Rose & Westra
A Division of GZA

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

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AIR MONITORING PLAN – CONSTRUCTION PHASE

House Street Property
1855 House Street NE
Belmont, Plainfield Township, Michigan

September 14, 2023
File No. 16.0062961.83

PREPARED FOR:
Wolverine World Wide, Inc.
Rockford, Michigan

Rose & Westra, A Division of GZA GeoEnvironmental, Inc.
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Submitted Via Email Only

September 14, 2023
File No. 16.0062961.83

Mr. Dave Latchana
Associate General Counsel
Wolverine World Wide Inc.
9341 Courtland Drive, NE
Rockford, Michigan 49351

Re: Air Monitoring Plan, Final Remedy Construction Activities
House Street Property, 1855 House Street NE
Belmont, Plainfield Township, Michigan

Dear Mr. Latchana:

On behalf of Wolverine World Wide, Inc. (Wolverine), Rose & Westra, a Division of GZA GeoEnvironmental, Inc. (R&W/GZA), has prepared this Air Monitoring Plan for Final Remedy construction activities at the House Street Property located at 1855 House Street, Belmont, Plainfield Township, Michigan. This Plan was prepared to supplement the Work Plan for the Final Remedy cap design identified in Paragraph 7.8 of Consent Decree No. 1:18-cv-00039-JTN-SJB, effective February 19, 2020.

Very truly yours,

Rose & Westra, a Division of GZA GeoEnvironmental, Inc.

Kate McDonald
Senior Project Manager

Loretta J. Powers, CHMM
Associate Principal

Ernest Hanna, P.E.
Senior Principal

Attachment

\\GZAGR1\Jobs\62000\629xx\62961.xx - WWW RAP-WP\62961.83 - House Street Pre-Construction Related Services\Air Monitoring Plan\62961.83 - Air Monitoring Plan_Construction.docx

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APPENDICES

Acronym	Definition
6:2 FTS	6:2 Fluorotelomer Sulfonate
AMP	Air Monitoring Plan
AQD	Air Quality Division
EGLE	Department of Environment, Great Lakes, and Energy
EPA	U.S. Environmental Protection Agency
HASP	Health and Safety Plan
HSP	House Street Property
NIOSH	National Institute for Occupational Safety and Health
OBZ	Observer's Breathing Zone
OSHA	Occupational Safety and Health Administration
PALs	Project Action Levels
PEL	Permissible Exposure Limits
PFAS	Perfluoroalkyl Substances
PFOA	Perfluoro-n-octanoic acid
PFOS	Perfluorooctanesulfonic acid
PID	Photoionization Detector
PM	Project Manager
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limits
R&W/GZA	Rose & Westra, a Division of GZA GeoEnvironmental, Inc.
Site	Former Wolverine Tannery, Rockford, Michigan
STRLs	Short-Term Response Levels
1,1,1-TCA	1,1,1-Trichloroethane
VOCs	Volatile Organic Compounds
Wolverine	Wolverine World Wide, Inc.
WP	Work Plan

1.0 INTRODUCTION

On behalf of Wolverine, R&W/GZA prepared this AMP for construction activities at the HSP at 1855 House Street NE, Belmont, Plainfield Township, Kent County, Michigan as provided in the WP for the Final Remedy cap design identified in Paragraph 7.8 of Consent Decree No. 1:18-cv-00039-JTN-SJB, effective February 19, 2020.

2.0 BACKGROUND

R&W/GZA conducted investigations in 2018 and 2019, the results of which are summarized in the reports titled *Implementation of 2018 Work Plan Summary Report* dated May 21, 2019 (2019 Report) and *Implementation of 2019 Work Plan - Summary Report* dated March 31, 2021 (2021 Report).

As a result of the findings from the 2018 and 2019 investigations, Final Remedy construction activities have been approved at the HSP. Fence line and personnel air monitoring are proposed at the HSP during Final Remedy construction activities while impacted subsurface materials are being excavated or relocated. The following sections describe the objectives, compound selection, and air monitoring methodology during Final Remedy construction activities to be performed at the HSP.

3.0 PROJECT OBJECTIVE

The overall project objective is to monitor and minimize risk of exposure of on-site personnel and off-site receptors to target constituents (metals, PFAS, VOCs, and dust) before and during Final Remedy construction activities at the HSP. The following sections summarize the objectives for each monitoring type and the Data Quality Objectives. The alert levels and associated responses are presented in **Section 8.0**.

3.1 PERSONNEL AIR MONITORING OBJECTIVES

Personnel air quality monitoring will only be performed at the excavation point in the breathing zone of R&W/GZA personnel who are observing the work (i.e., OBZ) before and during Final Remedy construction activities in which impacted subsurface materials (e.g., waste, waste mixed with soil, and soil that has contacted waste) are excavated or relocated. The Final Remedy Construction Contractor (Contractor) is responsible for their own personnel air monitoring. Hereafter, personnel air monitoring will refer to OBZ monitoring for R&W/GZA personnel.

The personnel air monitoring system is designed to:

- Establish background levels of target compounds in ambient air prior to Contractor mobilization;
- Monitor and document OBZ air levels of target compounds during Final Remedy construction activities;
- Use real-time OBZ monitoring results to meet the air monitoring requirements in the site-specific HASP; and
- Evaluate ongoing effectiveness of and need for additional vapor and/or dust suppression controls and/or alteration of work activities, to reduce airborne compounds to below acceptable risk levels.

Locations of personnel monitoring devices will vary based on the locations of excavation activities. Details on the OBZ monitoring are provided in the HASP.

3.2 FENCE LINE AIR MONITORING OBJECTIVES

Fence-line air monitoring will be performed before and during Final Remedy construction activities. Monitoring equipment will be situated at upwind and downwind locations along the fence-line. The fence-line air monitoring system is designed to:

- Establish background levels of target compounds in ambient air prior to Contractor mobilization;
- Monitor and document fence line ambient air levels of target compounds during Final Remedy construction activities;
- As a notification system to prevent off-site migration of airborne contaminants at concentrations above the PALs (refer to **Section 4.0**) by responding to exceedances of STRLs to ensure longer-term airborne concentrations at the fence line are below the PALs; and,
- Evaluate ongoing effectiveness of, and need for, additional vapor and/or dust suppression controls and/or alteration of work activities, to reduce airborne concentrations to below PALs.

Proposed fence-line monitoring locations are provided on **Figure 1**. Monitoring locations may be adjusted throughout the project depending on the locations of work being performed.

