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PPRP

Environmental Review Document
INGENCO Wholesale Power, LLC
Landfill Gas-to-Energy Project
Newland Park Landfill
Wicomico County, Maryland

29 June 2006

MARYLAND POWER PLANT RESEARCH PROGRAM

Robert L. Ehrlich, Jr., Governor ♦ Michael S. Steele, Lt. Governor

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INGENCO Wholesale Power, LLC
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A SAMPLE CALCULATIONS

This report was prepared under the direction of Susan Gray at the Maryland Department of Natural Resources, Power Plant Research Program (PPRP). Under contract to PPRP, the following individuals were responsible for conducting the work associated with this environmental review:

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- Fred Kelley, Versar, Inc., Columbia, MD, under Contract #K00B5200176;
- Christina Mudd, Exeter Associates, Inc., Columbia, MD under Contract #K00B5200175; and
- Peter Hall and Michael Laskoe, Metametrics, Inc., Charlottesville, VA, under subcontract to Exeter Associates, Inc.

ABSTRACT

In August 2005, INGENCO Wholesale Power, LLC (IWP) submitted an application to the Maryland Public Service Commission (PSC), under PSC Case No. 9044, for a Certificate of Public Convenience and Necessity (CPCN) to install 18 new engines, with a total generating capacity of 6.0 megawatts (MW). The new generation building will be located at the Newland Park Landfill in Wicomico County, Maryland.

The Department of Natural Resources (DNR) Power Plant Research Program (PPRP), coordinating with other State agencies, performed this environmental review of the IWP Landfill Gas-to-Energy Project during the PSC licensing process, pursuant to Section 3-304 of the Natural Resources Article of the Annotated Code of Maryland. The environmental review was conducted to evaluate the potential impacts to environmental and cultural resources from the proposed project. The results of DNR's analyses were used, as necessary, as the basis for establishing recommended licensing conditions for operating the facility, pursuant to Section 3-306 of the Natural Resources Article. DNR's recommendations were made in concert with the Departments of the Environment, Agriculture, Transportation, Business and Economic Development, and Planning, and the Maryland Energy Administration. The recommended licensing conditions presented in Section 6 of this report are consistent with those incorporated into the CPCN Final Order issued by the PSC on 31 March 2006.

This report describes PPRP's evaluations of the environmental and socioeconomic impacts of the proposed IWP landfill gas-to-energy generation facility and summarizes the results of these evaluations, which served as the basis for the State's recommended licensing conditions for the IWP CPCN. The document includes the analysis of the potential air quality, surface water, biological, ground water, socioeconomic, cultural, and noise impacts from the installation of the new engines.

INGENCO Wholesale Power, LLC (IWP) is proposing to install a landfill gas (LFG) generation facility at the Newland Park Landfill located at 6948 Brick Kiln Road in Salisbury, Wicomico County, Maryland. The landfill is approximately one-half mile west of the city limits of Salisbury. The Maryland Department of Natural Resources (DNR) Power Plant Research Program (PPRP) has prepared this Environmental Review Document in close cooperation with IWP in response to their application for a Certificate of Public Convenience and Necessity (CPCN) to the Maryland Public Service Commission (PSC) under PSC Case No. 9044. The proposed project includes an electric power generating system, consisting of 18 dual-fuel engines that will burn both collected LFG and No. 2 fuel oil to generate electricity. IWP is applying to the Maryland PSC for a CPCN for the electrical generation portion of the process; that component of the project is the focus of this Environmental Review.

PPRP has coordinated review of the proposed LFG generation facility with the following State agencies: Maryland Energy Administration (MEA), Maryland Department of the Environment (MDE), Maryland Department of Planning, Maryland Department of Transportation, Maryland Department of Business and Economic Development, and the Maryland Department of Agriculture. Based on this consolidated review, it is concluded that there will be no adverse impacts associated with the proposed electrical generation system to surface water or ground water resources, because all surface water and groundwater withdrawals and/or discharges associated with the proposed project will be permitted appropriately. No impacts are anticipated to threatened and endangered species, or to socioeconomic, aesthetic, or cultural resources because there will be no changes to the land use characteristics of the local area associated with the electrical generation system to be installed. Additionally, the proposed project will use existing overhead transmission lines along Owens Branch Road as well as pole-mounted lines on the landfill site to transfer power from the IWP site to the power grid. According to the application submitted to PSC by IWP, the interconnection point with Delmarva's line will be 300-600 feet from the IWP LFG generation facility. A small area of 0.1 acres will be disturbed for the interconnection; however, IWP has agreed to replant trees and has already designated the location to replant.

PPRP has evaluated the noise impacts from operating the proposed electrical generation equipment at the landfill site. Based on noise studies conducted on identical engines operating at the IWP facility in Amelia

County, Virginia, the proposed units will be able to operate in compliance with all applicable noise requirements, provided that appropriate acoustical controls are incorporated into facility design and construction. The recommended licensing conditions will require IWP to comply with existing State noise regulations.

The LFG generation project has the potential to emit several types of air pollutants; however, if the facility is operated in accordance with the recommended licensing conditions, the emissions are not predicted to cause any significant adverse impacts to air quality. The proposed air emission rates will meet all applicable Federal and State emissions limitations. The emissions of regulated pollutants will not trigger Prevention of Significant Deterioration (PSD) or nonattainment New Source Review (NA-NSR) permitting requirements because IWP has agreed to accept operational limits on the engines to ensure that emissions from the project are below all major new source permitting thresholds.

PPRP has worked with other State agencies in assessing the environmental impacts from the proposed project. The conditions proposed in Section 6 of this Environmental Review Document are the recommended conditions for the CPCN Final Order for the proposed IWP LFG generation facility to be located at the Newland Park Landfill.

1.0 INTRODUCTION

1.1 DESCRIPTION OF EXISTING SITE

The Wicomico County Department of Public Works, under a permit from the Maryland Department of the Environment (MDE) Waste Management Administration, operates the Newland Park Landfill. The landfill is located approximately one-half mile west of the city limits of Salisbury, Maryland (see Figure 1-1). The Newland Park Landfill has a design capacity of 16.5 million cubic meters (MDE, 2004) and occupies an approximately 180-acre site with an anticipated waste footprint of 125 acres.

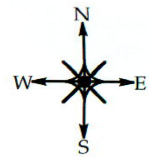
The Newland Park Landfill began accepting municipal solid waste in 1960. Currently, the collected landfill gas (LFG) is combusted in a flare that is owned and operated by Wicomico County. The LFG flare system was installed in 1998, and modified in 2000. The location of the existing LFG flare is depicted in Figure 1-2. Figure 1-3 gives a closer view of the site layout of the proposed INGENCO Wholesale Power, LLC (IWP) LFG generation facility, which will be located close to the LFG flare. The ownership of the proposed IWP LFG generation facility will be separate from Newland Park Landfill. Newland Park Landfill is owned and operated by Wicomico County. Therefore, as detailed in Section 2.3.1, the proposed system, which is the subject of this Environmental Review Document, has been evaluated as a new source rather than a modification to an existing source for air quality regulatory purposes.

