Aquifer Characterization 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 August 2, 2010
Terracon Project No. 07107020

Prepared for:
Chamberlain Manufacturing Corporation
Elmhurst, Illinois

Prepared by:
Terracon Consultants, Inc.
Bettendorf, Iowa

Terracon

August 2, 2010

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: Aquifer Characterization 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 Aquifer Characterization Work Plan (AC Work Plan) for activities in conjunction with the site referenced above. The AC Work Plan presents a summary of proposed activities for evaluating the characteristics of groundwater aquifers within unconsolidated geologic deposits and the underlying Devonian system bedrock.

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

Sincerely,
Terracon Consultants, Inc.

John F Brimeyer

John F. Brimeyer, PE
Environmental Manager

Kathleen E. Soft
for Gerald T Hentges, PG
Senior Project Manager

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ACRONYMS & ABBREVIATIONS

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AC ..... Aquifer Characterization
bgs ..... below ground surface
CERCLA ..... Comprehensive Environmental Response, Compensation, and Liability Act
City ..... City of Waterloo
COC ..... Chain of Custody
EPA ..... Environmental Protection Agency
Facility ..... Chamberlain Manufacturing facility
gpm ..... gallons per minute
HASP ..... Health and Safety Plan
IDNR ..... Iowa Department of Natural Resources
IGS ..... Iowa Geological Survey
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
USGS ..... United States Geological Survey
VOC ..... Volatile Organic Compound

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AQUIFER CHARACTERIZATION WORK PLAN
CHAMBERLAIN MANUFACTURING CORPORATION
FORMER FACILITY AT
550 ESTHER STREET
WATERLOO, IOWA

Project No. 07107020
May 20, 2010
Revised August 2, 2010

1.0 INTRODUCTION

Terracon has developed this AC Work Plan to present the approach for evaluating the groundwater aquifer characteristics within unconsolidated geologic deposits and the underlying Devonian system bedrock at the former Chamberlain Manufacturing Facility. This AC Work Plan is submitted in accordance with the requirements of the UAO, Docket Nos. RCRA 07-2010-002 and CERCLA 07-2010-005 dated April 20, 2010 and Task II 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 AC Work Plan has been developed per the recommendations of the IDNR memorandum dated March 25, 2009 and the requirements of the SOW

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 Facility was subsequently abandoned and is currently vacant. The 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 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.

Subsurface soils at the site consist of approximately 60 to 65 feet of sand and gravel deposits above Silurian and Devonian-aged limestone bedrock. The Devonian-age limestone deposits are about 125 feet thick and are composed of the Wapsipinicon and Cedar Valley formations. The Silurian-age limestone deposits are about 100 feet thick. Continuous confining layer are not present between the sands and gravels and the limestone bedrock, so these units are believed to be hydrologically connected. The Devonian aquifer in this area is intensely fractured, has karst development

Based on field observations, the upper groundwater unit, which underlies a large portion of the Facility, is a perched aquifer created by fill material overlying native soils. Depth to groundwater at the Facility ranges from less than 10 feet bgs in the area of the perched aquifer to 20 feet bgs. Depth to groundwater off the Facility ranges from approximately 10 feet bgs to greater than 20 feet. Groundwater in both the unconsolidated deposits and the Silurian and Devonian bedrock units are likely to flow to the southwest toward the Cedar River.

A municipal water supply well, used primarily as a peak well during periods of high demand (City Well No. 22), is located approximately 600 feet north of the Facility within Gates Park. The City Well No. 22 fully penetrates the Silurian-Devonian system. In addition, geothermal wells located at Logan Middle School and Allen Memorial Hospital, located west and northwest of the Facility, respectively, are developed in the Silurian-Devonian aquifer. The Logan Middle School geothermal system discharges extracted groundwater into an injection well located between the geothermal well and the site. The Allan Hospital geothermal system discharges the groundwater to the storm sewer system. The locations of the wells are depicted on Figure 2, Appendix A.

1.2 Previous Aquifer Characterization Activities

Following completion of the Logan Middle School geothermal system, a pump test was conducted in December 2008 to evaluate the system performance. In conjunction with pump test activities, transducers were installed in groundwater monitoring wells at and near the Facility to evaluate the effects of groundwater withdrawal on the contaminant plume. Although a direct correlation could not be established between the operation of the geothermal system and the groundwater monitoring wells, the IDNR, IGS, and USGS concluded that sub-regional flow under large withdrawal conditions was not well defined and that additional testing was warranted.