4.0 SELECTION OF TARGET COMPOUNDS, PROJECT ACTION LEVELS, AND SHORT-TERM RESPONSE LEVELS

R&W/GZA evaluated soil gas, soil, and waste material data that were previously collected using EPA methods during sub-surface activities at the HSP. The selection of target compounds was based on the individual compound concentrations, published inhalation toxicity information presented in the literature, and exposure standards promulgated by governmental agencies including EGLE AQD standards for PFOA, PFOS, and 6:2 FTS (collectively hereafter referred to as "PFAS"). R&W/GZA considered the constituents that exceeded one or more screening values in soil samples collected at the HSP during the 2018 and 2019 investigations. The constituent groups that exceeded screening values in HSP soil and waste were VOCs (including 1,1,1-TCA in waste material), metals (RCRA 8 metals and vanadium), and PFAS (specifically PFOS).

Based on the foregoing, PFAS, VOCs, and the RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) and vanadium were selected as the target constituents for the HSP. Due to the lack of direct measurement equipment for airborne metals and PFAS, total respirable particulates ("dust") will be used as a surrogate for RCRA 8 metals, vanadium, and PFAS. R&W/GZA used the maximum concentration detected in soil or waste at the HSP of each constituent with an occupational exposure limit [i.e., OSHA PEL, NIOSH REL, American Conference of Governmental Industrial Hygienists Threshold Limit Values®, or German Occupational Health Standards to calculate the maximum exposure concentration as the OSHA PEL for dust. For each of the target metals and PFAS, the OSHA PEL for dust was more restrictive than the maximum exposure concentration for the constituent alone. Therefore, in R&W/GZA's opinion, the OSHA PEL for dust is sufficiently protective of human health to serve as a surrogate for metals and PFAS in air. VOCs will be measured using a PID as described in **Section 6.0** below.

The fence-line air monitoring STRLs is set at a conservative 10 percent of the personnel response level for VOCs and 33 percent of the personnel response level for dust. The STRLs have been developed to provide proactive information to inform implementation of controls to protect both on-site personnel and off-site receptors from adverse health impacts from VOCs and dust. PALs were derived so as not to exceed acute- or sub-chronic exposure

levels that are associated with known health effects. Derivation of the PALs are provided in **Appendix A**, and OBZ Action Levels are presented in Table 3 of the HASP.

The fence-line (i.e., ambient air) STRLs are based on a 15-minute duration, and the PALs are a 24-hour average concentration. The National Ambient Air Quality Standard for PM10 particulate (150 micrograms per cubic meter as a 24-hour average concentration) was selected as the PALs for dust on this project. PFOS was the PFAS constituent with the highest detected concentrations in soil. GZA selected the maximum PFOS value detected in the materials to be disturbed on the HSP and used an 8-hour occupational health standard of 10 micrograms per cubic meter (ug/m^3) to calculate a dust concentration of 230 µg/m^3. Therefore, the PALs for dust (150 µg/m^3 as a 24-hour average concentration) and the STRLs (150 µg/m3 as a 15-minute average concentration) at the fence line is sufficiently protective of potential airborne concentrations of PFAS and metals.

Table 1 summarizes the selected STRLs to be used for the real-time monitoring system. These action levels may be adjusted as more background information becomes available. Derivation of the response levels are provided in **Appendix A.**

TABLE 1. STRLS

Monitoring Location	Compound	STRLs	Duration of Reading
OBZ	Total VOCs as measured on PID	5 ppm	5 minutes
Fence Line	Total VOCs as measured on PID	0.5 ppm	15 minutes
OBZ	Total Dust (PM10)	500 µg/m^3	5 minutes
Fence Line	Total Dust (PM10)	150 µg/m^3	15 minutes

Table 2 provides the PALs for the HSP.

TABLE 2. PALS

Monitoring Location	Compound	PALs	Duration of Reading
Fence Line	Total VOCs as measured on PID	350 ppm	8-hour TWA
Fence Line	Total Dust (PM10)	150 µg/m^3	24-hour Average

5.0 AIR MONITORING STRATEGY

The environmental monitoring required for the HSP will be conducted using the AirLogics perimeter air monitoring system. The primary advantage of real time measurements over traditional methods of manually collecting samples is the immediate availability of the data for proactive intervention by Site staff in controlling potential off-site migration of Site-related dust or vapors. The fence-line air monitoring system is intended to provide early identification of air quality readings which are elevated but not above the PALs so that mitigation and control measures can be implemented to protect public health in the vicinity of the HSP. The air monitoring system is designed to provide essentially real time feedback to implement control measures for dust, if necessary.

6.0 REAL-TIME AIR MONITORING

The fence-line air monitoring systems incorporate an automated notification system in the form of visual and text message alarms via cellphone to quickly identify conditions where Site-related dust or vapors may be approaching the STRLs. The notification allows for prompt control measure implementation to maintain airborne concentrations below the PALs at the fence lines. The real-time air monitoring system includes the instrumentation of four separate sampling locations along the HSP fence line.

6.1 MONITORING SYSTEM

The personnel air monitoring system is summarized in **Section 7.0** and is designed to measure respirable particulate matter as a surrogate for target constituents using continuous respirable particle monitors. Real-time methods for monitoring particle-bound metals and PFAS does not exist; therefore, particle levels will be used as a surrogate for metals and PFAS as described in **Section 4.0**.

The automated fence-line air monitoring system consists of the following five basic components: (1) PID, total VOC monitors; (2) dust monitors, (3) meteorological system, (4) computer control system, and (5) alarm system. Each of these system components is described in the following sections. Equipment Specifications are provided in **Appendix B**.

6.1.1 PID

VOC concentrations at the fence line are measured utilizing MiniRAE 3000 PIDs (or equivalent) with a 10.6 eV lamp. The PIDs measure ionizable VOCs by passing the air sample past an analytical detector and electronically measuring the resulting response. The PIDs are configured to respond to total VOCs without differentiation of individual compound concentrations. The limit of detection is 10 parts per billion by volume. The PID will be operated in accordance with manufacturer's specifications and following the calibration and correction guidelines provided in **Appendix B**.

Since one of the target VOCs is 1,1,1-TCA, an 11.7 eV lamp is required to detect this constituent. The continuous fence-line units will not accommodate a 11.7 eV lamp; therefore, a hand-held MiniRAE 3000 PID with an 11.7 eV lamp will be used when the Contractor is excavating waste material in the south-central portion of the HSP where 1,1,1-TCA was previously detected. Refer to **Section 6.2** for additional information.

