



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

DEPARTMENT OF NATURAL RESOURCES

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SEP 24 2015

Mr. Brian J. Power, Environmental Manager
Bridgeton Landfill, LLC
Republic Services, Inc.
13570 St. Charles Rock Road
Bridgeton, MO 63044

Re: Corrective Action Assessment and Plan including Inert Gas Injection – Neck Area and North Quarry, Bridgeton Sanitary Landfill, Permit Number 0118912, St. Louis County

Dear Mr. Power:

The Solid Waste Management Program (SWMP) is in receipt of Bridgeton Landfill, LLC's August 25, 2015, and September 9, 2015, submittals related to the SWMP's August 10, 2015 Corrective Action Assessment and Plan letter and a copy of an expert report entitled "Subsurface Self Sustaining Reaction Incident" by Sperling/Abedini provided to the department on September 3, 2015, by the Attorney General's Office.

Bridgeton Landfill's response to the department's August 25, 2015, letter is inadequate, in some areas, and requires corrective action to address those deficiencies detailed below:

Identification of Technology and Submission of Work Plan and Schedule

- **Requirement:** Republic Services shall submit a work plan and schedule identifying a technology or technologies that may be used to halt any potential movement of the South Quarry smoldering fire identified to be occurring in the neck north of the gas interceptor wells. The schedule must identify specifically the time needed for mobilization through project completion, whether required by the SWMP or initiated by Bridgeton Landfill.
- **Bridgeton Landfill Response:** Bridgeton Landfill agrees to submit a technical evaluation of a heat extraction line to control temperatures within the Corrective Action Zone (illustrated in **Attachment A**), including the Neck Area, by November 1, 2015.
- **Action Required to Comply:** Submission of the required work plan and schedule including evaluation of those additional technologies recommended in the experts' report as part of the technical evaluation by November 1, 2015, is acceptable to the SWMP.

As clarification, a technical evaluation of technology solutions alone without an implementable work plan and schedule (i.e., number of days for mobilization and completion of construction) fails to meet this requirement. The SWMP continues to have concerns with the corrective measures implemented to date by Bridgeton Landfill. Therefore, Bridgeton Landfill/Republic Services is required to submit contingent corrective measure plans and installation/construction

schedules for review and approval by the SWMP. The goal is to have these plans and needed contracts ready to initiate immediate installation/construction should the need arise. Associated with this effort, additional corrective measure concepts have been proposed within the expert report previously referenced and provided to Republic Services' legal counsel. Therefore, the SWMP is requiring as part of Bridgeton Landfill's contingent planning evaluation that an assessment of the recommendations and technology concepts contained in the expert report and a discussion of the feasibility of implementing such proposals be included in the November 1, 2015, submittal.

Submission of North Quarry Cap Enhancement Work Plan and Schedule

- **Requirement:** Republic Services must submit a work plan and schedule for completion of enhancement of the landfill's cap including the abandonment of North Quarry RCPs and connection of the GEWs listed in the "Connection of Previously Installed North Quarry Gas Controls" section of the August 10, 2015, letter.
- **Bridgeton Landfill Response:** Bridgeton Landfill agrees to complete a study identifying all inactive RCP structures in the North Quarry and submit a report of findings by October 1, 2015.
- **Action Required to Comply:** Submission of the work plan including abandonment of North Quarry RCPs and schedule to SWMP no later than October 9, 2015, is required.

We understand a component of the work planning process is the evaluation of North Quarry RCP structures in order to determine appropriate abandonment procedures. Such activities are a part of the North Quarry Cap Enhancement work plan and sufficient time needs to be allotted for completion of this task in the required schedule. However, the overarching requirement is not for an evaluation of the RCP structures, but rather submission of a work plan and schedule for completion of a North Quarry Cap Enhancement Project to reduce the potential for:

- *oxygen intrusion due to erosion or desiccation of the existing soil and vegetative cap;*
- *air emissions and odors should the subsurface smoldering fire move into the North Quarry; and*
- *a new independent smoldering fire in the North Quarry.*

