Ambient Air Monitoring Plan

Remedial Actions
Impacted Soil Removal
Former Manufactured Gas Plant Site
SRP 0190100008
Champaign, Illinois

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Prepared for:

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1 INTRODUCTION

The following sections provide an overview of the project and the objectives of the air monitoring program.

1.1 Project Overview

At the request of Ameren Services (Ameren), PSC Industrial Outsourcing, LP (PSC) has prepared this Ambient Air Monitoring Plan (AAMP) for use during the remedial action (RA) and interim remedial measures (IRM) scheduled at the former manufactured gas plant (MGP) site located in Champaign, Illinois. The site activities are being conducted to remove MGP-related impacted soil present from the remaining MGP-related structures that are located on the property. Ameren is completing this work in cooperation with the Illinois Environmental Protection Agency (IEPA) in accordance with the Site Remediation Program (SRP).

The site is located within the city limits of Champaign, Illinois in Champaign County (Figure 1). The site address is 308 North Fifth Street (formerly 502 East Hill Street), Champaign, Illinois. The FMGP began operations by approximately 1869 and continued through the early 1930s, at which time operations were converted to storage and distribution of natural gas. During this period two below ground gas holders, one aboveground gas holder, five tar wells, a tar separator, seven oil tanks, and two diesel fuel tanks were present. All aboveground structures, except for the booster house, were demolished in the late 1950s. The general area around the site consists if both residential and commercial properties. The property is currently vacant, is secured by a chain-link fence, and is owned by AmerenIP. The site has been enrolled in the IEPA SRP and been assigned site identification number 0190100008 – Champaign County.

This AAMP was prepared to monitor air quality at the perimeter of the site during remedial activities, for the protection of the surrounding community. The air monitoring program will consist of real-time perimeter monitoring and time-integrated sampling at stationary locations adjacent to the site fence line. The ambient air monitoring program is being completed separate from the industrial hygiene program designed for the protection of on-site remediation workers.

1.2 Air Monitoring Objectives

The objective of the ambient air monitoring program is to document air quality at the site perimeter during the proposed remedial activities. The data collected will be used to assess the concentrations of airborne constituents and particulates on a real-time basis. The real-time data will be used to assess off-site emissions at the site perimeter for comparison to site-specific action levels established for the air monitoring stations to determine if additional emission control measures are necessary. Air samples will be collected at stationary sample locations for laboratory analysis to demonstrate that the remedial activities had no significant impact to human health or the environment in the vicinity of the site.

The specific tasks to be completed to achieve the objectives of the air monitoring program include:

- *Baseline Monitoring* – The objective of baseline monitoring is to perform air sampling to document and provide baseline data for ambient air quality at the perimeter monitoring stations of the remediation site prior to the start of remedial activities. Baseline data is used to compare typical air quality at the site with air quality conditions during remediation activities. Baseline air monitoring will be performed prior to the beginning of remedial actions.
- *Real-time Ambient Air Monitoring* – Real-time ambient air quality will be monitored at the perimeter of the site during remedial activities to document perimeter air quality conditions. Real-time air monitoring will be compared to site-specific action levels to determine if the implementation of additional emission control measures is necessary.
- *Ambient Air Sampling* – Ambient air quality samples will be collected for laboratory analysis in order to perform an assessment of the air quality impact to the area surrounding the site from remediation activities. The intent is to demonstrate that the remediation activities at the site did not result in emissions that adversely impacted human health. Ambient air sampling will be performed during the baseline monitoring period, the remedial activities, and the post-remediation monitoring period.
- *Meteorological Monitoring* – A meteorological monitoring station shall be established to monitor weather conditions throughout the duration of the project, including the baseline monitoring, the monitoring during the remedial action activities, and the post-remediation monitoring.

2 AIR MONITORING PROGRAM

Perimeter air monitoring will be conducted during the baseline, the active remediation and the post-remediation phases of the project with real-time and time-integrated sample collection instruments. Real-time air monitoring will be conducted at regular intervals throughout the workday to monitor measured concentrations of photoionizable (volatile) vapors, benzene, and particulates. The real-time air quality data will be collected to assess short-term (daily) exposures, identify when measured parameters approach action levels, and determine when additional emission control measures may be necessary. Time-integrated sampling will be conducted to monitor concentrations of volatile organic compounds (VOCs), polycyclic aromatic Hydrocarbons (PAHs), and particulate matter measuring less than 10 microns in diameter at the perimeter of the site. Table 1 summarizes the constituents for which analyses will be performed. The analytical data will be used to evaluate potential off-site exposure to air emissions that occurred during the site activities.

2.1 Air Monitoring Station Placement

Six perimeter air monitoring stations (AMS) identified as AMS-1 through AMS-6 are proposed to be placed at intervals along the perimeter fence line at the locations as shown on Figure 2. The AMS will be locations for the collection of time-integrated air samples using USEPA Methods TO-13A, TO-15, and PM-10 to perform real-time air monitoring using field instrumentation. To satisfy project-specific QA/QC sampling requirements, a duplicate station (AMS-3D) will be co-located at the AMS-3 location on the north perimeter fence for duplicate sample collection purposes. The AMS most closely positioned to monitor conditions between the excavations and the nearest potential residential receptor was selected to serve as a duplicate AMS. In addition to the 6 AMS, twenty-six intermediate perimeter monitoring locations (IPML) have been established at 60' intervals (Figure 1) for the evaluation of perimeter conditions using only field instrumentation.

Placement of the AMS were based on locating them along each primary site boundary corresponding to the site orientation while also incorporating the configuration of the property and the predominant wind direction for the months of January to December. The AMS locations selected should provide representative data of ambient air quality at the perimeter of the site along each boundary of the site. The potential receptors are identified on Figure 2.

The site is located immediately east of the intersection of North Fifth Street and Hill Street. The remediation site encompasses an area of approximately 2.4 acres. The property is currently a vacant lot that is secured by a chain-link

fence around its perimeter with three locked gates. The site is generally level and covered with grass.

This area of Champaign is primarily residential, with light commercial activity to the southeast (Figure 2). The residential properties proximate to the site are located directly north of the property line, across the railroad tracks. Residential properties to the south are separated from the site by an alley. These include a single residence and the Center for Women and Children in Transition. Immediately east of the site is the Sixth Street right-of-way, which is now abandoned between the railroad right-of-way and the alley south of the site. That area is now grass-covered. Other property east of the vacated Sixth Street right-of-way is zoned commercial and consists of vacant land and parking lots, which includes the Medical Center and it's associated parking lots. North Fifth Street borders the site to the West and separates the site from residential properties. Formerly, Hill Street bisected the site in the east-west direction but is now part of the site. The nearest residences in this direction are 410 and 412 E. Hill Street. There are several lots that line Fifth Street that are vacant or in the case of 308 N. Fifth Street, 412 E. Hill Street, and 507 E. Washington Street, were purchased by Ameren, demolished, and will be converted to a gravel parking lot for this project.

Prevailing wind directions based on historical meteorological data were collected from the Midwest Regional Climate Center. The weather service station at University of Illinois, Willard Airport was selected because of its location in Champaign, Illinois. The historical weather data was reviewed to assist with conceptually locating the monitoring stations. Historical weather data for the months of January through December indicate predominant wind directions are from the south and the southwest. A wind rose diagram of historic prevailing wind directions for the months of January through December, along with yearly averages are provided in Appendix A.

Time-integrated sampling equipment will be placed on secure platforms at each AMS. The position of the sampler inlet will be situated approximately one meter from the top of the perimeter fence in accordance with USEPA guidance (Air/Superfund National Technical Guidance Study Series, Volume IV, EPA-45 1 /R-93-007, May, 1993). The stationary samplers will be positioned at each selected location using the following criteria:

- Located along the fence line or boundary of the site ;
- The instrument sample inlet will be placed approximately two meters above the ground ;
- The monitor will be located at a minimum of two meters from the nearest solid obstruction to allow airflow, and two times the height of the obstruction where possible;

- When possible, the immediate surroundings will have ground cover to prevent surface dust from affecting the measurements;
- The monitor will be installed on a flat surface with suitable accessibility, and will receive unrestricted airflow from at least three cardinal wind directions (270°), including the predominant wind direction;
- The monitor will be located away from combustion or fuel sources, when possible; and,
- 24 hour Security, electrical power, and (if remotely operated or reporting) communication lines will be provided.

Site-specific locations will be determined during setup at the site using the above criteria. Based on the limited space available, meeting all of the above criteria may not be possible at all monitoring stations. The locations will be selected to minimize interference of obstructions. Air sampling stations may be temporarily relocated, if stations interfere with excavation or other activities. If the air monitoring stations are relocated, revised AMS location will be noted in the field notebook with an explanation for the AMS relocation.

2.2 Baseline Air Monitoring

Baseline ambient air sampling will be conducted to characterize site air quality prior to the start of remedial activities. The baseline ambient air monitoring shall consist of real-time air monitoring, time-integrated sampling, and meteorological monitoring during a 72-hour period. The real-time air monitoring will be performed using the procedures described in Sections 2.3 and 2.4 of this AAMP, except that real-time air monitoring will only occur twice daily (morning and afternoon) during baseline monitoring. Time-integrated samples for off-site laboratory analysis will be collected from each AMS at the end of the 72-hour baseline monitoring period. Samples will be collected at all AMS locations and the duplicate AMS location; no partial sampling events are scheduled during baseline monitoring.

2.3 Real–Time Air Monitoring

Real-time monitoring for dust, VOCs, and benzene will be conducted at the AMS, the IPML and adjacent to the work zone on all days when remedial action activities are in progress and during the hours of operation. Real-time air monitoring will be conducted hourly (on average) at the AMS and IPML, and twice daily (morning and end of shift) at the inlet and discharge of the

carbon units. The type of real-time monitoring performed shall be in accordance with the following critera:

- *Each AMS* – real-time monitoring for particulate dust, VOCs, and benzene;
- *Downwind IPML* – real-time monitoring for particulate dust, VOCs, and benzene;
- *All Other IPML* – real-time monitoring for particulate dust and VOCs;
- *AMS or IPML with Real-time PID Reading Exceeding the Action Level* – real-time monitoring for benzene following the guidelines established for exceeding an action level.
- *Inlet and outlet of the carbon filtration units* – P.I.D. Readings and odor intensity monitoring.

