027-0364

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
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JAN 05 2012

Ms. Evelyn Tomlin, P.E.
Chief, Bureau of Environmental Services
Howard County Department of Public Works
6751 Columbia Gateway Drive, Suite 514
Columbia, MD, 21046

Dear Ms. Tomlin:

This letter serves to inform you that upon review of the public hearing record and all pertinent information, the Department has made a final determination to issue the Air Quality Permit to Construct for the energy generation facility consisting of one (1) GE Jenbacher (Model J 320 GS-C82) lean-burn landfill gas (LFG) fired 1,468 bhp reciprocating internal combustion engine to be located at 2350 Marriottsville Road, Marriottsville, Maryland, in Howard County.

Enclosed is a copy of the permit to construct and the Department's response to comments. The permit to construct has an effective date of January 12, 2012.

Should you have any questions regarding the procedures to be followed, please call Mario G. Cora at: (410) 537-3225.

Sincerely,

William V. Paul, Chief
Combustion and Metallurgical Division
Air Quality Permits Program
Air and Radiation Management Administration

WVP/jm

Enclosure

cc: Howard County Department of Health

DEPARTMENT OF THE ENVIRONMENT
AIR AND RADIATION MANAGEMENT ADMINISTRATION

NOTICE OF FINAL DETERMINATION REGARDING A PERMIT TO CONSTRUCT TO CONSTRUCT AN ENERGY GENERATION FACILITY CONSISTING OF ONE (1) GE JENBACHER LEAN-BURN LANDFILL GAS (LFG) FIRED INTERNAL COMBUSTION ENGINE

SUBMITTED BY HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS TO BE LOCATED IN MARRIOTTSVILLE, MARYLAND

The Department of the Environment, Air and Radiation Management Administration (ARMA), has made a final determination to issue a Permit to Construct to Howard County Department of Public Works. The proposed project will be located at 2350 Marriottsville Road, Marriottsville, Maryland, 21104, in Howard County. Copies of the application, the final determination, the permit conditions and emissions limitations, the Department's responses to public comments, and other supporting documents are available for public inspection. Ask for Docket #16-11 at the following locations during normal business hours:

Maryland Department of the Environment
Air and Radiation Management Administration
1800 Washington Boulevard
Baltimore, Maryland 21230

Howard County Library – Glenwood Branch
2350 State Route 97
Cooksville, MD 21723
410-313-5577

ARMA is issuing the permit, including the conditions and emissions limitations presented in the docket, with an effective date of January 12, 2012.

Pursuant to Section 1-601 of the Environment Article, Annotated Code of Maryland, a final determination by the Department is subject to judicial review at the request of any person that: (1) Meets the threshold standing requirements under federal law; and (2)(i) Is the applicant; or (ii) Participated in a public participation process through the submission of written or oral comments.

Any petition for judicial review must be filed pursuant to Section 1-605 of the Environment Article, Annotated Code of Maryland. The petition shall be filed in the circuit court for the county where the application for the permit states that the proposed activity will occur and otherwise conform to the requirements of Title 1, Subtitle 6 of the Environment Article, Annotated Code of Maryland.

Further information may be obtained by calling Ms. Shannon Heafey at 410-537-4433.

George S. Aburn, Jr., Director
Air and Radiation Management Administration

MARYLAND DEPARTMENT OF THE ENVIRONMENT

AIR AND RADIATION MANAGEMENT ADMINISTRATION

RESPONSE TO COMMENTS

for the

PUBLIC HEARING HELD ON OCTOBER 5, 2011
REGARDING AN AIR QUALITY PERMIT TO CONSTRUCT APPLICATION FOR A PROPOSED ENERGY GENERATION FACILITY CONSISTING OF ONE (1) GE JENBACHER LEAN-BURN LANDFILL GAS (LFG) FIRED INTERNAL COMBUSTION ENGINE TO BE INSTALLED AT THE ALPHA RIDGE LANDFILL
2350 MARRIOTTSVILLE ROAD
MARRIOTTSVILLE, HOWARD COUNTY, MD

Purpose of the Hearing: The purpose of this public hearing was to receive public comment on an application for a Permit to Construct an energy generation facility consisting of one (1) GE Jenbacher (Model J 320 GS-C82) lean-burn landfill gas (LFG) fired 1,468 bhp reciprocating internal combustion engine to be located at 2350 Marriottsville Road, Marriottsville, Maryland, 21104, in Howard County.

