

**Joint Venture**

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August 28, 2017

TO: Eric Ealy, Xcel Energy

CC: Terry Coss, Tom Perry

FR: Curt Dungey, FE JV

RE: Ambient Monitoring Procedures for Total Suspended Particulate and Calcium Oxide  
Ashland/NSP Lakefront Site Phase 2

**Introduction and Purpose**

The purpose of this technical memorandum is to provide a monitoring approach to measure ambient concentrations of total suspended particulate matter (TSP) and calcium oxide (CaO), as necessary, at selected perimeter locations near the Phase 2 project site (Site). The intent is to provide a practical approach to obtain data on concentrations of TSP (and CaO) at the boundary of the Site associated with activities occurring within and adjacent to the Sediment Processing Tent (SPT).

**Background**

A comprehensive system of highly-sensitive monitors encircles the Site at its boundaries to ensure that air quality standards are maintained and identify air quality issues regardless of which direction the wind is blowing. Additional information is provided by the use of handheld monitors to obtain location-specific information. To date the project has met all air quality guidelines established for the Site perimeter during dredging and processing in 2016 and 2017.

Because the dredged materials must be dried before being shipped off-site, lime is mixed in to dry it quicker. The lime used on site is a common form of CaO and can generate dust when handled. Dust is generated on an episodic basis at the Site, not a continuous basis. Operations run six days a week for no more than 15 hours per day.

The goal of the air monitoring plan for the Site is to have ongoing monitoring to ensure that no air quality levels are reached that could impact public or worker safety. Since lime dust is an irritant at some levels, several steps are taken to minimize fugitive lime dust emissions at the Site. These include using dust collectors inside the tent, air plenums

around the major door openings and ensuring doors on the tent are closed when the trucks are not being loaded, or barges are not being off-loaded.

On August 21, 2017 the state Department of Health Services (DOHS) issued a letter to Scott Hansen with a public health interpretation of air quality for the Site. In that letter DOHS recommended applying a Site perimeter air guideline for CaO at  $50 \mu\text{g}/\text{m}^3$  as a 24-hour average in addition to the  $\text{PM}_{10}$  and containments of concern (COC) monitoring already being performed at the perimeter. This request was made in response to visual observances of lime dust and steam leaving the SPT by the Agencies and several public comments from three primary sources: two residents and Our Lady of the Lake School (OLL).

CaO is a soluble alkaline dust. CaO is not considered to be carcinogenic. At sufficient concentrations, it can cause irritation. Studies have demonstrated that the most sensitive adverse health effect of CaO (i.e., the adverse effect that occurs at the lowest concentration) is irritation of the eyes, nasal passages, mucous membranes, and moist skin, and those reactions are not expected to occur unless levels of at least  $2,000 \mu\text{g}/\text{m}^3$  are reached (Cain et al., 2004, 2008). Major authoritative bodies that develop occupational exposure limits (OELs) for chemicals base their OEL for CaO on irritation effects (ACGIH, OSHA, NIOSH). These mild irritation effects are transient, reversible, and tolerable based on clinical studies (Cain et al., 2004, 2008). The initial effects at concentrations in the low 1000s of  $\mu\text{g}/\text{m}^3$ , serve as a warning, and are mild and transient.

The remainder of this memorandum details the proposed TSP and CaO program to be carried out at the Site.

## **Sampling and Analytical Procedure**

Air monitoring will be conducted during remedial activities to evaluate concentrations of TSP (and CaO) at three key locations surrounding the Site. This monitoring plan includes an integrated approach that combines real-time continuous monitoring for TSP with time-weighted average monitoring for CaO, as necessary, at three stationary locations surrounding the Site. Locations are as follows:

- ◆ AMP-01 – The air monitoring station located upslope of the corner of the former rail line and Ellis Avenue, on private residential property.
- ◆ AMP-02 – The air monitoring station located at the end of 2<sup>rd</sup> Avenue and close to OLL.
- ◆ AMP-03 – The air monitoring station located near the southeastern edge of the Site, near Prentice Avenue.

