Harbor Point – Parcel 4 Mixed Use

CONSTRUCTION AIR MONITORING PLAN

Honeywell Baltimore Works Site

Baltimore, Maryland

January 12, 2022

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Prepared For: Environmental Protection Agency – Region III
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1.0 INTRODUCTION

Harbor Point Parcel 4 Development, LLC (Developer) and its consultants have prepared this Construction Air Monitoring Plan (CAMP) in support of the Detailed Development Plan (DDP) for the Harbor Point – Parcel 4 Mixed Use project (or "Project"), on the former AlliedSignal Baltimore Works Site (or "Site"), located in Baltimore, Maryland. This CAMP pertains to the construction of the Harbor Point – Parcel 4 Mixed Use project, consisting of Phase 1: an 8-story podium on the western portion of the Project, containing a 1,292-car parking garage, retail spaces, and apartment units, with a 17-story apartment tower atop the southwestern portion of the podium. Phase 1 will also include a linear park constructed adjacently east of the garage/apartment building. In future Phase 2, an 8-story hotel will be built on the eastern portion of the Project, east of the linear park.

1.1 PURPOSE

This CAMP provides a description of the methods to be implemented during intrusive construction activities for collection of real-time particulate and weather data. In addition, the CAMP describes the data evaluation and reporting requirements. To that end, action levels for airborne particulate concentrations, established from the Harbor Point Phase 1 Development Project and approved by the EPA and MDE, will be compared to air quality during intrusive activities to demonstrate the effectiveness of the dust control measures implemented for the protection of human health and the environment. For the purpose of the DDP and this CAMP, "intrusive activities" are defined as the initiation of ground surface penetration, restoration of the caps, removal of controlled soil and debris, and completion of surface cleanup activities following the removal of controlled materials from the Project.

Development will be performed by the Developer and the Developer's representatives. This CAMP is not applicable to routine operations, monitoring, and maintenance work undertaken by Honeywell pursuant to the approved Consent Decree work plans.

1.2 CONSISTENCY WITH OTHER PLANS

This MHMP serves as an Environmental Control Document, as a component of the DDP for the Project. Other Environmental Control Documents include the following.

- The Material Handling and Management Plan (MHMP) addresses the handling and management of solids (asphalt, stone aggregates, concrete and wood debris, and soil) and liquids (groundwater and stormwater) that may be encountered during the intrusive activities at the Site. This Plan also includes dust control measures that describe soil/debris handling practices to be implemented to minimize dust emissions.
- The Health and Safety Plan (HASP) Guidance is intended to address worker safety related to potential exposure to environmental constituents of concern and can be used, as appropriate, by Contractors engaged in preparing bids and contractor-specific HASPs.
- The Spill Prevention and Response Plan (SPRP) is intended prevent hazardous material and petroleum product discharges (i.e., spills) from occurring, and mitigate the effects of a discharge, should one occur.

- The Stormwater Pollution Prevention Plan (SWPPP) provides an evaluation of potential pollution sources at the Project that could come in contact with stormwater and specifies appropriate measures to mitigate or control the discharge of pollutants in stormwater runoff.

1.3 BACKGROUND

The Site is located on a peninsula on the northeast shore of the Patapsco River of the Inner Harbor in the Fells Point section of Baltimore City. The Site consists of three Areas. Area 1 is the principal site of Honeywell's (formerly AlliedSignal) Baltimore Works Facility which included chromium processing production and support buildings on an area that covered approximately 16 acres. Prior to acquisition by Honeywell, Areas 2 and 3 were used for various industrial and warehousing operations, including chrome ore storage (Area 2) and brass foundry casting, oil blending and storage, coating/plastics production, lumber storage, and foundry (Area 3). Areas 2 and 3 currently include the Thames Street Wharf Office Building, 1405 Point (apartments), and the Wills Wharf office/hotel, and their associated parking lots. The Site is surrounded by water on the north, west, and south and the Living Classrooms campus to the north.

The principal contaminant of concern in Area 1 is hexavalent chromium (CrVI). An Environmental Remediation System (ERS) is maintained and operated by Honeywell International Inc. (Honeywell) to contain CrVI-impacted groundwater in Area 1 pursuant to the requirements of the Consent Decree by and between Honeywell, the U.S. Department of Justice, the United States Environmental Protection Agency (USEPA), and the Maryland Department of the Environment (MDE). The ERS consists of a Multimedia Cap (MMC), Hydraulic Barrier (HB), Head Maintenance System (HMS), a groundwater storage and transfer system, and the Outboard Embankment in Area 1; the layered soil cap (LSC) in Area 2; and the soil cap on the former Silver North and Silver South parcels in Area 3.

Historical sampling and analysis data from the Project area (Area 3 and non-designated areas) have identified elevated concentrations of some parameters, mainly including metals (lead and chromium), petroleum, and some polycyclic aromatic hydrocarbons (PAHs). The more significant soil contamination was found on the eastern portion of the Project, which necessitated the Area 3 cap. Some groundwater sampling has also identified elevated total chromium concentrations, although the primary area with chromium impacts is west of the Project, on Area 1.

In September 2019, additional environmental sampling and analysis were performed relevant to the Project footprint, resulting in additional data for the Project. These results are summarized in a report titled *Groundwater Evaluation and Soil Waste Characterization Summary*, dated September 6, 2019. The evaluation included groundwater samples collected from four soil borings. The results indicated total chromium concentrations ranging from 870 micrograms per liter (µg/L) to 47,000 µg/L. No detectable hexavalent chromium concentrations were reported.

1.4 EXISTING CONDITIONS

The Project contains an asphalt paved parking lot that was constructed in 2003 for Cirque de Soleil and is currently used for temporary surface parking for nearby developments. Several temporary trailers are located along the western site of the Project, and a stormwater management basin is located on the

northern portion of the Project. The southeastern portion of the Project contains a sanitary sewer pump station, situated on the former 950 South Caroline Street parcel. The C-Series DDP Drawings show the Project. Drawing EN1.01 shows including Area 1, Area 3, the existing Environmental Remediation System (ERS), and other pertinent Site features.

2.0 CONSTRUCTION AIR MONITORING

This section summarizes the key elements of construction air monitoring. Field Standard Operating Procedures (SOPs) have been prepared for implementation during construction air monitoring and are provided in the appendix.

2.1 CONSTRUCTION MONITORING LOCATIONS

A meteorological station and three fixed perimeter air monitoring locations, each consisting of one DustTrak 8533, will be established for construction air monitoring (Figure 2). The meteorological station will be located at the construction trailers. The perimeter air monitors are intended to be placed around the Project at locations that are most appropriate based on prevailing wind directions, but also reflective of practical considerations, including the availability of space around the work zone, electrical connectivity, safety, and security.

