



Bridgeton Sanitary Landfill Radiological Air Sampling June 2013

Missouri Department of Health and Senior Services



Bureau of Environmental
Epidemiology
October 2013



**Bridgeton Sanitary Landfill
Radiological Air Sampling Report
June 2013**

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Section 1: Site History

The Bridgeton Sanitary Landfill is currently owned by Bridgeton Landfill, LLC and is a subsidiary of Republic Services, Inc. The landfill waste mass encompasses approximately 52 acres with approximately 240 feet below the ground's surface and a total waste thickness of 320 feet. The waste is located in two distinct areas known as the North and South Quarries. Bridgeton was initially permitted on November 18, 1985, and ceased accepting waste on December 31, 2004. You can view the Bridgeton Landfill map by clicking on the link below.

<http://www.dnr.mo.gov/env/swmp/facilities/documents/bridgetonmap17x22.pdf>

On December 23, 2010, Bridgeton/Republic reported to the Missouri Department of Natural Resources (DNR) that the Bridgeton Sanitary Landfill was experiencing elevated temperatures on some gas extraction wells. The facility began testing landfill gas from the gas extraction system and found elevated hydrogen, carbon monoxide and reduced methane concentrations, which is indicative of a subsurface smoldering event.

By spring 2011, Bridgeton/Republic began implementing a series of corrective actions addressing the increased temperatures. In April 2012, DNR and Bridgeton/Republic began meeting to determine additional corrective actions necessary to address the subsurface smoldering event and associated odors.

On February 2, 2013, staff from the Missouri Department of Health and Senior Services (DHSS) collected air samples for particulate radioactive material at the Bridgeton Sanitary Landfill. Laboratory analysis of the DHSS samples by two different laboratories confirmed that no radioactivity was detected above normal background levels. Additional testing was conducted by DNR on May 16, 2013, and analysis of these samples showed no radioactivity distinguishable from natural background levels. The results of this additional testing are located on the DNR website <http://www.dnr.mo.gov/env/hwp/fedfac/westlakelandfill-ffs.htm>. However, community concerns about radiation, specifically alpha/beta radiation, continued to be expressed at public meetings, individual phone calls and emails.

Section 2: Alpha/Beta Radiation Air Sampling and Analysis Results

Introduction: Throughout the month of June 2013 staff from the DHSS visited the Bridgeton Sanitary Landfill to collect particulate air samples to be analyzed for alpha/beta activity. These samples were collected weekly and were an attempt to address the ongoing community concerns.

A total of 16 particulate air samples were collected in upwind and predominant downwind directions around the landfill for comparison with 8 air samples that were collected in “background” areas west of the site but in relative proximity of the landfill with a total of 24 samples being collected. See enclosed figures 1 through 5 for locations of samples.

Objective: The objective of the DHSS air sampling operation was to determine if the levels of alpha/beta activity around the landfill in upwind and downwind locations were above a screening level or distinguishable from levels in background locations.

Meteorological Conditions: Wind direction varied during the month of June but was mainly from a westerly direction during sample collection. Wind direction was obtained prior to sample collection near the site from the DNR meteorological station. Wind directions recorded are as follows:

| | |
|---------------|--|
| June 4, 2013 | Winds from the south shifting to the north/northeast in the afternoon. |
| June 11, 2013 | Winds from the south/southwest |
| June 18, 2013 | Winds from the north/northwest |
| June 27, 2013 | Winds from the southwest shifting to the west in the afternoon |

Sample Locations: Location of air samples was based on the wind direction obtained from the DNR meteorological station that day. See enclosed figures 1 through 4.

Background Sample Locations: Background samples were collected from the same sample locations in the St. Charles area throughout the month of June. Background locations are not known to be associated with any potential radiation sources. See enclosed figure 5.

Collection and Analysis of Airborne sample results: Airborne particulates were collected using standard operating procedures by drawing air through a filter membrane with an air sampling pump placed approximately 3-5 ft above the ground. (See section 3, Equipment) A total volume of 1000 cubic feet was drawn through the filter. The filter was placed in a bag and the bag surveyed for external exposure and contamination using a Ludlum 2241-3 with 44-38 and 44-9 probes. (See section 3, Equipment) Samples collected that day were sent off to the laboratory and particulate material collected on the filter was analyzed for alpha/beta activity.

Analysis of air samples collected around the Bridgeton Sanitary Landfill was completed by Eberline Analytical/ Oak Ridge Laboratory, Oak Ridge, TN. The results of the analysis are reported as radioactive concentrations in microcurie per milliliter ($\mu\text{Ci}/\text{mL}$). Tables 1 through 4 summarize the analysis of the air samples collected. The Nuclear Regulatory Commission’s effluent air concentration’s from 10 CFR 20 Appendix B Table 2 Column 1 were used as guidance for identifying a screening level for alpha and beta activity because they are applicable for the assessment and control of the dose to the public. The concentration values listed in this table are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously

over the course of a year, would produce a dose of 50 milliRem. (For comparison, the estimated average annual radiation dose per person is approximately 300 milliRem from natural background sources alone. See: <http://www.epa.gov/radiation/understand/perspective.html>.) From Table 2 Column 1, the values of 2E-14 and 6E-13 were identified for Thorium 230 (alpha) and Lead 210 (beta), respectively and were used as screening levels for this analysis.