Date and Location: The public hearing was held on Wednesday October 5, 2011 at 7:00 p.m. in the Marriotts Ridge High School Cafeteria, located at 12100 Woodford Drive, Marriottsville, MD 21104.

Attendance: Shannon Heafey, Public Participation Coordinator, Air and Radiation Management Administration, served as Hearing Officer. Twenty four members of the public attended the hearing. Mario Cora and Marcellina Gurley represented the Air Quality Permits Program, Air and Radiation Management Administration.

Comments, Questions, and Responses

Written comments and oral testimony have been grouped by subject:

Greenhouse Gases Issues:

Comment: A commenter provided an executive summary of a report prepared by the Landfill Gas to Energy Task Force (LFGETF) of the Sierra Club. The commenter noted that the LFGETF was asked to evaluate whether landfill gas to energy facilities would likely decrease or increase net greenhouse gas (GHG) emissions. The report concluded that reliance on landfill gas to generate electricity results in increased net GHG emissions. The conclusions in the report reinforce existing Sierra Club policy that supports diversion of the organic fraction of our discards from landfills so that uncontrolled methane is not generated in the first instance.

They also suggest that, in existing landfills with or without LFGETF facilities, regulations should be significantly strengthened to reduce methane emissions as much as possible.

Response: Under current state law, local jurisdictions have the responsibility for establishing a solid waste management plan for disposing of municipal solid waste (MSW). This plan includes the use of the existing Alpha Ridge Landfill. The generation of greenhouse gases such as methane is a natural by-product of all MSW landfills. Under current federal rules, GHG emissions from MSW landfills like the size of Alpha Ridge Landfill are not regulated. As such, GHG emissions from the Alpha Ridge Landfill are now dispersed into the atmosphere uncontrolled. The Alpha Ridge project, as proposed, would capture and utilize the methane gas created from the site's existing buried waste as a fuel to generate electricity. In doing so, GHGs emissions will decrease and the electricity generated will be sold to the regional electric power grid and made available for consumers of electricity. This approach used by Howard County is endorsed by the U.S. EPA which established the Landfill Methane Outreach Program (LMOP). The LMOP is a voluntary assistance program that helps to reduce methane emissions from landfills by encouraging the recovery and use of landfill gas (LFG) as an energy resource. Finally, it should be noted that the LFGETF report is in many ways not relevant because it focuses on the management of new waste where as the Alpha Ridge Landfill project deals with waste that has long been landfilled.

Air Quality Issues:

Comment 1: A commenter expressed some concerns about potential mercury, methyl mercury, and radionuclide emissions. The commenter also asked about data regarding all landfill cells noting if they are active or inactive, and the manner of capping.

Response 1: The landfill gas to energy project will not result in any change in existing mercury or radionuclide emissions, if any, from the Alpha Ridge facility. Section 112(n)(1)(B) of the 1990 Clean Air Act (CAA), as amended, required the U.S. EPA to prepare and submit a study on atmospheric mercury emissions to the US Congress. In the referred study (U.S. EPA, 1997), entitled "Mercury Study Report to Congress: An Inventory of Anthropogenic Mercury Emissions in the United States," the Agency discussed a variety of potential mercury emissions (i.e., electric utility steam generating units, municipal waste combustion units), including area sources such as MSW landfills. Mercury emissions from MSW landfills can potentially originate from household disposed material (*i.e.*, various batteries, old broken fluorescent light bulbs, electrical switches, thermometers, and other products) during daily dumping and covering operations. Once waste materials are covered with soil, mercury could be emitted from MSW landfills as a trace constituent of landfill gas. The U.S. EPA obtained measurement concentration data of mercury emissions throughout the country and used total landfill gas emissions to estimate potential mercury emission levels. It was found that the estimated total emissions of mercury from all MSW landfills in the country to be around 0.081 tons per year. This figure represents less than 0.1 percent of the total mercury released from all anthropogenic sources in the United States in 1994. Moreover, according to U.S. EPA, combustion of landfill gas converts methyl mercury into the less toxic, elemental form of mercury.