## **Total Suspended Particulate**

TSP monitoring will be performed using real-time air monitoring methodology. A real-time sampler will be located at each of the three fixed monitoring locations specified above. Each station will be equipped with continuous monitors to measure particulate matter as TSP. Samplers will operate at the same time as the  $\text{PM}_{10}$  samplers.

The particulate matter sampler will be a Met One E-Sampler continuous dust monitor. It is a direct reading real-time ambient dust monitor that utilizes light-scattering photometer (nephelometer) technology. The instrument operates on the principal that the concentration of dust measured by the unit is linearly proportional to the intensity of light scattered by airborne particles passing through the sensing chamber. This optical configuration produces optimal response to particles providing continuous measurement of airborne particles. The air flow rate is set at 2.0 liters per minute (lpm). While the unit can be set for different particle cut points, these units will be operated to assess all particle size ranges as TSP. It can measure concentrations ranging from 0 to 65,000  $\mu\text{g}/\text{m}^3$  (micrograms per cubic meter). This unit is designed to provide reliable data in the field to assess short-term concentrations against the recommended Alert or Action Levels. In addition, the system can be set up to operate on a communications package that allows data to be downloaded continuously into a data acquisition system. Calibration of the E-Sampler system will occur each day using procedures recommended by the equipment manufacturer.

Data from each unit will be summarized in 15-minute and 24-hour increments. Background data for ambient TSP levels in the Site vicinity are presently being researched, and may be applied in consideration of reviewing the TSP results. Included as Attachment 1 is a specification sheet for the E-Sampler.

### **Calcium Oxide**

Calcium oxide will be measured as total dust on a 47-millimeter (mm) 0.8 micron pore size mixed cellulose filter using a sampling pump set at 2 lpm. The sampling pumps will be set up at the same locations described above for TSP real-time monitoring to operate for 24-hour sampling intervals. Sample filters will be collected five days per week, representing operations from approximately Monday 7 a.m. to Saturday 7 a.m. As discussed below filters will only be sent in for CaO analysis if a TSP Alert Level is reached.

The sampling pump system will be integral to the Met One E-Sampler used for TSP sampling. While it is integral to the Met One E-Sampler unit, it operates completely separate from the real-time function. Given each of the air monitoring locations are already equipped with power, this set-up should be seamless. Attachment 1 includes the specifications for the CaO sampling capabilities of the Met One E-Sampler system.

Samples for potential CaO analysis will be collected daily at each of the three air monitoring stations. The filter samples will be held on-site pending results of data review from the real-time TSP monitors. Filter samples can generally be held for up to six months. As part of quality control, one blank filter sample will be submitted with each batch of filters for analysis.

Sampling personnel will use a field form to keep track of the total time the sampling pumps are operated at each sampling location. Sampling personnel will also need to verify flow through each sampling train using a rotameter before and after the sampling period to verify the flow stayed at the same rate throughout the time period.

All samples will be shipped to the laboratory using a Laboratory Test Request/Chain of Custody (COC) form. The laboratory that will be used for analysis is Analytics Corporation in Ashland, Virginia. Analytics has been accredited (#100531) by the American Industrial Hygiene Association Laboratory Accreditation Program, LLC (AIHA-LAP, LLC) since 1981. This laboratory is also accredited by the National Institute of Standards and Technology (formerly NBS). NSPW may also use Test America, which also has a location that can perform air quality analyses. It has also been accredited by AIHA-LAP, LLC.

Analysis of CaO as calcium will be performed by the Analytics Corporation using the National Institute for Occupational Safety and Health (NIOSH) Method 7300, which is used to analyze for a variety of metals and metalloids using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES). Results are expressed as total calcium. This method can detect CaO down to 2 micrograms. This method should be sufficient to detect concentrations of CaO well below the action level of  $50 \mu\text{g}/\text{m}^3$ . This laboratory will report results as CaO. If Test America is used, it will use NIOSH 7303, which is a slight variation on NIOSH 7300.