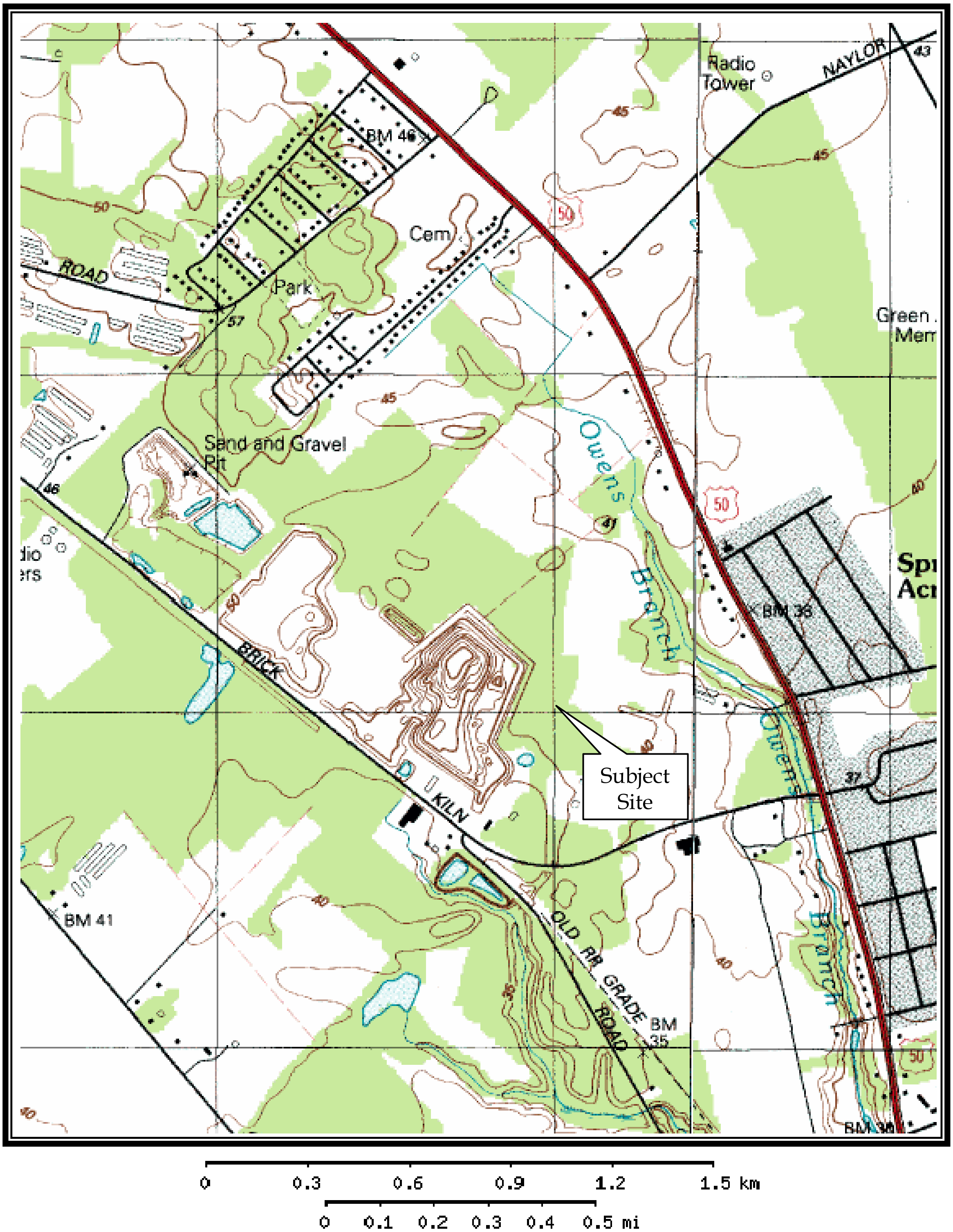
1.2 DESCRIPTION OF PROPOSED SYSTEM

IWP is planning to install a LFG generation facility and will use LFG generated by the Newland Park Landfill for energy production. In order to convert the LFG to useful energy, a new electric generating system that has the capability to burn collected LFG and No. 2 fuel oil in 18 engines is proposed at the Newland Park Landfill. IWP operates several established facilities in Virginia, as well as a facility in Pennsylvania, using the same operational characteristics that are proposed for the system to be installed at the Newland Park Landfill site.

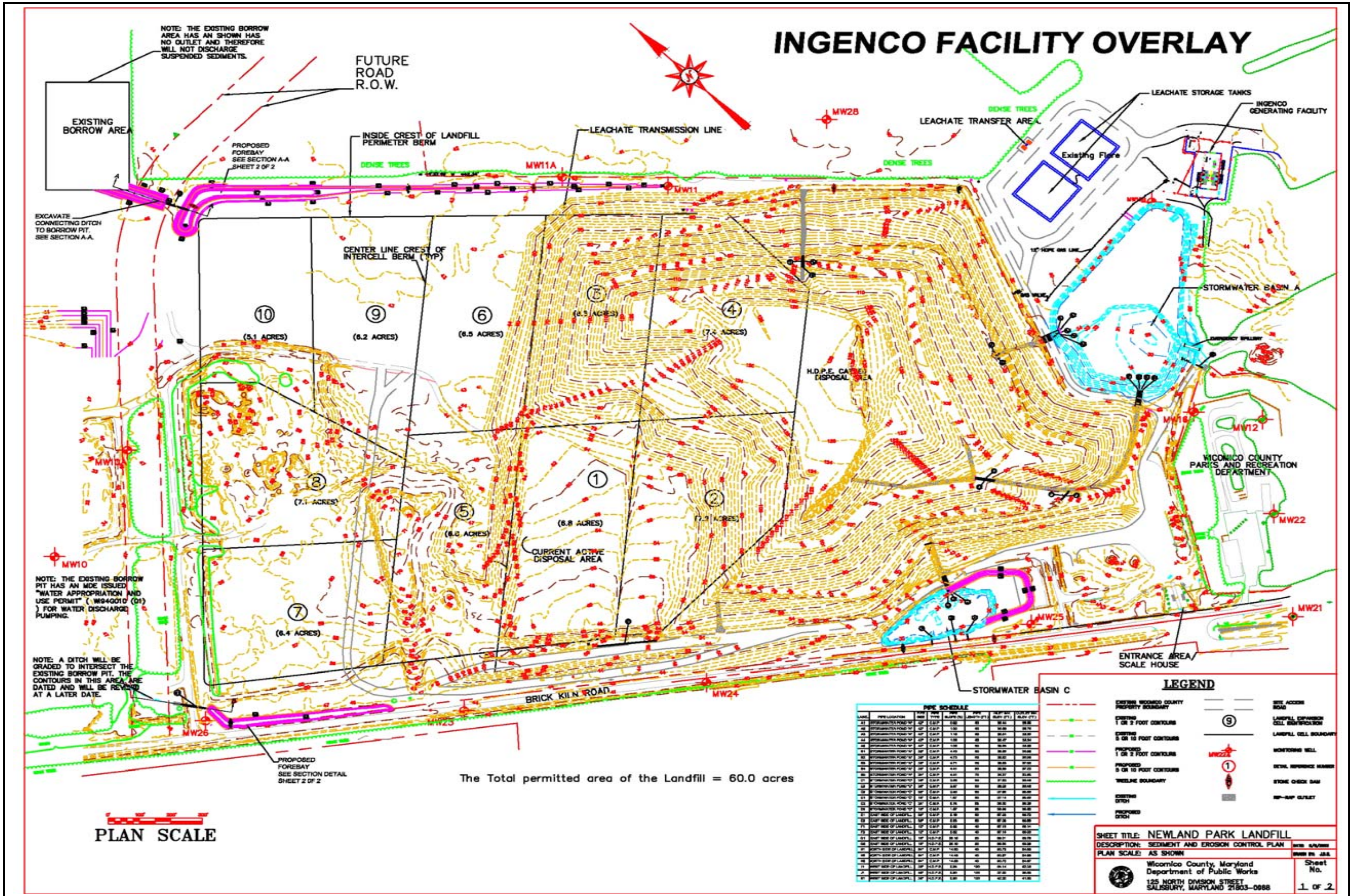
The proposed system is expected to reduce the operation of the existing flare substantially as the majority of landfill gas previously flared will now be combusted in the IWP engines. An analysis was prepared by J

Figure 1-1
Site Location Map
INGENCO Wholesale Power, LLC
Salisbury, Maryland





Source: USGS 15-min Topographic Map
Hebron Quadrangle (1992)



Source: IWP Application, 2005	**Figure 1-2** Site Layout Map Newland Park Landfill Salisbury, Maryland

Figure 1-2

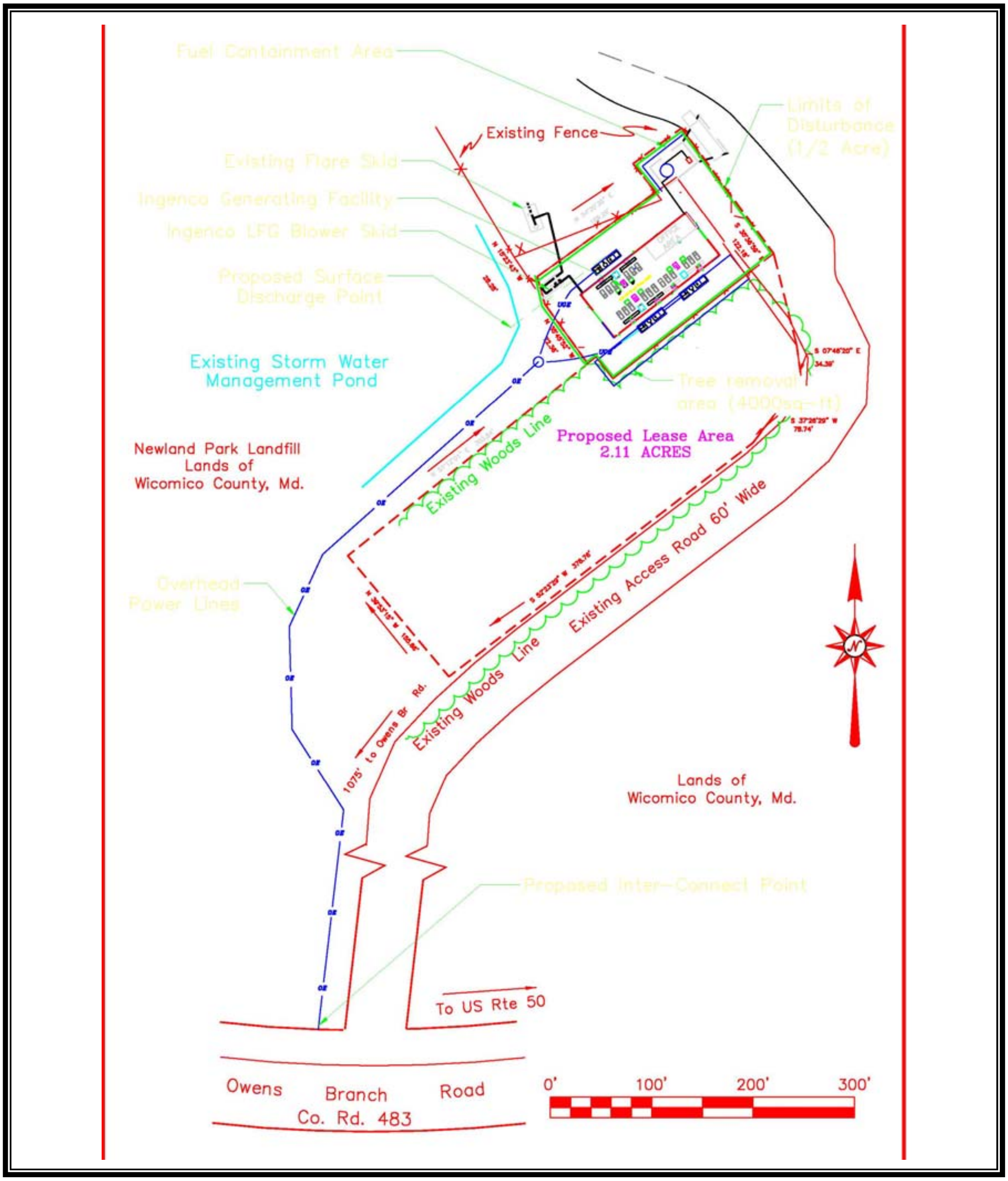
Site Layout Map

Newland Park Landfill

Salisbury, Maryland

Source: IWP Application, 2005

Figure 1-3
Site Layout Map
INGENCO Wholesale Power, LLC
Salisbury, Maryland



Source: IWP Application, 2005.

and L Consulting titled "Landfill Gas Production Data Sheet" in which projected LFG generation rates were predicted using EPA's Landfill Air Emissions Estimation Model (LAEEM) (IWP Application, 2005). Based on the LAEEM analysis, in year 2006, the proposed engine system will be capable of handling the entire capacity of LFG that Newland Park Landfill is expected to generate. If at any time the engines are not able to combust the amount of LFG directed to the engines (e.g., downtime for maintenance, low gas fraction modes), the excess LFG will be directed for combustion by the existing flare.

