CTEH CENTER FOR TOXICOLOGY AND ENVIRONMENTAL HEALTH, LLC

Confirmation Indoor Air Sampling Work Plan

Version 1.1

Prepared For:

Grenada Manufacturing, LLC

Grenada, Mississippi

October 14, 2016

	Name/ Position	Signature	Date Signed
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1.0 INTRODUCTION

Center for Toxicology and Environmental Health, LLC (CTEH®) has prepared this Sampling and Analysis Plan (SAP) on behalf of Grenada Manufacturing, LLC to conduct confirmatory indoor air (IA) monitoring as a follow-up to several prior sampling rounds that demonstrated an absence of a complete vapor intrusion (VI) pathway based on then existing screening levels at the Grenada Manufacturing, LLC facility located at 645 Highway 332 in Grenada, Mississippi (Facility), at the request of the United States Environmental Protection Agency (USEPA) in a letter dated Mach of 2016. A map of the Facility location and the proposed sampling locations is provided in Attachment A. This SAP outlines the scope of work for IA confirmatory monitoring that will include sub-slab, indoor air, and ambient outdoor air sampling. The SAP identifies the target analytes for which the samples will be tested, which are the same eleven volatile organic compounds (VOCs) targeted in the previously performed VI assessments at the Facility. The sampling results will be evaluated and compared to the current USEPA VI screening levels (VISLs)[1], USEPA composite worker air risk-based screening levels (RSLs)[2], and the data from the previous sampling events conducted at the Facility. The data also will be evaluated using the multiple lines of evidence (MLE) approach described in the USEPA OSWER Technical Guide[1].

2.0 BACKGROUND

Groundwater monitoring events have identified a VOC plume originating in Areas of Concern (AOCs) A and B, which are located at the up gradient area of the Facility. The plume travels with groundwater beneath the Facility's main plant building in route to the Zero Valent Iron Permeable Reactive Barrier (PRB), the Facility-wide groundwater remedy. By correspondence of November 26, 2001, USEPA Region 4 requested that IA sampling be conducted to verify that VOCs from groundwater were not impacting IA quality at the Facility. The results of the VI assessment were presented in a letter to USEPA dated February 26, 2002. The assessment identified 10 VOCs that potentially may exceed the target concentrations at one groundwater monitoring location near the main plant building. However, the assessment concluded there were insufficient data to determine whether the vapor to IA pathway was complete and if IA quality had been impacted. In a letter dated June 14, 2002, USEPA requested that an IA Monitoring Work Plan be prepared to collect data to further assess the vapor to IA pathway, and that an eleventh VOC, toluene, be added to the analyte list.

An IA Monitoring Report (Brown and Caldwell, 2004c) was submitted to USEPA in December 2004, which summarized the air monitoring activities that occurred on February 17, 2003, and the results. In a

[1] USEPA. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response; 2015 June; OSWER Publication 9200.2-154.

[2] USEPA. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. Washington, DC: U. S. Environmental Protection Agency, 2016 May. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016

letter dated May 17, 2004, USEPA required that additional IA sampling be conducted to supplement the data from the February 17, 2003 sampling event. Additional IA sampling occurred on August 18, 2004, which also was documented in the IA Monitoring Report. The data demonstrated the absence of a VI pathway at the Facility based on then existing screening levels.

In 2009, USEPA requested that additional winter and summer sampling rounds be performed. USEPA stated that, if the results of the additional IA sampling events did not indicate VI to the Facility, no further sampling would be required in the plant building. The 2009 IA monitoring events did not identify a complete VI pathway regarding the target analytes present in groundwater beneath the Facility. This report explained that the groundwater concentrations of target analytes generally had declined over the six-year period of IA sampling, and were expected to continue to decline (IA Monitoring Report, ICE Industries, Brown and Caldwell, 2010). In light of the six years of declining concentrations, USEPA agreed that no further IA monitoring would be necessary at the plant building, as long as the shallow groundwater target analyte concentrations monitored downgradient of the Facility remained below the concentrations previously reported.

This criterion was met, including in the most recent sampling event held in 2015 when the total chlorinated VOCs (CVOC) concentration was 2.5 micrometers (µM) in MW-3.[3] In March 2016, USEPA requested that Grenada Manufacturing, LLC, the Facility's permittee, perform additional VI investigative sampling at the main plant building due to the Agency's application of a more stringent screening level to workers. This SAP was prepared to conduct the additional confirmatory IA sampling to evaluate whether there is a potential VI pathway at the Facility and, if so, whether levels of target analytes in IA exceed the more stringent worker screening levels at the Facility's main plant building.