1.3 Project Objectives

The objective of the AC Work Plan is to develop procedures to determine if the influence of large withdrawal and injection conditions from municipal water supply and geothermal wells significantly alter the direction and rate of the flow of groundwater contaminant plumes toward sensitive receptors (under homes to the west-northwest of the Facility). Results of AC activities would also be used to determine if the wells would interfere with the effectiveness of a groundwater remedy, should any be technically and economically feasible for the Facility.

2.0 SCOPE OF SERVICES

The AC Work Plan is designed to gain a better understanding of the three-dimensional flow components and head relationships in the groundwater system by completing a pump test on an existing groundwater well. A series of transducers will be installed in groundwater wells and monitored in advance of the pump test to get relevant background information of local and regional stresses on the shallow water table and Devonian aquifer. Water levels will be continuously monitored during the pump test to evaluate water use and groundwater movement and following completion of the pump test to monitor groundwater recovery at affected locations.

2.1 Proposed Study Area

The study area will include the Facility and will extend north and west to include Gates Park, Allen Hospital, and Logan Middle School. In conjunction with aquifer characterization activities, groundwater levels will be monitored at shallow on-site well MW-12, deep on-site wells MW-15 and MW-16, shallow off-site well OSMW-9, and the former on-site production well No. 3. In addition, groundwater levels will be monitored at City Well No. 22 in Gates Park and at Logan Middle School geothermal well No. 1 and No. 2.

2.2 Aquifer Characterization Activities

2.2.1 Site Access

Prior to initiating pump test activities, Terracon will contact the Allen Hospital to discuss pump test procedures and to request permission to conduct a pump test on their geothermal well No. 2 or No. 3. In addition, the City of Waterloo Water Works, City of Waterloo Community Development Office, and Waterloo Community School District will be contacted to request permission to install transducers in their wells to measure groundwater levels during the pump test. If wells cannot be accessed to install transducers, existing altitude gauges will be used to obtain manual water level measurements observations.

Terracon will also contact Shawver Well Drilling to request assistance with the performance of the pump test with the removal of the Chamberlain Well No. 3 well head.

2.2.2 Pre-Test Activities

Two additional observation wells will be installed between the Allan Hospital wells and the Chamberlain site. The wells will be advanced to the top of bedrock and will be screened over the lower ten feet of the boring. The location of the proposed observation wells is depicted on Figure 2, Appendix A.

At least 24-hours prior to the start of the pump test, Terracon, in conjunction with the IDNR, IGS, and USGS will complete the installation of transducers in Chamberlain monitoring wells MW-12, MW-15, MW-16, and OSMW-9, former Chamberlain production well No. 3, Logan Middle School well No. 1 and No. 2, City Well No. 22, and the proposed observation wells. Immediately following installation, the depth to water will be measured from a convenient reference using an electric water tape. The water level measurement and time will be recorded on a standard field form.

Prior to installing the transducers in Chamberlain monitoring wells MW-12, MW-15, MW-16 and former Chamberlain production well No. 3, Terracon will measure for the presence of non-aqueous phase liquids by lowering an electric interface probe to the bottom of the well.

2.2.3 Pump Test Activities

At the designated time, Allen Hospital well No. 2 or No. 3 will be started and allowed to run non-stop for a period of at least 24-hours. The well will be operated at a rate of 1,100 gpm. Water levels in the well be recorded at 5-minute intervals for the first 30 minutes, 10-minute intervals for the next 60 minutes, 30-minute intervals for the next four hours, and then hourly until the completion of the test.

Periodic water level measurements will be made using an electric water tape at Chamberlain monitoring wells MW-12, MW-15, MW-16, and OSMW-9, former Chamberlain production well No. 3, Logan Middle School well No. 1 and No. 2, and the proposed observation wells to verify recorded measurements. The water level measurements and times will be recorded on a standard field form.

2.2.4 Post-Test Activities

Not sooner than 24-hours following completion of the pump test, Terracon, in conjunction with the IDNR, IGS, and USGS will remove the transducers from Chamberlain monitoring wells MW-12, MW-15, MW-16, and OSMW-9, former Chamberlain production well No. 3, Logan Middle School well No. 1 and No. 2, City Well No. 22, and the proposed observation wells. Immediately prior to transducer removal, the depth to water will be measured from a convenient reference using an electric water tape. The water level measurement and time will be recorded on a standard field form.