The 18 engines and controls for the system will be housed in a new building to be located adjacent to the existing flare at the landfill (Figure 1-3). The engines will be grouped into three separate, six-engine modules. Combustion gases from each "module set" will exit the building through a separate exhaust stack containing a silencer, muffler and stack extension. Each stack will be one foot in diameter and at a height of 42 feet (IWP #5, 2005).

The new engines proposed by IWP are 350-kW Detroit Diesel Series 60 Engines (IWP Application, 2005). The engines are capable of firing in a single-fuel mode using only No. 2 fuel oil or in a dual-fuel mode using a pilot charge of No. 2 fuel oil and LFG. At a 350 kW generator output, the engines have a heat rate of 3.325 million Btu per hour (MMBtu/hr) burning No. 2 fuel oil, or 3.68 MMBtu/hr under dual-fuel burning conditions. The total cylinder displacement of each engine is 12.7 liters. In addition to a single stack, engines in each module will have a common cooling system, a proprietary control system, and switch gear serving and controlling the module, designed and built by IWP for operations with LFG. The proposed IWP LFG generation facility will require water for cooling; therefore, each of the three engine modules will have a small cooling tower. Each tower will have a total water recirculation of 180 gpm (Greene, 2006). Based on the heat rate, each engine has the potential to combust up to 118 standard cubic feet per minute (scfm) of LFG containing 50% methane at maximum load, for a total capacity to burn 2,135 scfm.

IWP will have the ability to run the engines in a variety of single-fuel and dual-fuel modes. The decision on the selection of mode of operation will be based on parameters such as the quantity and methane content of the landfill gas supply, electrical demand, and emissions caps contained in the CPCN conditions and the operating permit. The majority of facility operations will be conducted in dual-fuel mode with a LFG fraction between 81 and 96 percent, which is known as the "high gas fraction" mode. The facility output in this mode will likely be between 2.5 and 4 megawatts (MW).

Because the high gas fraction mode only allows for generation of approximately 4 MW, IWP would like the flexibility to run in single fuel mode to achieve the 6 MW maximum at certain times in the year. The IWP LFG generation facility may also run at this "high output" mode when the landfill is unable to provide gas. IWP can get a higher facility output by reducing the amount of landfill gas and increasing the amount of No. 2 fuel oil supplied to each engine or by operating some engines at the high gas fraction mode and some engines at a low gas fraction mode. The estimated time IWP will run using these high output modes, including the operation mode of 0% LFG, is less than 500 hours per year for the entire facility (IWP Application, 2005).

It is important to note that IWP does not wish to run continuously throughout the year until limits are met. IWP may wish to shut down the electric generation system during periods when the price of electricity does not warrant operating the engines. It is estimated that IWP could run the new facility approximately 6,000 to 8,500 total hours throughout the year, dependent upon the modes of operation used.

1.3 POWER PURCHASE AGREEMENT

Generated electricity will be sold to wholesale power purchasers in the PJM market. The proposed project will be a PURPA Qualifying Facility. The generated electricity will be directed for distribution, through a PJM Interconnection Service Agreement, operated by Delmarva Power (Delmarva). IWP has requested that PJM initiate its study protocol to examine the impact of interconnection and operation of the facility on the Delmarva sub-transmission system. The point of interconnection with Delmarva's line will be 300-600 feet from the facility.

1.4 RENEWABLE ENERGY POLICY

There are two significant policy initiatives that affect the IWP project. These are Federal tax credits and the renewable portfolio standard recently enacted by Maryland.

1.4.1 Federal Tax Credits

There are two federal tax credits that encourage the production and use of LFG: the unconventional fuels federal tax credit, also known as the "Section 29(a) credit," and the federal production tax credit. Section 29(a) provides a credit for each barrel-of-oil equivalent produced from qualified fuels, such as LFG, for anyone who collects and sells the fuel to a third-party. Thus, the unconventional fuels tax credit applies to the owner or operator of the landfill gas well and not IWP. Because of the third-party requirements, LFG projects that utilize the unconventional fuels tax credit have bifurcated ownership structures, where one company owns the gas collection equipment and produces the gas and another company buys the gas and uses it to generate electricity.

The second of the two Federal tax credits available to LFG projects is the federal production tax credit (PTC), enacted as part of the Energy Policy Act of 1992. The PTC provides a tax credit of $15 per MWh, adjusted for inflation, for eligible resources. Originally targeted to support electricity generated from wind and closed-loop biomass resources, the tax credit has been expanded to include open-loop biomass, geothermal, solar, small irrigation power, municipal solid waste, and landfill methane. The most recent extension of the PTC came as part of the Energy Policy Act of 2005, which extends the PTC until the end of 2007. The PTC is effective for ten years from the date that the Qualifying Facility enters into operation, and after being adjusted for inflation, is set at $19/MWh in 2005.

Despite having two Federal tax credits available to developers, Congress did not intend for developers to double-up on these credits and thus added language in both 2004 and in the Energy Policy Act of 2005 to prevent this potential "double dipping." The U.S. tax code bars anyone using LFG to generate electricity from claiming the PTC if the gas comes from a facility where Section 29 credits were claimed at any time in the past. Because the LFG recovery equipment was not installed until after 1998, the Newland Park project will be ineligible for the unconventional fuels tax credit. However, IWP will be eligible to take advantage of the PTC, if the Newland Park facility becomes operational before the end of 2007, as planned.

1.4.2 State Renewable Portfolio Standards

A renewable portfolio standard (RPS) is a requirement on load-serving entities (such as electric utilities) that a certain percentage of the energy used to serve retail customers comes from eligible renewable energy sources. In some instances, renewable energy credits (RECs), representing a megawatt-hour of renewable generation, are used to comply with a state RPS. Twenty states and the District of Columbia have RPS policies in place or pending.

In 2004, Maryland, Pennsylvania, and the District of Columbia all enacted RPS policies, joining New Jersey, which adopted a RPS in 1999 and significantly revamped it in 2004. In 2005, Delaware enacted legislation creating an RPS. As is typical with many other state RPS policies, the mid-

Atlantic state RPS policies will rely on the selling and trading of RECs as a compliance mechanism and as a means of minimizing the above-market costs of renewable energy technologies. RECs represent the non-energy attributes of renewable energy, such as cleaner air or water, and can be viewed as the monetary premium for renewable energy resources. The Generator Attributes Tracking System (GATS), developed by PJM Environmental Information Services to facilitate the tracking and exchange of non energy attributes of electricity, including RECs, began operations in September 2005.

The impact of these RPS policies is to ensure a market for renewable energy projects such as the IWP LFG generation facility project.

The RPS policy in Maryland classifies eligible renewable resources into Tier 1 and Tier 2 renewable resources. The Maryland RPS defines Tier 1 renewable resources as solar, wind, biomass, and as long as certain conditions are met, landfill methane, anaerobic digestion from animal or poultry waste, ocean energy, fuel cells from methane or qualifying biomass, and small hydro less than 30 MW. Tier 2 renewable resources under the Maryland policy include large hydro other than pumped storage, poultry litter, and municipal solid waste plants. The IWP project would qualify as a Tier 1 renewable resource under the Maryland RPS.

1.5 CONTENTS OF ENVIRONMENTAL REVIEW DOCUMENT

The Maryland Department of Natural Resources, Power Plant Research Program (PPRP) in conjunction with the Maryland Department of the Environment (MDE) and other State agencies has worked in close cooperation with IWP in the preparation of this Environmental Review Document. Other State agencies that have been involved in the evaluation of the proposed project and its impacts have included: Maryland Energy Administration, Maryland Department of Planning, Maryland Department of Transportation, Maryland Department of Business and Economic Development, and the Maryland Department of Agriculture. Through this assessment, the proposed electrical generating system was evaluated to:

- Identify and evaluate potential air quality impacts of the new engines;
- Evaluate compliance with State and Federal air quality regulations;
- Evaluate compliance with State noise limitations;
- Identify and evaluate any potential surface and ground water impacts;
- Identify and evaluate effects on land use in the vicinity of the landfill; and
- Identify and evaluate potential impacts to socioeconomic, aesthetic, and cultural resources.

This report presents the results of this assessment, including proposed conditions for consideration by the PSC for incorporation into the CPCN Final Order for the project.

Section 2 of the Environmental Review Document discusses the air quality issues related to the proposed electrical generation system. Noise impacts are summarized in Section 3. Potential impacts from the project on the ecology, ground water, and surface water are summarized in Section 4. Section 5 provides a description of potential socioeconomic, aesthetic, and cultural resource impacts. The recommended conditions for incorporation into the CPCN Final Order for the project are summarized in Section 6.

2.0 AIR QUALITY IMPACTS

2.1 AIR QUALITY IMPACT ASSESSMENT BACKGROUND AND METHODOLOGY

2.1.1 Overview

As part of the CPCN application process, PPRP, in conjunction with the MDE Air and Radiation Management Administration (ARMA), evaluates potential impacts to air quality resulting from emissions of projects to be licensed in Maryland under COMAR 20.80. This evaluation includes the identification of project air emissions, review of permitting requirements, an assessment of ambient air quality through dispersion modeling, and a complete air quality regulatory review.