## **Alert and Action Levels and Responses**

### **Alert Level**

If real-time data indicate that concentrations of TSP exceeded  $50 \mu\text{g}/\text{m}^3$  over a 24-hour period at either AMP-01, AMP-02, or AMP-03, filter samples for CaO will then be submitted to the laboratory for analysis. If the  $50 \mu\text{g}/\text{m}^3$  for CaO was found to have been exceeded, operations from the day of the exceedance will be closely scrutinized, as described in Table 7-4 of the *Monitoring Plan* for PM<sub>10</sub> Alert Level to evaluate the likely cause of the exceedance and a follow-up report will be issued to the Agencies with corrective measures detailed.

### **Action Level**

Given that CaO is not likely to cause any irritation below  $2,000 \mu\text{g}/\text{m}^3$  to  $5,000 \mu\text{g}/\text{m}^3$ , and based on studies referenced above, NSPW believes that  $1,000 \mu\text{g}/\text{m}^3$  is an appropriate Action Level for the Site.

If real-time monitoring results record a level of  $1,000 \mu\text{g}/\text{m}^3$  for any 15-minute interval, and the trigger is attributable to Site activities (e.g., not a result of adjacent residential or other commercial activities) an Action Level will be considered to have been reached and sediment processing activities and load-out will be temporarily discontinued. The source of the Action Level will be thoroughly addressed and the Actions described in Table 7-4 of the *Monitoring Plan* for PM<sub>10</sub> Action Level will be followed prior to re-initiating work. After operations have been evaluated by FE JV and NSPW, and two consecutive 15-minute intervals have returned to less than  $500 \mu\text{g}/\text{m}^3$ , processing and load-out operations will be allowed to re-start. A follow-up report will be issued to the Agencies with corrective measures detailed.

**Attachment 1**  
**Specification for Met One E-Sampler**

# Specifications

## Specifications

Concentration Ranges (Auto-ranging)	0-0.5, 0-1, 0-10 0-65 mg/m <sup>3</sup>
Laser	670 nm, 5 mW
Sensitivity	0.001mg/m <sup>3</sup>
Sample Period	1 sec
Sample Flow Rate	2 LPM
Pump Type	Diaphragm 10,000 hr
Accuracy	8% of NIOSH 0600
Precision	0.003 mg/m <sup>3</sup> or 2% reading
Particle Size Sensitivity Range	0.1-100 micron
Long term Stability	5% reading
Sensor Type	Forward Light Scatter
Average Period	1 – 60 minutes
Display	4X20 LCD
Internal Battery (Optional)	12 VDC 12 Amp-Hr, lead acid
Power Consumption	350mA (no heater) 1.1 A (w/heater)
Internal Battery Operation, no heater	>30 Hours
with heater	10 Hours
Battery Type	Lead Acid
Size	10.5 (267) X 9.25 (235) X 5.7 (145) inches (mm)
MOI Service Period	2 yrs
Programmable Auto-Zero	15min to 24 hours
Programmable Auto-Span	15min to 24 hours
Traceable Testing	Gravimetric
Sample Line Heater	Configurable RH Controlled
Outputs	Analog 0-1,0-2.5, 0-5VDC, RS232
Data Storage Capacity	12000 Records
Temperature Compensation	Standard
Temperature Range	-10 deg to 50 deg C
RH Measurement	Internal
Ambient Temperature	-30 deg to 50 deg C
Ambient Pressure	1040 to 600 mbars
Alarm	Contact Closure
Available Cut Points	TSP, PM10, PM2.5, PM1



## Standard Equipment

Universal Voltage Power Supply  
Battery Charger Internal  
**47 mm Filter Holder**  
Comet Software  
TSP Inlet  
Inlet Heater  
Digital Output Cable  
Instruction Manual

## Options

PM10, PM2.5, PM1 Sharp-Cut Cyclone  
Extra 47 mm Filter Holders  
Aluminum Tripod  
MicroMet Software  
Radio Modem  
Phone Modem  
Satellite  
Wind Speed/Direction Sensor  
Ambient RH  
External Battery Cable  
Battery

# E-SAMPLER™



## The New Standard in Real-Time Aerosol Monitoring

The E-SAMPLER is the most feature-packed light-scatter Aerosol Monitor available. Whatever your monitoring needs, the E-sampler will provide accurate, dependable and relevant data.