Real-time perimeter monitoring will also take place when significant changes occur in the on-site activities outside of the regularly scheduled intervals. Real-time air monitoring at the AMS and IPML will be completed along the site perimeter at the end of each workday to verify that particulate and vaporous concentrations do not exceed the action level concentration. AMS and IPML will be clearly identifiable during the field activities for easy return to the location on a regular basis. The locations are shown on Figure 1.

During hourly real-time perimeter air monitoring, the field technician will record current meteorological conditions (wind direction and speed, temperature, humidity, and barometric pressure) from the on-site meteorological station. Air quality measurements will be collected from the "breathing zone" (3' to 6' above ground surface) at each AMS and IPML as specified above. The field technician will point the instrument toward the open excavation or any stockpile area, the instrument will be allowed to equilibrate and a reading from each instrument will be recorded on the data sheet. The average concentration measured over a 1-minute sample interval will be recorded at each AMS and IPML.

The Air Monitoring Data Form (Appendix B) will be used to record measured concentrations from the dust monitor, photoionization detector (PID) and a gas chromatograph (GC). The Air Monitoring Data form will be posted daily in a display case at the east fence line. A description of real-time monitoring methods and equipment are provided in the following subsections.

2.3.1 Particulates

Real-time monitoring of fugitive particulates will be conducted during hourly perimeter monitoring using a TSI Dusttrak II Aerosol Monitor (or equivalent instrument) at each AMS and IPML. The detection limit for the Aerosol Monitor will be 0.001 milligrams per cubic meter (mg/m^3). Instrument readings will be observed and recorded either manually to data sheets or transferred from the data-logger to electronic files.

An average concentration measured at each perimeter monitoring location over a 1-minute sample interval will be recorded. The result will be compared to the action level for particulates to assess air quality. Visible emissions of dust leaving the site will be evaluated and addressed regardless of instrument readings.

2.3.2 Volatile Organic Compounds

Real-time monitoring for VOCs will be conducted using a RAE MiniRAE portable PID with a 10.6ev lamp (or equivalent instrument). The PID will be used to non-selectively monitor VOC concentrations at the site perimeter. The PID will have a lower detection limit of 0.1 parts per million (ppm).

The PID will be used to monitor air quality at each AMS and IPML along the fence line. Periodic PID measurements will also be collected adjacent to active work areas and any stockpiles to evaluate work zone air quality for comparison to perimeter air quality. Instrument readings will be measured over a 1-minute sample interval at each location and the average concentration will be recorded either manually to data sheets or downloaded from the data-logger to a database.

2.3.3 Benzene

Real-time monitoring of benzene will be conducted using a Photovac Voyager (Voyager) portable GC (or equivalent instrument). The portable GC will be used to selectively monitor benzene concentrations in air. Of all expected volatile constituents in MGP residuals, benzene is the analyte of most concern; therefore, benzene was chosen for selective GC monitoring. The portable GC has a lower detection limit for benzene that ranges between 0.002 to 0.005 ppm. All GC files will be downloaded daily.

The portable GC will be used to monitor benzene concentrations at each AMS and at a selected IPML that is downwind from the work area. The portable GC will also be used to monitor benzene concentrations at any AMS or IPML for which the VOC concentration as measured by the PID exceeds the action level. The GC will be setup to automatically activate an audio alarm when the pre-set action limit concentration is exceeded.

2.4 Time-Integrated Sampling

Ambient air sampling will be conducted using stationary integrated samplers at each AMS located along the perimeter fence for the collection of samples for laboratory analysis. A description of ambient air monitoring methods and equipment are provided in the following subsections.

2.4.1 Sample Frequency and Duration

Ambient air sampling will be conducted throughout the duration of the site activities on approximate 72-hour periods. As this remediation project is scheduled for 4 Phases of remedial activities, with 4 sprung structure moves. It is anticipated that based on analytical data, time-integrated air monitoring may be suspended during structure demobilizations and remobilizations. The sampling schedule may also be interrupted during holidays or extended inclement weather if no activities are conducted. Air sampling will be concluded once all excavation and impacted soil handling activities have been completed and the excavated area has been backfilled. Air monitoring activities will not be conducted during site restoration. A baseline sample event, as described in Section 2.2, will be scheduled prior to the start of site activities to document site conditions.

2.4.2 Sample Collection and Analysis

At each stationary AMS location, an air sampler will be installed for the collection of air samples for analysis of PNAs, VOCs, and PM10 concentrations. Sampling and laboratory for PNAs and VOCs analysis will be completed in accordance with USEPA Methods TO-13A and TO-15. The list of the PNA and VOC compounds to be analyzed and the laboratory detection limits for each method is listed in Table 1. PM10 sampling and analysis will be in accordance with EPA Method 40 CFR, Part 50, Appendix M – "Reference Method for Determination of Particulate Matter as PM10 in the Atmosphere". Should soil sample

laboratory analytical results from confirmation soil samples of the excavations indicate that either VOCs or PAHs are not present at levels that may provide for air emissions, the collection, analyses, and reporting of the air samples may be altered to reflect those conditions.

Following the completion of each air monitoring event, the samples will be packaged and prepared for overnight delivery to the analytical laboratory selected for the project. Chain-of-custody forms and the Ambient Air Monitoring Sheet will accompany all samples during shipment. Air monitoring forms are included in Appendix B.

2.4.2.1 Polycyclic Aromatic Hydrocarbons Compounds (PAHs)

Samples for PAHs will be collected using Tisch Environmental Model GPS-1 samplers and PUF sampling system or equivalent media. Sampling and laboratory analysis will be completed in accordance with USEPA Method TO-13A.

The GPS-1/PUF sampling system collects suspended airborne particulates and organic vapors to measure total PAH emissions. Air is being drawn through a two-stage sample media containing a quartz particulate filter and an adsorbent cartridge for vapor entrapment. Particulate-bound PAHs will be collected on a 4-inch-diameter acid-washed quartz-fiber filter and the gaseous fraction of PAHs will be collected in the secondary 2-inch-diameter by 3-inch-long glass PUF cartridge, packed with polyurethane foam (PUF) and XAD-2 resin, as described in the USEPA Method TO-13A.

The PUF sampling system operates on 110 VAC, 10 Amp per pump/unit and has an electronic data recorder to document continuous operation during sampling events. The variable flow pumps will be set to sample at approximately 250 liters per minute (LPM) flow rate over the duration of the 72-hour sampling period. The flow rate will be monitored during real-time perimeter monitoring.

At the conclusion of each 72-hour sampling event, the PUF cartridge and filter will be prepped for shipping to the lab and repackaged in the laboratory supplied sample container. The samples will be stored on site in a refrigerated system at a temperature not to exceed 4°C (62°), and protected from ambient or artificial light exposure to prevent decomposition of photo-sensitive PAHs. The laboratory will analyze each

sample (PUF and filter) as one sample. Samples recovered from the sampling equipment on the weekends will be preserved onsite until the following Monday.

2.4.2.2 Volatile Organic Compounds

Samples for VOCs will be collected using laboratory certified, 6.0-liter SUMMA canisters and reset flow regulators. Sampling and laboratory analysis will be completed in accordance with USEPA Method TO-15.

The flow controller will be used to regulate the flow rate into the canister. The flow controller will be constructed to provide a constant flow rate of 1.2 to 1.33 ml/min over the 72-hour sampling period. Vacuum gauges will be attached between the flow regulator and SUMMA canisters to monitor vacuum pressure in the canisters during the 72-hour sample period. Vacuum pressure measurements will be recorded at each station during real-time perimeter monitoring. Flow regulation will be checked or recalibrated if pressure readings deviate from the anticipated 0.4 in. Hg per hour rate of change in pressure.

The laboratory will provide pre-cleaned and certified 6-liter SUMMA canisters for sample collection. The SUMMA canisters will be evacuated by the laboratory to the minimum prescribed negative pressure of -27 inches of mercury (in. Hg). The vacuum pressure in each SUMMA canister will be checked prior to use. If the vacuum pressure is less than -27 in. Hg, the SUMMA canister will not be used.

2.4.2.3 PM10 Particulate Matter

Particulate matter measuring less than 10 microns in diameter will be collected using high volume Grasby-Anderson motors and PM10 monitoring stations at each of the 6 AMS locations. Filter media used for the collection of PM10 samples will be pre-weighted quartz filters as in accordance with USEPA Method PM10 specified in 40CFR 50, Appendix J.

2.5 Meteorological Monitoring

A MetOne Instruments, Inc. AutoMet self-contained digital meteorological system (or equivalent) will be used to measure and record wind speed and wind direction, ambient temperature, relative humidity, and barometric pressure at 10-second intervals. The recorded measurements will be averaged over 60-minute increments by the system's internal software. The 60-minute average measurements for each meteorological parameter will be stored in the AutoMet data logger and downloaded periodically.

The meteorological system will be mounted on either a 10-foot aluminum mast or a 10-foot tripod depending upon the monitoring location selected. The monitoring location will be selected to minimize interferences from surrounding natural or man-made obstructions. The mast or tripod mounted system will be equipped with a lightning rod and grounding system. If the meteorological system is mounted on a structure (stack or roof of a building), it will be mounted on a 10- to 15-ft mast placed on the side of the structure facing the prevailing wind direction. The system will be powered by 115 Volt AC, 20 amp electrical service.

Installation and operation of the meteorological monitoring system will be conducted in accordance with manufacturer specifications. Data collected during the monitoring program will be routinely screened for potential operational problems. General weather conditions will be recorded daily in the field notebook or on field forms.

2.6 Quality Assurance/Quality Control

The following sections provide a brief description of the quality assurance/quality control (QA/QC) procedures to be implemented for the ambient air monitoring program.

2.6.1 QA/QC Samples

Field blanks (duplicate and trip blanks) will be collected in accordance with USEPA Methods TO-13A and TO-15 QA/QC sampling requirements. Laboratory QC will be in accordance with the requirements for the methods. Full Contract Laboratory Program (CLP) data packages will be provided for all analyses completed by the laboratory. Field QA/QC sample frequency is provided below.

Field Duplicates

Duplicate PNA and VOC samples will be collected at a 10% frequency during baseline air sampling and for the duration of the remedial actions. One duplicate sample will be collected during the baseline event completed prior to the start of remedial activities. During remediation, one duplicate sample will be collected per week. Duplicate samples will be collected at the duplicate sample station AMS-3D, co-located at sample location AMS-3 immediately north of the site.

Trip Blanks

Trip blanks will be submitted to the laboratory for PNA analysis with each sample event submitted. Cartridges will be selected from the sample batches at random and submitted with the collected samples for analysis as a trip blank.