To conduct the air quality evaluation of the proposed IWP LFG generation facility project, PPRP and ARMA evaluated projected maximum potential air emissions (short-term and annual) to ensure the project will meet applicable regulatory thresholds and limits. The proposed project was also evaluated to determine whether its emissions would have any adverse impacts on the existing ambient air quality in the region. This was completed through air dispersion modeling that predicts the ambient air concentrations resulting from source emissions.

2.1.2 Regulatory Considerations

The U.S. Environmental Protection Agency (EPA) has defined concentration-based National Ambient Air Quality Standards (NAAQS) for several pollutants, which are set at levels that are considered to be protective of the public health and welfare. Specifically, the NAAQS have been defined for six "criteria" pollutants, including particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone, and lead (Pb). Air emissions limitations and pollution control requirements are generally more stringent for sources located in areas that do not currently attain a NAAQS for a particular pollutant (known as "nonattainment" areas).

The air quality in Wicomico County, where the IWP LFG generation facility project is located, is in attainment for all pollutants. However, the entire State of Maryland, along with many of the Northeastern states, is located in the Northeast Ozone Transport Region (NOTR) and as a result, Wicomico County is treated as a moderate nonattainment area for ozone. This signifies that sources of volatile organic compound (VOC) and nitrogen oxides (NO_x) emissions may be subject to the requirements of Nonattainment New Source Review (NA-NSR) permitting program, because both of these pollutants contribute to the formation of ozone. Potential emissions from new and modified sources in attainment areas are evaluated through the Prevention of Significant Deterioration (PSD) program. Section 2.3 discusses PSD and NA-NSR applicability.

In addition to PSD and NA-NSR, other Federal and State regulations may apply to the proposed IWP LFG generation facility (see Section 2.5). These regulations apply either as a result of the type of emission source that is to be constructed, or as a result of the pollutants to be emitted from the source. These regulations may specify limits on pollutant emissions and impose monitoring, recordkeeping and/or reporting requirements, which are incorporated as recommended conditions in Section 6.

2.2 *PROPOSED PROJECT AIR EMISSIONS*

2.2.1 *Criteria Pollutants*

Gas generation at landfills is complex and dynamic; over time many aspects of the gas generation can change, including methane concentration, carbon dioxide concentration, gas generation rate, maximum yield, and recoverability. As such, gas generation rates are difficult to predict accurately. In demonstrating emissions calculations, IWP made assumptions of LFG at 50% methane content and a flow rate of 1,000 scfm per engine to project the gas generation rates from the Newland Park Landfill (IWP Application, 2005). This projection is the basis for which the evaluations of the emissions from the proposed LFG generation facility project have been made for this licensing case. The projections of 1,000 scfm and 50% methane are supported by both the Landfill Gas Model (IWP Application, 2005) and that Newland Park Landfill is currently operating at approximately 900 scfm and 50% methane (Townsend, 2005).

Maximum potential criteria pollutant emissions were calculated from the proposed electrical generating system using maximum engine heat input capacities and worst-case emission factors provided by IWP. Because IWP has requested flexibility to operate burning any mixture of No. 2 fuel oil and LFG (i.e., from 0% LFG/100% No. 2 fuel oil to 96% LFG/4% No. 2 fuel oil), they have developed a sliding scale of emission factors for NO_x, CO, and SO_2 that reflect how emissions change over the different gas fractions (described further in Section 2.2.1.1). For VOCs and PM_{10}, the guaranteed emission rates (i.e., the emission rates for each of the engines that IWP has committed to never exceed based on previous stack test data) are constant (in lbs/MMBtu) across the entire range of gas/No. 2 fuel oil mixtures (gas fraction). Total PM emissions are a conservative estimate based on the ratio of total PM to PM_{10} found in AP-42 (EPA, 1996b). The maximum potential emission for each pollutant is based on the maximum hourly emission rate (i.e., at the gas fraction with the worst-case emissions for that pollutant) and an operating schedule of 24 hours per day, 365 days per year. The cooling towers will also have the potential to emit very small quantities of PM_{10}. Maximum potential emissions from the facility (18 engines combined) are summarized in Table 2-1.

Table 2-1 Maximum Potential Criteria Pollutant Emissions from 18 Proposed Engines[1]

Pollutant	Maximum Potential Emissions[2] (tons/year)
NO_x	629
CO	627
VOC	116
PM_{10}	58.0
$PM_{2.5}$	58.0[3]
PM	70.5
SO_2	87.0
Pb	0[4]

[1] Based upon IWP guaranteed emission rates (IWP Application, 2005).
[2] Based on an operating schedule of all 18 engines, 24 hours per day, 365 days per year.
[3] $PM_{2.5}$ emissions are assumed to equal PM_{10} emissions.
[4] Lead emissions assumed to be zero because No. 2 fuel oil contains no lead.

Although the potential emissions calculations were based on an operating schedule of 24 hours per day, 365 days per year, the engines could be shut down for maintenance or may only be operated during peak economic periods. When the engines are not running, or excess LFG is generated during maintenance or malfunctions, LFG would be directed to the separate, permitted flare operated by the Newland Park Landfill.

From the data provided in Table 2-1, the potential to emit for NO_x and VOC without limits would exceed NA-NSR thresholds (see Section 2.3.3). Likewise, the potential to emit CO without limits would exceed PSD thresholds (see Section 2.3.2). To avoid PSD and NA-NSR requirements, IWP has proposed a restriction on annual emissions from the engines.

Operational limits to avoid PSD and NA-NSR requirements are common. However, because emissions from the proposed IWP LFG generation facility will vary widely depending on the dual-fuel mixture, a fuel usage or hours restriction would not be sufficient to ensure that annual emission caps are met. Instead, IWP proposes to use a series of fuel-specific emission factors (in lbs/MMBtu), developed from experience at other IWP LFG facilities, to demonstrate compliance with NO_x and CO emissions limits (refer to Section 2.2.1.2 for further details regarding NO_x and CO emissions calculations). Stack test data from IWP's other operating facilities indicates that VOC emissions do not vary significantly across different gas fractions and that a worst-case VOC emission factor can be used under any operating mode to conservatively quantify VOC emissions. Table 2-2 displays the required emissions limits to avoid PSD and NA-NSR (refer to Section 2.2.1.3 for a description of the VOC emission factor).

Table 2-2 Criteria Pollutant Emission Limits for 18 Engines

Pollutant	Annual Emissions Limit (ton/year)
NO_x	<100
CO	<250
VOC	<50

2.2.1.1 *Evaluating IWP Emissions Data*

Since IWP will have the ability to run the engines in a variety of modes (with different gas fractions), estimations had to be made for a large variety of circumstances. First, IWP calculated the potential to emit for each pollutant at each LFG fraction to determine the worst case mode for each pollutant. The potential to emit was based on running as many engines as the operating mode (i.e., gas fraction) would permit for 8,760 hours per year. Because IWP does not intend to run the engines continuously, IWP also provided estimated "maximum actual" estimates at various modes that are more likely operating scenarios. PPRP did not fully reproduce the emissions, but completed a comprehensive review of the proposed emission factors and the source of information supporting those values (e.g. stack test data from similar IWP facilities, different methods of emission calculations, etc.). The results of this evaluation are presented below for each criteria pollutant.

2.2.1.2 *Determining NO_x and CO Emissions*

IWP plans to operate the facility under different operating modes, using different amounts of No. 2 fuel oil and LFG, depending on the fluctuating economics of the electricity market. NO_x and CO emissions vary across these operating modes. For example, NO_x emissions are at a maximum when 100% No. 2 fuel oil is burned. When more LFG is burned, NO_x emissions decrease as the inert gases in the LFG suppress the formation of NO_x. Likewise for CO, it appears that the engines have more complete combustion when the fuel has either a high level of No. 2 fuel oil or a high level of LFG. When there is an equal mixture, tests indicate that CO emissions peak. These general trends in emission factors (in lbs/MMBtu) are demonstrated in Figure 2-1. The annual NO_x and CO emissions will be calculated using conservative equations, which account for the varying emissions across the entire gas fraction range (i.e., from 0% LFG/100% No. 2 fuel oil to 96% LFG/4% No. 2 fuel oil). Because of the need for flexibility, IWP will monitor numerous parameters that affect the emission rates and that are used in the emissions equations.

IWP proposes to use calculations to determine annual emissions of NO_x and CO because of the large variation in the emission factors (in lbs/MMBtu) with different LFG fractions. Through extensive stack testing, IWP has found that the emission factors for NO_x and CO are not linear with gas fraction changes. However, IWP has found that if the entire range of operations is broken down into discreet gas fraction ranges, emission factors can be directly related to gas fraction in each separate range. This allows IWP to calculate the NO_x or CO emissions at any gas fraction using a single equation. Because the relationship between the emission factor and the gas fraction is different in different gas fraction ranges, there are different constants used in the equations for each range. As seen in Figure 2-1, there are two straight-line ranges for CO and four for NO_x. These constants in the equations are referred to as fuel-specific emission factors and are different for each range. The equations and parameters used to determine the emissions over a certain time period (hourly shown below) of constant gas fraction are presented below as Equations 2-1 and 2-2.

