

US EPA ARCHIVE DOCUMENT

AUG 02 2011

# Vapor Intrusion Interim Measures Work Plan

Chamberlain Manufacturing Corporation

Former Facility at

550 Esther Street

Waterloo Iowa

EPA Docket Nos.

RCRA-07-2010-002

CERCLA-07-2010-0005

May 20, 2010

Revised October 14, 2010

Amended August 1, 2011

Terracon Project No. 07107020

**Prepared for:**

Chamberlain Manufacturing Corporation

Elmhurst, Illinois

**Prepared by:**

Terracon Consultants, Inc.

Bettendorf, Iowa

Offices Nationwide  
Employee-Owned

Established in 1965  
terracon.com

# Terracon



August 1, 2011

United States Environmental Protection Agency  
Region 7  
Air, RCRA and Toxics Division  
901 North 5th Street  
Kansas City, KS 66101

Attention: Mr. Bruce Morrison

Re: Vapor Intrusion Interim Measures Work Plan  
Chamberlain Manufacturing Corporation  
Former Facility at 550 Esther Street  
Waterloo Iowa  
EPA Docket Nos. RCRA-07-2010-002 and CERCLA-07-2010-0005

Dear Mr. Morrison:

Terracon Consultants, Inc. (Terracon) is pleased to submit this revised Vapor Intrusion Interim Measures Work Plan (VIIM Work Plan) for activities in conjunction with the site referenced above. The VIIM Work Plan presents a summary of proposed activities related to the installation of vapor mitigation systems in residential structures which demonstrate an exceedance of human-health risk-based levels.

Should you have any questions or require additional information, please do not hesitate to contact our office.

Sincerely,

**Terracon Consultants, Inc.**

John F. Brimeyer, PE  
Environmental Manager

  
John A. Sallman, PG  
Department Manager

Terracon Consultants, Inc. 870 40th Avenue Bettendorf, Iowa 52722  
P [563] 355 0702 F [563] 355 4789 [terracon.com](http://terracon.com)



## TABLE OF CONTENTS



<b>1.0 INTRODUCTION</b>	<b>4</b>
1.1 Site Conditions	4
1.2 Previous Assessment Activities	5
1.3 Project Objectives	5
<b>2.0 SCOPE OF SERVICES</b>	<b>6</b>
2.1 Mitigation Determination	6
2.2 Proposed Mitigation Activities	7
2.2.1 Site Access	7
2.2.2 System Installation Activities	7
2.3 Health and Safety	8
2.4 Site Access Protocol	8
<b>3.0 PROCEDURES</b>	<b>8</b>
3.1 System Design	8
3.2 Diagnostic Tests	9
3.3 System Installation	9
3.4 System Commissioning	10
3.5 System Operations	10
3.6 Post-Installation Monitoring	10
<b>4.0 QUARTERLY VAPOR INTRUSION INTERIM MEASURES REPORT</b>	<b>11</b>
<b>5.0 DATA TRANSMITTAL TO RESIDENTS</b>	<b>11</b>
<b>6.0 SCHEDULE</b>	<b>12</b>

### Tables

Table 2-1 Interim Measures Decision Matrix <sup>1</sup>	6
Table 3-1 Post-Installation Monitoring Schedule	11
Table 6-1 Schedule	12

### Appendices

**Appendix A – Figures**

**Appendix B – Installation and Operation Commissioning Checklist**

**Appendix C – Letters to Residents and Owners**

## ACRONYMS & ABBREVIATIONS



CERCLA .....	Comprehensive Environmental Response, Compensation, and Liability Act
City .....	City of Waterloo
COC .....	Chain of Custody
EPA .....	Environmental Protection Agency
Facility .....	Chamberlain Manufacturing facility
HASP .....	Health and Safety Plan
NELAC .....	National Environmental Laboratory Accreditation Conference
PCE .....	Tetrachloroethene (or Perchloroethene)
PID .....	Photoionization Detector
ppm .....	parts per million
QA .....	Quality Assurance
QAM .....	Quality Assurance Manual
QAPP .....	Quality Assurance Project Plan
QC .....	Quality Control
RCRA .....	Resource Conservation and Recovery Act
SOP .....	Standard Operating Procedure
SOW .....	Statement of Work
TCE .....	Trichloroethene
TestAmerica .....	TestAmerica, Inc.
TSOP .....	Terracon Standard Operating Procedure
UAO .....	Unilateral Administrative Order
USEPA .....	United States Environmental Protection Agency
VIC .....	Vapor Intrusion Characterization
VIIM .....	Vapor Intrusion Interim Measures
VOC .....	Volatile Organic Compound

**VAPOR INTRUSION INTERIM MEASURES WORK PLAN  
CHAMBERLAIN MANUFACTURING CORPORATION  
FORMER FACILITY AT  
550 ESTHER STREET  
WATERLOO, IOWA**

**Project No. 07107020  
May 20, 2010  
Revised October 14, 2010  
Amended August 1, 2011**

## **1.0 INTRODUCTION**

Terracon has developed this VIIM Work Plan to identify procedures for the implementation of interim remedial measures in residential structures in which vapor concentrations related to shallow groundwater contamination from the former Chamberlain Manufacturing Facility (Facility) exceed specified levels. This VIIM Work Plan is submitted in accordance with the requirements of the UAO, Docket Nos. RCRA 07-2010-002 and CERCLA 07-2010-005 (UAO) dated April 20, 2010 and Task IA of the SOW attached to the UAO. Capitalized terms not defined herein have the definitions set for the in the UAO or the SOW.