Trip blanks will not be submitted for VOC analysis. The chain of custody for the SUMMA canisters documents vacuum pressure from the time the canisters are delivered to the site until the canisters are returned to the laboratory for analysis. The vacuum pressure record for each canister provides the assurance that the samples were not compromised prior to analysis.

2.6.2 Instrument Calibration and Checks

Periodic calibrations and checks are required on the field instruments and equipment to be used for the ambient air monitoring program. Daily instrument calibrations, or calibration checks, will be conducted at the beginning of each shift. The calibration results will be recorded in the calibration log form provided in Appendix B. The following sections provide a brief description of the calibrations and checks required for each piece of equipment.

Aerosol or Dust Monitor

The aerosol monitor will be calibrated daily in accordance with the manufacturer's specifications and results recorded on the calibration log form.

Photoionization Detector

The PID will be calibrated daily by the field-sampling technician using 5 ppm and 100 ppm isobutylene calibration gas and in accordance with

necessary throughout the day to verify calibration of the instrument. Instrument calibration will be recorded on the calibration log form.

Portable Gas Chromatograph

The GC will be calibrated by the field-sampling technician at the start of each shift using 1 ppm benzene calibration gas. Span checks will be completed as necessary throughout the day to verify calibration of the instrument. Instrument calibration will be recorded on the calibration log form.

Sampling Using USEPA Method TO-13A

The TO-13 sampling systems will be calibrated in accordance with USEPA Method TO-13A procedures and manufacturer's instructions. A multiple point calibration will be completed in the field for comparison to the instrument calibration curve. The multiple point calibration will be performed at a minimum once during the project or on a frequency of once-per-month, whichever is greater. The samplers will be recalibrated if relocated and following instrument maintenance. A daily single-point calibration check will be performed prior to, and at the conclusion of, each 72-hour sampling event. A conventional U-tube manometer will be used to determine the operational flow rate of the instrument, and provide a correlation between flow rate and the magnehelic gauge reading. Calibration data will be recorded on air monitoring forms provided in Appendix B.

Sampling Using USEPA Method TO-15

The flow controllers used for TO-15 sampling will be purged and calibrated prior to each use. Calibration and decontamination procedures to be followed during sample preparation were developed by the laboratory supplying the sampling equipment. Prior to each use, the flow controllers will be back flushed with ultra-high-pure nitrogen gas for a minimum of 8 hours. The flow controllers will then be calibrated using a flow meter. The flow rate is checked to determine if it is within the acceptable range. The flow controllers can be adjusted as necessary to meet the target final vacuum pressure of –5 in. Hg. Purge and calibration data will be recorded on calibration data sheets provided in Appendix B.

Sampling Using EPA Method 40 CFR, Part 50, Appendix M – PM10

A multiple point calibration will be completed in the field for comparison to the instrument calibration curve. The multiple point

calibration will be performed at a minimum once during the project or on a frequency of once-per-month, whichever is greater. The samplers will be recalibrated if relocated and following instrument maintenance. A daily single-point calibration check will be performed prior to, and at the conclusion of, each 72-hour sampling event. A conventional U-tube manometer will be used to determine the operational flow rate of the instrument, and provide a correlation between flow rate and the magnehelic gauge reading. Calibration data will be recorded on air monitoring forms provided in Appendix B. PM10 sampling and analysis will be in accordance with EPA Method 40 CFR, Part 50, Appendix M – Reference Method for Determination of Particulate Matter as PM10 in the Atmosphere.

Meteorological Weather Station

Meteorological sensors will be calibrated by the supplier prior to shipment and properly oriented in accordance with manufacturer instructions. Weather conditions will be recorded in the field notebook or on field forms to be compared with the meteorological data collected.

3 AMBIENT AIR ACTION LEVELS

Action levels were developed for real-time and time-integrated air monitoring at the site. Risk-based action levels were developed to maintain perimeter air quality at an acceptable level during remedial activities. Discussion of the action levels is provided in the following sections.

Project specific air quality standards or acceptable exposure levels were developed using risk-based exposure equations for inhalation and are presented in Table 2. The project specific air quality standards are based on project specific data, represent a projected 54-week project duration, and are used to develop a maximum acceptable exposure concentration to a theoretical sensitive receptor. The potential receptor locations are identified on Figure 2. The project specific air quality standards will be used to assess the effectiveness of the air monitoring program following the completion of the project. The project specific exposure levels were also used to develop the tiered action levels for real-time monitoring results of volatile emissions to help prevent exceedance of the project air quality standards to potential receptors.

3.1 Receptor Exposure Levels

Prior to calculating site-specific action levels, acceptable exposure levels to potential receptors were developed to serve as a basis for potential exposure to constituents that could potentially be emitted from the site during the remedial actions. These potential exposures would be derived for the emission of dust particulate, VOCs, and benzene.

3.1.1 Particulates

The ambient air exposure level for particulates was established based on the National Ambient Air Quality Standards (NAAQS). The NAAQS 24-hour average concentration for particulates with diameters of 10 microns or less is **0.150 mg/m^3**.

3.1.2 Volatile Organic Compounds

The NIOSH and OSHA time weighted average (TWA) action level for benzene is 1.0 part per million (ppm). One-half of the OSHA action level or **0.5 ppm** was selected as the acceptable exposure limit to potential off-site receptors for VOCs as measured with field instruments.

3.1.3 Benzene

Short term exposure levels to potential off-site receptors were developed using risk-based exposure equations for the inhalation of vapors as outlined in USEPA's Risk Assessment Guidance for Superfund document and the IEPA's Tiered Approach for Corrective Action (TACO) document. The risk-based exposure equation

$$C_{exp(c)} = [TR \times BW \times AT_c] / [SF_i \times IR \times EF \times ED]$$

was used for potential exposure for carcinogenic effects. Where the following are defined:

$C_{exp(c)}$ = Acceptable risk-based air concentration for carcinogenic constituent.
TR = Target cancer risk level (1 per 1,000,000 occurrences).
BW = Body weight. Kg
AT_c = Averaging time for carcinogens.
SF_i = Inhalation Slope Factor for carcinogens
IR = Inhalation Rate.
EF = Exposure Frequency.
ED = Exposure Duration.

The risk-based exposure equation

$$C_{exp(nc)} = [THI \times RfD_i \times BW \times AT_{nc}] / [IR \times EF \times ED]$$

was used for non-carcinogenic effects. Where the following are defined:

$C_{exp(nc)}$ = Acceptable risk-based air concentration for noncarcinogenic constituent.
THI = Target Hazard Index (1).
BW = Body weight.
AT_{nc} = Averaging time for noncarcinogens.
RfD_i = Inhalation reference dose for noncarcinogens.
IR = Inhalation Rate.
EF = Exposure Frequency.
ED = Exposure Duration.

Most of the potential receptors in the vicinity of the remediation site are residential properties to the north, west and south, with commercial/industrial property users to the west of the remediation site. As a conservative approach to deriving an acceptable maximum exposure level for benzene, the "theoretical sensitive receptor" model used is a potential child receptor in a residential setting with 24-hour per day exposure over a 54-week duration of the project. The standard USEPA default values for target cancer risk, body weight, inhalation

exposure level for benzene, the "theoretical sensitive receptor" model used is a potential child receptor in a residential setting with 24-hour per day exposure over a 54-week duration of the project. The standard USEPA default values for target cancer risk, body weight, inhalation rate, averaging time, and exposure frequency values were used as input parameters. The inhalation slope factor and inhalation reference dose values were obtained from the USEPA Integrated Risk Information System (IRIS). The exposure duration was based upon the estimated project duration of 54 weeks. An acceptable target risk exposure level concentration of **0.081 mg/m^3 (0.026 ppm)** was calculated for benzene based on the theoretical sensitive receptor model.

3.2 Real-Time Action Levels

The real-time action levels were developed to serve as an indicator of acceptable short-term air quality and to identify when emission control responses are necessary. Real-time action levels were developed for particulates, total VOCs as measured by field instruments, and for the single constituent benzene because of its low exposure level as established by IRIS, its potential ease of volatility and mobility, and the capability of field instruments to identify and quantify the constituent. The real-time action levels were developed using air quality workplace and ambient air standards, air dispersion modeling, the capability of the field screening and analytical instruments, and knowledge of MGP waste characteristics.

Air quality measurements of particulates, volatiles, and benzene concentrations will be collected at AMS and the downwind IPML. The average PID and particulate concentrations will be measured over a 1-minute sample interval and recorded on data sheets. Benzene concentrations will also be measured at any IPML with PID readings that exceed the action levels for volatiles.

Action levels established for each of the three real-time monitoring parameters (particulates, volatiles, and benzene) are provided in the following sections. The action levels were calculated from the exposure levels described in Section 3.1 with adjustments made for actual intervals of field activities and wind dispersion. The action levels were selected to maintain acceptable daily air quality at the site, and reduce the potential for subsequent emissions at higher concentrations. Action levels and response guidelines for action level exceedances are provided in Table 3. Recommended emission control response actions for action level exceedances are discussed in Section 3.3.

3.2.1 Particulates

An ambient air action level for particulates was established for the site based on NAAQS. The NAAQS 24-hour average concentration for particulate with diameters of 10 microns or less is 0.150 mg/m^3. The real-time (instantaneous) action level of **0.360 mg/m^3** was developed for particulate concentrations at the site perimeter based on a 8-hour working day. The average concentration measured over a 1-minute sample interval will be reported at each location. Visible emissions of dust particulate leaving the site will be evaluated and addressed regardless of instrument readings.

3.2.2 Volatile Organic Compounds

An ambient air action level for volatiles was established for the site based on NIOSH and OSHA TWA values for benzene. A real-time (instantaneous) action level of **0.5 ppm** (one-half the OSHA benzene TWA) was selected as the action level for TVOCs at the site perimeter. The PID will be used to monitor non-specific concentrations of total photoionizable vapors present. The detection of photoionizable vapors provides an indication of the potential presence of benzene vapors. In the event a PID measurement exceeding 0.5 ppm is reported, the portable GC will be used to quantify the actual concentration of benzene present.

3.2.3 Benzene

The short-term risk-based, fence line, ambient air action levels for benzene for each AMS are presented in Tables 4 and 5. They have been established to help prevent unacceptable site-related benzene concentrations from leaving the site during the proposed remedial operations. The action levels were calculated using the short-term exposure level from Section 3.1 for benzene and adjusting for dispersion and the release of emissions only during working hours throughout the duration of the remedial actions.

