

SCS ENGINEERS

February 6, 2013
File No. 23211003.00

Ms. Charlene S. Fitch, P.E.
Chief, Engineering Section
Solid Waste Management Program
Missouri Department of Natural Resources
1730 East Elm Street
Jefferson City, MO 65101

Subject: Gas Interceptor Well Expanded Design (Permit #0118912) at Bridgeton Landfill
Bridgeton Landfill, Bridgeton, Missouri

Dear Ms. Fitch:

Attached please find our Gas Interceptor Well System Expanded Design. This Design Plan is a revision of the permit approved on January 11, 2013, and represents additional Temperature Monitoring Probes (TMPs) as well as additional Gas Interceptor Wells (GIWs).

1 INTRODUCTION

This Design Plan describes the Gas Interceptor Well System originally submitted to Missouri Department of Natural Resources (MDNR) on January 10, 2013 and approved on January 11, 2013, as well as the additions made for this expanded design.

In an effort to minimize or stop movement of subsurface heat from the south quarry to the north quarry, additional special purpose, interceptor gas wells are being proposed. There are two rows of wells being proposed. The first row of wells is planned approximately 50 feet north of the first line of temperature monitoring probes (TMPs 7R, 8, and 9) installed at the facility. The second row of wells is proposed to be installed 50 feet north of the first row of wells, and staggered in between the first row of wells. In addition to the gas interceptor well installations, six additional temperature monitoring probes (TMPs) are being proposed (See Drawing 2 – Well Layout Plan). A description of the design approach and contingencies is described below.

2 DESIGN APPROACH

The location of the first row of interceptor wells is 50 feet north of a theoretical line that would run from TMP-7R through TMP-8 and then to TMP-9. The location of the second row of interceptor wells is 50 feet north of a theoretical line that would run from GIW-1 through GIW-7 (inclusive).



The first row Gas Interceptor Wells (GIWs) has been planned so the first well is located approximately 75 feet from the west edge of the quarry (south quarry). The remaining wells in this row begin 50 feet from the first well and are spaced 50 feet from one another along the line described above (50 feet north of the theoretical TMP line). The GIWs are labeled on the Site Map – GIW-1 through GIW-7. The wells are grouped into two separate collection lines – four wells in one group and three wells in the other group. Each well group has a common header manifold that connects all the wells of that group and then connects to the existing header system. The western group of wells (group of four wells) connects into the existing 18-inch header along the western perimeter of the landfill, in the amphitheater area. The eastern group of wells connects to the existing 16-inch header, which runs east and west at the narrow part of the landfill at the North and South Quarry boundaries. Each well group has a main header valve and the potential for a bypass to a cooling device if needed, and each well has a control valve. Additionally, each well has a 6-inch Tee which has been designed to accommodate the use of a phase separation tank, if required.

The second row of wells has their own manifolds and is also broken into two groups – one manifold connects four wells and the other manifold connects two wells. Each of these manifolds connects to the other manifolds before the by-pass loops, which then connects to the existing headers (west manifold connects to first row west header and east manifold connects to east header)

The well spacing design will provide heavy vacuum overlap from well to well. This will create a low pressure area “wall” (vacuum curtain) that will allow heated and pressurized gas a controlled means of escape where it can be safely destructed in the current GCCS.

3 WELL DESIGN

The wells are designed to be drilled a maximum depth of 150 feet below ground surface. However, due to the bottom surface grades, GIW-1 can only achieve a depth of approximately 57 feet below ground surface. A well schedule has been provided on the detail sheet drawing.

The wells will be constructed of carbon steel and be 6-inch in diameter. The wells will have 25 feet of solid pipe and the rest will be perforated pipe, as shown on the well detail (Detail 3 on Sheet 3). Each well will have a flanged cast iron knife valve (McMaster-Carr Model #6312T35 or equivalent) for control of heated gas and potential liquids that may be collected. This knife provides maximum flexibility in adjusting to actual conditions that may be encountered. The top of each well will be a steel flange that can either accept a custom steel wellhead or a Landtec wellhead. Each well head will be approximately 4-5 feet above ground when completely constructed.