Appendix B contains two sample wind rose diagrams, one for the Baltimore-Washington International (BWI) Airport and one for a weather station at Locust Point, south of the Project. The BWI Airport wind rose identifies prevailing winds commonly blowing from the west and northwest; however, this wind rose likely reflects broad, regional conditions. The Locust Point wind rose indicates winds often blow from the west and west-southwest, as well as from other directions, including the south, southwest, northwest, north, and northeast. Using these data, as well as experience during prior projects at the Harbor Point peninsula, winds are often blowing from the west and south, but are also affected by surrounding buildings, the adjoining water bodies, and short-term weather conditions, and are therefore quite variable.

In consideration of the typical wind directions, the variability of the wind directions, the tight space constraints around the Project, and the limitations on equipment placement based on the above factors, the proposed perimeter air monitor locations are shown on Figure 2. The locations will include PFAM-1 at the approximate middle of the eastern boundary (along Caroline Street, near the weather station), PFAM-2 at the northern boundary (along Dock Street near Caroline Street), and PFAM-3 at the western boundary (on Wills Street at the Plaza Garage). With USEPA and MDE approval, these locations may be adjusted at the beginning of the project, if warranted by work conditions, work areas, prevailing wind direction, etc.; however, the locations of the PAMs and weather station are intended to remain the same throughout the Project's intrusive activities. T. Rowe Price, the future occupant of the pending Parcel 3 development at Harbor Point, will be notified if the perimeter air monitor locations are adjusted.

Fixed monitoring locations and equipment will be sited, to the extent possible, away from trees, buildings, roadways, or other obstacles that may cause undue influence on the measured concentrations according

to 40 CFR Part 58, Appendix E. All sampler inlets should be placed not less than 2 meters above ground level and have unrestricted air flow for at least 270 degrees around each sampler.

The real-time particulate monitoring data transmitted by telemetry from the fixed stations will be continuously accessed during construction work hours from the telemetry dashboard operating on the personal computer located in the construction office trailer. The dashboard will be set to send an alert, by e-mail and text notifications, to the on-site Field Manager (FM) and Field Technician (FT) if any of the monitors indicate an exceedance of the particulate Action Level or indicate a malfunctioning unit. In the event of an alert of an action level exceedance, corrective actions will be initiated in accordance with Section 5.0.

Should a monitor malfunction, the Field Manager (FM) or designee will deploy the spare monitor as soon as practicable during construction hours and will contact the equipment provided to deliver a replacement spare monitor.

The monitoring instruments will be protected inside a waterproof case with an omni-directional air intake port and will be mounted on a tripod. The real-time monitor data loggers will be downloaded daily, as practicable, to acquire the results of the previous 24-hour monitoring acquisition period to a personal computer via telemetry provided at each monitoring station.

2.2 CONSTRUCTION MONITORING DURATION AND FREQUENCY

The duration of the intrusive construction activities is expected to span 6-9 months. The field data objective is to collect daily, real-time particulate concentration data with three monitors during intrusive activities during the Project.

Real-time particulate monitoring will be performed continuously, 24 hours per day during the work week at each fixed monitoring location throughout the duration of intrusive activities (as defined in Section 1.1). Monitoring will start and end prior to work hours beginning each work day. As such, the 24-hour monitor period started prior to work hours on a Friday business day will end on Saturday. Continuous, real-time particulate monitoring data will be collected to document conditions during work periods to demonstrate the efficacy of the installed dust controls. Data will be accessed remotely via fixed station telemetry and stored to a personal computer on a daily basis, as practicable.

2.3 MONITORING EQUIPMENT AND METHODS

Each fixed monitoring station will have one DustTrak 8533 real-time dust monitor. The DustTrak can monitor Total Particulate Matter (PM) concentrations for particles from 0.1 microns up to approximately 15 microns in diameter (known as "Total PM"). The DustTrak will be set to provide PM_{10} readings, representing the inhalation fraction (up to 10 microns) of Total PM. Although not an established Reference Method, the DustTrak Model 8533 has the advantage of providing real-time concentration readings throughout intrusive construction work.

The DustTrak Model 8533 will monitor PM_{10} concentrations and store 1-minute averages on the internal data logger. As recommended by the manufacturer, the Ambient Air calibration factor will be selected to

represent outdoor ambient dust. The DustTrak will be calibrated daily and maintained/operated according to the Standard Operating Procedures (SOP), Appendix C. The calibration steps include a Zero Calibration and a Flow Calibration prior to every 24-hour sampling event.

A meteorological monitoring station will be sited following EPA siting guidance in EPA-454/B-08-002 *Quality Assurance Handbook for Air Pollution Measurement Systems Volume IV: Meteorological Measurements Version 2.0 (Final),* March 2008. The wind speed and direction sensors for the meteorological monitoring system will be situated approximately 10 meters above ground, mounted to one of the temporary construction office trailers or to another acceptable nearby structure, such as the Plaza Garage. The meteorological sensors will be calibrated on-site during installation following the guidance of EPA-454/B-08-002.

3.0 QUALITY ASSURANCE AND QUALITY CONTROL

3.1 DATA MANAGEMENT

This section describes the data management process and methods to ensure data integrity from data production in the field to final use and retention. All data will be reviewed and verified for accuracy by the FM. The FM or designee will ensure that the field and technical data obtained for the project will provide the end user with acceptable data. All field and technical data shall be reviewed under the direction of FM, to ensure that the final data is accurate prior to the inclusion in the project report. The field data sheets, log books, and DustTrak data are reviewed by the FM weekly.

Real-time data processing is summarized as follows:

1. The field data sheets (real-time PM_{10}) and real-time instrument data logs are submitted (electronic or hard copy) by field personnel to the GTA USA Project Manager weekly;
2. Real-time PM_{10} concentration data will be provided as 15-minute averages based on one-minute frequency data collection; and
3. The GTA USA FM, or designee, then stores the information electronically into GTA USA's project files and uploads the summary tables to the project website the next business day.

Data will be retained on file at GTA USA for a minimum of five years after the cessation of air monitoring, and will be readily available for audits and data verification activities.

3.2 DATA REVIEW AND VALIDATION

All data will be verified by a review of the completeness. Field operations will be fully documented, reviewed, and audited. The process of reviewing field data will involve evaluating field records for consistency and completeness assuring that each sample result is fully supported by accurate metadata, reviewing QC and calibration information, summarizing deviations and determining their impact on data quality, summarizing the samples collected, and summary of the review in the project report.