According to the County officials, radionuclides are not known to have been disposed of at the Alpha Ridge Landfill, and so are not expected to be present in this landfill gas or emissions from combustion of this gas.

Information regarding landfill cell activity can be obtained by contacting the Howard County Bureau of Environmental Services at (410) 313-6444.

Comment 2: One commenter asked if a filtering system can or will be installed on the generator system, and its location within the overall system (pre-combustion or post-combustion). The same commenter also asked how the filtered contaminants will be disposed.

Response 2: The U.S. EPA has developed New Source Performance Standards (NSPS) for the type of engine that has been proposed for this project, which is a reciprocating internal combustion engine (RICE). A source must comply with these standards irrespective of any pre-filtering or pre-conditioning of the methane gas. In the case of the proposed LFGE the proposed installation will use landfill gas which does not require pretreatment prior to being combusted in the engine. After combustion, the exhaust emissions will contain only trace quantities of particulate and other volatile organic compounds. The primary constituents in the exhaust gases will be carbon dioxide, nitrogen oxides, sulfur dioxide, and carbon monoxide. Based on our review, the projected exhaust emissions for the proposed installation were found to be in compliance with the applicable federal and state regulatory requirements. Thus, no emission filtering is required. In addition, the technical evaluation concluded that the proposed internal combustion technology does not require pre-combustion filtration to comply with current regulatory requirements.

Comment 3: A citizen requested information about the type of continuous monitoring system that will be used at the facility.

Response 3: Based on applicable regulatory requirements and the information contained in the application, it was determined that the proposed LFGE project will not require a continuous emissions monitoring system (CEMS). The use of CEMs is generally suitable for much larger facilities such as electric utility boilers and municipal waste combustors. Because these types of engines (RICE) are certified to comply with the emission standards set in the federal and state air quality regulations, it is appropriate for the Department to consider less costly alternatives for quantifying air pollutant emissions. For the proposed project, the Department is requiring the source to conduct an initial stack test to demonstrate compliance with the federal and State emission limitations. Actual emissions will be correlated with actual electrical output from the engine. Based on the results of this test, the Department will assess the need for and/or frequency of additional testing for the engine. Because federal regulations require that the engine owner or operator maintain a rigorous maintenance program for the proposed engine, the Department is generally satisfied that engine emissions will remain stable and predictable. The maintenance program detailed in the permit will include the maintenance of logs and records that are readily available for the Department to review. It is expected that proper implementation of maintenance procedures will ensure compliance with the applicable federal and state regulations. In conclusion, the proposed installation at Alpha Ridge Landfill compares well with other sources throughout the State (*i.e.*, Reichs Ford Sanitary Landfill located in Frederick County and owned by FC Landfill Energy, LLC, and the Gude Landfill and Oaks Landfill both located in Montgomery County and owned by the Northeast Maryland Waste Disposal Authority) using similar technology (GE Jenbacher).

Comment 4: Various comments were received in relation to potential dioxins and furans emission during the combustion of landfill gas. One commenter asked about the emission rates for NMOC (VOCs and HAPs, specifically dioxins and furans) for the existing flare. The same commenter further asked about the testing methodology and dates. Furthermore, the commenter stated that the permit should require testing for HAPs from all landfill gas combustion sources (shrouded flare and RICE).

Response 4: According to U.S. EPA there is the potential for the emission of dioxins/furans during the flaring of landfill gas or its use as a fuel in internal combustion engines. EPA states the following: "... review of the available data indicates that dioxins/furans can be released in small amounts when landfill gas is combusted by flare or for recovering energy. Based on national and international source tests, the concentration of dioxins from landfill gas combustion ranges from non-detectable to 0.1 nanograms (10^{-9} grams) of toxic equivalents (TEQ) per dry standard cubic meter of exhaust, at 7 percent oxygen. Because of the health threat from uncontrolled emissions of other organic compounds in landfill gas, EPA found, in developing emissions standards that landfill gas destruction in a proper control device (e.g., flare or energy recovery unit) with minimal by product generation of dioxins/furans, is preferable to the release of uncontrolled landfill gas. In summary, EPA believes that the potential for dioxin emissions from the combustion of landfill gas is small."