## Features

- Programmable Auto-Zero
- Programmable Auto-Span
- Auto-ranging (1 to 65000  $\mu\text{m}/\text{m}^3$ )
- Automatic Flow Control Protocol
- Internal Battery (30 Hours Operation without heater & 10 Hours with heater.)
- Laser-Diode Precise Optical Engine
- Integral 47mm Analysis Filter
- Ambient Pressure and Temperature
- Internal Datalogger
- PM<sub>10</sub>, PM<sub>2.5</sub>, PM<sub>1</sub>, TSP Monitoring
- Aluminum Weatherproof Enclosure
- Sheath-Air protected Optics
- Completely Self-Contained
- No Tools Filter Replacement

## Applications

- Ambient Air Monitoring
- Remediation Site Perimeter Monitoring
- Indoor Air Quality Monitoring
- Source Monitoring
- Visibility Monitoring
- Mobile Monitoring



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Met One Instruments, Inc.

# E-SAMPLER

## Dual Technology

The E-SAMPLER is a dual technology instrument that combines the unequalled real-time measurement of light scatter with the accuracy standard of filter methods. The simple filter loading process testifies to the seamless blending of both technologies. Filters can be extracted and replaced in less than one minute and filter medium can be selected based on laboratory analysis. Particulate loading on the filter does not reduce performance due to the Met One actual flow control protocol. Ambient temperature and pressure are measured and actual flow is calculated and controlled by the E-SAMPLER microprocessor independent of filter loading change.

## Principle

The E-SAMPLER provides real-time particulate measurement through near-forward light scattering. An internal rotary vane pump draws air at 2 LPM into the sensing chamber where it passes through visible laser light. Aerosols in the air scatter light in proportion to the particulate load in the air. Scattered light is collected by precise glass optics and focused on a PIN diode. Rugged state of the art electronics measure the intensity of the focused light and output a signal to the CPU. The output is linear to concentrations greater than 65,000 ug/m<sup>3</sup>. Every E-SAMPLER is factory

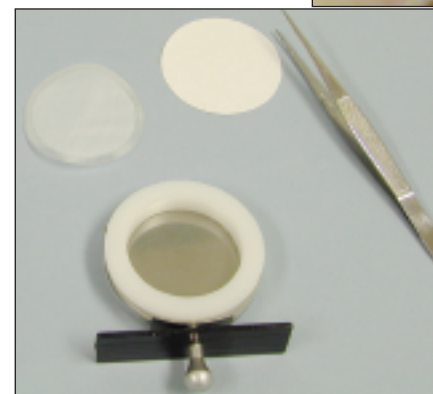
calibrated using polystyrene latex spheres of known index of refraction and diameter at multiple points to validate linearity.

## Maintenance

Each E-SAMPLER has two internal filters (not the 47mm Analysis Filter) to protect sensitive optics and prevent damage to the flow components. Both filters are accessible from



the front panel. Coin slots enable these filters to be removed and checked or replaced without any tools. Filter life for both will exceed 1 year in the harshest of conditions. All E-SAMPLERS have sheath air from the internal filters that continually curtain the optics. This sheath air protection allows the E-SAMPLER to



aerosol



monitoring

be used in adverse environments without performance degradation. Even in harsh conditions the E-SAMPLER will operate to specifications for 2 years without need of recalibration.

## Operation

The E-SAMPLER is rugged, portable and easy to use. The all aluminum enclosure is not only rugged but provides electronic stability by filtering potential RF interference. Set-up is a snap with the quick connect system which works with the EX-905 tripod. For other mounting applications, holes are provided to fasten to any structure. Simply turning the monitor on will start a sample using the most recent parameters. The unit will continue to operate until user intervention or battery failure. Auto-Zero and Auto-Span ensure that the data collected will be of the highest quality. Both Zero and Span can be operated manually or individu-



reporting tool. This software supports modem, radio, direct connection and generates summary reports as well as recordings and charts. Comet software included which provides easy to use terminal access to E-Sampler data.

ally programmed at varying time bases (15 minutes to 24 hours). The E-SAMPLER can also be configured for start/stop times, recording periods, averaging time and other parameters.

## Data Collection and Software

Optional MicroMet Plus is a complete communications, data collection and data