4.0 COMPARISONS TO ACTION LEVELS

The particulate concentration action levels to be utilized for construction air monitoring were previously established for the Harbor Point Phase 1 Development Project and were approved by the EPA and MDE. The action level for the fixed perimeter particulate monitoring will be the National Ambient Air Quality Standard for PM_{10} of 150 $\mu g/m^3$.

5.0 RESPONSE ACTIONS

The response actions summarized below will be performed in the event of an alarm triggered at a fixed perimeter monitor station. These steps address conditions during the intrusive construction work day. If an alarm condition occurs during non-working hours when the construction site is inactive for the day or weekend, the alarm condition will be addressed prior to commencing work the next work day.

1. Inspect the fixed, perimeter monitor that sounded the alarm for the possibility that the DustTrak monitor may be malfunctioning, as evidenced by alerts sent by telemetry when negative readings are recorded or loss of power occurs.

    a. If the DustTrak instrument that sounded appears to be malfunctioning, after checking the other fixed, perimeter station instrument operation and concentration readings for consistency of reported PM_{10} concentrations, run the Zero Cal and Flow Cal verifications, and re-start the previously alarming DustTrak.

    b. Observe another 15-minute PM_{10} average to document that the instrument is no longer malfunctioning. Under this scenario, no further action is required after 45 minutes (three 15-minute averages) from the initial alarm and work interruption. Resume construction activities and prepare an event log.

2. If after following Step No. 1, the PM_{10} concentration is not improving and remains at or above the alarm level:

    a. The Field Manager, in consultation with the GTA USA Project Manager, will direct construction personnel to stop work involving all potential dust-generating work activities that may be contributing PM_{10} concentrations above the action level and initiate dust suppression, such as misting with potable water.

    b. After the fixed, perimeter station DustTrak monitors indicate that the 15-minute PM averages are below the action level for 30 continuous minutes and there are no 15-minute exceedances of the action level at any of the perimeter air monitoring locations, resume construction activities.

    c. Document SOP BMPs and additional corrective measures taken in an event log.

The Field Manager, or designee, in consultation with the GTA USA Project Manager, will notify the primary points of contact (owner, MDE, USEPA, and Brian Magee and Norman Forsberg at Arcadis) immediately

following the initial alarm and subsequent steps. The Perimeter STEL Alarm Event Log will be completed by the Field Manager and immediately transmitted to the EPA and MDE Project Coordinators.

6.0 REPORTING

This subsection describes the types of reports that may be produced for the project. The types of reports that may be produced include daily data summary tables, event logs, data quality assessment reports, performance evaluation (PE) and audit reports, and the construction summary report. Additionally, real-time particulate monitoring results will be posted to a project website.

6.1 DAILY DATA SUMMARY TABLES

Electronic spreadsheet data summary tables with hourly airborne PM_{10} concentrations for each PAM station, hourly wind speed, wind direction, and daily rainfall will be prepared by the field staff daily, as practicable, for the previous 24-hour monitoring acquisition period. The electronic spreadsheets will then be uploaded to GTA USA's project files and website the following business day following the data acquisition, as practicable, for access by the agencies and the public.

6.2 EVENT LOGS

When applicable, event logs will be generated to identify nonconforming situations and corrective actions taken. Corrective actions to remedy a nonconforming situation in the field can be defined by the GTA USA FM or Project Manager. A description of the required action will be documented in an event log. Corrective actions must be approved verbally by GTA USA's Project Manager and by both the EPA and MDE representatives prior to implementation. Upon implementation of the corrective action, the Project Manager will be provided with the completed event log, which becomes part of the project file. Copies of completed event logs will also be provided electronically to the agencies and to Arcadis on the same day as the event.

6.3 DATA QUALITY ASSESSMENT REPORTS

The FM or designee will report to the Project Manager, or a qualified designee on the progress of each phase of field work and any QA/QC issues associated with field activities.

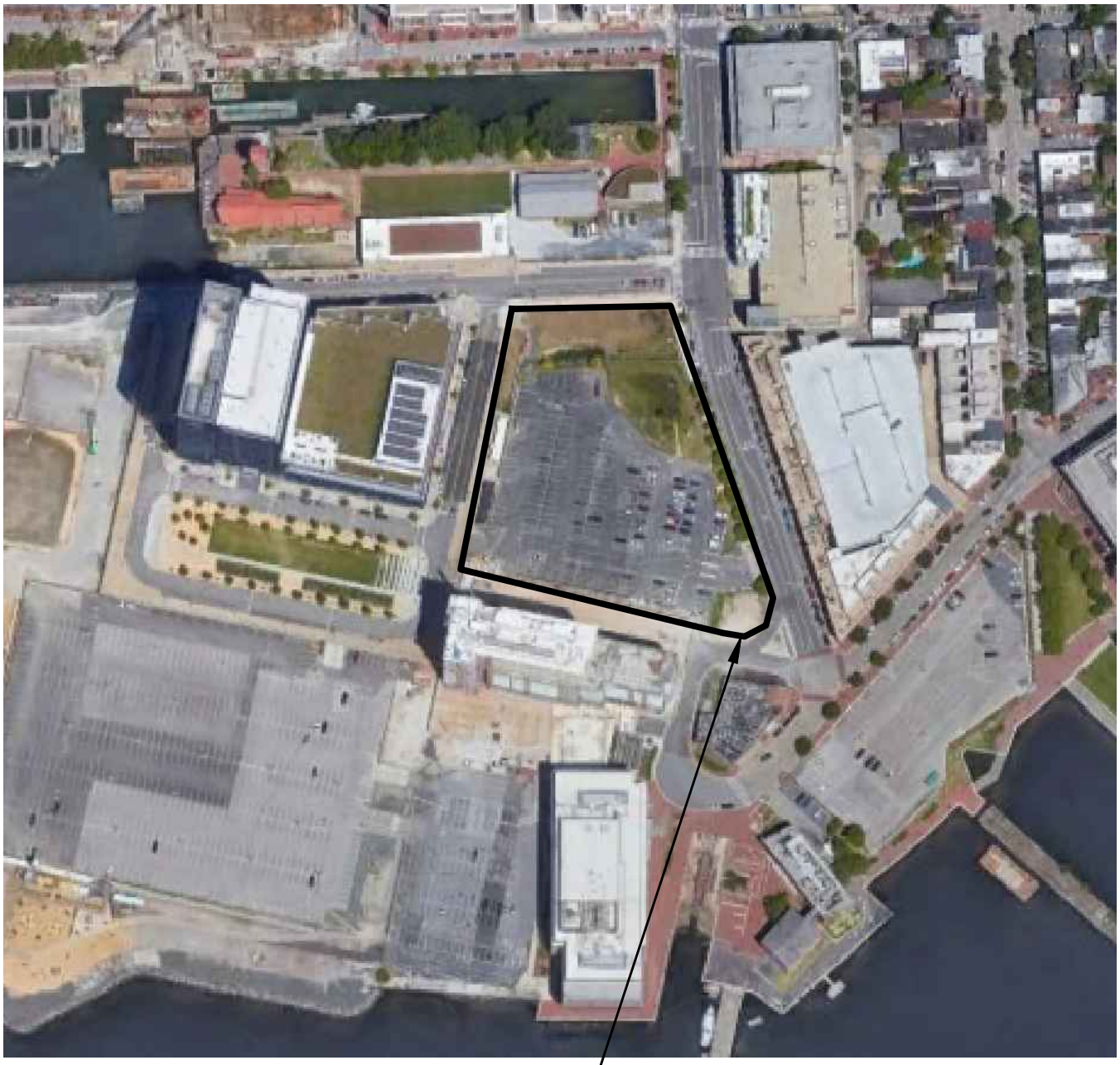
Data quality assessment reports will be submitted electronically and hard copy to the agencies and to Arcadis on a monthly basis throughout the intrusive construction activity duration. All field verification and validation information will be included, electronically.