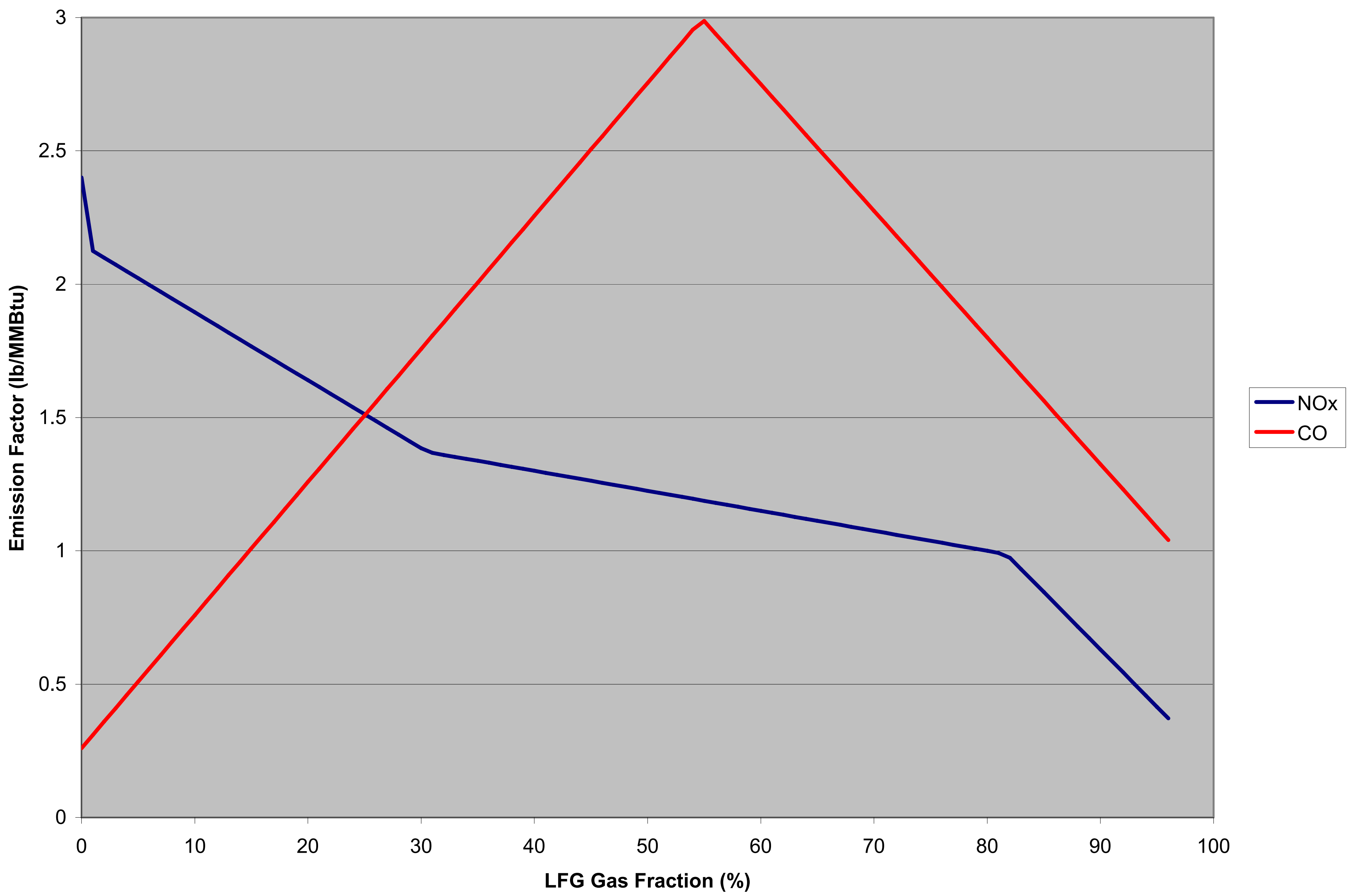


Figure 2-1

Representative NOx and CO Emission Factors

INGENCO Wholesale Power (IWP), LLC

Salisbury, Maryland

Equation 2-1: $\text{NOx (lbs/hr)} = \left[\left(\frac{(A \times CV_{liq}) \times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right) \times \text{ENOx(l)}\right] + \left[\left(\frac{(B \times CV_{LFG}) \times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right) \times \text{ENOx (LFG)}\right]$

Equation 2-2: $\text{CO (lbs/hr)} = \left[\left(\frac{(A \times CV_{liq}) \times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right) \times \text{ECOx (l)}\right] + \left[\left(\frac{(B \times CV_{LFG}) \times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right) \times \text{ECOx (LFG)}\right]$

Where:

A = gallons of No. 2 fuel oil consumed per hour
B = cubic feet of landfill gas consumed per hour
CV_{liq} = calorific value (heat content) in Btu/gal of No. 2 fuel oil
CV_{LFG} = calorific value (heat content) in Btu/ft^3 of LFG

Fuel-specific emission factors
ENOx (l) = Emission factor for NO_x from No. 2 fuel oil (in lbs/MMBtu)
ENOx(LFG) = Emission factor for NO_x from LFG (in lbs/MMBtu)
ECO(l) = Emission factor for CO from No. 2 fuel oil (in lbs/MMBtu)
ECO(LFG) = Emission factor for CO from LFG (in lbs/MMBtu)

IWP expects that the fuel-specific NO_x and CO emission factors for the proposed LFG generation facility will be similar to those used at the IWP Mountain View facility located at Greencastle, Pennsylvania. The proposed LFG generation facility will operate under the same engine configurations and same operational procedures as the Mountain View facility (i.e., higher gas-fractions and timing controls are used to achieve lower NO_x emissions). These facilities are run similarly because the two facilities have similar annual emission restrictions as opposed to IWP's Virginia facilities that have higher NO_x emissions limits. Table 2-3 presents representative fuel-specific emission factors from the Mountain View facility that PPRP used to evaluate the proposed IWP LFG generation facility emissions.

Table 2-3 Representative Fuel-specific Emission Factors for NO_x and CO for Use in Predicting Emission Rates

Landfill Gas Fraction Range (NO_x)	ENOx(l)	ENOx(LFG)
0% (100% No. 2 fuel oil)	2.4	0
1%-30%	2.15	-0.40
81%-96%	4.50	0.20

Landfill Gas Fraction Range (CO)	ECO(l)	ECO(LFG)
0%-30%	0.26	5.25
81%-96%	5.60	0.80

PPRP and ARMA have reviewed the information provided by the applicant concerning the equations proposed by IWP to predict hourly emissions of NO_x and CO, as well as stack test data at other IWP facilities used to estimate the fuel-specific emissions factors used in the equations. It is concluded that the equations are a conservative and justifiable method to determine annual emissions. Although Mountain View is likely quite close to the proposed IWP LFG generation facility, due to the variance in the chemical composition of different landfill gases for each site, PPRP and ARMA recommend the proposed IWP LFG generation facility determine its own site-specific emission factors from stack testing conducted after the units are constructed at the Newland Park Landfill.

2.2.1.3 *Determining VOC and Particulate Matter Emissions*

Until site-specific factors are determined, IWP will calculate VOC emissions using the conservative emission factor of 0.4 lb/MMBtu which was derived from stack test data from other IWP facilities. The largest VOC stack test result recorded at any IWP faculty was 0.346 lb/MMBtu at the Chesterfield, Virginia facility. The highest reading at the Mountain View facility (the facility operates under conditions similar to the proposed facility) was 0.141 lb/MMBtu.

Similarly, IWP will calculate PM_{10} emissions using a conservative emission factor of 0.2 lb/MMBtu. PM_{10} stack test data from similar IWP facilities yielded a maximum value of 0.1027 lb/MMBtu. Using the conservative factor, potential to emit PM_{10} emissions does not exceed the PSD threshold. The ratio of AP-42 emission factors for total PM to PM_{10} for dual-fuel internal combustion engines is approximately 1.22. Therefore, the potential to emit for total PM can be calculated by multiplying PM_{10} emissions by that same factor. It is assumed that $PM_{2.5}$ emissions are equal to PM_{10} emissions.

In addition to emissions from the engines, three onsite cooling towers will also have the potential to emit very small quantities of PM_{10}. Based on TDS data presented by IWP (see Table 4-4), cooling tower water flows (Green, 2006) and EPA emission factors (EPA, 1995), the PM_{10} emissions from the cooling towers are estimated to be 0.06 tpy. As such, PM_{10} emissions from these cooling towers are considered insignificant to the project and will not be regulated by MDE.

Using the conservative estimates for both the engines and cooling towers, total particulate emissions do not exceed the PSD threshold.

2.2.1.4 *Determining SO_2 Emissions*

IWP will calculate SO_2 emissions using two emission factors. Due to a large difference in SO_2 emissions from burning LFG and burning No. 2 fuel oil, a separate emission factor is used for each fuel source. A factor of 0.303 lb/MMBtu is used for No. 2 fuel oil. The factor is derived using an AP-42 equation (EPA, 1998a) and the maximum allowable fuel limit of 0.3% sulfur. The factor used for combusting LFG is a conservative 0.0332 lb/MMBtu (IWP Application, 2005). This value is based on the stoichiometric conversion of hydrogen sulfide from the LFG (assumed to be 100 ppmv) to SO_2. Each factor is multiplied by the corresponding fuel input (MMBtu/hr) and converted to tons per year. Using these conservative factors, potential to emit SO_2 emissions do not exceed the PSD threshold.

2.2.2 ***Hazardous Air Pollutant (HAP) Emissions***

In addition to the criteria pollutant emissions, combustion sources have the potential to emit hazardous air pollutants (HAPs). These pollutants can be uncombusted organic compounds that originate in the LFG, diesel or natural gas (methane) combustion by-products from the engines, or hydrochloric acid (HCl) generated from the combustion of chlorinated compounds. Since LFG constituents vary due to various wastes placed in the landfill, predicting the specific amount of HAPs emitted from engines burning LFG is difficult. Therefore, PPRP estimated the HAP emissions in the following manner:

- Uncombusted organics – different sources of typical LFG organic constituents and default combustion/control efficiencies;

- Diesel or natural gas (methane) combustion byproducts – AP-42 emission factors; and

- HCl – stoichiometric conversion of chlorinated organic compounds found in the LFG to HCl (using different sources of typical LFG organic constituents).