The new gas interceptor wells will be constructed using the same configuration and well components that were previously approved by MDNR on January 11, 2013.

4 WELL DESIGN CONTINGENCIES

Due to the nature of the heat generating reaction at the Bridgeton Landfill, it is possible that the collected gas may be heated above normal operating temperatures or may be heated gas along with liquids. Both of these situations have been identified and worked into the design of the system.

If the collected gas is a heated gas with the extra liquids, each GIW had been design with a tee and blind flange that can be utilized to direct the collected gas to a phase separation device and then be re-inserted into the header piping. If the collected gas is only a heated gas (without the extra liquids) then a bypass line has been designed into each well group header that can direct the gas into a cooling device before continuing to the blower/flare station.

5 HEADER SYSTEM

The header system of the proposed GIW collection system will be tied into the existing 16-inch diameter header located approximately at the North/South Quarry boundary and the 18-inch header along the western perimeter in the amphitheater area. The existing header is located approximately 4 feet below ground surface and slopes both to the east and the west from the high point approximately at the midpoint of the header. The header from each new well group will be sloped downhill to the existing header, running above ground until it gets close to the tie-in with the existing header, where it will go below ground to make the connection to the existing header.

The main header from each well group, as well as the common collector pipe for each well group, is a 10-inch diameter pipe. The lateral to each GIW is a 4-inch diameter pipe. Steel piping for the header and the common collection manifolds will be used on the well side of the contingency cooling device flange. HDPE pipe will be used from this flange north to the 16-inch header tie-in. The 4-inch lateral lines will also be constructed of steel (See detail drawing).

6 TEMPERATURE MONITORING PROBES

In addition to the six new gas interceptor wells, six new temperature monitoring probes (TMPs) are being proposed. The TMPs will be constructed in the same configuration and using the same method as previously approved plan, approved by MDNR on September 27, 2012. The proposed location of the new TMPs is south of a line that goes from existing TMP-1 through TMP-4. A new TMP (TMP-15) will be installed 50-feet south of TMP-8.

The existing TMPs are located on the site map (Sheet 2 of 3) and highlighted in yellow. The proposed six additional TMPs are shown on the plan sheet highlighted in a light purple.

Ms. Charlene S. Fitch, P.E.
February 6, 2013
Page 4

Sincerely,

F. Daniel Brennan

F. Daniel Brennan, P.E.
Ohio PE#57,293
Senior Project Engineer
SCS ENGINEERS

Deborah A. English

Deborah A. English, P.E.
Missouri PE#2005-006304
Project Director
SCS ENGINEERS

cc Craig Almanza, Bridgeton Landfill, LLC



MDNR APPROVAL LETTER
ORIGINAL GAS INTERCEPTOR WELL DESIGN
JANUARY 11, 2013



Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

JAN 11 2013

Mr. Craig Almanza
Area Environmental Manager
Republic Services, Inc.
13570 St. Charles Rock Road
Bridgeton, MO 63044

RE: Gas Interceptor Well Design, Bridgeton Landfill LLC, Permit Number 0118912,
St. Louis County

Dear Mr. Almanza:

This letter is in response to your email submittal dated January 10, 2013, to the Missouri Department of Natural Resources' (Department) Solid Waste Management Program (SWMP). The submittal included a narrative and a set of plan sheets entitled "2013 Gas Interceptor Well Design Bridgeton Landfill." The submittal proposed the installation of seven Gas Interceptor Wells (GIW) in order to remove heated and pressurized gas near the neck of the landfill. The GIWs are located approximately 50' north of TMPs 7, 8, and 9 and will be connected to the existing gas collection and control system.

The SWMP has reviewed the submittal and hereby approves the proposed design as being in substantial compliance with the Missouri Solid Waste Management Law and regulations. The following conditions are integral to this approval. Compliance with these conditions shall, in part, determine compliance with Permit Number 0118912.