6.4 SUMMARY DATA REPORTS

The final summary data report titled, "Harbor Point - Parcel 4 Mixed Use Construction Air Monitoring Report", will be produced by GTA USA and will combine all of the interim reports described above, electronically. This summary report will be provided to the agencies and Arcadis.

CAMP APPENDIX A

FIGURES



Notes

1. Base image obtained from Google Earth (©2017 Google).

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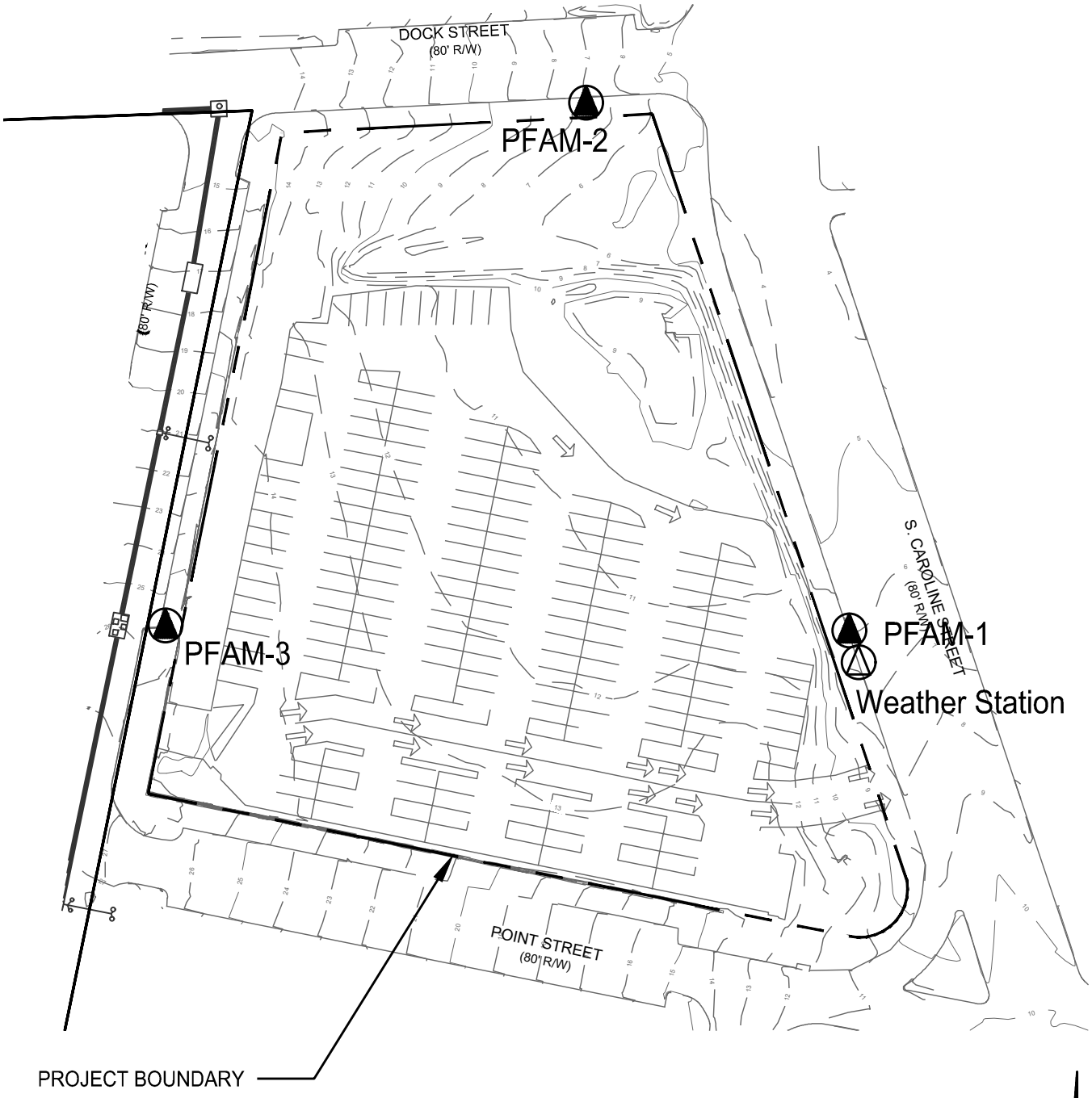
HARBOR POINT - PARCEL 4

BALTIMORE, MARYLAND

SITE LOCATION MAP

PROJECT: 190896x1	DATE: OCTOBER 2020	SCALE: 1" = 2,000'	DESIGN BY: VSG	REVIEW BY: SJS	FIGURE: 1



Notes

1. Base CAD drawing provided by RKK, dated August 3, 2021.
2. Note that the proposed air monitoring locations are approximate and may be adjusted based on weather conditions, prevailing wind direction, work areas, etc.