The USEPA model Screen 3™ was used to estimate the dispersion of benzene concentrations for various atmospheric conditions along the distance from the source area to the fence line AMS and to the nearest off-site receptors in the general direction of the each AMS. The maximum assumed acceptable exposure concentration (**0.081 mg/m^3 or 0.026 ppm**) for a receptor was multiplied by a dispersion ratio to estimate an action level for each fence line and AMS. The dispersion ratio is the ratio of the effective dispersion from the source to the AMS

and workweek as minimal emissions are anticipated during nights and weekends.

Because five separate remediation areas or excavations are anticipated to be present during the four phases of remedial actions, action levels were independently calculated for emissions from each excavation to each AMS. The lower calculated action levels were then used for establishing the overall action levels for the project and at each fence line. Calculation sheets for the development of the adjusted action level concentrations are provided in Appendix C for each remediation area.

A benzene perimeter action level of **0.065 mg/m^3 (0.020 ppm)** was selected for the project and is based on the lowest calculated risk-based exposure concentration at a fence line AMS which would correspond to a maximum exposure of **0.019 mg/m^3 (0.006 ppm)** of benzene to a potential receptor throughout the duration of the project. As a conservative approach to monitoring for potential emissions from the site, this benzene action level will be applied at all perimeter monitoring locations (AMS and IPML) although fence line-specific action levels may be applied for the project. Fence line-specific action levels would apply the action level calculated for the specific fence line associated with the specified AMS for making decisions on implementation of emission controls.

If benzene action levels are being exceeded, engineering controls will be implemented by the remediation contractor to reduce vaporous emissions. Emission response decisions will be based on PID and GC readings as described in the procedures provided in Section 3.3.

3.2.4 Time-Integrated Exposure Levels

The time-integrated sampling monitors exposure potential from the remediation site emissions. The analytical results for each 72-hour sampling period will be tabulated to calculate average air concentrations for selected compounds detected over the duration of the site activities. The average air concentrations for the target compounds will serve as the measure of air quality at the site perimeter over the duration of the project. The air concentrations for each AMS will be compared to baseline concentrations collected at the start of the project and to the air quality standards developed for the 24-hour and 8-hour exposure scenarios. The air quality standards outlined in Table 2 were developed for BTEX and selected PNA compounds for each AMS location for a eight-week exposure period. Should the duration

of the project extend beyond the anticipated period, the air quality standards will be adjusted. The time-integrated daily sampling results will be compared to the air quality standards as they are received from the analytical laboratory to assess the effectiveness of emission control efforts during the site activities.

3.3 Response to Action Levels

Emission controls will be implemented at the site, as necessary, to maintain acceptable air quality at the perimeter of the site. Action levels developed for volatiles and particulates will be used to gauge relative air quality at the perimeter fence. Emission control measures will be implemented in the event action levels are exceeded. The response actions taken to control off-site emissions will be proportional to the severity of the exceedance at the perimeter fence line real-time measurements recorded. The frequency of real-time measurements collected will be increased until perimeter air quality no longer exceeds action levels. The site construction supervisor will be notified of each exceedance and applicable actions will be discussed to reduce off-site emissions. Control measures will be applied to the areas or tasks being completed in the order which least impedes progress of the site activities. Response guidelines to an action level exceedance are provided in Table 3.

3.3.1 Evaluation of Action Level Exceedance

If the real-time air monitoring action level for benzene is exceeded during perimeter air monitoring, the air monitoring technician will inform the site-supervisor and proceed with additional real-time air monitoring with the GC. Additional GC readings will be taken over a 5-minute interval at the location where the highest recorded measurement was detected. The total time for the GC to complete the analysis for benzene is estimated at 2 minutes. The average of three successive benzene runs with the GC will be used as the 5-minute average benzene concentration.

If the 5-minute average concentration exceeds the air action level for benzene, but is less than 10-times the action level, a 15-minute average concentration will be obtained from the same AMS or IPML. The 15-minute average concentration will be used to evaluate potential emission control measures. Should the 15-minute average continue to exceed the action level, emission control measures will be initiated and 15-minute average readings will be measured until such time as the concentration drops below the action level.

If the real-time air monitoring results indicate a benzene concentration greater than 10-times the action level, the air monitoring technician will immediately notify the site supervisor. The site supervisor will immediately initiate emission control measures. Air monitoring for 15-minute averages will proceed until such time as the 15-minute average concentration is less than the action level.

3.3.2 Emission Control Measures

If an action level is exceeded, the initial step will be to assess potential sources or material handling procedures that may be contributing to the unfavorable conditions. Actions taken to reduce volatile air emissions may include reducing the area of exposed soils, altering material handling procedures, reducing the rate of production, and/or covering exposed soil surfaces. Tarps, plastic sheeting, clean fill or cellulose/foam spray applications may also be applied, as applicable, to control emissions. Particulate emissions may be controlled by wetting working surfaces and haul roads, or by covering exposed soils in inactive work areas. If action levels are sustained over a 30-minute monitoring interval, work activities will be ceased until an effective response can be implemented. The increased frequency of real-time air monitoring will be continued until air quality at the site perimeter no longer exceeds action levels.

At the end of each shift, stockpiles and exposed soil surfaces will be covered to minimize emissions. Tarps, plastic sheeting or cellulose/foam suppressant applications may be used, as applicable. The air monitoring technician will monitor air quality at each perimeter location to verify that action levels are not being exceeded before leaving the site. The stockpile and excavation areas will be screened with the PID and inspected to assure that areas are properly covered.

4 DATA REPORTING

The following sections provide a description of the procedures used for recording field data.

4.1 Field Logbook

A field logbook and/or field forms will be maintained throughout the project. Information to be recorded in the logbook or field forms will include:

- description of remediation activities;
- general field weather conditions;
- general real-time perimeter monitoring observations;
- action levels exceedances; and
- emission control actions taken in response to action level exceedance.

Air monitoring data sheets and field forms are provided in Appendix B.

4.2 Real-Time Monitoring Data

The real-time air monitoring data will be maintained in a project logbook or electronic database. Field data including measured concentrations recorded during perimeter air monitoring rounds, calibration records, maintenance, sampling irregularities, and repairs will be recorded on data sheets and in the field logbook for the real-time air monitoring.

The real-time sampling results will be routinely reported to the site manager to allow prompt evaluation and response to potential emission problems when action levels have been approached or exceeded.

4.3 Time-Integrated Sampling Data

Field data, including equipment calibration, sample identification; equipment maintenance, sampling irregularities, and shipments will be recorded in air data sheets and the field logbook. A set of field logbooks will be maintained for the time-integrated sampling network to log daily information of the nature described above, pertinent to documenting the time-integrated sampling program.

The accumulated time-integrated results, field data, and comparison to the project air quality standards will be presented in the Ambient Air Monitoring Report.

Unless a sampling event is pulled on a Saturday or holiday, samples will be shipped to the laboratory within 24 hours of collection and analyzed within recommended holding times. If a sampling event is pulled on a Saturday or holiday, sample media required to be iced, will be placed in an on-site freezer and shipped to the lab the next business day. Preliminary results will be reported to the site manager to assess potential air quality concerns due to site activities. Laboratory report results will be summarized in the project completion report. The summary will include site conditions, sampling and analytical procedures, and analytical results.

Definitions

AAMP – Ambient Air Monitoring Plan

Action Level – Calculated on-site concentration established for the IPMLementation of emission controls.

AMS – Air monitoring station: temporary air monitoring structure established to house and contain instrumentation for the collection of air samples for off-site laboratory analysis.

Exposure Levels – Calculated risk-based concentration for exposure to potential receptor for a target cancer risk level of 10^{-6} or a noncarcinogenic target hazard index of 1.

GC – Gas chromatograph.

IPML – Intermediate perimeter monitoring location: locations established along the perimeter of the site for measuring air quality conditions for particulate dust, volatile organic compounds, and benzene using aerosol or dust monitoring, PID or FID, and portable GC, respectively.

PID – Photoionization detector.

Real-time – On-site readings measured using field instrumentation.

Remedial action activities – Activities associated with remedial actions that include, but are not limited to the excavation, staging, blending, treating, loading, transporting backfilling, grading, of materials on site.

Time-integrated – Collection of air sample continuously and throughout the duration of the specified period.

REFERENCES

U.S. Environmental Protection Agency (USEPA). Office of Research and Development, National Center for Environmental Assessment. 1997. *Exposure Factor Handbook.* (EPA/600/P-95/002Fa)

U.S. Environmental Protection Agency (USEPA). January 1999. *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition, Compendium Method T0-13A*, Determination of Polycyclic Aromatic Hydrocarbons (PAHs) in Ambient Air Using Gas Chromatography/Mass Spectrometry (GC/MS) June (with applicable updates).

National Archives and Records Administration, Code of Federal Regulations – Protection of Environment 40, Part 50, 1997. National Primary and Secondary Ambient Air Quality Standards, Appendix M – Reference Method for the Determination of Particulate Matter as PM_{10}. in the Atmosphere.