The VIIM Work Plan has been developed in accordance with USEPA guidance including but not limited to:

- *RCRA Corrective Action Plan: Final* (EPA 520-R-94-004, OSWER Directive 9902.3-2A, May 1994) ("Corrective Guidance")
- *Interim Final RCRA Facility Investigation (RFI) Guidance* (EPA 530/SW-89-031)
- *RCRA Ground-water Monitoring: Draft Technical Guidance* (November 1992)
- *Test Methods for Evaluating Solid Waste* (SW-846, most recent method)
- *Construction Quality Assurance for Hazardous Waste Land Disposal Facilities* (EPA 530/SW-85-031, July 1986).

### **1.1 Site Conditions**

The Facility is an irregularly shaped parcel containing approximately 22.8 acres and located at 550 Esther Street in Waterloo, Iowa. A Topographic Map is included as Figure 1 in Appendix A. A Site Diagram is included as Figure 2.

The Facility manufactured metal washer wringers and projectile metal parts from approximately 1919 until 1996 when it was sold to Atlas Warehouse L.C. for use as a storage facility. The

## **Vapor Intrusion Interim Measures Work Plan**

Former Chamberlain Manufacturing Facility ■ Waterloo, Iowa

May 20, 2010, Revised October 14, 2010, Amended August 1, 2011 ■ Terracon Project No. 07107020

**Terracon**

Facility was subsequently abandoned and is currently vacant. The City of Waterloo (City) acquired the Facility from Atlas Warehouse L.C in 2005 in an effort to facilitate redevelopment and has demolished a significant portion of the Facility.

The Facility is zoned Heavy Industrial (M-2) by the City. The Facility is adjoined by park land to the north and south, single family residential housing to the west, and Virden Creek followed by a golf course to the east. Virden Creek is within approximately 100 feet of the Facility at its closest point. Gates Park adjoins the Facility to the north across Louise Street, to the east across Virden Creek, and to the south across the railroad tracks. Single family residences are located across East 4th Street to the west of the Facility. Single family residences are also located along the east side of East 4th between Anita and Louise Streets.

### **1.2 Previous Assessment Activities**

Beginning in 2004, the City conducted an environmental assessment of the site using a USEPA Brownfields Grant. Results of assessment activities identified impacts to soil and groundwater at the site including a chlorinated solvent plume that extends offsite to the south and west. Site assessment activities were not completed due to funding restrictions of the Brownfields Grant program.

Subsequently, environmental assessment activities of onsite soil and groundwater conditions and the offsite chlorinated solvent plume were completed by Chamberlain. The lateral extent of the chlorinated solvent plume has been determined to extend south and west from the Facility into an area of residential development. USEPA's preliminary evaluation of the vapor intrusion to indoor air pathway resulting from the groundwater plume identified the potential for vapor intrusion into residential structures.

To further evaluate the vapor intrusion pathway, the USEPA conducted subslab vapor sampling of selected residences in November 2008. Due to problems with the sampling and analysis equipment, the sampling activities were repeated in April/May 2009. Subslab vapor samples were collected from ten homes located along and near East 4<sup>th</sup> Street and analyzed for VOCs. In addition, one indoor air sample was collected from one of the ten homes. The results of sampling activities identified PCE and TCE in excess of subslab vapor screening levels. The elevated concentrations were generally located within the 2200, 2300, and 2400 block of East 4<sup>th</sup> Street.

### **1.3 Project Objectives**

The objective of the VIIM Work Plan is to develop procedures for the implementation of the proposed interim measures in certain Residences adjoining the Facility to the south and west. Subslab vapor sampling will be conducted in accordance with a USEPA-approved VIC Work Plan. Based on the results obtained from site characterization sampling performed in accordance with the VIC Work Plan, the need for vapor intrusion interim measures will be determined.

## Vapor Intrusion Interim Measures Work Plan

Former Chamberlain Manufacturing Facility ■ Waterloo, Iowa

May 20, 2010, Revised October 14, 2010, Amended August 1, 2011 ■ Terracon Project No. 07107020

**Terracon**

## 2.0 SCOPE OF SERVICES

### 2.1 Mitigation Determination

The determination of the need for the implementation of interim measures will not be based solely on the results of sub-slab and indoor sampling, but will consider multiple lines of evidence, consistent with ITRC guidance. As noted, "sub-slab gas concentrations, by themselves, do not necessarily indicate the extent to which vapor intrusion is occurring or, if it is occurring, whether vapor intrusion represents a health risk. In evaluating the results of vapor intrusion characterization activities, consideration will be given to other factors including, but not limited to, information provided during completion of the Occupied Dwelling Questionnaire, groundwater analytical data, and statistical evaluation of the data. The evaluation of analytical results and other factors will be used to determine if, based on the compilation of data, an observed exceedance of sub-slab or indoor air screening levels is indicative of vapor intrusion associated with the chlorinated solvent plume and the Facility.

If an exceedance of sub-slab and indoor air screening levels is determined to be indicative of vapor intrusion posing a health risk and associated with the chlorinated solvent plume and the Facility, interim measures will be implemented. Interim measures/risk management decisions will be determined by the USEPA based on multiple lines of evidence including the decision matrix presented in Table 2-1.