0 40 80

Approximate Scale
1 inch = 80 feet

NORTH

GEO-TECHNOLOGY ASSOCIATES, INC.
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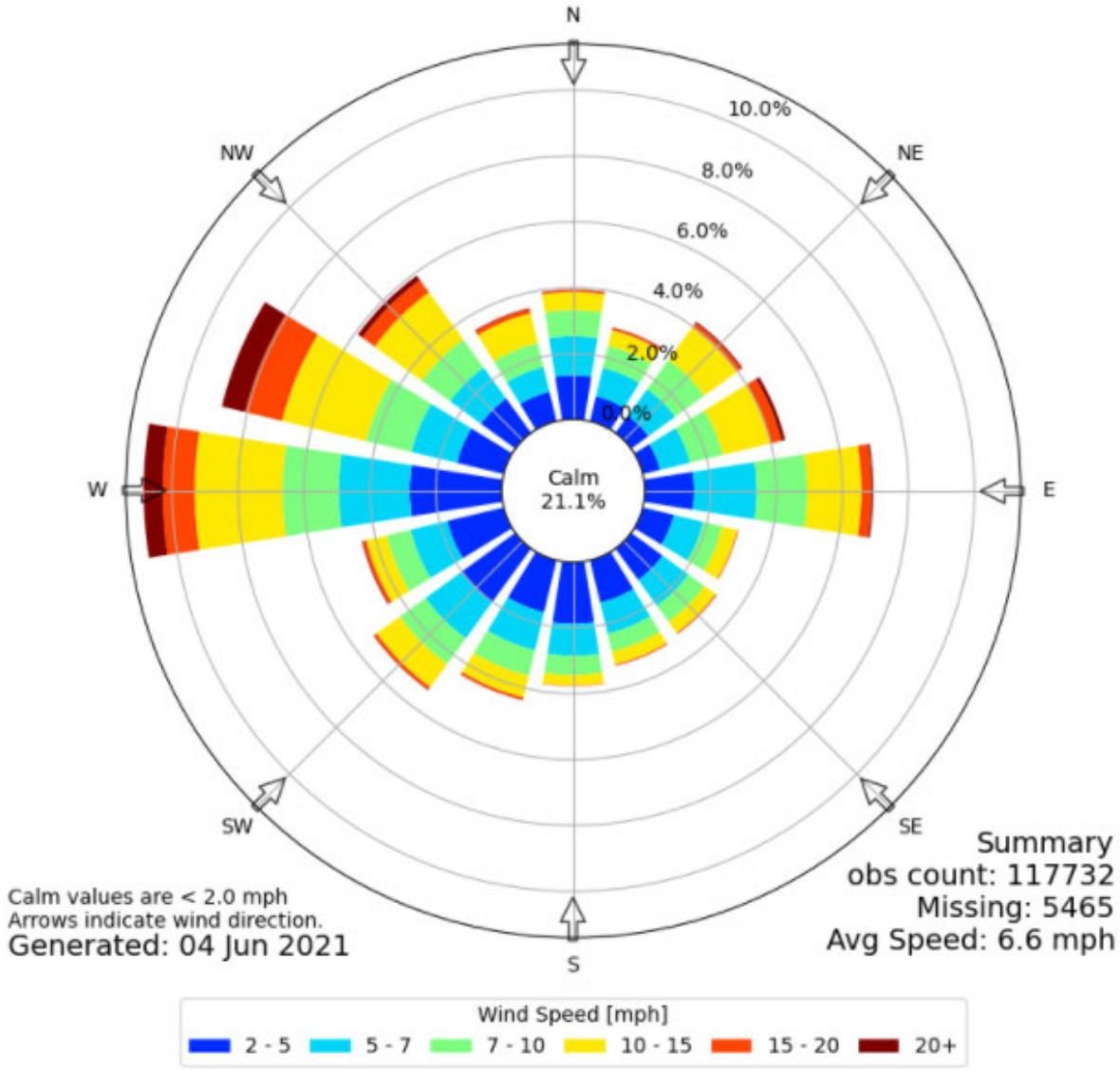
HARBOR POINT PARCEL 4
BALTIMORE, MARYLAND

CONSTRUCTION AIR MONITORING LOCATIONS

PROJECT: 190896x1	DATE: REV. JAN 2022	SCALE: 1" = 80'	DESIGN BY: SC	REVIEW BY: SJS	FIGURE: 2

CAMP APPENDIX B

BALTIMORE REGION WIND ROSE SAMPLES



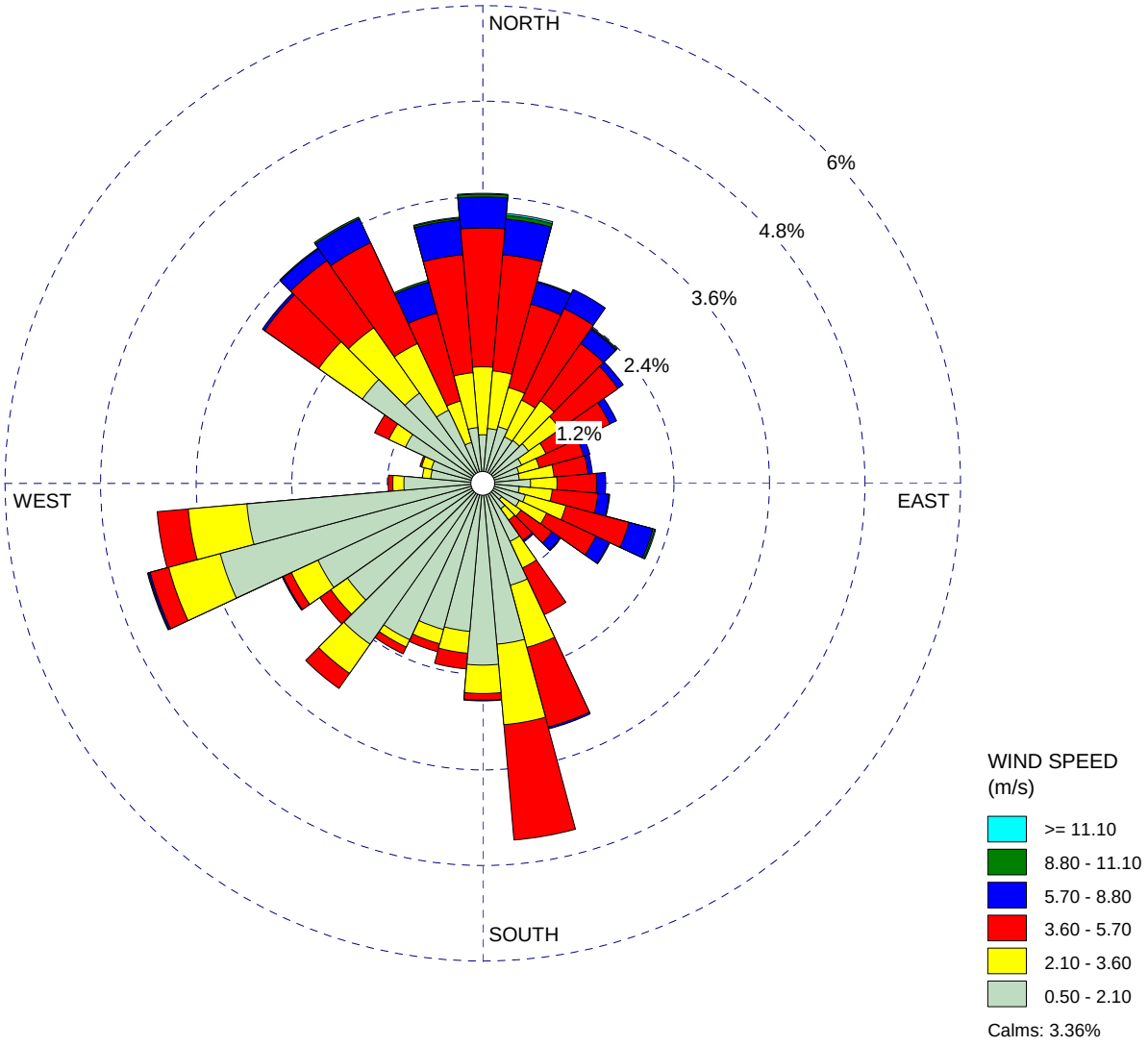
Baltimore-Washington International Airport (BWI) Wind Rose