For compounds that are common to both the uncombusted organics group and the diesel or natural gas combustion by-product group, the maximum emission rate was used.

The listing of HAP LFG constituents that may be emitted as uncombusted organics at the IWP LFG generation facility (and their respective concentrations) were taken from three sources: Section 2.4, Tables 2.4-1 and 2 of EPA's *Compilation of Air Pollutant Emission Factors* (EPA, 1998a); a LFG analysis performed at the Mountain View Landfill, where IWP has a facility; and HAP stack test results from the Mountain View facility. To determine the emissions of uncombusted organic compounds, PPRP used the higher of the Mountain View stack test data result and the "combusted" LFG analysis result using the maximum LFG concentration. The combustion (control) efficiencies applied to the maximum concentrations of LFG constituents were the default control efficiencies for halogenated and non-halogenated species listed in Table 2.4-3 of AP-42 (EPA, 1998a).

Because the IWP engines can combust 100% No. 2 fuel oil, HAP emission estimates were calculated using the emission factors in AP-42 Chapters 3.3 on diesel engines (EPA, 1996a). In dual-fuel mode, the IWP engines operate in a similar mode to traditional diesel/natural gas dual-fueled engines; therefore, emission factors from Chapter 3.4 of EPA's AP-42 (EPA, 1996b) were also used to estimate HAPs. If a compound was found in both lists of HAPs (uncombusted organics and engine by-products), the maximum emissions were used in the evaluation. These emission estimates are provided in Appendix A.

PPRP estimated HCl emissions assuming a 93% destruction (as specified in Table 2.4-3 of AP-42) of the maximum concentration of chlorinated compounds found in either the Mountain View LFG analysis or AP-42's default LFG analysis. These calculations are also found in Appendix A.

The maximum potential to emit each individual HAP was calculated using the maximum emission factor of the AP-42 methods (in lbs/MMBtu), the maximum engine heat input (MMBtu/hr), and a worst case operating schedule of 24 hours/day and 365 days/year. Based on this analysis, total HAPs will be less than 16 tpy and no single HAP is estimated to exceed 7 tpy.

2.3 NEW SOURCE REVIEW

2.3.1 *Definition of "Source" and the Relationship with the Newland Park Landfill*

Because the proposed IWP LFG generation facility will be located within the confines of an existing source (the Newland Park Landfill), PPRP and ARMA investigated whether IWP would be considered part of the Newland Park Landfill "source" for PSD and NA-NSR purposes (40 CFR 52.21, COMAR 26.11.06.14 and COMAR 26.11.17). "Stationary source" is defined in the PSD regulations at 40 CFR 52.21(b)(5) as "…any building, structure, facility, or installation which emits or may emit a regulated NSR pollutant." The term "building, structure, facility or installation" is defined in 40 CFR 52.21(b)(6) as:

> "…all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control) except the activities of any vessel. Pollutant-emitting activities shall be considered as part of the same industrial grouping if they belong to the same "Major Group" (i.e., which have the same first two digit code) as described in the Standard Industrial Classification Manual, 1972, as amended by the 1977 Supplement (U.S. Government Printing Office stock numbers 4101-0066 and 003-005-00176-0, respectively)."

The underlying criteria that would cause the electric generation project to be considered part of the Newland Park Landfill would be that the electric generation project: 1) belongs to the same industrial grouping as Newland Park Landfill (or is a support facility within that grouping); 2) is contiguous or adjacent to the landfill; and 3) is under common control.

The proposed IWP LFG generation facility (SIC 4931) is part of the same industrial grouping as the landfill (SIC 4953). IWP has no plans to support Newland Park Landfill with the electricity generated. In addition, EPA has concluded in similar projects (EPA, 2002) that if LFG is sold, responsibility for compliance with 40 CFR Part 60 Subpart WWW (i.e., responsibility for the landfill) is not transferred. As such, there does not appear to be any support relationship between Newland Park Landfill and IWP with respect to the power produced from the proposed electric generation system.

The IWP site is clearly "contiguous or adjacent to" the Newland Park Landfill, as it lies within the landfill property boundary.

The third criterion assessed to determine if the IWP LFG generation facility should be considered as part of the Newland Park landfill source is the issue of "common control." Wicomico County owns the landfill, flare and gas collection system. IWP has entered into a sublease with Wicomico County for the property on which the IWP LFG generation facility will be located. IWP does not own any portion of the Newland Park Landfill, nor does Wicomico County own any portion of the proposed LFG generation facility project. Furthermore, under the contract between Wicomico County and IWP for the purchase and use of LFG by IWP, each party is responsible for environmental compliance for its specific operation. Newland Park Landfill is responsible for the operation and maintenance of the flare system and under this contract, IWP is responsible for the proper combustion of landfill gas used by its facility (IWP #3, 2005).

PPRP and ARMA have reviewed the information provided by the applicant and other guidance documents, and have concluded that because the IWP LFG generation facility and Newland Park landfill are not under "common control," the two co-located facilities constitute two separate sources for PSD and NA-NSR purposes.

2.3.2 PSD Applicability

Under PSD regulations, a new source, such as the proposed LFG generation facility project, is considered major if the potential emissions of any criteria pollutants are above the major source threshold of 250 tpy. As indicated in Table 2-1, projected maximum potential emissions from the project of all pollutants, with the exception of CO and NO_x, do not exceed PSD major source thresholds. NO_x and CO emissions would exceed 250 tpy unless an operational or emissions restriction is imposed on the new engines. IWP has proposed to limit facility operations to cap CO and NO_x emissions to avoid PSD applicability. Details of the proposed restriction are provided in Section 2.3.3.2.

2.3.3 Nonattainment New Source Review

2.3.3.1 Ozone NA-NSR Applicability

The LFG generation facility project will be located in an area that is designated as the Northeast Ozone Transport Region (NOTR). Although Wicomico County is in attainment for ozone, being in the NOTR requires projects to be assessed as if they were in a moderate nonattainment area for ozone. Therefore, the new IWP LFG generation facility is major for NA-NSR purposes if it has the potential to emit 50 tpy of VOC or 100 tpy of NO_x (the ozone precursor pollutants). Based on the VOC and NO_x emissions estimates presented in Table 2-1, the proposed LFG generation facility project would be considered a major new source for VOC and NO_x under NA-NSR because VOC and NO_x emissions will exceed the respective thresholds, unless an operational or emissions restriction is imposed on the new engines.

IWP is proposing to cap NO_x and VOC emissions to avoid triggering NA-NSR. Details of the proposed restriction are provided in Section 2.3.3.2.

2.3.3.2 *Proposed Restrictions to Avoid NA-NSR and PSD*

Because IWP will operate the facility in a variety of fuel-mix modes, as well as shut down during periods of low economic benefit, an electric output restriction is not practical in this case. Therefore, to avoid triggering NA-NSR and PSD, IWP has agreed to cap VOC, NO_x, and CO emissions as follows:

VOC <50 tpy
NOx <100 tpy
CO <250 tpy

Although these emission levels will make the proposed IWP LFG generation facility a Title V source, it will avoid triggering PSD requirements. IWP's proposed annual emissions limits have been included as recommended conditions for the PSC to consider in issuing the CPCN Final Order for the IWP LFG generation facility project (see Section 6).

2.3.3.3 *Demonstration of Compliance with Proposed Restriction*

To ensure that the emissions limits are met, IWP will be required to conduct stack testing to develop and verify the emission factors for NO_x, CO, and VOCs. The facility will be subject to a number of monitoring and recordkeeping requirements to collect the operating data used to calculate the annual NO_x, VOC and CO emissions. These activities will include conducting initial performance (stack) testing, collecting and recording landfill gas and No. 2 fuel oil usage data, and collecting and recording other routine operations data.

To make the emission caps enforceable, IWP will be required to estimate emissions at least monthly and report monthly total and rolling 12-month cumulative emissions periodically.

2.4 *NAAQS COMPLIANCE DEMONSTRATION*

The NAAQS are concentrations in the ambient air that are established by EPA at levels intended to protect human health and welfare, with an adequate margin of safety. If a source was subject to PSD, an air quality analysis, including an evaluation of the impact of the new source's emissions on NAAQS attainment, and on applicable PSD increments would be required. PSD increments are established by EPA as allowable incremental increases in ambient air concentrations due to new sources in attainment areas, set at levels that are substantially less than the NAAQS.

The proposed project is a minor source under PSD rules and hence is not required to conduct an air quality impact analysis. However, PPRP and ARMA have conducted dispersion modeling analysis to ensure that the proposed project will not result in impacts greater than the NAAQS. NAAQS for NO_2, CO, SO_2, PM_{10}, $PM_{2.5}$ (fine particulates) and ozone, defined by federal regulations (40 CFR 50), are shown in Table 2-4.

Table 2-4 National Ambient Air Quality Standards and Significant Impact Levels

Pollutant	Averaging Time	Significant Impact Level (SIL)	NAAQS
NO_2	Annual	1.0	100 (0.053 ppm)
CO	8-hour	500	10,000 (9 ppm)
	1-hour	2,000	40,000 (35 ppm)
SO_2	Annual	1.0	80 (0.03 ppm)
	24-hr	5.0	365 (0.14 ppm)
	3-hr	25.0	1,300 (0.5 ppm)
PM_{10}	Annual	1.0	50
	24-hr	5.0	150
Other pollutants for which NAAQS have been established but evaluations are not necessary			
Ozone	8-hr	N/A	156 (0.08 ppm)
	1-hr	N/A	235 (0.12 ppm)
$PM_{2.5}$	Annual	N/A	15
	24-hr	N/A	65

Source: 40 CFR 50.4 through 50.12; all values are shown in µg/m³ except as noted

The NAAQS for $PM_{2.5}$ and ozone are also listed in Table 2-4 for completeness; however, ambient air quality evaluations for these pollutants are not necessary. EPA has promulgated the NAAQS for $PM_{2.5}$ (fine particulate matter); however, the regulatory program for evaluating the NAAQS for $PM_{2.5}$ has not been fully implemented in Maryland. The State is required to prepare a State Implementation Plan (SIP) before April 2008 to address $PM_{2.5}$.

