. If boundary noise readings exceed 65 dBA then controls/countermeasures of the noise source will be implemented to reduce levels to below 65 dBA.

5.4.3 Speciated VOC Sampling

Speciated VOC sampling will be performed at a frequency of one sample event every 6 days, throughout the Project duration regardless of dredging operations, and will follow the USEPA 6th day sampling schedule. Sampling events will be conducted over a 24-hour period beginning on the morning of the designated monitoring day between 7 and 10 AM[21]. Project activities that may affect air quality during the 24-hour sample will be documented.

Sample collection will be performed in accordance with the procedure provided in the SOP 100.600 (Appendix B) using laboratory supplied 6-Liter SUMMA® canisters. Canisters will be equipped with a vacuum gage, a flow metering valve set to collect air samples at approximately 4 cubic centimeters per minute (cc/min), and a stainless-steel "J" tube with a polyethylene funnel at the inlet to prevent precipitation from entering the metering valve and canister. Samples will be shipped to the analytical laboratory[22] via standard Chain-of-Custody procedures and analyzed via USEPA Method TO-15 (described in Section 7) for 25 target VOCs presented Table 3.5-3.

As specified in the procedure, samples will be considered valid if they meet the following collection criteria:

- Samples are collected over a 24-hour period (± 1-hour).
- Final canister vacuum is between 0.1 and 15 inches of mercury.

Samples not meeting these criteria will still be analyzed; the data will be flagged/qualified as estimated (as described in Section 10.2).

5.5 FIELD AND LABORATORY DOCUMENTATION

5.5.1 Field Documentation

The following forms will be used to record monitoring and sampling activities:

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[21] Sample collection will be started and stopped manually. Therefore, the sampling start and end times will be during normal business hours, rather than from midnight to midnight.

[22] Currently Air Toxics, Ltd, Folsom, CA

- Daily Perimeter Inspection Field Forms (SOP 200-100)
- Daily Real-time/Continuous Air Monitoring Report (DAMR) (SOP 300-100)
- Daily Field Calibration Form(SOP 200-100)
- Excursion Tracking Log (SOP 200-100)
- Ambient Air Sampling (TO-15) Field Form (SOP 100-600)
- Chain-of-Custody (SOP 100-600)
- Field Logbook

Daily perimeter inspections will be documented individually on the Daily Perimeter Inspection Field Form. Four forms will be generated daily (one per 12 hours of monitoring for each of the SCA and Lakeshore work areas). Each Daily Perimeter Inspection Field Form will contain the following information:

- Date and time of inspection
- Results of inspection items for each perimeter monitoring station
- Measurement results of mercury, H_2S, odors, and noise (if applicable)
- H_2S, mercury, TVOC, and noise monitors daily calibration results

Daily Air Monitoring Reports (DAMRs) will be completed each day by the site operator. Each DAMR will contain a summary of the results from the previous day and include the following:

- Range of hourly dust and TVOC concentrations as well as the time of the maximum hourly measurements
- Daily meteorological summary
- Results of mercury, H_2S, odors, and noise measurements
- Description of air quality criteria excursions (including background-correction and response actions)

The Daily Calibration Field Form (included with SOP 200-100 in Appendix B) will document results of daily dust and TVOC instrument calibrations. One form is to be completed for each AQM stations each monitoring day. Within 6 hours of the start of the normal daytime AQM work shift (by noon each day), the AQM operator will conduct a zero calibration/check of the dust monitor and challenge the TVOC monitor with zero and span gases as described in SOP 200-100. Calibration responses must be within QAPP tolerance limits (identified in Section 8) for instrument data to be deemed valid.

The Excursion Tracking Log will be used to document air quality criteria excursions (background-corrected measurements above action levels or perimeter limits). Tracking log entries will document the apparent cause of the excursion and the corrective actions taken, if any. The form will be completed by the AQM operator whenever an excursion occurs. This form will be submitted to the Parsons Site Manager and O’Brien & Gere Project Manager once per month (if excursions occurred) so that systematic evaluations of excursions can be conducted.

Speciated VOC monitoring will be documented during each sampling event using the Ambient Air Sampling (TO-15) Field Form and the Chain-of-Custody. Section 6.0 of this QAPP provides detail on information that will be recorded on these documents.

Field logbooks will also be used to record daily AQM activities. Entries will be written in sufficient detail such that a particular situation can be reconstructed. Logbooks will be bound field survey books, marked with the Site name on the front and inside covers. Entries into the logbook may contain a variety of information, as discussed in SOP 200.100 and QAPP Section 6.3. There will be one logbook for the SCA work area and a separate logbook for the Lakeshore work area. Logbooks will be stored securely in the AQM field office for each work area when not in use. After project completion, the O’Brien & Gere Project Manager will maintain custody of these documents.

When a photograph is taken, a notation will be made in the logbook indicating:

- Date
- Photo number
- Time
- Description/Location

5.5.2 Laboratory Documentation

Laboratory documentation will include NYSDEC Category B analytical packages as described in Section 10 of this QAPP. Copies of the laboratory data packages will be stored by the laboratory for incorporation into the sample file. The Laboratory QA Manager will be responsible for review of laboratory data packages.

5.5.3 Data Management

Data will be generated in the laboratory and also in the field. The laboratory-generated data will be entered into the laboratory database management system and presented in data packages. The laboratory will perform the data review process, including a minimum of 10 percent check of the data (back to the raw data) in the secondary review by a laboratory supervisor. Field real-time data will be validated daily. Details for data collection, validation, and reporting are presented in data management SOP 300.100 (Appendix B).

Data will be provided in the following electronic data deliverable (EDD) format:

- Analytical Data
  - ☐ Laboratory EDD - Project EDD Specification for direct upload into the Honeywell database.
  - ☐ Validated Data – Monthly Validated EDD submitted to NYSDEC
- Real-time Field Data – Monthly Validated EDD for continuous real-time data submitted to NYSDEC

Each EDD will be submitted on diskette and/or by e-mail. The Laboratory EDD will be submitted with the hardcopy data package. Data validators will provide the sample results with validation qualifiers to O’Brien & Gere data management personnel. Data validation qualifiers will be checked independently and entered by hand into the Honeywell database.

In addition to the EDDs, the laboratory will deliver the original data report with original Chain-of-Custody forms in both hard copy and electronic (PDF) formats. The laboratory EDD must match the hardcopy report for sample and analysis information. The EDD records must be the same format (i.e., flat file format).

Generally, the information flow will include the following steps for speciated VOC samples submitted to the laboratory for analysis:

- Samples will be collected in the field by O’Brien & Gere and transported to the laboratory.
- Samples will be analyzed at the laboratory and data generated.
- The laboratory data will be sent to the O’Brien & Gere data validator for evaluation and to the Project Manager for preliminary evaluation.
- Qualified data will be sent by the data validator to O’Brien & Gere data management personnel and entered into the Honeywell database.
- Final data from the database will be provided to the Project Manager for evaluation in terms of project goals.

O'Brien & Gere will maintain the contents of project files including copies of relevant records, sample logs, field notebooks, photographs, drawings, including laboratory data deliverables, and all sample custody documentation at its main office.

Field real-time data will be validated daily. Details for data collection, validation, and reporting are presented in the data management SOP 200.100 (Appendix B).

6. SAMPLE HANDLING AND CUSTODY

This section describes how the speciated VOC samples will be handled from their origination in the laboratory to the sample collection in the field and then back to the laboratory for analysis.

6.1 SAMPLE CUSTODY AND PROCEDURES

Chain-of-custody procedures will be instituted for speciated VOC samples collected and submitted for laboratory analysis.[23] These procedures include field custody, laboratory custody, and evidence files. Samples are physical evidence and will be handled according to strict Chain-of-Custody protocols. The laboratory analytical reports must contain documentation that traces the samples from the field to the laboratory and through analysis. USEPA has defined custody of evidence as follows:

- In actual possession;
- In view after being in physical possession;
- In a locked laboratory; and
- In a secure, restricted area.

6.2 SAMPLE HANDLING

QA measures will begin with the sample containers. Individually certified-clean sample SUMMA® canisters[24] will be provided by the laboratory. Table D-2 lists the sample container requirements. Table F-2 describes the canister preparation requirements. These tables are included in this QAPP in Appendix D.

Canisters will be shipped to the Project site. The maximum time unused canisters can be held on-site prior to sample collection is 15 days after receipt of the canister from the laboratory. Therefore, the AQM operator will document the receipt date of each SUMMA® canisters shipment on tags attached to each canister.

During sample collection, samples labels, attached to the canisters, will be completed in their entirety. Samples will be shipped or transported within 24 hours of being collected and will arrive at the laboratory no later than 72 hours after sample collection. Proper Chain-of-Custody documentation will be maintained as discussed below. Samples will be analyzed within the holding times specified in Table D-2 (30 days from sample collection).

6.3 FIELD CUSTODY PROCEDURES

The AQM operator is responsible for the care and custody of the sample until transferred to the shipping company or transporter. The operator will note information regarding collection of QA/QC samples and any observations related to speciated VOC samples on the Ambient Air Sampling (TO-15) Field Form. Additional information will be recorded onto the sampling field form as follows:

- Name of sampler(s), date and time;
- Canister and flow controller IDs;
- Sample identification numbers (IDs);
- Location IDs;
- Canister initial and final field pressures (in. Hg);
- Meteorological conditions (temperature, barometric pressure, and precipitation);
- Sample canister designation as QC sample (field duplicate);
- Start and end dates/times of sample collection.

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[23] Chain-of-custody procedures are not applicable to real-time parameters.
[24] Individual certification is more stringent QA procedure than the method's minimum requirement (batch certification).

The Chain-of-Custody (included as an attachment to SOP 100.600) and sample tags will be completed by the AQM operator. The Chain-of-Custody providing information, signatures, dates, and other information, as required on the Chain-of-Custody form, will be completed by the field sampler and included in each shipping container. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the Chain-of-Custody. The field sampler will sign the Chain-of-Custody when relinquishing custody. The original Chain-of-Custody will accompany the shipment, and a copy will be retained by the field sampler and returned to the project file.

Each sample container will be transported via courier or overnight commercial carrier to the contracted laboratory. Samples will not be sent to another laboratory without the permission of the O'Brien & Gere Project Manager. Samples will not be subcontracted to a laboratory for sample analysis through another laboratory. If a carrier is used to take samples between the sampler and the laboratory, the airbill number must be written on the Chain-of-Custody.

Sample shipments will not be left at an unsecured or questionable drop. The laboratory will assign a number for each sample upon receipt. That sample number will be placed on the sample label. The sample label will remain attached to the sample container.

6.4 FIELD AND SHIPPING CHAIN-OF-CUSTODY PROCEDURES

The Chain-of-Custody will be maintained, starting in the field when sample canisters are prepared deployment. The Chain-of-Custody will be completed in accordance with the guidance in this QAPP. The AQM operator must record the appropriate information on the Chain-of-Custody for each sampling location. The AQM operator will be required to provide the following information on the Chain-of-Custody:

- Laboratory name and address;
- Project identification and number;
- Site information;
- Name of sampler(s), date and time of log entry;
- Canister and flow controller IDs;
- Sample identification numbers (IDs);
- Location IDs;
- Canister initial and final pressures (in. Hg);
- Sample canister designations as QC samples (field duplicates);
- Date and start and end times of sample collection;
- Required parameters and analysis;
- Sample matrix;
- Sampler signature, date, and time; and
- Dates and method of sample shipments (including tracking numbers);

The TO-15 field form will be completed and copied. The original will be kept in on-site file cabinets; the copy will be submitted to the Project Manager and kept on-file in the O'Brien & Gere Syracuse office.

The shipping container will be closed, and two paper or plastic security (custody) seals will be affixed to the lid, and the field sampler will initial and number the seal. The number of the custody seals will be recorded on the Chain-of-Custody. The seals must be broken to open the container and will indicate tampering if both seals are broken before receipt at the laboratory.

When the samples arrive at the laboratory, the Laboratory Sample Custodian will sign the courier's airbill or bill of lading. The courier's airbill number will be documented on the Chain-of-Custody.

6.5 LABORATORY CHAIN-OF-CUSTODY PROCEDURES

Laboratory custody procedures continue when the samples are received by the laboratory. When the samples arrive at the laboratory, the Laboratory Sample Custodian will sign the Chain-of-Custody. The sample custodian's duties and responsibilities upon sample receipt will be to:

- Document receipt of samples;
- Inspect sample shipping containers for the presence or absence of custody seals and for container integrity;
- Sign and date the appropriate forms or documents, verify and record the agreement or disagreement of information on sample documents and, if there are discrepancies, record the problem and notify the Laboratory Project Manager;
- Log sample information into the laboratory sample tracking system;
- Label sample with a unique, sequential laboratory sample number; and
- Place samples in a sample storage area that is a secure, limited-access storage.

The laboratory will immediately contact the O'Brien & Gere Project Manager if issues pertaining to sample condition or documentation are detected (e.g., broken security seal; broken, open, or otherwise compromised sample containers; Chain-of-Custody information in disagreement with sample labels). The laboratory will also document the canister pressures and contact the O'Brien & Gere Project Manager if sample canister pressure issues are detected upon receipt.

At the laboratory, the analysts will be required to log samples in and out of storage as the analysis proceeds using the Internal Chain-of-Custody Form. There must not be a lapse in the custody for the sample canisters and that exchanges of custody are documented on the form. Samples will be returned to secure storage at the close of business. Care must be exercised to properly complete, date, and sign records needed to generate the data package.

The following procedures must be followed by the laboratory:

- Samples will be handled by the minimum number of people possible.
- Laboratory will set aside a secured sample storage area consisting of a clean, dry, isolated room.
- Samples will be signed in and out of the sample storage area by persons handling sample analysis and processing.
- Samples which require special handling will be properly stored and maintained prior to analysis.
- The analytical area will be restricted to authorized personnel only.
- After sample analysis is complete, the analytical data is to be kept secured and released to authorized personnel only.

If samples have not been properly identified during sample collection, the Laboratory Project Manager will contact the O'Brien & Gere Project Manager prior to the start of sample analysis.

6.6 FINAL EVIDENCE FILES

The final evidence file will be the central repository for documents that constitute evidence relevant to sampling and analysis activities as described in this QAPP. O'Brien & Gere is the custodian of the evidence file and maintains the contents of evidence files for the Project, including relevant records, logs, field notebooks, photographs, subcontractor reports, validated data, and data reviews.

Copies of the laboratory data packages will be stored by the laboratory for incorporation into the sample file. The Laboratory Project Manager will be responsible for laboratory data packages.

Upon completion of the analyses, the O'Brien & Gere Project Manager will begin assimilating the field and laboratory data. In this way, the file for the samples will be generated. The final file for the sample will be stored at O'Brien & Gere and may consist of the following:

- Laboratory data packages, including summary forms and raw data from the analysis of environmental and QC samples, chromatograms, mass spectra, calibration data, log sheets, calculation examples, and sample preparation log;
- Chain-of-Custodies;
- Data validation reports;
- Field log book and field form;
- Photographs;
- Contractor and subcontractor reports; and
- Correspondence.

7. LABORATORY ANALYTICAL PROCEDURES

7.1 LABORATORY ANALYSIS

USEPA Method TO-15 will be utilized for analysis of the speciated VOC samples for the program, as listed in Table F-1 of Appendix D. This method uses specially prepared stainless steel canisters for the collection of air samples in the field. The samples are collected using the sub-atmospheric pressure technique. The sample from the canister is directed through a cryogenic concentrator onto a multi-sorbent trap and then onto a cryogenic focusing unit designed to reduce the water content of the sample prior to introduction in the GC/MS instrument system.

All laboratories analyzing samples for submittal to NYSDEC must meet the required NYSDOH Environmental Laboratory Certification for Method TO-15 and appropriate NELAP Accreditation, or a combination of certifications and accreditation. Laboratories must meet and maintain the analytical protocol requirements stipulated for the certified method.

The laboratory will utilize the analytical method and additional requirements listed in this QAPP. The method or most recent laboratory control limits will be used to evaluate samples for this project, where applicable, and will be provided in the QC result summary forms. In addition, the QC requirements and corrective actions listed in Table F-2, which augment the method requirements, are to be followed by the laboratory during the analysis activities.

In the event of a major analytical system failure, the Laboratory Project Manager will identify the situation and provide corrective action guidance. The O'Brien & Gere QA Officer will be notified and the situation will be documented in the data package case narrative.

Unless a dilution is part of the laboratory's standard operating procedures, samples may be diluted only if analytes of concern generate responses in excess of the linear range of the instrument. If the laboratory adds air to a sample during the analysis process, the air source must be the same as the air source that is used for the preparation of the method blanks.

Standards and reference materials will be analyzed to determine analyte concentrations for comparison with expected concentrations to measure method accuracy. Precision will be measured by the RPD associated with the field duplicate pair.

The generated data will be input into the laboratory database management system. Analytical and pertinent field data will be managed in the Locus EIM relational database management system (DBMS). Laboratory analytical data will be provided in the appropriate EIM electronic data deliverable (EDD) format for direct upload; pertinent field data will be entered into EIM using the appropriate electronic upload format. Data validation qualifiers will be entered into EIM manually and checked independently. EIM will be used to provide custom data queries and tables to support data analysis and report preparation; data tables containing the validated sample data will be included in their corresponding investigation report. Complete descriptions of analytical procedures to be used in the laboratory are described in the USEPA Method TO-15 and Table D-3 of this QAPP. The laboratory NYSDOH and NELAC Certifications for the contracted laboratory are presented in Attachment C. The laboratory SOPs and QA Manual are available upon request.

7.2 RLS AND MDLS

The RL is the lowest concentration that can be reliably quantified within specified limits of precision and accuracy during routine laboratory operations. The lowest calibration standard will establish the RLs that will be reported by the laboratory for data generated through the sampling activities.

MDLs are the lowest concentration of an analyte that can be measured with 99% confidence that the analyte concentration is greater than zero. RLs are levels above the MDLs at which the laboratory has demonstrated the quantitation of analytes.

8. CALIBRATION AND MAINTENANCE PROCEDURES

8.1 FIELD INSTRUMENTS CALIBRATION AND INSPECTION REQUIREMENTS

Real-time monitors will be calibrated on-site using methods prescribed by the manufacturers. Table 8.1-1 summarizes the calibration and preventative maintenance requirements for each monitor.

Table 8.1-1 Calibration and Maintenance Requirements – Real-time Monitors

Parameter	Make/Model	Calibrations	Preventive Maintenance
Dust (PM_{10})	Thermo Scientific MIE ADR-1500	a. Factory calibration every 12 months b. Zero calibration weekly and whenever zero appears to be rising, negative, or otherwise suspect c. Daily zero check	a. Inspect extended monitoring HEPA filter cartridge every 3 months; replace HEPA filter cartridge every month b. Clean optical sensing chamber upon zero calibration failure or when readings are otherwise suspect c. Format memory every 3-months
TVOC	RAE Systems MiniRAE 3000	a. Introduce zero (0.0 ppm) and span (5.0 ppm) gas each day or whenever zero appears to be rising or is otherwise suspect.	a. Clean sensor and lamp every month and after moisture is found in probe or calibration fails; replace sensor and lamp as needed b. Measure pump flow rate once per year; replace pump as needed c. Replace moisture/particulate inlet filters as necessary
Hydrogen Sulfide	Jerome 631-X	a. Factory calibration every 12 months b. Zero adjustment daily and whenever zero appears to be rising, negative, or otherwise suspect	a. Regenerate sensor twice daily b. Replace intake fritware as necessary
Mercury	Jerome J505	a. Factory calibration every 12 months b. Zero check monthly	a. Replace intake fritware as necessary
Noise	CEL 254	a. Factory calibration every 12 months b. Calibration check/adjustment daily	a. Not required
Odor	St. Croix Nasal Ranger	a. Not required	a. Replace charcoal filters each month as necessary b. Clean instrument and replace nose piece and o-rings when particulate is observed

Calibrations of continuous real-time monitors will be performed daily, in accordance SOPs 100.100, 100.200, and 200.100. Daily calibrations will be documented on the Daily Calibration Field Form in the daily site procedure SOP 200.100. Additional calibrations due to instrument zero drift or suspected instrument malfunction will be performed and documented in the Daily Perimeter Inspection Field Form.

Calibrations of the mercury and H_2S monitors will be performed in accordance with instrument SOPs 100.400 and 100.500, respectively, and the daily site procedure SOP 200.100. The H_2S and noise monitors will be calibrated daily in accordance with the instruments' operation manuals. Zero checks of the mercury monitor will be performed monthly as recommended by the manufacturer. Field calibration span checks of the Jerome J505 mercury monitor are not recommended by the manufacturer. Table 8.1-2 provides the calibration requirements of the real-time monitors.

Table 8.1-2 Field Calibration Limits – Real-time Monitors

Instrument	Zero	Span
Dust: Thermo ADR 1500	≥ 0.0 and ≤ 10 µg/m^3	None
TVOCs: RAE MiniRAE 3000	≥ 0.0 and ≤ 0.2 ppm	≤ ± 10% of span
H_2S: Jerome 631-X	≥ 0 and ≤ 3 ppb	NA
Mercury: Jerome J505	>0.05 µg/m^3	NA
Noise: Casella CEL 254	NA	0.5 dB[a]

[a] Span calibration consists of a check to field calibrator at either 94.0 or 114.0 dBA.

Preventive maintenance will be performed on continuous real-time monitors to keep them functioning properly. The dust and TVOC monitor Preventative Maintenance Schedule is contained in SOP 200.100. Calibration and preventive maintenance of meteorological tower sensors is performed 3 times annually through routine QA/QC calibration and maintenance visits (conducted by Parsons).

8.2 FIELD INSTRUMENT CALIBRATION AND INSPECTION EQUIPMENT

Equipment and tools required for calibrations, preventative maintenance, and inspection will generally be stored at the Central Station PC location and will be maintained by the AQM operator. These items are presented in Table 8.2-1.

Table 8.2-1 Monitor Calibration and Maintenance Equipment

Parameter	Make/Model	Calibration Equipment	Maintenance and Inspection Equipment
Dust (PM_{10})	Thermo Scientific MIE ADR-1500	a. Manufacturer supplied zero filter	a. Manufacturer supplied HEPA filter cartridge b. Laptop with pDR port software and manufacturer supplied USB communication cable c. Compressed air
TVOC	RAE MiniRAE 3000 photo ionization detector	a. 0.0 ppm ultra high purity zero air b. Tedlar bag or equivalent (non VOC absorbing) c. 5.0 ppm Isobutylene span gas (100L cylinder) with demand flow regulator	a. NIST traceable Bios Dry Cal DC Lite flow meter b. Manufacturer supplied external particulate filter c. Manufacturer supplied photo ionization detector sensor d. Ultra sonic bath e. Methyl alcohol f. Cotton swabs g. Optical lens paper h. Nitrile gloves
Odor	St. Croix Nasal Ranger	a. Manufacturer supplied replaceable carbon cartridges	a. Manufacturer supplied replacement nose pieces and o-rings b. Alcohol prep wipes
Noise	CEL 254 sound level meter	a. NIST traceable sound level calibrator b. Small manufacturer supplied flat-head screw driver	a. 4 AAA batteries for power supply
Mercury	Jerome 505-X	a. Manufacturer supplied zero filter	a. Replacement intake fritware
H_2S	Jerome 631-X	a. Manufacturer supplied zero filter	a. Replacement intake fritware
Speciated VOCs	NA	a. NIST traceable digital vacuum gage[a]	a. NA

[a] Digital vacuum gage is required for documenting initial and final SUMMA® canister pressures.

8.3 LABORATORY QA/QC REQUIREMENTS

The laboratory has an internal QA/QC program that provides guidelines to routinely check the reliability and validity of work conducted at the laboratory. The stated objectives of a laboratory QA/QC program are as follows:

- Procedures are documented, including any changes in administrative and/or technical procedures;
- Analytical procedures are validated and are conducted according to sound scientific principles;
- Laboratory performance is monitored through inspections to provide for necessary corrective actions; and
- Data results are properly recorded and archived.

Internal QC procedures for analytical services will be conducted by the laboratory in accordance with its SOPs and the individual method requirements, in a manner consistent with appropriate USEPA or other analytical methods.

Table D-3 summarizes the laboratory QC checks, frequency of analysis, control limits, and laboratory corrective actions for the analytical method to be used for this project. Brief descriptions of laboratory QA/QC analyses are contained in the following subsections.

8.3.1 GC/MS Tuning

Tuning and performance criteria are established to verify mass resolution, identification, and to some degree, instrument sensitivity. These criteria are not sample specific; conformance is determined using standard materials. Therefore, these criteria should be met in all circumstances.

8.3.2 Calibration

Compliance requirements for satisfactory instrument calibration are established to verify that the instrument is capable of producing acceptable quantitative data. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of analysis, and continuing calibration and performance checks document satisfactory maintenance and adjustment of the instrument on a day-to-day basis. Proper calibration of laboratory analytical instrumentation is essential for the generation of reliable data that meets the project's DQOs. Analytical instrument calibration is monitored through the use of criteria established for individual analytical methods. Calibration procedures to be followed are specified, in detail, in the analytical methods. These procedures specify the type of calibration, calibration materials to be used, range of calibration, and frequency of calibration. In addition, the calibration requirements listed in the QC requirements and corrective actions in Table D-3, which augment the method requirements, are to be followed by the laboratory during the analysis activities.

Before the GC/MS is calibrated for organics analysis, the instrument mass calibration and resolution for VOCs is verified by 4-bromofluorobenzene (BFB). The performance check analysis must meet the criteria referenced in the analytical method and this QAPP. The system must be verified every 24 hours of analysis and when the instrument performance check solution fails to meet criteria. Samples are not analyzed until performance check analysis criteria are met.

For organics analysis, an initial five-point (minimally) calibration is performed for the target compounds prior to sample analysis. One of the calibration standards must be at the QL. The calibration requirements as specified in the method and this QAPP must be met. If these parameters fail to meet criteria, corrective actions must be implemented.

8.3.3 Blanks

Several types of blanks will be analyzed by the laboratory. Corrective action procedures will be implemented for blank analyses if target compounds are detected at concentrations greater than the QLs. The criteria for evaluation of blanks apply to any blank associated with a group of samples. If problems with a blank exist, data associated with the project must be carefully evaluated to determine whether or not there is an inherent variability in the data for the project, or if the problem is an isolated occurrence not affecting other data.

A method blank is an unused, certified canister that has not left the laboratory that undergoes the preparation procedures applied to a sample. These samples are analyzed to examine whether sample container, preparation, and analysis techniques result in sample contamination. The laboratory will prepare and analyze a method blank with each group of samples analyzed within a 24-hour analytical sequence.

An instrument blank is an unused, certified canister that has not left the laboratory that undergoes the preparation procedures applied to a sample. These samples are analyzed to monitor target analyte carryover on the instrument when necessary.

Field blanks and trip blanks will not be collected or analyzed for this project.

8.3.4 Internal Standards Performance

Internal standards, which are compounds not found in environmental samples, will be spiked into samples and blanks, and laboratory control samples (LCS) at the time of sample preparation. Internal standards must meet retention time and performance criteria specified in the analytical method or the sample will be reanalyzed.

8.3.5 LCS

The LCS solution is a standard solution that consists of known concentrations of the complete list of target analytes. These QC samples are then prepared and analyzed following the same procedures employed for environmental sample analysis to assess method accuracy independently of sample matrix effects. The laboratory will prepare and analyze an LCS with each analytical sequence within a 24-hour period. Percentage recoveries will be evaluated to assess the efficiency of the preparation and analysis method independent of environmental sample matrix effects.

8.3.6 Compound Identification and Quantitation

The objective of the qualitative criteria is to minimize the number of erroneous identification of compounds. An erroneous identification can either be a false positive (reporting a compound present when it is not) or a false negative (not reporting a compound that is present). The identification criteria can be applied much more easily in detecting false positives than false negatives. Negatives or non-detected compounds, on the other hand, represent an absence of data and are, therefore, much more difficult to assess. The objective for quantitative requirements is to maximize the accuracy of data and sensitivity of the instrument. Samples should be analyzed undiluted to maximize sensitivity. Unless sample screening indicates the presence of high concentration target analytes, samples should be analyzed undiluted to maximize sensitivity. Samples must be reanalyzed at the appropriate dilution when concentrations exceed the linear calibration range to maximize accuracy.

8.3.7 Control Limits

Control limits are either listed in the appropriate methods or are established separately. Control limits can be considered action limits. Laboratory-established limits are defined as ± three standard deviations of the mean and correspond to 99.7 percent confidence limits of a normal distribution curve. The laboratory establishes control limits for each analyte of concern using a minimum of twenty data points. Minimally, the control limits are updated by the laboratory on an annual basis. Therefore, the most recent control limits are used to evaluate data for the field activities. The current method or laboratory control limits used to assess data for this field investigation will be summarized by the laboratory in the analytical report.