WIND ROSE PLOT:

Station BLTM2 - 8574680 - Baltimore, MD

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS: 2020	DATA PERIOD: **Start Date: 1/1/2020 - 00:00** **End Date: 12/31/2020 - 23:00**	COMPANY NAME:	
		MODELER: **R. Jalbert**	ARCADIS
	CALM WINDS: **3.36%**	TOTAL COUNT: **7904 hrs.**	
	AVG. WIND SPEED: **2.64 m/s**	DATE: **8/16/2021**	PROJECT NO.: **30060991**

CAMP APPENDIX C

FIELD SAMPLING PROTOCOL STANDARD OPERATING PROCEDURE; REAL-TIME AIR SAMPLING FOR TOTAL PARTICULATE MATTER IN AMBIENT AIR

Harbor Point – Parcel 4 Mixed Use

FIELD SAMPLING PROTOCOL AND STANDARD OPERATING PROCEDURE

REAL-TIME AIR SAMPLING FOR TOTAL PARTICULATE MATTER IN AMBIENT AIR

Honeywell Baltimore Works Site

Baltimore, Maryland

August 6, 2021

Prepared By: Harbor Point Parcel 4 Development, LLC
Beatty Harvey Coco Architects, LLP
GTA USA, LLC
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RK&K Engineers

Prepared For: Environmental Protection Agency – Region III
Maryland Department of the Environment

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1.0 INTRODUCTION

This protocol and standard operating procedure (SOP) is intended to provide a general overview and step-by-step instructions for personnel in the field responsible for carrying out real-time ambient air sampling for particulate matter. The instructions cover assembly of the instrument, instrument programming and operation, deployment and field data recording. This SOP has been prepared in accordance with the guidance documents *Guidance for Preparing SOPs* (USEPA 2007) and *Quality Assurance Handbook for Air Pollution Measurement Systems* (USEPA 1994, USEPA 2008).

This document assumes that instrument location siting has already been successfully completed ensuring each location meets the acceptable criteria with regards to the proximity of obstructions (i.e. buildings, trees, etc.), technician safety, and any potential contamination contributions from surrounding operations.

2.0 EQUIPMENT LIST

The following equipment will be required for the air monitoring program:

- DustTrak® DRX Aerosol Monitor Model 8533, including:
    - TrakPro™ Software
    - Zero Filter
    - Power Supply
    - 6600 mAH Lithium Ion Rechargeable Battery
    - USB Cable
    - Analog alarm/output cables
    - Calibration Certificate
    - Spare Internal Filter Elements
    - Flexible Teflon tubing and connectors
    - Omni Directional Inlet
- Global Telemetry System
- Alarm System Junction Box
- BIOS Defender 510-H Air Flow Calibrator unit;
- Laptop PC with TrakPro™ Software;
- NEMA enclosures or other waterproof cases for each instrument;
- Tripods capable of supporting NEMA enclosures 2 meters above ground; and
- Field data sheets – provided in Appendix A, clipboards, pens.

Additional Field Supplies:

Miscellaneous tools (wrenches, screwdrivers, pliers, etc.);
Electrical extension cords;
Ground Fault Interrupter power strips
Personal protective equipment (PPE), see the site specific Health and Safety Plan (HASP);
Field notebook.

3.0 HEALTH AND SAFETY

All monitoring activities undertaken at the Site must be completed under the approved, site-specific HASP. The HASP identifies the hazards, personal protective equipment, monitoring, and emergency procedures for conducting work at the Site. Monitoring and support personnel must acknowledge their review of the HASP prior to performing work at the Site.

4.0 INSTRUMENT SETUP

The monitor used within this SOP is the DustTrak® DRX Aerosol Monitor Model 8533 (the "monitor") manufactured by TSI Incorporated. The monitor employed during this program uses TrakPro™ Software. The DRX 8533 monitors Total PM concentration and stores 1-minute averages on an internal data logger. The instrument measures real-time aerosol mass readings using light-scattering laser photometers for particles approximately 15 µm or less in diameter. The DRX 8533 monitors can be operated at flow rates up to three (3) liters per minute (Lpm). Figure 1 presents the typical DRX 8533 monitor.

For purposes of this monitoring program, the DRX 8533 monitor will be set to provide PM_{10} readings, representing the inhalation fraction (up to 10 microns) of Total PM.he DRX 8533 contains an internal 6600 mAH Lithium Ion rechargeable battery. For purposes of this monitoring program, AC power will be available for providing the monitor with constant power therefore the internal battery will only be used to maintain instrument operation in the event monitoring could be interrupted by AC power loss.

This document assumes that sample locations have already been sited and adhere to the proper sample location criteria. The monitor should be placed on a reasonably level surface with the sample inlet at a height of no less than 2 meters with unobstructed air flow for at least 270 degrees around the monitor. For duplicate monitoring, each monitor will be connected to the same monitor inlet.

The monitors should be secured from the effects of wind loading to prevent tipping over in elevated wind conditions. The tripod stand with weatherproof case housing the monitor can be secured with masonry blocks on each leg and will be attached by chain with lock to an unmovable object to protect from theft.