CONDITIONS:

1. The submittal and individual plan sheets need to be signed and sealed by a professional engineer. In addition, please verify the scale on Drawing 2. Please submit two (2) hard copies to the SWMP for our records.
2. A Construction Quality Assurance (CQA) Report should be submitted when the installation is completed. It shall include Daily Logs, Boring Logs, Construction Diagrams, and signed and sealed as-built drawings.
3. Drawing 2 indicates that the proposed location of GIW-3 is on the temporary liner. In the CQA Report, please detail the procedures used to maintain the integrity of the liner during the drilling and installation. In addition, please provide the necessary records that the flexible membrane liner is properly repaired around the well.

4. The Gas Interceptor Well Detail on Drawing 3 shows a 36 inch borehole, but the submittal did not indicate what type of drilling method will be used. Please specify this information in the CQA Report.
5. The Well Schedule on Drawing 3 indicates proposed well depths of 150' for GIWs 2 through 7. Prior approval from the SWMP is required to deviate from these depths.
6. The plan states "each well has a 6" Tee which has been designed to accommodate the use of a phase separation tank, if required." Please specify if this tank will be operational at the same time as well installation or provide the projected timeframe for the tank to be installed and operational if ejected liquid is encountered.

This approval should not be construed as compliance with any existing federal or state laws other than the Missouri Solid Waste Management Law; nor should this be construed as a waiver for any other regulatory requirements. This approval is not to be construed as compliance with any existing local permitting or zoning ordinances; nor does it supersede any local permitting and/or zoning requirements.

The Department reserves the right to revoke, suspend, or modify Permit Number 0118912 after due notice, if the permit holder fails to operate the facility in compliance with the Missouri Solid Waste Management Law and regulations, terms and conditions of the permit, and the approved engineering plans and specifications.

If you have any questions or comments regarding this letter, please contact Mr. J P Boessen of my staff at (573) 526-3940 or P.O. Box 176, Jefferson City, Missouri 65102-0176.

Sincerely,

SOLID WASTE MANAGEMENT PROGRAM



Charlene S. Fitch, P.E.
Chief, Engineering Section

CSF:brl

- c: Mr. Larry Lehman, Chief, Compliance/Enforcement Section, SWMP
Ms. Brenda Ardrey, Chief, Operations Section, SWMP
Ms. Laura Yates, St. Louis County Department of Health
St. Louis Regional Office

ORIGINAL TMP PLAN

SUBMITTED TO MDNR SEPTEMBER 14, 2012

MDNR APPROVAL LETTER
ORIGINAL TMP INSTALLATION PLAN
SEPTEMBER 27, 2012

Ms. Charlene S. Fitch, P.E.
Missouri Department of Natural Resources
Solid Waste Management Program
1738 East Elm Street
Jefferson City, Missouri 65101

September 14, 2012

Dear Ms. Fitch:

**Temperature Monitoring Point Installation Plan
Bridgeton Landfill, LLC – Permit #118912
Bridgeton, Missouri**

Attached please find the Temperature Monitoring Point (TMP) Plan (Plan) which demonstrates how Bridgeton Landfill intends to construct the TMP's within the waste mass to observe temperatures at a consistent frequency down to the waste/quarry floor interface. The Plan was developed by P.J. Carey & Associates, PC (P.J. Carey) in conjunction with Bridgeton Landfill management. P.J. Carey has extensive experience designing, engineering, and overseeing the installation of systems such as is proposed in the Plan at other solid waste landfills throughout the United States.

The Plan proposes 9 TMP's set up along a primary and secondary line with intermediate TMP's in between to establish a rate of temperature advance through the waste mass to (or regression from) the north quarry near the boundary of the north and south quarries. It also includes details of the construction of each monitoring point and a proposed schedule for installation.