It has been established that process conditions leading to the formation of dioxin/furans are due to the combustion of organic material in the presence of chlorine and particulate matter under certain thermodynamic conditions such as low combustion temperatures and brief combustion times. For example, sources of dioxin/furan include municipal waste combustors, residential and commercial coal combustion, residential and commercial oil combustion, trash burning, residential fireplaces, cars, cigarettes, wild fires, and the combustion of landfill gas. However, the characteristics of landfill gas combustion are less conducive to dioxin/furan formation. Consequently, there is no specific emission rate information of dioxins/furan for the proposed project. Specific requirements for quantifying emission rates for installations and actual annual emissions for VOC and HAPs are established in the Alpha Ridge Landfill Title V (Part 70) Operating Permit which requires the submittal of an annual Emission Certification report. With regards to testing and dates, the Department has included a requirement in the Permit to Construct for compliance stack testing of the engine for NO_x, CO, VOCs. This test is expected to be conducted within 180 days of initial start-up to quantify pollutant emissions and demonstrate compliance with the emission limits specified in the permit to construct and in accordance with an approved stack test protocol. The permit conditions also require the Permittee to simultaneously monitor electrical output from the engine/generator set during the stack test. Based on the current regulations, the Permittee is not required to perform testing to determine emission rates for dioxins and furans. The U.S. EPA does not consider landfill gas flares or engines to be major sources of HAPs, and provides no HAPs emission factors for these sources.

Comment 5: A commenter asked why the estimated VOC and HAP emission rates increased with the landfill gas to energy project.

Response5 : As part of the Department's technical evaluation, the Permittee was asked to show the current levels of emission for the entire Alpha Ridge Landfill. The new internal combustion engine will be a new source of emissions at the facility. Proposed emission rates for HAPs and VOCs originating from the internal combustion engine were calculated based on the exhaust gas emission factors provided by the vendor. This information was then used to show

compliance with the applicable air quality emission limits and air quality standards. The proposed emission rates showed compliance with the applicable air quality emission limits and air quality standards. Furthermore, facility-wide emissions were found to be in compliance with the applicable federal and state regulations. Compliance was shown even without discounting for the fact that flare operation would be reduced when the generator is operating. It was also found that emissions originating from the proposed installation compared well with other sources throughout the State using similar technology. These sources include the Reichs Ford Sanitary Landfill in Frederick County, and the Gude Landfill and Oaks Landfill both located in Montgomery County.

Comment 6: A commenter stated that the application should address compliance with the proposed Major Source Boiler MACT. The commenter further stated that the application should address specific emissions limits for HAPs, as specified as the "MACT floor." It was also suggested that the application should address how the proposed landfill gas to electric project will comply with the "MACT floor" levels, as well as the possibility the EPA could impose more stringent requirements.

Response 6: The proposed installation does not meet the definition of a boiler as defined in COMAR 26.11.01.01B(17)(a). As such, it would not be subject to any federal or state regulations for boilers. However, as a stationary internal combustion engine, it is subject to the MACT requirements specified in 40CFR 63, Subpart ZZZZ which was listed as a permit condition.

Comment 7: A commenter stated that the application should provide air-dispersion information for all PTE (potential to emit) byproducts specific to downwind, upwind and cross-wind zones. Secondly, the application should state PTE dispersion rates for each zone.