The data in the “results” column of the reports was compared to the screening levels for alpha/beta activities. The comparison shows that the results of all 24 samples collected in the upwind, downwind and background locations are less than the screening levels.

Additionally, when comparing the results of the 24 samples to each other, no identifiable difference was found between upwind, downwind and background samples. This is true for both the gross alpha and beta samples.

Conclusion: The air sampling results summarized above confirm that alpha/beta activities around the Bridgeton Sanitary Landfill during the month of June are indistinguishable from natural background levels.

Section 3: Equipment

- **Air Sampling:**
 - Radeco Model H810 AC High Volume air samplers with holder to accommodate a two-inch particulate filter.
 - Ludlum Model 2241-3 with 44-38 Energy Compensate GM probe and 44-9 pancake probe.

Section 4: Radon

Radon is a naturally occurring radioactive gas that can be an indoor air hazard anywhere in the state. It comes from the natural decay of uranium that is found in nearly all soils. Radon is a noble gas, which means it does not burn or react readily with other chemicals. It typically moves up through the ground to the air above, where it dissipates to low levels. EPA estimates that naturally occurring background levels for radon are around 0.4 pCi/L. However, a home or other building can trap radon inside where it can build up. Any home may have a radon problem. This means new and old homes, well-sealed and drafty homes, and homes with or without basements.

Although isotopes at the nearby West Lake Landfill do generate radon, ambient air concentrations are expected to dissipate quickly. This sampling did not specifically address radon, but compared other alpha or beta activity levels in upwind, downwind, and background locations, without finding a difference.