8.3.8 Standards and Solutions

The use of standard materials of a known purity and quality is necessary for the generation of reproducible data. The laboratory will monitor the use of laboratory consumable materials including solutions, standards, and reagents. Reagent solutions used for quantitation purposes must be American Chemical Society (ACS)-grade or better. The laboratory must use standard mixtures of target gases in high-pressure cylinders certified traceable to a NIST Standard Reference Material or NIST/USEPA-approved Certified Reference Material. Standards should be traceable by lot number to a certificate of analysis, which is on file at the laboratory. Standards and standard solutions are verified prior to use. Standards are routinely checked for signs of deterioration, including unusual volume changes, discoloration, formation of precipitates, or changes in analyte response.

The sample canisters used for this project will be supplied by the laboratory as previously described. The containers will be batch or individually certified-clean by the laboratory and documentation will be provided in the data package.

The Laboratory Project Manager and the field representatives will be ultimately responsible for checking supplies for contamination.

8.4 LABORATORY INSTRUMENTS MAINTENANCE

Each major piece of analytical laboratory instrumentation that will be used on this project has been documented and is on file with the laboratory. An equipment form will be prepared for each new purchase and old forms will be removed from the instrument area and filed when an instrument is replaced.

The laboratory will be required to maintain an equipment form detailing both preventative maintenance activities and the required QA testing and monitoring. In the event the instrument does not perform within the limits specified on the monitoring form, the Laboratory QA Manager will be notified and a decision will be made as to what corrective action is necessary. The corrective action procedure will be documented in the instrument log. If repair is necessary, the instrument will not be used for analyses until repairs are completed and the instrument tested. Repairs made to the instrument will be documented in the instrument logbook. Required QA/QC testing and monitoring will be completed prior to the resumption of sample analysis.

Routine maintenance is performed to keep laboratory instruments running under optimum conditions and to reduce instrument malfunction. Specific preventative maintenance programs outlining required maintenance procedures and their application frequencies are incorporated in laboratory SOPs for each methodology.

Minimally, laboratory instruments will undergo maintenance on an annual basis and when calibration, blank, or QC analyses indicate that maintenance is necessary to correct or improve system performance. Maintenance, whether performed by laboratory personnel or manufacturer, is documented as an entry in the appropriate log. Log entries include the reason for maintenance, maintenance performed, date, and initials of person in charge during maintenance.

The operating temperatures for refrigerators, coolers, ovens, and water baths will be monitored by the laboratory daily. The analyst will record the following information in a bound logbook: equipment identification, temperature reading, date and time of reading, and analyst initials.

9. REAL-TIME MONITORING DATA REDUCTION, VALIDATION AND MANAGEMENT

This section describes the data reduction and assessment procedures to be followed to continually check the integrity of the real-time monitoring data.

9.1 FIELD DATA REDUCTION

Field operations will include both data reduction and data management. Data reduction consists of the data processing at the Central Receiver Station after raw data have been collected from each station and saved to the Central PC. Field data management consists of the procedures by which data are stored and maintained at the Central Receiver Station both on the Central PC and in physical storage files.

The data reduction process will include the following tasks:

- Upload of continuous raw hourly data from each fixed monitoring station and meteorological stations into daily excel spreadsheets
- Review of data from daily site inspection forms and site logbook
- Development of daily graphs of continuous monitor concentrations and wind conditions
- Summary of the results from each station into a daily air monitoring report (DAMR)

Field data reduction will be performed daily at the Central Station by an AQM operator. All data reduction tasks will be completed during the morning following the day of collection, and will cover data from midnight to midnight of the previous day. Specific guidelines for field data reduction are in SOP 300-100.

9.2 DATA VALIDATION

Data validation will be conducted after completion of the data reduction process, and will consist of the following:

- Review of the following daily field data reports:
  - hourly data summary in daily Excel spreadsheets for continuous air monitoring and meteorological data
  - daily graphs of continuous monitor concentrations and wind conditions
  - DAMR including real-time mercury, sulfur dioxide, noise and odor monitor data
- Review and confirmation of missing hourly data periods for continuous parameters prior to submittal of monthly EDD

Specific procedures for validation of real-time data are contained in Section 5 of SOP 300-100.

9.3 DATA MANAGEMENT

All raw data files will be maintained on the Central Station PC in a dedicated file directory. All raw data files and current program setup files and programs will be backed up to a separate hard drive every two weeks by mirroring the primary hard drive in the Central Station PC. In addition, as a secondary backup, hourly data from fixed AQM stations and meteorological stations will be collected and stored onto the Lakeshore PC.

All hourly raw data files will be archived annually at the end of each calendar year, and saved to the project directory on the O'Brien & Gere' Syracuse office network. A copy of the hourly raw data files will also be made to compact media disk (CD) which will be stored in physical file cabinet at the Central Station.

10. SAMPLE ANALYSIS DATA ASSESSMENT, VALIDATION AND USABILITY

This section describes the data assessment and validation procedures for speciated VOCs to check the integrity and usability of the analytical data.

10.1 ANALYTICAL DATA ASSESSMENT

10.1.1 Laboratory Procedures

The laboratory will perform in-house analytical data reduction and evaluation under the direction of its internal Laboratory QA Manager. The Laboratory QA Manager is responsible for assessing data quality and advising of any data that were rated "preliminary" or "unacceptable" or other notations that would caution the data user of possible unreliability. Data reduction and reporting by the laboratory will be conducted as follows:

- Qualified chemists approve the analytical runs and reduce the raw data to the final report;
- Upon acceptance of the raw data by the area supervisor, a computerized report is generated and sent to the Laboratory QA Manager;
- The Laboratory QA Manager completes a thorough audit of reports at a frequency of 1 in 10, and an audit of every report for consistency;
- The Laboratory QA Manager and area supervisors will decide whether any sample re-analysis is required; and
- Upon acceptance of the preliminary reports by the Laboratory QA Manager, final reports will be generated and electronically signed by the Laboratory Director.

The laboratory will report the data in the same chronological order in which it is analyzed along with QC data. Only data that pertains to this project will be included in the data packages.

Data results will be reported to O'Brien & Gere in accordance with project deliverable requirements for electronic data.

The laboratory will provide stand-alone and comprehensive data packages that provide information, including summary forms for QC evaluation and raw supportive data, to allow for full data validation to be performed by O'Brien & Gere.

The laboratory will provide O'Brien & Gere with data packages as described previously that contain the following information in each analytical data package submitted:

- Cover sheets listing the samples included in the report and case narrative comments describing problems encountered in analysis;
- Shipping documentation (Chain-of-Custody forms, Field Test Data Sheets, internal Chain-of-Custodies and sample log-in checklists)
- Canister pressures from both the field and laboratory;
- Tabulated results of project target analytes identified and quantified, reported in micrograms per cubic meter (µg/$m^{3)}$, MDLs (also reported in parts per billion by volume) and QLs;
- Raw supportive results (including quantitation reports and mass spectra) for samples and dilution analyses;
- Raw supportive results (including quantitation reports) and summary forms for instrument performance checks, sample batching, initial calibrations and initial and closing calibration verifications, internal standards, and LCS analyses;
- Raw supportive results (including quantitation reports and mass spectra) and summary forms for method blanks and dilutions performed;
- Canister certification result summary forms, analysis results and batching information;

- Sample preparation logs, instrument run logs and dilution calculation forms;
- Example sample result calculation, including unit conversions, starting with raw data information;
- MDL study summaries and verification summaries for each instrument used; and
- Standard and spike preparation tracing information.

10.1.2 Sample Data Assessment

Sample results obtained will be qualitatively and quantitatively assessed by the project team on a project-wide basis. Factors to be considered in the data assessment will include, but are not necessarily limited to, the following:

- Were all samples obtained using the methodologies and SOPs proposed in the QAPP?
- Were samples obtained from all proposed sampling locations?
- Do any analytical results exhibit elevated laboratory QLs or MDLs?
- Were any reported analytes not expected to be present?
- Were all laboratory data validated according to the frequency and protocols proposed in the QAPP?
- Which data points were found to be unusable based on data evaluation?
- Which data points were found to be usable with qualification based on data evaluation?
- What effects do qualifiers applied as a result of data evaluation have on the ability to implement the project decision rules? Have sufficient data of appropriate quality been generated to meet the key objectives of the project as identified in this QAPP?

10.2 DATA VALIDATION AND ASSIGNMENT OF QUALIFIERS

10.2.1 Data Validation

Data validation is a process of determining the suitability of a measurement system for providing useful analytical data for samples submitted for laboratory analysis; the process indicates whether or not data can be used for a specific purpose based on the project requirements. Through this process, the laboratory performance and practices are evaluated and both estimated data and unusable data that are not technically and legally defendable are identified to the data user.

Data validation is essentially a three-step process. The quality assurance/quality control information associated with the data is first compared to the QA/QC criteria. Based on the results of this comparison, the analytical data are then assigned qualifiers, which provide an indication of the data's usability. Data associated with excursions from the QA/QC criteria are qualified based on guidance provided in the current USEPA data validation guidance document and professional judgment. Finally, based on the QA/QC information review and the qualifiers assigned to the analytical data, an overall evaluation of the data's usability is performed, considering the data parameters of precision, sensitivity, accuracy, representativeness, comparability, and completeness. The data validation report summarizes the data quality information collected during the validation process.

Data validation will be performed and reported quarterly on the data from the samples collected and submitted to the laboratory for analysis. Data validators from O'Brien & Gere will provide the data validation services. Upon request by the data validator, the laboratory will provide additional or supplemental information within 3 working days of the request.

The quality assurance/quality control information associated with the ambient air data will be compared to the QA/QC criteria presented in the USEPA Method TO-15, the QAPP requirements presented in Table D-3 and the and the current laboratory control limits. Data not within control limits may require corrective action by the laboratory. Data validators will check corrective action reports and results of reanalysis, if available. Corrective actions implemented by the laboratory will be referenced in the data validation report.

Full data validation consists of a review of data summary forms and raw analytical supportive data that are provided in the data packages. During the full validation, data validators will recalculate selected laboratory sample calculations using raw data when verifying sample results. In addition, data validators will review selected raw data to verify that compound identification was performed correctly and transcription errors are not present. For full data validation, the following QA/QC parameters will be included in the review for VOC analyses, where applicable:

- QAPP compliance;
- Sample collection;
- Chain-of-custodies;
- Canister pressures;
- Holding times;
- Calibrations;
- Blank analysis;
- LCS/LCSD analysis;
- Internal standards performance;
- Field duplicate analysis;
- GC/MS instrument performance check;
- Clean canister evaluation;
- Target analyte quantitation, identification, and QLs; and
- Documentation completeness.

10.2.2 Assignment of Qualifiers

Data affected by excursions from the previously described QA/QC criteria will be qualified using the following data validation guidance document and professional judgment:

- USEPA. 2006. Validating Volatile Organic Analysis of Ambient Air in canister by Method TO-15. SOP HW-31, Revision 4. Albany, New York

The application of these validation guidelines will be modified to reflect method and QAPP requirements and will involve utilizing professional judgment. The validation approach to be taken by O'Brien & Gere will be a conservative one; qualifiers will be applied to sample data to indicate minor excursions detected in comparison to method and validation criteria. In this way, data associated with any type of excursion will be identified to the data user. Major excursions will result in data being rejected, indicating that the data are considered unusable for either quantitative or qualitative purposes. Minor excursions will result in sample data being qualified as approximate.

Utilizing USEPA guidance and professional judgment, the following qualifiers will be used in this data validation:

- "U" – Indicates that the analyte was analyzed for, but was not detected.
- "J" – Indicates that the result should be considered to be an estimated value. This qualifier is used when the data validation process identifies a deficiency in the data generation process.
- “UJ” – Indicates that the sample-specific reporting limit for the analyte in this sample should be considered approximate. This qualifier is used when the data validation process identifies a deficiency in the data generation process.

- ”R” – Indicates that the reporting limit or sample result has been determined to be unusable due to a major deficiency in the data generation process. The data should not be used for any qualitative or quantitative purposes.

10.3 DATA USABILITY EVALUATION

Data usability with respect to the DQOs and data uses will be compared to the project requirements. In the event that the completeness objective for speciated VOC sampling of 85 percent is not achieved, additional samples may be collected.

Based on the QA/QC information review and the qualifiers assigned to the analytical data, an overall evaluation of the data’s usability will be performed. Data usability is defined as the percentage of data that remains unqualified or is qualified as approximate or non-detected due to blank excursions, divided by the data reported by the laboratory times 100. The percent usability excludes the data qualified as rejected due to major QA/QC excursions.

The data usability evaluation considers the data parameters of precision, sensitivity, accuracy, representativeness, comparability, and completeness which are described as follows:

- Precision will be evaluated through the review of field duplicate analyses and LCS/LCSD analysis, if performed.
- Sensitivity is evaluated through the review of QLs.
- Accuracy is evaluated through the review of internal standards, LCS recoveries, calibration, and instruction performance check.
- Representativeness is evaluated through the review of holding times, sample preparation, blank analysis, and target compound identification and quantification.
- Comparability is evaluated through the review of the analytical methods and reporting procedures for consistency.
- Completeness is defined as the overall percentage of sample results that are determined to be usable.

Factors to be considered in evaluating the consequences of estimated or rejected data may include the following:

- The nature and magnitude of the data quality problem – for example, a small positive bias in a sample concentration near a screening level may result in a conservative conclusion, but a large negative bias may render the screening-level comparison meaningless.
- The nature and location of the affected sample(s) – for example, a data deficiency in a result for an area where available data are limited may have a much greater impact on data interpretation than a similar deficiency in one of many results for a study area.
- The context of the sample result within the data set – for example, a questionable result for an analyte that is detected at high concentrations and important for site interpretation is likely to have a much greater impact on data interpretation than a questionable result for an analyte that is present at only low concentrations.

10.4 DATA VALIDATION REPORT

The data validation report will contain separate QA sections in which data quality information collected during the project is summarized. The validation report will include the following:

- Guidelines used to evaluate the data;
- Data qualifiers applied to sample results;
- Summary of samples collected and analyses performed;
- Narrative that identifies major and minor analysis excursions detected for each parameter evaluated for each analysis;

- Additional issues and information that may be beneficial to the data user; and
- Data summary forms.

Discussion of QA/QC excursions which do not result in the qualification of an analyte, or which result in additional qualification of data previously qualified is optional in the validation report.

The data validation report will be prepared under the direction of an O'Brien & Gere QA Manager and will include the report on the usability of the data and results of any laboratory and field audits.

11. QA REQUIREMENTS

Audits of both field and laboratory activities are be conducted to document that sampling and analysis are performed in accordance with the procedures established in this QAPP, and evaluate both field and laboratory activities.

11.1 FIELD AUDITS

Internal field audits will be conducted twice per year within approximately one month of the beginning and end of each dredge air monitoring season. In addition to the internal field audits, external field audits may also be conducted by NYSDEC. Internal field audits will consist of a system audit of the air monitoring program operations directed by the AQM Project Officer.

The system audit is general assessment of how the monitoring network is being operated relative to the stated QC procedures established in this QAPP. Inspections of the monitoring stations and interviews with the AQM operators will be conducted by the auditor to determine:

- Whether the type of field measurements, data recovery rates, and form of output data are sufficient for the purpose of the program
- Adherence of routine operations, field calibrations, routine maintenance, and QA activities
- The level of preventive and non-routine maintenance since the previous audit
- The suitability of equipment used for calibration and operational checks
- Sample collection, handling, and packaging were performed in compliance with the established procedures;
- Status of changes to the system configuration and any recommendations implemented as a result of a previous audit,
- The effect of instrument outages and component failures or malfunctions that may have affected the quality and quantity of collected data,
- The adequacy and completeness of documentation in station logs and field forms

The auditor will review with field personnel the findings of the audit and summarize the findings in a written report within 30-days of the audit. If deficiencies are identified, follow-up audits will be conducted to determine if deficiencies have been corrected.

11.2 LABORATORY AUDITS

At the discretion of the Project Manager, internal performance and system audits of laboratories may be conducted by the O’Brien & Gere QA Manager or QA Manager’s designee. System audits include examination of laboratory documentation on:

- Sample receiving;
- Sample log-in;
- Sample storage;
- Chain-of-custody procedures;
- Sample preparation and analysis; and
- Instrument operating records.

The performance audits may include blind QC samples prepared and submitted along with project samples to the laboratory for analysis throughout the project. The analytical results of these blind performance samples are evaluated to document that the laboratory is conducting its scope of work according to established methods and standards, as referenced in this QAPP.

External laboratory audits may also be conducted by NYSDEC.

11.3 QUALITY REVIEWS

The O'Brien & Gere Project Officer and Project Manager will review aspects of the implementation of this QAPP once every 12 months (total of three reviews anticipated). The reviews will cover the following:

- Deviations from this QAPP
- Results of data validation and performance evaluation audits
- Significant QA/QC problems, recommended solutions, and results of corrective actions
- Indication of whether the QA objectives were met
- Limitations on use of the measurement data
- Data Validation Reports
- Audit Findings

12. CORRECTIVE ACTIONS

Corrective actions to the monitoring program may be required for two classes of problems: (i) analytical and equipment problems; and (ii) non-conformance problems with QAPP requirements. Analytical and equipment problems may occur during sampling and sample handling, sample preparation, laboratory instrument analyses, and/or data review.

For non-conformance problems, a formal corrective action program will be determined and implemented at the time the problem is identified and will be documented in QA reports to the O'Brien & Gere Project Manager. The person who identifies the problem is responsible for notifying the O'Brien & Gere Project Manager. Implementation of a corrective action will be confirmed through the same channels. Non-conformance with the established QC procedures in this QAPP will be identified and corrected.

The enacted corrective actions will be documented in the appropriate field notebook, log, or project case file. Laboratory personnel are encouraged to discuss specific issues and proposed corrective actions with the O'Brien & Gere QA Manager.

Staff members will not initiate corrective action without prior communication of findings through the proper channels.

12.1 SAMPLE COLLECTION/FIELD MEASUREMENTS

Technical staff and project personnel will be responsible for reporting suspected technical or QA non-conformances, or suspected deficiencies of any activity or issued document, by reporting the situation to the O'Brien & Gere Project Manager. The Project Manager will assess the suspected problems in consultation with the Project Officer to make a decision based on the potential for the situation to impact the quality of the data. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, appropriate action will be initiated and implemented by the Project Manager by:

- Evaluating reported non-conformances;
- Controlling additional work on non-conforming items;
- Determining the action to be taken;
- Maintaining a calendar log of non-conformance events and solutions implemented; and
- Ensuring descriptions of non-conformance and correlating corrective actions are included in the final Site documentation in project files.

If appropriate, the Project Manager will not allow additional work that depends on the non-conforming activity to be performed until the corrective actions are completed.

Corrective action for field measurements may include:

- Repeating the measurement to check the error;
- Recalibrating instruments;
- Checking the calibration;
- Repairing or replacing the instrument or measurement devices; and
- Stopping work, if necessary, until corrective actions can be implemented and return to appropriate DQOs can be confirmed.

The O'Brien & Gere field team is responsible for on-site activities. In this role, the Project Manager, at times, is required to adjust the field programs and procedures to accommodate Site-specific needs. When it becomes necessary to modify a program, the responsible person will notify the Project Manager of the anticipated change and implement the necessary changes after obtaining the approval of the Honeywell Program Manager. The change in the program will be documented in the field logbook. In addition, the action taken during the period of deviation will be evaluated in order to determine the significance of any departure from established program practices.

The O'Brien & Gere Project Manager is also responsible for the controlling, tracking, and implementation of the identified changes and will regularly inform the Honeywell Project Director of any deviations and corrections made.

12.2 LABORATORY ANALYSIS

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The investigative action taken is dependent on the analysis and the event.

Generally, the following corrective actions may be taken by the laboratory. When calibration, instrument performance, and blank criteria are not met, the cause of the problem will be located and corrected. The analytical system will then be recalibrated, if required. Sample analysis will not begin until calibration, instrument performance, and blank criteria are met. When reference standard analyses are out of control, samples analysis will cease. The problem will be investigated. Depending on the results of the overall QC program for the sample set, the data may be accepted, accepted with qualification, or determined to be unusable.

If, through the application of the corrective actions listed in Table D-3, the data is determined to be unusable, the QC analysis will be re-prepared and re-analyzed. If QC criteria are met upon re-analysis, only the re-analysis results are reported. If QC criteria are still not met upon re-analysis, both sets of sample results will be reported and the O'Brien & Gere QA Manager will be notified of the situation at the time of sample analysis.

13. REPORTING

This section describes the reporting of data collected from the Program to the involved regulatory agencies and to the public via the Project's website. Note that procedures for reporting exceedances of action levels and perimeter limits are discussed in Section 3.3.

13.1 PERIODIC DATA SUBMITTALS TO REGULATORY AGENCIES

There will be three periodic data submittals to regulatory agencies: 1) daily summaries of real-time data, 2) monthly electronic data deliverables (EDDs), and 3) speciated VOC data summaries.

13.1.1 Daily Real-time Data Summaries

A summary of real-time data collected each monitoring day (from midnight to midnight) will be provided to the Project's Site Managers and representatives of the regulatory agencies (NYSDEC, NYSDOH, USEPA). The summaries, in the form of Daily Air Monitoring Reports, will be emailed the day after each monitoring day.

The Daily Air Monitoring Report (DAMR) is presented in SOP 200,100. The DAMR contains a summary of the range of measured concentrations for dust and TVOC as well as the time of the maximum concentration. The report also provides the maximum mercury, H_2S, noise and odor levels for each monitoring day. The reported concentrations/levels will be total measurements, including background. Finally, any excursions above action levels of will be described on the report; such descriptions will include an explanation of background corrections and corrective action taken to reduce concentrations.

13.1.2 Electronic Data Deliverables

Approximately one month after the end of each calendar month of monitoring, an electronic data deliverable (EDD) for the two real-time continuous parameters (dust and TVOC) will be emailed in the standard NYSDEC format (both text and Excel ® file formats) to the NYSDEC-designated representative(s). The data files will contain direct measurement results that have not been corrected for background concentrations.

Approximately one month after the quarterly data validation of the speciated VOC sample analyses (described in Section 10), an EDD for the speciated VOC samples will be emailed to the NYSDEC-designated representative(s). The data files will contain sample analysis results that have not been corrected for background concentrations.

Other parameters that are measured on a survey basis (mercury, hydrogen sulfide, noise, odors) will not be submitted in EDD format, but in the DAMR only (see Section 13.1.1).

13.1.3 Speciated VOC Data Summaries

In addition to EDDs, summaries of the speciated VOC data (uncorrected data and background-corrected data) will be submitted to the NYSDEC-designated representative(s) once per quarter (submitted approximately two months following each calendar quarter). The data will be presented in tabular form showing the validated sample analysis results for each sample collected during the report quarter, as well as the background corrected results and 12-month block averages of the background corrected data, as described in Section 9.1. Once the first 12 months of sampling has taken place (anticipated to be between July 2012 to July 2013), the fourth quarterly data submittal will compare the background-corrected 12-month block averages to the perimeter limits described in Section 3.3. Similarly, the fourth quarterly data submittal for each subsequent 12-month periods (ending in July of 2014, and 2015) will include the comparison to perimeter limits.

13.2 WEBSITE DATA SUMMARY

One-hour average data from continuous real-time air monitoring (TVOC and dust) and meteorological stations will be graphically displayed on the Honeywell web site (http://www.lakecleanup.com). There will be one graph available for viewing for each day, each station, and each of the two real-time parameters and two meteorological stations. The data will have been validated using procedures described in Section 9.1. Notes will be placed on the graphs to explain exceedances of action levels and perimeter limits and to describe corrective action taken, if applicable.

13.3 QA REPORTS

Findings of QA audits and reviews, described in Section 11 will be summarized in memoranda within 30 days of each audit or review. The memoranda will be distributed to and discussed with the field team or laboratory. Corrective actions, if any, will be identified in the audit report, and followed-up on during the subsequent audit.

13.4 MONITORING REPORT

At the end of the project when all air monitoring is completed, a report will be assembled to document the air monitoring program, and will contain the following topics:

- Monitoring activities overview
- Monitoring results summary (excursions, averages)
- Excursion corrective action summary (emission reduction activities)
- Data quality

Project files of original field forms and laboratory reports, raw and validated data will be maintained and archived by O'Brien & Gere. They, along with EDDs, will not be submitted with the monitoring report.

Contact Information

CONTACT INFORMATION

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Field Monitoring – Standard Operating Procedures

100.100 Daily Operation, Calibration, and Maintenance - MIE ADR 1500 Particulate Monitor

100.101 Data Retrieval - MIE ADR 1500 Particulate Monitor

100.200 Daily Operation, Calibration and Maintenance - MiniRae 3000 Photoionization Detector

100.201 Data Retrieval - MiniRae 3000 Photoionization Detector

100.300 Daily Operation - Nasal Ranger Field Olfactometer

100.400 Daily Operation, Calibration, and Maintenance – Jerome J505

100.500 Daily Operation, Calibration, and Maintenance - Jerome 631-X

100-600 To-15 Ambient Air Sample Collection Procedures for Speciated Volatile Organic Compounds

200.100 Routine Daily AQM Procedures

200.200 Quality Assurance Precision Assessment - AQM Instrumentation

300.100 Data Management for Air Quality Monitoring Data Logger System

300.200 Background Correction of Real-Time Total VOC and PM10 Ambient Air Measurements

STANDARD OPERATING PROCEDURE

Number 100.100

Revision 2– 6/20/12

DAILY OPERATION, CALIBRATION, AND MAINTENANCE MIE ADR 1500 PARTICULATE MONITOR

PROGRAM SPECIFIC PROCEDURE HONEYWELL AIR QUALITY MONITORING PROGRAM

1.0 APPLICABILITY

This set of procedures outlines the general steps for the daily operation calibration, and maintenance of the MIE ADR 1500 Particulate Monitor (ADR). These procedures are to be performed by O'Brien & Gere personnel performing air quality monitoring on the Honeywell Onondaga Lake air quality monitoring program.

2.0 TEST EQUIPMENT REQUIRED

2.1 ADR zeroing HEPA filter
2.2 Thermo Scientific pDR Port software v2.0.1
2.3 Field laptop computer with RS232 port or USB to RS232 adapter and cable
2.4 Thermo Scientific USB 2.0 data communication cable (PN 1008857-00)
2.5 Campbell Scientific CR1000KD

3.0 SUPPORTING DOCUMENTS

3.1 Daily Field Calibration Form
3.2 MIE ADR-1500 Particulate Monitor Instruction Manual
3.3 ADR-1500 Preventative Maintenance Schedule

4.0 OPERATION

4.1 Connect the PM_{10} cyclone (red) and cyclone holder to the ADR sample inlet on top of the instrument enclosure.

4.2 Connect the omni-directional inlet to the PM_{10} cyclone inlet.

4.3 Connect to either an AC or DC power source, then open the ADR enclosure door and press and hold the ADR power button to turn the instrument on.

4.4 The “OPERATE” menu is displayed. If the ADR has been reset in regards to programmable settings being returned to default due to power loss or factory reset, the following Steps 4.5 through 4.10 should be followed. Otherwise, to start sampling, proceed to Step 4.11.

4.5 Connect the USB 2.0 data communication cable between the ADR and a PC with pDR Port software installed and open pDR Port

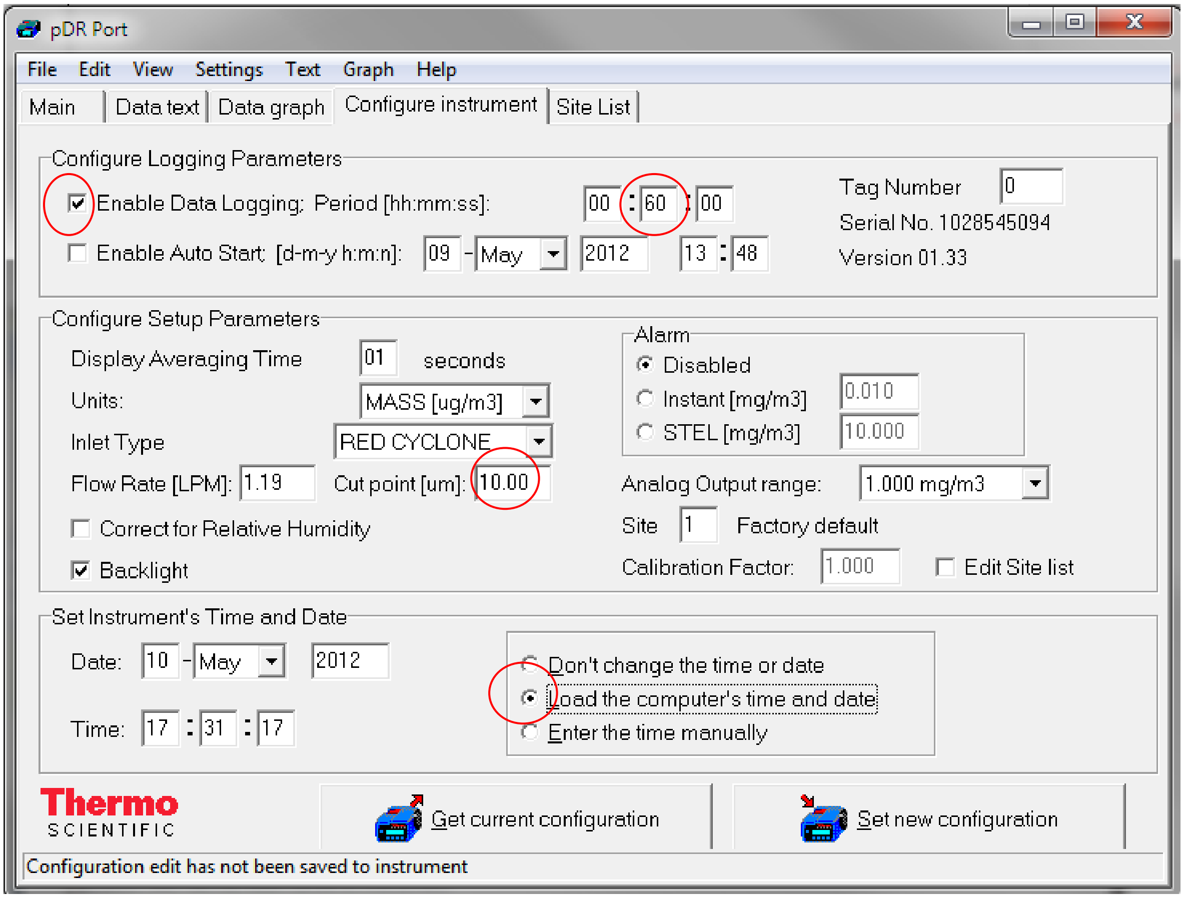
4.6 Select the appropriate communication port for the PC, a toolbar will appear, prompting for a selection of a communication port for the computer. Choose the appropriate port by referencing the control panel on the computer.