4.1 CONNECTING TO THE COMPUTER

The DustTrak DRX monitor can be connected to a computer to download data and upload sampling programs. Connect the USB host port of a Microsoft® Windows®-based computer to the USB device port on the side of the DustTrak monitor.

4.2 INSTALL TRAKPRO™ DATA ANALYSIS SOFTWARE

TrakPro software can preprogram the DustTrak monitor, download data, view, and create raw data and statistical reports, create graphs, and combine graphs with data from other TSI instruments that use TrakPro software. Follow the supplier/manufacturer instructions for installing the software and setting up the computer.

TrakPro software contains a comprehensive installation guide. TSI recommends printing out this guide prior to starting the TrakPro software installation on your computer, so it may be consulted during the installation. The TrakPro Software manual is located in the Help file in TrakPro software.

4.3 SETUP MENU

Pressing Setup activates the Setup Menu touchscreen buttons along the left edge of the screen. Setup is not accessible when the instrument is sampling.

4.4 ZERO CALIBRATION

TSI recommends performing a zero check prior to each use for the DustTrak monitor, before running any extended tests, and after the instrument experiences a significant environmental change. Examples of significant environmental changes would be ambient temperature changes that exceed 15°F (8°C) or moving from locations with high aerosol concentrations to low concentrations.

Run **Zero Cal** prior to every 24-hour sampling event. Zero Cal requires that the zero filter be attached prior to running. Zero Cal must also be performed if the unit is reading negative concentrations. It is not possible for the DustTrak monitor to read negative concentrations. Negative concentrations are a symptom of zero drift. **Never perform a Zero Cal without first attaching a zero filter.**

1. Press Zero Cal Button
2. Attach Zero Filter
3. Press the **Start** button to start Zeroing process.
4. A count-down clock will appear indicating the time remaining. The screen with indicate Zero Cal Complete when done.

Remove filter after zeroing has been completed. The instrument is now zero calibrated and ready for use.

4.5 FLOW RATE SETTING

For purposes of this monitoring program, the flow rate setting shall be 2.0 Lpm. For DustTrak DRX Model 8533, ***the flow cannot be changed***. Run **Flow Cal** to calibrate the flow set point. The flow set point is factory set to 3 Lpm total flow; 2 Lpm of the total flow is measured aerosol flow, and 1 Lpm of total flow is split off, filtered, and used for sheath flow. There is an internal flow meter in the DustTrak DRX instrument that controls flow rate to ±5% if factory set point. TSI recommends checking the flows with an external flow reference meter, especially when collecting data. The pump will automatically start when entering the Flow Cal screen.

Flow Calibration:

1. Attach a flow calibrator (BIOS Defender 510-H) to inlet port.
2. Move the arrows up or down to achieve desired flow on the reference flow meter. Each up or down arrow will change the flow about 1%. Allow time between button presses to let pump change to the new flow rate.
3. Select **Save** once the desired flow rate is achieved. Select **Undo** to return to the factory set point.

4. Record the calibration data in the field logbook.

4.6 DATE AND TIME SETTING

Set the DRX 8533 to the correct date and time prior to use. Follow the procedure below for setting the monitor date and time.

The **Settings** screen sets basic unit parameters:

1. Set current date, current time and date/time format. Time can be set in 12 or 24 hour format.
2. Date can be set in yyyy/dd/mm, yyyy/mm/dd or mm/dd/yyyy. The date format for the project will be **yyyy/mm/dd** to ensure consistency with the format adopted all other sampling documentation.

5.0 MONITOR OPERATION

Follow the procedure below for operating the DRX 8533 aerosol monitor.

The **RunMode** tab brings up sampling mode options. Sampling mode options include **Survey Mode**, **Manual Log**, and **Log Mode 1-5**.

1. Survey mode runs a real time, continuous active sample, but does not log data.
2. Manual log sets the instrument to log data for a specified run time.
3. Log mode starts and stops the instrument at specified times, run for a specified test length and performs multiple tests of the same length with a specified time period between tests.

The **Manual** sampling mode is to be set for this project as follows:

- The log interval can be set from 1 second to 60 minutes. It is the amount of time between logged data points.
- Test length can be set from 1 minute to the limit of the data storage.
- Time Constant can be set from 1 to 60 seconds. This will control the update rate of the main screen. It is the rolling average of data displayed on the main screen and is not linked to logged data in either Manual or Program Log modes.
- The Log Interval will be set to 1 minute, the Test Length will be set to allow 24-hour storage (“storage limit”) and the Time Constant will be set to 1 second for this project. In Manual mode, data will be stored to a file named *Manual XYZ* where *XYZ* is an incrementing integer.

6.0 TAKING MASS CONCENTRATION MEASUREMENTS

Measurements are started and controlled from the main screen. The Total mass concentration will be selected for measurement and display. Prior to starting a measurement the instrument should be zeroed from the Setup screen and the run mode should be configured and selected from the RunMode

screen.

When the instrument is on, but not taking any mass measurements the start button will be green and instruments pump will not be running. To start taking a measurement, press the green **Start** button.

While taking a measurement the screen will display the current measured mass concentration. The various regions of the screen are described below.

The **Mass Fractions Region** (live keys) shows the size segregated mass measurements. The highlighted channel displayed in larger font on the left can be changed by touching on the screen the measurement of the most interest on the right-hand side of the screen. Set the Total channel as the highlighted display during monitoring.

1. The **Display Mode Region** (live key) is the size segregated mass fractions displayed in this area can be selected by touching in the Display mode region. The modes than can be selected with this live key are:
    a. **ALL** (PM1, PM2.5, Respirable, PM10 and Total),
    b. **IAQ-ENV** (PM1, PM2.5, PM10 and Total), and
    c. **IH** (Respirable, PM10 and Total).
2. The **Run Mode Region** shows the run mode selected from the RunMode screen.
3. The **File Name Region** displays the file name to which the data is currently being saved.
4. The **Test Progress Region** shows the time-based progress of the test.
5. The **Error Indicator** shows the current stats of the instrument.