Figure 1
Bridgeton Sanitary Landfill
Air Sample Collection Point June 4, 2013

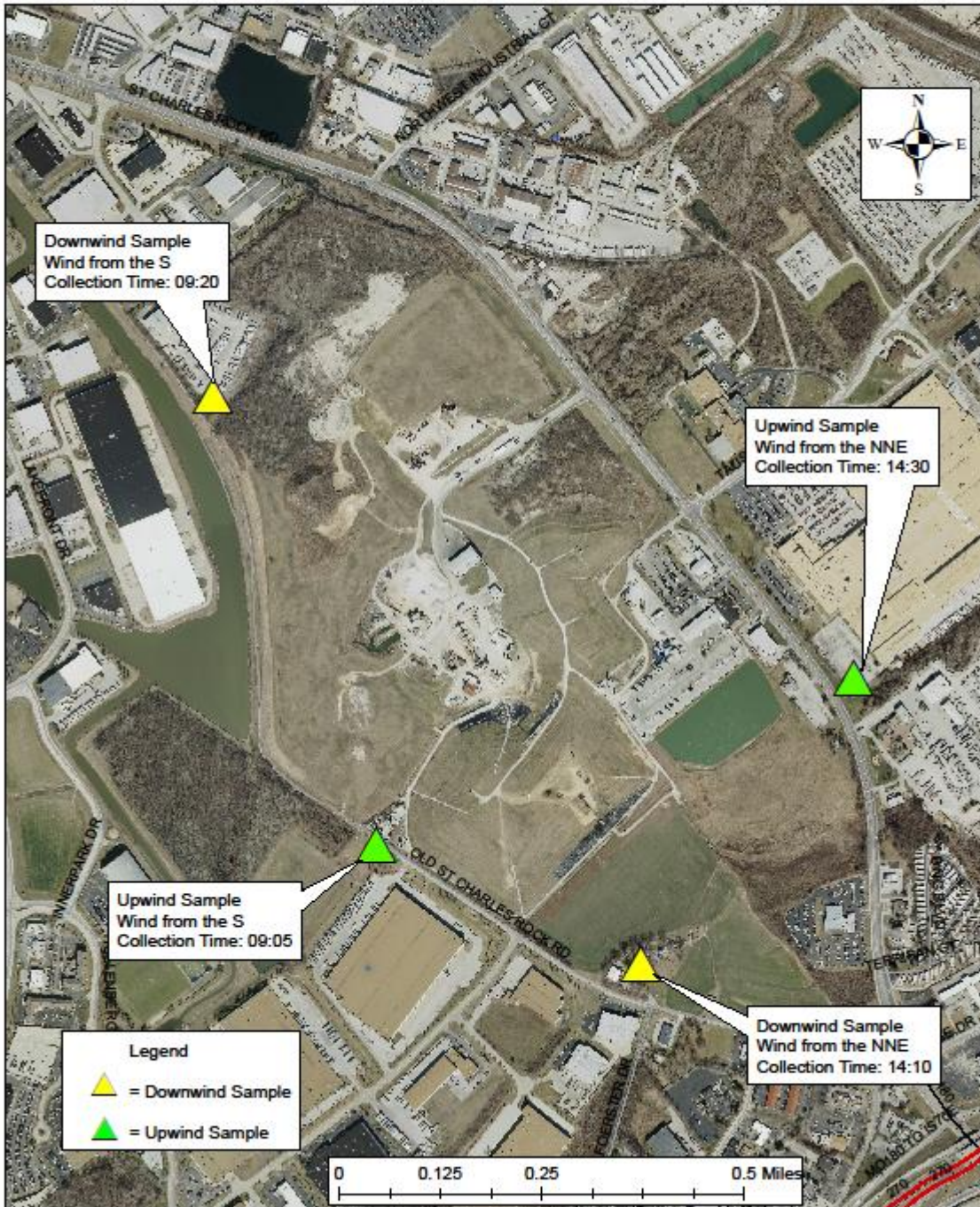




Figure 2
Bridgeton Sanitary Landfill
Air Sample Collection Point June 11, 2013

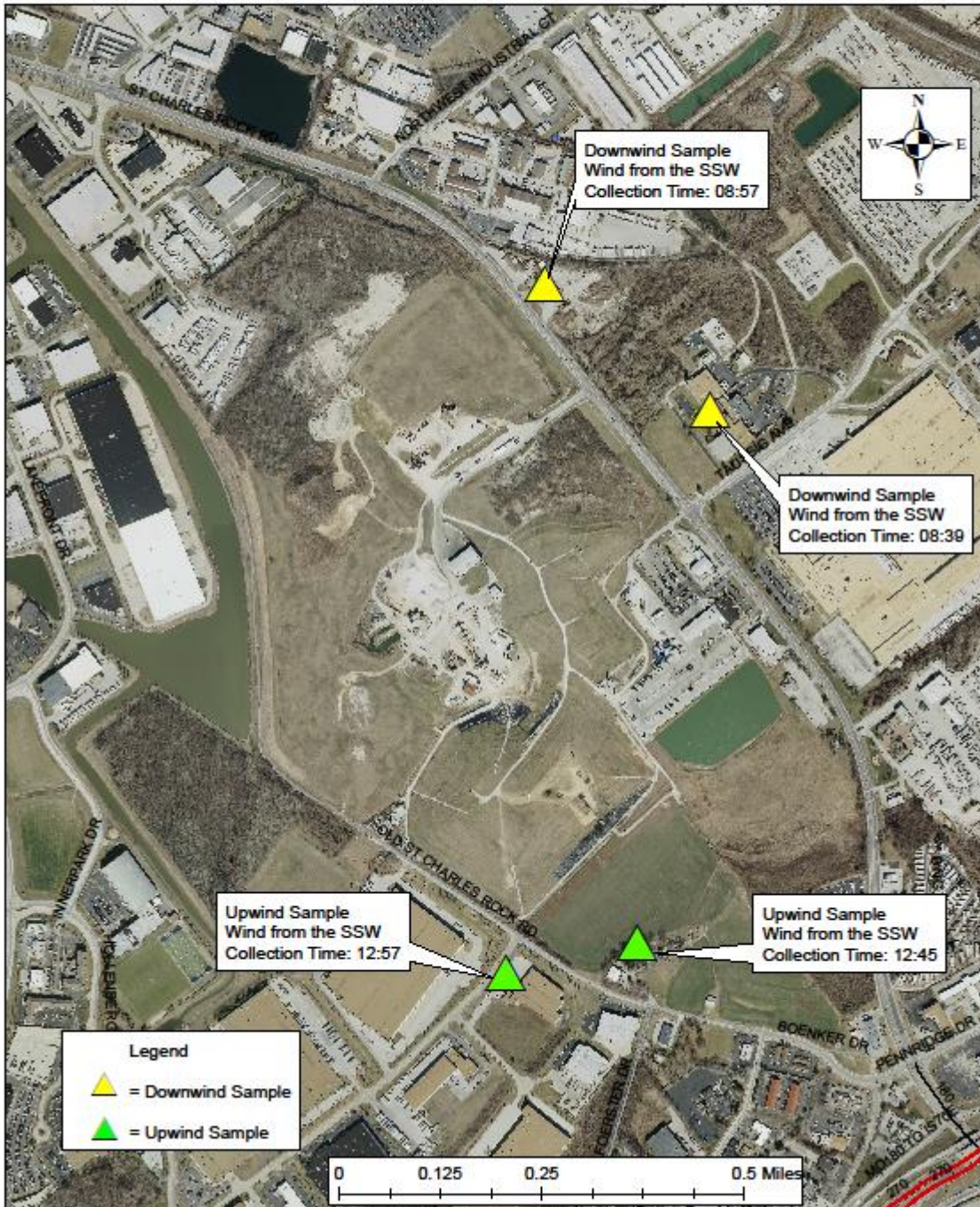




Figure 3
Bridgeton Sanitary Landfill
Air Sample Collection Point June 18, 2013

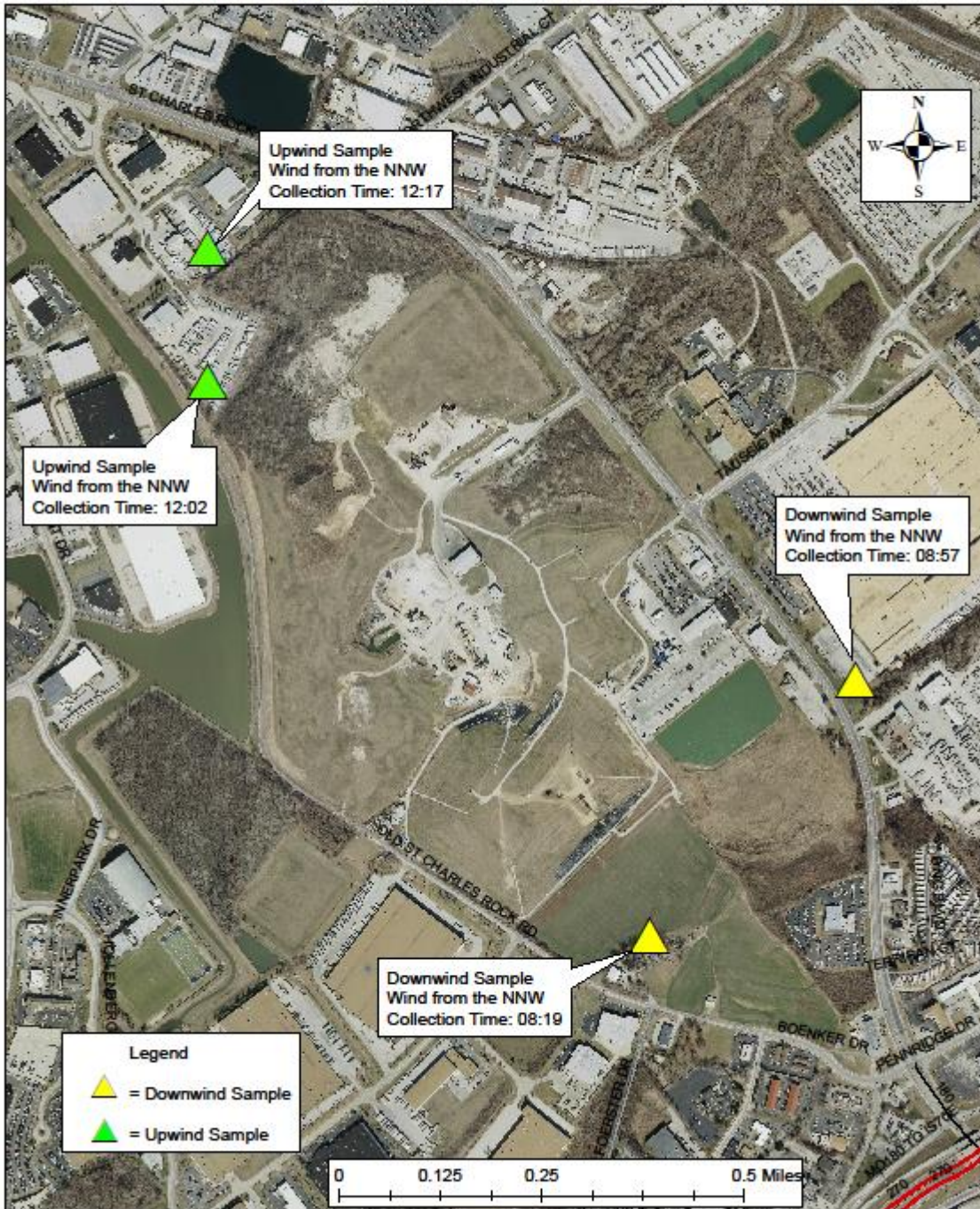




Figure 4
Bridgeton Sanitary Landfill
Air Sample Collection Point June 27, 2013

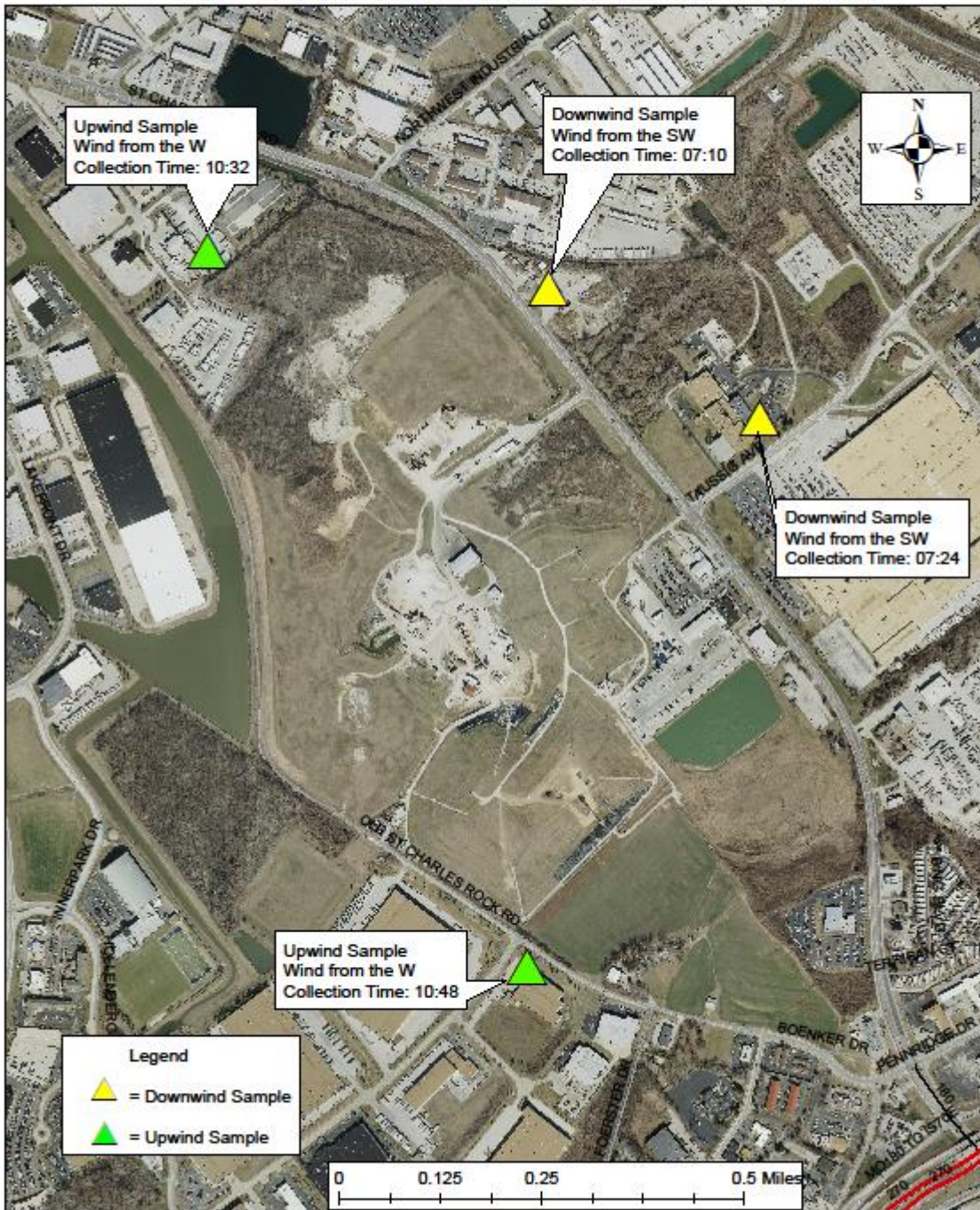




Figure 5
Bridgeton Sanitary Landfill
Background Sampling Locations

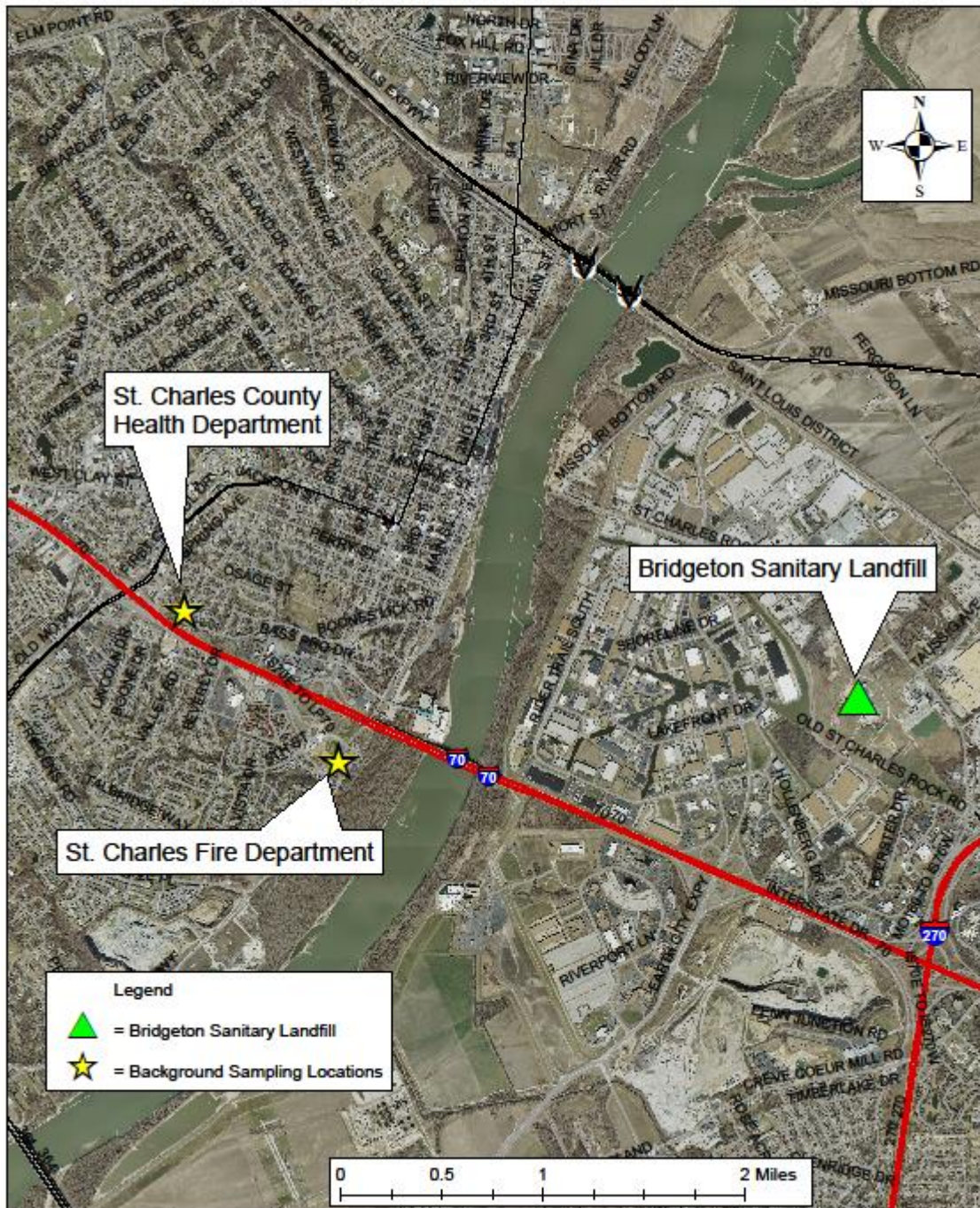


Table 1