U.S. Environmental Protection Agency (USEPA). Office of Air Quality Planning and Standards, 1998. *Quality Assurance Handbook For Air Pollution Measurement Systems, Volume II: Part 1, Ambient Air Quality Monitoring Program Quality System Development.* (EPA-415/R-98-004)

List of Tables

Table 1
Monitored Constituents and Laboratory Method Detection Limits
Ameren-IP MGP
Champaign, Illinois

Component	MDL	Units
PAH (Method TO-13A)		
Naphthalene	1.0	ug
2-Methylnaphthalene	1.0	ug
2-Chloronaphthalene	1.0	ug
Acenaphthylene	1.0	ug
Acenaphthene	1.0	ug
Fluorene	1.0	ug
Phenanthrene	1.0	ug
Anthracene	1.0	ug
Fluoranthene	1.0	ug
Pyrene	1.0	ug
Chrysene	1.0	ug
Benzo(a)anthracene	1.0	ug
Benzo(b)fluoranthene	1.0	ug
Benzo(k)fluoranthene	1.0	ug
Benzo(a)pyrene	1.0	ug
Indeno(1,2,3-c,d)pyrene	1.0	ug
Dibenz(a,h)anthracene	1.0	ug
Benzo(g,h,i)perylene	1.0	ug
VOCs (Method TO-15)		
Freon 12	1.0	ppbv
Freon 114	1.0	ppbv
Chloromethane	1.0	ppbv
Vinyl Chloride	1.0	ppbv
Bromomethane	1.0	ppbv
Chloroethane	1.0	ppbv
Freon 11	1.0	ppbv
1,1-Dichloroethene	1.0	ppbv
Freon 113	1.0	ppbv
Methylene Chloride	1.0	ppbv
1,1-Dichloroethane	1.0	ppbv
cis-1,2-Dichloroethene	1.0	ppbv
Chloroform	1.0	ppbv
1,1,1-Trichloroethane	1.0	ppbv
Carbon Tetrachloride	1.0	ppbv
Benzene	1.0	ppbv
1,2-Dichloroethane	1.0	ppbv
Trichloroethene	1.0	ppbv

Component	MDL	Units
VOCs (Method TO-15)		
trans-1,3-Dichloropropene	1.0	ppbv
1,1,2-Trichloroethane	1.0	ppbv
Tetrachloroethene	1.0	ppbv
Ethylene Dibromide	1.0	ppbv
Chlorobenzene	1.0	ppbv
Ethyl Benzene	1.0	ppbv
m,p-Xylene	1.0	ppbv
o-Xylene	1.0	ppbv
Styrene	1.0	ppbv
1,1,2,2-Tetrachloroethane	1.0	ppbv
1,3,5-Trimethylbenzene	1.0	ppbv
1,2,4-Trimethylbenzene	1.0	ppbv
1,3-Dichlorobenzene	1.0	ppbv
1,4-Dichlorobenzene	1.0	ppbv
Chlorotoluene	1.0	ppbv
1,2-Dichlorobenzene	1.0	ppbv
1,2,4-Trichlorobenzene	1.0	ppbv
Hexachlorobutadiene	1.0	ppbv
Propylene	1.0	ppbv
1,3-Butadiene	1.0	ppbv
Acetone	1.0	ppbv
Carbon Disulfide	1.0	ppbv
2-Propanol	1.0	ppbv
trans-1,2-Dichloroethene	1.0	ppbv
Vinyl Acetate	1.0	ppbv
2-Butanone (Methyl Ethyl K	1.0	ppbv
Hexane	1.0	ppbv
Tetrahydrofuran	1.0	ppbv
Cyclohexane	1.0	ppbv
1,4-Dioxane	1.0	ppbv
Bromodichloromethane	1.0	ppbv
4-Methyl-2-pentanone	1.0	ppbv
2-Hexanone	1.0	ppbv
Dibromochloromethane	1.0	ppbv
Bromoform	1.0	ppbv
4-Ethyltoluene	1.0	ppbv
Ethanol	1.0	ppbv
Methyl tert-Butyl Ether	1.0	ppbv
Heptane	1.0	ppbv

MDL - Method Detection Limit
PAHs - Polycyclic Aromatic Hydrocarbons
VOCs - Volatile Organic Compounds

Table 2
Air Quality Standards
Ameren-IP Former MGP Site
Champaign, Illinois

Air Quality Standards

Constituent	RfD_i (mg/kg-d)	SF_i $(mg/kg\text{-}d)^{-1}$	$C_{air\text{-}nc}$ mg/m^3	$C_{air\text{-}c}$ mg/m^3	Receptor AQS mg/m^3
Benzene	1.70E-03	2.90E-02	5.21E-01	2.47E-02	2.47E-02
Toluene	1.14E-01		3.50E+01		3.50E+01
Ethylbenzene	2.90E-01		8.89E+01		8.89E+01
Xylene (total)	2.00E-01		6.13E+01		6.13E+01
Acenaphthylene	3.00E-03		9.20E-01		9.20E-01
Benzo(a)anthracene		3.10E-01		2.31E-03	2.31E-03
Benzo(a)pyrene		3.10E+00		2.31E-04	2.31E-04
Benzo(b)fluoranthene		3.10E-01		2.31E-03	2.31E-03
Benzo(k)fluoranthene		3.10E-02		2.31E-02	2.31E-02
Chrysene		3.10E-03		2.31E-01	2.31E-01
Dibenzo(a,h)anthracene		3.10E+00		2.31E-04	2.31E-04
Fluorene	4.00E-02		1.23E+01		1.23E+01
Indeno(1,2,3-cd)pyrene		3.10E-01		2.31E-03	2.31E-03
Naphthalene	8.60E-04		2.64E-01		2.64E-01
Phenanthrene	3.00E-02		9.20E+00		9.20E+00

Input Parameters

Parameter	Description	Units	Value	Reference
THI	Target Hazard Index	unitless	1	USEPA
TR	Target Cancer Risk	unitless	1.00E-06	USEPA
RID_i	Inhalation Referncee Dose	mg/kg-d	see above	USEPA
SF_i	Inhalation Slope Factor	$(mg/kg\text{-}d)^{-1}$	see above	USEPA
BW	Body Weight (child)	kg	19	USEPA
AT_{nc}	Averaging Time for non-carcinogens (residential)	years	30	USEPA
AT_c	Averaging Time for carcinogens (residential)	years	70	USEPA
IR	Inhalation Rate (child)	m^3/day	8.4	USEPA
EF	Exposure Frequency	days/year	350	USEPA
ED	Exposure Duration (12 weeksPhase 1)	year	0.231	site-specific
$C_{air\text{-}nc}$	Risk-based air concentration for noncarcingens	mg/m^3	calcuated	see below
$C_{air\text{-}c}$	Risk-based air concentration for carcingens	mg/m^3	calcuated	see below

Equations

$C_{air\text{-}nc} = (THI \times RID_i \times BW \times AT_{nc}) / (IR \times EF \times ED)$	Eq. R10
$C_{air\text{-}c} = (TR \times BW \times AT_c) / (Sf_i \times IR \times EF \times ED)$	Eq. R9

Receptor AQS (Air Quality Standard) is maximum acceptable concentration at receptor point.
Exposure based on sensitive (child) receptor, 24-hours/day, 7-days/week, 6-week project duration

Table 3
Response Guidelines to Action Level Exceedances
Ameren-IP Former MGP Site
Champaign, Illinois

Parameter	Level	Action Level Concentration	Response
		Photoionization Detector	
Volatiles		< 0.5 ppm (1 min. avg.)	record
	1	> 0.5 ppm (1 min. avg.)	collect CG sample and additional PID 1 min. avg.
		Gas Chromatograph	
Benzene		< 0.050 ppm (point conc.)	record
	1	> 0.050 ppm (point conc.)	collect confirmation 5 min. GC sample avg.
	2	> 0.050 ppm (5 min. avg.)	collect confirmation 15 min. GC sample avg. - notify supervisor
	3	> 0.050 ppm (15 min. avg.)	initiate emission control - notify supervisor(s) collect confirmation 15 min. GC sample avg.
	4	> 0.50 ppm (15 min. avg.)	Initiate shut down procedures
		Aerosol Monitor	
Particulates		< 0.360 mg/m^3 (1 min. avg.)	record
	1	> 0.360 mg/m^3 (1 min. avg.)	collect confirmation 5 min. avg. - notify supervisor
	2	> 0.360 mg/m^3 (5 min. avg.)	collect confirmation 15 min. avg.
	3	> 0.360 mg/m^3 (15 min. avg.)	initiate emission control
	4	> 3.6 mg/m^3 (15 min. avg.)	Initiate shut down procedures
	- -	Visible dust emission	initiate emission control

NOTES:

Emission control measures are implemented until measurements no longer exceed Level 2 guidelines.

Visible dust emission to be address requardless of concentration detected.

Action Level guideline concentrations based on 10 hour and 1 hour equivalent concentrations at the west fenceline.

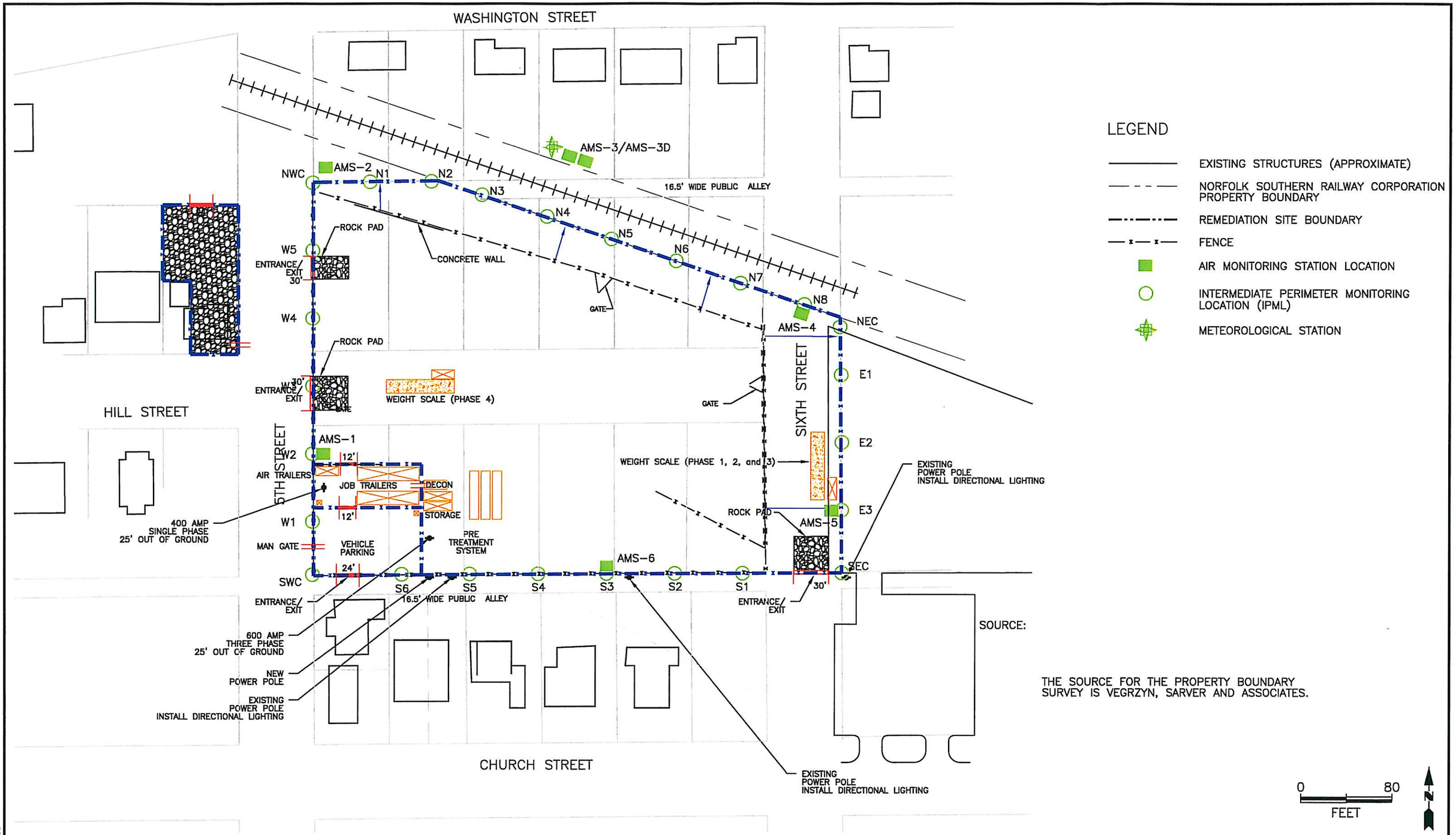
TABLE 4
AMBIENT AIR ACTION LEVELS FOR BENZENE
24-HOUR EXPOSURE AND 10-HOUR EQUIVALENT
RISK-BASED EXPOSURE CONCENTRATION
REMEDIATION AREA
STABLE WIND CONDITIONS