Response 7: The proposed installation is not a major source of air pollutants and does not trigger any major review with regard to National Ambient Air Quality Standards (NAAQS). Therefore, multi-source air dispersion modeling is not automatically required as part of the permit application process. However, as part of the Department's technical evaluation, the Permittee was asked to provide current air pollutant emission levels for the entire Alpha Ridge Landfill. To further evaluate the potential emissions of criteria pollutants, the Department did perform an independent air dispersion modeling evaluation using the EPA approved SCREEN 3 model. Results from the dispersion model confirmed that the proposed installation will not cause or contribute to a violation of the NAAQS. Furthermore, facility-wide emissions were found to be in compliance with all applicable federal and state regulations. It was also found that emissions originating from the proposed installation compare well with other sources such as Reichs Ford Sanitary Landfill, Oaks Landfill, and Gude Landfill.

Comment 8: A commenter stated that the application should list all known health risks associated with all items on the potential to emit list.

Response 8: The Department does not require additional health risk data to support the permit application. This is because the Department relies on standards and guidelines that are health-based, so that sources meeting those standards and guidelines do not pose significant risks to public health.

NOTE: The comments addressed below pertain to issues other than air quality and thus do not bear on the Department's ability to render a decision on the approvability of the application.

Noise Issues:

Comment : A commenter asked whether the County has conducted a sound study or considered low frequency vibrations from the landfill gas to energy equipment.

Response: The noise standards for the State of Maryland, specified in COMAR 26.02.03.03, require that a person may not cause or permit noise levels which exceed 65 decibels (dBA) during the hours from 7:00am to 10:00pm, and 55 dBA between the hours of 10:00 p.m. and 7:00 a.m. on residential property. It is the operators at the Alpha Ridge Landfill who are responsible for ensuring ongoing compliance with the noise standards. As part of the informational outreach for this project, the County did address this specific issue in a newsletter. The newsletter states that a sound study was conducted by Hessler Associates, Inc. that included background testing on the A weighted scale, which represents human perception of sound and is the basis of noise regulations. Low frequency (tonal) issues were not detected from the existing landfill gas blower and flare equipment. Hessler also reviewed noise data provided by the manufacturers of the proposed equipment and concluded that discrete tones (including low frequency vibrations) were not anticipated. Additionally, the generator container has been upgraded, a hospital grade silencer has been added and the gas compressor has been containerized to proactively address potential noise issues.

County and Business Management Issues:

Comment 1: A commenter requested specific information about the business and management aspect of the project. In particular information was requested regarding the pro forma, the business contract between county and contractor for installation, and the contract for installation.

Response 1: The Department suggests that you contact the Howard County, Bureau of Environmental Services for this information.

Comment 2: A commenter requested specific information about the costs of the project. The commenter asked a question regarding the amount of money projected to be made per year selling Renewable Electricity Credits. In addition, the commenter asked about the amount of money projected to be made selling electricity.

Response 2: The Howard County FAQ newsletter for the project provides some general information regarding project cost. The Department suggests that you contact the Howard County, Bureau of Environmental Services should you wish additional detail.

Comment 3: A commenter asked about data regarding all landfill cells noting, if they are active or inactive and the manner of capping.

Response 3: Information regarding landfill cell activity can be obtained by contacting the Howard County, Bureau of Environmental Services at (410) 313-6444.

Comment 4: A commenter requested specific information about the proposed landfill operations, and management of gas production levels, and quality. In particular, the commenter asked about the methods to be used to maximize gas production and increase the methane concentration in the landfill gas. Furthermore, the commenter asked about the estimates for landfill methane generation under present conditions, and what modification was made to the landfill to increase methane production. In another instance, the commenter asked about the County's intent for implementing the county's leachate recirculation initiative, the estimates for landfill gas capture rates under the current system and with the proposed leachate recirculation system, and updated potential to emit numbers for a landfill gas to electric system that incorporate a leachate recirculation system as it is proposed in the capital budget.