Following removal of the transducers, the IDNR, in conjunction with the IGS and USGS may collect one groundwater sample from Chamberlain monitoring wells MW-12, MW-15, MW-16, and OSMW-9, former Chamberlain production well No. 3, Logan Middle School wells No. 1 and No. 2, City Well No. 22, and the proposed observation wells, and Allen Hospital well No. 2 or No. 3. Groundwater samples will be field screened for temperature and pH and will be submitted to a laboratory for analysis of tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, 1,1,1-trichloroethane, and 1,1,2-trichloroethane by EPA Method 8260.

3.0 METHODOLOGIES

Project activities will be completed in accordance with the USEPA-approved QAPP, Revision 1 dated August 18, 2006 and relevant TSOPs. The following TSOPs will be used during the assessment.

Table 3-1 Terracon Standard Operating Procedures

REFERENCE NO.	TITLE
E.10	Project Mobilization
E.20	Standard Safe Operating Procedures for Hazardous Waste Operations
E.30	Chain of Custody Documentation
E.50	Sampling – Environmental Representativeness
E.470	Sample Handling – Groundwater (Non-Hazardous)
E.530	pH Field Screening – Water
E.570	Temperature Field Screening
E.580	Turbidity Field Screening
E.1830	Field Measurement - Free-Phase Product
E.2405	Cleaning - General
E.2410	Cleaning - Manual Washing

4.0 LABORATORY ANALYSIS

Groundwater samples will be submitted for analysis of tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, 1,1,1-trichloroethane, and 1,1,2-trichloroethane using EPA Method 8260.

Laboratory procedures will be performed by TestAmerica, Cedar Falls, Iowa. TestAmerica is NELAC accredited for the laboratory methods referenced above. The laboratory QAM and SOP is on file with the USEPA. A copy of the TestAmerica data will be reported in accordance with the QAM and SOP.

5.0 AQUIFER CHARACTERIZATION REPORT

In accordance with the schedule in the USEPA-approved AC Work Plan, Respondent will submit a AC Report which provides an evaluation of the 24-hour pump test results. The AC Report will evaluate the response and recovery of the unconsolidated aquifer and the Silurian/Devonian aquifer. The evaluation will consider the influence of recurring City Well No. 22 on the contaminant plume under stressed conditions.