Air Monitoring Station	Fenceline	*24-Hour Exposure 7-Days per Week*		*10-Hour Equivalent Exposure 5-Day Work Week*	
		mg/m^3	ppm_v	mg/m^3	ppm_v
AMS-1	West Fenceline	0.024	0.008	0.082	0.026
AMS-2	Northwest Fenceline	0.024	0.008	0.081	0.025
AMS-3	North Fenceline	0.025	0.008	0.083	0.026
AMS-3D	North Fenceline Duplicate Station	0.025	0.008	0.083	0.026
AMS-4	Northeast Fenceline	0.026	0.008	0.086	0.027
AMS-5	East Fenceline	0.063	0.020	0.212	0.067
AMS-6	South Fenceline	0.028	0.009	0.094	0.030

The tables used in the development of benzene ambient air action levels are provided in Appendix C.
Calculations include dispersion modeling, which incorporates seasonal wind speed and direction data.
Therefore, ambient air action levels may be adjusted if the project is substantially delayed.
An addendum will be issued at that time including new ambient air action levels and a revised Appendix C.

Exposure Duration (12 Weeks Phase 2)

List of Figures



PSC

TITLE:

AIR MONITORING STATION (AMS) AND
INTERMEDIATE PERIMETER MONITORING LOCATIONS (IPML)

DWN: TMM	DES: SS	PROJECT NO: 62403053	
CHKD: PTS	APPD:	AMERENIP CHAMPAIGN, ILLINOIS	
DATE: 3/5/09	REV:	FIGURE 1	

COL J:\624\026478-096

WASHINGTON STREET

408N5 R21

505EW R20

507EW VACANT

509EW R19

511EW R18

601EW R17

603EW R16

R15 607.5EW

R14 609EW

VACANT

16.5' WIDE PUBLIC ALLEY

McGABE BROTHERS 411NW R13

410EH R22

408EH R23

AMERENIP PROPERTY

GATE

HILL STREET (VACATED)

GATE

GATE

HILL STREET

5TH STREET

SIXTH STREET

PARKING LOT

R24

VACANT

409EH

HOSPITAL WAREHOUSE

16.5' WIDE PUBLIC ALLEY

304N5 R4

504EC R6

R7 506EC

R8 508EC

510EC R9

R10 512EC

408EC R1

R2 410EC

412EC R3

R5 502EC

PARKING LOT

608EC R11

610EC HOSPITAL R12

CHURCH STREET

LEGEND

- EXISTING STRUCTURES (APPROXIMATE)
- AMERENIP PROPERTY BOUNDARY (FORMER MGP SITE)
- FENCE
- 610EC — POTENTIAL RECEPTOR ID
- APPROXIMATE BUILDING FOOTPRINT (NOT FROM SURVEY DATA)

SOURCE: THE SOURCE FOR THE PROPERTY BOUNDARY SURVEY IS VEGRZYN, SARVER AND ASSOCIATES.

0 80
FEET

N

COL J:\624\026478-095

PSC

TITLE:
POTENTIAL RECEPTORS

DWN: TMM	DES: MRC	PROJECT NO: 62403053 AMERENIP CHAMPAIGN, ILLINOIS	
CHKD:	APPD:		
DATE: 4/21/09	REV:	FIGURE 2	

APPENDIX A

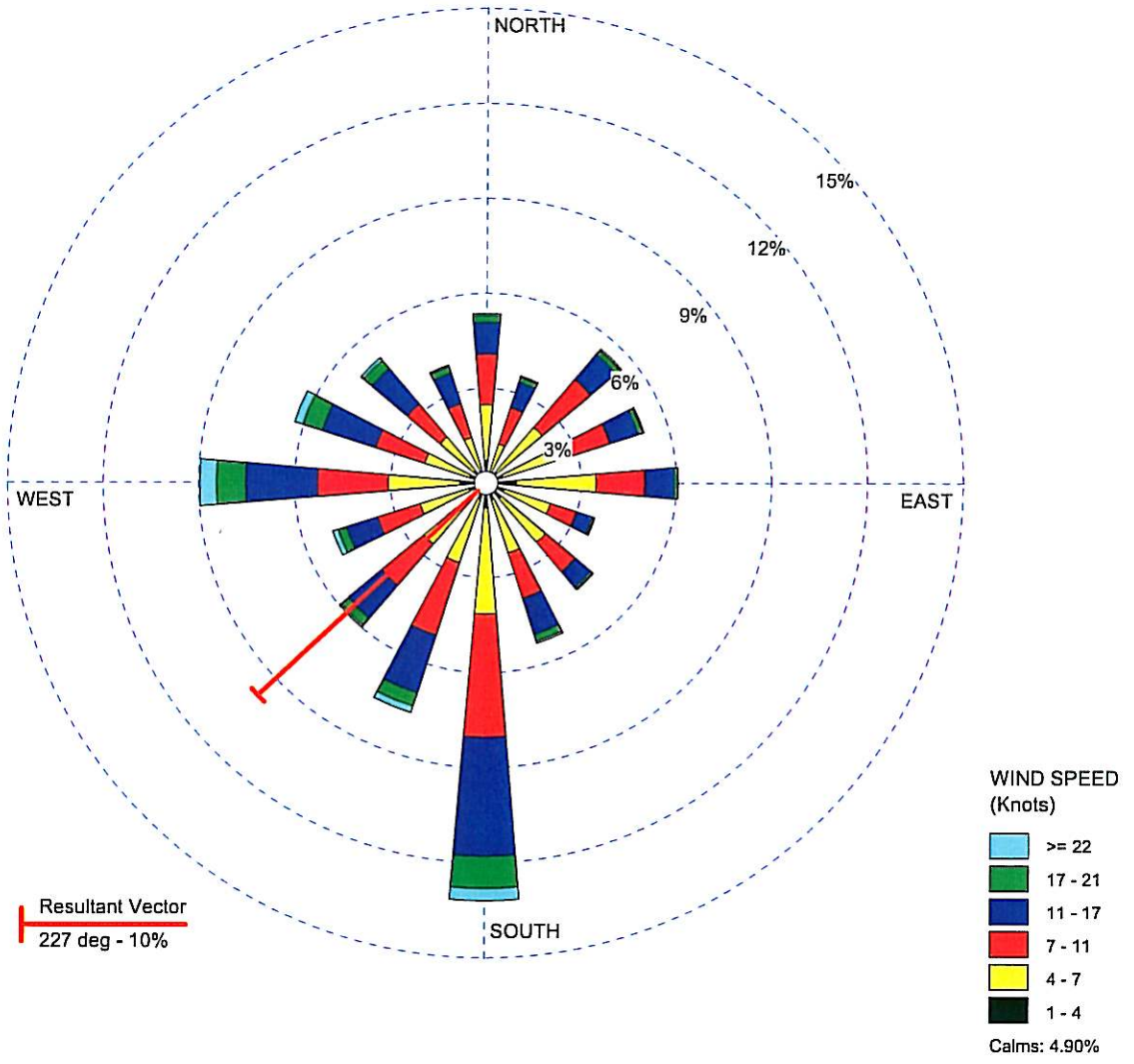
HISTORICAL WEATHER DATA AND WIND ROSE

WIND ROSE PLOT:

#94870 - UNIVERSITY OF IL WILLARD AIRPORT
CHAMPAIGN, IL

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **2000-2008** **Jan 1 - Dec 31** **00:00 - 23:00**	COMPANY NAME: **Midwestern Regional Climate Center**	
		SERVICE CLIMATOLOGIST: **Alan Black**	MRCC
	CALM WINDS: **4.90%**	TOTAL COUNT: **77417 hrs.**	
	AVG. WIND SPEED: **9.11 Knots**	DATE GENERATED: **4/21/2009**	PROJECT NO.: **62403053**

Station ID: 94870 Run ID:
Year: 2000 2001 2002 2003 2004 2005 2006 2007 2008
Date Range: Jan 1 - Dec 31
Time Range: 00:00 - 23:00

Frequency Distribution
(Count)

Wind Direction (Blowing From) / Wind Speed (Knots)

	1 - 4	4 - 7	7 - 11	11 - 17	17 - 21	>= 22	Total
N	554	1357	1234	771	166	51	4133
NNE	207	798	927	650	116	44	2742
NE	339	1434	1540	802	120	55	4290
ENE	437	1523	1199	718	109	42	4028
E	741	1930	1192	711	87	17	4678
ESE	473	1173	666	401	50	17	2780
SE	499	1404	950	488	68	21	3430
SSE	441	1365	1157	915	176	60	4114
S	615	2585	3016	2882	784	311	10193
SSW	415	1640	1859	1467	344	164	5889
SW	463	1509	1324	1043	231	67	4637
WSW	436	1249	1070	788	213	135	3891
W	638	1730	1712	1741	710	408	6939
WNW	422	1143	1248	1353	493	209	4868
NW	386	1083	1046	1126	266	87	3994
NNW	329	837	864	771	162	52	3015
Total	7395	22760	21004	16627	4095	1740	77417

Frequency of Calm Winds: 3796
Average Wind Speed: 9.11 Knots

Station ID: 94870 Run ID:
Year: 2000 2001 2002 2003 2004 2005 2006 2007 2008
Date Range: Jan 1 - Dec 31
Time Range: 00:00 - 23:00