3.0 SCOPE OF WORK

The field investigation key tasks include the collection of samples from indoor air, soil gas from sub-slab locations, basement air beneath a portion of the Facility, and outdoor air samples. Based upon previous sampling events and the requirement for IA confirmation sampling, CTEH® will conduct the following:

- Collection of IA samples to determine the presence, if any, of the eleven target analytes in the Facility's main building,
- Collection of ambient air samples to determine the presence, if any, of the target analytes in the environment surrounding the Facility;
- Collection of sub-slab vapor samples and basement air samples from previously sampled locations to determine the presence, if any, of the target analytes;

[3] Well MW-3 is best located to monitor the shallow groundwater chlorinated VOC (CVOC) concentrations beneath the plant building. AOC A is upgradient of the plant and MW-3 is just downgradient of the plant and in the pathway of the CVOC plume originating at AOC A. Annual monitoring reports document the past and current CVOC concentrations in groundwater at MW-3 and show a general declining trend through the most recent sample obtained in 2015.

In light of the foregoing, the sampling strategy will consider and take into account: 1) screening criteria for indoor air concentrations for target analytes; 2) access to basement for sub-slab sampling; 3) air handling systems used in the main plant building; and 4) work space usage and work shift hours.

The SAP will consider, as appropriate, multiple lines of evidence, an approach set forth in the OSWER Technical Guide. Thus, IA sample results will also be used to support an MLE analysis in evaluating the potential presence of a VI pathway that will include:

- Distribution of IA target analytes within the Facility, including a comparison of target analyte concentrations in IA to basement and sub-slab to assess consistency with VI principles; Concentrations of target analytes in IA compared to sub-slab soil vapor and ambient outdoor air samples, to determine whether sub-slab soil vapor target analyte concentrations or outdoor air samples are sufficiently elevated to contribute to indoor air;
- Composition of target analytes present in IA compared to composition of target analytes present in sub-slab vapor, soil gas vapor (if needed), and groundwater; and
- Comparison of target analytes in IA to USEPA's VI screening levels (VISLs) and regional screening levels (RSLs) used for IA in industrial setting.

3.1 Indoor Air Concentrations for Target Analytes

Table 1 presents a list of the eleven VOCs that are the target analytes for the indoor air sampling event. The chemical abstracts service (CAS) numbers and indoor air screening concentrations for each VOC also are presented in the table. Indoor air screening values are from the USEPA VI Screening Level (VISL) calculator and the USEPA Regional Screening Levels for Worker Composite Air and correspond to hazard index of 1 or a carcinogenic risk level of $1X10^{E-6}$ (1 in 1,000,000). These indoor air screening concentrations were used to determine appropriate sampling and analytical methods that have detection limits below the applicable screening values.

Table 1 Indoor Air Screening Values for the Target Analytes

Chemical Name	CAS Number	Vapor Intrusion Commercial Air Screening Level (VISL)[a]		Composite Worker Air Regional Screening Level[b]	
		µg/m^3	ppbv	µg/m^3	ppbv
Benzene	71-43-2	1.6	0.5	1.6	0.5
1,1-Dichloroethene	75-35-4	880	222	880	222
1,2-Dichloroethane	107-06-2	0.47	0.12	0.47	0.12
cis-1,2-Dichloroethene[c]	156-59-2	NE	NE	NE	NE
trans-1,2-Dichloroethene[c]	156-60-5	NE	NE	NE	NE
Methylene Chloride	75-09-2	1200	345	1200	345
Tetrachloroethene	127-18-4	47	7	47	7

Trichloroethene	79-01-6	3.0	0.6	3.0	0.6
1,1,2-Trichloroethane	79-00-5	0.77	0.14	0.77	0.14
Toluene	108-88-3	22,000	5,838	22,000	5,838
Vinyl chloride	75-01-4	2.8	1.1	2.8	1.1

[a] USEPA. Vapor Intrusion Screening Level (VISL) Calculator Version 3.5.1. Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response; May, 2016.; https://sMayemspub.epa.gov/src/document/11/196702
[b] USEPA. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. Washington, DC: U. S. Environmental Protection Agency, 2016 May. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016
[c] VISL and RSL screening values have not been established for the cis/trans isomers of 1,2-dichloroethene; however, USEPA Region 4 recommends the use of a screening value of 3,500 µg/m^3 for indoor air and 120,000 µg/m^3 for sub-slab samples.
NE = Not established
µg/m^3 = micrograms per cubic meter; ppbv = parts per billion volume