6.1.2 Dust Monitors

Direct reading, real-time TSI 8530 DUSTRAK meters, or equivalent, will be used to monitor for dust in the upwind and downwind locations. The measurement of dust levels is accomplished using infrared electromagnetic radiation to sense airborne particles. The dust meter will be configured to respond to dust particles < 10 micron in diameter (PM10). The DustTrak will collect one sample every minute and an average sample over 15 minutes will be utilized to compare to the STRLs and PALs.

6.1.3 Meteorological System

An on-site meteorological tower will be utilized to differentiate between upwind and downwind sample locations. The meteorological system consists of a wind speed and direction, temperature, and relative humidity sensors mounted on a portable meteorological tower co-located with one of the air monitoring stations. The wind meteorological data is continuously recorded.

Each air monitoring station has a corresponding range of wind direction which identifies when winds are blowing from the HSP activities toward that sampling location.

6.1.4 Computer Control System

Data generated by the air monitoring stations, meteorological station, as well as operational parameters (i.e., status of the telemetry system, the solar charging system, battery voltage, and alarm), is continuously uploaded via radio telemetry links to a central computer system in the operations trailer. The central computer system

communicates with each perimeter monitoring station every minute to obtain the latest data values from the individual sensors. The data are then displayed on the central computer screen, and stored in a database along with the meteorological data and other operational status information. The monitoring data is automatically archived and used to print out summary graphs at the end of each day.

6.1.5 Alarm System

The system allows for the programming of two alarm levels (yellow warning and red alert). If pre-programmed STRLs for total VOCs or particulates are exceeded, the system initiates both visual and electronic alarm notifications to HSP managers. The alarms are visually displayed on the central computer screen in the on-site trailer and are electronically sent via text message or email to assigned individuals' cellphones. The alarm notification system is active 24 hours per day. The monitoring data is automatically archived and used to print out summary graphs at the end of each workday.

The alarm will activate if the STRLs are exceeded. Final Remedy construction activities will be altered if the target compounds exceed their STRLs.

The system is equipped with a pager module that notifies the technician operating the system if a STRL or PAL is triggered overnight or off hours.

6.2 MONITORING SYSTEM OPERATION

During Final Remedy construction activities, the systems' internal sensors will provide continuous air quality measurements at the four sampling locations and compare the measurements to the background concentrations collected prior to Contractor mobilization. The system compares the measurements to the STRLs in near real-time. If a STRL is exceeded, a visual alarm is illuminated and a notification is provided via text message (refer to **Section** 8.0 for the notification list). In the event of an alarm condition, the HSP manager will identify the source and initiate the controls to mitigate the emissions within 30 minutes. The goal is to operate the real time monitoring system 24 hours/day – 7 days/week. Therefore, the system will provide data on an essentially continuous basis for the duration of the project. In addition to providing data during work activities (i.e., conventional practice), this system will provide data continuously including evenings, weekends and holidays when no work is being conducted.

Since the automated PID units are not fitted with 11.7 eV lamps, R&W/GZA personnel will use handheld MiniRAE 3000 PIDs with 11.7 eV lamps to monitor the OBZ at a minimum of every 30 minutes while the Contractor is excavating or moving waste and will collect readings at the fence line at a minimum of once every 2 hours. If the STRL of 5 ppm is exceeded for 5 minutes in the OBZ, then the monitoring personnel will notify the Construction Lead and Contractor Foreman who will be responsible for implementing responses outlined in **Section 9.0**. The monitoring personnel will then collect measurements at each of the fence-line monitoring locations using the MiniRAE 3000 PID with the 11.7 eV lamp and document the results. The data will be collected from the downwind station in the closest proximity to the work area first. If the STRL is exceeded at the fence line, personnel will notify the Construction Lead and responses will follow the procedures outlined in **Section 9.0**.

6.3 BASELINE (PRE-FINAL REMEDY CONSTRUCTION) MONITORING

Prior to the initiation of Final Remedy construction activities, baseline monitoring will be performed to quantify "background" levels of the selected constituents using the automated system. Background sampling will be performed during the week, at a minimum, preceding the planned Final Remedy construction activities at the HSP.

6.4 FINAL REMEDY EQUIPMENT CALIBRATION

System operation requires a full-time technician for the routine inspection and testing of the system. The technician is responsible for routine evaluation of the equipment, operation, replacement of expendable supplies, and testing the system performance. The operator's daily responsibilities include calibration of sensors, daily maintenance of system components, troubleshooting as needed, communications with the R&W/GZA Construction Lead regarding alerts, and documentation of alarms.

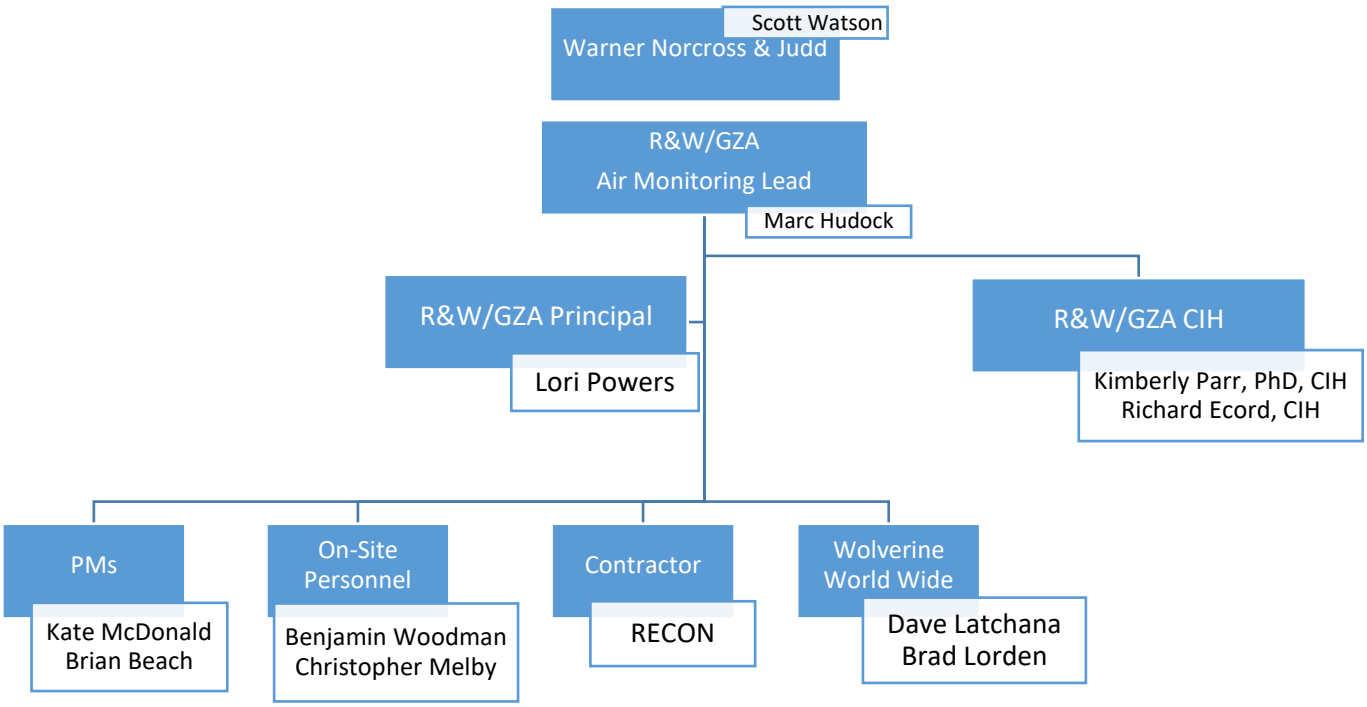
The system calibration is tested through routine calibration checks and designed to provide for daily equipment calibrations to test for calibration drift. Meteorological system maintenance and calibrations are conducted annually.