6.0 SCHEDULE

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

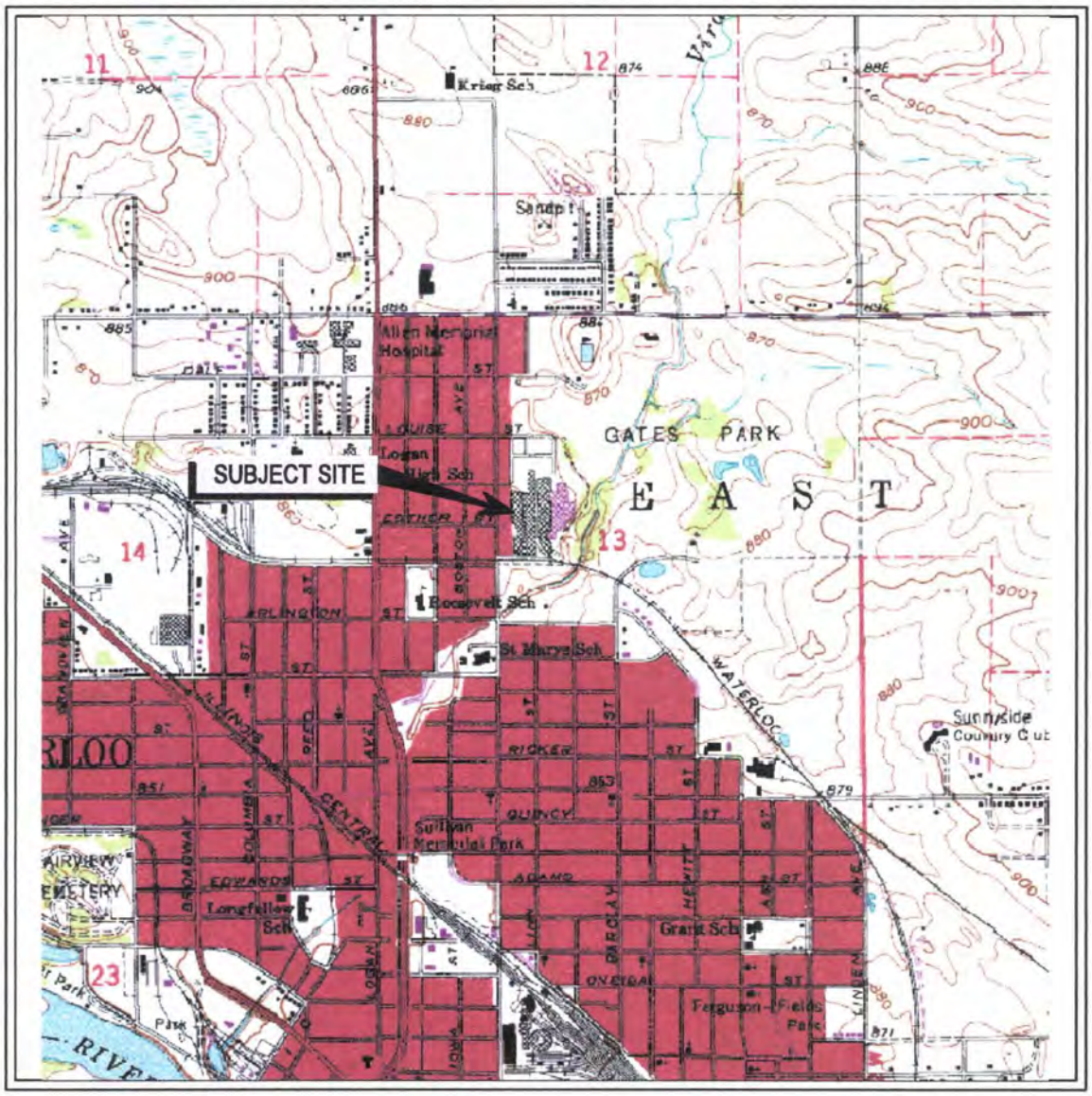
Table 6-1 Schedule

Activity	Days to Complete After USEPA Approval of AC Work Plan
Notify affected parties, coordinate with IDNR, IGS, and USGS, and arrange for services of well contractor	30
Complete pump test	60
Receive analytical results	75
Submit AC Report	120