3.2 Sub-slab and Ambient Air Concentrations for Target Analytes

Ambient air concentrations and sub-slab soil vapor concentrations of the eleven target analytes will be compared against applicable screening values (USEPA 2015 and USEPA 2016). The analytical sampling method was chosen so that detection limits are below applicable screening values, in accordance with USEPA VI guidance (USEPA 2015 and USEPA 2016). Table 2 lists the commercial sub-slab air screening values.

Table 2 Commercial Sub-Slab Air Screening Values for the Target Analytes

Chemical Name	CAS Number	Vapor Intrusion Commercial Air Screening Level (VISL)[a]	
		µg/m^3	ppbv
Benzene	71-43-2	52	16
1,1-Dichloroethene	75-35-4	29,000	7,314
1,2-Dichloroethane	107-06-2	15	3.7
cis-1,2-Dichloroethene[b]	156-59-2	NE	NE
trans-1,2-Dichloroethene[b]	156-60-5	NE	NE
Methylene Chloride	75-09-2	41,000	11,802
Tetrachloroethene	127-18-4	1,600	236
Trichloroethene	79-01-6	100	18.6
1,1,2-Trichloroethane	79-00-5	26	4.8
Toluene	108-88-3	730,000	193,732
Vinyl chloride	75-01-4	93	36

[a] USEPA. Vapor Intrusion Screening Level (VISL) Calculator Version 3.5.1. Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response; May, 2016.; https://semspub.epa.gov/src/document/11/196702
[b] VISL and RSL screening values have not been established for the cis/trans isomers of 1,2-dichloroethene; however, USEPA Region 4 recommends the use of a screening value of 3,500 µg/m^3 for indoor air and 120,000 µg/m^3 for sub-slab samples.
NE = Not established
µg/m^3 = micrograms per cubic meter; ppbv = parts per billion volume

3.3 Air Handling Systems Used in Main Plant Building

Information about the air handling systems in the main plant building was provided in prior reports. In summary, the main plant building can be divided into two general zones to describe the air handling systems:

- Zone A – Offices/Breakrooms/Restrooms
- Zone B – Production Areas

In general, Zone A rooms have independent air handling systems in the form of central air conditioning and/or window air conditioning units. Several offices are designated "smoking" offices where smoking of tobacco products is allowed indoors. Zone B comprises the majority of the main plant and is referred to as the south low bay, high bay, and north low bay. All bays are open without separation between sections, allowing air to flow throughout the area. The two zones described above are used in this work plan. A detailed map showing the proposed sampling locations is provided as Attachment A. In discussions with the Grenada Manufacturing, LLC's tenant's, proposed sampling locations may need to be modified due to equipment movement and/or safety concerns (i.e. tripping hazards); therefore, sampling locations may be modified once on-site. The intent is to keep sampling locations in the same generalized area as planned.

The sampling strategy is to collect representative air samples within each of the two zones during an upcoming warm-weather month. As discussed, the results of that sampling event then will be analyzed in light of current screening levels and the sampling data from prior indoor air monitoring events.

3.4 Work Space Usage and Work Shifts

Currently, almost all areas within the plant are being used, either for storage or active production, with the exception of the area referred to as the basement which is not used. As of May 3, 2016, Grenada Manufacturing, LLC's tenant is operating three – eight-hour work shifts.

Grenada Manufacturing, LLC's tenant is painting presses in Zone B of the Facility, as well as a storage tank outside of the Facility. Press painting is being done during off-shifts, which are not scheduled at this time. The painting materials are being stored in Zone B.

Commencing in late October 2016, the plant operator also intends to install a new press pit at the Facility. However, if USEPA provides swift approval of the SAP, arrangements are in place to conduct the VI study during the week of October 24th.

The plant operator will be contacted in advance of the IA sampling event to coordinate sampling around the construction and maintenance activities at the Facility. IA sampling will be scheduled at a time that minimizes impact, if any, of interfering with these activities. In light of the accommodation reached with

the plant operator on the timing and process for conducting the sampling, the sampling canisters already have been ordered.