This submittal is intended to partially address Action Item #2 of the July 23rd, 2012 MDNR letter responding to the Contingency Plan and Summary Report submitted by the Bridgeton Landfill on April 6th, 2012. As was discussed and agreed upon in the August 29th, 2012 meeting at the Jefferson City, MO MDNR-SWMP office, a plan proposing the design, locations, and installation schedule of the TMP's was to be submitted by September 14, 2012.

13570 St. Charles Rock Road
Bridgeton, MO 63044
314.744.8166 - Office
Dvasbinder@republicservices.com

As is described in the Plan, Bridgeton Landfill is diligently working towards initiating the installation of these monitoring points within the next three weeks. That said, it is requested that an expedited review of this Plan be completed so that installation is not delayed. If additional information or clarifications are needed, please feel free to contact me at 314-744-8166 at your earliest convenience.

Sincerely,

Bridgeton Landfill, LLC.

David Vasbinder
Environmental Manager

Cc: John Haasis – St. Louis County Department of Health

Enclosures



Jeremiah W. (Jay) Nixon, Governor • Sara Parker Pauley, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

SEP 27 2012

CERTIFIED MAIL #7009 3410 0001 9190 5805
RETURN RECEIPT REQUESTED

Mr. David Vasbinder
Environmental Manager
Republic Services, Inc.
13570 St. Charles Rock Road
Bridgeton, MO 63044

RE: Temperature Monitoring Point Installation Plan, Bridgeton Landfill, L.L.C.,
Permit Number 0118912, St. Louis County

Dear Mr. Vasbinder:

This letter is in response to a submittal, "Temperature Monitoring Point Installation Plan for Bridgeton Landfill L.L.C.", dated September 14, 2012, received September 17, 2012, by the Missouri Department of Natural Resources' (Department) Solid Waste Management Program (SWMP). The submittal consisted of a two (2) page cover letter from you, addressed to Ms. Charlene S. Fitch, P.E. and a TMP Installations proposal for Bridgeton Landfill, LLC attached, prepared by P.J. Carey & Associates, P.C., Sugar Hill, Georgia, dated September 13, 2012.

The submittal is proposing the installation of nine (9) thermocouple string probes in the saddle area of the landfill to document any advancement of the Subsurface Smoldering Event (SSE). The thermocouples will start at a depth of no more than 285 feet, be placed in 20 foot increments to the top of the landfill. They will be drilled using roto-sonic drilling technique, installed in a sheath and grouted in place. The proposed locations are shown on Figure 1.

The SWMP has reviewed this report in accordance with the Missouri Solid Waste Management Law and regulations. The SWMP hereby **approves** the location and installation of the Temperature Monitoring Points at the Bridgeton Sanitary Landfill with the following conditions. Compliance with these conditions will, in part, determine compliance with Solid Waste Disposal Area Permit Number 0118912.

CONDITIONS:

1. Within 15 days, submit action levels/trigger values for future actions. These levels and/or triggers are to be established before the sensors are placed to ensure that all parties are in agreement with the established value that represents a problem or an impact.

2. Within 15 days submit a plan stating how the monitoring data will be collected and reported to SWMP. Explain whether the thermocouples will be connected to a real-time system that records the data or if it will be a manual read system? Explain what the monitoring frequency will be, along with the timeframe for reporting the results to the SWMP.
3. Within 15 days submit a proposal to define the temperatures of the waste in the south edge of the SSE, so that both edges of the event are characterized as discussed during our August 29, 2012, meeting.
4. Submit a list of SSE isolation break options that will be considered if the action levels/trigger values are exceeded with the Isolation Break Implementation Plan.
5. Submit a list of contractors that would be able to construct the different kinds of SSE breaks that may be used with the Isolation Break Implementation Plan.
6. Provide an estimate for the amount of time it will take from the action level/trigger value being reached, to notifying and getting contractor on site and the amount of time it will take to construct the different isolation breaks with the Isolation Break Implementation Plan.
7. You must contact the SWMP five (5) days before installation of the Temperature Monitoring Points begins.