Appendix A

Figures

UNITED STATES – DEPARTMENT OF THE INTERIOR – GEOLOGICAL SURVEY



SCALE 1:24 000

1 .5 0 KILOMETERS 1 2

1000 0 METERS 1000 2000

1 .5 0 1

MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000

FEET

CONTOUR INTERVAL FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

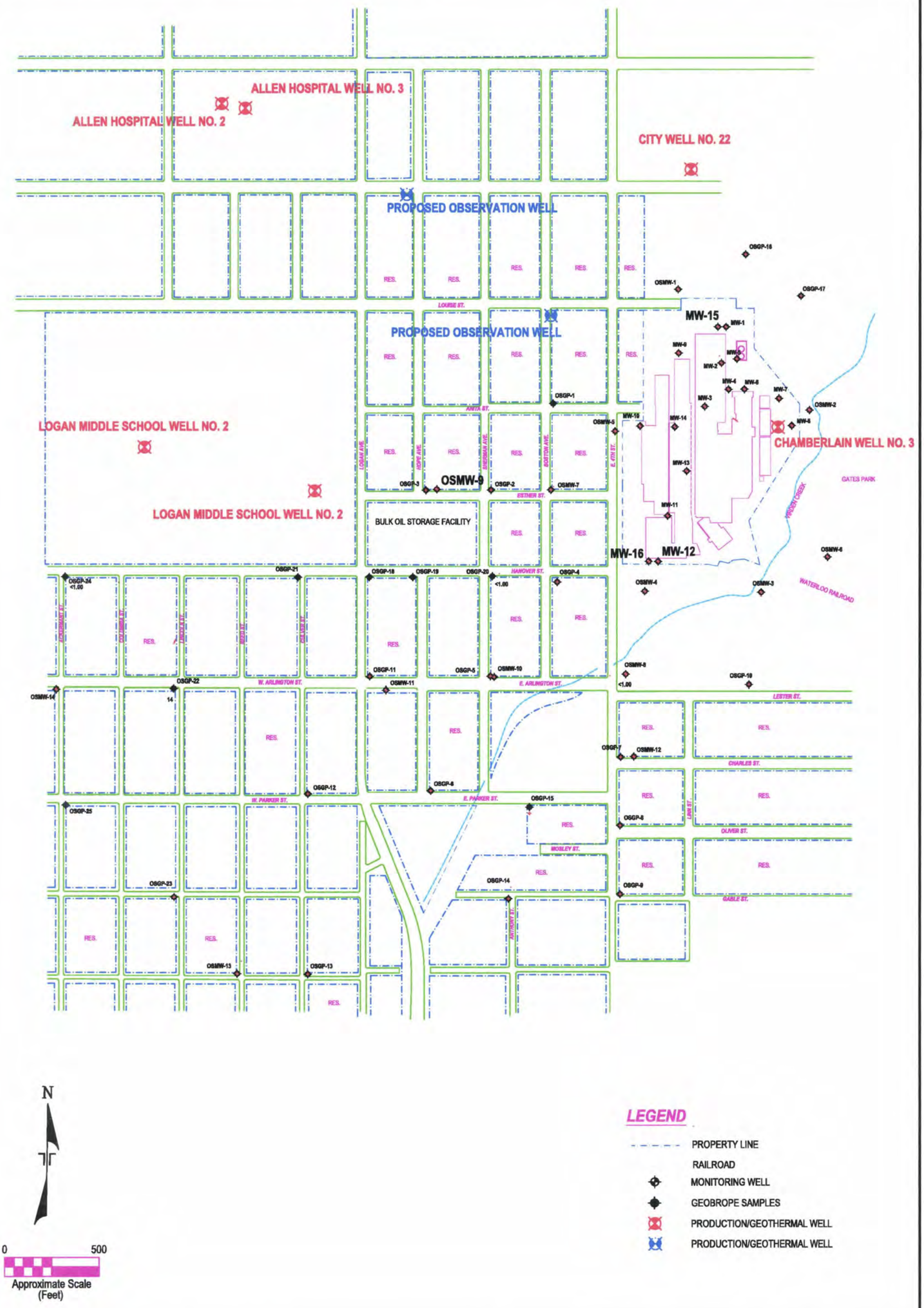
TOPO LINES REPRESENT 10–FOOT CONTOURS

N

WATERLOO NORTH QUADRANGLE

7.5 MINUTE SERIES (TOPOGRAPHIC)

Project Mngr: JFB	Project No. 07107020	Terracon Consulting Engineers and Scientists	TOPOGRAPHIC VICINITY MAP	FIG. No.
Drawn By: JFB	Scale: AS SHOWN		AQUIFER CHARACTERIZATION WORK PLAN	
Checked By: JFB	File No. 07107020-T3-FIG1		FORMER CHAMBERLAIN MANUFACTURING FACILITY	
Approved By:	Date:	870 40th Avenue Bettendorf, Iowa 52722	550 ESTHER ST.	1



REV.	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists
870 40th Avenue, Bettendorf, Iowa 52722
(563) 355-0702, (563) 355-4789

WELL LOCATION DIAGRAM

AQUIFER CHARACTERIZATION WORK PLAN
FORMER CHAMBERLAIN MANUFACTURING FACILITY
550 ESTHER STREET

WATERLOO IOWA

FIGURE 2

PROJECT MGR:	JFB
DRAWN BY:	MRF
APPVD. BY:	JFB
SCALE:	AS SHOWN
DATE:	MAY 2010
PROJECT NO.	07107020
FILE NAME:	AC Well Locations
SHEET NO.:	2 OF 3

REVISED 2/11

REV.	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists
870 40th Avenue, Battendorf, Iowa 52722
(563) 355-0702, (563) 355-4789