Table 2-1 Interim Measures Decision Matrix<sup>1</sup>

Generic Screening Levels		Indoor Air Concentrations ( $\mu\text{g}/\text{m}^3$ )	
		<Indoor Air Screening Level	>Indoor Air Screening Level
Sub-Slab Soil Gas Concentration ( $\mu\text{g}/\text{m}^3$ )	< Sub-Slab Vapor Screening Level <sup>2,5</sup> Risk $\leq 10^{-6}$ and Hazard Quotient <sup>2</sup> $\leq 1$	NO ACTION	NO ACTION (potential indoor source)
	> Sub-Slab Vapor Screening Level $10^{-6} < \text{Risk} < 10^{-4}$ and Hazard Quotient $> 1$	Risk Management Decision (monitor)	Resample & Potential Further VI Investigation and/or Mitigate
	> Sub-Slab Vapor Screening Level <sup>2</sup> Risk $> 10^{-4}$ or Hazard Quotient <sup>3</sup> $> 1$	Risk Management Decision (monitor or mitigate)	Mitigate <sup>4</sup>

<sup>1</sup> – If applicable regulations and/or USEPA guidance should change, then the screening may be changed and subsequent sample results shall be compared to the updated screening levels

<sup>2</sup> – Based on attenuation factor ( $\alpha$ ) of 0.1

<sup>3</sup> – Hazard Quotient used for site specific chemical rather than Hazard Index used for several chemicals

<sup>4</sup> – Acute exposures may warrant a rapid response that includes installation of a vapor mitigation system

<sup>5</sup> – If significant floor openings are observed, and sub-slab concentrations exceed indoor air screening levels, indoor air sampling will be required

Conditions where sub-slab concentrations are greater than the sub-slab screening level, but indoor air concentrations are less than indoor air screening levels are indicative of a potential risk

## Vapor Intrusion Interim Measures Work Plan

Former Chamberlain Manufacturing Facility ■ Waterloo, Iowa

May 20, 2010, Revised October 14, 2010, Amended August 1, 2011 ■ Terracon Project No. 07107020

**Terracon**

only. Such residences will be monitored to demonstrate that the risk is not realized, or if indoor air screening levels are exceeded, to proceed with mitigation. Alternatively, and if sub-slab concentrations pose greater than a  $10^{-4}$  risk, a vapor mitigation system may be installed in accordance with the VIIM schedule on the basis of the original sub-slab and indoor air analytical results. Proposed monitoring activities will be presented in the Quarterly VIIM Report for the calendar quarter in which the analytical results are received.

If sub-slab concentrations exceed screening levels, sub-slab concentrations pose less than a  $10^{-4}$  risk, and indoor air concentrations exceed screening levels, additional investigation may be conducted to determine if the reported concentrations are indicative of vapor intrusion posing a health risk and are associated with the chlorinated solvent plume and the Facility. In lieu of providing an offer to the Residence to install a vapor mitigation system, a notice will be provided to the USEPA if resampling of the residence or further vapor intrusion investigation is proposed. Proposed resampling or investigation activities will be presented in the Quarterly VIIM Report for the calendar quarter in which the analytical results are received.

### 2.2 Proposed Mitigation Activities

It is anticipated that a soil vapor mitigation system, similar to a radon mitigation system, will be installed as a preventive measure beneath the existing slab at the identified residences that elect to have a system installed. The system will function as a subslab depressurization system which will induce a negative pressure in the subslab soils (relative to the pressure within the residence) in order to provide a preferential pathway for subslab soil vapors to bypass the residence.

#### 2.2.1 Site Access

Upon receipt of analytical results in excess of USEPA-approved screening levels and evaluation of the multiple lines of evidence associated with the chlorinated solvent plume and the Facility, notification will be provided to Residences that exceed risk management decision criteria for the site. The notification will provide a summary of the results and an offer to complete the installation of a vapor mitigation system. If accepted, the system installation will be scheduled and completed.

#### 2.2.2 System Installation Activities

Vapor mitigation systems will be installed by an Iowa Department of Public Health credentialed radon mitigation specialists under sub-contract agreement with Terracon. One or more of the following subcontractors will be used.

## **Vapor Intrusion Interim Measures Work Plan**

Former Chamberlain Manufacturing Facility ■ Waterloo, Iowa

May 20, 2010, Revised October 14, 2010, Amended August 1, 2011 ■ Terracon Project No. 07107020

# **Terracon**

Brad J. Lehmann  
Professional House Doctors, Inc.  
6820 University Avenue, Suite 153  
Cedar Falls, IA 50613  
Phone: (319) 266-1512

Andrew Barber  
Crystal Heating & Plumbing, Inc.  
1210 West Bremer Avenue  
Waverly, IA 50677  
Phone: (319) 352-3241

Mallon Construction Service  
Lonnie L. Mallon  
P.O. Box 344  
Janesville, IA 50647  
Phone: (319) 987-3418

### **2.3 Health and Safety**

It is anticipated that personnel in the work area will require a USEPA Level D work uniform consisting of hard hats, safety glasses, protective gloves, and steel-toed boots.

### **2.4 Site Access Protocol**

Residences will be notified at least 48 hours in advance of the start of system installation activities. City staff will be contacted if issues regarding access to assessment locations are encountered during assessment activities.

## **3.0 PROCEDURES**

This section presents the approach to design, install, and commission the protective vapor mitigation systems in homes where the resident accepts Chamberlain's offer for a system.

### **3.1 System Design**

Upon receipt of authorization to proceed, the mitigation specialist will design individual systems based on information obtained by Terracon in conjunction with subslab vapor sampling activities. Typically for single family residences with slab areas less than 1,500 square feet, one or two suction points will be sufficient to properly mitigate the entire slab. An example of a typical protective vapor mitigation system drawing is attached as Figure 3; however, this is provided for information only. The actual system design will be dependent on actual site conditions and will be adjusted accordingly. A drawing will be developed and provided to the resident, who will sign the drawing indicating their approval of the placement of system apparatus with respect to esthetics and living-space interference. The mitigation specialist will proceed with each installation upon receipt of the resident-approved drawing and receipt of a building permit from the City.