Ozone, while not emitted directly, is formed by reactions of hydrocarbons and NO_x in the presence of sunlight. Ozone is a regional pollutant, in that the effects of individual sources are not ordinarily distinguishable from the effects of literally thousands of sources of ozone precursors such as NO_x and VOCs. Therefore, emissions of NO_x from the present combustion sources were assessed in terms of impacts on the NAAQS for NO_2, and not in terms of the role of NO_x as an ozone precursor.

In this analysis, the impacts to the NAAQS were predicted using two dispersion models: the Industrial Source Complex model (ISCST3) and AERMOD. AERMOD is the current EPA guideline model to be used for dispersion modeling analysis. ISCST3 is the guideline model that AERMOD replaces, and is anticipated to continue to be used under some circumstances during a transition period that will last through calendar year 2006. The latest version of ISCST3 (version 02035) and the latest version of AERMOD (version 43000) were used for this analysis.

2.4.1 *Source Characteristics*

The proposed LFG generation facility is located on a small parcel of land in the southeast portion of the Newland Park Landfill site. The locations of the stacks and buildings with respect to the property line for the facility are shown in Figures 2-2 and 2-3. The stack parameters and emission rates used in the modeling analysis are summarized in Table 2-5. The impacts of emissions from the project were evaluated using two sets of emission rates: a short-term emission rate based on the maximum hourly emission rate corresponding to using 100% No. 2 fuel oil in the fuel mixture, and an annual emission rate which represents the maximum annual emission rate to which the facility will be restricted. The short-term emission rate is used for evaluation of short-term ambient standards (1-hour, 8-hour, etc.) and the annual emission rate is used to evaluate the annual ambient standard.

2.4.2 *Building Downwash*

Aerodynamic downwash caused by buildings and structures in the vicinity of exhaust stacks can lead to an increase in ground-level concentrations. To account for downwash effects in ISCST3, EPA's Building Profile Input Program (BPIP) model was applied. BPIP calculates direction-specific building dimensions for each stack. Downwash effects are modeled with AERMOD by using algorithms derived from the ISCPRIME model. The algorithms contained in ISCST3 are known to have several deficiencies, most of which tend to make the predictions conservative (i.e., predict higher impacts than a more accurate model would predict). The ISCPRIME model was developed by the Electric Power Research Institute (EPRI) in response to a need to improve existing downwash models.

BPIP also calculates the good engineering practice (GEP) stack height for a given stack location. GEP is the height at which downwash effects are considered to be insignificant. For IWP, the GEP height, as determined by BPIP, for all the stacks is 65 meters. Since the proposed stacks are 42 feet (12.8 meters), they will be affected by downwash.

FIGURE 2-2 EXCERPTS FROM HEBRON, MD, USGS TOPOGRAPHIC INGENCO LANDFILL FACILITY

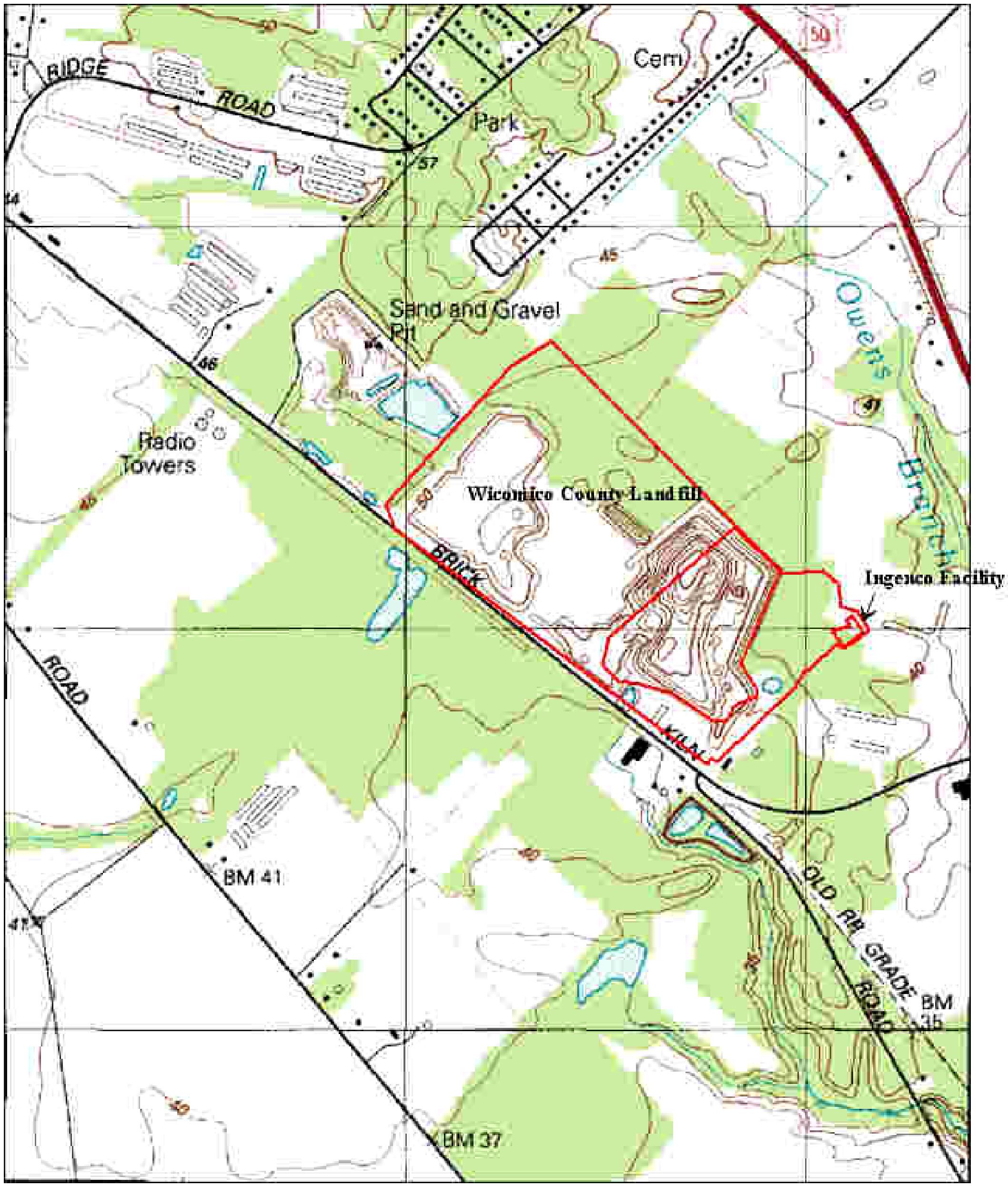
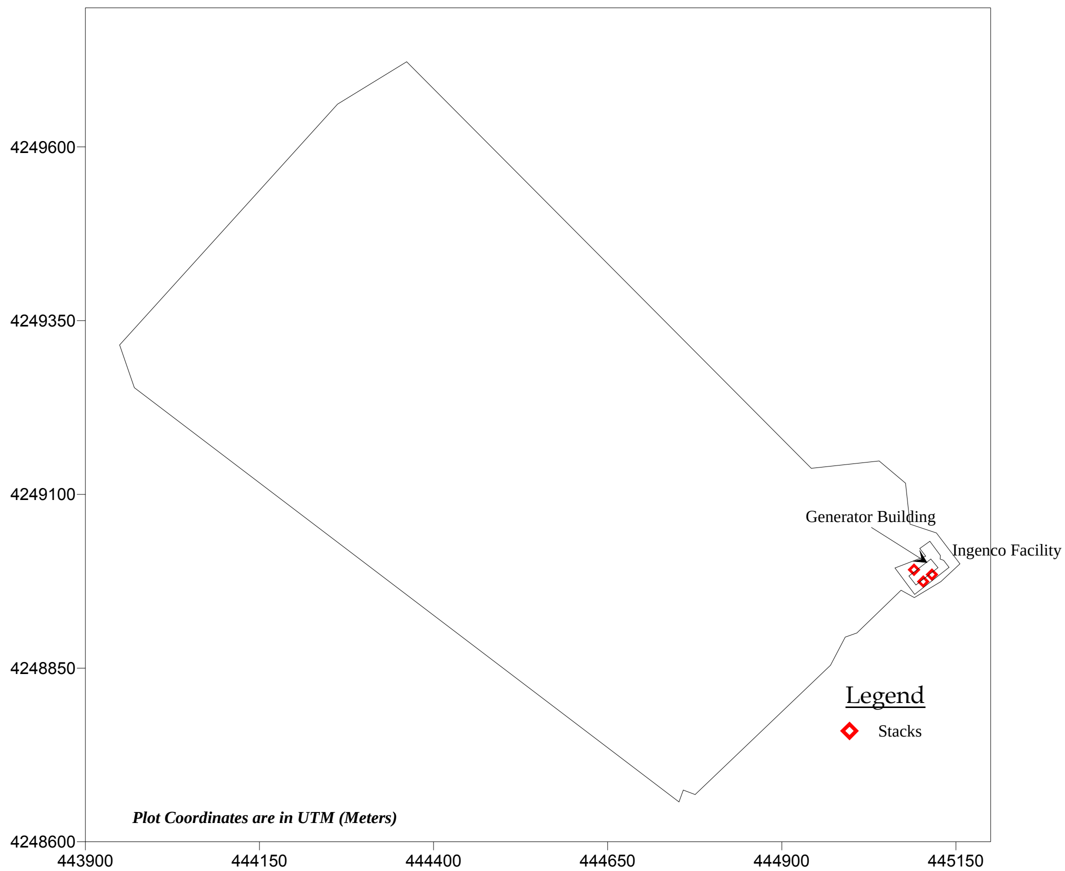