Equipment calibration will be performed in accordance with the manufacturers' instructions. Field checks, calibration, and zeroing using the appropriate reference standards must be made on-site at the minimum frequency specified in the operation manual. A daily log of all instrument readings, as well as all field reference checks and calibration information will be maintained.

Spare monitoring instrumentation (i.e., hand-held PIDs with an 11.7 eV lamp and a TSI 8530 DUSTRAK meter, or equivalent) will be on-Site and available for use in the event of air monitoring station failure. If monitoring or sampling equipment is determined not to be in proper working order, it will be removed from service, replaced with other equipment and sent to the appropriate manufacturer or supplier for service and calibration.

7.0 COMMUNICATIONS

The following flow chart depicts the communications chain for responding to an actionable level.



Contact List			
Name	**Role**	**Cellular No.**	**Company Office**
Loretta Powers	Associate Principal	To be posted on-Site	Grand Rapids, MI
Kate McDonald	Senior PM		Portland, ME
Benjamin Woodman	Construction Lead		Portland, ME
Christopher Melby	Field Team Lead		Grand Rapids, MI
Chris Sargent	Contractor		Houston, TX
Rick Ecord	EHS Director		Providence, RI
Dave Latchana	Wolverine		Rockford, MI
Brad Lorden	Wolverine		Rockford, MI
Scott Watson	WN&J		Grand Rapids, MI

If a STRL is exceeded, triggering a yellow or red alert, the AirLogics system operator will notify the first individuals for each company/agency listed above. If the primary contact is not available then, the AirLogics System operator will contact the second contacts for each company/agency as appropriate. If corrective actions are required to respond to the red alert condition, R&W/GZA field representatives are responsible for notifying the on-site Contractor Superintendent or designated staff person. R&W/GZA will be responsible for confirming that the Contractor's corrective actions are sufficient to bring the particulate and/or VOC levels below the Short-Term Response Level. A summary of potential responses to the Short-Term Response Level exceedances is presented in the following section.

8.0 SUMMARY OF ACTION LEVELS AND RESPONSES

The following table presents the readings and associated responses for the Site-specific air-monitoring plan at the fence line.

Alert Level	Reading	Potential Response Action(s)
Green	PM10 particulates < 150 µg/m^3 Total VOCS < 0.5 ppm	1. None – continue monitoring
Yellow	PM10 particulates > 150 µg/m^3 Total VOCS > 0.5 ppm	1. Confirm particulate exceedances are downwind of work area and are from HSP activities. 2. If particulates are attributable to HSP activities, take the following actions as appropriate: • Use water or other material to mist exposed surface materials and/or roadways to suppress windblown dust in accordance with the Contractor's fugitive dust plan. • Cover areas of exposed impacted soils or open stockpiles of impacted soils that are not being worked with tarpaulins, vapor suppressing foam, or equivalent in accordance with the Contractor's fugitive dust plan. • Slow the pace of the Final Remedy construction activities. • Change the process or equipment to alternatives that minimize air emissions.
Red	PM10 particulates > 150 µg/m^3 for more than 15 minutes Total VOCS > 0.5 ppm for more than 15 minutes	1. Apply yellow alert controls. 2. Cease activities if action level exceedances not resolved. 3. Re-initiate Final Remedy construction activities after reaching concurrence between R&W/GZA personnel (including PM, and Industrial Hygienist) and the Contractor.