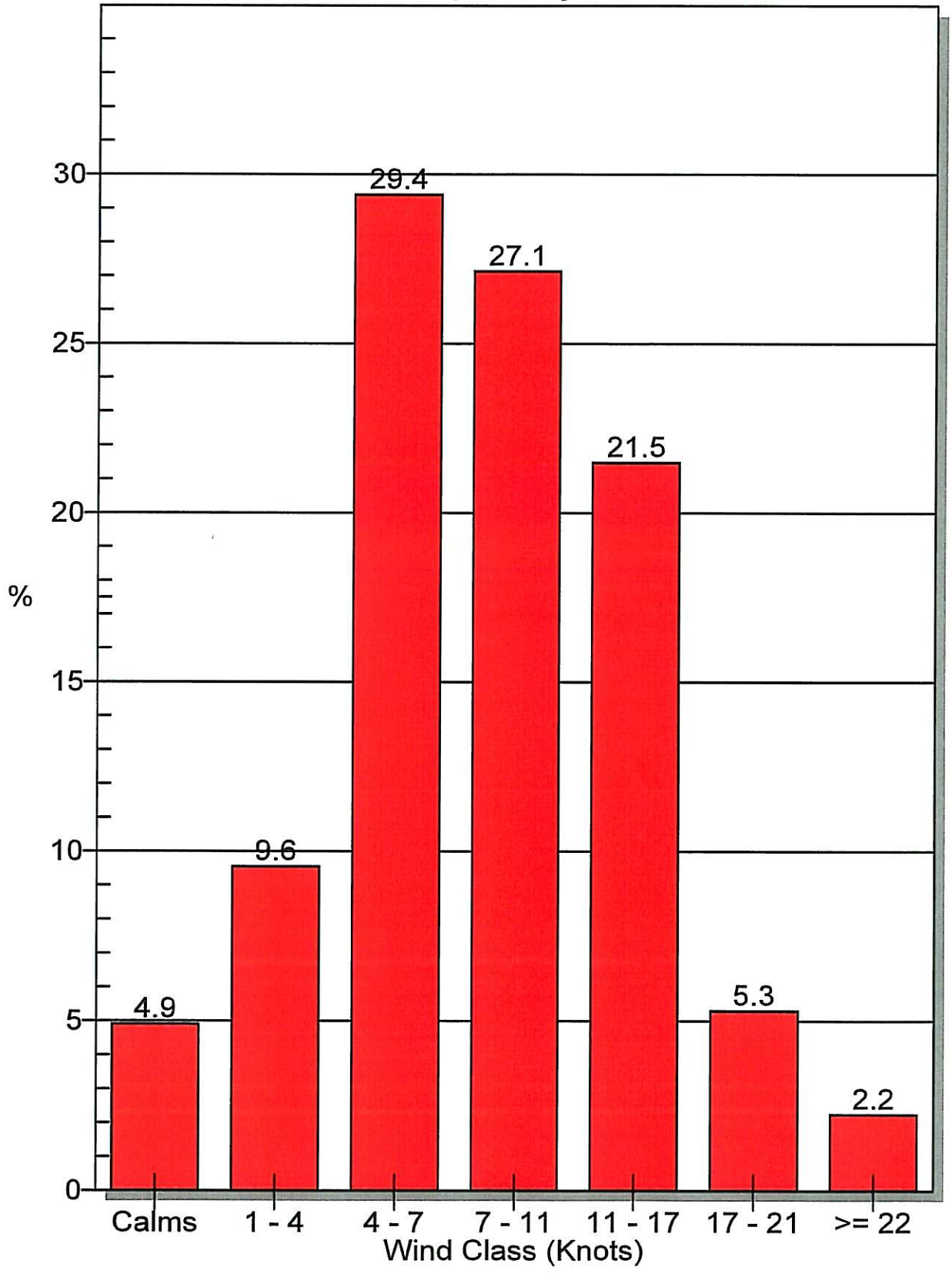
Frequency Distribution
(Normalized)

Wind Direction (Blowing From) / Wind Speed (Knots)

	1 - 4	4 - 7	7 - 11	11 - 17	17 - 21	>= 22	Total
N	0.007156	0.017528	0.015940	0.009959	0.002144	0.000659	0.053386
NNE	0.002674	0.010308	0.011974	0.008396	0.001498	0.000568	0.035419
NE	0.004379	0.018523	0.019892	0.010359	0.001550	0.000710	0.055414
ENE	0.005645	0.019673	0.015488	0.009274	0.001408	0.000543	0.052030
E	0.009572	0.024930	0.015397	0.009184	0.001124	0.000220	0.060426
ESE	0.006110	0.015152	0.008603	0.005180	0.000646	0.000220	0.035909
SE	0.006446	0.018136	0.012271	0.006304	0.000878	0.000271	0.044306
SSE	0.005696	0.017632	0.014945	0.011819	0.002273	0.000775	0.053141
S	0.007944	0.033391	0.038958	0.037227	0.010127	0.004017	0.131664
SSW	0.005361	0.021184	0.024013	0.018949	0.004443	0.002118	0.076069
SW	0.005981	0.019492	0.017102	0.013472	0.002984	0.000865	0.059896
WSW	0.005632	0.016133	0.013821	0.010179	0.002751	0.001744	0.050260
W	0.008241	0.022347	0.022114	0.022489	0.009171	0.005270	0.089631
WNW	0.005451	0.014764	0.016120	0.017477	0.006368	0.002700	0.062880
NW	0.004986	0.013989	0.013511	0.014545	0.003436	0.001124	0.051591
NNW	0.004250	0.010812	0.011160	0.009959	0.002093	0.000672	0.038945
Total	0.095522	0.293992	0.271310	0.214772	0.052895	0.022476	0.950967

Frequency of Calm Winds: 4.90%
Average Wind Speed: 9.11 Knots

Wind Class Frequency Distribution



APPENDIX B

FIELD FORMS

Air Monitoring Field Log

Date: _____

Project Name: Ameren - Champaign, IL

Project #: 62403053

Client Company: Ameren

PSC Oversight: _____

Site Location: Fifth and Hill

PSC Site Supervisor: Jacob Blanton

Weather Conditions

Cloud Cover: S = Sunny (Clear); PC = Partly Cloudy; H = Hazy; D = Dusty

Hour #	Time	Temp. (°F)	Barometric Pressure (in. Hg)	Precipitation (check one)						Visible Dust	Humidity (%)	Wind		Cloud Cover
				None	Rain	Drizzle	Fog	Sleet	Snow			Speed	Direction*	
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														

Site Activity Log

Time	Activity

Note: This form is to be completed hourly during field activities.

* Wind Direction is the direction from which the wind is coming from.

Completed By: _____ Date: ____/____ Reviewed: _____

AIR MONITORING DATA FORM

Project Name: Ameren - Champaign IL *Date:* _____ *Sample Technician:* Skrivan Hahn

Project Number: 62403053 *Time:* _____ Brumley Ritter

Site Activities: Excavating Blending Stockpiling Loading Trucks Backfilling Moving Tent No Activity Duffe Gardner

DUST MONITORING

	AMS-1					AMS-2									AMS-3 / -3D				AMS-4				AMS-5				AMS-6							
Time	W1	W2	W3	W4	W5	NWC	N1	N2	N3	N4	N5	N6	N7	N8	NEC	E1	E2	E3	SEC	S1	S2	S3	S4	S5	S6	SWC								

VOCs MONITORING

	AMS-1					AMS-2									AMS-3 / 3D				AMS-4				AMS-5				AMS-6							
Time	W1	W2	W3	W4	W5	NWC	N1	N2	N3	N4	N5	N6	N7	N8	NEC	E1	E2	E3	SEC	S1	S2	S3	S4	S5	S6	SWC								

Sta #	Summa (in.Hg.)	Time
1		
2		
3		
3D		
4		
5		
6		

Comments: _____

CARBON UNIT
REAL-TIME AIR HANDLER DATA FORM

Project Name: **Ameren - Champaign IL** *Phase:* _____ *Date:* _____

Project Number: **62403053**

Site Activities: Excavating Blending Stockpiling Loading Trucks Backfilling No Activity

Sample Technician: Skrivan Brumley Duffe Hahn Ritter Gardner Other: _____

AIR HANDLERS

TIME	AH-1 (North)				AH-2 (North Central)				AH-3 (South Central)				AH-4 (South)			
	INSIDE		OUTSIDE		INSIDE		OUTSIDE		INSIDE		OUTSIDE		INSIDE		OUTSIDE	
	PID	ODOR	PID	ODOR	PID	ODOR	PID	ODOR	PID	ODOR	PID	ODOR	PID	ODOR	PID	ODOR

Comments: _____

X - NO ODOR
1 - SLIGHT
2 - MEDIUM
3 - STRONG
4 - VERY STRONG

PSC INDUSTRIAL OUTSOURCING LP
EQUIPMENT CALIBRATION LOG FORM

PROJ NAME: _____ INSTRUMENT: _____
PROJECT # : _____ SERIAL NUMBER: _____

DATE	TIME	CALIBRATED BY	HOURS USED	CALIBRATION STANDARD	INITIAL READING*	CORRECTED READING*	BATTERY CHECK (Y/N)	MAINTENANCE AND REPAIRS

* Specify Units

IP\AIR\CAL LOG

APPENDIX C

CALCULATION OF AMBIENT AIR ACTION LEVELS – AMEREN CHAMPAIGN REMEDIATION SITE

TABLE C-1
AIR QUALITY STANDARDS
AMEREN FORMER MGP SITE
CHAMPAIGN, ILLINOIS

SITE-SPECIFIC AIR QUALITY STANDARDS

Constituent	RfD_i (mg/kg-d)	SF_i $(mg/kg\text{-}d)^{-1}$	$C_{air\text{-}nc}$ mg/m^3	$C_{air\text{-}c}$ mg/m^3	Receptor AQS mg/m^3
Benzene	1.70E-03	2.90E-02	5.21E-01	2.47E-02	2.47E-02
Toluene	1.14E-01		3.50E+01		3.50E+01
Ethylbenzene	2.90E-01		8.89E+01		8.89E+01
Xylene (total)	2.00E-01		6.13E+01		6.13E+01
Acenaphthylene	3.00E-03		9.20E-01		9.20E-01
Benzo(a)anthracene		3.10E-01		2.31E-03	2.31E-03
Benzo(a)pyrene		3.10E+00		2.31E-04	2.31E-04
Benzo(b)fluoranthene		3.10E-01		2.31E-03	2.31E-03
Benzo(k)fluoranthene		3.10E-02		2.31E-02	2.31E-02
Chrysene		3.10E-03		2.31E-01	2.31E-01
Dibenzo(a,h)anthracene		3.10E+00		2.31E-04	2.31E-04
Fluorene	4.00E-02		1.23E+01		1.23E+01
Indeno(1,2,3-cd)pyrene		3.10E-01		2.31E-03	2.31E-03
Naphthalene	8.60E-04		2.64E-01		2.64E-01
Phenanthrene	3.00E-02		9.20E+00		9.20E+00