7.0 ALARM

Alarm allows you to set alarm levels on any of the 5 mass channels PM1, PM2.5, RESP, PM10 and Total. However, the alarm functioning is determined by the logging interval. The alarm will turn ON only if the average concentration over the logging interval exceeds the set point. If the logging interval is too long and the concentration exceeds the set point and stays at that level, the alarm will not turn ON until after the logging interval has passed. Likewise, the alarm will not stop until after the concentration has dropped below 5% of the threshold and after the logging interval has passed. The Alarm is dependent on the logging interval. For the DustTrak to alarm as soon as the Alarm Setpoint is exceeded, the logging interval must be set as low as possible (i.e., 1 second or 2 seconds). If long test durations do not permit setting such a short logging interval, use the Short Term Exposure Limit (STEL) alarm instead. The STEL is always based on 1 second concentrations and is independent of the logging interval. For more details on the STEL alarm, see Section 7.2. In Survey mode, the alarm is dependent on the time constant.

7.1 ALARM SETTINGS

- **Alarm 1 – Setpoint [mg/m^3]:** The mass concentration level upon which Alarm 1 is triggered. Alarm 1 will trigger if the mass concentration, taken at the logging interval, rises above the setpoint. ***Note****: Alarm 2 must be lower than Alarm 1 when both alarms are enabled.*

- **Alarm 2 – Setpoint [mg/m^3]:** The mass concentration level upon which Alarm 2 triggers. Alarm 2 triggers if the mass concentration, taken at the logging interval, rises above the setpoint. ***Note**: Alarm 2 must be lower than Alarm 1 when both alarms are enabled.*

- **Alarm 2 Enable [On, Off]:** Enables Alarm2 to be logged and will activate the Audible or Visible alarms if they are enabled.

- **Relay 1 [On, Off]:** When the relay alarm is turned on, unit will close relay switch when Alarm 1 level is surpassed. Relay alarm can only be linked to one mass channel at a time. Relay selection is available on the 8533 desktop model only.

- **Audible [On, Off]:** When the audible alarm is turned on, the instrument will activate internal beeper when Alarm 1 or Alarm 2 level is surpassed. Audible alarm can only be linked to one mass channel.

- **Visible [On, Off]:** When the visible alarm is turned on, unit will show the alarm icon in title bar when Alarm1 or Alarm2 level is surpassed.

7.2 STEL ALARM

The STEL Alarm will be used for this project and will be set to **80% of the project-specific dust action limit**.

When a STEL alarm is selected, the instrument will inspect the data on a second by second basis, independent from the selected logging interval. If the mass exceeds the STEL limit, a STEL alarm triggers and the following actions will be taken.

- **STEL 1 [On, Off]:** When the STEL alarm is turned on, STEL data will be collected when Alarm 1 level is surpassed. STEL alarm can only be linked to one mass channel at a time. STEL selection is available on the 8533 desktop model only.

- **STEL Indicator:** Will show Red on the main screen. Data will be taken off the STEL alarm channel at a 1 minute logging interval for 15 minutes. This data will be stored in a separate file named STEL_XXX, where XXX will be matched to the logged data file. The instrument will also continue to log the mass concentration data at the logging interval selected.

- **STEL Alarm Repeat:** If the instrument remains over the STEL limit after the 15 minute interval, or if the instrument exceeds the STEL limit later during the sample period, additional STEL files will be generated.

8.0 MONITOR MAINTENANCE

The DustTrak DRX Aerosol Monitor requires maintenance on a regular basis. The table below lists the factory recommended maintenance schedule.

Some maintenance items are required each time the DustTrak monitor is used or on an annual basis. Other items are scheduled according to how much aerosol is drawn through the instrument. For example, TSI recommends cleaning the inlet sample tube after 350 hours of sampling a 1 mg/m^3 concentration of aerosol. This recommendation should be pro-rated according to how the instrument is used. 350 hours at 1 mg/m^3 is the same amount of aerosol as 700 hours at 0.5 mg/m^3 or 175 hours at 2 mg/m^3, etc.

Recommended Maintenance Schedule	
Item	**Frequency**
Perform Zero Check	Before each use
Clean inlet	350 hours at 1 mg/m^3
Clean 2.5 µm calibration impactor	Before every use
Replace internal filters	350 hours at 1 mg/m^3 or when indicated by the main screen filer error indicator
Return to factory for cleaning and calibration (For 8533EP, TSI recommends that both the DustTrak monitor and the External Pump Module be returned to TSI)	Annually
Replace the internal HEPA filters in the External Pump module	Annually

The DustTrak monitor keeps track of the accumulated amount of aerosol drawn through it since its last cleaning. When the internal filter replacement is due, the filter error indicator will turn from green to red.

8.1 CLEANING THE INLET

1. The inlet should be cleaned based on the schedule above.
2. Turn the DustTrak monitor off.
3. Unscrew the inlet nozzle from the instrument.
4. Clean the inlet port. Use a cotton swab to clean the outside of the inlet port. The swabs can be dampened with water or a light solvent (e.g., isopropanol). Clean the inside of the sample tube by using a small brush, along with a light solvent. Dry the tube by blowing it out with compressed air, or let it air-dry thoroughly**. Do NOT Blow into Instrument.**
5. Screw (hand-tighten) inlet back into instrument.

8.2 REPLACING THE INTERNAL FILTERS

Replace the internal filters based on the schedule above or when the filter indicator on the main screen changes to red, using the following steps.

- Turn the instrument off.
- Remove old filters from the instrument, as follows:
    1. Open filter access door on the back of the instrument.
    2. Use the enclosed filter removal tool (PN 801668) to unscrew the filter cap.
    3. Pull out single cylindrical filter from filter well. If filter well is visibly dirty, blow out with compressed air.
    4. Put a new filer (P/N 801673) back into filter well and screw filter cap back into place.
    5. Open blue retention clip by pinching ends inward and pushing down.
    6. Remove 37-mm filter cassette by pulling downward and outward.
    7. Open filter cassette using enclosed tool PN 7001303.

8. Remove screen mesh from filter cassette and blow out using compressed air. Blow in reverse direction to remove captured particulate.
9. Replace mesh in filter cassette and press halves together. Ensure filter has been fully closed. The filter tool PN 7001303 can be used to ensure the filter is fully closed.
10. Place filter cassette back into position and close blue retaining clip. Make sure retaining clip snaps back into place.

- Reset the instrument's filter counter. Resetting the counter will clear the filter error condition shown on the main screen. Reset the counters by the following:

1. Turn on the instrument.
2. Press the Setup button to go into the setup screen.
3. Touch the **Cum Filter Conc.**: (live key) to reset the aerosol mass.
4. *Replace user serviceable filters?* Dialog will appear. Press **OK**.
5. *Reset filter concentration?* Dialog will appear. Press **Yes** to reset the cumulative filter concentration to zero.
6. The Setup screen will not show zero for the **Cum Filter.**
7. **Concentration and** the current date for the **Filter Time.**