November 2, 2015

Mr. Chris Nagel
Missouri Department of Natural Resources
Solid Waste Management Program
1738 East Elm Street
Jefferson City, Missouri 65101

Re: Technical Evaluation of Heat Extraction Barrier
Bridgeton Landfill, Bridgeton, Missouri
Permit No. 0118912

Dear Mr. Nagel:

Bridgeton Landfill, LLC ("Bridgeton Landfill") received a letter from the Missouri Department of Natural Resources (MDNR) on August 10, 2015 that included a request for a "*workplan and schedule identifying a technology or technologies that may be used to halt any potential movement of the South Quarry smoldering fire.*" Bridgeton Landfill submitted a response letter dated August 25, 2015 proposing a technical evaluation of a heat extraction line to control temperature within the Neck Area. In a letter dated September 24, 2015, the MDNR required that the submittal also include *"contingent corrective measures plan and installation/construction schedules for review and approval by the SWMP"* and *"evaluation of those additional technologies recommended in the experts' report..."*

In response to MDNR's request for a workplan and construction schedule, please find transmitted with this letter a report prepared by Feezor Engineering, Inc. titled "Technical Evaluation of a Heat Extraction Barrier."

Regarding your request for an evaluation of those additional technologies recommended in the experts' report [of Sperling/Abedini] and a discussion of the feasibility of implementing such proposals, Bridgeton Landfill's response is as follows:

1. On October 16, 2015, EPA publicly rejected Dr. Sperling's report.

2. Bridgeton Landfill likewise rejects Dr. Sperling's report and flooding and gas redirection ideas as, at least, tentative, untested, speculative, outside his expertise, unnecessary, impossible to implement, potentially hazardous to groundwater and contrary to the Landfill's permit. Further, the right to select remedial action for the purpose of isolating or protecting the low-level radiologically-impacted material at the West Lake Landfill Superfund Site belongs to EPA, not the SWMP.

3. Bridgeton Landfill's experts likewise reject Dr. Sperling's theory and ideas. We refer you, for example, to the expert report of James Walsh (available at bridgetonlandfill.com), which states in part:

A report on the reaction or SSR at Bridgeton Landfill was published on September 2, 2015 by Landfill Fire Control, Inc. (LFCI) of North Vancouver, B.C., Canada. That report contains two primary recommendations for future action at Bridgeton Landfill to deal with the reaction. The first recommendation was to inject cooled exhaust gasses from the GCCS flare into the landfill waste mass in the Neck area between the North and South Quarries to create a positive-pressure, cold, and inert gas barrier that would serve to block any potential movement of the SSR from the South to the North Quarry. The second recommendation was to create a closed-loop ground water and leachate recirculation system that would raise the water level in landfill areas as yet unaffected by the reaction.

The first recommendation to use cooled flare gas as an inert gas injection to block movement of the reaction is simply not feasible to apply, and would not work anyway. Capturing and cooling flare gas is not technically feasible, and would be prohibitively costly. Cold inert gas injection is one method that has been used to extinguish conventional landfill fires, Usually, super-cooled carbon dioxide or nitrogen in liquid or gaseous forms produced by a specialty gas manufacturer can be delivered to a landfill by tanker trucks, and then pumped into the landfill through newly installed dedicated steel injection pipes. Conventional plastic pipes would shatter from the cold, obviously. Provision of these gases from a dedicated specialty gas manufacturer is far more technically feasible and cost-effective versus capturing and cooling the super-heated exhaust gases from a landfill flare. Using the exhaust gas in this manner has never been done, makes no sense, and is simply absurd.

More importantly, inert gas injection as proposed at Bridgeton Landfill will simply not work as intended. As indicated above, inert gas injection has been use before with some effectiveness on conventional small-area landfill fires. With that said, even this small scale of application has its limitations. For this approach to have any effectiveness, the volume to be affected must be small, shallow, and well-defined. The challenge with inert gas injection is that as with any applied media injected to a landfill waste mass, it flows in through the path of least resistance, usually into waste volumes of low density and through non-dense waste pathways or pockets. Inert gas injection cannot get into and through denser and deeper waste areas, especially if the waste is saturated, so inevitably it doesn't get to all of the fire. Even in small, shallow, well-defined landfill fire applications of inert gas injection, it seldom gets all of the fire. The rest must be left to remediate on its own over time, or other techniques like excavation and removal must be applied to get all of the affected waste volume.