Input Parameters

Parameter	Description	Units	Value	Reference
THI	Target Hazard Index	unitless	1	USEPA
TR	Target Cancer Risk	unitless	1.00E-06	USEPA
RID_i	Inhalation Refernce Dose	mg/kg-d	see above	USEPA
SF_i	Inhalation Slope Factor	$(mg/kg\text{-}d)^{-1}$	see above	USEPA
BW	Body Weight (child)	kg	19	USEPA
AT_{nc}	Averaging Time for non-carcinogens (residential)	years	30	USEPA
AT_c	Averaging Time for carcinogens (residential)	years	70	USEPA
IR	Inhalation Rate (child)	m^3/day	8.4	USEPA
EF	Exposure Frequency	days/year	350	USEPA
ED	Exposure Duration (12 Weeks Phase 2)	year	0.231	site-specific
$C_{air\text{-}nc}$	Risk-based air concentration for noncarcingens	mg/m^3	calcuated	see below
$C_{air\text{-}c}$	Risk-based air concentration for carcingens	mg/m^3	calcuated	see below

Equations

$C_{air\text{-}nc} = (THI \times RfD_i \times BW \times AT_{nc}) / (IR \times EF \times ED)$ Eq. R10

$C_{air\text{-}c} = (TR \times BW \times AT_c) / (SF_i \times IR \times EF \times ED)$ Eq. R9

Receptor AQS (Air Quality Standard) is maximum acceptable concentration at receptor point.
Exposure based on sensitive (child) receptor, 24-hours/day, 7-days/week, 8-week project duration

TABLE C-2
PHASE 2
FENCELINE - SENSITIVE RECEPTOR CONCENTRATION RATIO CALCULATION SHEET
REMEDIATION AREA
STABLE WIND CONDITIONS - STABILITY CLASS F
PERIOD - JULY through SEPTEMBER

AMEREN FORMER MGP SITE
CHAMPAIGN, ILLINOIS

	Fence Line					
Air Monitoring Station	**AMS-1**	**AMS-2**	**AMS-3**	**AMS-3D**	**AMS-4**	**AMS-5**
Fenceline	**West**	**Northwest**	**North**	**North**	**North East**	**East**
Distance (meters)	19.51	36.58	17.07	17.07	56.08	80.47
Concentration (ug/m^3)	1.08E+05	1.13E+05	1.07E+05	1.07E+05	1.19E+05	1.25E+05
Concentration (ppm)	3.32E+01	3.48E+01	3.29E+01	3.29E+01	3.65E+01	3.84E+01

	Receptor					
Receptor Number	**R21**	**R3**	**R10**	**R10**	**R17**	**R11**
Receptor Name	**Residence**	**Residence**	**Residence**	**Residence**	**Residence**	**Residence**
Distance (meters)	22.86	45.72	18.29	18.29	41.15	146.30
Concentration (ug/m^3)	1.09E+05	1.16E+05	1.07E+05	1.07E+05	1.14E+05	4.64E+04
Concentration (ppm)	3.35E+01	3.57E+01	3.31E+01	3.29E+01	3.53E+01	1.43E+01

	Fenceline to Receptor Ratio					
Name	**F1/R1**	**F2/R2**	**F3/R3**	**F4/R4**	**F5/R5**	**F6/R6**
Ratio	1.0	1.0	1.0	1.0	1.0	2.6

Stable wind conditions - Stability Class F; wind speed 1.00 m/s.
Unit Emission Rate - 0.001 g/s-m^2.

Benzene used as reference molecular weight for conversion from µg/m^3 to ppm.
Screen 3 software used to calculate benzene concentrations shown.

TABLE C-3
PHASE 2
FENCELINE - SENSITIVE RECEPTOR CONCENTRATION RATIO CALCULATION SHEET
REMEDIATION AREA
AVERAGE CASE WIND CONDITIONS - STABILITY CLASS E
PERIOD - JULY through SEPTEMBER

AMEREN FORMER MGP SITE

CHAMPAIGN, ILLINOIS

	Fence Line					
Air Monitoring Station	**AMS-1**	**AMS-2**	**AMS-3**	**AMS-3D**	**AMS-4**	**AMS-5**
Fenceline	**West**	**Northwest**	**North**	**North**	**North East**	**East**
Distance (meters)	19.51	36.58	17.07	17.07	56.08	80.47
Concentration (ug/m^3)	4.05E+04	4.22E+04	4.03E+04	4.03E+04	4.38E+04	4.56E+04
Concentration (ppm)	1.25E+01	1.30E+01	1.24E+01	1.24E+01	1.35E+01	1.41E+01

	Receptor					
Receptor Number	**R21**	**R3**	**R10**	**R10**	**R17**	**R11**
Receptor Name	**Residence**	**Residence**	**Residence**	**Residence**	**Residence**	**Residence**
Distance (meters)	22.86	45.72	18.29	18.29	41.15	146.30
Concentration (ug/m^3)	4.09E+04	4.30E+04	4.04E+04	4.04E+04	4.26E+04	1.28E+04
Concentration (ppm)	1.26E+01	1.32E+01	1.25E+01	1.25E+01	1.31E+01	3.94E+00

	Fenceline to Receptor Ratio					
Name	**F1/R1**	**F2/R2**	**F3/R3**	**F4/R4**	**F5/R5**	**F6/R6**
Ratio	0.99	0.98	1.00	1.00	1.03	3.4

Average Case Condition - Stability Class E; wind speed 3.5188 m/s.
Unit Emission Rate - 0.001 g/s-m^2.

Benzene used as reference molecular weight for conversion from µg/m^3 to ppm.
Screen 3 software used to calculate benzene concentrations shown.

TABLE C-4

CALCULATION FOR ADJUSTED FENCELINE CONCENTRATION ACTION LEVEL
24-HOUR BENZENE EXPOSURE CONCENTRATION
EAST REMEDIATION AREA
AMEREN FORMER MGP SITE
CHAMPAIGN, ILLINOIS

Monitoring Point	Acceptable Receptor Point Exposure Concentration		Fenceline/Receptor Ratio	Fenceline Concentration 24-Hour Benzene Action Level	
	mg/m^3	ppm_v		mg/m^3	ppm_v
AMS-1	0.025	0.008	1.0	0.024	0.008
AMS-2	0.025	0.008	1.0	0.024	0.008
AMS-3	0.025	0.008	1.0	0.025	0.008
AMS-3D	0.025	0.008	1.0	0.025	0.008
AMS-4	0.025	0.008	1.0	0.026	0.008
AMS-5	0.025	0.008	2.6	0.063	0.020
AMS-6	0.025	0.008	1.1	0.028	0.009

Acceptable Receptor 2nd St. Res.

Fenceline/receptor ratio obtained from Table C-2.

Conversion of mg/m^3 to ppm_v for benzene (molecular weight of 78):

$$ppm_v = [(mg/m^3) \times 24.5] / 78$$

Exposure Duration (12 Weeks Phase 2)

TABLE C-5

CALCULATION FOR ADJUSTED FENCELINE CONCENTRATION ACTION LEVEL
10-HOUR EQUIVALENT BENZENE EXPOSURE CONCENTRATION
EAST REMEDIATION AREA
AMEREN FORMER MGP SITE
CHAMPAIGN, ILLINOIS

Monitoring Point	Adjusted Receptor Point Exposure		Fenceline/Receptor Ratio	Equivalent Fenceline Concentration 10-Hour Benzene Action Level	
	mg/m^3	ppm_v		mg/m^3	ppm_v
AMS-1	0.083	0.026	1.0	0.082	0.026
AMS-2	0.083	0.026	1.0	0.081	0.025
AMS-3	0.083	0.026	1.0	0.083	0.026
AMS-3D	0.083	0.026	1.0	0.083	0.026
AMS-4	0.083	0.026	1.0	0.086	0.027
AMS-5	0.083	0.026	2.6	0.212	0.067
AMS-6	0.083	0.026	1.1	0.094	0.030

Adjusted receptor pc 2nd St. Res.

10 hour exposure (action level) is factored from 24 hour exposure concentration.

Fenceline/receptor ratio obtained from Table C-2.

Conversion of mg/m^3 to ppm_v for benzene (molecular weight of 78):

$$ppm_v = [(mg/m^3) \times 24.5] / 78$$

Exposure Duration (12 Weeks Phase 2)

TABLE C-6

CALCULATION FOR ADJUSTED FENCELINE CONCENTRATION ACTION LEVEL
1-HOUR EQUIVALENT BENZENE EXPOSURE CONCENTRATION
EAST REMEDIATION AREA
AMEREN FORMER MGP SITE
CHAMPAIGN, ILLINOIS

Monitoring Point	Adjusted Receptor Point Exposure		Fenceline/Receptor Ratio	Equivalent Fenceline Concentration 1-Hour Benzene Action Level	
	mg/m^3	ppm_v		mg/m^3	ppm_v
AMS-1	0.83	0.26	1.0	0.82	0.26
AMS-2	0.83	0.26	1.0	0.81	0.25
AMS-3	0.83	0.26	1.0	0.83	0.26
AMS-3D	0.83	0.26	1.0	0.83	0.26
AMS-4	0.83	0.26	1.0	0.86	0.27
AMS-5	0.83	0.26	2.6	2.12	0.67
AMS-6	0.83	0.26	1.1	0.94	0.30

Adjusted receptor pc 2nd St. Res.

1-hour exposure (action level) is factored from 24-hour exposure concentration.

Fenceline/receptor ratio obtained from Table C-2.

Conversion of mg/m^3 to ppm_v for benzene (molecular weight of 78):

$$ppm_v = [(mg/m^3) \times 24.5] / 78$$

Exposure Duration (12 Weeks Phase 2)