  4.6.1 To verify the communication port to use, through control panel select “system”, then from the toolbar select “hardware”. Choose “device manager”. Select “Ports”. The communication port to use is identified as the Silicon Laboratories USB cable.

4.7 Select “show instrument panel”, located directly below the menu for communication port selection. If properly connected, a screen will appear that mirrors the “operate” screen on the face of the ADR. Once connection is confirmed, close the instrument panel display.

4.8 Select the “Configure instrument” tab on pDR Port.

4.9 Using the following screen shot of the pDR Port configuration screen, set the ADR to the appropriate settings.



Configure Logging Parameters

☑ Enable Data Logging; Period [hh:mm:ss]: 00 : 60 : 00

☐ Enable Auto Start; [d-m-y h:m:n]: 09 - May 2012 13 : 48

Tag Number 0

Serial No. 1028545094

Version 01.33

Configure Setup Parameters

Display Averaging Time 01 seconds

Units: MASS [ug/m3]

Inlet Type RED CYCLONE

Flow Rate [LPM]: 1.19 Cut point [um]: 10.00

☐ Correct for Relative Humidity

☑ Backlight

Alarm

● Disabled

○ Instant [mg/m3] 0.010

○ STEL [mg/m3] 10.000

Analog Output range: 1.000 mg/m3

Site 1 Factory default

Calibration Factor: 1.000 ☐ Edit Site list

Set Instrument's Time and Date

Date: 10 - May 2012

Time: 17 : 31 : 17

○ Don't change the time or date

● Load the computer's time and date

○ Enter the time manually

Configuration edit has not been saved to instrument

4.10 When finished click “Set new configuration” and it will be loaded to the unit. Then disconnect the USB cable from the ADR.

4.11 To start sampling, press the ENTER button to enter the “START A RUN” menu, then press the ENTER button once more.

4.12 To ensure optimal sampling during period of elevated humidity or fog, make sure the sample inlet heater is active by pressing the red and black toggle switch on the face of the instrument to the “1” (on) position.

4.13 When sampling is complete press the ESC button, then press the ENTER button to finish the run.

5.0 CALIBRATION

5.1 Zero/Initialize - The following procedure shall be followed once during the first day of each monitoring week and as necessary if ADR response indicates excessive zero drift or is otherwise suspect.

5.1.1 From the “OPERATE” menu, press ENTER, and then press the down arrow button 3 times to navigate to “ZERO INSTRUMENT FILTER READY”.

5.1.2 Remove the omni-directional inlet and cyclone/cyclone holder from the ADR inlet on top of the instrument shelter.

5.1.3 Attach the orange tubing with the zeroing HEPA filter to the ADR inlet and press the ENTER button. The ADR will perform a background measurement and adjust the optical signal offset. The measurement takes approximately 5 minutes.

5.1.4 When completed successfully, the ADR will display “COMPLETE: BKG OK”. If “COMPLETE: BKG HI” or “FAILURE 0x00ee” is displayed, re-perform the zero calibration procedure. If after multiple zero calibrations the ADR response does not read “COMPLETE: BKG OK”, it is malfunctioning and must be replaced, perform corrective maintenance.

5.1.5 Record the date/time, ADR ID, and ADR zero response (“BKG OK”, “BKG HI” or “FAILURE”) on the Daily Field Calibration Form. Press the ENTER button to return to the “OPERATE” menu.

5.2 Dynamic Zero Check – The following procedure shall be conducted once per day (except for the day of the Zero/Initialize procedure described in Section 5.1) to confirm the zero baseline of the ADR response.

5.2.1 Remove the omni-directional inlet from the ADR inlet.

5.2.2 Attach the orange tubing with the zeroing HEPA filter to the ADR inlet.

5.2.3 Using the Campbell Scientific CR1000KD handheld keypad; enter the tech menu. The display will show digital and analog values of Dust.

5.2.4 Compare the digital and analog values; record the response of the two output signals onto the daily calibration field form. If the difference is < 10 µg/m^3 and > -2 µg/m^3 the ADR is operating acceptably.

5.2.5 If the ADR response is > 10 µg/m^3 and < -2 µg/m^3, perform SOP Section 5.1 (Zero/Initialize) then repeat Section 5.2. If the ADR is still outside of the specified range, replace the unit and conduct maintenance as described in Section 6.0.

5.2.6 After completing the zero check, re-attach omni-directional inlet.

6.0 MAINTENANCE

Extended use of the ADR can result in contamination of the ADR optical sensing chamber, extended monitoring HEPA filters, and the PM_{10} cyclone. This contamination can result in ADR zero calibration failures or excessive zero drift. In addition, extended use can result in need for pump replacement. Besides dust contamination, extended use of ADRs can fill the instrument's data storage capacity, resulting in potential failure of the instrument's display panel and proper operation. As a result the following maintenance should be performed to maintain proper ADR operation.

6.1 If the ADR repeatedly exhibits a failed zero calibration response or zero drift, the ADR optical sensing chamber will be cleaned with compressed air following the manufacturer's prescribed procedure on page 5-7 of the MIE ADR-1500 Instruction Manual.

6.2 The ADR will be cleaned and calibrated annually by the manufacturer. In addition, the ADR's extended monitoring HEPA filter will be visually checked every 3-months or sooner to determine if replacement is required. If the filter shows significant discoloration from dust build-up, replacement of the filter will be conducted following the manufacturer's prescribed procedure on page 5-27 of the Instruction Manual and noted on the Preventative Maintenance Schedule.

6.3 The PM_{10} cyclone will be checked every 3-months or sooner and cleaned as needed. The PM_{10} cyclone will disassembled into its three components and each cleaned with compressed air, cotton swabs, and methanol.

6.4 The ADR-1500 can only hold up to 100 tags of data on the unit. These tags of data must be cleared every 3-months or sooner by to prevent possible memory malfunctions. To delete ADR memory, perform steps 6.4.1 through 6.4.3

6.4.1 Connect the ADR to the desktop PC or field laptop with the USB cable. If the unit has the digital cable connected from the ADR-1500 to the CR800, this cable must be disconnected from behind the LCD faceplate of the ADR-1500 before continuing. Once connected to the ADR, open the pDR Port software.

6.4.2 Select the “File” tab and then click on “Delete data from pDR-1500”. Delete all of the tags.

6.4.3 Disconnect the USB cable from the unit and reconnect the digital cable (if disconnected prior to procedure).

6.5 If the ADR has frequent negative zero drifts, it needs to be restored to a factory “fresh” zero.

6.5.1 Connect to the ADR through pDR Port as outlined in Sections 4.5 to 4.7.

6.5.2 Click on the “Data text” tab of pDR Port, and then click the third icon in from the right that resembles a folded piece of paper.

6.5.3 A black command window will appear. Click on the command window and input the following commands. Note that the sequence has spaces between the characters. For example; the first line reads v(space)62(space)0(space)0(space)1024 and then the enter key.

6.5.3.1 V 62 0 0 1024 Enter

6.5.3.2 V 62 1 0 256 Enter

6.5.3.3 V 62 2 0 64 Enter

6.5.3.4 V 62 3 0 16 Enter

6.5.3.5 V 62 4 0 4 Enter

6.5.3.6 V 62 5 0 1 Enter

6.5.4 When this is completed, exit pDR Port and disconnect the USB cable from the unit. Zero the instrument following Section 5.1 and then return the instrument to operation.

6.6 All routine preventative maintenance will be tracked using the Preventative Maintenance Schedule.

STANDARD OPERATING PROCEDURE

Number 100-101

Revision 0 – 03/23/12

DATA RETRIEVAL
MIE ADR 1500 PARTICULATE MONITOR

NETWORK SPECIFIC PROCEDURE
HONEYWELL AIR QUALITY MONITORING NETWORKS

1.0 APPLICABILITY

This set of procedures outlines the general steps for retrieval of data from the MIE ADR 1500 Particulate Monitor (ADR) used for measurement of PM_{10} concentrations. These procedures are to be performed when manual retrieval of data from the ADR is required. These procedures are to be performed by operators working on a Honeywell AQM program. This SOP assumes operators have basic user knowledge of the ADR and Microsoft Excel (MS Excel).

2.0 TEST EQUIPMENT REQUIRED

2.1 Portable field laptop computer with pDR Port software and Silicon Laboratories USB driver installed

2.2 Thermo Scientific USB 2.0 data communication cable (PN 1008857-00)

3.0 SUPPORTING DOCUMENTS

3.1 MIE ADR-1500 Particulate Monitor Instruction Manual

3.2 Standard Operating Procedure 100.100 Daily Operation, Calibration, and Maintenance – MIE ADR 1500 Particulate Monitor

4.0 DATA RETRIEVAL

The following procedure will be followed to manually retrieve data from the ADR:

4.1 Connect the USB 2.0 data communication cable between the ADR and a PC with pDR Port software installed.

4.2 Power on the ADR.

4.3 Open pDR Port software.

4.4 Select the appropriate communication port for the PC, a toolbar will appear, prompting for a selection of a communication port for the computer. Choose the appropriate one by referencing the control panel on the computer.

  4.4.1 To verify the communication port being used, select control panel, “system,” then from the toolbar select “hardware.” Then choose “device manager.” From the list select “Ports.” Verify the communication port listed by locating the Silicon Laboratories USB cable.

4.5 Select “show instrument panel,” located directly below the menu for communication port selection. If properly connected, a screen will appear that mirrors the “operate” screen on the face of the ADR. Once confirmed, close this screen.

4.6 Select the “data” tab from the toolbar in the pDR port program.

4.7 Choose the “get new data from pDR-1500” icon located at the left of the header under the “data” tab.

4.8 Select the relevant data file by selecting the “tag” number from the list that will appear. The data will appear in the pDR port program screen. Select file “save as” to save the file as a .txt file. Save to the appropriate folder named by the following scheme: PM10_ADR_”Station Location"_DATE (i.e. PM10_ADR05_OLSCA1_030812).

4.9 After exporting the .txt file, right click on the file and open the file with MS Excel. Once open, click on the header for Column “A” to select the data in Column “A”. Then in the toolbar, select “data” and choose “text to

STANDARD OPERATING PROCEDURE

Number 100.200

Revision 1 – 6/20/12

DAILY OPERATION, CALIBRATION AND MAINTENANCE MINIRAE 3000 PHOTOIONIZATION DETECTOR

PROGRAM SPECIFIC PROCEDURE HONEYWELL AIR QUALITY MONITORING PROGRAM

1.0 APPLICABILITY

This set of procedures outlines the general steps for the daily operation, calibration and maintenance of the MiniRAE 3000 Photoionization Detector (PID) used of measurement of total volatile organic compounds (VOCs). These procedures are to be performed as required each day by O'Brien & Gere personnel performing air quality monitoring on the Honeywell Onondaga Lake air quality monitoring program.

2.0 TEST EQUIPMENT REQUIRED

2.1 VOC free/ultra pure zero air (THC<0.01 ppm)
2.2 Isobutylene calibration gas standard (5 ppm) with flow regulator (on-demand or flow matching-type) or Tedlar bag (1-liter minimum)
2.3 ProRAE Studio software v1.14 or later
2.4 Portable field laptop computer with RS232 port or USB to RS232 adapter and cable

3.0 SUPPORTING DOCUMENTS

3.1 Daily Field Calibration Form
3.2 MiniRAE 3000 User's Guide
3.3 MiniRAE 3000 Lamp Cleaning Procedure

3.4 MiniRAE 3000 Preventative Maintenance Schedule

4.0 OPERATION

4.1 Connect the particulate filter (white disc) to the PID sample inlet.

4.2 Connect the PID travel charger to the base of the PID.

4.3 Connect the energized 12VDC power and RS232 cable to the travel charger.

4.4 Turn the PID power on by pressing and holding down the “Mode” button for approximately 2 seconds. The PID will emit a beep and the pump will start. The monitor may display “Apply zero gas…”. If so, do not apply zero gas at this time; press the Φ button to quit. The PID is now sampling. Verify the display of #.# PPM on the screen.

4.5 To get to the main options menu, press and hold the Φ and **N/-** buttons simultaneously for approximately 2 seconds until either the main menu or the “Password” screen appears. If prompted for a password, enter “0000” as the password by using ↑ and → and then select “Enter”. The main menu screen will then appear.

4.6 To verify the proper span gas and span gas concentration are programmed in the PID, perform the following steps from the main menu screen (step 4.5):

4.6.1 Using the →, highlight and select the icon called “Calibration”.

4.6.2 From the “Calibration” screen, select “Span Calib”.

4.6.3 Isobutene should be displayed as the “C.Gas” and 5 ppm as the “Span”. If these are incorrect, perform the following steps to correct the span gas and span gas concentration.

4.6.3.1 Select “Yes” to make changes to the span gas.

4.6.3.2 From the “Select Gas From” screen, select “My List”.

4.6.3.3 Select “Isobutene” from the displayed list and then select “Save”.

4.6.3.4 Select “Back” from the “Select Gas From” screen and then select “Yes” to change the span gas concentration.

4.6.3.5 Using ↑ and →, enter 5000 ppb and select “Done”. Select “Quit” to return the “Calibration” screen. Select “Back” to return to the main menu.

4.6.3.6 Select “Back” twice to return to sampling.

4.7 To verify the PID is logging data, look for a floppy disk icon on the lower right corner of the display. If the icon is not present, the PID is not logging data. To setup data logging on the PID, perform the following steps from the main menu screen (step 4.5):

4.7.1 Highlight and select the icon called “Datalog”.

4.7.2 From the “Datalog Type” menu, select “Interval”. Using ↑ and →, specify the logging interval as 900 seconds (15 minutes) and select “Done”. Select “Save” if prompted.

4.7.3 From the “Datalog Type” menu, select “Data Selection”. Check boxes for “Average” and “Maximum” and select “Done”. Select “Save” if prompted.

4.7.4 From the “Datalog Type” menu, select “Auto”. With “Auto” selected, the PID will log data every time it operates. Select “Save” if prompted.

4.7.5 Select “Back” twice to return to sampling.

4.8 To verify the PID operating mode is “Hygiene” mode, check to see if the instrument automatically started sampling when powered on. If the PID did not start sampling automatically and displayed “Ready…” after being powered on, the instrument operating mode is “Search”. To change the PID operating mode to “Hygiene”, perform the following steps from the main menu screen (step 4.5):

4.8.1 Highlight and select the icon called “Monitor Setup”.

4.8.2 Highlight and select “Op Mode”

4.8.3 Highlight and select “Hygiene”, select “Done”, and then select “Save”.

4.8.4 Select “Back” twice to return to sampling.

4.9 When sampling is complete, press and hold the Φ for approximately 5 seconds to turn the PID off.

5.0 CALIBRATION

5.1 This calibration procedure shall be performed once each sampling day and additionally as needed if PID zero drift is noticeable:

5.1.1 Press and hold the Φ and **N/-** buttons simultaneously for approximately 2 seconds until the “Password” screen appears. Select “Enter”. The “Calibration” screen will appear.

5.1.2 To perform a zero air calibration, perform the following steps.

5.1.2.1 At the “Calibration” screen, select “Zero Calib” to perform a zero air calibration.

5.1.2.2 Open the valve on the Tedlar bag of VOC free zero air and attach it to the PID sample inlet. Select “Start” on the PID.

5.1.2.3 The calibration will be 30 seconds in duration. A countdown timer is displayed on the PID. When “Zero is done” is displayed, the zero air calibration is complete. The zero response of the PID is displayed for approximately 3 seconds before the PID automatically returns to the “Calibration” screen. Record the date/time, PID ID, and PID zero response on the Daily Field Calibration Form.

5.1.2.4 The zero response of the PID must be ≤0.2 ppm. If the zero response of the PID is above 0.2 ppm, the zero calibration procedure will be re-performed. If after multiple zero calibrations the PID response does not meet the 0.2 ppm criteria, the PID will be removed from operation and replaced with a properly operating back-up PID.

5.1.3 To perform a span gas calibration, perform the following steps.

5.1.3.1 From the “Calibration” screen, select “Span Calib”.

5.1.3.2 Connect the 5 ppm Isobutylene span gas standard cylinder with attached on-demand flow or flow-matching regulator to the PID sample inlet, or connect a 1-liter or larger Tedlar bag filled with 5 ppm Isobutylene gas. Select “No” on the PID to confirm no change to the span gas value. Open the Tedlar bag or flow-matching regulator.

5.1.3.3 Select “Start” to initiate span calibration. The calibration will be 30 seconds in duration. A countdown timer is displayed on the PID. When “Span is done” is displayed, the span gas calibration is complete. The span response of the PID is displayed for approximately 3 seconds before the PID automatically returns to the "Calibration" screen. Record the PID span response on the Daily Field Calibration Form.

5.1.3.4 The span response of the PID must be ±10 percent of the span gas concentration ≥(4.5 ppm to ≤5.5 ppm). If the span response of the PID does not meet the ±10 criteria, the span calibration procedure will be re-performed. If after multiple span calibrations the PID response does not meet the ±10 percent criteria, the PID will be removed from operation and replaced with a properly operating back-up PID.

5.1.3.5 After span calibration, select "Back" to return to the PID sampling screen.

6.0 MAINTENANCE

Normal extended use of PIDs can result in contamination of the PID sensor and/or lamp. This contamination can result in PID lamp alarms, failed calibration responses, or severe zero drift. In addition, extended use can result in need for pump replacement. As a result the following maintenance should be performed to maintain proper PID operation.

6.1 Each PID lamp and sensor will be cleaned monthly as preventive maintenance. Cleaning will be conducted following the manufacturer's prescribed procedure on pages 91-92 of the MiniRAE 3000 User's Guide and the attached MiniRAE 3000 lamp cleaning procedure. Monthly cleaning will be documented on the MiniRAE 3000 Preventative Maintenance Schedule.

6.2 In addition to monthly cleaning, PID lamps and sensors will also be cleaned as needed for corrective maintenance when PIDs repeatedly exhibit lamp alarms, failed calibration responses, failed humidity tests, excessive zero drift, or suspect readings. Cleaning will be conducted following the manufacturer's prescribed procedure on pages 91-92 of the MiniRAE 3000 User's Guide.

6.3 If the issues have not been resolved, and either the PID lamp or sensor appears to be damaged or worn, then replace the lamp or sensor. Document any replacements in the MiniRae 3000 Preventative Maintenance Schedule.

6.4 If PID response is not corrected after preventive maintenance cleaning, or lamp or sensor replacement, the PID will be returned to the manufacturer for repair or further diagnosis.

6.5 Once per year, the PID pump flow rate will be measured using a flow meter. The pump flow rate will be compared to the manufacturer's recommended flow rate of over 450 cc/min. If the pump flow rate is found to be at or below 450 cc/min, the PID will be returned to the manufacturer for pump replacement or repair. Additionally, if the PID repeatedly responds with a pump error (denoted by a blinking pump icon with an "X" on the sampling screen) then the PID will be returned to the manufacturer for pump replacement or repair. Pump flow rate checks will be documented on the MiniRAE 3000 Preventative Maintenance Schedule.

MiniRAE 3000 Lamp Cleaning Procedure

MiniRAE 3000 Lamp Cleaning Procedure

- Personnel performing this procedure must wear nitrile gloves
- Remove inlet by unscrewing the large metal piece at the top of the PID
- Remove sensor very carefully by wiggling and pulling gently upward
    - Carefully remove black O-ring from the outside of the sensor
- Remove lamp very carefully by using your fingernail to pry it upward
    - Carefully remove white O-ring from the lamp
- Remove coarse metal filter by unscrewing the smaller metal piece from the larger piece on the PID inlet
    - Using a wide, flathead screwdriver unscrew the nut on the inside of the large inlet piece
    - Push from the top of the inlet to drop out the coarse metal filter
- Place sensor and coarse metal filter into ultra-sonic bath
- Carefully and slowly pour methanol into bath covering all components of the sensor and coarse metal filter
- Close the lid on the ultra-sonic bath and switch it on to high (II) for 5-10 minutes
- Clean the lamp with a Q-tip dipped into methanol using a rubbing motion on all areas of the lamp
    - Wipe off with a piece of optical lens paper and let dry for at least a few hours (preferably overnight)
- Switch off the ultra-sonic bath (0) and open lid, lift basket and hang to remove excess fluid
- Remove sensor from bath and wipe dry with a piece of optical lens paper
    - Then place on clean paper towel to dry for at least a few hours (preferably overnight)
- Remove coarse metal filter and place onto paper towel to dry for at least a few hours (preferably overnight)
- Fill out the “SCA Instrument Maintenance Schedule” for the PID cleaned
- Reassemble and test out PID after drying

STANDARD OPERATING PROCEDURE

Number 100-201

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DATA RETRIEVAL

MINIRAE 3000 PHOTOIONIZATION DETECTOR

NETWORK SPECIFIC PROCEDURE

HONEYWELL AIR QUALITY MONITORING NETWORKS

1.0 APPLICABILITY

This set of procedures outlines the general steps for retrieval of data from the handheld MiniRAE 3000 Photoionization Detector (PID) used of measurement of total volatile organic compounds (TVOCs). These procedures are to be performed when manual retrieval of data from the ADR is required. These procedures are to be performed by operators working on a Honeywell AQM program. This SOP assumes operators have basic user knowledge of the ADR and Microsoft Excel (MS Excel).

2.0 TEST EQUIPMENT REQUIRED

2.1 Portable field laptop computer with RS232 port or USB to RS232 adapter and ProRAE Studio software v1.14 or later installed

2.2 RS232 9-pin communication cable

2.3 PID Travel Charger

3.0 SUPPORTING DOCUMENTS

3.1 MiniRAE 3000 User's Guide

3.2 Standard Operation Procedure 100.200 Daily Operation, Calibration, and Maintenance – MiniRAE 3000 Photoionization Detector

4.0 DATA RETRIEVAL

The following procedure will be followed to manually retrieve data from the PID:

4.1 Connect the RS232 communication cable between the PID travel charger and a PC with ProRAE Studio software v1.14 installed. Power must be supplied to the travel charger, either through a 120-V AC power supply or a 12-V DC power supply (as is installed at Honeywell SCA and Lakeshore AQM stations).

4.2 At the sampling screen on the PID, select → until "Enter PC Comm. and stop measurement" is displayed.

4.3 Select "Yes" to pause the PID and start communications with the PC

4.4 Open ProRAE Studio software on the PC

4.5 Select the appropriate communication port on the PC by selecting "Operation" from the ProRAE Studio toolbar, clicking on "Setup Connection", and selecting the appropriate PC port and confirming the change.

4.6 Select "Operation" from the ProRAE Studio toolbar and click on "Download Datalog". All PID data will be presented on the left side of the screen. Once downloaded, all data on the PID is automatically saved in the RAE Systems Inc\ProRAE Studio V1.14\RAEFile folder as file name **Data_Model Name_Serial Number_Date.dlg,** a file that can be opened using ProRAE Studio software.

4.7 Select the relevant data file under "Text Mode", click on "Option" on the toolbar, and select "Export Text…" Export the file as a .txt file to the appropriate folder named by the following scheme: TVOC_PID ID_"Station Location"_DATE (i.e. TVOC_PID05_OLSCA1_030812).

4.8 After exporting the .txt file, right click on the file and open the file with MS Excel. Once open, click on the header for Column “A” to select the data in Column “A”. Then in the toolbar, select “data” and choose “text to columns”. A tool box will open. Select the “delimited” option and click next. Select “comma” from the list of options, then click “Finish”.

4.9 Save both the .txt and MS Excel .xls files keeping the file names the same.

STANDARD OPERATING PROCEDURE

Number 100.300

Revision 1 – 8/4/10

DAILY OPERATION
NASAL RANGER FIELD OLFACTOMETER

GENERAL PROCEDURE

1.0 APPLICABILITY

This set of procedures outlines the general steps for the operation of the handheld St. Croix Nasal Ranger Field Olfactometer (Nasal Ranger). Daily operation of the Nasal Ranger will be performed following the procedure outlined below.

2.0 TEST EQUIPMENT REQUIRED

2.1 Nasal Ranger Field Case

3.0 SUPPORTING DOCUMENTS

3.1 Nasal Ranger Odor Observation Field Form

4.0 INSTRUMENT PREPARATION

4.1 Clean the nose piece of the instrument with alcohol wipes prior to use and inspect the foam cushioned seal around the nose piece. Replace the foam cushion if necessary.

4.2 The instrument comes with two different range orifices (dials) for measuring odors, one low and one high. For most downwind ambient air monitoring applications, install the low range dial (2 through 60 Dilution-to-Threshold or

D/T). If odors are expected to be very strong, install the high range dial (60 through 600 D/T). The dials can be installed/removed using the hex key supplied with the instrument. Use care to install the gaskets and spacers properly. A diagram of the dial assembly is attached.

4.3 Turn the Nasal Ranger on by pressing the black button on the instrument below the nose piece. The Nasal Ranger is now ready for measurements.

5.0 OPERATION

5.1 The operator shall hold the instrument onto his/her nose firmly to create an air-tight seal with the nose piece. The operator shall zero the nose by taking several comfortable inhalations through the nose piece with the range dial set in between ranges (blank position). This will allow for only fresh/zero air to move through the instrument. The operator shall exhale through the instrument, keeping the nose in the nose piece and not breaking the air-tight seal. This shall be performed prior to any field measurements for at least 1-minute.

5.2 For measurements, the operator shall hold the instrument parallel with the ground and inhale through the nose piece at the proper rate of 16 to 20 liters per minute (lpm). This rate is identified by a green “circle” light on top of the instrument.

5.3 The operator shall make two inhalations at each range, starting at the highest range of the dilution dial and moving down the range of the dial until odor is detected. The operator shall zero his/her nose before making measurements at each range.

6.0 DOCUMENTATION

6.1 The operator shall document the odor concentration at which the odor was observed on the Nasal Ranger Odor Observation Field Form. For example, if an odor is detected at the 15 D/T setting but not at 30, then “15” will be check-marked on the field form.

6.2 The operator shall repeat the procedure for zeroing the nose and repeat the measurement to verify the result.

6.3 The operator shall note the location of the measurement, the time at which it was taken, and any construction/operation descriptions affecting the measurement. These descriptions include, but are not limited to, are:

- Type of construction activity
- Size of potential odor source
- Distance from measurement to potential odor source

STANDARD OPERATING PROCEDURE

Number 100.400

Revision 0 – 3/23/12

DAILY OPERATION, CALIBRATION AND MAINTENANCE
JEROME J505 MERCURY VAPOR ANAYLZER

PROGRAM SPECIFIC PROCEDURE
HONEYWELL AIR QUALITY MONITORING PROGRAM

1.0 APPLICABILITY

This set of procedures outlines the general steps for the initial daily setup, sampling, zero calibration checks, and maintenance of the Jerome J505 Mercury Vapor Analyzer (J505). These procedures are to be performed as required each day by O'Brien & Gere personnel performing air quality monitoring on the Honeywell Onondaga Lake air quality monitoring (AQM) program.

2.0 TEST EQUIPMENT REQUIRED

2.1 AC Adapter Power Supply (AZI P/N 990-0244)
2.2 Zero Air Filter (AZI P/N Z2600 3905)
2.3 Monitor inlet tube (probe) (AZI P/N 1400 2002)
2.4 Tweezers (AZI P/N 690-0012)
2.5 Knurled intake assembly

3.0 SUPPORTING DOCUMENTS

3.1 Daily Air Quality Monitoring Inspection Form
3.2 Jerome J505 Operation Manual

4.0 INITIAL DAILY SET UP

To be performed at the beginning of each monitoring day to ready instrument for operation.

4.1 Hold down the power key ⏻ to power on the instrument. The software revision is displayed on the startup screen on the digital display.

4.2 The screen displays “Warmup” for about 6 minutes while the instrument is warming up and stabilizing. When the progress bar on the digital display fills completely, “Ready” is displayed. The instrument is ready for operation.