Granted what is being proposed here is to inject the gas in an unaffected area, north of the current reaction to block its movement northward. But the same limitations will exist. The injected inert gas would again take the path of least resistance. It would not provide a uniform, complete distribution. Some pockets of denser waste material or sealed-off voids will be unaffected and unprotected. SCS has performed inert gas injection on dozens of landfill fires before. They have all been shallow, small, conventional landfill fires, never of this type, size, or depth. The depth of the reaction at Bridgeton Landfill is well over the 30 ft maximum depth we have applied inert gas injection before. Further, the application of inert gas is fleeting -- it is pumped in, does its job quickly if at all, and then dissipates.

The injected gas will not remain at depth for an indefinite time period as would be needed here to form a blocking wall to up to 100 ft deep. If injection were to be sustained indefinitely, the production of the manufactured (or on-site cooled) gas would be prohibitively expensive, not technically feasible, and has never been done. Continuous inert gas injection has never been applied as a blocking wall, or for this large an affected mass, or for other than a conventional landfill fire.

Inert gas injection will simply not work at all for Bridgeton Landfill to provide a lasting barrier to the movement of the reaction.

The second recommendation was for ground water and leachate to be pumped into the landfill, presumably raising the water level, and serving to block reaction expansion in current unaffected areas, or to remediate the reaction in areas currently affected by the reaction. The implication is that this or any landfill is like a sand aquifer, that a water table exists at a defined and consistent level, that all waste mass below that level is fully saturated, and that all waste above that level are substantially dry. Landfills in general simply do not work like that, and certainly the Bridgeton Landfill as a very deep, quarry landfill mostly below the natural adjacent water table does not.

A deep, dense MSW landfill like the Bridgeton Landfill is not like a sand aquifer. Varying degrees of saturation can be found at any landfill depth. While it is true as a general rule that deeper parts of the landfill tend to be wetter and higher parts less so, there may be dry dense isolated volumes at depth in the landfill, and totally saturated pockets near the top. A water level recorded in a well in a landfill is more likely to be a perched water level at that point, flooding in from height and filling the whole well with liquid. This makes it look like the landfill is saturated to that level, but it is not. Assuredly, many wells have measured water levels that are far higher than any level of saturation in the landfill at that point. Saturation in waste varies widely from top to bottom, and from one horizontal area to another.

The second issue with this is the perception that a landfill can be dewatered, or even flooded. Landfills are dense and heterogeneous, and tend to resist absorbing water provided

to it very rapidly. And a waste volume already saturated at depth, tends to yield back excess water at a very slow rate. Think of leachate infiltration galleries for leachate recirculation programs. It is often very difficult to get waste even near the landfill surface where is may be drier to absorb liquids quickly. And think of dewatering programs at depth in a landfill. At depth in a landfill, the waste does tend to be wetter, but any attempt to pump water at depth from a landfill is a very slow go, in any event, and certainly compared to the large volumes of water down there.

In summary, any attempt to flood shallow waste volumes perceived to be dry and unsaturated with water will fail. The water will go in at a slow rate and not saturate the intended waste volume in a uniform, complete manner. And more importantly, flooding existing reaction-affected waste volumes or doing so to block future reaction movement would not stop this reaction anyway. It has already been demonstrated that this reaction exists at depth, below measured "water table" levels, in areas of higher saturation, to depths of 60 to 100 ft. Clearly a saturated waste volume can be susceptible to the reaction, and therefore will not block it.

4. Dr. Sperling admitted in deposition facts showing that his report was materially incorrect and overstated.

5. Dr. Sperling admitted in deposition that his ideas should not be implemented based on his report without study and approval by others more qualified since he lacks the expertise necessary to evaluate them fully.

6. Dr. Sperling was unaware before deposition that the data show the heart of the subsurface reaction is already below the water table at the Neck Area TMPs, undermining his entire theory that rapidly adding water could "quench" the "fire." Dr. Sperling also admitted the subsurface reaction is not a fire, as his report had inaccurately claimed.

7. Dr. Sperling was unaware when he wrote his report that July 2015 conditions at GEW109, upon which his recommendations are based, are stable to improving. He had assumed, falsely, that they were new and therefore indicated recent reaction movement. The SWMP has the data proving he was wrong.

8. Dr. Sperling admitted at deposition and in his report that sentinel well GEW39 is presently unimpacted by the subsurface reaction, so there is still no movement of reaction impacts beyond GEW109 shown by site data.

In short, Dr. Sperling's ideas are, in our opinion, ill-advised and based on a mistaken site conceptual model and theories outside his expertise. Bridgeton Landfill reserves the right to add to or explain further its response. This explanation seems adequate for the SMWP to reject Dr. Sperling's report and recommendations.

Sincerely,

Brian J. Power

Brian J. Power
Environmental Manager
Bridgeton Landfill, LLC.

Attachment: *Technical Evaluation of a Heat Extraction Barrier*