9.0 REFERENCES

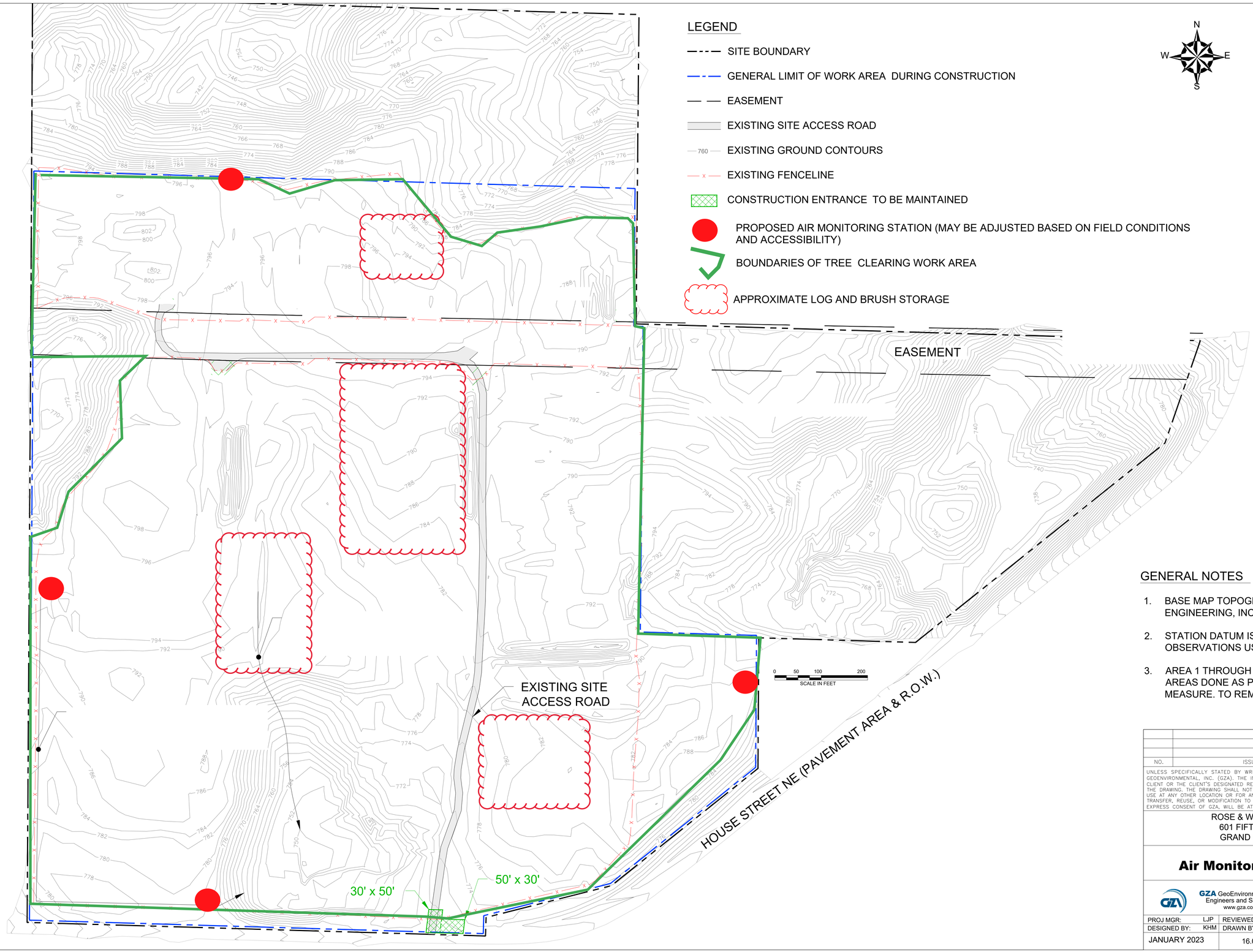
R&W/GZA. 2023. *Health and Safety Plan, House Street Property*.

R&W/GZA. 2022. *Revised Work Plan – Final Remedy, Wolverine World Wide, Inc. – House Street Property, Plainfield Township, Kent County, Michigan*. Submitted to EGLE December 2, 2022.

R&W/GZA. 2019. *Implementation of 2018 Work Plan Summary Report* dated May 21, 2019.

R&W/GZA. 2021. *Implementation of 2019 Work Plan - Summary Report* dated March 31, 2021.

FIGURE



GENERAL NOTES

1. BASE MAP TOPOGRAPHY PROVIDED BY EXXEL ENGINEERING, INC DATED OCTOBER 6, 2020.
2. STATION DATUM IS NAVD88, BASED ON GPS OBSERVATIONS USING MDOT CORS.
3. AREA 1 THROUGH AREA 5 ARE LIMITED CAPPED AREAS DONE AS PART OF AN INTERIM REMEDIAL MEASURE. TO REMAIN AND BE CAPPED OVER.

NO.	ISSUE/DESCRIPTION	BY	DATE

ROSE & WESTRA, A DIVISION OF GZA
601 FIFTH STREET NW, SUITE 102
GRAND RAPIDS, MICHIGAN 49504

Air Monitoring During Construction

GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

WN&J/WWW

PROJ MGR: LJP	REVIEWED BY: LJP	CHECKED BY: JC	FIGURE
DESIGNED BY: KHM	DRAWN BY: TAK	SCALE: AS SHOWN	1
JANUARY 2023	16.0062961.82		

APPENDIX A

PROJECT ACTION LEVEL CALCULATIONS

ARSENIC ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 80.8 mg/kg

Exposure Limit (EL): 0.01 mg/m^3 (OSHA PEL for inorganic arsenic)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**61.9**	**mg/m3**	**OR**	**61881** **ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5** **mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1 being

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

BARIUM ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 140 mg/kg

Exposure Limit (EL): 0.5 mg/m^3 (OSHA action level for soluble barium)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**1786**	**mg/m3**	**OR**	**1785714**	**ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5**	**mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

TOTAL CHROMIUM ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 11000 mg/kg

Exposure Limit (EL): 0.5 mg/m^3 (OSHA PEL for chromium metal and insoluble salts)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**2**	**mg/m3**	**OR**	**2273** **ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5** **mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

LEAD ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 460 mg/kg

Exposure Limit (EL): 0.05 mg/m^3 (OSHA PEL for inorganic lead)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**54**	**mg/m3**	**OR**	**54348**	**ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5**	**mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

MERCURY ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 180 mg/kg

Exposure Limit (EL): 0.025 mg/m^3 (OSHA PEL for mercury, acceptable ceiling concentration)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**69**	**mg/m3**	**OR**	**69444** **ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5** **mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

SELENIUM ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^{6}\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^{3})}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 7 mg/kg

Exposure Limit (EL): 0.2 mg/m^3 (OSHA PEL for inorganic lead, 8 hour TWA OR exposure limit being used)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**14286**	**mg/m3**	**OR**	**14285714** **ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5** **mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1 being

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

VANDADIUM ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^{6}\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^{3})}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 110 mg/kg

Exposure Limit (EL): 0.05 mg/m^3 OSHA PEL for V2O5. NIOSH REL is 10x PEL

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**227**	**mg/m3**	**OR**	**227273** **ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5** **mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1 being

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

ZINC ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 6500 mg/kg

Exposure Limit (EL): 5 mg/m^3

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**385**	**mg/m3**	**OR**	**384615**	**ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5**	**mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1 being

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

6:2 FTS ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 0.11 mg/kg (Maximum Concentration detected in material to be disturbed onsite)

Exposure Limit (EL): 0.001 mg/m^3 (Michigan AQD Health Based Screening Levels)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**4545.5**	**mg/m3**	**OR**	**4545455**	**ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5**	**mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1 being

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

PFOA ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 1.7 mg/kg (Maximum Concentration detected in material to be disturbed onsite)

Exposure Limit (EL): 0.005 mg/m^3 (German Occ Health Standard, referenced by EGLE in 2018)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**1470.6**	**mg/m3**	**OR**	**1470588**	**ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5**	**mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1 being

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

PFOS ACTION LEVEL CALCULATIONS FOR DUST METER
Wolverine House Street Property

$$ELs = \frac{(10^6\ mg\ /\ kg)\ /(SF)}{conc\ (mg\ /\ kg)\ /\ EL\ (mg\ /\ m^3)}$$