4.3 Check for the following required sampling parameters:

  4.3.1 Verify “STANDARD” is present at the bottom left of the screen. If it is not, set the J505 to sample in standard mode by performing the following:

    4.3.1.1 Press the “MODE” softkey. Using the directional arrows, select “STANDARD” and press the ENT button. Press the ESC button to return to the “READY” screen.

  4.3.2 Verify “micro” is present at the bottom right hand of the screen. If it not, set the J505 to measure in “micro” units by performing the following:

    4.3.2.1 Press the “UNITS” softkey. Using the directional arrows, select “MICRO (ug/m^3)” and press the ENT button. Press the ESC button to return to the “READY” screen.

5.0 SAMPLING

Perform a mercury measurement with the J505 by performing the following procedure:

5.1 Press the TEST button on the keypad or the TEST button on the handle. The measurement will take up to 28-seconds to complete. The mercury measurement will be displayed on the instruments digital display.

6.0 ZERO CALIBRATION CHECK

The Zero Air Filter (AZI P/N Z2600 3905) can be used to verify proper instrument operation. The Zero Air Filter removes mercury vapor from the air sample to establish an instrument zero. This procedure is to be performed monthly, when zero drift has occurred, or when readings are otherwise suspect.

6.1 Readings with the filter installed should be less than 0.05µg/m^3.

6.2 If readings with the filter installed are not below 0.05µg/m^3, change the intake fritware filter as discussed on page 22 of the Operation Manual.

6.3 If replacing the fritware filter does not resolve the problem, the instrument will be replaced.

6.4 Note: It is necessary to equilibrate the instrument to the ambient air temperature, as ambient temperatures that are cooler or warmer than the instrument's sensors will cause lower or higher readings, respectively. Continuous sampling of clean air with the Zero Air Filter will not cause saturation of the sensor, but will equalize temperatures (ambient temp vs. instrument temp) faster to allow accurate analysis to begin sooner.

7.0 MAINTENANCE

There are no user serviceable components or assemblies inside the J505, however, replacement of the intake fritware is required when zero calibration checks indicate an elevated instrument zero as described above.

STANDARD OPERATING PROCEDURE

Number 100.500

Revision 0 – 3/23/12

DAILY OPERATION, CALIBRATION AND MAINTENANCE
JEROME 631-X HYDROGEN SULFIDE MONITOR

PROGRAM SPECIFIC PROCEDURE
HONEYWELL AIR QUALITY MONITORING PROGRAM

1.0 APPLICABILITY

This set of procedures outlines the general steps for the daily operation, calibration and maintenance of the Jerome 631-X Hydrogen Sulfide Monitor (631-X). This ambient air analyzer is capable of detecting Hydrogen Sulfide (H_2S) concentrations from 0.003 PPB up to 50 PPM. These procedures are to be performed as required each day by O'Brien & Gere personnel performing air quality monitoring on the Honeywell Onondaga Lake air quality monitoring program.

2.0 TEST EQUIPMENT REQUIRED

- 2.1 110V AC power cord
- 2.2 Zero Air Filter
- 2.3 Potentiometer adjustment tool (Trimmer)
- 2.4 631-X inlet tube (probe)
- 2.5 Intake assembly
- 2.6 Intake filter (0.25 inch fritware) (optional)

3.0 SUPPORTING DOCUMENTS

- 3.1 Daily Perimeter Inspection Field Form
- 3.2 Jerome 631-X Operation Manual

4.0 INITIAL DAILY SET UP

Perform these steps at the beginning of each day to verify proper 631-X operation, and as necessary during the 24-hour work period when zero drift has occurred or when readings are otherwise suspect:

4.1 Press the ON button. The digital display (also called the digital meter) should read “000” in less than one second.

4.1.1 A “LO BAT” message will appear briefly in upper left corner of the digital meter. If the “LO BAT” message persists, recharge the battery by turning the instrument off and keeping it plugged into an AC power outlet. Once instrument is sufficiently charged, the sensor regeneration process sequence can resume starting with Section 4.1 of this SOP. If the battery does not take a charge the instrument must be sent in for repair and replaced.

4.2 After turning the 631-X on, allow it to warm up for one minute to ensure the analyzer’s electronics have stabilized.

4.3 Insert the Zero Air Filter into the instrument’s intake and tighten the probe-intake nut to finger tight. Note: It is necessary to equilibrate the instrument to the ambient air temperature, as ambient temperatures that are cooler or warmer than the instrument’s sensors will cause lower or higher readings, respectively. Continuous sampling of clean air with the Zero Air Filter will not cause saturation of the sensor, but will equalize temperatures (ambient temp vs. instrument temp) faster to allow accurate analysis to begin sooner.

4.3.1 Press the SAMPLE button.

4.3.2 Sample continuously until readings stabilize.

4.4 The 631-X is now ready for the Regeneration Cycle.

4.4.1 Connect the 110V AC power cord to the bottom of the instrument and plug it into an AC power outlet. AC power is required to thermally regenerate the sensor.

4.4.2 Press the REGEN button. The digital display will flash ".H.H.H" for the duration of the 10-minute regeneration cycle. **NOTE: DO NOT INTERRUPT THIS CYCLE.** If ".P.P.P" appears on the screen, the power cord is required, the power source is not sufficient enough for the instrument (<110VAC) or the fuse needs to be replaced. See pages 16, 17, and 22 of the User Manual for these specific maintenance procedures.

4.4.3 The instrument will display ".0.0.0" when the regeneration cycle is completed.

4.4.4 Wait a minimum of **30-minutes** after the sensor regeneration cycle is complete for the 631-X to cool down to ensure maximum sample accuracy. Once 30-minutes have passed, proceed to step 4.6.

4.6 The instrument is now ready for the Zero Check – Adjustment.

4.6.1 While holding the ZERO button, insert the trimmer (flathead side) into the ZERO ADJUST potentiometer.

4.6.2 Turn the trimmer left or right to adjust the ZERO ADJUST potentiometer until the digital display reads "0", then release the zero button.

4.6.3 With the zero air tube still inserted into the instrument's intake, take several samples (pressing the SAMPLE button again after each reading) for approximately one minute.

4.6.4 After one minute, stop sampling (do not press the SAMPLE button anymore) and press the ZERO button again to check for zero drift.

4.6.5 Adjust to "0" if necessary using steps 4.6.1 & 4.6.2. of this SOP.

4.6.6 Release ZERO button and repeat sampling through the Zero Air Filter until sensor remains on "0".

4.7 Once the instrument is zeroed, loosen the probe-intake nut and remove the Zero Air Filter.

4.7.1 Press the power OFF button.

4.7.2 Disconnect the power cord from the bottom of the instrument and from the power outlet.

4.7.3 The instrument Regeneration Cycle and Zero Check – Adjustment is complete.

5.0 SAMPLING

This analyzer has two operation modes: Sample Mode and Survey Mode. Sample Mode is the standard operation mode and is used for optimum accuracy.

5.1 To initiate the H_2S sampling process, perform the following steps:

5.1.1 Insert the Sample Probe (metal tubing) into the instrument's intake and tighten the intake nut until finger tight and press the "ON" button. The LCD displays "000". Disregard the LCD's initial momentary readings.

5.1.1.1 If the LO BAT indicator remains on, recharge the instrument

5.1.2 Allow instrument to warm up for 1 minute to allow the instrument's electronics to stabilize before beginning the next step.

5.1.3 Press the SAMPLE button. During the sample cycle, the digital meter will display bars (-,--, or ---) to indicate the amount of sensor saturation.

5.1.4 At the end of the sampling cycle, read the digital display.

5.1.5 The number on the digital display is the H_2S concentration in PPB. This value remains until the next sample is taken. The digital display will automatically clear at the start of each sample.

5.2 If elevated readings are detected, perform the following steps to insure the readings are valid:

5.2.1 Confirm the reading by taking another sample.

5.2.2 Remove the Sample Probe and install the Zero Air Filter. Verify that the readings reduce to zero or very close to zero.

5.2.3 Remove the filter, re-insert the Sample Probe and re-sample to verify that elevated readings do exist.

5.3 When the sensor is completely saturated, the digital meter will display ".8.8.8" instead of an H_2S measurement. No further sampling is possible until a Sensor Regeneration is performed using the steps in Sections 4.5 - 4.7 of this SOP.

5.4 Press the SAMPLE button for the next reading, or press the OFF button to power down the instrument when not in use.

6.0 MAINTENANCE

Normal extended use of 631-X can result in saturation of the internal sensor and/or contamination of the intake filter and internal scrubber filters. This contamination can result in failed regeneration attempts, high erratic results, and zero drift. If these instrument responses are observed, the AQM operator will replace the intake fritware. If replacement of the fritware does not improve instrument response, the 631-X will be replaced. The following sections cover the routine maintenance items for this instrument. See page 18 of the User’s Manual for the instrument’s Preventive Maintenance Calendar.

6.1 The instrument will have a Regeneration Cycle and Zero Adjustment performed at the beginning of every day, when sensor is saturated or as needed when readings are suspect.

6.2 Where sample readings are deemed to be suspect, first perform confirmatory steps outlined in Section 5.5 before conducting Sensor Regeneration and Zero Adjustment procedure

6.3 If analyzer response is not corrected after Regeneration Cycle and Zero Adjustment procedures, replace intake filter (.25” fritware), as discussed on page 19 of the Operation Manual

6.4 For all other Troubleshooting scenarios, please refer to pages 24- 26 of the Operation Manual.

6.5 For all other diagnostics error message displayed on the instrument’s digital meter, please refer to page 10 of the Operation Manual.

STANDARD OPERATING PROCEDURE
Number 100.600
Revision 0 – 3/23/12

TO-15 AMBIENT AIR SAMPLE COLLECTION PROCEDURES FOR SPECIATED VOLATILE ORGANIC COMPOUNDS

PROGRAM SPECIFIC PROCEDURE
HONEYWELL AIR QUALITY MONITORING PROGRAM

1.0 APPLICABILITY

This set of procedures outlines the general steps to collect 24-hour ambient air samples for TO-15 analysis of speciated volatile organic compounds (VOCs). The site-specific Quality Assurance Project Plan (QAPP) should be consulted for proposed sample locations and sampling schedule. These procedures are to be performed by O'Brien & Gere personnel conducting air quality monitoring as part of the Honeywell Onondaga Lake air quality monitoring program.

2.0 TEST EQUIPMENT REQUIRED

2.1 Individually certified 6-Liter Summa® canisters (laboratory supplied), or equivalent
2.2 24-hour flow controller (pre-calibrated and supplied by the laboratory)
2.3 Ambient air adapter ("sampling cane") (laboratory supplied), or equivalent
2.4 35mm polypropylene funnel, or equivalent
2.5 NIST traceable digital vacuum gauge
2.6 9/16 wrench, or equivalent

3.0 SUPPORTING DOCUMENTS

3.1 TO-15 External Chain of Custody (COC) (attached)

3.2 Ambient Air Sampling TO-15 Field Form (FF) (attached)

4.0 SAMPLE COLLECTION PROCEDURE

4.1 Sampling personnel must avoid activities immediately before and during the sampling that may contaminate the sample (e.g., using markers, fueling vehicles, smoking, etc.).

4.2 Record initial temperature, barometric pressure, and precipitation in the appropriate section of the FF.

4.2.1 The information should be recorded from the on-site meteorological tower, or from a reliable source of local measurements (i.e. local airport).

4.2.2 If substantial changes to these conditions occur as the sampling progresses, indicate changes in the comment section of the FF.

4.3 Sample canisters must be used within 14 days of receipt of shipment. The following describes how to take an initial vacuum reading on a canister and attach the flow controller.

4.3.1 Remove a canister, flow controller and laboratory documentation from the shipping box.

4.3.2 Confirm that the main valve on the canister is closed (turned clockwise).

4.3.3 Record the sample location, sample ID, canister ID, and flow controller ID on the FF.

4.3.4 Remove the brass plug or protective cap from the inlet of the canister, if equipped.

4.3.5 Turn the vacuum gage on and place it on the canister inlet. Tighten the nut using a 9/16” wrench.

4.3.6 Zero the vacuum gage by pressing and holding the ‘zero’ button until the reading on the LCD display is zero.

4.3.7 Open the main valve on the canister and allow the vacuum reading to stabilize. Once stabilized, record the vacuum reading on the FF. Once recorded, close the main valve on the canister.

4.3.7.1 Typical canister vacuums range from 28 to 31 in. Hg. If the canister does not have a vacuum of at least 25 in. Hg, do not use the canister.

4.3.7.2 Compare the initial field vacuum to the vacuum recorded in the laboratory documentation. The field vacuum and laboratory vacuum must be within 4 inches of mercury (in. Hg). If the vacuum difference exceeds 4 in. Hg, do not use the canister.

4.3.8 Confirm the main valve on the canister is closed, and remove the vacuum gage using a 9/16” wrench.

4.3.9 Place the flow controller on the canister inlet and tighten nut using a 9/16” wrench. Attach the sampling cane to the inlet of the flow controller and tighten with a 9/16” wrench. Install a funnel to the inlet of the sampling cane such that the larger opening on the funnel faces down.

4.3.10 Lightly tap on the vacuum gage attached to the flow controller. Record the gage zero prior to start reading on the FF.

4.3.11 If equipped, record sample location, sample ID, canister ID, flow controller ID and initial vacuum on the canister tag.

4.3.12 Repeat this process for the remainder of the sampling canisters.

4.4 Place the canister at the sampling location, attach the canister to the railing using bungee cords, and confirm that the canister is stable.

4.4.1 Open the main valve on the canister and record the start time on the FF. Record the start time on the canister tag, if equipped.

4.4.2 Repeat this process for the remainder of the sampling canisters.

4.5 When applicable, monitor vacuum readings as the sampling progresses. Identify potential sample canisters that may be oversampling (indicated by vacuum gage readings dropping at a faster pace) or undersampling (indicated by vacuum gage readings dropping at a slow rate). Typical vacuum rates should drop around 1.25 in. Hg per hour.

4.6 The canister should be allowed to sample for approximately 24 hours (23-25 hours is typical). The sample will be recovered (prior to a 23-hour sample duration) when the observed vacuum reading on the flow controller gage is equal to 3 in. Hg. Sampling will cease when the canister vacuum is below 3 in. Hg (as measured using an NIST traceable vacuum gage) or at a 25-hour sample duration. The following section describes how to recover a canister.

4.6.1 Close the main valve on the canister and record the sample end time on the FF and canister tag.

4.6.1.1 If recovering the sample before a 23-hour sample duration (due to canister oversampling), indicate the stop time in the comment section of the FF.

4.6.2 Confirm that the main valve on the canister is closed and remove the flow controller using the 9/16 wrench.

4.6.3 Turn the vacuum gage on and place it on the canister inlet. Tighten the nut using a 9/16” wrench.

4.6.4 Zero the vacuum gage by pressing and holding the ‘zero’ button until the reading on the LCD display is zero.

4.6.5 Open the main valve on the canister and allow the vacuum reading to stabilize. Once stabilized, record the final vacuum reading on the FF. Once recorded, close the main valve on the canister.

4.6.5.1 If recovering the sample before a 23-hour sample period, and the vacuum is 1-3 in. Hg, record the final canister reading on the FF. If the vacuum is more than 3 in. Hg., follow steps 4.3.8 – 4.4.1 of this SOP to restart the sample. Record the canister start time in the comment section of the FF.

4.6.6 Confirm the main valve on the canister is closed, and remove the vacuum gage using a 9/16” wrench. Reinstall the brass plug or protective cap on the canister inlet.

4.6.7 If equipped, record the final vacuum reading on the canister tag.

4.6.8 Repeat this process for the remainder of the sampling canisters.

4.7 Record the final temperature, barometric pressure, and precipitation in the appropriate section of the FF.

4.8 If the vacuum is measured at zero in. Hg. (using an NIST traceable vacuum gage), the sample cannot be analyzed.

5.0 COC DOCUMENTATION AND SAMPLE SHIPMENT

5.1 The following describes the process of completing the COC

- 5.1.1 Fill in the COC#, the sampler’s full name, the PO#, and circle ‘Y’ for standard (under the PO#).
- 5.1.2 Fill in the sample start date, sample start time, sample end date, and sample end time for each canister. Then fill in the field sample ID, canister ID, and flow regulator ID.
- 5.1.3 Fill in the initial and final pressures using the “negative” symbol to indicate a vacuum.
- 5.1.4 If there are no field duplicates then cross those lines out with a single straight line. Cross out the remaining empty spaces below the field duplicates using large ‘X’s (see SCA Field Guide for examples).
- 5.1.5 If the canisters were shipped with a shipping return label, record the FedEx tracking number in the special instructions section of the COC. If there is no pre-printed shipping return label, obtain a tracking number from a new label and record the number on the COC.
- 5.1.6 Sign the COC and indicate the time and date of shipment.
- 5.1.7 Verify that all of the information has been entered correctly

5.2 Make an electronic copy of both the COC and the FF and upload them into the project folder following the existing naming scheme.

5.3 Place the canisters and flow controllers with sampling canes back into the packaging provided by the laboratory.

5.4 Place the original COC in a Zip-Lock bag, or equivalent, and place inside the canister box.

5.5 Tape the box closed using shipping tape; do not use duct tape. Place two signed and dated custody seals over the tape that spans the length of the box. Cut a small piece of tape and place over the custody seals to protect them during shipping.

5.6 Place the shipping label onto the top of the box. Verify the ship to address matches the laboratory address indicated on the COC. Be sure to remove or cross out any previous labels that remain on the box.

5.7 Verify that the shipping method is standard overnight delivery. Contact FedEx to schedule a pick-up.

External Chain of Custody Record

TestAmerica Labs (Los Angeles)
3585 Cadillac Avenue, Suite A
Costa Mesa, CA 92626
714-258-8610

Chain Of Custody / Analysis Request

AESI Ref: 38609.59845
COC # : SCA-
Lab Use Only
Lab Proj #
Lab ID

Privileged & Confidential

Site Name: SCA PDI - SCA Perimeter Air Monitoring - WBs 12-15

EDD To: Chuck Sharpe

Location of Site: Geddes and Camillus, New York

Client Contact: (name, co., address)
Al.Labuz@Honeywell.com
Honeywell International
301 Plainfield Road, Suite 330
Syracuse, New York 13212

Hardcopy Report To: Scott Manchester
Invoice To: Al Labuz

Sampler:
P O #
Analysis Turnaround Time:
Standard - **Y**
Rush Charges Authorized for - **N**
2 weeks -
1 week -
Next Day -

Preservative

Job No.

Sample Identification

	Location ID	Sample Start Date	Sample Start Time	Field Sample ID	Sample End Date	Sample End Time	Sample Type	Sample Matrix	Sample Purpose	# of Cont.	Grab/Composite	Field Filtered Sample ?	TO-15 LL	TO-15 SIM		Canister ID	Flow Regulator ID	Initial Pressure (in Hg)	Final Pressure (in Hg)	Lab Sample Numbers
											Units									
1	OL-SCA2			SCA- -01			AIR-OUT	AIR	REG	1	-	-	X	X						
2	OL-SCA3			SCA- -02			AIR-OUT	AIR	REG	1	-	-	X	X						
3	OL-SCA5			SCA- -03			AIR-OUT	AIR	REG	1	-	-	X	X						
4	OL-SCA7			SCA- -04			AIR-OUT	AIR	REG	1	-	-	X	X						
5	SCA-FD-			SCA- -05			QC	AIR	FD	1	-	-	X	X						
6	SCA-FD2-			SCA- -06			QC	AIR	FD2	1	-	-	X	X						
7				SCA- -07							-	-								
8				SCA- -08							-	-								
9				SCA- -09							-	-								
10				SCA- -10							-	-								
11				SCA- -11							-	-								
12				SCA- -12							-	-								

Special Instructions:

Relinquished by	Company	O'Brien & Gere	Received by	Company		Condition		Custody Seals Intact	
	Date/Time			Date/Time		Cooler Temp.			
Relinquished by	Company		Received by	Company		Condition		Custody Seals Intact	
	Date/Time			Date/Time		Cooler Temp.			

Preservatives: 0 = None; [1 = HCL]; [2 = HNO3]; [3 = H2SO4]; [4 = NaOH]; [5 = Zn. Acetate]; [6 = MeOH]; [7 = NaHSO4]; 8 = Other (specify):

Air Toxics Ltd.
180 Blue Ravine Road, Suite B
Folsom, CA 4719
(916) 985-1000

Chain Of Custody / Analysis Request

AESI Ref: **38609.59845**
COC # : SCA-
Lab Use Only
Lab Proj #
Lab ID

Privileged & Confidential

Site Name: SCA PDI - SCA Perimeter Air Monitoring - WBs 12-15

EDD To: Chuck Sharpe

Location of Site: Geddes and Camillus, New York

Client Contact: (name, co., address)
Al.Labuz@Honeywell.com
Honeywell International
301 Plainfield Road, Suite 330
Syracuse, New York 13212

Hardcopy Report To: **Scott Manchester**
Invoice To: **Al Labuz**

Sampler:
P O #

Analysis Turnaround Time:
Standard - **Y**
Rush Charges Authorized for - **N**
2 weeks -
1 week -
Next Day -

Preservative

Job No.

Sample Identification

#	Location ID	Sample Start Date	Sample Start Time	Field Sample ID	Sample End Date	Sample End Time	Sample Type	Sample Matrix	Sample Purpose	# of Cont.	Grab/Composite	Field Filtered Sample ?	TO-15 LL	TO-15 SIM		Canister ID	Flow Regulator ID	Initial Pressure (in Hg)	Final Pressure (in Hg)	Lab Sample Numbers
													0	0	0	0 0 0	0 0 0	0 0	0 0	
											Units									
1	OL-SCA2			SCA- -01			AIR-OUT	AIR	REG	1	-	-	X	X						
2	OL-SCA3			SCA- -02			AIR-OUT	AIR	REG	1	-	-	X	X						
3	OL-SCA5			SCA- -03			AIR-OUT	AIR	REG	1	-	-	X	X						
4	OL-SCA7			SCA- -04			AIR-OUT	AIR	REG	1	-	-	X	X						
5	SCA-FD-			SCA- -05			QC	AIR	FD	1	-	-	X	X						
6	SCA-FD2-			SCA- -06			QC	AIR	FD2	1	-	-	X	X						
7				SCA- -07							-	-								
8				SCA- -08							-	-								
9				SCA- -09							-	-								
10				SCA- -10							-	-								
11				SCA- -11							-	-								
12				SCA- -12							-	-								

Special Instructions:

Fed Ex Tracking Numbers:

Relinquished by:	Company:		Received by:	Company:		Condition:		Custody Seals Intact? (Y/N):
	Date/Time:			Date/Time:		Cooler Temp.:	
Relinquished by:	Company:		Received by:	Company:		Condition:		Custody Seals Intact? (Y/N):
	Date/Time:			Date/Time:		Cooler Temp.:	

Preservatives: 0 = None; [1 = HCL]; [2 = HNO3]; [3 = H2SO4]; [4 = NaOH]; [5 = Zn. Acetate]; [6 = MeOH]; [7 = NaHSO4]; 8 = Other (specify

Ambient Air Sampling (TO15)
Field Form

Honeywell

Honeywell International, Inc.

Syracuse, NY

SCA Work Zone Perimeter

Sample Start Date: ____________________

Sample End Date: ____________________

Operator: ____________________

Sample Location[a]	Sample ID[b]	Canister S/N	Flow Controller S/N	Gage Zero Reading Prior to Start ("Hg)	Start Time	Initial Canister Pressure ("Hg)	End Time	Final Canister Pressure ("Hg)	Duplicate Sample?

Ambient Meteorological Conditions

Conditions at the Start of Sampling		Conditions at the End of Sampling	
Temperature (Deg. F.):	______________	Temperature (Deg. F.):	______________
Barometric Pressure ("Hg):	______________	Barometric Pressure ("Hg):	______________
Precipitation (Yes/No):	______________	Precipitation (Yes/No):	______________

Comments:

---

[a] For Sample Location, the following labeling scheme is required: OL-SCA[Station Location]. e.g. Sample Location of station 2 is OL-SCA2

[b] For Sample ID, the following labeling scheme is required: SCA-[COC #]-[sequential number]. e.g. Sample ID of the sample collected at station 2 using COC # 1005 is SCA-1005-01 . For station 3, using the same COC, the Sample ID is SCA-1005-02.

STANDARD OPERATING PROCEDURE

Number 200.100

Revision 0 – 6/20/12

AIR QUALITY MONITORING
ROUTINE DAILY SITE PROCEDURES FOR SEDIMENT CONSOLIDATION AREA AND LAKESHORE

PROGRAM SPECIFIC PROCEDURE
HONEYWELL AIR QUALITY MONITORING PROGRAM

1.0 APPLICABILITY

This standard operating procedure (SOP) outlines the routine daily procedures for air quality monitoring (AQM) at the Sediment Consolidation Area (SCA) and Lakeshore. This SOP includes the following: 1) startup and operation of Campbell Scientific Loggernet data acquisition software, 2) alarms and excursion alarm response, 3) daily inspections and excursion response for survey monitors, 4) daily calibration of continuous monitors, 5) daily calibration requirements of perimeter survey AQM monitors, 6) field reporting responsibilities, and 7) site logbook entries. These procedures are to be performed by operators working on a Honeywell AQM program. This SOP assumes operators know the project perimeter criteria, and have basic training and user knowledge of system air monitoring equipment, Campbell Scientific CR800 data logger and software, and Microsoft Office 2007 Excel and Word.

2.0 SUPPORTING DOCUMENTS

2.1 Daily operation SOPs for applicable monitors
    2.1.1 ADR 1500 Daily Operation SOP 100.100
    2.1.2 MiniRAE 3000 Daily Operation SOP 100.200
    2.1.3 Nasal Ranger Field Olfactometer Daily Operation SOP 100.300
    2.1.4 Jerome J505 Mercury Vapor Analyzer Daily Operation SOP 100.400
    2.1.5 Jerome 631-X Hydrogen Sulfide Analyzer Daily Operation SOP 100.500
2.2 Data Management SOP 300.100
2.3 Daily Calibration Field Forms (SCA and Lakeshore) (attached)

2.4 Daily Perimeter Inspection Field Forms (SCA and Lakeshore) (attached)

2.5 Excursion Flowchart – Dust, TVOCs, Hg and H_2S (attached)

2.6 Noise Excursion Flowchart (attached)

2.7 Site Logbook (SCA and Lakeshore)

3.0 DATA ACQUISITION SOFTWARE STARTUP AND OPERATION - CAMPBELL LOGGERNET

This procedure describes how to start the automated collection of continuous monitor data through the Central station PC and Campbell Scientific Loggernet Admin Software (Loggernet) and Loggernet RTMC Pro software (RTMC Pro). Additionally, this provides a procedure to enable secure connection to RTMC Pro through the Campbell Web Server software.

3.1 Power-on the Central Station PC and log into the PC under the “Honeywell” profile using the password “obg2”.

3.2 Ensure the Verizon ethernet cable is attached to the back of the PC and verify the PC has a connection to the internet.

3.3 To start the monitoring and collection of continuous monitor data:

3.3.1 Start Loggernet and from the “Main” tab, open the “Connect” screen and “Status Monitor” screen. Verify proper connectivity to the SCA and Lakeshore monitoring station data loggers through the “Status Monitor” screen. Proper connectivity is indicated if the “time of last collection” for each station is current.

3.3.2 Under the Loggernet “Data” tab, open “RTMC Pro” twice. Through one RTMC Pro, use the “file” drop down and open the “Revision_7” project. Open the “Public” project through the second RTMC Pro. “Revision_7” is used for AQM operators and consists of Aerial, History, Control, Alarms, and Weather tabs. “Public” consists of only the Aerial and History tabs and is accessible by secure internet connection.

3.3.3 Navigate to the desktop screen and click the Windows start icon in the bottom left. Select the RTMC Web Server program to start it. An RTMC Web Server icon appears in the bottom of the desktop screen in the task bar, indicating the program is running. While RTMC Web Server is running, there will be secure access by authorized off-site users to the "Public" RTMC Pro project. Offsite users must enter the proper IP address, then enter "honeywellsca" as a user ID, and "obgaqm" as the password to view the "Public" Web Server displays.

3.4 The AQM operator will have access to the following SCA and Lakeshore fixed station data from the Aerial, History, and Alarm tabs of RTMC Pro: 1) real-time instantaneous; 2) 1-minute averages, and 3) running and blocked 1-hour averages. One-minute averaged dust or TVOC (total volatile organic compound) levels at AQM stations above investigative levels will trigger visual and audible alarms from RTMC Pro to notify the operator. In addition, in the event where the SCA operator is not able to observe these data (either through routine or non-routine activities), RTMC Pro will alert the operator remotely via text message (through cellular connection) of measurements above investigative levels. Section 7.0 of this SOP provides the procedure the SCA operator will follow upon receiving an investigative level alarm.

3.5 During periods of precipitation (heavy or steady rain or snow), dust monitoring will be paused. TVOC monitoring will be performed during periods of precipitation; however, there may be instances where TVOC monitoring should be paused as well (instrument malfunction troubleshooting, end-of-dredge season shut down, etc…. To control sleep and test mode (calibration) status of a monitoring station MiniRAE 3000 photoionization detector (PID) or an MIE ADR-1500 (ADR) through the RTMC Pro program, select the Control tab.