DOCUMENT:

“Temperature Monitoring Point Installation Plan for Bridgeton Landfill L.L.C.”, dated September 14, 2012, received September 17, 2012, by the Missouri Department of Natural Resources’ Solid Waste Management Program. The submittal consisted of a two (2) page cover letter addressed to Ms. Charlene S. Fitch, P.E. and a TMP Installations proposal for Bridgeton Landfill, LLC attached, prepared by P.J. Carey & Associates, P.C., Sugar Hill, Georgia, dated September 13, 2012.

This approval is not to be construed as compliance with any existing federal or state environmental laws other than the Missouri Solid Waste Management law; nor should this be construed as a waiver for any other regulatory requirements. This approval is not to be construed as compliance with any existing local permitting or zoning ordinances; nor does supercede any local permitting and/or zoning requirement.


The Department reserves the right to revoke, suspend, or modify this approval and /or Permit Number 0118912 after due notice, if the permit holder fails to maintain the facility in compliance with the Missouri Solid Waste Management Law and regulations, the terms and conditions of the permit, and the approved engineering plans and specifications.

Mr. David Vasbinder
Page 3 of 3

We appreciate your continued efforts toward environmentally sound solid waste management practices. If you have any questions or comments, please contact Mr. J. P. Boessen of my staff at (573) 526-3940 or at P.O. Box 176, Jefferson City, Missouri 65102-0176.

Sincerely,

SOLID WASTE MANAGEMENT PROGRAM



Charlene S. Fitch, P.E.
Chief, Engineering Section

CSF:jjj

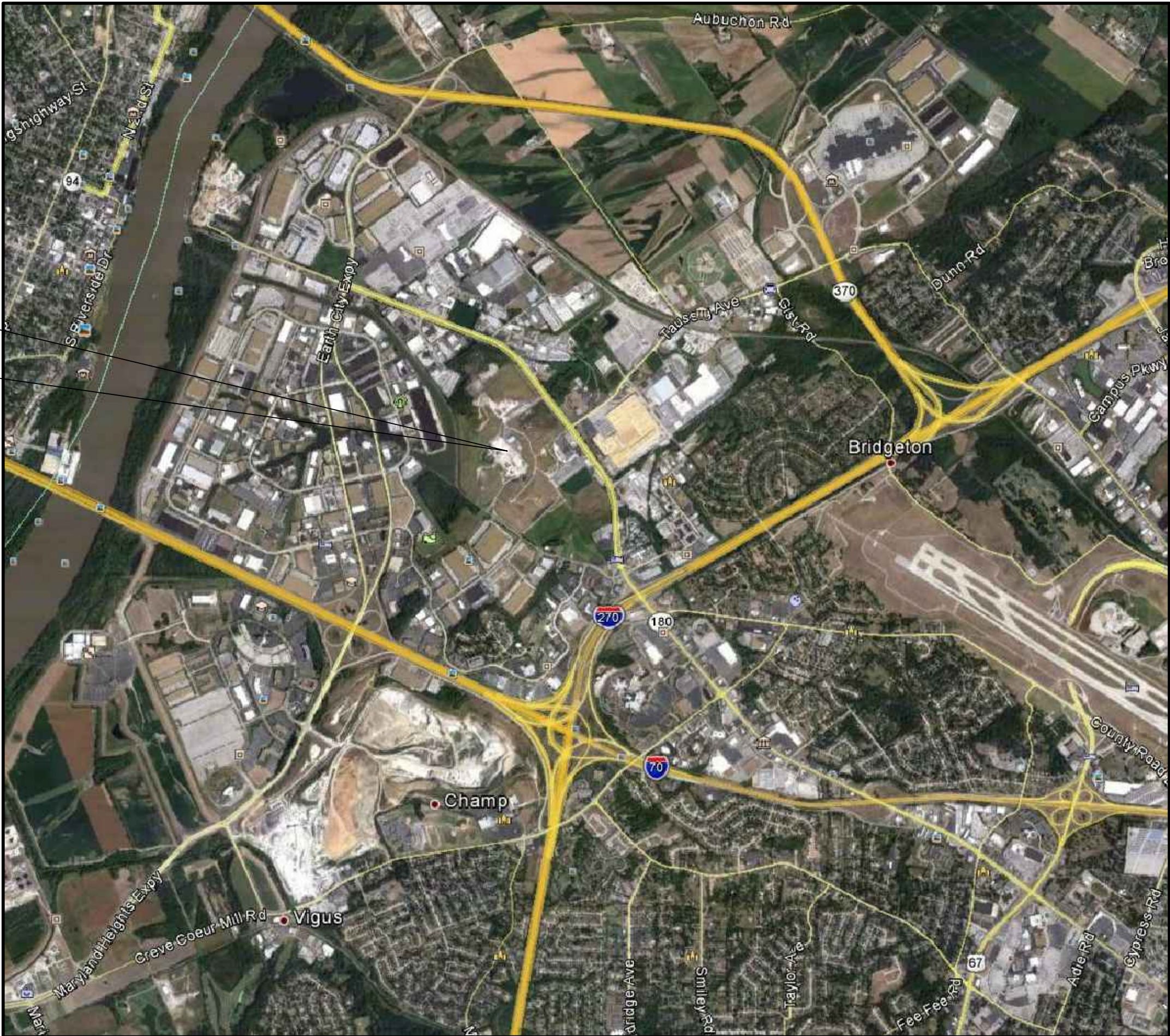
c: Mr. John Haasis, P.E., St. Louis County Department of Health
Mr. Larry Lehman, Chief, Compliance/Enforcement Section, SWMP
Mr. Joe Trunko, St. Louis Regional Office