Conversion Factor: 1,000,000 10^6 mg/kg

SF (Safety Factor): 2 Unitless

Soil Contaminant Concentration (conc): 220 mg/kg (Maximum Concentration detected in material to be disturbed onsite)

Exposure Limit (EL): 0.01 mg/m^3 (German Occ Health Standard, referenced by EGLE in 2018)

Concentration displayed on dust monitor of total dust in air at which the contaminant of concern would be at its established exposure limit (ELs):	**22.727**	**mg/m3**	**OR**	**22727**	**ug/m3**
The OSHA Permissible Exposure Limit for particulates not otherwise classified (PNOC). If the dust monitor displays a value greater than these listed, respiratory protection should be used.	**15**	**mg/m^3 TOTAL**	**OR**	**5**	**mg/m^3 RESPIRABLE**

Safety Factor (SF) is a unitless quantity used to account for your degree of confidence in the following factors (1 being

1. The concentration of the contaminant in the airborne dust is the same as the average soil concentration.

2. The soil concentration data depicts a representative or worst case.

3. The monitoring instrument used accurately reports the concentration of dust in the air (respirable dust monitors typically under report the concentration of total dust-in-air).

APPENDIX B

EQUIPMENT MANUALS

TO BE KEPT ON FILE IN THE SITE TRAILER

APPENDIX C

AIRLOGICS SYSTEM EQUIPMENT SPECIFICATIONS

AQS 1

Specification Sheet

Near reference real-time monitor for particulates plus O_3/NO_2/CO/VOC

Designed for environmental professionals who need to monitor and manage specific outdoor dust and particulates, and gases continuously and in real- time.

The AQS 1 delivers affordable and defensible measurement of PM_{10}, $PM_{2.5}$, PM_1, TSP, and up to three gases, O_3, NO_2, CO, H_2S and VOC, all simultaneously.

MCERTS certified for PM_{10} by the UK Environment Agency.

What is it?

- Reduce failure and downtime thanks to this robust purpose-built outdoor monitor for dust and gaseous pollutants
- Industry-leading gas sensing technology from Aeroqual comes fully integrated in the same compact format
- Reduce site visits using two-way communications – remotely troubleshoot, upgrade software, change settings, and calibrate
- Plug in all your devices – noise, weather, reference monitors – to the AQS 1 power and data interface and view data in one software dashboard
- Power up with quick and easy interface to solar and battery systems
- Respond in real-time via configurable email / SMS alerts

What can it measure?

- Specific dust fractions, wind, weather and noise

Who is it for?

- Industrial operators who need to manage dust and particulates from site activities, within regulatory or permitted limits:
  - Construction and remediation
  - Oil and gas facilities
  - Quarry and mine operators
  - Port and bulk handling terminals
  - Waste management sites
- Environmental consultants who want defensible data without the usual time and hassle of air monitoring projects
- Regulatory authorities who need to fill the gaps in the regulatory PM monitoring network
- EHS managers who need to demonstrate that they are providing a safe environment for the people in their care
- Researchers who want to collect accurate, scientifically robust data without the cost of a reference PM monitor

T: +64 9 623 3013 **F:** +64 9 623 3012 **E:** sales@aeroqual.com **W:** aeroqual.com

Specifications | AQS 1

Particle module	Sizes	Range	Accuracy	Resolution	Lower Detectable Limit (2σ)
Nephelometer	PM_1, $PM_{2.5}$, PM_{10} OR TSP	0 to 60,000 µg/m³	±(2 µg/m³ + 5% of reading)	0.1 µg/m³	1 µg/m³
Profiler (Optical Particle Counter)	PM_1, $PM_{2.5}$, PM_{10} AND TSP	PM_1 200 µg/m³ $PM_{2.5}$ 2000 µg/m³ PM_{10} 5000 µg/m³ TSP 5000 µg/m³	±(5 µg/m³ + 15% of reading)	0.1 µg/m³	1 µg/m³
	Optional Particulate Counts: 0.3, 0.5, 0.7, 1.0, 2.0, 3.0, 5.0, 10 microns (counts range: 0-100,000 counts/L)				

Gas module	Range	Resolution	Noise Zero; Span % of reading	Lower Detection Limit (2σ)	Precision	Linearity (% of FS)	Drift 24 hour Zero; Span % of FS
Ozone O_3	0-500 ppb	0.1 ppb	1 ppb; 1%	1 ppb	2% of reading or 2 ppb	1.5%	1 ppb; 0.2%
Nitrogen dioxide NO_2	0-500 ppb	0.1 ppb	1; 1%	1 ppb	2% of reading or 2 ppb	1%	2 ppb; 1%
Carbon Monoxide CO	0-25 ppm	0.001 ppm	0.02 ppm; 1%	0.04 ppm	3% of reading or 0.05 ppm	1%	0.14 ppm; 2%
VOC (Low range)	0-500 ppb	0.1 ppb	1 ppb; 1%	1 ppb	2% of reading or 1 ppb	1%	1 ppb; 1%
VOC (High range)	0-30 ppm	0.01 ppm	0.1 ppm; 1%	0.05 ppm	2% of reading or 0.05 ppm	2%	0.1 ppm; 1%
Hydrogen Sulfide H_2S	0-10,000 ppb	0.1 ppb	1 ppn; 0.1%	2 ppb	1% of reading or 3 ppb	0.5%	1 ppb; 0.5%

System specifications	
Control system	Embedded fanless PC (Intel Celeron® N3350, 1.6GHz, dual core, 4GB RAM, 32GB SSD hard drive), Ubuntu Linux Operating System
Communications[1]	Standard: WIFI, Ethernet (LAN) Optional modem: Cellular IP 4G LTE
Software	**Aeroqual Cloud** – Choose a plan that is right for you **Optimize**: Reduce site visits and improve data quality by managing your monitors and optimizing network performance remotely. **Plus**: Stay one step ahead with enhanced features for viewing and sharing data, real-time alerts, and analysis. Talk to our sales team to learn more about Aeroqual Cloud plans.
Data logging	32 GB Hard Drive (> 5 years data storage)
Averaging period	1 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 hr, 2 hr, 4 hr, 8 hr, 12 hr, 24 hr
Power requirements[2]	100-260 VAC (standard): 31.3 W Regulated 12 VDC (if required): 34.3 W
Enclosure	Lockable IP65 GRP cabinet with integrated aluminum solar shield armor
PM sampling system	Inlet: Omni-directional 36 cm (14.1 inches) heated inlet; Optional sharp cut cyclones for PM10, PM2.5 or PM1 size selection Pump: 12 V brushless DC diaphragm Optics: 670 nm laser, near-forward scattering nephelometer with sheath air protection
Dimensions[3]	483 H x 330 W x 187 D mm (19 H x 13 W x 7.4 D inches) Includes solar shield armor & mounting brackets
Weight[4]	< 13 kg (28.6 lbs)
Operating range	-10 °C to +45 °C (14 °F to 113 °F)
Mounting	Pole, tripod and wall mounting brackets included
Factory integrated sensors[5]	Gill WindSonic (ultrasonic wind sensor), Vaisala WXT536 (weather transmitter), Met One MSO (weather transmitter), Cirrus MK427 Class 1 (noise sensor), Novalynx Pyranometer (solar radiation)
Compatible tested sensors	BSWA 308 (sound level meter), Met-One BC-1060 (black carbon monitor), Met-One E-BAM PLUS (Beta-Attenuation Mass Monitor)