June 4, 2013

| Report of Analysis | Missouri DHSS | | | | | | |
|---------------------------|---------------------------------|---------------|-------------|----------|-----------------|---------------------------|--------------|
| | 930 Wildwood Dr | | | | | | |
| | Jefferson City, MO 65109 | | | | | | |
| Sample ID | Sample Date | Analysis Date | Analyte | Result | Screening Level | >Screening Level (Yes/No) | Report Units |
| BLANK | 06/17/13 00:00 | 6/18/2013 | Gross Alpha | 9.83E-15 | 2.00E-14 | No | uCi/ml |
| 13-0001 (BACKGROUND) | 06/04/13 07:45 | 6/18/2013 | Gross Alpha | 5.92E-15 | 2.00E-14 | No | uCi/ml |
| 13-0002 (BACKGROUND) | 06/04/13 12:29 | 6/18/2013 | Gross Alpha | 4.70E-16 | 2.00E-14 | No | uCi/ml |
| 13-0026 (UPWIND) | 06/04/13 09:05 | 6/18/2013 | Gross Alpha | 1.32E-14 | 2.00E-14 | No | uCi/ml |
| 13-0027 (UPWIND) | 06/04/13 14:10 | 6/18/2013 | Gross Alpha | 3.34E-15 | 2.00E-14 | No | uCi/ml |
| 13-0051 (DOWNWIND) | 06/04/13 09:20 | 6/18/2013 | Gross Alpha | 1.82E-15 | 2.00E-14 | No | uCi/ml |
| 13-0052 (DOWNWIND) | 06/04/13 14:30 | 6/18/2013 | Gross Alpha | 5.50E-15 | 2.00E-14 | No | uCi/ml |
| | | | | | | | |
| BLANK | 06/17/13 00:00 | 6/18/2013 | Gross Beta | 7.76E-14 | 6.00E-13 | No | uCi/ml |
| 13-0001 (BACKGROUND) | 06/04/13 07:45 | 6/18/2013 | Gross Beta | 7.03E-14 | 6.00E-13 | No | uCi/ml |
| 13-0002 (BACKGROUND) | 06/04/13 12:29 | 6/18/2013 | Gross Beta | 8.45E-14 | 6.00E-13 | No | uCi/ml |
| 13-0026 (UPWIND) | 06/04/13 09:05 | 6/18/2013 | Gross Beta | 8.61E-14 | 6.00E-13 | No | uCi/ml |
| 13-0027 (UPWIND) | 06/04/13 14:10 | 6/18/2013 | Gross Beta | 7.53E-14 | 6.00E-13 | No | uCi/ml |
| 13-0051 (DOWNWIND) | 06/04/13 09:20 | 6/18/2013 | Gross Beta | 7.64E-14 | 6.00E-13 | No | uCi/ml |
| 13-0052 (DOWNWIND) | 06/04/13 14:30 | 6/18/2013 | Gross Beta | 9.34E-14 | 6.00E-13 | No | uCi/ml |