Corrective Measures including "Hot Spot" Treatment and Submission of Work Plan and Schedule

- **Requirement:** Bridgeton Landfill shall submit a corrective measures work plan and schedule with a control line specified within the corrective action zone as stated in the SWMP's October 7, 2014, letter and, at a minimum, a corrective action measure using inert gas injection as a "hot spot" treatment. As stated above, Bridgeton Landfill provided on September 9, 2015, a work plan for "hot spot" treatment.
- **Bridgeton Landfill Response:** Inert gas injection technology is not appropriate for large, deep, area-wide reactions nor for conventional landfill fires (or SSOs) deeper than 30 feet. The affected area must be delineated in order to design an effective injection plan. The Bridgeton

Landfill, LLC Environmental Manager and the MDNR will actively collaborate to verify and classify the SSO event. Such determination will be made within four weeks of the Initial Notification. The event will be classified as a local SSO if monitoring indicates that combustion is constrained to one gas well and that there is no evidence that the SSO is enlarging.

- **Action Required to Comply:** Bridgeton Landfill shall provide a plan and schedule for timely implementation of inert gas injection including a list of vendor(s) for the necessary materials.

To be clear, Bridgeton Landfill's timeframe of 4 weeks for determination of use of inert gas injection is unacceptable. The submitted report details that inert gas injection is most effective in a limited area. The one week period necessary to confirm both temperature and carbon monoxide levels, i.e., 180° F and 1,500 ppm through laboratory analysis, should allow the facility to determine that placement of additional soil alone is or is not sufficient to extinguish the SSO. This evaluation should take into consideration the extent of the North Quarry affected, including the area's proximity to known radiologically impacted material (RIM), with a primary objective of not allowing time for significant expansion of the SSO to occur. The use of inert gas injection is expected to begin upon determination that an SSO exists or approximately one week from identification of a "hot spot". The stated limitation on size of the area to be injected to one gas extraction well at a depth of no more than 30 feet appears arbitrary as the effectiveness of inert gas injection is dependent on adequate volume and uniformity of dispersion at the impacted depth. At a minimum, to make the submitted plan immediately implementable, Bridgeton Landfill/Republic Services must identify a vendor(s) of the materials necessary to implement inert gas injection and provide a response to our comments related to the area and depth that can be treated effectively.

Operation of Gas Control System

- **Requirement:** Oxygen levels are to be maintained in the North Quarry GEWs at no greater than 1.5% by volume to further reduce the likelihood of oxygen intrusion and creation of an independent fire.
- **Bridgeton Landfill Response:** Bridgeton Landfill agrees to set a goal level of 1.5% oxygen while complying with the NSPS reporting and corrective action requirements should the 5% threshold be violated.
- **Action Required to Comply:** Maintain oxygen levels at no greater than 1.5% by volume in the North Quarry GEWs.

New Source Performance Standards were developed, in part, to identify landfills not being operated in a manner to prevent landfill fires. Landfill fires are known to result in increased air emissions and odor releases. Bridgeton Landfill's South Quarry and Neck Area have an ongoing subsurface smoldering fire. Additionally, Bridgeton Landfill states that historically the facility has achieved less than 1.5% oxygen in the North Quarry and that only twice in the last six months, out of over 1,200 readings, has any gas extraction well in the North Quarry

exceeded 1.5% oxygen. Many of the trends noted at landfills including Bridgeton Landfill are affected by weather conditions and barometric pressure. As we move into fall and winter, note that North Quarry oxygen exceedances have been encountered most frequently during the late fall and early winter outside the 6 months referenced in your response to the SWMP.

The Solid Waste Management Program will notify you under separate cover of a modification to the facility's Solid Waste Disposal Area operating permit. This modification requires operation of gas extraction wells in the North Quarry of Bridgeton Landfill and reporting of corrective measures to the SWMP as stated in the program's August 10, 2015, letter to the facility.

If Bridgeton Landfill fails to timely comply with each of the above requirements the SWMP, working through the Attorney General's Office, will take immediate action to invoke all available legal remedies to obtain such compliance from Bridgeton Landfill, LLC, a Republic Services, Inc. company.