[1] 4G LTE not available in all markets.
[2,4] Configuration used for power and weight calculations: base unit, nephelometer, PM_{10} sharp cut, modem, heater on.
[3] Dimensions are for enclosure. PM sampling inlet with cyclone adds 360 mm (14.17") to total height.
[5] Optional

AIRLOGICS
AIR MONITORING SYSTEMS

AQS-1

POWER OPTIONS:
110-line
16-hour rechargable lithium batteries
Solar

AQS-1 and the Dust Sentry are AirLogics' newest and most nimble, modular, and customizable air monitoring systems.

About AirLogics, LLC

AirLogics occupies a unique place in the environmental consulting and air monitoring sector. Our company was formed from a top-tier environmental consultancy that was trying to help a client manage their risk on a remediation site. In developing a solution to reduce their risk, an innovative and patented air monitoring system was born. From there, a company was built around that system. What evolved was a company that appears to be a rental equipment company, but functions like and has the sensibilities of a professional consulting firm, including the professional staff, expertise, and attention to solving our clients problems. We are proud of the position that AirLogics occupies in the environmental and air monitoring space.

The AirLogics Advantage

The primary advantages of AirLogics over traditional rental equipment providers are:

Professional Services

Our degreed and licensed professionals are scientists, engineers, and consultants with subject matter experience who can help you better achieve your site management goals. From planning to execution to post-mobilization reporting, AirLogics can assist you reduce your risk.

State-of-the-Art Industry Leader

Whether its developing our own systems or acquiring systems and sensors made by others, AirLogics is continually investing in state-of-the-art technology.

Real-time

Numerous stakeholders can benefit from actionable, real-time data. Real-time management of ambient air quality, rather than passive measurement and retrospective documentation, helps users immediately identify potential emissions and begin corrective action.

AQS-1 by Aeroqual

Near reference real-time monitor for particulate fractions plus O3 /NO2 /VOC

Designed for those who need to monitor and manage specific outdoor dust and particulates, and gases continuously and in real-time. The AQS-1 delivers affordable and defensible measurement of PM10, PM2.5, PM1, TSP, and up to three gases, all simultaneously.

What is it?

- A robust weather-proof monitor with integrated solar shielding for outdoor monitoring of dust, VOCs and other gases

- A modular and configurable monitoring platform for measurement of a targeted particulate and gases, and the option to integrate weather sensors (e.g. wind, humidity, precipitation, and solar)

- A flexible communications platform that transfers real-time data wirelessly, and gives you access through an API

- A web interface accessed via browser on any device, see all your data in one place and set email / SMS alerts on parameters of concern

AQS-1 by Aeroqual

What can it measure?

Particulates, up to three gases, wind meteorology, and noise

- **PM_{10}**
- **PM_{25}**
- **PM_{1}**
- **TSP**
- **NO_2**
- **O_3**
- **Total VOCs**
- **dB**
- **H2S**

WEATHER
wind speed, wind direction, rain, humidity, temp

AQS-1
by Aeroqual

Specifications

Control System: 1

Embedded fanless PC, Intel Atom N2600, 1.6 GHz, 2 GB RAM, 32 GB SSD, Ubuntu Linux Operating System

Communications: 2

Standard: WIFI, Ethernet (LAN)
Optional: Cellular IP HSPA 4G modem

Data Logging: 3

32 GB Hard Drive (>5 years data storage)

Averaging Periods 4

1 min, 5 min, 10 min, 15 min, 20 min, 30 min, 1 hr, 2 hr, 4 hr, 8 hr, 12 hr, 24 hr

Power Requirements: 5

100-260 VAC (standard): 21W / 30W* Regulated 12 VDC (if required): 21W / 30W*

PM Sampling System: 6

Inlet: Omni-directional 36cm (14.1 inches) heated inlet; Optional sharp cut cyclones for PM10, PM2.5 or PM1 size selection
Pump: 12V brushless DC diaphragm
Optics: 670nm laser, near-forward scattering nephelometer with sheath air protection

Dimensions: 7

483 H x 330 W x 187 D mm (19 H x 13 W x 7.4 D inches)
Includes solar shield armour & mounting brackets

Weight: 8

<13 kg (28.6 lbs)