## Vapor Intrusion Interim Measures Work Plan

Former Chamberlain Manufacturing Facility ■ Waterloo, Iowa

May 20, 2010, Revised October 14, 2010, Amended August 1, 2011 ■ Terracon Project No. 07107020



### 3.2 Diagnostic Tests

Diagnostic testing will be performed prior to the installation of the mitigation system to evaluate air flow characteristics and capacity of the material beneath the slab. Diagnostic testing will consist of drilling small diameter holes through the slab, applying a vacuum to one hole, and measuring pressure drops at the surrounding test holes. The objective of the diagnostic testing is to investigate, evaluate, and document the development of negative pressure field, via the induced movement of the air flow beneath the slab.

Two methods will be used to monitor and document the development of a negative pressure field: pressure testing and smoke testing. Pressure testing is the preferred method as it provides a direct and quantitative means to measure a negative pressure field. However, if very pervious fills/subsoils are present, large volumes of air could be moved with relatively little pressure drop, which might be undetectable by the micromanometer. The creation of a negative pressure field will be verified by smoke tests, which demonstrate the (downward) advection of smoke (air) into the ground (i.e., through the slab).

Generally, the diagnostic extraction hole will be at least 3/4 inches in diameter; the test holes 3/8 inches in diameter. Test holes will be placed at varying distances from the extraction hole, such that the size of the effective pressure field under the slab may be evaluated. A "shop vac" unit will be used to pump air from the extraction hole; the pressure drop and flow rate at this extraction point will be monitored and recorded. Pressure drops at the test holes will be measured quantitatively with a pressure gauge (e.g., a micromanometer). Following the test, the diagnostic extraction and test holes will be sealed with portland cement grout, with 2 holes that will be made permanent ports with threaded plugs in order to provide points to demonstrate establishment of a negative pressure field by the system.

### 3.3 System Installation

It is anticipated that the proposed systems will consist of a network of sump/cored holes in the concrete slab with vertical pipes which will be sealed at the floor and will exit the roof of the building to draw and expel soil vapor from beneath the concrete slab of the building. Each protective vapor mitigation system suction point will be installed with a pressure gage (U-tube manometer) and an audible alarm that will alert the building occupants in the event of a system malfunction. Labels, placed on system components, will provide a telephone number of a Terracon contact that the occupant can call for questions and repairs. Slab cracks, holes, and other openings will be sealed, caulked, or covered. Floor drains that are not connected to the municipal sewer will be replaced with Dranjer-type devices that allow water to travel down the drain but do not allow vapors to migrate up the drain. Covers will be installed over the top of all sumps in order to limit potential vapor transport from the sump to indoor air.

## Vapor Intrusion Interim Measures Work Plan

Former Chamberlain Manufacturing Facility ■ Waterloo, Iowa

May 20, 2010, Revised October 14, 2010, Amended August 1, 2011 ■ Terracon Project No. 07107020

**Terracon**

Typically, an individual system will be set up and installed in one to two days depending on access and residence specifics, such as vent locations, utility clearances, and any repairs required to building materials and roofing. An inline electric fan will provide vacuum to draw potential vapors to the preferential pathway.

Building and electrical permits will be obtained, if required, in accordance with local building codes.

### 3.4 System Commissioning

Upon completion, Terracon will review system installation to document that it was installed properly, is achieving the design criteria, and is performing in accordance with defined performance specifications, discussed in this subsection. Results of the commissioning will be recorded on the *Installation and Operation Commissioning Checklist* provided in Appendix B. An as-built drawing will be prepared (modification of the design drawing) for each commissioned system, showing locations of suction points, piping, and fans on a plan view of the depressurized slab.

The static pressure at each suction point (u-tube manometer readings) and at the fan inlet will be recorded. These measurements will define the operating performance of each system as it achieves depressurization across the entire slab.

System components will be reviewed with each property owner following completion of system installation.

### 3.5 System Operations

System inspections will be conducted once a month for a period of one quarter. Following this initial period of performance monitoring, it is anticipated that the inspection schedule can be reduced to annually.

Subslab vapor sampling ports will be left in place to allow measurement of the negative pressure field created by the system.

### 3.6 Post-Installation Monitoring

Following the completion of system installation, periodic monitoring and sampling will be completed to document continued performance of the system. System monitoring will consist of observation of the exterior portions of the vapor mitigation system for indications of damage, deterioration, or other visible problems. System monitoring will include reading the in-line manometer and observing blower motor operation. Results of the periodic system monitoring will be documented on a data form. To verify that the system is maintaining indoor air concentrations

## Vapor Intrusion Interim Measures Work Plan

Former Chamberlain Manufacturing Facility ■ Waterloo, Iowa

May 20, 2010, Revised October 14, 2010, Amended August 1, 2011 ■ Terracon Project No. 07107020

**Terracon**

below indoor air screening levels, indoor air samples will be collected and analyzed consistent with the procedures identified in the VIC Work Plan. Ambient air samples will be collected at a rate of one per every five indoor air samples.

Post installation monitoring will be performed in accordance with Table 3-1.

**Table 3-1 Post-Installation Monitoring Schedule**

<b>Monitoring Activity</b>	<b>Schedule</b>
Initial Indoor Air Sampling	Within 30 days after completion of system installation
System Inspection	Annually beginning one year after system installation
Indoor Air Monitoring	Every three years beginning three years after system installation

Indoor air monitoring results will be evaluated to determine if interim measures can be discontinued if results are below the risk management criteria in the VIC Work Plan.