3.5 Summary of Sampling Strategy

In summary, the sampling strategy is to:

- Utilize a sampling and analytical method that will achieve detection limits below appropriate air screening values.
- Collect indoor air samples from representative areas within each of the main plant building's two zones.
- Collect samples during one 24-hour sampling event during a representative warm-weather day for comparison against appropriate screening levels.
- Collect ambient air samples during the same time period as IA sampling.
- Collect sub-slab soil gas per MLE methodology in evaluating the potential for VI.

4.0 HEALTH AND SAFETY

The personnel conducting the sampling will review and adhere to the Facility-specific Health and Safety Plan (HASP) developed by CTEH®. The sampling activities will be completed in accordance with this Work Plan and as dictated by the HASP.

5.0 DATA QUALITY OBJECTIVES

This section of the SAP presents the intended data usage and quality assurance (QA) objectives. The data collected during field activities will be used to evaluate whether there is a VI pathway into the Facility's main building. IA samples will be collected and compared to USEPA OSWER VISL Calculator, Version 3.5.1 and the USEPA RSL Composite Worker Air listed in Table 1 above (May 2016 RSLs). The predominant data quality objective (DQO) is to generate valid data that is suitable for its intended use.

A strategic planning approach based on scientific methodology and MLE will be employed for data collection activities. The purpose of following this approach is to create a systematic procedure that ensures the type, quantity, and quality of data used in decision-making is appropriate for the intended application.

The sampling program will be effectuated in conjunction with a well-defined quality assurance (QA) program that references the sampling, analysis, and data validation procedures for generating valid and defensible data. The goal of the field QA program is to document that samples are collected without the effects of accidental cross- or systematic contamination. The sections below outline the QA procedures for sampling, analysis, and data validation.

6.0 AIR SAMPLING METHOLOGY AND ANALYSIS

Confirmatory IA samples as well as ambient and sub-slab/basement vapor samples will be collected from multiple locations to assess whether there is a VI pathway by which IA in the main Facility building is impacted by the presence of target analytes in accordance with current screening levels. All work in the Facility will be coordinated with Grenada Manufacturing LLC's tenant so that proper safety requirements are followed and operational disruptions are minimized. All sampling will be documented in field notebooks, CTEH® field forms, or hand-held devices.

6.1 Qualitative Indoor Air Survey

Prior to collecting air samples, a qualitative indoor air survey will be performed to assess the sampling conditions, to confirm sampling locations, and to preliminarily monitor the air at the sampling locations using real-time air monitoring devices and/or portable gas chromatograph/mass spectrometer (GC/MS). Field personnel will walk through the main plant building to record the air handling systems being used at the time of the sampling, i.e., are air conditioners on, are fans on with windows open, and if on, how many and which ones. The proposed sampling locations will be confirmed based on the walk-through with Grenada Manufacturing, LLC's tenant and adjustments made as necessary to address any safety or operational concerns and noted on the sampling map and in the field book. An air monitoring instrument such as a photoionization detector (PID) or portable GC/MS will be used to survey the sampling locations to check for concentrations of VOCs.

6.2 Methodology and Analysis

This section provides a general description of the sampling procedures and methods that will be followed. The indoor air screening values were compared with available sampling and analysis methods. Table 3 provides a summary of the method detection limits achievable by USEPA Compendium Method TO-15 (modified). This method includes both the sample collection and analysis. All air samples (ambient air, indoor air, and sub-slab vapor) will be analyzed following USEPA TO-15 for the target analytes. CTEH® plans on initially submitting collected samples for analysis of VOCs by USEPA Modified Method TO-15 Selective Ion Monitoring (SIM) or modified USEPA TO-15 method (no SIM). Samples are collected in stainless steel canisters that are individually certified clean by a National Environmental Laboratory Accreditation Program (NELAP) certified laboratory and analyzed for the target analytes using a GC/MS for the analysis. The canisters will be equipped with flow restrictors that are pre-set by the laboratory to collect six liters of air over a time duration of 24 hours to obtain representative indoor air samples. Ambient air samples will be collected for a 24 hour period and sub-slab vapor samples will be collected for approximately 10 minutes. Table 3 below also lists the commercial air and worker composite screening values.