DRAWINGS

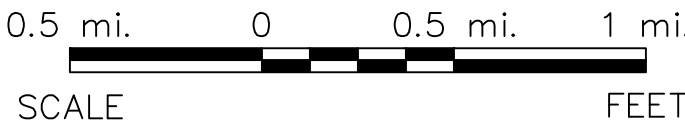
2013 GAS INTERCEPTOR WELL SYSTEM -
EXPANDED DESIGN
BRIDGETON LANDFILL
BRIDGETON, ST. LOUIS COUNTY, MISSOURI

DRAWING INDEX		
DRAWING NO.	DRAWING TITLE	
1	-	COVER SHEET
2	-	WELL LAYOUT PLAN
3	-	CARBON STEEL INTERCEPTOR WELL DETAILS

BRIDGETON LANDFILL




LOCATION MAP



PREPARED FOR:
BRIDGETON LANDFILL, LLC
13570 ST. CHARLES ROCK ROAD
BRIDGETON, MO 63044

PREPARED BY:
SCS ENGINEERS
2060 READING ROAD
SUITE #200
CINCINNATI, OHIO 45202-1497
PHONE (513) 421-5353
FAX (513) 421-2847

JANUARY 3, 2013
REVISED: JANUARY 30, 2013

			
CK. BY		DESCRIPTION	
1/30/13		Added Proposed GWS and TMPs	CES
SHEET TITLE		COVER SHEET	
PROJECT TITLE		BRIDGETON LANDFILL 2013 GAS INTERCEPTOR WELL SYSTEM - EXPANDED DESIGN	
CLIENT:			
BRIDGETON LANDFILL, LLC BRIDGETON LANDFILL 13570 ST. CHARLES ROCK ROAD BRIDGETON, MO 63044			
SCS ENGINEERS STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS, INC. 2060 READING ROAD, SUITE #200, CINCINNATI, OHIO 45202 PH. (513) 421-5353 FAX NO. (513) 421-2847			
PROJ. NO. 23211003.00		DWG. BY: FDB	Q/A BY: DAE
CHK. BY: JWW			
CADD FILE: COVER SHEET			
DATE: 1/3/2013			
SCALE: NONE			
DRAWING NO.			
1 of 3			