## 4.0 QUARTERLY VAPOR INTRUSION INTERIM MEASURES REPORT

Terracon will prepare and submit Quarterly VIIM Reports that detail the design and installation of the vapor intrusion mitigation system(s) completed during the quarterly reporting period. The report will document system design "as-builts," information on the expected operational life of the system, a recommendation for the frequency for monitoring and maintaining the system, criteria for determining its effectiveness, a schedule for system replacement in whole or in part (as appropriate), the frequency of system inspection by the Respondent, the results of post-installation system monitoring, and any approved deviations from the approved VIIM Work Plan.

## 5.0 DATA TRANSMITTAL TO RESIDENTS

Correspondence that provides sampling results to residents and homeowners will only be transmitted by the USEPA, unless prior written approval is provided by the USEPA to Terracon and Chamberlain to perform the transmittal.

Any other written correspondence to residents and owners from Chamberlain and Terracon related to the vapor intrusion sampling and mitigation shall be approved by the USEPA prior to being transmitted provided; however, that USEPA shall be deemed to have approved letters to residents and owners requesting access and confirming appointments for sampling or system installation substantially in the form of Appendix C attached hereto. Chamberlain and Terracon will copy the USEPA on any written communications with any residents regarding the property. USEPA will copy Chamberlain and Terracon on any written communications with any residents regarding the property.

**Vapor Intrusion Interim Measures Work Plan**

Former Chamberlain Manufacturing Facility ■ Waterloo, Iowa

May 20, 2010, Revised October 14, 2010, Amended August 1, 2011 ■ Terracon Project No. 07107020

**6.0 SCHEDULE**

Based upon currently available information, the proposed schedule is as follows:

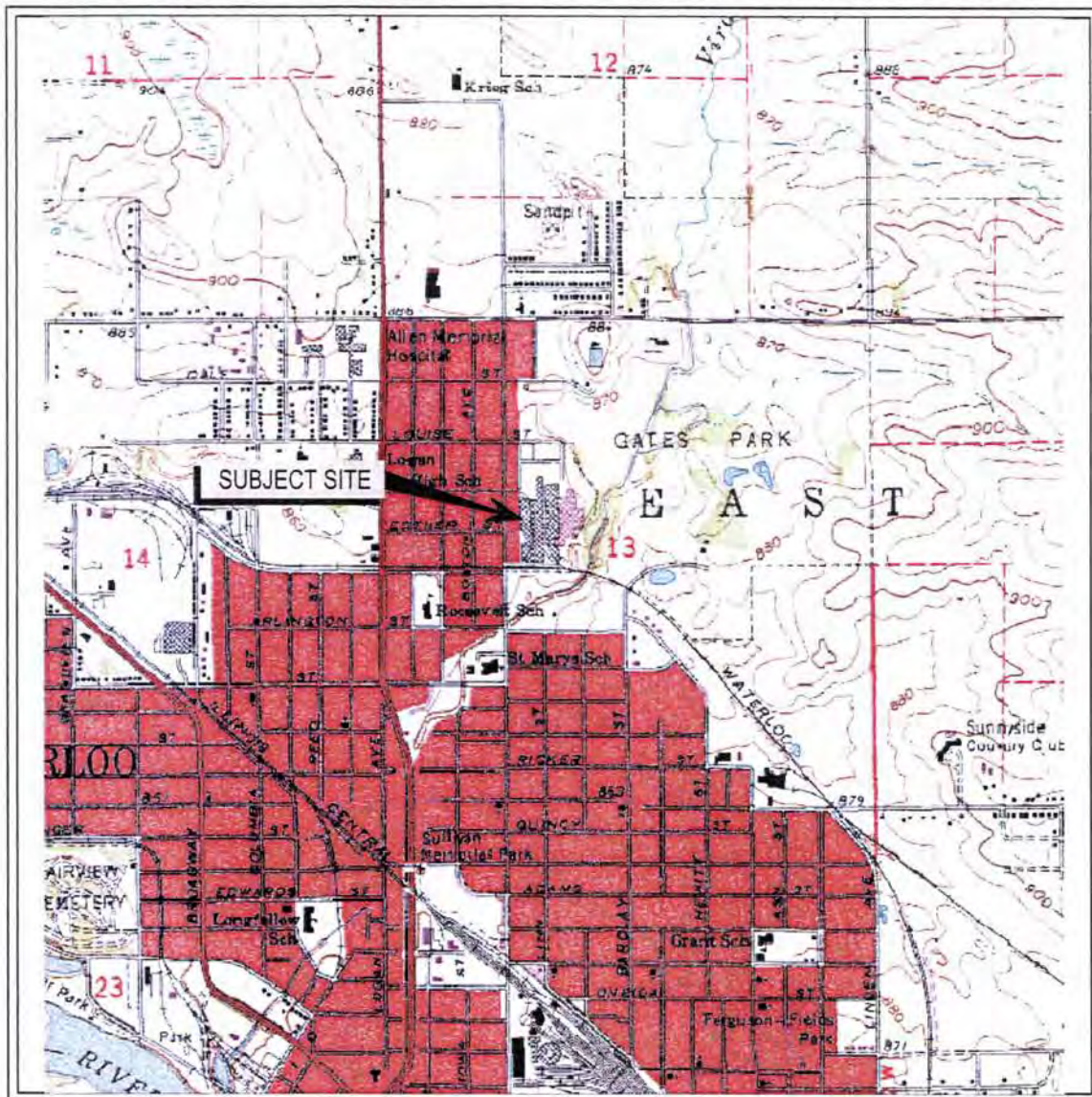
**Table 6-1 Schedule**

<b>Activity</b>	<b>Days to Complete</b>
Terracon to submit validated data to USEPA	45 days following collection of sample
Terracon to submit offer for interim measures to Residence	15 days following receipt of notification from USEPA
Deadline for acceptance of offer for installation of mitigation system from residents	3 months following receipt of offer, which period may be extended for an 3 additional months if there is a change in ownership or occupant during the initial 3-month period
Terracon to complete individual system Installation	45 days following receipt of acceptance letter from owner and resident
Terracon to prepare and submit Quarterly VIIM Reports	30 days after the end of each calendar quarter