Table 3 Comparison of USEPA Method TO-15 Detection Limits to Indoor Air Screening Values and OSHA 8-hour TWA PELs

Chemical Name	CAS Number	USEPA Method TO-15 SIM Method Limit of Detection[a] (ppbv)	USEPA Commercial Air VISL[b] (ppbv)	RSL Composite Worker Air Screening Level[c] (ppbv)	OSHA PEL TWA (ppbv)
Benzene	71-43-2	0.014	0.5	0.5	1,000
1,1-Dichloroethene	75-35-4	0.0053	222	222	NE
1,2-Dichloroethane	107-06-2	0.0052	0.12	0.12	50,000
cis-1,2-Dichloroethene[d]	156-59-2	0.0053	NE	NE	200,000
trans-1,2-Dichloroethene[d]	156-60-5	0.0053	NE	NE	200,000
Methylene Chloride	75-09-2	0.012	345	345	25,000
Tetrachloroethene	127-18-4	0.003	7	7	100,000
Trichloroethene	79-01-6	0.0039	0.56	0.56	100,000
1,1,2-Trichloroethane	79-00-5	0.0039	0.14	0.14	10,000
Toluene	108-88-3	0.011	5838	5838	200,000
Vinyl chloride	75-01-4	0.0078	1.1	1.1	1,000

[a] Limit of Detection expected concentrations for Method TO-15 analytes as supplied by ALS Environmental/ Simi Valley
[b] USEPA. Vapor Intrusion Screening Level (VISL) Calculator Version 3.5.1. Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response; May, 2016; https://semspub.epa.gov/src/document/11/196702
[c] USEPA. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. Washington, DC: U. S. Environmental Protection Agency, 2016 May. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016
[d] VISL and RSL screening values have not been established for the cis/trans isomers of 1,2-dichloroethene; however, USEPA Region 4 recommends the use of a screening value of 3,500 µg/m^3 for indoor air and 120,000 µg/m^3 for sub-slab samples.
NE – Not established

Once received by the field personnel, the canisters will be inspected for damage, then taken out to the sampling locations. Prior to setting up samples, a leak test will be performed and the canister's initial pressure will be recorded. The IA and ambient air samples canisters will be set up so that the breathing zone is sampled (i.e., the inlet to the canister will be between four and six feet above the floor). Sample collection will begin when the canisters are opened. Field personnel will note the start time for each canister and other pertinent data according to Method TO-15. At the end of the sampling period, the canister inlet will be closed and the time noted. Field personnel will confirm that each canister is properly labeled and then will ship them back to the laboratory for analysis and reporting. All samples will be sent under proper chain-of-custody.

IA samples will be collected from each of the two zones within the building. Field quality assurance/quality control (QA/QC) samples also will be collected: one co-located or duplicate (i.e., replicate) sample will be collected within each zone and one field blank sample will be collected. The field blank sample simply will be a clean canister shipped from the laboratory to the Facility with the rest of the canisters, a regulator will be attached, vacuum pressure checked and logged, but no air will flow through the inlet to the evacuated canister. The field blank canister will then be labeled and shipped

back to the laboratory for analysis. Table 4 presents a summary of the samples for analysis. It is estimated that 22 samples will be collected for analysis. However, depending on the accessibility to sub-slab and basement locations, the number of samples collected may change. The locations will be selected in conjunction with the plant operator to ensure that the sampling locations do not interfere with plant operations.

Table 4 Summary of Air Samples for Analysis from Main Plant Building

Sampling Area	Number of Locations	Number of Co-Located/Duplicate Samples	Total Number of Samples
Sub-slab	6	-	6
Zone A – Offices/Breakrooms/Restrooms	3	1	4
Zone B – Production	4	1	5
Basement	2	1	3
Ambient (Outdoor)	2	1	3
Field Blank	-	-	1
Total Number of Samples	-	-	22

Sub-slab and basement air samples will be collected from sub-slab vapor ports which will be installed and access ports to the basement from the main floor of the Facility following indoor air sampling. Each sub-slab vapor port will be leak tested with helium prior to sampling. The sub-slab samples will be collected for 10 minutes using laboratory calibrated flow controller and Teflon tubing fitted to sampling canisters with Swagelok connectors. The sampling assembly will be purged prior to sampling to not introduce potential vapors into the building.

Laboratory QA/QC samples will be prepared and analyzed as specified in Method TO-15. All data will be validated by a third party validator, as described below.

In summary, the monitoring and sampling will be performed following this schedule:

Day 1 –Real-time air monitoring and photo documentation
Day 2 – Set out Zone A-B indoor and ambient samples for 24-hr collection
Day 3 – Pick up samples and install sub-slab vapor ports for sub-slab sampling
Day 4 - Collect sub-slab vapor samples.