3.5.1 Setting a monitor to sleep will take it out of measurement mode and pause the monitor. To set a sleep status of a monitor, click the "Pump_Status" icon under the headings "MiniRAE 3000" or "ADR 1500". Enabling a PID or ADR to sleep will change the icon color from green to red. "Waking" a PID from sleep will change the color of the icon from red to green. Additionally, the corresponding blue text boxes at the bottom of the Control tab will consist of "NANs" when monitors are properly set to sleep. When the instruments are not asleep, the text boxes will contain the real-time measurement value of the instruments.

If an instrument does not sleep after the “Pump_Status” icon is clicked, this procedure may need to be repeated until it is successful. Please note that “error code” alarms may be activated briefly when monitors are toggled from sleep mode to operating mode.

3.5.2 To set a test mode status of a monitor, click the “test_mode” icon under the headings “MiniRAE 3000” or “ADR 1500”. Enabling a monitor to test mode will change the icon color from green to red. Repeat of this procedure will take the monitor out of test mode. During test mode, the monitor continues to measure and collect data, however, the data logger will not record data from that monitor.

4.0 ALARMS AND EXCURSION ALARM RESPONSE

The following procedure will be followed by the AQM operator after either observing 1-minute early warning levels, or 1-hour average AQM concentrations above investigate levels, or after receiving notification alarms from RTMC Pro. These procedures are also applicable for investigating readings for any real-time monitor.

4.1 Upon observing concentrations above investigate levels or receiving an RTMC Pro alarm, immediately determine the cause of the alarm. Instrument malfunctions often will appear as a “NAN” value on RTMC Pro for real-time measurements while concentrations above investigation levels (actual or due to monitor drift or malfunctions) will be displayed as their numeric value. Additionally, RTMC Pro alarms may result from Central Station PC and/or fixed AQM station communication malfunctions.

4.2 If an instrument status/malfunction or communication malfunction triggered the alarm/monitor reading, determine if the problem can be resolved through RTMC Pro. Some alarm notifications of instrument malfunctions are the result of an improperly set “Sleep” state. Toggling the instrument out of the “Sleep” state may resolve this issue. Communication problems with fixed AQM stations are most often the result of a Raven XT cellular modem malfunction. This cannot be resolved at the Central Station PC location. A reset of the modem must be performed by depressing the “reset” button on the modem.

4.3 If a communication malfunction triggered the RTMC Pro alarm, determine if the communication problem is from the Central Station PC or a fixed AQM station. Most often, a fixed AQM station communication problem is evident as a single station not transmitting data to the Central Station PC. This problem is most often resolved by visiting the AQM station in question and depressing the “Reset” button on the modem.

4.4 If an alarm/monitor reading is not due to instrument status/malfunction or communication malfunction, or cannot be resolved through RTMC Pro, go to the appropriate SCA or Lakeshore AQM station to inspect the station and determine if the reading in question is instrument related. If the readings are instrument related, perform the necessary instrument recalibration or troubleshooting as specified in the appropriate instrument operation SOP.

4.5 If the air monitor levels are not instrument-related, photograph the station and, the on-site or off-site activity responsible for the readings (if visually evident), and follow steps outlined in the Excursion Flowchart – Dust, TVOCs, Hg and H_2S

4.6 Document the date, time, description of site visit/investigation activities and resolution in the field log book.

5.0 DAILY INSPECTIONS AND EXCURSION RESPONSE FOR SURVEY MONITORS

5.1 Prior to performing the initial daily inspection (between midnight and 6:00 am), perform regenerations and calibrations as necessary on the Jerome J505 (mercury) monitor and Jerome 631-X (hydrogen sulfide) monitor in accordance with SOPs 100.400 and 100.500, respectively. In addition, a calibration of the sound level meter (SLM) must be performed. Calibration results will be documented on site-specific Daily Perimeter Inspection Field Forms (Inspection Forms) (attached). Calibration requirements of monitors used during inspections are as follows:

5.1.1 Field calibration of the SLM is required prior to the first daily inspection every monitoring day. The check will be made against a certified sound level calibrator at either the 94 or 114 dBA range. The calibration result will be considered acceptable if the SLM response is observed to be less than 0.5 dBA of the calibration range. If the SLM response to the calibrator is equal to or greater than 0.5 dBA, the SLM will be adjusted in accordance with the instrument's operation manual so that it is within 0.5 dBA and the SLM will be recalibrated. A copy of the SLM operation manual will be kept with the Central Station.

5.1.2 A regeneration and zero check/adjustment will be performed on the hydrogen sulfide monitor once prior to the initial inspection every monitoring day or as necessary if the monitor response indicates excessive zero drift or is otherwise suspect.

5.1.3 A zero calibration will be performed on the mercury monitor once per month.

5.2 Using the Weather tab of RTMC, observe the current wind direction as recorded by the site-specific meteorological station (Wastebed 13 tower and Lakeshore tower) and determine each station's orientation to site construction activities (downwind or not downwind). Additionally, a check of the towers' instrument responses to apparent weather conditions should be made. The check should compare the towers' 5-minute averaged data of wind speed, wind direction, temperature, relative humidity, and barometric pressure.

5.3 Four inspections should be performed per day, one during each 6-hour time block. Two Inspection Forms will be completed during each 24-hour monitoring day for each of the SCA and Lakeshore AQM sites (one form for each 12-hours of monitoring starting at midnight of the monitoring day).

5.4 While performing an inspection at each SCA/Lakeshore AQM station, document all findings on the inspection form. The inspection will consist of:

5.4.1 A thorough check of SCA/Lakeshore AQM station hardware and instrument performance as defined on the inspection form.

5.4.2 A visual observation of PID and ADR monitor responses and determination of reasonableness. Reasonable instrument response is one that matches current apparent conditions (i.e., elevated ADR response during periods of precipitation and visible dust). A zero calibration of the PID or ADR may be necessary during station inspections if excessive zero drift is observed or if the instrument responses are otherwise suspect.

5.4.3 Hydrogen sulfide, mercury, and odor monitoring will be performed at each SCA and Lakeshore AQM station. Noise monitoring will only be performed at each SCA AQM stations.

5.4.3.1 The SLM should be set to measure A-weighted SPLs with a slow response. The operator will take a visual 1-minute average. If the sound level is above 65 dBA, then the operator will follow the Noise Excursion Flowchart. All sound level measurements will be documented on the Daily Perimeter Inspection Field Form.

5.4.3.2 Mercury and hydrogen sulfide will each be measured once during each station's inspection. If the instantaneous measured mercury or hydrogen sulfide concentration is above the investigate level for that parameter, then additional measurements will be performed until the reading average falls below the investigation level or measurements have been repeatedly for a one-hour period. If the 1-hour mercury of hydrogen sulfide level is above investigate level, the operator will follow the Excursion Flowchart – Dust, TVOCs, Hg and H_2S.

5.4.3.3 The Nasal Ranger Field Olfactometer will be used to monitor and quantify odors when an odor is present/observed at the SCA AQM station location during the time of inspection. If odors are not observed, measurements with the Nasal Ranger will not be conducted. If odors are observed to be due to off-site source(s), the source will be identified, if possible, by the observed wind direction. If the source is Project-related additional odor measurements may be performed to further quantify the odor, which may include monitoring odor measurements at the Honeywell property boundary and/or in the community. All odor measurements will be documented on the Daily Perimeter Inspection Field Form.

5.5 Additional documentation on the inspection forms will include the inspection date and operator’s initials.

6.0 DAILY CALIBRATION OF CONTINUOUS MONITORS

The following procedure provides instruction on how to calibrate SCA and Lakeshore AQM station continuous monitors (PIDs and ADRs). These calibrations will be performed once during the morning of each monitoring day.

6.1 Plug the male end of the Campbell Scientific CR1000KD handheld unit serial cable into the available female serial port (CS I/O) on the data logger, the display should turn on

6.2 Press the Enter button until the “cal_Test” menu appears, press “enter”.

6.3 For PIDs, select “PID_Test” by using the keys on the direction key pad and pressing the Enter button. Change the test value from “False” to “True” using the directional pad on the handheld and press “enter” to select. For ADRs, press the Back button to return to the “cal_Test” menu and follow the same procedure as above for “ADR_Test”.

6.4 Follow the calibration procedures provided in SOPs 100.100 and 100.200 for calibration of the instruments. Alternatively, a dynamic calibration check may be performed on the ADR provided that a zero calibration was performed previously during the monitoring week (starting Monday). PID zero and span calibrations will be performed daily.

6.5 ADR instrument response during calibrations should be recorded from the CR1000KD handheld unit, not the instrument display. The response can be observed from the CR1000KD on the “cal_Test” menu.

 6.5.1 For the ADR, both the analog and digital instrument response should be observed. If the analog or digital response exceeds 10 µg/m^3, or if the digital response indicates zero drift (response below

-2 μg/m^3) repeat the calibration procedure or perform maintenance as prescribed in Sections 5.2 and 6.0 of SOP 100.100.

6.6 Document the calibration results for both the ADR and PID on the site-specific Daily Calibration Forms for SCA and Lakeshore (attached).

6.7 Following calibrations of the ADR and PID, return the “PID_Test” and “ADR_Test” values from “True” to “False” following a similar method as described in step 4.1.3 using the Campbell Scientific CR1000KD handheld unit (the handheld display will turn off after 5-minutes of inactivity. If the handheld unit display is off, press any key to reactivate it).

6.8 Press the “esc” button on the CR10000KD to return it to the main Campbell Scientific screen.

7.0 FIELD DATA REDUCTION AND REPORTING

A procedure for the production of daily concentration graphs and a daily air monitoring report (DAMR) is included in the Data Management SOP 200.200. The following presents the daily requirements of the SCA and Lakeshore operators regarding data reduction and reporting.

7.1 One DAMR for the SCA and Lakeshore AQM stations will be completed for each 24-hour day.

7.2 At the completion of each work shift, SCA and Lakeshore operators will be responsible for updating the working drafts of the DAMRs for that day. The updates shall include a review of continuous monitor data and inspection data collected during the operators’ work shift.

7.3 The SCA operator will be responsible for reduction (graph generation) of continuous monitor data and reporting (DAMR) for both SCA and Lakeshore monitoring sites.

7.4 The SCA operator will submit the daily SCA and Lakeshore data and report to the O’Brien & Gere Project Manager or designee the following day.

8.0 SITE LOGBOOK ENTRIES

There will be one or two logbooks maintained for the SCA AQM operations and one logbook for Lakeshore AQM operations. The following section lists documentation that is to be recorded in site logbooks by the AQM operator:

8.1 Current date

8.2 Arrival time and name of AQM operators on site

8.3 IDs of active AQM instruments

8.4 Start/stop times and, if AQM instrumentation is portable, the locations of AQM instrumentation (including downwind/upwind monitor designation)

8.5 Time of daily (routine or non-routine) AQM calibrations including results and initials of AQM operator (calibration results may be included instead on daily calibration field forms)

8.6 Routine apparent weather observations throughout the monitoring day

8.7 Start/stop times and specific locations of construction activities performed

8.8 Thorough notes on each of the following, as applicable:

    8.8.1 all construction activities performed

    8.8.2 off-site and on-site sources that may affect AQM instrument measurements

    8.8.3 visible dust on site

    8.8.4 early warning levels of AQM measurements including cause, duration, location, and, if AQM instrumentation is fixed, a list of downwind AQM instrumentation IDs

    8.8.5 any real-time monitor excursion or odor observations, corrective actions performed, and downwind and affected AQM instrumentation

8.9 List of non-site personnel and/or agencies and companies on site and reason (as necessary) for their visit

8.10 Meeting and/or conversation notes with project personnel

8.11 AQM operator signature time off-site at the completion of daily AQM with a line through any remaining space on the page if AQM activities are completed for the day

Daily Air Quality Inspection Field Form

DAILY AIR QUALITY MONITORING DAY TIME INSPECTION

Honeywell International, Inc.
Syracuse, NY

Lakeshore Work Area

Date:

Page of

Station ID	OL-LS1		OL-LS2		OL-LS3		OL-LS4		OL-LS5		OL-LS6		OL-LS7		OL-LS8	
Inspection Time:																
Operators Initials:																
Station hardware appears unchanged?																
Instruments powered on/datalogging?																
Data is reasonable and compares well with observed ambient conditions?[a]																
Battery voltages >12.7v?																
Alarms since the last inspection?																
Sample inlets blocked/contain moisture?																
Is solar panel clear and properly angled?																
Is the station currently downwind of site activities?																
Odor Readings (OU)																
Mercury Readings ($\mu g/m^3$)																
Hydrogen Sulfide Readings (ppb)																
Comments:																

Daily Inspection Monitor Calibrations

Jerome 631-X Hydrogen Sulfide Monitor (S/N)			Jerome J505 Mercury Monitor (S/N)
Regeneration/Zero Calibration:	Time:	Initials:	Calibration Date:
			Calibration performed within previous 30-days? (Y/N):
			Time/Initials:

---

[a] Observed conditions are considered ambient conditions that may affect instrument measurements, such as during rainy/humid periods or windy/dusty periods.

Honeywell

Honeywell International, Inc.
Syracuse, NY

SCA Work Perimeter

Date: **Page** **of**

Station ID	OL-SCA1		OL-SCA2		OL-SCA3		OL-SCA4		OL-SCA5		OL-SCA6		OL-SCA7		OL-SCA8	
Inspection Time:																
Operators Initials:																
Station hardware appears unchanged?																
Instruments powered on/datalogging?																
Data is reasonable and compares well with observed ambient conditions?[a]																
Battery voltages >12.7v?																
Alarms since the last inspection?																
Sample inlets blocked/contain moisture?																
Is solar panel clear and properly angled?																
Is the station currently downwind of site activities?																
Odor Readings (OU)																
Mercury Readings ($\mu g/m^3$)																
Hydrogen Sulfide Readings (ppb)																
Sound Level Readings (dBA)																
Comments:																

Daily Inspection Monitor Calibrations

CEL 254 Sound Level Meter (S/N)	Jerome 631-X Hydrogen Sulfide Monitor (S/N)			Jerome J505 Mercury Monitor (S/N)
Daily SLM Calibration Result:	Regeneration/Zero Calibration:	Time:	Initials:	Calibration Date:
Time/Initials:				Calibration performed within previous 30-days? (Y/N):
				Time/Initials:

---

[a] Observed conditions are considered ambient conditions that may affect instrument measurements, such as during rainy/humid periods or windy/dusty periods.

Daily Field Calibration Form

Honeywell **Honeywell International, Inc.** **Syracuse, NY** **Lakeshore Work Perimeter**	**Date:**	**Station IDs:**
	Operator(s):	**Project No.:**
	Test Parameters: PM_{10} and Total VOCs	

CALIBRATION STANDARDS

Instrument	Zero	Span
PM_{10}: Thermo ADR 1500	HEPA Filter	*No field span check*
TVOCs: RAE MiniRAE 3000	UHP Zero air	5 ppm Isobutylene

CALIBRATION CHECK TOLERANCE LIMITS

Instrument	Zero	Span
PM_{10}: Thermo ADR 1500	≥ 0.0 and ≤ 10 µg/m^3	None
TVOCs: RAE MiniRAE 3000	≥ 0.0 and ≤ 0.2 ppm	$\leq \pm$ 10% of span

CALIBRATION CHECK RESULTS

ADR 1500: PERFORMED ON FIRST DAY OF EACH MONITORING WEEK
MINIRAE 3000: PERFORMED EACH MONITORING DAY

ADR 1500

Station #	Time	Instrument S/N	Zero	Span	In Tolerance?	Comments
OL-LS-1				NA		
OL-LS-2				NA		
OL-LS-3				NA		
OL-LS-4				NA		
OL-LS-5				NA		

MiniRAE 3000

Station #	Time	Instrument S/N	Zero	Span	In Tolerance?	Comments
OL-LS-1						
OL-LS-2						
OL-LS-3						
OL-LS-4						
OL-LS-5						

COMMENTS

DAILY FIELD CALIBRATION FORM - SCA

Honeywell **Honeywell International, Inc.** **Syracuse, NY** **SCA Work Perimeter**	**Date:**	**Station IDs:**
	Operator(s):	**Project No.:**
	Test Parameters: PM_{10} and Total VOCs	

CALIBRATION STANDARDS

Instrument	Zero	Span
PM_{10}: Thermo ADR 1500	HEPA Filter	*No field span check*
TVOCs: RAE MiniRAE 3000	UHP Zero air	5 ppm Isobutylene

CALIBRATION CHECK TOLERANCE LIMITS

Instrument	Zero	Span
PM_{10}: Thermo ADR 1500	≥ 0.0 and $\leq 10\ \mu g/m^3$	None
TVOCs: RAE MiniRAE 3000	≥ 0.0 and ≤ 0.2 ppm	$\leq \pm$ 10% of span

CALIBRATION CHECK RESULTS

ADR 1500: PERFORMED ON FIRST DAY OF EACH MONITORING WEEK

MINIRAE 3000: PERFORMED EACH MONITORING DAY

ADR 1500

Station #	Time	Instrument S/N	Zero	Span	In Tolerance?	Comments
OL-SCA-1				NA		
OL-SCA-2				NA		
OL-SCA-3				NA		
OL-SCA-4				NA		
OL-SCA-5				NA		
OL-SCA-6				NA		
OL-SCA-7				NA		
OL-SCA-8				NA		

MiniRAE 3000

Station #	Time	Instrument S/N	Zero	Span	In Tolerance?	Comments
OL-SCA-1						
OL-SCA-2						
OL-SCA-3						
OL-SCA-4						
OL-SCA-5						
OL-SCA-6						
OL-SCA-7						
OL-SCA-8						

COMMENTS

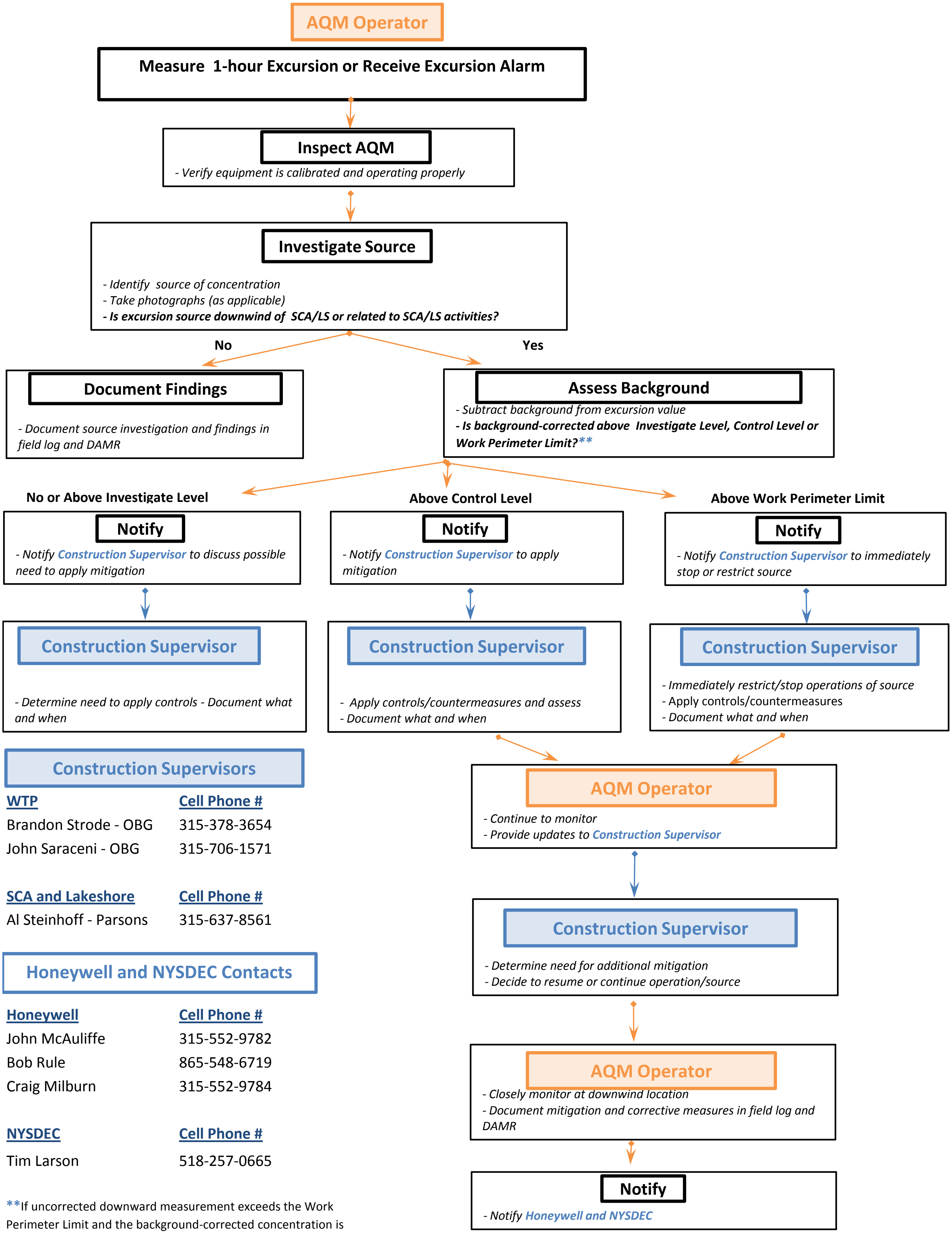
Elevated Reading Tracking Log

Air Quality Monitoring Excursion Tracking Log - Honeywell SCA Work Zone Perimeter

Entry #	Date	Time	Dust Measurement ($\mu g/m^3$)	Control Level / Perimeter Limit ($\mu g/m^3$)	VOC Measurement (ppm)	Control Level / Perimeter Limit (ppm)	Odor Measurement (OU)	Trigger Level (OU)	Station ID	Operator	Cause or Apparent Source / Comments	Corrective action / Resolution	Photo ID Taken
1				100/150		3/5		7					
2				100/150		3/5		7					
3				100/150		3/5		7					
4				100/150		3/5		7					
5				100/150		3/5		7					
6				100/150		3/5		7					
7				100/150		3/5		7					
8				100/150		3/5		7					
9				100/150		3/5		7					
10				100/150		3/5		7					
11				100/150		3/5		7					
12				100/150		3/5		7					
13				100/150		3/5		7					
14				100/150		3/5		7					
15				100/150		3/5		7					
16				100/150		3/5		7					
17				100/150		3/5		7					
18				100/150		3/5		7					
19				100/150		3/5		7					
20				100/150		3/5		7					

Excursion Flow Chart

Excursion Flowchart - Dust, TVOC, Hg and H2S
Honeywell SCA Air Monitoring Excursion Process



AQM Operator

Measure 1-hour Excursion or Receive Excursion Alarm

Inspect AQM

- Verify equipment is calibrated and operating properly

Investigate Source

- Identify source of concentration
- Take photographs (as applicable)
- Is excursion source downwind of SCA/LS or related to SCA/LS activities?

No

Document Findings

- Document source investigation and findings in field log and DAMR

Yes

Assess Background

- Subtract background from excursion value
- Is background-corrected above Investigate Level, Control Level or Work Perimeter Limit?**

No or Above Investigate Level

Notify

*- Notify **Construction Supervisor** to discuss possible need to apply mitigation*

Construction Supervisor

- Determine need to apply controls - Document what and when

Above Control Level

Notify

*- Notify **Construction Supervisor** to apply mitigation*

Construction Supervisor

- Apply controls/countermeasures and assess
- Document what and when

Above Work Perimeter Limit

Notify

*- Notify **Construction Supervisor** to immediately stop or restrict source*

Construction Supervisor

- Immediately restrict/stop operations of source
- Apply controls/countermeasures
- Document what and when

AQM Operator

- Continue to monitor
*- Provide updates to **Construction Supervisor***

Construction Supervisor

- Determine need for additional mitigation
- Decide to resume or continue operation/source

AQM Operator

- Closely monitor at downwind location
- Document mitigation and corrective measures in field log and DAMR

Notify

*- Notify **Honeywell and NYSDEC***

Construction Supervisors

WTP	**Cell Phone #**
Brandon Strode - OBG	315-378-3654
John Saraceni - OBG	315-706-1571

SCA and Lakeshore	**Cell Phone #**
Al Steinhoff - Parsons	315-637-8561

Honeywell and NYSDEC Contacts

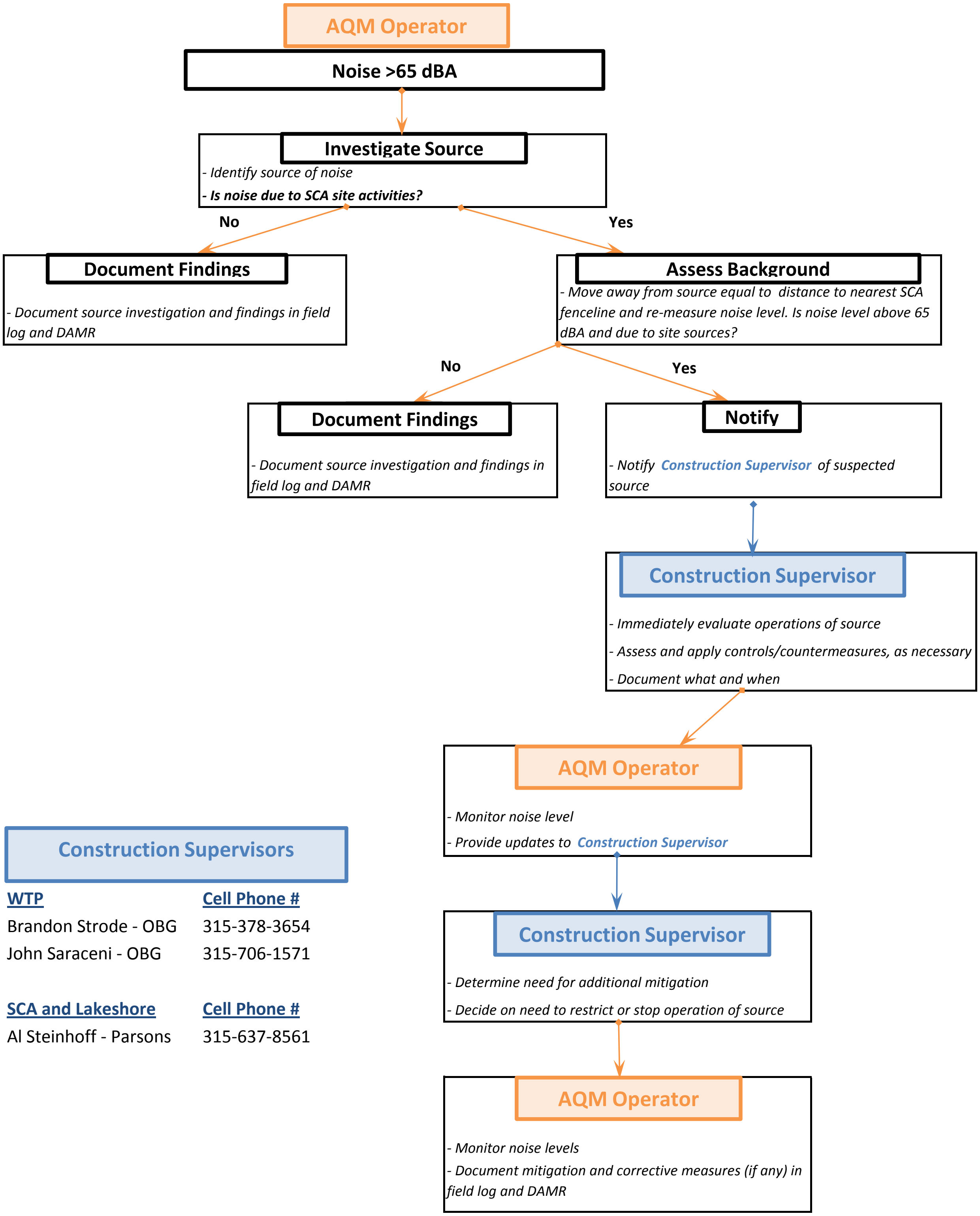
Honeywell	**Cell Phone #**
John McAuliffe	315-552-9782
Bob Rule	865-548-6719
Craig Milburn	315-552-9784

NYSDEC	**Cell Phone #**
Tim Larson	518-257-0665

**If uncorrected downward measurement exceeds the Work Perimeter Limit and the background-corrected concentration is between the Investigate and Control Levels, then proceed to "Above Control Level" responses. Report as an excursion of Investigate Level.