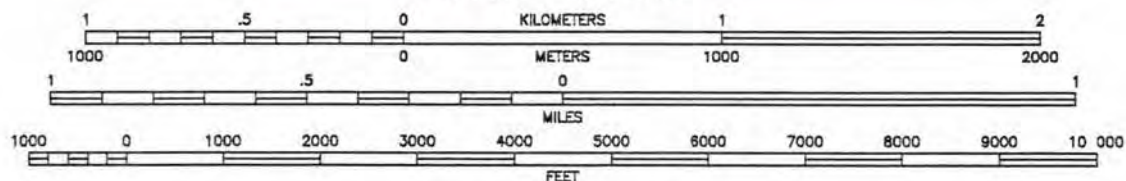
**Appendix A**

**Figures**

UNITED STATES — DEPARTMENT OF THE INTERIOR — GEOLOGICAL SURVEY



SCALE 1:24 000



CONTOUR INTERVAL FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929  
TOPO LINES REPRESENT 10-FOOT CONTOURS

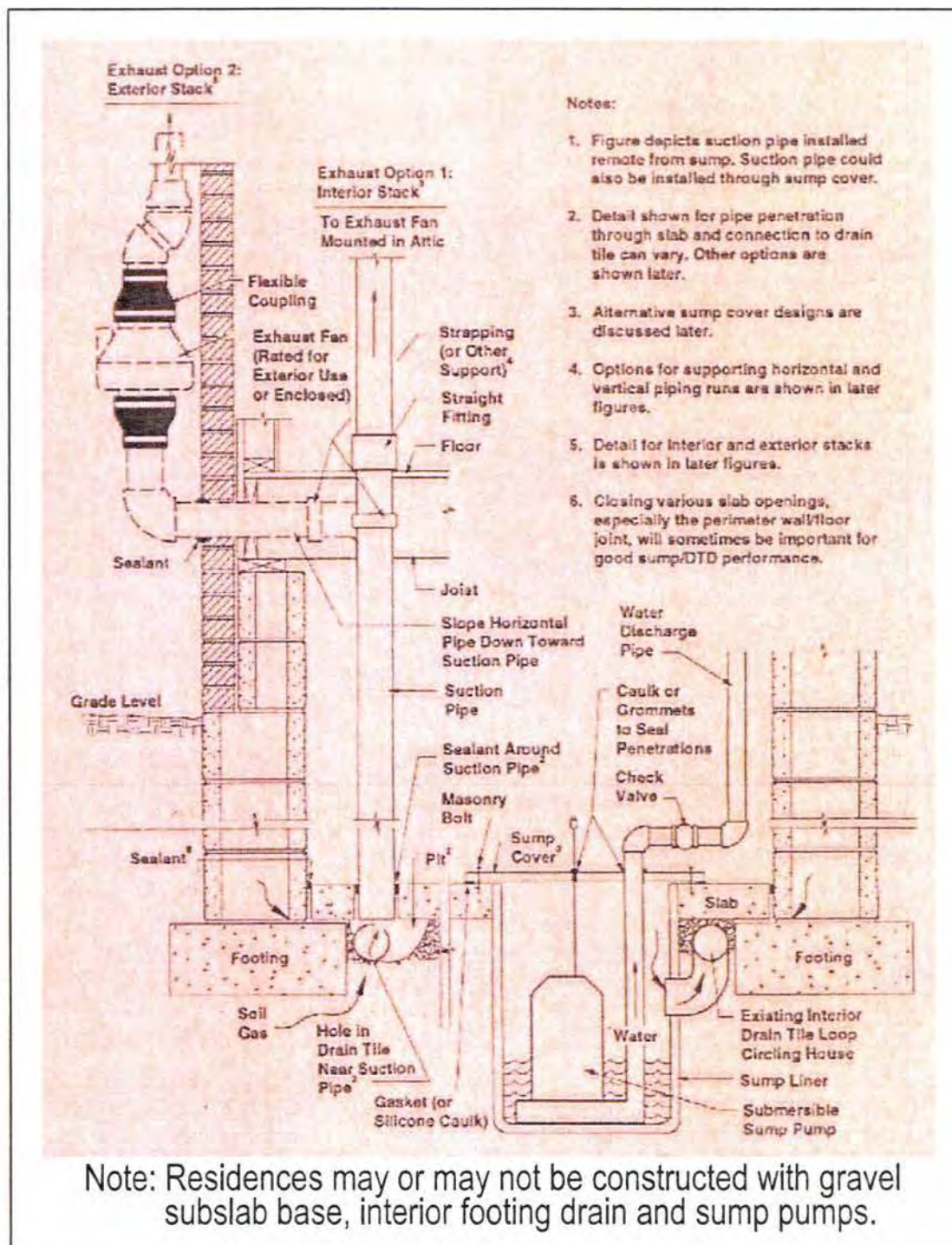
WATERLOO NORTH QUADRANGLE

7.5 MINUTE SERIES (TOPOGRAPHIC)



Project Mgr:	JFB	Project No.	07107020	<b>Terracon</b> Consulting Engineers and Scientists 370 40th Avenue Bettendorf Iowa 52722 (563) 355-1702 (563) 355-4739	TOPOGRAPHIC VICINITY MAP	FIG. No.
Drawn By:	JFB	Scale:	AS SHOWN		VAPOR INTRUSION INTERIM MEASURES WORK PLAN	1
Checked By:	JFB	File No.	07107020-T2-FG1		FORMER CHAMBERLAIN MANUFACTURING FACILITY	
Approved By:	JFB	Date:	MAY 2010		550 ESTHER ST. WATERLOO, IOWA	