Sub-slab soil gas and ambient air samples will be collected as additional lines of evidence to investigate the potential for VI.

6.3 Sample Handling Procedures

Samples will be placed in laboratory supplied clean, individually certified clean, evacuated canisters and labeled with sample identification number and date. Laboratory COCs will contain sample identification number, sampler name, sample date, analysis and methodology requested, and time of sample collection. Samples will be packaged, labeled, and documented in an area which is free of impact and provides for secure storage. Custody seals will be placed as necessary, and chain-of-custody procedures will be maintained from the time of sample collection until arrival at the laboratory to protect sample integrity. Shipping or transporting of samples to the laboratory will be done within a timeframe to meet the recommended holding times.

Nitrile gloves will be worn by sampling personnel and changed between activities at each discrete sample collection location. Previously worn nitrile gloves will be discarded in appropriate waste receptacles with other personal protective equipment.

6.4 Sample Labeling

Sample containers will be clearly labeled with the following information:

- Unique sample identification GAMS (Grenada, Mississippi)
- Sample Type - IA/ SS/OA (Indoor Air/ Sub-Slab/Outdoor Air)
- Sampler name or initials
- Date sample collected
- Time sample collected

The unique sample designation will include the following: four letter site prefix, sample type, two digit month, two digit day, three-digit numerical designation, and quality assurance (QA) sample designation, as appropriate. The sample types will be IA (Indoor Air), OA (Outdoor Air), and SS (Sub-slab).

7.0 INDOOR AIR SAMPLING IMPLEMENTATION

7.1 Proposed Schedule for Implementation

Upon receipt of USEPA's approval of the SAP, sampling activities will commence during the week of October 24, 2016.. Samples will be sent for laboratory analysis using standard turnaround times, and analysis, data verification and validation are anticipated to be completed within three weeks of receipt of completed analytical data packages/reports from the accredited laboratory. Upon receipt of validated data, the *Indoor Air Monitoring Report* will be prepared and submitted within 45 days.

7.2 Proposed Content for Report

The Indoor Air Monitoring Report will include the following information:

- Description of the qualitative survey conducted prior to air sampling
- Description of the air sampling event
- Summary of air sampling results
- Assessment of air sampling results compared to previous sampling
- Assessment of the potential for VI to IA based on comparison of air sampling results and previous sampling to the current worker screening levels
- Copies of chain of custody forms and analytical laboratory reports (including validation reports)

7.3 Project Organization and Management

The CTEH® Project Technical Director, Dr. Kelly Scribner, and Project Manager, Christine Millner, are responsible for coordinating technical activities and directing CTEH® personnel on the project, and are the primary CTEH® contacts. Dr. Scribner is the principal with responsibility for the overall quality of the work. Ms. Millner from the Little Rock, Arkansas, office will manage project-related activities. She is responsible for the establishment and monitoring of schedules, coordination of field activities, managing data, and the interface with and performance of any subcontractors.

8.0 QUALITY ASSURANCE

8.1 Field Calibration

Instruments used in the field as part of this sampling event are anticipated to consist of a RAE Systems ppbRAE PID, Inficon HAPSITE Portable GC/MS, global positioning systems (GPS) units, digital cameras, and handheld data collection devices such as tablets/smart phones. Operators of each piece of equipment are responsible for maintaining (including proper battery charge), calibrating and/or calibration checks, and operating this equipment such that it conforms to each respective manufacturer's specifications.

8.2 Field Duplicate Sample

One field duplicate will be collected and submitted for laboratory analyses in each zone of the plant's main building to verify the reproducibility of the sampling methods. Field duplicates collected using a T-bar regulator to fill two evacuated canisters simultaneously from the same sample location will be submitted to the laboratory for analysis consistent with the prescribed analysis (one parent and one

duplicate sample). Comparison of the sample to the duplicate sample results are used to assess the precision of sampling in the matrix (air).

8.3 Laboratory QA

Laboratory quality control procedures will be conducted in a manner consistent with relevant guidance documents. Deliverables will contain the supporting documentation necessary for data verification/validation. Internal laboratory quality control checks will include method blanks, laboratory control standards (lab spikes), system monitoring compounds, calibration standards, and internal standards.