Draft - 4/11/2012

Excursion Flowchart - Noise
Honeywell SCA Air Monitoring Excursion Process



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SCA and Lakeshore	**Cell Phone #**
Al Steinhoff - Parsons	315-637-8561

MiniRAE 3000 and ADR 1500 Preventative Maintenance Schedule

Honeywell
Honeywell International, Inc.
Syracuse, NY
SCA Work Zone Perimeter

MiniRAE 3000 Preventative Maintenance Schedule

	Lamp and Sensor Cleaning Service[a]																								Pump Flow Rate Check[b]		Sensor Replacement[c]		Lamp Replacement[d]		
MiniRAE 3000 Serial Number	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Replaced	Date Replaced	Date Replaced	Date Replaced	Comments
01																															
02																															
03																															
04																															
05																															
06																															
07																															
08																															
09																															
10																															
11																															
12																															
13																															
14																															

[a] Lamp and sensor cleaning to be performed once at the beginning of each month

[b] Pump flow rate check to be performed once per year

[c] Sensor to be replaced as necessary

[c] Lamp to be replaced as necessary

Honeywell
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Syracuse, NY
SCA Work Zone Perimeter

ADR 1500 Preventative Maintenance Schedule

ADR 1500 Serial Number	HEPA Filter Visual Check / Replacement[a]								Datalog Memory Format[b]								Factory Calibration[c]					Comments
	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Due	Date Completed	Date Performed	Date Due	Date Performed	Date Due	Date Performed	
01																						
02																						
03																						
04																						
05																						
06																						
07																						
08																						
09																						
10																						
11																						
12																						
13																						
14																						

[a] HEPA filters to be visually checked once every 3-months
[b] Datalog memory to be deleted once every 3-months
[c] Annual calibration to be performed every 12-months

STANDARD OPERATING PROCEDURE

Number 200-200

Revision 0 – 03/23/12

QUALITY ASSURANCE PRECISION ASSESSMENT PROCEDURE - AQM INSTRUMENTATION

NETWORK SPECIFIC PROCEDURE

HONEYWELL AIR QUALITY MONITORING NETWORKS

1.0 APPLICABILITY

This set of procedures outlines the general steps for the assessment of AQM instrumentation precision. These procedures are to be performed on all Thermo Fisher MIE ADR-1500 (ADR) dust monitors, Rae Systems MiniRAE 3000 (PID) TVOC monitors, Jerome 631-X hydrogen sulfide monitors (631-X), and Jerome J505 (J505) mercury monitors. These procedures are to be performed as required once per month by O'Brien & Gere personnel performing air quality monitoring on the Honeywell Onondaga Lake AQM program. Precision checks will be performed after routine daily calibrations have been performed on primary AQM instruments. These procedures will performed on all above referenced primary AQM instrumentation used on the Program.

2.0 TEST EQUIPMENT REQUIRED

2.1 Thermo Fisher MIE ADR-1500 (ADR)
2.2 Thermo Scientific USB 2.0 data communication cable (PN 1008857-00)
2.3 ADR Omni-direction Inlet Extension (3/8" stainless steel tubing)
2.4 Rae Systems MiniRAE 3000 (PID)
2.5 5.0 ppm Isobutylene span gas cylinder with regulator (or equivalent)
2.6 Campbell Scientific CR1000KD handheld unit with 9-pin serial cable
2.7 Jerome 631-X Sulfides Monitor
2.8 Jerome J505 Mercury Monitor

2.9 Computer (PC) with RS232 port or USB to RS232 adapter and cable and pDR Port software and Silicon Laboratories USB driver installed

3.0 SUPPORTING DOCUMENTS

3.1 MIE ADR-1500 Particulate Monitor Instruction Manual

3.2 Standard Operating Procedure 100.100 Daily Operation, Calibration, and Maintenance – MIE ADR 1500 Particulate Monitor

3.3 Standard Operating Procedure 100.101 Manual Data Retrieval for MIE ADR 1500 Particulate Monitor

3.4 MiniRAE 3000 User’s Guide

3.5 Standard Operating Procedure 100.200 Daily Operation, Calibration and Maintenance of the MiniRAE 3000 Photoionization Detector (PID)

3.6 Standard Operating Procedure 100.201 Manual Data Retrieval for MiniRAE 3000 Photoionization Detector (PID)

3.7 Jerome 631-X Hydrogen Sulfide Monitor Operation Manual

3.8 Standard Operating Procedure 100.500 Daily Operation, Calibration and Maintenance of the Jerome 631-X Hydrogen Sulfide Monitor

3.9 Jerome J505 Mercury Monitor Operation Manual

3.10 Standard Operating Procedure 100.400 Daily Operation, Calibration, and Maintenance of the Jerome J505 Mercury Monitor

4.0 ADR PRECISSION ASSESSMENT PROCEDURE

This procedure will be followed to assess AQM fixed station (primary) ADR precision. This procedure assumes the primary ADR is operating under test conditions (is running and dust data are being logged and by a Campbell Scientific CR800 (data logger) and averaged into 1-hour data). A collocated ADR will be used to assess precision. The collocated ADR internal battery should be sufficiently charged prior to operation to allow for at least 3 hours of operation

4.1 Install an ADR from the AQM Program back-up inventory at the fixed AQM station location adjacent to and in near proximity to (< 1 meter distance) to the primary ADR.

  4.1.1 The collocated ADR inlet should be adjusted to equal height with the primary ADR inlet using an ADR Omni-direction Inlet Extension.

  4.1.2 Utilize ties or strapping to securely place the collocated instrument.

4.2 Follow the start-up, calibration, and operation procedures as outlined in SOP 100.100 and the instrument's instruction manual to initialize the collocated ADR for data logging of 1-minute averaged data (if necessary), set the time and date, and start a test run. Note the time when the run started in the field log book.

4.3 Allow the instrument to sample for sufficient time as to allow comparison of at least two hours of averaged data by the data logger. Note that the primary ADR averages will start at the top of the hour. At the end of the two hours, halt the run and note the time that the instrument is stopped in the field log book.

4.4 Remove/collect the collocated ADR. Download the collocated ADR data per SOP 100.101 to a PC, export it to MS Excel, and save it with a unique file name.

4.5 Average the collocated ADR 1-minute averaged data into 60-minute averages starting at the top of the hour.

4.6 Compare at least two concurrent 60-minute data averages between the primary ADR (as recorded by the data logger) and the collocated ADR.

4.7 Calculate the primary instrument precision using the following equation:

$$\text{Precision (\%)} = \frac{\text{(Primary Instrument – Collocated Instrument)}}{\text{½ (Primary Instrument + Collocated Instrument)}}$$

4.8 Acceptable ADR precision is ≤±15%.

5.0 PID PRECISSION ASSESSMENT PROCEDURE

This procedure will be followed to assess AQM fixed station (primary) PID precision. This procedure assumes the primary PID is operating under test conditions and PID data is being logged and by a Campbell Scientific CR800 (data logger). A collocated PID will be used to assess precision. The collocated PID internal battery should be sufficiently charged prior to operation.

5.1 Employ a PID from the AQM back-up inventory to use as a collocated PID at the AQM station.

5.2 Power on the collocated PID at the AQM station and follow the start-up, calibration, and operation procedures as outlined in SOP 100.200 and the instrument's user's guide to initialize the collocated PID, set the time and date, and start a test run. **Please note that data logging is not required for the collocated PID.**

5.3 Enable "PID_Test" mode on the data logger by following the calibration procedure in SOP 200.100 Section 4.0 using the Campbell Scientific CR1000KD handheld unit with 9-pin serial cable. This will flag data from the primary PID so that the data logger does not record it and RTMC alarms will not be triggered. Note the time of the "PID_Test" in the field log book.

5.4 The Campbell Scientific CR1000KD handheld unit will display various real-time data values after enabling the "PID_Test". Real-time primary PID response can be observed in the "VOC" field. This value is given in ppm, so the AQM. operator must convert this value to ppb for comparison to the collocated PID.

5.5 Challenge the primary PID with a 5.0 ppm Isobutylene standard (typically a span gas cylinder with regulator used during daily PID calibration). Please note that the application of the gas must occur while the PID is in normal sample mode (not calibration mode). Observe the primary PID response from the data logger and wait for it to stabilize before recording the value.

5.6 Repeat step 5.4 with the collocated PID using the instrument's digital LCD display. Record the collocated PID response observed from the instrument's digital display.

5.7 Disable “PID_Test” mode on the data logger through the Campbell Scientific CR1000KD handheld unit to resume primary PID data collection.

5.8 Calculate the primary PID precision using the same equation provided in Step 4.7 of this SOP. Acceptable PID precision is ≤±15%.

6.0 JEROME 631-X PRECISSION ASSESSMENT PROCEDURE

This procedure will be followed to assess 631-X H_2S analyzer precision. A collocated 631-X will be used to assess precision. The collocated 631-X internal battery should be sufficiently charged prior to operation.

6.1 Follow the start-up and calibration procedure as outlined in SOP 100.500 and in the 631-X operation manual.

6.2 With the instruments side by side and with both instruments providing stable readings, record three consecutive measurements from the digital LCD display from each 631-X in the field log book and document the time.

6.3 Calculate the average of the measurements from each 631-X.

6.4 If both averaged measurements are equal to or greater than 6 ppb (equal to the investigation level for H_2S), then follow the procedure in Step 4.7 of this SOP to assess precision.

6.5 If at least one of the averaged measurements is below 6 ppb, then half the investigation level (3 ppb) shall be used as assess precision. In these instances, 631-X precision is considered acceptable if the primary averaged response is within 3 ppb of collocated 631-X averaged response.

7.0 JEROME J505 PRECISSION ASSESSMENT PROCEDURE

This procedure will be followed to assess J505 mercury analyzer precision. A collocated J505 will be used to assess precision. The collocated J505 internal battery should be sufficiently charged prior to operation.

7.1 Follow the start-up and calibration procedure as outlined in SOP 100.400 and in the instrument’s operation manual.

7.2 Follow the start-up and calibration procedure as outlined in the instrument’s Standard Operating Procedure.

7.3 With the instruments side by side and with both instruments providing stable readings, record three consecutive measurements from the digital LCD display from each J505 in the field log book and document the time.

7.4 Calculate the average of the measurements from each J505.

7.5 If both averaged measurements are equal to or greater than 0.3 ug/m^3 (equal to the investigation level for mercury), then follow the procedure in Step 4.7 of this SOP to assess precision.

7.6 If at least one of the averaged measurements is below 0.3 ug/m^3, then half the investigation level (0.15 ug/m^3) shall be used as assess precision. In these instances, J505 precision is considered acceptable if the primary averaged response is within 0.15 ug/m^{3}of collocated J505 averaged response.

STANDARD OPERATING PROCEDURE
Number 300.100
Revision 2 – 4/11/12

DATA MANAGEMENT FOR AIR QUALITY MONITORING DATA LOGGER/CELLULAR SYSTEM

PROGRAM SPECIFIC PROCEDURE
HONEYWELL AIR QUALITY MONITORING PROGRAM

1.0 APPLICABILITY

This standard operating procedure (SOP) outlines the general steps to collect, reduce, validate, and report air quality monitoring (AQM) data from a data logger monitoring system, that uses a Campbell Scientific CR800 or CR 1000 series data loggers (data loggers) to transmit real-time data via cellular telemetry to a central computer running Campbell Scientific LoggerNet data communication software and RTMC Pro data display software. These procedures are to be performed by AQM personnel working on the Onondaga Lake Dredging, Sediment Management, and Water Treatment Project. This SOP assumes personnel have basic user knowledge of the data logger, Microsoft Excel, Microsoft Word, and Campbell Scientific's LoggerNet and RTMC Pro software. In particular this document explains how to process the AQM data for the sediment consolidation area and the lakeshore monitoring sites.

2.0 SUPPORTING DOCUMENTS

2.1 Daily Air Monitoring Report (attached)
2.2 Daily operation SOPs for applicable monitors (SOP Numbers 100.100 and 100.200)
2.3 Excel file format for EDD production (attached)

3.0 DATA COLLECTION

This procedure describes how the data logger collects and transmits AQM data. Data collected include all data in each averaging table on the data logger including date, time, Dust and TVOC monitor output, and selections of additional information such as monitor status records, data validity codes, and other operating parameters (e.g., battery voltages).

3.1 Continuous Monitors – TVOC and Dust

3.1.1 Data from the monitors are recorded onto a Campbell Scientific CR800 data logger at each SCA and Lakeshore fixed AQM station.

3.1.1.1 The data loggers are programmed to record instantaneous data from each monitor once every 5 seconds and save the data into 60-minute and 1-minute averaged data tables. Data storage capacities for each table are to be a minimum of 4 weeks (before they will be overwritten by new data).

3.1.1.2 60-minute and 1-minute averaged data tables are comprised of a maximum of 720 and 12 instantaneous readings, respectively, from each monitor.

3.1.1.3 Additional data tables for 15-minute averaged, 5-second instantaneous, and "runtime" data are optional. If 5-second data are recorded, then the storage capacity of this data table should be limited to 2 days so as to not limit data logger memory storage for 60-minute and 1-minute averaged data.

3.1.1.4 Through additional programming, the data loggers will not record AQM monitor data if they are considered invalid. Such invalid data may include values that are outside the monitor's range (as sometimes results from monitor malfunctions), recorded during a calibration period, or (as is found with the digital output of some monitors) data that are a result of invalid data strings. Instantaneous data resulting from invalid data strings are recorded by the data logger "NAN" (not a number) and are not included in the averages.

3.1.2 Data (instantaneous and from averaged data tables) are transmitted through cellular modems to a central computer (PC).

3.1.2.1 Each monitoring station data logger is connected to a cellular modem with either CDMA or GPRS network capability.

3.1.2.2 Through Campbell Scientific LoggerNet data acquisition software (LoggerNet), the central PC is programmed to poll 1-minute and 60-minute average data and, if available, 15-minute average, 5-second instantaneous, and runtime tables from each monitoring station approximately once every 15-seconds through the wireless network.

3.1.2.3 Polled data are stored into one folder on the central PC's hard drive and named accordingly:

5-second data points: "SITE ID_STATION ID_5_SECOND"
1-minute averages: "SITE ID_STATION ID_ONE_MINUTE"
15-minute averages: "SITE ID_STATION ID_FIFTEEN_MINUTE"
60-minute averages: "SITE ID_STATION ID_SIXTY_MINUTE"

3.1.3 RTMC Pro is configured to send alarms to the designated project cell phone used by the operators, as well as at the central PC. When activated, these alarms are viewable on the "Alarms" tab of RTMC Pro.

3.1.3.1 TVOC alarms will provide visible and audible notifications for error codes, positive zero drift, and both 1-minute and 60-minute averages above AQM criteria.

3.1.3.2 Dust monitor alarms will provide visible and audible notifications for negative zero drift, and both 1-minute and 60-minute averages above AQM criteria.

3.1.3.3 Optional - Other alarms may also be configured to notify the operator of instrument malfunctions and cellular communication errors, or provide visual indicators such as upwind/downwind designations for AQM stations.

3.2 Meteorological Data

3.2.1 Data from the meteorological instruments are recorded onto Campbell Scientific CR1000 data loggers at the Wastebed 13 and Lakeshore meteorological towers.

3.2.1.1 The data loggers are programmed to record data from each instrument continuously and save the data into 60-minute and 5-minute averaged data tables.

3.2.2 Data are transmitted through cellular modems to a central PC.

3.2.2.1 Each meteorological tower data logger is connected to a cellular modem with either CDMA or GPRS network capability.

3.2.2.2 Through LoggerNet, the central PC is programmed to poll 5-minute and 60-minute average data from the meteorological tower data loggers approximately once every 5-minutes through the wireless network.

3.2.3 The data is displayed on RTMC Pro at the central PC as 5-minute averages of wind speed, wind direction (degrees and cardinal degrees), relative humidity, barometric pressure, and temperature. The 60-minute average data is also continuously graphed on the 'Weather' tab of the RTMC Pro to provide a daily history of weather conditions at the site.

4.0 DATA REDUCTION

This procedure covers the production of daily concentration graphs and a daily air monitoring report (DAMR).

4.1 Set up a folder in the central PC to save the current/previous monitoring day's files. Under a folder named 'Air Monitoring' with subfolders for the specific project, find the current month's folder in the form 'mm yyyy'. Create a folder in the format 'mm-dd' for the current/previous monitoring day's data.

4.2 Graph Production

4.2.1 The Split program of LoggerNet can import the current/previous monitoring day's 60-minute data and data capture percentages from each monitoring station 60-minute data output (.dat) file and export that data into one comma-delimited RPT file. Using Split, open each parameter (TVOC, Dust, and meteorological) PAR file to run. After running each PAR file, data from all stations will have been exported into three (TVOC, Dust, and meteorological) RPT files.

4.2.2 Through MS Excel, copy the appropriate RPT data into the 'All Dust/TVOC/Met Data' tab of the Excel files named 'TVOC_mmddyyyy', 'Dust_mmddyyyy', and 'Wind_mmddyyyy-EST/EDT'.

4.2.2.1 Enter the date and time of construction activity/monitoring period into the 'Time Entry' tab of each of these files (for 24-hour monitoring, the start time should be "0000" and the end time should be "2400").

4.2.2.2 Graphs will be generated automatically from the entered data.

4.2.2.2.1 If necessary, insert a text box to any of the graphs to document instances of rain, monitor malfunction, monitor maintenance, etc....

4.2.2.2.2 Copy the Dust and TVOC graphs into the appropriate tabs of the Excel file named 'Summary Tables_mmddyyyy'.

4.2.2.3 Minimum, maximum, and time of maximum averages for Dust and TVOCs are also automatically calculated and appear on the 'Time Entry' tab of these files.

4.2.2.4 Manually input the range of both TVOC and Dust concentrations, along with the associated times of maximum concentrations, into the MS Word file named 'DAMR_mmddyyyy'.

4.2.2.5 Manually input the minimum and maximum temperature and relative humidity, the average wind speed and wind direction, the precipitation sum, and the average barometric pressure into the 'DAMR_mmddyyyy' file.

4.3 Daily Air Monitoring Report (DAMR)

4.3.1 The 'DAMR_mmddyyyy' file now shows the minimum and maximum 60-minute average concentrations for Dust and TVOCs at each station during the monitoring period. It also shows the weather data for the SCA and Lakeshore for that same monitoring period.

4.3.2 Manually input the maximum odor, noise, mercury, and sulfide readings for each station for the previous monitoring day. These AQM parameters will be documented on the previous monitoring day's Daily Perimeter Inspection Field Forms for the SCA and Lakeshore.

4.3.3 Make any necessary comments regarding excursions, background corrections, and corrective actions.

4.3.4 Put the AQM operator's name at the bottom of the document in the form 'J. Smith'.

4.4 Post the DAMR file, 'VOC_mmddyyyy' and 'Dust_mmddyyyy' files, and 'Wind_mmddyyyy' file to the project folder for validation.

5.0 DATA VALIDATION

This section of the SOP describes the role of the data validator, who reviews the data files, looks for certain criteria to ensure its validity, edits the files, and saves them as validated data.

5.1 Data File Review Criteria and Guidelines

5.1.1 The data must be complete in all locations throughout the files.

5.1.2 The data capture for each 60-minute period must be ≥75% (540 instantaneous monitor readings) for the period to be reported as valid.

5.1.3 The start and stop time on each data table and graph must correspond to the monitoring period for the monitoring day being reported (midnight to midnight).

5.1.4 The data on each station's data table and graph must correspond to the 'All Dust/TVOC/Met Data' tab; this includes the title and legend on each graph.

5.1.5 The date on each station's data table and graph must be current for the monitoring day being reported.

5.1.6 Stations will be reviewed for identical data between stations that may indicate improper data collection or reduction.

5.1.7 Invalidated data values will be deleted from the applicable data table cell; the invalid data value will be recorded in a comment for the data table cell along with the reason for invalidation.

5.1.8 Reasons for invalid data will be noted in a text box on the appropriate graph.

5.1.9 Any edits to the data files will be saved into the appropriate project directory in the following file naming formats: 'VOC_mmddyyyy.xlsm', 'Dust_mmddyyyy.xlsm', and 'Wind_mmddyyyy.xlsm'.

5.2 DAMR Review Criteria and Guidelines

5.2.1 The minimum, maximum, and time of maximum for each station must correspond to the times and values listed on the corresponding data file ('Time Entry' tab).

5.2.2 Wind speed and wind direction averages will be verified against the 'Wind_mmddyyyy-EST/EDT' file. Temperature, relative humidity, barometric pressure and precipitation will be checked for reasonableness with ambient conditions on that monitoring day and verified if deemed suspect.

5.2.3 The '<' symbols will be checked for correct usage for the range of minimum and maximum concentrations for TVOC.

5.2.4 Any exceedance levels or values deemed unusual will be investigated further and addressed in a comment on the DAMR if necessary.

5.2.5 All comments will be checked for completeness as appropriate to the action or condition described.

5.2.6 Any edits to the DAMR will be saved into the appropriate project directory.

6.0 DATA REPORTING

This procedure describes the reporting of data in the form of the DAMR, as an electronic data deliverable (EDD), and to a public website, such as http://www.lakecleanup.com/ where data is posted daily. Reporting requirements will vary among Honeywell air monitoring projects. Check with the project's work plan for the specific reporting requirement.

6.1 The data validator creates a pdf file out of the ‘DAMR_mmddyyyy’ MS Word file and sends this to the NYS DEC, Honeywell, and Parsons for each monitoring day.

6.2 Using FileZilla© the ‘TVOC_mmddyyyy’, ‘Dust_mmddyyyy’, ‘Wind_mmddyyyy’ data are converted to a pdf format and loaded to an ftp site where they are transferred to http://www.lakecleanup.com/.

6.3 For each month of data or each program’s data, the data validator produces an Excel file with a format shown in the attached Excel file format for EDD. These files are sent to Parsons where they are run through a macro that reformats the data for the NYSDEC EDD file. Parsons then emails the EDD to NYSDEC.

Daily Real-time/Continuous Air Monitoring Report (DAMR) – SCA and Lakeshore

Honeywell **Honeywell International, Inc.** Syracuse, NY	**Daily Air Monitoring Report**	**SCA and Lakeshore Work Zone Perimeters** **Date: mm/dd/yyyy**

Weather Station	**Wind Speed**	**Wind Direction**	**Air Temperature (ºF)**		**Relative Humidity (%)**		**Barometric Pressure**	**Precipitation**
Location	**(mph)**	**(sector)**	**Max**	**Min**	**Max**	**Min**	**(in.Hg)**	**(inch)**
Wastebed 13								
Lakeshore								

	Dust - 1 hour Average		**TVOCs – 1 hour Average**		**Mercury**	**Hydrogen Sulfide**	**Odor**	**Noise**
Station ID	**Range ($\mu g/m^3$)**	**Time of Max (hr)**	**Range (ppm)**	**Time of Max (ppm)**	**Maximum ($\mu g/m^3$)**	**Maximum (ppb)**	**Maximum (OU)**	**Maximum (dBA)**
OL-SCA1								
OL-SCA2								
OL-SCA3								
OL-SCA4								
OL-SCA5								
OL-SCA6								
OL-SCA7								
OL-SCA8								
OL-LS__								N/A
OL-LS__								N/A
OL-LS__								N/A

Notes: 1. *Maximum concentrations without background correction*
2. *Time of maximum concentrations reported for stations with readings above detection limit.*

ND – Not Detected
N/A – Not Applicable
N/O – Not operating

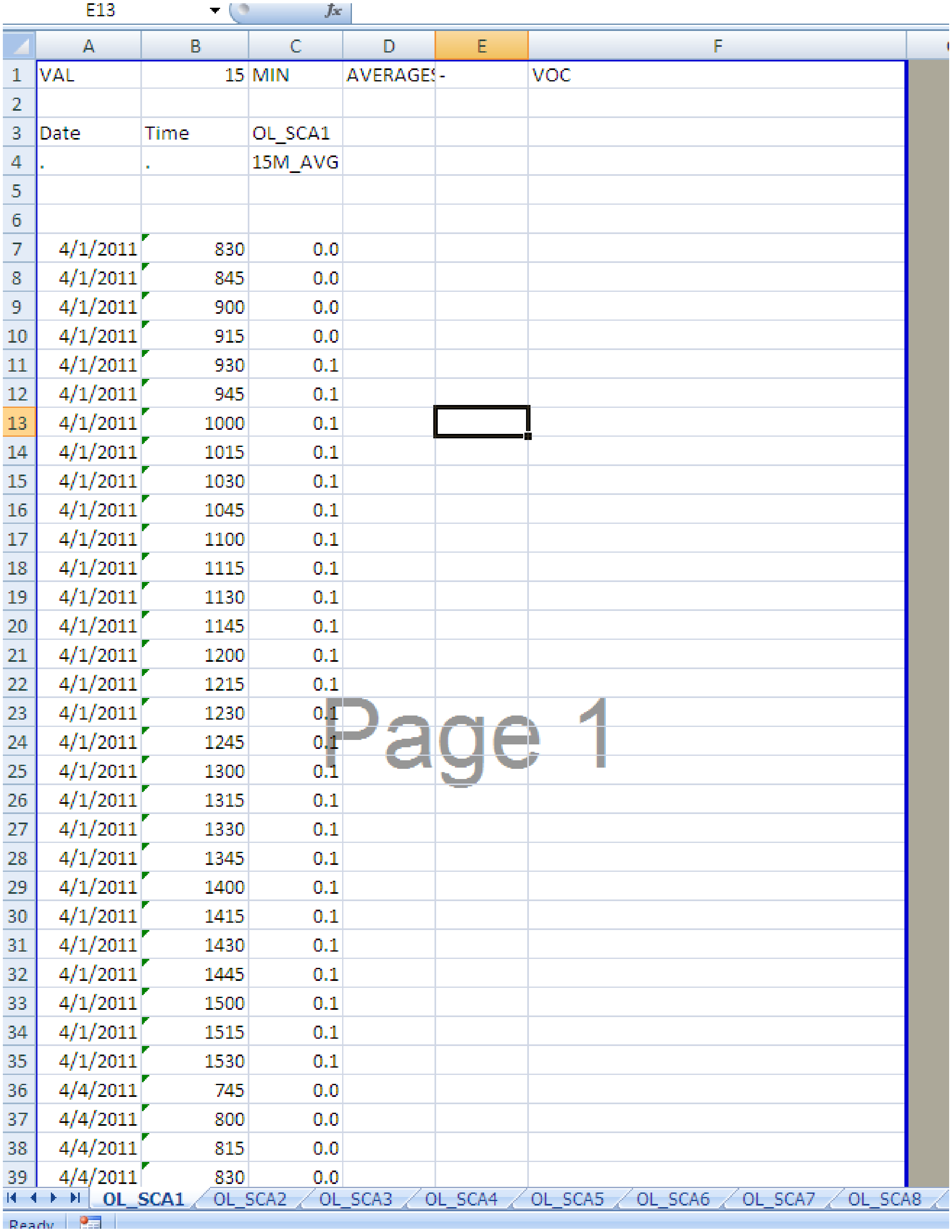
Excursions above Criteria

- **Explain background corrections:** Not applicable.

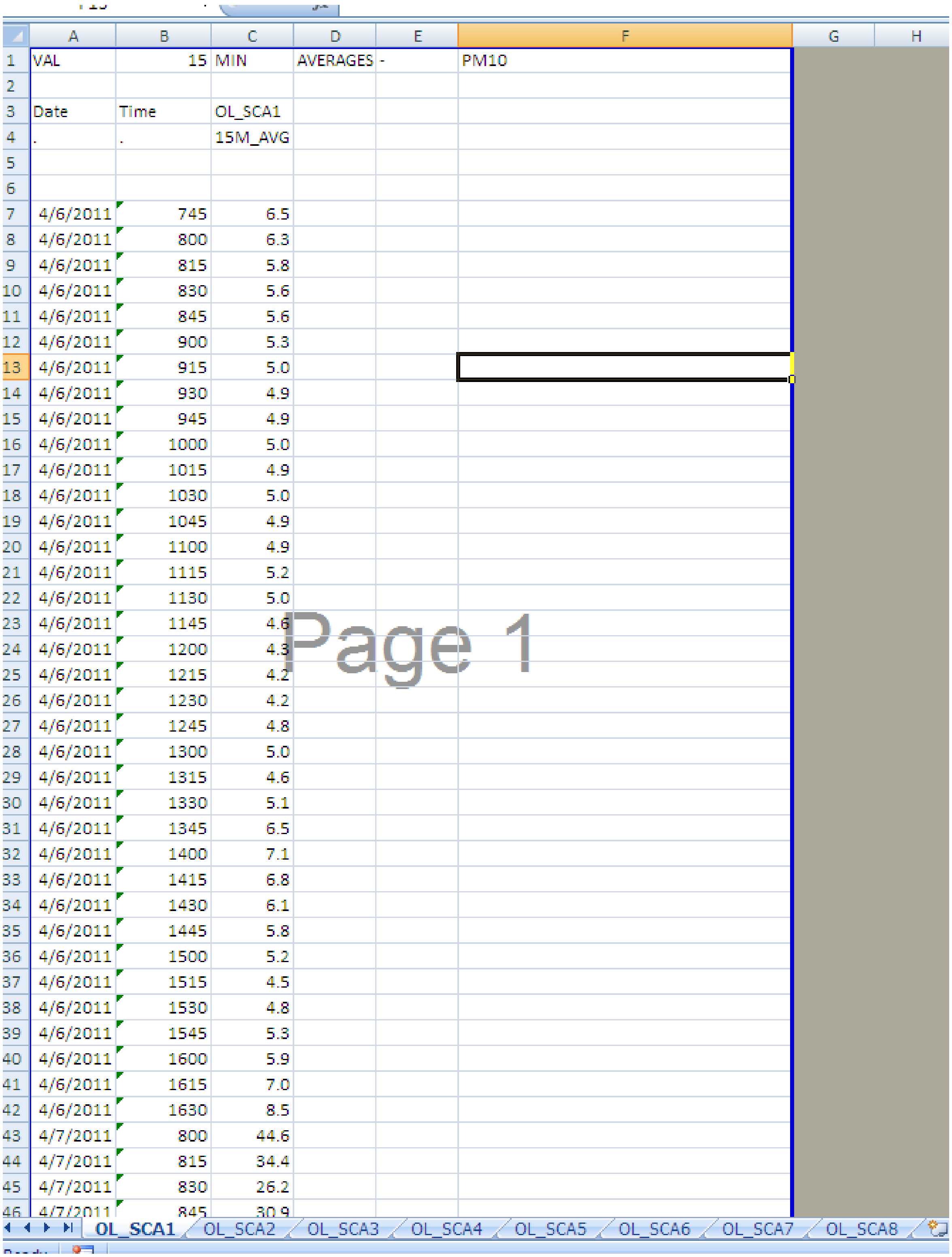
- **Explain excursions above trigger and action criteria (after background corrections) and corrective actions taken:** No excursions.