Response 4: The Department conferred with the County to respond to this question. With respect to possible plans for increasing the landfill's gas production in order to increase electricity generation, the County states that there are no plans. In fact, the County has noted that the proposed generator is actually sized for a gas flow rate that is *lower* than the current gas flow rate at the landfill. Given the generator size, there would be no advantage to increasing the production of the Landfill's gas output. The landfill methane generation rates were predicted using the EPA approved LandGEM model along with site specific landfill data. Based on the LandGEM model, the estimates for landfill methane generation under present conditions are expected to have limited variability over a period of several years. The County does not have a leachate recirculation initiative. Leachate recirculation was previously included in the County's capital budget to promote decomposition and airspace reclamation. Leachate recirculation is no longer included in the County's capital budget. Since the intent of the leachate recirculation system was not to increase landfill gas production; the County did not calculate potential to emit numbers for a landfill gas to electric system with leachate recirculation system. In the County's most recent annual Emissions Certification report to the Maryland Department of the Environment, the landfill gas capture rate for calendar year 2010 was approximately 77%. The County does not have estimated landfill gas capture rates with a leachate recirculation system.

Comment 5: A commenter requested why an internal combustion engine was chosen when it is not the cleanest option.

Response 5: This matter was discussed in the Howard County FAQ newsletter for the project. A copy of the referenced factsheet can be accessed by contacting the Howard County, Bureau of Environmental Services. According to the County, they evaluated the option of installing micro turbines and found that such an option would not be cost effective. Specifically, in order to provide the same production as the generator system, approximately seventeen micro turbines, each rated at 60 kW, would have been needed. Also, while the estimate of emissions for the turbine option was lower, the comparative difference was not significant.

Comment 6: A commenter asked if the facility will be manned 24 hrs a day in the event of an engine malfunction. What are the safety mechanisms that are going to be in place to switch it over? What happens after 4:00 p.m.? Another commenter asked what the County is doing to protect employees at the landfill gas flare and combustion engine work sites.

Response 6: The County has staff on call 24 hours a day, 7 days a week to monitor the Landfill's gas system and other environmental systems. The Landfill's gas system includes the flare and the generator, has several alarm conditions and automatic system shutoffs that would activate

well before any safety issue were to arise. In addition, the proposed generator has internal safety shut offs in place, including:

• Knock Sensors – Each cylinder is equipped with a knock sensor that detects any unusual combustion in the cylinder (knock, misfire, etc.) and recalibrates or shuts down the engine.
• Flame Arrestor – The flame arrestor prevents the generator from back firing.
• Smoke and Gas Detection – These devices are installed inside the trailer/container to detect gas leaks and fire. If detected, the engine is shut down.
• Gas train – The gas train includes safety devices to shut down gas flow when a problem is detected.
• Safety Shutdowns – The generator is equipped with many sensors, which monitor all critical operating parameters on the generator; should any of these parameters deviate from specification, the generator will shut down.

Comment 7: A commenter asked if there is a natural gas pipeline that is installed to provide a supplemental gas to this engine generator when there is not enough methane being produced. This commenter also asked about what plans are out there and what right of ways required for additional distribution facilities to get the power that they are generating as excess power back onto the grid?

Response 7: The County has indicated that it does not plan to install a natural gas pipeline and will not be purchasing natural gas to produce electricity. The County has sized the generator system such that it requires less than the Alpha Ridge Landfill's current gas flow to operate at full load. As a consequence, excess gas will continue to flow to the flare. Studies performed by PJM, and Baltimore Gas and Electric (BGE) indicated that the electrical load generated by the gas-to-energy project will not adversely affect the PJM network, and that this load can be connected to BGE's local distribution system.

Comment 8: A commenter asked about approaches the County may be taking to establish a work environment that is compliant NIOSH-based exposure levels? Are there plans for an employee health monitoring system? Will there be measurements of OSHA Group 1 carcinogens during the life of the Project? Is there a system for ongoing evaluation and risk assessment for carcinogenic exposure? Finally, it was suggested that the permit should require personal protective equipment (PPE) for any landfill employee coming in contact with exhaust from any landfill gas combustion source.

Response 8: The Department does not implement or enforces OSHA regulations and/or NIOSH guidelines for workplaces. Since the Department does not have regulatory or enforcement authority on matters related to health in the workplace, work related conditions in the air quality permit would be inappropriate and unenforceable. It should be noted that workers would not be exposed to emissions directly since the emissions are vented through a stack that is nearly 14 feet high.