8.4 Data Validation

Level IV Data Validation of the data generated by the laboratory performing the analyses will include at a minimum sample holding times, accuracy, precision, contamination of field generated or laboratory method blanks, and surrogate compound recovery. Third party, independent data validation is provided by Environmental Data Professional, L.L.C. (eDATApro). Accuracy will be determined by evaluating laboratory spikes recoveries. Precision will be determined by evaluating laboratory and field duplicate samples. Level IV data validation will be performed on at least 10%, or more of submitted samples.

All data packages will receive a data package completion check from the corresponding laboratory generating the data package to ensure that the deliverable requirements specified for this project have been satisfied. Data verification (Level II) will be performed on sample delivery groups prior to release of the data. Level II data verification will be performed on 100% of submitted samples.

9.0 WASTE DISPOSAL

It is not anticipated that any waste will be generated while collecting ambient or indoor air samples. However, if any waste is generated, the method for storage and disposal of investigative-derived waste materials will comply with applicable local, state, and federal regulations, or be handled in a manner consistent with any Waste Management Plan that is developed.

10.0 DATA ANALYSIS

The sampling results will be reviewed for the presence/absence of the analytes examined. The concentrations of any detected compounds will then be compared to:

- Historical sampling results and sub-slab and outdoor air sampling results,
- USEPA VI screening levels (VISL), as identified above. If USEPA VISL's are updated prior to IA sampling and comparison, the most up-to-date data will be used.

- USEPA Composite Worker Air Risk-Based Screening Levels (RSLs), as identified above.
- OSHA PELs, as identified above.

The results of laboratory analyses will be uploaded to the USEPA Region 4 EQUIS database in the appropriate format following the completion of data validation.

11.0 RECORDS MANAGEMENT

Records management refers to the procedures for generating, controlling, and archiving project-specific records and records of field activities. Project records, particularly those that are anticipated to be used as evidentiary data, directly support current or ongoing technical studies and activities, and provide historical evidence for later reviews and analyses, will be legible, identifiable, retrievable and protected against damage, deterioration, or loss on a centralized electronic database. Handwritten records will be written in indelible ink. Records likely will include, but are not limited to, the following: bound field notebooks on pre-numbered pages, sample collection forms, personnel qualification and training forms if requested, sample location maps, equipment maintenance and calibration forms if used, chain-of custody records, maps and drawings, transportation and disposal documents as needed, reports issued as a result of the work, procedures used, correspondence, and any deviations from the procedural records. Documentation errors will be corrected by drawing a single line through the error so it remains legible and will be initialed by the responsible individual, along with the date of change, and the correction will be written adjacent to the error.

12.0 FURTHER EVALUATION

Following data review and evaluation, one or more of the following steps will be taken:

1. If all IA samples are below VISL and/or RSL screening values, an additional cold weather sampling event will be scheduled which will follow the methods outlined in this work plan.

2. If some or all of the IA samples exceed VISL and/or RSL screening values, the following additional evaluations will be completed:

    a. IA results will be compared to sub-slab and basement results to determine if the analytes exceeding screening values are present at higher concentrations and/or similar ratios in sub slab or basement samples.

    b. IA results will be compared to ambient air results to determine whether outdoor air is a contributing factor.

c. Screening of indoor areas for other potential VOC sources may be proposed. This may include additional sampling and emission chamber samples as needed to determine other potential VOC sources.

3. If the VI pathway is confirmed for some or all analytes exceeding VISL screening values, a risk assessment will be completed to determine whether the IA sampling results indicate an unacceptable risk to plant workers and personnel.

4. If the risk assessment determines that an unacceptable risk is present for plant workers and personnel, the following steps will be taken:

   a. PID and Field GC/MS screening will be completed at the plant to identify locations where VI may be occurring in plant locations where unacceptable risks have been identified. Additional indoor air and worker-specific sampling may be conducted.

   b. All locations identified as possible complete VI pathways will be closed and/or sealed in an appropriate manner.

   c. An additional IA sampling event will occur following the work outlined above in accordance with the methods described in this work plan.

Any proposed further evaluation activities requiring access to the Facility will require advanced agreement from Grenada Manufacturing, LLC's tenant.

13.0 REFERENCES

ITRC. Vapor Intrusion Pathway: A Practical Guideline. Washington, DC: Interstate Technology and Regulatory Council, Vapor Intrusion Team; 2007 Jan.

USEPA. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response; 2015 Jun; OSWER Publication 9200.2-154.