Table 2
June 11, 2013

| Report of Analysis | Missouri DHSS | | | | | | |
|---------------------------|---------------------------------|---------------|-------------|-----------|-----------------|---------------------------|--------------|
| | 930 Wildwood Dr. | | | | | | |
| | Jefferson City, MO 65109 | | | | | | |
| Sample ID | Sample Date | Analysis Date | Analyte | Result | Screening Level | >Screening Level (Yes/No) | Report Units |
| BLANK | 06/24/13 00:00 | 6/25/2013 | Gross Alpha | 4.14E-15 | 2.00E-14 | No | uCi/ml |
| 13-0003 (BACKGROUND) | 06/11/13 07:28 | 6/25/2013 | Gross Alpha | 8.24E-15 | 2.00E-14 | No | uCi/ml |
| 13-0004 (BACKGROUND) | 06/11/13 07:46 | 6/25/2013 | Gross Alpha | 5.85E-15 | 2.00E-14 | No | uCi/ml |
| 13-0053 (DOWNWIND) | 06/11/13 08:39 | 6/25/2013 | Gross Alpha | -2.82E-15 | 2.00E-14 | No | uCi/ml |
| 13-0054 (DOWNWIND) | 06/11/13 08:57 | 6/25/2013 | Gross Alpha | 7.95E-15 | 2.00E-14 | No | uCi/ml |
| 13-0055 (UPWIND) | 06/11/13 12:45 | 6/25/2013 | Gross Alpha | 8.04E-15 | 2.00E-14 | No | uCi/ml |
| 13-0056 (UPWIND) | 06/11/13 12:57 | 6/25/2013 | Gross Alpha | 7.00E-15 | 2.00E-14 | No | uCi/ml |
| BLANK | 06/24/13 00:00 | 6/25/2013 | Gross Beta | 8.87E-14 | 6.00E-13 | No | uCi/ml |
| 13-0003 (BACKGROUND) | 06/11/13 07:28 | 6/25/2013 | Gross Beta | 7.66E-14 | 6.00E-13 | No | uCi/ml |
| 13-0004 (BACKGROUND) | 06/11/13 07:46 | 6/25/2013 | Gross Beta | 9.68E-14 | 6.00E-13 | No | uCi/ml |
| 13-0053 (DOWNWIND) | 06/11/13 08:39 | 6/25/2013 | Gross Beta | 9.61E-14 | 6.00E-13 | No | uCi/ml |
| 13-0054 (DOWNWIND) | 06/11/13 08:57 | 6/25/2013 | Gross Beta | 8.09E-14 | 6.00E-13 | No | uCi/ml |
| 13-0055 (UPWIND) | 06/11/13 12:45 | 6/25/2013 | Gross Beta | 1.03E-13 | 6.00E-13 | No | uCi/ml |
| 13-0056 (UPWIND) | 06/11/13 12:57 | 6/25/2013 | Gross Beta | 8.85E-14 | 6.00E-13 | No | uCi/ml |