Well No.	Location Coordinates		Surface Elevation	Waste Bottom	Landfill Depth	TMP Target
	N-S	E-W	(ft MSL)	Elevation (ft MSL)	(ft)	Depth (ft)
TMP-10	1,067,871	516,294	482.7	328.9	154	154
TMP-11	1,067,847	516,362	498.2	262.3	236	210
TMP-12	1,067,812	516,425	500.2	272.1	228	210
TMP-13	1,067,758	516,386	498.9	270.2	229	210
TMP-14	1,067,772	516,332	496.0	274.9	221	210
TMP-15	1,067,568	516,396	520.3	263.8	256	210
TMP drill depth equals landfill bottom or 210 feet maximum						

Well No.	Location Coordinates		Surface Elevation (ft MSL)	Waste Bottom Elevation (ft MSL)	Landfill Depth (ft)	Borehole Depth (ft)	Well Pipe Depth (ft)	Slotted Pipe Depth (ft)	Solid Pipe Depth (ft)	Above Grade Riser (ft)	Thickness of Gravel Pack (ft)	
	N-S	E-W										
	GIW-1	1,067,752	516,216	477.4	420.4	57	57	56	31	25	5	34
	GIW-2	1,067,732	516,261	490.6	280.0	211	150	149	124	25	5	127
	GIW-3	1,067,712	516,307	495.9	275.9	220	150	149	124	25	5	127
	GIW-4	1,067,692	516,353	501.1	270.2	231	150	149	124	25	5	127
	GIW-5	1,067,672	516,399	511.8	270.0	242	150	149	124	25	5	127
	GIW-6	1,067,690	516,446	510.0	270.0	240	150	149	124	25	5	127
	GIW-7	1,067,707	516,493	501.9	329.1	173	150	149	124	25	5	127
	GIW-8	1,067,748	516,459	502.2	270.0	232	150	149	124	25	5	127
	GIW-9	1,067,736	516,426	507.4	270.0	237	150	149	124	25	5	127
	GIW-10	1,067,730	516,389	503.2	270.0	233	150	149	124	25	5	127
	GIW-11	1,067,749	516,347	496.8	273.4	224	150	149	124	25	5	127
	GIW-12	1,067,769	516,301	495.2	277.6	219	150	149	124	25	5	127
	GIW-13	1,067,789	516,255	481.8	335.8	146	146	145	120	25	5	123
Total							1,853	1,840	1,515	325	65	1,554

1. THIS DRAFT WELL SCHEDULE IS NOT INTENDED FOR CONSTRUCTION UNTIL ACTUAL SURVEY DATA IS OBTAINED AND THE WELL SCHEDULE IS REVISED BY THE ENGINEER.
2. SURVEYOR SHALL LOCATE WELLS AND VERIFY SURFACE ELEVATIONS BEFORE CONSTRUCTION. A PRE-CONSTRUCTION SURVEY (NORTHING/EASTING/ELEVATION DATA) SHALL BE PROVIDED TO THE ENGINEER A MINIMUM OF 2 WEEKS PRIOR TO CONSTRUCTION. ENGINEER SHALL VERIFY THE WELL SCHEDULE BASED ON THE PRE-CONSTRUCTION SURVEY.
3. FOLLOWING REVIEW OF SURVEY DATA, CONTRACTOR SHALL GET AUTHORIZATION FROM OWNER AND ENGINEER PRIOR TO DRILLING.
4. WELL DEPTHS BASED ON TOPOGRAPHIC SURVEYED BY SHERBERT-CARSON-CLAXTON, DATED MAY 2011, AND BASE GRADES OBTAINED FROM MIDWEST ENVIRONMENTAL CONSULTANTS APRIL 1998 LANDFILL GAS RECOVERY SYSTEM DESIGN.

UNDER NO CIRCUMSTANCES SHALL DRILLING ACTIVITIES BEGIN WITHOUT PROVIDING THE ABOVE SIGNATURES. ANY CHANGES TO WELL LOCATIONS OR DEPTHS SHALL REQUIRE THESE SIGNATURES TO BE OBTAINED AGAIN.