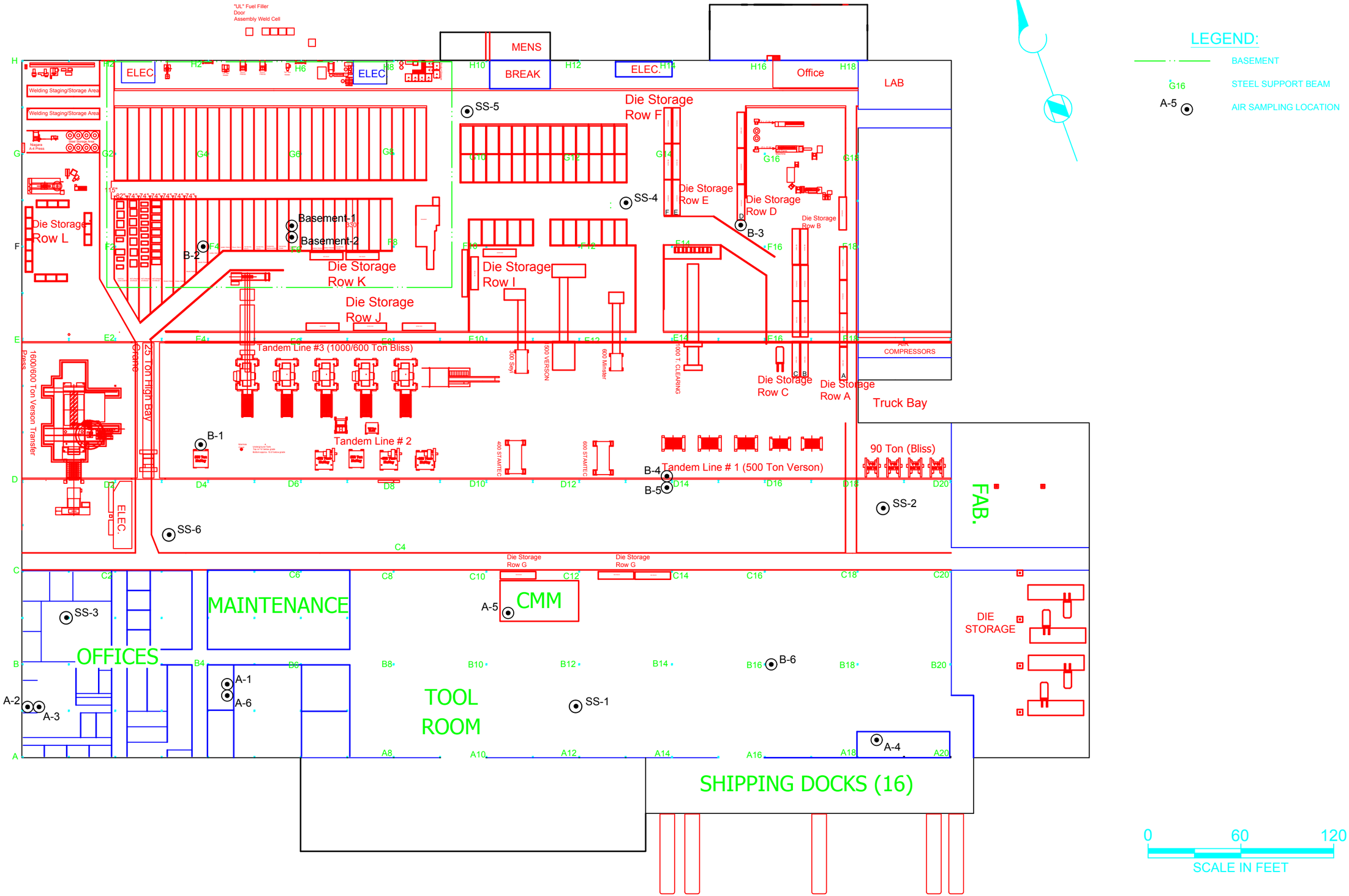
USEPA. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. Washington, DC: U. S. Environmental Protection Agency, 2016 May. https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016

USEPA. Vapor Intrusion Screening Level (VISL) Calculator Version 3.5.1. Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response; 2016. https://www.epa.gov/sites/production/files/2016-01/visl-calculator_v_346.xlsm

Attachment A

Map of the Facility and Proposed Sampling Locations

FIGURE 2-1
Indoor Air Sampling Locations



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