Table 3
June 18, 2013

| Report of Analysis | Missouri DHSS | | | | | | |
|---------------------------|---------------------------------|----------------------|----------------|---------------|------------------------|-------------------------------------|---------------------|
| | 930 Wildwood Dr. | | | | | | |
| | Jefferson City, MO 65109 | | | | | | |
| Sample ID | Sample Date | Analysis Date | Analyte | Result | Screening Level | >Screening Level (Yes/No) | Report Units |
| BLANK | 06/28/13 00:00 | 6/28/2013 | Gross Alpha | 8.49E-15 | 2.00E-14 | No | uCi/ml |
| 13-0005 (BACKGROUND) | 06/18/13 07:40 | 6/28/2013 | Gross Alpha | 5.01E-15 | 2.00E-14 | No | uCi/ml |
| 13-0006 (BACKGROUND) | 06/18/13 07:47 | 6/28/2013 | Gross Alpha | 2.82E-15 | 2.00E-14 | No | uCi/ml |
| 13-0028 (DOWNWIND) | 06/18/13 08:19 | 6/28/2013 | Gross Alpha | 5.65E-15 | 2.00E-14 | No | uCi/ml |
| 13-0029 (UPWIND) | 06/18/13 12:02 | 6/28/2013 | Gross Alpha | 5.73E-15 | 2.00E-14 | No | uCi/ml |
| 13-0057 (DOWNWIND) | 06/18/13 07:55 | 6/28/2013 | Gross Alpha | 1.82E-15 | 2.00E-14 | No | uCi/ml |
| 13-0058 (UPWIND) | 06/18/13 12:17 | 6/28/2013 | Gross Alpha | 5.50E-15 | 2.00E-14 | No | uCi/ml |
| | | | | | | | |
| BLANK | 06/28/13 00:00 | 6/28/2013 | Gross Beta | 8.93E-14 | 6.00E-13 | No | uCi/ml |
| 13-0005 (BACKGROUND) | 06/18/13 07:40 | 6/28/2013 | Gross Beta | 9.67E-14 | 6.00E-13 | No | uCi/ml |
| 13-0006 (BACKGROUND) | 06/18/13 07:47 | 6/28/2013 | Gross Beta | 1.03E-13 | 6.00E-13 | No | uCi/ml |
| 13-0028 (DOWNWIND) | 06/18/13 08:19 | 6/28/2013 | Gross Beta | 1.21E-13 | 6.00E-13 | No | uCi/ml |
| 13-0029 (UPWIND) | 06/18/13 12:02 | 6/28/2013 | Gross Beta | 1.15E-13 | 6.00E-13 | No | uCi/ml |
| 13-0057 (DOWNWIND) | 06/18/13 07:55 | 6/28/2013 | Gross Beta | 9.91E-14 | 6.00E-13 | No | uCi/ml |
| 13-0058 (UPWIND) | 06/18/13 12:17 | 6/28/2013 | Gross Beta | 8.19E-14 | 6.00E-13 | No | uCi/ml |

Table 4
June 27, 2013

| Report of Analysis | Missouri DHSS | | | | | | |
|---------------------------|---------------------------------|---------------|-------------|----------|-----------------|---------------------------|--------------|
| | 930 Wildwood Dr. | | | | | | |
| | Jefferson City, MO 65109 | | | | | | |
| Sample ID | Sample Date | Analysis Date | Analyte | Result | Screening Level | >Screening Level (yes/No) | Report Units |
| BLANK | 07/10/13 00:00 | 7/11/2013 | Gross Alpha | 4.21E-15 | 2.00E-14 | No | uCi/ml |
| 13-0007 (BACKGROUND) | 06/27/13 06:45 | 7/11/2013 | Gross Alpha | 2.25E-15 | 2.00E-14 | No | uCi/ml |
| 13-0008 (BACKGROUND) | 06/27/13 07:34 | 7/11/2013 | Gross Alpha | 6.53E-15 | 2.00E-14 | No | uCi/ml |
| 13-0030 (DOWNWIND) | 06/27/13 07:10 | 7/11/2013 | Gross Alpha | 4.20E-15 | 2.00E-14 | No | uCi/ml |
| 13-0031 (DOWNWIND) | 06/27/13 07:24 | 7/11/2013 | Gross Alpha | 7.43E-15 | 2.00E-14 | No | uCi/ml |
| 13-0032 (UPWIND) | 06/27/13 10:32 | 7/11/2013 | Gross Alpha | 5.99E-15 | 2.00E-14 | No | uCi/ml |
| 13-0033 (UPWIND) | 06/27/13 10:48 | 7/11/2013 | Gross Alpha | 9.98E-16 | 2.00E-14 | No | uCi/ml |
| BLANK | 07/10/13 00:00 | 7/11/2013 | Gross Beta | 6.93E-14 | 6.00E-13 | No | uCi/ml |
| 13-0007 (BACKGROUND) | 06/27/13 06:45 | 7/11/2013 | Gross Beta | 9.22E-14 | 6.00E-13 | No | uCi/ml |
| 13-0008 (BACKGROUND) | 06/27/13 07:34 | 7/11/2013 | Gross Beta | 1.13E-13 | 6.00E-13 | No | uCi/ml |
| 13-0030 (DOWNWIND) | 06/27/13 07:10 | 7/11/2013 | Gross Beta | 1.11E-13 | 6.00E-13 | No | uCi/ml |
| 13-0031 (DOWNWIND) | 06/27/13 07:24 | 7/11/2013 | Gross Beta | 9.84E-14 | 6.00E-13 | No | uCi/ml |
| 13-0032 (UPWIND) | 06/27/13 10:32 | 7/11/2013 | Gross Beta | 1.03E-13 | 6.00E-13 | No | uCi/ml |
| 13-0033 (UPWIND) | 06/27/13 10:48 | 7/11/2013 | Gross Beta | 1.03E-13 | 6.00E-13 | No | uCi/ml |

Photographic Log

Photo 1: Location looking north toward the landfill.



Photo 2: Location looking southwest toward the landfill.



Photo 3: Location looking southwest toward the landfill.



Photo 4: Location looking southeast toward the landfill.