REV	DATE	BY	DESCRIPTION

**Terracon**  
Consulting Engineers and Scientists

670 2nd Avenue  
St. Paul, MN 55102

Telephone: (612) 222-1234  
Fax: (612) 222-1235

# VAPOR MITIGATION SYSTEM

VAPOR INTRUSION INTERIM MEASURES WORK PLAN  
FORMER CHAMBERLAIN MANUFACTURING FACILITY  
550 ESTHER STREET

WATERLOO

IOWA

# FIGURE 3

PROJECT NO.	201
DRAWN BY	JRS
CHECKED BY	JRS
SCALE	AS SHOWN
DATE	MAR 2010
PROJECT NO.	07101720
FILE NAME	07101720-3.dwg
SHEET NO.	3 OF 3

**Appendix B**

**Installation and Operation Commissioning Checklist**

## Installation and Operation Commissioning Checklist

Commissioning Checklist.xlsx, Sheet1

**Appendix C**

**Letters to Residents and Owners**



**Sent by Certified Mail  
Return Receipt Requested**

[Date]

[Resident/Owner]

[Address]

[City, State, Zip]

Dear [Resident/Owner]:

As requested by the United States Environmental Protection Agency ("EPA") Terracon Consultants, Inc. (Terracon) recently completed environmental testing of soil vapors beneath certain homes in your neighborhood near the 550 Esther Street property, currently owned by the City of Waterloo. The testing was conducted on behalf of Chamberlain Manufacturing Corporation.

On [sample date(s)], Terracon collected sub-slab soil gas samples from the sampling port installed in the basement floor of your home. The collected samples were submitted to a testing laboratory for analysis. Terracon has received and validated the results of laboratory analysis and has provided the results to the EPA. Based on EPA's initial review, the sub-slab sample analytical results exceed applicable screening levels for certain contaminants.

Based on these results and in accordance with the USEPA-approved Vapor Intrusion Interim Measures Work Plan, additional sampling is recommended to determine if vapors may be present in your home that warrant attention. A representative of Terracon will contact you and make arrangements for additional sampling activities.

It is important to know that this additional sampling is a precautionary step. The information we obtain will help us gain a fuller understanding of the conditions in your neighborhood and whether any additional action is needed.

Please call (563) 355-4852 if you have any questions. We appreciate your cooperation in this process.

Sincerely,  
**Terracon Consultants, Inc.**

A handwritten signature in cursive script that reads "John F. Brimeyer". The signature is written in dark ink and is positioned above the printed name and title.

John F. Brimeyer, PE  
Environmental Manager

cc: Mr. Bruce Morrison, USEPA



***Sent by Certified Mail  
Return Receipt Requested***

[Date]

[Resident/Owner]

[Address]

[City, State, Zip]

Dear [Resident/Owner]:

As requested by the United States Environmental Protection Agency ("EPA") Terracon Consultants, Inc. (Terracon) recently completed environmental testing of soil vapors beneath certain homes in your neighborhood near the 550 Esther Street property, currently owned by the City of Waterloo. The testing was conducted on behalf of Chamberlain Manufacturing Corporation

On [sample date(s)], Terracon collected sub-slab soil gas samples from the sampling port installed in the basement floor of your home and indoor air samples from the basement and first floor living areas of your home. The collected samples were submitted to a testing laboratory for analysis. Terracon has received and validated the results of laboratory analysis and has those results to the EPA. Based on EPA's initial review, the sub-slab sample analytical results exceed applicable screening levels for certain contaminants; however, indoor air analytical results do not exceed applicable screening levels.

Based on these results and in accordance with the USEPA-approved Vapor Intrusion Interim Measures Work Plan, additional sampling is recommended to monitor conditions in your home to confirm that vapors are not present that warrant attention. A representative of Terracon will contact you and make arrangements for additional sampling activities.

It is important to know that this additional sampling is a precautionary step. The information we obtain will help us gain a fuller understanding of the conditions in your neighborhood and whether any additional action is needed.

# Terracon

Please call (563) 355-4852 if you have any questions. We appreciate your cooperation in this process.

Sincerely,  
**Terracon Consultants, Inc.**

A handwritten signature in cursive script that reads "John F. Brimeyer".

John F. Brimeyer, PE  
Environmental Manager

cc: Mr. Bruce Morrison, USEPA

**Sent by Certified Mail  
Return Receipt Requested**

# Terracon

[Date]

[Resident/Owner]

[Address]

[City, State, Zip]

Dear [Resident/Owner]:

As requested by the United States Environmental Protection Agency ("EPA") Terracon Consultants, Inc. ("Terracon") recently completed environmental testing of soil vapors beneath certain homes in your neighborhood near the 550 Esther Street property (the "Esther Street Property"), currently owned by the City of Waterloo.

On [sample date(s)], Terracon collected sub-slab soil gas samples from the sampling port installed in the basement floor of your home and indoor air samples from the basement and first floor living areas of your home. The collected samples were submitted to a testing laboratory for analysis. Terracon has received and validated the results of laboratory analysis and has provided the results to the EPA. Based on EPA's review, the sub-slab and indoor air sample analytical results exceed applicable screening levels.