AQS-1 by Aeroqual

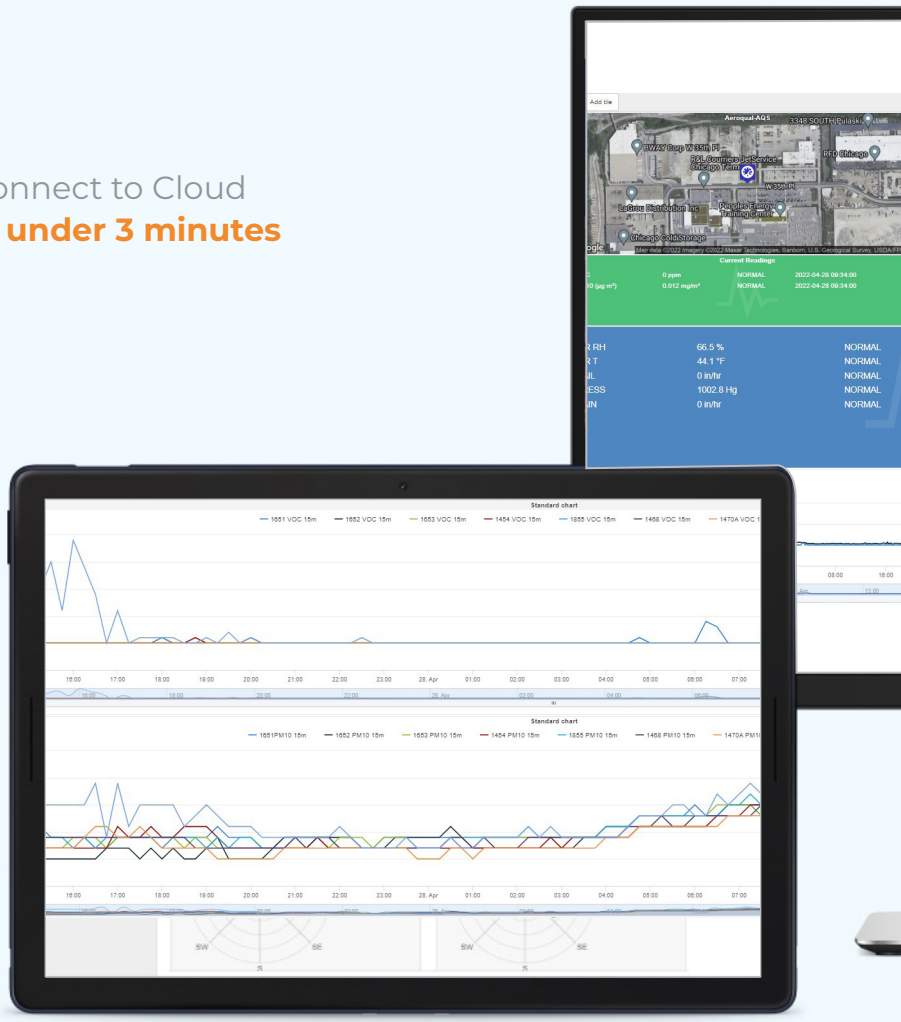
Particle Module	Sizes	Range	Accuracy	Resolution	Lower Detectable Limit (2σ)
Nephelometer	PM1/PM2.5/ PM10/TSP	0 to 60,000 µg/m3	<±(2 µg/ m3 + 5% of reading)	0.1 µg/m3	<1 µg/m3
Profiler (OPC)	PM1/PM2.5/ PM10/TSP	PM1 200 µg/m3 PM2.5 2000 µg/m3 PM10 5000 µg/m3 TSP 5000 µg/m3	<±(5 µg/m3 + 15% of reading)	1.0 LPM	<1 µg/m3

Gas Module	Range	Resolution	Noise	Lower Detectable Limit/ppb	Precision	Linearity (% of FS)	Drift 24 Hour
Ozone O3	0-500 ppb	0.1	<1 <1%	1	<2% of reading or 2 ppb	<1.5%	1; 0.2%
Nitrogen dioxide NO2	0-500 ppb	0.1	<1 <1%	2	<2% of reading or 3 ppb	<2.0%	2; 1%
VOC (Low range)	0-500 ppb	0.1	<1 <1%	<1	<2% of reading or 1 ppb	<1.0%	1; 1%
VOC (High range)	0-30 ppm	10	<100; <0.20 or 1%	<50	<2% of reading or 20 ppb	<2.0%	100; 1%

AQS-1
by Aeroqual

Data Access, Management & Visualization

Connect to Cloud
in **under 3 minutes**



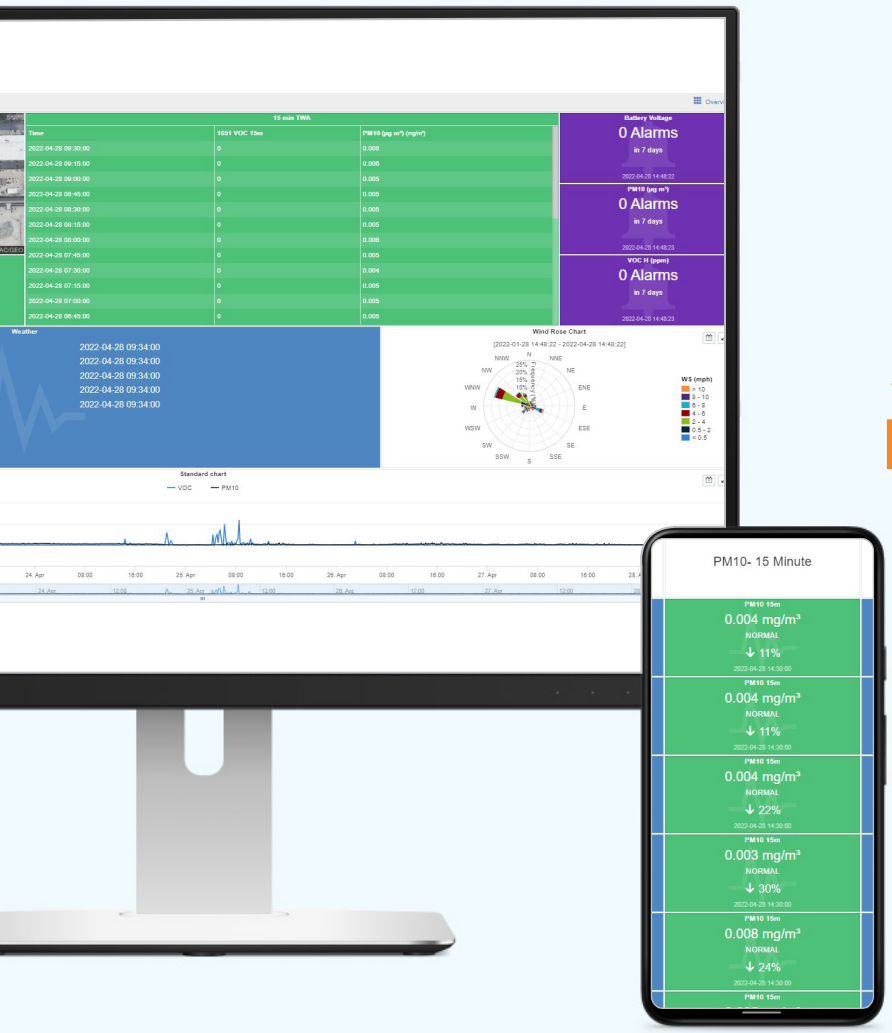
Compatible with
1,000's of different
monitor configurations

SMS

Get alerts via SMS / email
within **90-120 seconds** of an event

AQS-1
by Aeroqual

Our system processes over
6 million datapoints per day



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Visualizations

Achieve greater
than **99% uptime**

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AIR MONITORING SYSTEMS

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