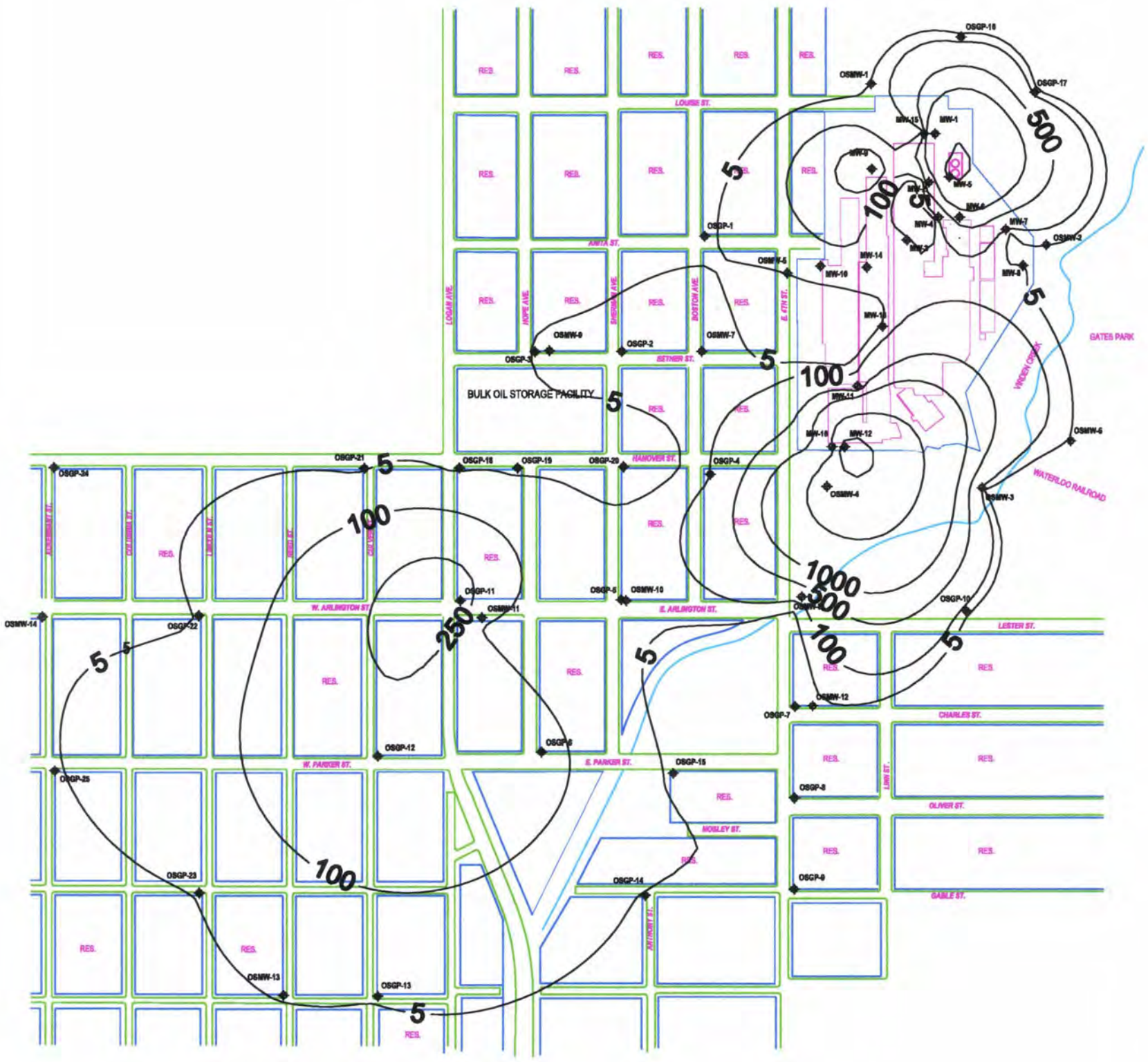
WELL LOCATION DIAGRAM

AQUIFER CHARACTERIZATION WORK PLAN
FORMER CHAMBERLAIN MANUFACTURING FACILITY
550 ESTHER STREET

WATERLOO IOWA

FIGURE 2-R1

PROJECT MGR:	JFB
DRAWN BY:	MRF
APPVD. BY:	JFB
SCALE:	AS SHOWN
DATE:	FEB 2011
PROJECT NO.	07107020
FILE NAME:	AC Well Locations
SHEET NO.:	2 OF 3



N

0 500

Approximate Scale (Feet)

LEGEND

- PROPERTY LINE
- RAILROAD
- MONITORING WELL
- RES. RESIDENTIAL
- FORMER GEOBROPE SAMPLES
- PROPSED VAPOR SAMPLING LIMITS

REV.	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists

870 40th Avenue, Bettendorf, Iowa 52722
(563) 355-0702 (563) 355-4789

STUDY AREA LIMITS

AQUIFER CHARACTERIZATION WORK PLAN
FORMER CHAMBERLAIN MANUFACTURING FACILITY
550 ESTHER STREET

WATERLOO IOWA

FIGURE 3

PROJECT MGR.	JFB
DRAWN BY:	JFB
APPVD. BY:	JFB
SCALE:	AS SHOWN
DATE:	JULY 2010
PROJECT NO.	07107020
FILE NAME:	07107020-T3FIG3
SHEET NO.:	3 OF 3