As directed by the EPA and in accordance with the USEPA-approved Vapor Intrusion Interim Measures Work Plan, we are proposing to install an EPA-approved system (the "System") to reduce vapor concentrations. The System would be located in your basement and installed at no cost to you.

If you would like the System installed now, the installation will be scheduled and completed by an Iowa Department of Public Health credentialed mitigation specialist under sub-contract agreement with Terracon. You will be notified at least 48 hours in advance of the start of system installation activities. (\* **See the "Mitigation System Request Form" below.**)

Upon receipt of authorization to proceed, the mitigation specialist will design individual systems based on information provided by Terracon. Diagnostic testing will be performed prior to the installation of the mitigation system to evaluate air flow characteristics and capacity of the material beneath the slab and to confirm design assumptions.

It is anticipated that the proposed systems will consist of a network of sump/cored holes in the basement floor slab with vertical pipes which will be sealed at the floor and will exit the roof of the building to draw and expel soil vapor. Slab cracks, holes, and other openings will be sealed, caulked, or covered. Floor drains that are not connected to the municipal sewer will be replaced with Dranjer-type devices that allow water to travel down the drain but do not allow

Terracon Consultants, Inc. 870 40<sup>th</sup> Avenue Bettendorf, Iowa 52722  
P [563] 355 0702 F [563] 355 4789 [terracon.com](http://terracon.com)



Geotechnical



Environmental



Construction Materials



Facilities

# Terracon

vapors to migrate up the drain. Covers will be installed over the top of all sumps in order to limit potential vapor transport from the sump to indoor air.

Typically, an individual system will be set up and installed in one to two days depending on access and residence specifics, such as vent locations, utility clearances, and any repairs required to building materials and roofing. An inline electric fan will provide vacuum to draw potential vapors to the preferential pathway.

Following the completion of the System installation, periodic monitoring and sampling will be completed by Terracon to document continued performance of the System.

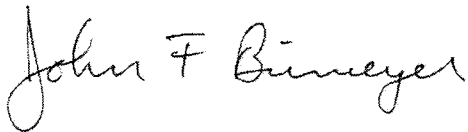
If you would like to have the system installed in your home, please complete the enclosed two page Mitigation System Request Form and mail it to:

Terracon Consultants, Inc.  
870 40<sup>th</sup> Avenue  
Bettendorf, Iowa

In order to facilitate scheduling, we ask that you return the attached Mitigation System Request Form (both pages) no later than [30 days from mailing]. After we receive the form, we will call you to schedule a mutually convenient time for us to meet at your home to begin the installation process.

Please call (563) 355-4852 if you have any questions. We appreciate your cooperation in this process.

Sincerely,  
**Terracon Consultants, Inc.**



John F. Brimeyer, PE  
Environmental Manager

cc: Mr. Bruce Morrison, USEPA

**Mitigation System Request Form**

*(Please complete and return by [date])*

**Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

\_\_\_\_\_

**Telephone:** \_\_\_\_\_ (Day)

\_\_\_\_\_ (Evening)



**PERMISSION TO INSTALL AND INSPECT MITIGATION SYSTEM**

I hereby provide the City of Waterloo, Chamberlain Manufacturing Corporation ("Chamberlain"), Terracon Consultants, Inc. ("Terracon"), the United States Environmental Protection Agency (the "EPA"), and/or their authorized representatives, agents, employees, and/or subcontractors, permission to enter my residence located at [Address], Waterloo, Iowa at a mutually convenient time for the purpose of completing the installation of a vapor mitigation system (the "System") and subsequently to inspect such System as outlined in Terracon's letter dated [date], and the previously executed access agreement.

I acknowledge that the System was designed, manufactured, inspected and installed by Terracon and Terracon's subcontractors and that Chamberlain is not the designer, manufacturer, inspector, distributor or installer of the System. I agree that Chamberlain will not be held responsible for the actions of Terracon and/or its subcontractors.

**Signature of Owner:**

Name: \_\_\_\_\_

\_\_\_\_\_

Dated: \_\_\_\_\_, 2011



***Sent by Certified Mail  
Return Receipt Requested***

[Date]

[Resident/Owner]

[Address]

[City, State, Zip]

Dear [Resident/Owner]:

As requested by the United States Environmental Protection Agency ("EPA") Terracon Consultants, Inc. (Terracon) recently completed environmental testing of soil vapors beneath certain homes in your neighborhood near the 550 Esther Street property, currently owned by the City of Waterloo.

On [sample date(s)], Terracon collected sub-slab soil gas samples from the sampling port installed in the basement floor of your property at [address], Waterloo, Iowa. The collected samples were submitted to a testing laboratory for analysis. Terracon has received and validated the results of laboratory analysis and has provided the results to the EPA. Based on EPA's review, the sub-slab analytical results do not exceed applicable screening levels.

Based on the results of sub-slab soil gas sampling and in accordance with the USEPA-approved Vapor Intrusion Interim Measures Work Plan, USEPA has determined that further action is not warranted in your property. As directed by the EPA, we will contact [you/your tenant] to arrange a time to remove the sampling port and seal the area where the port was installed..

Please call (563) 355-4852 if you have any questions. We appreciate your cooperation during this process.

Sincerely,  
**Terracon Consultants, Inc.**

A handwritten signature in cursive script that reads "John F. Brimeyer".

John F. Brimeyer, PE  
Environmental Manager

cc: Mr. Bruce Morrison, USEPA