Compliance

with corrective measures requirements is one way in which the program and department ensures protection of human health, public safety and the local environment.

Evaluation of Conditions at Bridgeton Landfill

Bridgeton Landfill's response related to technical evidence supporting movement of the reaction, in part, states that "...the presence, movement and intensity of an approaching subsurface reaction are revealed by three main indicators: (1) subsurface temperatures, (2) gas constituents and quality, and (3) settlement (due to breakdown of waste in reaction zones.)" Not all indicators referenced in Bridgeton Landfill's response are indicative of an approaching reaction, but rather, in some cases, document prior activity or passing of the reaction through an area. Further, SWMP staff have observed that thermal and pressure induced damage to infrastructure is also a proven indicator of areas where the smolder is either approaching or is highly active at the Bridgeton Landfill

Bridgeton Landfill must take all necessary steps to stop forward movement or any further expansion of the current fire in the Neck Area or development of an independent smolder in the North Quarry. In reviewing monitoring data in the Neck Area, the data continues to support the presence of the smolder in the area to the North of the gas interceptor wells which is of concern to SWMP and the AGO's experts.

Statements were made in Bridgeton Landfill's response to SWMP's August 10, 2015, letter disputing data presented related to the following topics. The SWMP disagrees with some of the representations in the provided response and restates our position below.

Subsurface Temperatures

Bridgeton Landfill's Response: Temperature can provide evidence regarding the presence of a subsurface reaction, as the reaction will generate heat. Note that the heat, once generated, can be retained within the well-insulated waste mass and will dissipate slowly.

SWMP Response: Temperature monitoring probes at certain depths in the Neck Area of the landfill continue to show an upward heat trend.

Brian Power
Bridgeton Sanitary Landfill
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Gas Constituents

Bridgeton Landfill's Response: Carbon monoxide levels are below any MDNR levels of concern in the Neck Area and the North Quarry, and have remained stable for over a year.

SWMP Response: Bridgeton Landfill has an extensive and ongoing subsurface smoldering fire. CO is monitored as set forth in the First Agreed Order and amendments to allow for timely mitigation of any developing problems. CO levels in the Neck Area, at a minimum, around GEW-38, GEW-39, GEW-56R, GEW-109 and GEW-110 remain of concern. As an example, GEW-109 currently in the September 20, 2015, monthly report has a temperature of 175.8° F and CO at 2,200 ppm and GEW-56R with temperature of 173.1° F and CO at 2,100 ppm. Additional constituents in the gas composition are also evaluated, such as methane and hydrogen content. Methane gas concentrations of 40% and greater by volume are present in healthy landfill gas well fields, hydrogen by volume is minimal and oxygen content is maintained at less than 5% by volume. Bridgeton Landfill has over the past few months been reporting at the flares a methane level at or near 10%, hydrogen levels at or near 8% and oxygen at or near 10%.

Settlement

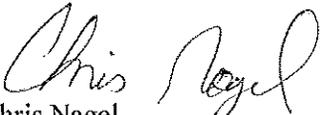
Bridgeton Landfill's Response: The Bridgeton Landfill monitors settlement in the neck and south quarry monthly, and evidence indicates that the active SSE has moved away from the Neck Area and is currently in the southeast portion of the South Quarry, moving southward and away from the neck and the North Quarry.

SWMP Response: Visual observations made during monthly site visits show ongoing surface changes in the Neck which appears due to continuing settlement in the area of the gas interceptor wells and the west slope leading into the North Quarry.

If you have any questions or comments, please feel free to contact me or Brenda Ardrey at (573) 751-5401 or at P.O. Box 176, Jefferson City, MO 65102-0176.

Sincerely,

SOLID WASTE MANAGEMENT PROGRAM


Chris Nagel
Director

CN/bam

c: Jim Getting, P.E., Bridgeton Landfill, LLC
Ms. Laura Yates, St. Louis County Department of Health
Mr. Tom Phillips, Attorney General's Office

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