Submitted by:

Excel File Format for EDD Production



	A	B	C	D	E	F
1	VAL	15	MIN	AVERAGE	-	VOC
2						
3	Date	Time	OL_SCA1			
4	.	.	15M_AVG			
5						
6						
7	4/1/2011	830	0.0			
8	4/1/2011	845	0.0			
9	4/1/2011	900	0.0			
10	4/1/2011	915	0.0			
11	4/1/2011	930	0.1			
12	4/1/2011	945	0.1			
13	4/1/2011	1000	0.1			
14	4/1/2011	1015	0.1			
15	4/1/2011	1030	0.1			
16	4/1/2011	1045	0.1			
17	4/1/2011	1100	0.1			
18	4/1/2011	1115	0.1			
19	4/1/2011	1130	0.1			
20	4/1/2011	1145	0.1			
21	4/1/2011	1200	0.1			
22	4/1/2011	1215	0.1			
23	4/1/2011	1230	0.1			
24	4/1/2011	1245	0.1			
25	4/1/2011	1300	0.1			
26	4/1/2011	1315	0.1			
27	4/1/2011	1330	0.1			
28	4/1/2011	1345	0.1			
29	4/1/2011	1400	0.1			
30	4/1/2011	1415	0.1			
31	4/1/2011	1430	0.1			
32	4/1/2011	1445	0.1			
33	4/1/2011	1500	0.1			
34	4/1/2011	1515	0.1			
35	4/1/2011	1530	0.1			
36	4/4/2011	745	0.0			
37	4/4/2011	800	0.0			
38	4/4/2011	815	0.0			
39	4/4/2011	830	0.0			



	A	B	C	D	E	F
1	VAL	15	MIN	AVERAGES	-	PM10
2						
3	Date	Time	OL_SCA1			
4	.	.	15M_AVG			
5						
6						
7	4/6/2011	745	6.5			
8	4/6/2011	800	6.3			
9	4/6/2011	815	5.8			
10	4/6/2011	830	5.6			
11	4/6/2011	845	5.6			
12	4/6/2011	900	5.3			
13	4/6/2011	915	5.0			
14	4/6/2011	930	4.9			
15	4/6/2011	945	4.9			
16	4/6/2011	1000	5.0			
17	4/6/2011	1015	4.9			
18	4/6/2011	1030	5.0			
19	4/6/2011	1045	4.9			
20	4/6/2011	1100	4.9			
21	4/6/2011	1115	5.2			
22	4/6/2011	1130	5.0			
23	4/6/2011	1145	4.6			
24	4/6/2011	1200	4.3			
25	4/6/2011	1215	4.2			
26	4/6/2011	1230	4.2			
27	4/6/2011	1245	4.8			
28	4/6/2011	1300	5.0			
29	4/6/2011	1315	4.6			
30	4/6/2011	1330	5.1			
31	4/6/2011	1345	6.5			
32	4/6/2011	1400	7.1			
33	4/6/2011	1415	6.8			
34	4/6/2011	1430	6.1			
35	4/6/2011	1445	5.8			
36	4/6/2011	1500	5.2			
37	4/6/2011	1515	4.5			
38	4/6/2011	1530	4.8			
39	4/6/2011	1545	5.3			
40	4/6/2011	1600	5.9			
41	4/6/2011	1615	7.0			
42	4/6/2011	1630	8.5			
43	4/7/2011	800	44.6			
44	4/7/2011	815	34.4			
45	4/7/2011	830	26.2			
46	4/7/2011	845	30.9			

STANDARD OPERATING PROCEDURE
Number 300.200
Revision 0 – 6/6/12

BACKGROUND CORRECTION PROCEDURES
REAL-TIME AMBIENT AIR MONITORS

PROJECT SPECIFIC PROCEDURE
HONEYWELL AIR QUALITY MONITORING PROGRAM

1.0 APPLICABILITY

This procedure outlines the general steps for making background corrections to real-time air measurements of Total Volatile Organic Compounds (TVOCs), PM_{10} (dust), mercury and hydrogen sulfide at the work zone perimeters[1] of the Honeywell Onondaga Lake (dredging) program. Background air concentrations and other measurement responses that are not related to Honeywell (site) activities must be estimated and subtracted from real-time measurements so that concentrations attributable to site-related activities can be estimated and compared to project air quality criteria (action levels and work perimeter limits). Background correction is performed for typical community air monitoring programs and as recommended in the NYSDOH generic community air monitoring plan.

2.0 MONITORING INSTRUMENTATION AND AIR QUALITY CRITERIA

Project short-term (1-hour) air quality criteria consist of action levels and work perimeter limits. For each air quality parameter, there are two action levels: investigate and control. Action levels and work perimeter limits are evaluated using real-time monitoring instrumentation for TVOCs, dust, mercury, and hydrogen sulfide. Instrumentation and 1-hour air quality criteria are summarized below.

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[1] There are two work perimeters: around the sediment consolidation area (SCA) and along the Onondaga Lake shoreline (Lakeshore). Air monitoring around the SCA was conducted at eight fixed monitoring locations (OL-SCA1 through 8) since August 2010 and is planned to be conducted during the lake dredging portion of the program. Air monitoring during dredging will also be conducted along the lake shore at five monitoring locations (OL-LS1 through 5).

2.1 TVOCs – Rae Systems MiniRAE 3000

Perimeter Limit: 5 parts per million (ppm)

Control Level: 3 ppm

Investigate Level: 2 ppm

2.2 Dust – Thermo Fisher ADR 1500

Perimeter Limit: 150 micrograms per cubic meter (µg/m^3)

Control Levels: 125 µg/m^3

Investigate Level: 100 ug/m^3

2.3 Mercury – Jerome J505

Perimeter Limit: 0.6 µg/m^3

Control Levels: 0.4 µg/m^3

Investigate Level: 0.3 ug/m^3

2.4 Hydrogen Sulfide – Jerome 631-X

Perimeter Limit: 10 parts per billion (ppb)

Control Levels: 8 ppb

Investigate Level: 6 ppb

3.0 BACKGROUND AND MONITOR BIAS

Background is associated with off-site sources of air emissions upwind of the Honeywell air monitoring stations. The air monitors can also exhibit false positive responses (biases) not associated with off-site or on-site air emissions, but due to certain meteorological conditions or the monitor’s calibration (see Section 3.2). Both background and monitor biases need to be identified and quantified so they can be subtracted from the total downwind monitoring results (see Section 5), which will yield concentrations attributable to only site activities for direct comparison to action levels and work perimeter limits.

3.1 Background Sources – Background concentrations are defined as air quality concentrations attributable to any other source except for those associated with Honeywell activities.[2] Background air emission sources consist of off-site emission sources near the site (local sources) and unidentifiable sources from long distances comprise most of the regional meso-scale air quality levels. Together the local and long-distance sources combine to determine the site's background level. During construction air quality monitoring (AQM) that took place around the sediment consolidation area (SCA) between January 2011[3] and April 2012, the following background levels and local sources of TVOCs and dust were identified.

3.1.1 TVOCs – Background levels typically ranged from <0.1 ppm (the monitor's detection limit) to 0.3 ppm at all monitoring stations. There was only identifiable intermittent local source of TVOCs, the Camillus C&D landfill. SCA monitoring station 2 (OL-SCA2) is immediately adjacent to and north of off-loading and grading activities at the landfill.

3.1.2 Dust – During periods of medium to low humidity (<90% RH), background levels ranged from 1 to 20 µg/m^3, which is comparable with regional dust levels monitored by NYSDEC[4]. There was one identifiable local source of visible particulate and dust, the Camillus C&D landfill. See Section 4.1 for more detail.

3.2 Monitor Biases – In addition to air emission sources, monitors will indicate a positive measurement not because of actual airborne pollutant concentrations, but due to high humidity, condensation or calibration drift. Each monitor's response to these conditions needs to be subtracted from the total measurements, so that site-related concentrations can be more accurately estimated (see Section 5).

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[2] There are other Honeywell sites not associated with the lake dredging that will have activities occurring during the same time as the dredging, some of which will have separate air monitoring networks. Operators of all networks need to know what other Honeywell activities are occurring upwind of their specific network so that they can exclude those emissions from background estimates.

[3] New models of monitors (described in Section 2) were installed in January 2011.The new models significantly reduced false positive dust measurements attributable to high humidity and calibration drift of TVOC measurements.

[4] Annual average of dust monitored in Rochester by NYSDEC has been 13 µg/m^3 for 2008, 2009 and 2010. http://www.dec.ny.gov/docs/air_pdf/10annrpt.pdf

3.2.1 High Humidity – When relative humidity is high (>90%), background levels of dust range from 10 to 35 µg/m^3, which is slightly higher than during lower humidity. Humidity normally has an insignificant affect on TVOC measurements, but can result in more frequent zero drift. According to the Jerome manufacturer, neither the mercury nor the hydrogen sulfide monitor's response is significantly affected by humidity.

3.2.2 Condensation – Occurs under high relative humidity, heavy dew and fog conditions. These conditions are typically found during summer mornings after a cool night when heavy dew and fog form. For fixed AQM stations, SCA station 5 (OL-SCA5), and to a lesser extent at OL-SCA6, have routinely been more susceptible, and experience a higher frequency of condensation interference in the dust monitors. Those stations are in the shadows of trees and not exposed to the morning sun. If condensed liquid is pulled into the monitor's optical chamber, the dust monitor responds with a rapid increase over a minute or more, followed by a gradual tailed decline that could take two to several hours to return to an actual background level. Procedures are incorporated in the standard operating procedures for these monitors that have reduced but not eliminated condensation entrainment. Therefore the bias associated with condensation has been mitigated but not eliminated.

3.2.3 Calibration Drift – Occurs when the monitor's zero response changes and results in a slow rise in measurement levels. The TVOC monitor is more susceptible to drift than the dust monitor, though both monitors need daily checks to document their response and need for adjustment. Procedures are in place to monitor zero drift and alarm the AQM operator of conditions of noticeable monitor drift. Procedures are instituted to check (and adjust if applicable) the zero of the TVOC monitor's when drift is suspected and levels are ≥ 0.5 ppm, and check and adjust the dust monitor when levels drift below -2 µg/m^3.

4.0 BACKGOUND ESTIMATION

Background levels need to be estimated for and over the same time period as excursions occurring at downwind monitoring stations. It is assumed excursions cannot occur at upwind stations since air parcels upwind of the site have not yet reached site activities. Therefore no corrective actions (investigation, control, and/or curtailment) will be taken due to readings at upwind stations. The following procedures will be followed to estimate the different types of background sources and monitor biases.

4.1 Off-site Local Sources – Although other local sources of TVOCs and dust may be revealed as air quality monitoring proceeds through the dredging program, only one local non-site-related source of TVOCs and dust at the SCA has thus-far been identified, the Camillus C&D landfill. Occasionally these landfill activities may potentially also produce VOCs likely attributable to VOC-containing items unknowingly mixed into the C&D waste.

Wind directions from which the monitoring stations will be downwind of the landfill are as follows:

Station	Downwind Wind Directions (°) of Landfill
OL-SCA1	20 to 50
OL-SCA2	300 to 70
OL-SCA3	240 to 270
OL-SCA4	270 to 300
OL-SCA5	290 to 320
Ol-SCA6	310 to 330
OL-SCA7	320 to 340
OL-SCA8	330 to 350

Even when affecting background at OL-SCA2, the Camillus Landfill has not resulted in increased background at any other AQM stations. Since OL-SCA2 is never simultaneously downwind of the landfill and the SCA, background correction as a result of off-site local sources near the SCA should not be required. However, local sources at the Lakeshore have yet been evaluated via air monitoring but will be when dredging monitoring commences.

There is a composting facility to the west and northwest of the SCA that has been an occasional source of odors at the SCA (primarily at OL-SCA5, 6, and 7) but has not been identified as a source of TVOCs or dust at the SCA work perimeter. Off-site local sources of TVOCs and dust have not been identified at the lakeshore monitoring locations because construction air monitoring has not been conducted there at the time of the initial development of this SOP. As more local sources of TVOCs or dust are identified during the monitoring program, this SOP will be updated with specific source information and downwind directions.

Estimation of the concentrations attributable to a local off-site source is to be conducted if the source is upwind of the monitoring station experiencing an excursion. The operator will investigate the source(s) causing the excursion and will take into account local off-site sources. In instances where both off-site and site sources are upwind of the excursion, then the operator will conservatively assume that the Project source is the cause of the excursion, and will take action accordingly.

4.2 Regional Background – Regional background will be estimated from monitors that are upwind of site-related activities during the same monitoring period as the excursion. If there is more than one upwind monitor during the excursion period, the upwind monitor measuring the highest background concentration will be used to estimate the regional background correction.

4.3 Monitor Bias – Relative humidity and calibration drift can cause a monitor to respond higher than the actual pollutant concentrations (positive bias). Positive monitor bias can be estimated as discussed below. Note that actual concentrations cannot be reliably measured during condensation interference, and therefore, data collected during periods determined to be affected by condensation interference and resulting in excursion levels may be invalidated.

4.3.1 High Humidity – Section 3.2.1 describes the effect of humidity on TVOC and dust measurements. The operator will be aware of relative humidity (as measured by the on-site meteorological stations) and the various stations' responses to the humidity occurring at the time of the downwind excursion. Humidity bias is included in the regional background estimate, but consideration (through operator experience) should be given to the monitors that are more susceptible to humidity biases.

4.3.2 Calibration Drift – The procedure for estimating calibration drift is to challenge the suspect monitor with zero air and adjust the monitor's zero accordingly. The difference between the concentration before and after the zero adjustment is the estimated bias.

5.0 BACKGROUND CORRECTION

Background correction begins with identification of downwind monitors (those measuring emissions from site-related sources) and ends with subtraction of the estimated background. It is currently assumed, based on previous site observations, that off-site local sources will not significantly affect readings downwind of the SCA. Therefore, only background from upwind regional sources and monitor biases will be subtracted from the downwind monitor concentration. The procedure for background correction is detailed below.

5.1 Site-Related Emission Sources – The emission sources of TVOCs at the SCA are fixed, and consist of the geotextile tubes, retention ponds, processing/screening area and water treatment plant. Sources of dust at the SCA are movement of earth at and around the geotextile tubes and along the site's access roads (vehicle traffic). Therefore, except for vehicle traffic, all SCA emission sources are at fixed locations.

Emission sources of TVOCs at the Lakeshore will be the active dredge area and any debris that is placed on shore. These sources are not fixed and will continually change as dredging progresses.

5.2 Downwind and Upwind Monitors Designations – Monitoring locations that are downwind of the SCA or lakeshore activities must be known at all times and closely watched for changing concentrations. The following table identifies wind directions under which the monitoring stations will be upwind or downwind of the fixed SCA emission sources.

Station	Downwind Wind Directions (°) of SCA[a]	Upwind Wind Directions (°) of SCA[a]
OL-SCA1	235 to 310	350 to 195
OL-SCA2	255 to 335	20 to 210
OL-SCA3	320 to 55	95 to 280
OL-SCA4	355 to 85	130 to 310
OL-SCA5	35 to 150	190 to 350
D Ol-SCA6	65 to 185	230 to 25
OL-SCA7	110 to 250	290 to 65
n OL-SCA8	175 to 290	335 to 135

w

[a] upwind directions are based on each SCA monitoring location relative to the fixed SCA emission sources (see Section 5.1). Each wind sector has been expanded by 48 degrees to account for the annual average wind variation (known as, sigma theta).

Upwind and downwind designations for monitoring locations at the Lakeshore will change as the source locations change (see Section 5.1). Therefore, designations will be developed by the operator each monitoring day.

5.3 Background Subtraction – Background correction will be conducted using the following equation:

Site-related Concentration = **Downwind Measurement (Total) –**
Upwind Measurement (regional background) –
Monitor Bias –
Local Off-site Source(s)

Where:

Downwind Measurement (Total) = the actual hourly average measurement

Upwind Measurement = the maximum concentration measured at upwind stations, represents regional background as described in Section 4.2, but not influenced by local off-site sources

Monitor Bias = False positive readings as defined in Section 4.3

Local Off-site Source(s) = Estimated concentrations attributable to local off-site sources as defined in Section 4.1

6.0 DOCUMENTATION

6. 1 Daily Air Monitoring Report – All excursions, background corrections and corrective actions taken will be documented on this report. With respect to background correction, the report will identify the upwind and downwind stations during the excursion. It will also present the values used in the background correction as shown in the equation in Section 5.3.

Real-time Monitor Specifications

CR800-Series Specifications

Electrical specifications are valid over a -25° to +50°C range unless otherwise specified; non-condensing environment required. To maintain electrical specifications, Campbell Scientific recommends recalibrating dataloggers every two years. We recommend that the system configuration and critical specifications are confirmed with Campbell Scientific before purchase.

PROGRAM EXECUTION RATE

10 ms to one day @ 10 ms increments

ANALOG INPUTS (SE1-SE6 or DIFF1-DIFF3)

3 differential (DF) or 6 single-ended (SE) individually configured. Channel expansion provided by AM16/32B and AM25T multiplexers.

RANGES and RESOLUTION: Basic resolution (Basic Res) is the A/D resolution of a single conversion. Resolution of DF measurements with input reversal is half the Basic Res.

Range (mV)[1]	*DF Res (µV)*[2]	*Basic Res (µV)*
±5000	667	1333
±2500	333	667
±250	33.3	66.7
±25	3.33	6.7
±7.5	1.0	2.0
±2.5	0.33	0.67

[1] Range overhead of ~9% on all ranges guarantees that full-scale values will not cause over range.

[2] Resolution of DF measurements with input reversal.

ACCURACY[3]:
±(0.06% of reading + offset), 0° to 40°C
±(0.12% of reading + offset), -25° to 50°C
±(0.18% of reading + offset), -55° to 85°C (-XT only)

[3] The sensor and measurement noise are not included and the offsets are the following:

Offset for DF w/input reversal = 1.5·Basic Res + 1.0 µV
Offset for DF w/o input reversal = 3·Basic Res + 2.0 µV
Offset for SE = 3·Basic Res + 3.0 µV

ANALOG MEASUREMENT SPEED:

Integration Type/ Code	*Integration Time*	*Settling Time*	*Total Time*[5]	
			SE w/ No Rev	*DF w/ Input Rev*
250	250 µs	450 µs	~1 ms	~12 ms
60 Hz[4]	16.67 ms	3 ms	~20 ms	~40 ms
50 Hz[4]	20.00 ms	3 ms	~25 ms	~50 ms

[4] AC line noise filter.

[5] Includes 250 µs for conversion to engineering units.

INPUT NOISE VOLTAGE: For DF measurements with input reversal on ±2.5 mV input range; digital resolution dominates for higher ranges.

250 µs Integration:	0.34 µV RMS
50/60 Hz Integration:	0.19 µV RMS

INPUT LIMITS: ±5 V

DC COMMON MODE REJECTION: >100 dB

NORMAL MODE REJECTION: 70 dB @ 60 Hz when using 60 Hz rejection

SUSTAINED INPUT VOLTAGE W/O DAMAGE: ±16 Vdc max.

INPUT CURRENT: ±1 nA typical, ±6 nA max. @ 50°C; ±90 nA @ 85°C

INPUT RESISTANCE: 20 Gohms typical

ACCURACY OF BUILT-IN REFERENCE JUNCTION THERMISTOR (for thermocouple measurements):
±0.3°C, -25° to 50°C
±0.8°C, -55° to 85°C (-XT only)

ANALOG OUTPUTS (Vx1-Vx2)

2 switched voltage, active only during measurement, one at a time.

RANGE AND RESOLUTION: Voltage outputs programmable between ±2.5 V with 0.67 mV resolution.

V_x ACCURACY: ±(0.06% of setting + 0.8 mV), 0° to 40°C
±(0.12% of setting + 0.8 mV), -25° to 50°C
±(0.18% of setting + 0.8 mV), -55° to 85°C (-XT only)

V_x FREQUENCY SWEEP FUNCTION: Switched outputs provide a programmable swept frequency, 0 to 2500 mv square waves for exciting vibrating wire transducers.

CURRENT SOURCING/SINKING: ±25 mA

RESISTANCE MEASUREMENTS

MEASUREMENT TYPES: The CR800-series provides ratiometric measurements of 4- and 6-wire full bridges, and 2-, 3-, and 4-wire half bridges. Precise, dual polarity excitation using any of the 3 switched voltage excitations eliminates dc errors.

VOLTAGE RATIO ACCURACY[6]: Assuming excitation voltage of at least 1000 mV, not including bridge resistor error.

±(0.04% of voltage reading + offset)/V_x

[6] The sensor and measurement noise are not included and the offsets are the following:

Offset for DF w/input reversal = 1.5·Basic Res + 1.0 µV
Offset for DF w/o input reversal = 3·Basic Res + 2.0 µV
Offset for SE = 3·Basic Res + 3.0 µV

Offset values are reduced by a factor of 2 when excitation reversal is used.

PERIOD AVERAGING MEASUREMENTS

Any of the 6 SE analog inputs can be used for period averaging. Accuracy is ±(0.01% of reading + resolution), where resolution is 136 ns divided by the specified number of cycles to be measured.

INPUT AMPLITUDE AND FREQUENCY:

Voltage Gain	*Input Range (±mV)*	*Signal (peak to peak)*[7]		*Min Pulse Width (µV)*	*Max*[8] *Freq (kHz)*
		Min. (mV)	*Max (V)*		
1	2500	500	10	2.5	200
10	250	10	2	10	50
33	25	5	2	62	8
100	2.5	2	2	100	5

[7] With signal centered at the datalogger ground.

[8] The maximum frequency = 1/(Twice Minimum Pulse Width) for 50% of duty cycle signals.

PULSE COUNTERS (P1-P2)

2 inputs individually selectable for switch closure, high frequency pulse, or low-level ac. Independent 24-bit counters for each input.

MAXIMUM COUNTS PER SCAN: 16.7 x 10^6

SWITCH CLOSURE MODE:
Minimum Switch Closed Time: 5 ms
Minimum Switch Open Time: 6 ms
Max. Bounce Time: 1 ms open w/o being counted

HIGH FREQUENCY PULSE MODE:
Maximum Input Frequency: 250 kHz
Maximum Input Voltage: ±20 V
Voltage Thresholds: Count upon transition from below 0.9 V to above 2.2 V after input filter with 1.2 µs time constant.

LOW LEVEL AC MODE: Internal ac coupling removes dc offsets up to ±0.5 V.

Input Hysteresis: 12 mV @ 1 Hz
Maximum ac Input Voltage: ±20 V
Minimum ac Input Voltage:

Sine Wave (mV RMS)	*Range(Hz)*
20	1.0 to 20
200	0.5 to 200
2000	0.3 to 10,000
5000	0.3 to 20,000

DIGITAL I/O PORTS (C1-C4)

4 ports software selectable, as binary inputs or control outputs. They also provide edge timing, subroutine interrupts/wake up, switch closure pulse counting, high frequency pulse counting, asynchronous communications (UART), SDI-12 communications, and SDM communications.

HIGH FREQUENCY MAX: 400 kHz

SWITCH CLOSURE FREQUENCY MAX: 150 Hz

EDGE TIMING RESOLUTION: 540 ns

OUTPUT VOLTAGES (no load): high 5.0 V ±0.1 V; low <0.1

OUTPUT RESISTANCE: 330 ohms

INPUT STATE: high 3.8 to 16 V; low -8.0 to 1.2 V

INPUT HYSTERISIS: 1.4 V

INPUT RESISTANCE: 100 kohms

SWITCHED 12 V (SW12)

One independent 12 V unregulated source is switched on and off under program control. Thermal fuse hold current = 900 mA @ 20°C, 650 mA @ 50°C, 360 mA @ 85°C.

CE COMPLIANCE

STANDARD(S) TO WHICH CONFORMITY IS DECLARED: IEC61326:2002

COMMUNICATIONS

RS-232 PORTS:
- 9-pin: DCE port for battery-powered computer or non-CSI modem connection.
- COM1 to COM2: Two independent Tx/Rx pairs on control ports (non-isolated); 0 to 5 VUART
- Baud Rates: selectable from 300 bps to 115.2 kbps.
- Default Format: 8 data bits; 1 stop bits; no parity
- Optional Formats: 7 data bits; 2 stop bits; odd, even parity

CS I/O PORT: Interface with CSI peripherals

SDI-12: Digital control ports 1 or 3 are individually configured and meet SDI-12 Standard version 1.3 for datalogger mode. Up to ten SDI-12 sensors are supported per port.

PROTOCOLS SUPPORTED: PakBus, Modbus, DNP3, FTP, HTTP, XML, POP3, SMTP, Telnet, NTCIP, NTP, SDI-12, SDM

SYSTEM

PROCESSOR: Renesas H8S 2322 (16-bit CPU with 32-bit internal core)

MEMORY: 2 MB of Flash for operating system; 4 MB of battery-backed SRAM for CPU usage, program storage and data storage

CLOCK ACCURACY: ±3 min. per year. Correction via GPS optional.

SYSTEM POWER REQUIREMENTS

VOLTAGE: 9.6 to 16 Vdc (reverse polarity protected)

EXTERNAL BATTERIES: 12 Vdc nominal

TYPICAL CURRENT DRAIN:
- Sleep Mode: 0.7 mA (0.9 mA max.)
- 1 Hz Sample Rate (1 fast SE meas.): 1 mA
- 100 Hz Sample Rate (1 fast SE meas.): 16.2 mA
- 100 Hz Sample Rate (1 fast SE meas. w/RS-232 communication): 27.6 mA
- CR1000KD or CR850 Keyboard Display On (no backlight): add 7 mA to current drain
- CR1000KD or CR850 Keyboard Display On (backlight on): add 100 mA to current drain

PHYSICAL SPECIFICATIONS

DIMENSIONS: 9.5" x 4.1" x 2" (24.1 x 10.4 x 5.1 cm); additional clearance required for serial cable and sensor leads.

WEIGHT: 1.5 lbs (0.7 kg)

WARRANTY

3 years against defects in materials and workmanship.

Printed November 2011

Product Specifications

Real-time, ambient dust monitor designed for continuous monitoring.

Thermo Scientific Area Dust Monitor, ADR-1500

Key Features

- Volumetric flow control
- Modular optics and long life primary HEPA filter for ease of servicing
- Multiple power and communications capabilities
- Durable weather-proof IP65 enclosure
- Designed for ease of transport and installation

The Thermo Scientific Area Dust Monitor, Model ADR-1500 utilizes the highly sensitive light-scattering photometer (nephelometer) technology, as used in the Thermo Scientific pDR Series. The intensity of the light scattered by airborne particles passing through the sensing chamber is linearly proportional to their concentration. This optical configuration produces optimal response to particles providing continuous measurements of the concentrations of airborne particles for total particulate and cut-points ranging from PM10 down to PM1.

The ADR-1500 incorporates a temperature and relative humidity (RH) sensor coupled with an internal heater to mitigate the positive bias with elevated ambient RH. Additionally, the flow control is truly volumetric and is maintained through digital feedback of the onboard barometric pressure sensor, temperature sensor, and calibrated differential pressure across a precision orifice. The principles of true volumetric flow, as incorporated by the ADR-1500, result in an accurate sample volume and precise particle cut-point.

The measured concentration of particulate matter is displayed in real-time on the two-line LCD readout display. Additional values can be displayed, such as run start time and date, time averaged concentrations, elapsed run time and many more.

The flexible power capabilities allow the ADR-1500 to operate on AC (100-240 VAC), external DC (12-24 Vdc) or an internal battery. Communications options are available for USB, RS-232, analog and wireless capability.

The ADR-1500 is housed in a weather-proof IP65 enclosure producing a compact and durable instrument that is ready for rapid deployment and unattended operation. A top mounted handle allows for ease of transport and installation with mounting options available for wall, post, or tripod locations.

Product Specifications

To maintain optimal product performance, you need immediate access to experts worldwide, as well as priority status when your air quality equipment needs repair or replacement. We offer comprehensive, flexible support solutions for all phases of the product life cycle. Through predictable, fixed-cost pricing, our services help protect the return on investment and total cost of ownership of your Thermo Scientific air quality products.

Thermo Scientific Ambient Dust Monitor, ADR-1500

Concentration measurement range	0.001 to 400 mg/m^3 (auto-ranging)
Scattering coefficient range	1.1 x 10^{-6} to $0.6m^{-1}$ (approximately) @ λ = 880nm
Precision / Repeatability	+/- 2% of reading or +/- 0.005 mg/m^3, whichever is larger, for 1-second averaging time
2-sigma^2 with heater off and	+/-0.5% of reading or +/- 0.0015 mg/m^3, whichever is larger, for 10-second averaging time
RH correction disabled (over 30 days)	+/-0.2% or reading or +/- 0.0005 mg/m^3, whichever is larger, for 60-second averaging time
Accuracy	+/- 5% of reading (+/- precision) traceable to SAE Fine test dust
Resolution	0.1 µg/m^3
Particle size range *of maximum response*	0.1 to 10 µm
Flow rate range	1.0 to 3.5 liters/min.
Aerodynamic particle cut-point range	1.0 to 10 µm, with optional cyclone accessories
Alarm averaging time	Real-time (1 - 60 seconds) or STEL (15 minutes)
Data logging averaging periods	1 second to 1hour
Logged data	Averaged concentrations, temperature, RH, barometric pressure, time/date, and data point number
Run Summary	Site number, average and max. concentrations, time/date of maximum, number of logged points, start time/date, elapsed time (run duration), averaging (logging) period, calibration factor and tag number
Serial interface	High speed, USB/RS-232 (reserved for wireless applications), 19,200 baud
Real-time digital signal	Concentration, flow, temperature, relative humidity, barometric pressure, time, date
Real-time analog signal	0 to 2 V and 4 to 20 mA, with selectable full scale ranges between 0.1 and 400 mg/m^3
	0-0.1, 0-0.4, 0-1.0, 0-4.0, 0-10, 0-40, 0-100 and 0-400, mg/m^3
Alarm output	Load impedance > 100 kΩ , Alarm ON = short to ground, Alarm OFF = open
Internal battery run time	1.2 L/min. (heater and alarm constantly on) > 24-hour run time
AC Source	100-240 VAC, 50/60Hz, 12/24 Vdc for solar or auxiliary battery options
Operating environment	14 to 122°F (10 to 50°C) 10 to 95% RH, non-condensing
Physical dimensions	21" (533mm) H x 17" (431mm) W x 17" (215mm) D, 28.5 lbs. (12.9 kg)
Optional cyclones	GK 2.05 (Red) primarily for PM$_4$ through PM$_{10}$, SCC 1.062 (blue) primarily for PM$_1$ through PM$_4$

Ordering Information

Model ADR-1500
Choose from the following configurations/options
to customize your own Model ADR-1500

1. Power cords:
A = 110v power cord
B = 220v power cord

2. Relay kit:
A = Relay kit
N = No relay kit

3. Pole mounting:
A = Pole mount kit, 2" DIA
B = Pole mount kit, 3" DIA
C = Pole mount kit, 4" DIA
N = None

4. External cables:
A = Analog external cable assembly
B = 12/24 Vdc external cable assembly
C = Both cables
N = None

5. 37mm Cassette filter holder assembly
A = 37mm Cassette filter holder assembly with filter support & holder
N = None

6. Cyclone and the cyclone adapter
A = Blue cyclone assembly (PM 1 - 2.5 Microgram CP) with cyclone adapter
B = Red cyclone assembly (PM 4 - 10 Microgram CP) with cyclone adapter
C = Both cyclones with cyclone adapter
N = None

Your Order Code: Model ADR1500 __ __ __ __ __ __

Lit_ADR1500AQI_12/09

This product is manufactured in a plant whose quality management system is ISO 9001 certified.

Air Quality Instruments
27 Forge Parkway
Franklin, MA 02038 USA
(866) 282-0430
(508) 520-0430
(508) 520-1460 fax
www.thermo.com/ih

Thermo
SCIENTIFIC

MiniRAE 3000

Portable Handheld VOC Monitor

The MiniRAE 3000 is the most advanced handheld volatile organic compound (VOC) monitor on the market. Its photoionization detector's (PID) extended range of **0 to 15,000 ppm** makes it an ideal instrument for applications from industrial hygiene to leak detection and HazMat.

The **RF modem allows real-time data transmissions** with a base controller located up to 500 feet away from the MiniRAE 3000 (or two miles with optional RAELink3 portable modem). A personal computer can be used as the base station for a MiniRAE 3000 system. The standard ProRAE Remote software is capable of monitoring the input of up to 64 remotely located monitors, including MiniRAE 3000, AreaRAE, etc.

Wireless

AutoRAE Compatible

Key Features

- **Proven PID technology**
  The patented sensor provides the following unique features:
  - 3-second response time
  - Extended range up to 15,000 ppm with improved linearity
  - Humidity compensation with integral humidity and temperature sensors
- **Real-time wireless** data transmission with built-in RF modem or Bluetooth
- **Designed for simple service** Easy access to lamp and sensor in seconds without tools
- **Big graphic display** for easy overview of gas type, Correction Factor and concentration
- **Field-interchangeable battery pack** replaced in seconds without tools
- **Integrated flashlight** for better view in dark conditions
- **User-friendly screens, including dataplot chart view**
- **Integrated RAE Systems Correction Factors list for more than 200 compounds** to measure more chemicals than any other PID
- **Multi-language support** with 12 languages encoded
- **Rugged housing** withstands use in harsh environments
  - IP67 waterproof design for easy cleaning and decontamination in water
  - Strong protective removable rubber boot

Additional Advantages

- View real-time sensor data and alarm status at headquarters or command center
- Automatic lamp type recognition
- Duty-cycling™ lamp and sensor auto-cleaning technology
- Tough, flexible inlet Flexi-Probe™
- 3 large keys operable with 3 layers of gloves
- Strong, built-in sample pump draws up to 100 feet (30m) horizontally or vertically
- Loud, 95dB audible alarm
- Bright red flashing visual alarm
- Interchangeable drop-in Lithium-Ion and alkaline battery packs
- Charging cradle doubles as an external battery charger
- Compatible with AutoRAE™ calibration station
- ProRAE Remote software simultaneously controls and displays readings for up to 64 remote detectors
- License-free, ISM band RF transmission with communication range up to 500 feet (2 miles with optional RAELink3 modem)
- Optional RAELink3 modem provides GPS capability to track and display readings from remote detectors and provide up to 2 miles' long-distance transmission
- Datalogging with up to 6 months of data at one-minute intervals
- 3-year 10.6 eV lamp warranty

MiniRAE 3000

Specifications*

Detector Specifications

Size	10" L x 3.0" W x 2.5" H (25.5 cm x 7.6 cm x 6.4 cm)
Weight	26 oz (738 g)
Sensors	Photoionization sensor with standard 10.6 eV or optional 9.8 eV or 11.7 eV lamps
Battery	• Rechargeable, external field-replaceable Lithium-Ion battery pack • Alkaline battery adapter
Operating Hours	16 hours of operation (12 hours with alkaline battery)
Display Graphic	4 lines, 28 x 43 mm, with LED backlight for enhanced display readability
Keypad	1 operation and 2 programming keys, 1 flashlight on/off
Direct Readout	Instantaneous reading • VOCs as ppm by volume • High values • STEL and TWA • Battery and shutdown voltage • Date, time, temperature
Alarms	95dB at 12" (30 cm) buzzer and flashing red LED to indicate exceeded preset limits • High: 3 beeps and flashes per second • Low: 2 beeps and flashes per second • STEL and TWA: 1 beep and flash per second • Alarms latching with manual override or automatic reset • Additional diagnostic alarm and display message for low battery and pump stall
EMI/RFI	Highly resistant to EMI/RFI. Compliant with EMC directive (2004/108/EC); R & TTE directive (1999/5/EC)
IP Rating	• IP67 unit off and without flexible probe • IP65 unit running
Datalogging	Standard 6 months at one-minute intervals
Calibration	Two-point or three-point calibration for zero and span. Calibration memory for 8 calibration gases, alarm limits, span values and calibration dates
Sampling Pump	• Internal, integrated flow rate at 500 cc/mn • Sample from 100' (30m) horizontally and vertically
Low Flow Alarm	• Auto pump shutoff at low-flow condition
Communication	• Download data and upload instrument set-up from PC through charging cradle or optional Bluetooth™ • Wireless data transmission through built-in RF modem
Frequency	902 to 928 MHz (license-free), 2.400 to 2.4835 GHz (license-free), 433 MHz, 869 MHz
RF Range	Up to 500' (152m; 900 MHz, 433 Mhz, 869 Mhz), extendable with RAELink3 Repeater to 2 miles (3.2km)
Hazard Area Approval	• **US and Canada:** c CSA us, Classified as Intrinsically Safe for use in Class I, Division 1 Groups A, B, C, D • **Europe:** ATEX II 2G EEx ia IIC T4
Temperature	-4° to 122° F (-20° to 50° C)
Humidity	0% to 95% relative humidity (non-condensing)
Attachments	Durable bright yellow rubber boot
Warranty	3 years for 10.6 eV lamp, 1 year for pump, battery, sensor and instrument

*Specifications are subject to change

Sensor Specifications

Gas Monitor	Range	Resolution	Response Time T90
VOCs	0 to 999.9 ppm 1000 to 15,000 ppm	0.1 ppm 1 ppm	< 3 s < 3 s

Monitor only includes:

- MiniRAE 3000 Monitor, Model PGM-7320
- Wireless communication module built in, as specified
- Datalogging with ProRAE Studio Package for Windows™ 98, 2000, NT, ME & XP
- Charging/download adapter
- RAE UV lamp, as specified
- Flex-I-Probe™
- External filter
- Rubber boot
- Alkaline battery adapter
- Lamp-cleaning kit
- Tool kit
- Operation CD-ROM
- Operation & Maintenance manual
- Soft leather case

Monitor with accessories kit adds:

- Hard transport case with pre-cut foam padding
- Charging/download cradle
- 5 Porous metal filters and O-rings
- Organic vapor zeroing kit
- Gas outlet port adapter and tubing

Optional calibration kit adds:

- 100 ppm isobutylene calibration gas, 34L
- Calibration regulator and flow controller

Optional Guaranteed Cost of Ownership Program:

- 4-year repair and replacement guarantee
- Annual maintenance service

RAE Systems Inc.
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raesales@raesystems.com

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DS-1018-02

JEROME®

APPLICATIONS

- Ambient Air Analysis
- Clean Up Compliance
- Detection Compliance
- Disposal & Recycling
- Exhaust Duct Monitoring
- Facility Monitoring
- Fluorescent Lamps
- Gold Mining
- Hazardous Waste Sites
- HAZMAT
- Landfill Monitoring
- Leak Detection
- Mercury Exclusion Testing
- Mercury Spill Response
- Monitoring: light bulbs, mercury switches equipment
- Plant Environment
- Quality Control
- Scrubber Efficiency Testing
- Source Surveys
- Worker Safety

CERTIFICATIONS

ISO 9001:2008

MADE IN THE USA

ARIZONA INSTRUMENT LLC
3375 N Delaware St | Chandler, AZ
www.azic.com

NEW

JEROME® J505
Atomic Fluorescence Spectroscopy Mercury Vapor Analyzer

The NEW! Jerome® J505 Mercury Vapor Analyzer is a portable fluorescence spectroscopy analyzer, which allows the detection cell to be simpler, smaller, lighter weight and more durable than competing spectroscopy instruments. The highly efficient optical cell requires less flow to purge the system, allowing the J505 to run at a lower flow rate minimizing sample dilution as found in competing spectroscopy instruments.

FEATURES

- Meets EPA & ATSDR Cleanup Levels
- Flexible Data Handling
- Choice of Two Independently Adjustable High Limit Alarms
- Programmable Auto Sampling Mode
- Choice of 3 Units of Measurement (nanograms, micrograms, milligrams)
- Color Display with Easy to Use Menu System
- Battery Operation for 10+ Hours | Battery Charges in 3 Hours or Less
- A USB Keyboard can be used for Easy Entry of Locations (optional)
- Integrated Data Logging Saves all Test Results (excludes search mode)

SPECIFICATIONS

Resolution	0.01 µg/m^3 (10ng/m^3) in standard test mode	
Detection Range	0.05 to 500 µg/m^3	
Data Storage Capacity	Up to 10,000 test results, 100 test locations	
Operating Environment	5 to 45°C, non-condensing, non-explosive	
Accuracy	0.3 µg/m^3	±15%
	1 µg/m^3	±10%
	25 µg/m^3	±10%
	100 µg/m^3	±10%
Typical Response Time	Search	8 sec. first reading; continuous 1 sec. updates
	Quick	16 sec.
	Standard	28 sec.
Flow Rate	1 liter/minute	

JEROME®

Rentals Available
Loaners Available
24 Hour Customer Support

Sales Representatives
800.528.7411 | 602.470.1414
sales@azic.com

Extended Warranties and Parts
800.528.7411 | 602.470.1414
sales@azic.com

Power Requirements	12VDC power adapter runs on 100-240VAC, 0.8A
Internal Battery Pack	Rechargeable nickel metal hydride (NiMH) with 10+ hours of operation | Battery charges in 3 hours or less
Dimensions	12” L x 6.2” W x 8.4” H
Weight	6.5 lb
Output	USB flash drive
Warranty	1 year, factory parts and labor

ACCESSORIES

990-0230	USB Keyboard
990-0244	AC Adapter Power Supply (supply/charger)
990-0246	Soft Handle Grip
990-0247	Soft Carrying Case
Y990-0234	Mercury Spill Kit

PARTS

345-0241	Intake Fritware (pack of 5)
1400 2002	Probe
Z2600 3905	Zero Air Filter

More Information

ARIZONA INSTRUMENT LLC
3375 N Delaware St | Chandler, AZ
www.azic.com

8. JEROME® 631-X TECHNICAL SPECIFICATIONS

Range	0.003ppm (3ppb) to 50ppm H_2S in four graduated ranges
Sensitivity	0.003ppm H_2S
Precision	5% relative standard deviation
Accuracy	Range 0: ± 0.003ppm at 0.050ppm H_2S Range 1: ± 0.03ppm at 0.50ppm H_2S Range 2: ± 0.3ppm at 5.0ppm H_2S Range 3: ± 2ppm at 25ppm H_2S
Response time-sample mode	
10 to 50 ppm (Range 3)	13 seconds
1.0 to 10.0 ppm (Range 2)	16 seconds
0.10 to 1.00 ppm (Range 1)	25 seconds
0.001 to 0.100 ppm (Range 0)	30 seconds
Response time-survey mode	
10 to 50 ppm (Range 3)	3 seconds
1.0 to 9.9 ppm (Range 2)	6 seconds
0.10 to 0.99 ppm (Range 1)	15 seconds
0.001 to 0.099 ppm (Range 0)	20 seconds
Flow rate	150 ± 10ml/min (0.15 ± .01 liters/min)
Power requirements	100-120 V~, 50/60 Hz, 1 A or 220-240 V~, 50/60 Hz, 1 A
Fuse	F1A 250V, 5mm X 20mm
Internal battery pack	Rechargeable Nickel Cadmium
Operating environment	0° to 40 °C, non-condensing, non-explosive
Case construction	Aluminum alloy
Dimensions – standard model	33 cm L x 15 cm W x 10 cm H (13" L x 6" W x 4" H)
Dimensions – XE model	35 cm L x 18 cm W x 18 cm H (14" L x 7" W x 7" H)
Weight – standard model	3.18 kilos (7 pounds)
Weight – XE model	3.5 kilos (8 pounds)
Digital meter display	Liquid crystal display (LCD)
Certification	CE mark on 220-240 V~, 631-XE model only.

Nasal Ranger® Field Olfactometer
Technical Specifications

Detection Technique:	Human Nose
Discrete Dilution Ratios:	2, 4, 7, 15, 30, 60 D/T's (Standard Dilution-to-Threshold Ratios)
Response Time:	As fast as 3-seconds (2 inhalations)
Accuracy:	+/- 10% of D/T
Repeatability:	+/- 2%
Inhalation Rate:	16-20 liters per minute
Operating Temperature Range:	32° to 104°F, 0° to 40°C
Power Requirements:	Standard 9-Volt Alkaline Battery
Dimensions:	14"(L) x 7.5"(H) x 4"(W) (35.5 x 19 x 10 cm)
Weight:	2.0 lbs (0.91 kg)
Materials of Construction:	PTFE and Polymer Alloys
Odor Filter Cartridge:	3.5" diameter x 1.5" (H) (8.9 cm diameter x 7 cm)
Nasal Mask:	2.75" (H) x 2.25" (W) (7 cm x 5.7 cm)
Patent:	U.S. Patent No.: 6,595,037
Calibration Verification:	Recommended Annually
EMC Verification:	Emissions: EN 61326: 1997, Class B Immunity: EN 61326:1997, Industrial Location
Markings:	89/336/EEC (EMC) 92/59/EEC (General Product Safety) CE

Laboratory QA Tables

Table D-1. *Field Sampling Summary- Analytical Parameters*

Parameter (Method or Field Measurement)	Matrix	Sample Containers and Volumes	Preservation	Holding Times	Number of Investigative Samples	QC sample frequency			
						Field Duplicate	Trip Blank	MS/MSD and Spike Duplicate	Field Rinsate Blank
Speciated VOCs (USEPA Method TO15)[1]	Air	6.0 Liter SUMMA® vacuum canisters Sampling for 24 hours, with an airflow of 3.2-3.4 mL per minute.	None	Analysis within 30 days from collection to analysis. Used and un-used canisters must be returned to the laboratory within 15 days of shipment of the canisters to the sampling location.	TBD	One per 20 samples (1)	Not required	Not required	Not required

NOTES:

VOCs - volatile organic compounds.

TBD indicates to be determined.

1. United States Environmental Protection Agency (USEPA). 1999. *Compendium Method TO-15: Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS).* Cincinnati, Ohio.

Source: O'Brien & Gere

Table D-2. *VOCs using USEPA Method TO-15 quality control requirements and corrective actions.*

Audit	Frequency	Control Limits	Corrective Action
Holding Times	Samples must be analyzed within holding time. Used and un-used canisters must be returned to the laboratory within 15 days of shipment of the canisters to the sampling location.	Analyze within 30 days of sample collection. Preservation of sample containers is not required.	If holding times are exceeded for initial or re-analyses required, notify QAO since re-sampling may be required. Document corrective action in the case narrative
Canister Preparation	1. Canisters are equipped with a laboratory preset regulator, pressure gauge, critical orifice, stainless steel frit dust filter over the orifice, and specially prepared interior surfaces. 2. The flow controller (regulator) is preset at the laboratory for sample collection periods and the collection period is identified for each canister. 3. Canisters are shipped to the site at sub-atmospheric pressure approximating negative 30 inches of mercury. 4. The laboratory evacuates the canister to approximately – 30 inches of Hg prior to shipping.		
Sample collection using canisters	1. Air samples will be collected at a rate of 3.2-3.4 milliliters per minute using a 6-Liter canister. 2. The backpressure is primarily a factor of the length of the tubing from the sampling point to the canister, the interior diameter of the tubing, the construction of the sampling probe, and the soil type. 3. If the backpressure constraint is greater than the vacuum in the canister, sample collection will not occur. 4. When possible, the system backpressure should be evaluated prior to sampling. 5. The method by which the ambient pressure and temperature will be obtained must be either weather station or portable instrument for exterior samples.		
Canister Leak Test Evaluation Prior to Collection	All canisters are leak tested prior to each sampling. Canister pressure must be recorded by lab prior to shipment to the client (approximately -30 inches of mercury), and by field after sample collection. The pressure must be recorded by lab upon receipt.	The difference between the initial canister pressure recorded at the laboratory and the subsequent pressure reading prior to sample collection at the field location must not be greater than 10 in Hg.	1. If canister pressure is exceeded notify QAO since re-sampling may be required. 2. Document communications and corrective action in the case narrative.

Table D-2. *VOCs using USEPA Method TO-15 quality control requirements and corrective actions.*

Audit	Frequency	Control Limits	Corrective Action
Canister Leak Test Evaluation After Collection	Canister pressure should be recorded by the field after sample collection, and by the lab upon receipt at the lab.	The difference between the pressure recorded in the field after sample collection and the pressure recorded by the lab upon sample receipt must not be greater than 10 in Hg. If pressure difference is exceeded, documentation instructing the lab to analyze the sample must be provided.	1. If canister pressure is exceeded notify QAO since re-sampling may be required. 2. Document communications and corrective action in the case narrative.
Canister Filling	The canisters should be filled to a minimum of -15 in Hg, but ideally filled to between -5 in Hg and -2 in Hg when collection of sample is completed.	Canisters used for sample collection should be filled properly.	1. If canister filling requirement is exceeded notify QAO since re-sampling may be required. 2. Document communications and corrective action in the case narrative. 3. Results from canisters received by the lab with no measureable pressure will be qualified as approximate.
Canister Cleaning	1. Canisters must be clean and free of any contaminants before sample collection. 2. Canisters will be individually certified. 3. The same laboratory that certifies the canisters as clean must analyze the sample canisters. 4. Certification should be provided in the data package. The laboratory must document which canisters are associated with each batch certification.	1. Canisters are cleaned using either humid zero nitrogen cleaning procedures as described in USEPA Method TO-15 or the canisters are heated in an isothermal oven or by use of heating bands. 2. Individually certified canisters are analyzed by TO-15. 3. Clean canisters do not contain analytes above or equal to the quantitation limit (QL). 4. Any canister that has not tested clean will not be used.	1. If canister cleaning requirement is exceeded notify QAO since re-sampling may be required. 1. 2. Document communications and corrective action in the case narrative.
GC/MS tuning	Once every 24 hours prior to initial calibration and calibration verification.	1. Tune key ions and abundance criteria listed in USEPA Method TO-15 must be met for all ions and analyses must be performed within 24 hours of injection of the tune. 2. Part of the tune peak will not be background subtracted to meet tune criteria. 2. Documentation of all tune analyses and evaluations must be included in the data packages.	1. Tune the mass spectrometer. 2. Document corrective action in the case narrative - samples must not be analyzed until control limit criteria have been met.
Analytical Sequence	Analytical sequence is defined as analyses performed within a 24-hour period.	Not applicable	Not applicable

Table D-2. *VOCs using USEPA Method TO-15 quality control requirements and corrective actions.*

Audit	Frequency	Control Limits	Corrective Action
Initial Calibration (IC)	Prior to sample analysis and when calibration verification criteria are not met. Initial calibration will contain all target analytes in each standard.	1. Minimally five concentrations of standards bracketing the expected concentration range for all compounds of interest. One standard must be at or below the QL. 2. The %RSD must be less than or equal to 30 for all target analytes or calibration coefficient of greater than 0.990 for calibration curves. The following exception is allowed: Up to two analytes can exceed 30% RSD but must be less than or equal to 40%. 3. Minimum relative response factor (RRF) of ≥ 0.05. 4. If used, tracer gas should be included in calibration. 5. Quantitation of analyses will utilize the initial calibration results.	1. Identify and correct problem. 2. Recalibrate instrument. Samples must not be analyzed until initial calibration criteria are met.
Calibration Verification (CCV)	Every 24 hours, following tune. Calibration verification will contain all target analytes in each standard at a concentration that is representative of the midpoint of the initial calibration.	1. The percent difference must be less than or equal to 40 for no more than two target analytes 2. Minimum RRF of ≥ 0.05.	1. Reanalyze. 2. If criteria are still not met, identify and correct problem and recalibrate. Samples must not be analyzed until continuing calibration criteria are met. Data associated with CCV <40 percent will be flagged.
Method Blank Analysis	Prepared with each analytical sequence of 24-hour period. The method blank is an unused, certified canister that has not left the laboratory. The blank canister is pressurized with humidified, ultrahigh purity nitrogen and carried through the same analytical procedure as a field sample. The injected aliquot of the blank must contain the same amount of internal standards that are added to each sample.	1. The laboratory method blank should be analyzed after the calibration standard and before any samples are analyzed. 2. The blank can not contain any target analyte at a concentration greater than the QL or analytes with elution characteristics and mass spectral features that would interfere with identification and measurement of a method analyte.	1. Reanalyze blank. 2. If limits are still exceeded, investigate and correct problem. Otherwise, flag data indicating blank contamination was detected. 3. Document corrective action in the case narrative.

Table D-2. *VOCs using USEPA Method TO-15 quality control requirements and corrective actions.*

Audit	Frequency	Control Limits	Corrective Action
Field/ Equipment Blank Analysis (when requested)	Laboratory-supplied clean canister for each batch of canisters. Collected one per sampling day and/or one after every 20 samples, if required. Canister blank may not be required for this project.	The blank can not contain any target analyte at a concentration greater than the QL or analytes with elution characteristics and mass spectral features that would interfere with identification and measurement of a method analyte.	1. Investigate problem. 2. Document in the case narrative.
Internal Standards	Samples, blanks, LCSs must be spiked with method specified internal standards. Add sufficient internal standard equivalent to 10 ppbv in the sample.	1. The area response for each internal standard must be within ±40 percent of the mean area response of the internal standard in the most recent valid calibration verification. 2. The retention time for each of the internal standards in the blanks must be within ±0.33 minutes between the analysis and the most recent valid calibration verification.	1. Reanalyze. 2. If recovery is still outside criteria, report both analyses. 3. Document corrective action in the case narrative.
Laboratory Control Sample (LCS)	Every 20 samples, one per analysis sequence. LCS will contain all target analytes in each calibration standard, using a second source, at a concentration that is near a midpoint calibration standard.	Recovery within laboratory control limits. For compounds without established laboratory control limits, 70-130% recovery will be used. The lowest acceptable control limits for recovery will be 10%.	If recovery failures are above control limits and these compounds are not detected in the associated samples above the MDL or QL, corrective action is not required. If recovery failures are below control limits, reanalyze LCS and examine results of other QC analyses. If other QC criteria have not been met, stop analysis, locate and correct problem, recalibrate instrument and reanalyze samples since last satisfactory LCS. Document corrective action in the case narrative.
Field Duplicate Analysis	One per 20 samples, or as collected during the project.	Within 25 relative percent difference (RPD) for air samples. For sample results that are less than or equal to five times the QL, the criterion of plus or minus two times the QL will be applied to evaluate field duplicates.	No corrective action required of the laboratory since the laboratory will not know the identity of the field duplicate samples. If these criteria are not met, sample results will be evaluated on a case-by-case basis.

Table D-2. *VOCs using USEPA Method TO-15 quality control requirements and corrective actions.*

Audit	Frequency	Control Limits	Corrective Action
Sample Batching	The laboratory will batch project samples together along with QC samples specified from the project. Non-project information will not be included in the data packages.	Not applicable	Not applicable
Sample Analysis	All Canister samples should be at temperature equilibrium in the laboratory.	Not applicable	Not applicable
Sample Dilution	Automatic dilution of samples is permitted to obtain an aliquot of sample from the canister. Samples must be diluted and re-analyzed when concentrations exceed the highest calibration standard.	Makeup air should only be humidified ultra highj purity nitrogen, and the source must be same as that used for method blank preparation. Dilution will keep the concentration in the upper half of the initial calibration range.	Not applicable
Laboratory control limits	1. Generated with results for an analyte from a minimum of 20 sample analyses. The average of the sample results and the standard deviation are calculated. The internal warning limits are established at 2 times the standard deviation and the control limits are established at 3 times the standard deviation. The control limits are updated annually.	Not applicable	Not applicable

Table D-2. *VOCs using USEPA Method TO-15 quality control requirements and corrective actions.*

Audit	Frequency	Control Limits	Corrective Action
Deliverables	1. Data deliverables must be provided to document each audit item for easy reference and inspection. 2. An example calculation will be provided for each type of analysis, for each type of matrix in the data package using samples from the project. The calculation will start with the raw data information from the quantitation report and end with the final target analyte concentration (both in ppbv and µg/m^3) demonstrating unit conversions applied. 3. Any laboratory abbreviations or notations presented in the raw data or summary information will be explained or referenced in the case narrative. 4. Final spiking concentrations will be presented in summary form. 5. Run logs will be provided in the data packages. 6. Canister pressures (using inches of mercury) prior to shipment and upon receipt, canister certification documentation and leak check evaluation documentation must be included in the data package.	Not applicable	Provide missing or additional deliverables for validation purposes.
Standard Preparation and Tracing	The laboratory will provide standard tracing and preparation information for the first data package. Standard preparation information will begin with the certified gas standard and end with the working calibration standards used for IC, CCV and spiking. Unit cancelation will be demonstrated. The complete procedure that is used to prepare the standards will be provided for each standard level.		
Method requirements	The laboratory will perform the method as presented in this table and will adhere to the requirements presented herein. Otherwise the laboratory will specifically note any procedures that differ from the method or the table in the data package case narrative.	Not applicable	Not applicable

Table D-2. *VOCs using USEPA Method TO-15 quality control requirements and corrective actions.*

Audit	Frequency	Control Limits	Corrective Action
Notes: Data validation will be performed in accordance with QA/QC criteria established in the QAPP and this table and the analytical methods that are currently used by the laboratory. Excursions from QA/QC criteria will be qualified based on guidance provided in the QAPP and this table. Communications with O'Brien & Gere will be documented and referenced in the data packages. Source: O'Brien & Gere			

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