FIGURE 2-3 INGENCO FACILITY STACKS AND BUILDINGS

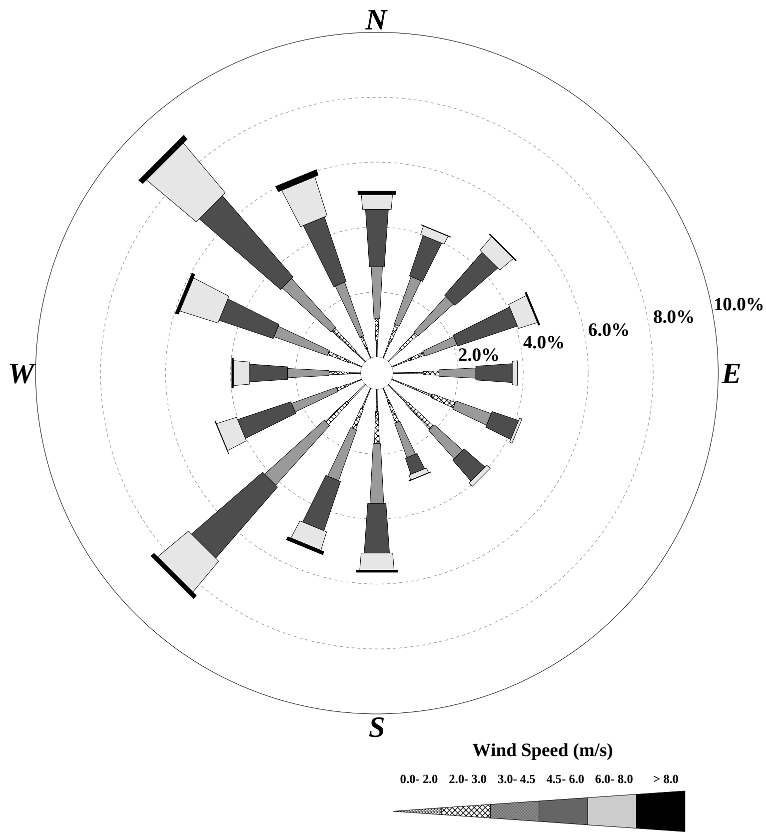


2.4.3 Meteorological Data

EPA's Guidelines for Air Quality Models (GAQM) requires that impacts from an emission source be evaluated using five years of representative meteorological data. Five years of hourly surface observations measured at the Salisbury Wicomico International Airport (Wban: 72404) and upper air data from Wallops Island, Virginia meteorological station (Wban: 93739) are used for this analysis. Meteorological data is processed with EPA's PC-based preprocessor for air dispersion models (PCRAMMET) to develop modeling input files in ASCII format. This data containing hourly records of wind speed, wind direction, atmospheric stability category, temperature, and mixing height is used directly with ISCST3. The AERMET preprocessor was used to develop the meteorological inputs for AERMOD.

An air quality modeling analysis should be accompanied by an evaluation of the representativeness of the meteorological data used in the model. The representativeness of meteorological data from a weather station for a project site is evaluated by developing wind roses. Figure 2-4 displays a wind rose for Salisbury for the five years of meteorological data. It can be seen that winds are predominantly from the west, but no "channeling" effects (which would indicate the presence of high elevation locations in the vicinity of the weather station) are observed. Also, based on the visual inspection of the topographic map, no major terrain features are observed between the project site and the weather station. PPRP and ARMA conclude that the five-year data set from Salisbury is suitable and representative for use with the proposed IWP LFG generation facility.

FIGURE 2-4 WIND ROSE FOR SALISBURY INTERNATIONAL AIRPORT



Frequencies indicate direction from which the wind is blowing

Table 2-5 Summary of Stack Parameters Used in Modeling Analysis

(a) English Units

STK ID	UTM N	UTM E	Ht (ft)	Dia (ft)	Flow Rate (acfm)	Flow Vel. (ft/min)	Temp. (F)
STK1	445089.9	4248991.5	42	1.00	16,000	20,372	800
STK2	445103.1	4248974.5	42	1.00	16,000	20,372	800
STK3	445115.6	4248984.5	42	1.00	16,000	20,372	800

(b) Model Units (Metric)

STK ID	UTM N	UTM E	Ht (m)	Dia (m)		Flow Vel. (m/s)	Temp. (K)
STK1	445089.9	4248991.5	12.80	0.3048		103.49	699.82
STK2	445103.1	4248974.5	12.80	0.3048		103.49	699.82
STK3	445115.6	4248984.5	12.80	0.3048		103.49	699.82

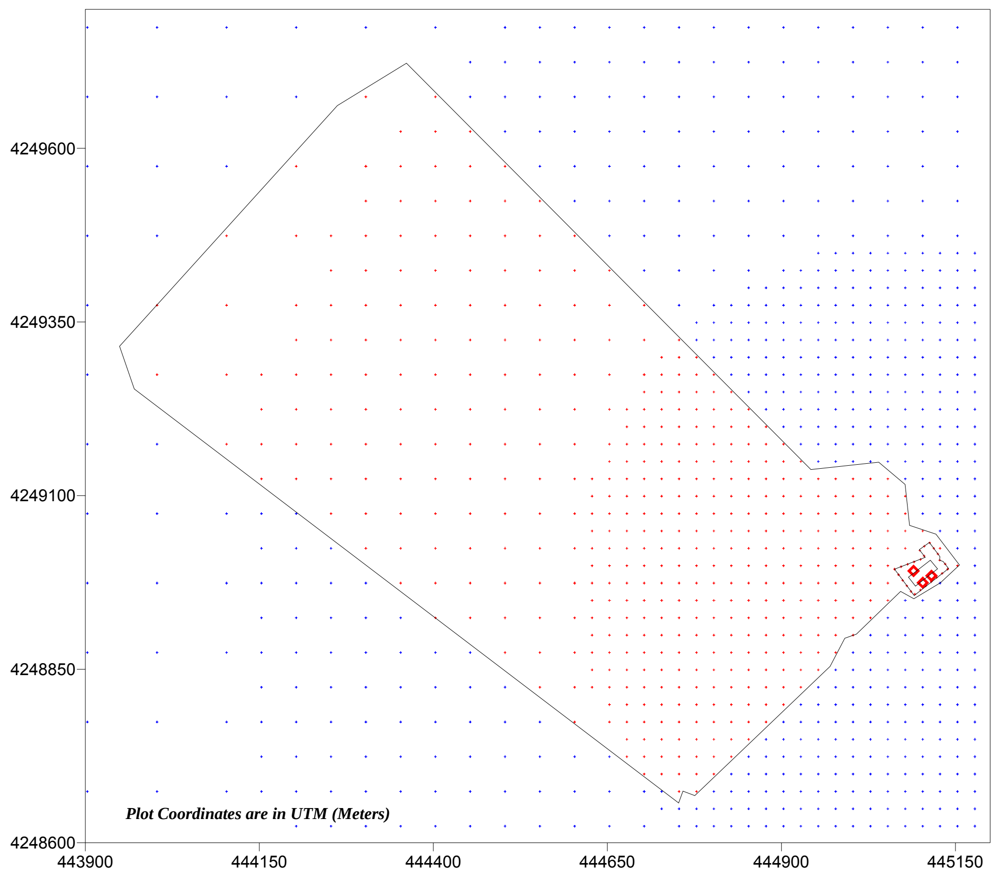
(c) Emission Rates

Pollutant	Short-Term			Annual			
		(lb/hr)	(g/s)	(tpy)	(lb/hr)	(g/s)	
NO_x		143.63	18.10	99.00	22.60	2.85	
CO		143.20	18.04	249.00	56.85	7.16	
SO_2		19.863	2.50	26.00	5.94	0.75	
PM_{10}		13.227	1.67	36.80	8.40	1.06	

2.4.4 *Receptor Grid Development*

A detailed receptor grid was developed for this project that extended up to 2.5 kilometers from the proposed stacks. The GAQM requires receptors to be placed at all locations representing ambient air, i.e. outside the property line. The extent of the receptor grid is intended to capture the maximum impacts from the stacks. In this analysis, two sets of receptors were developed: the first was outside the fenced portion of the Newland Park Landfill and the second was outside the IWP site property boundary but within the landfill fenced area. The receptor grid extended up to 2.5 kilometers from the stacks with varying spacing with distance from the stacks. The receptors spacing was as follows: 25-m spacing from the IWP site property line to 500-m from the stacks; 50-m spacing from 500-m to 1,000-m from the stacks; and 100-m spacing from 1,000 m to 2,500 m from the stacks. The receptor elevations were assigned using digital elevation models (dems) data obtained from United States Geological Survey (USGS) database. A total of 3,833 receptors were generated for the project site. The receptor grid developed for this analysis is shown in Figure 2-5. The AERMAP program was used to develop a hill scale parameter for each receptor, as required by AERMOD.

(b) Onsite and Offsite Receptor Grid



2.4.5 *Ambient Monitoring Data*

In the evaluation of impacts of proposed sources on NAAQS, modeled predictions from an individual source are added to the existing ambient background concentrations. EPA and state agencies monitor concentrations of the criteria pollutants at various locations across the United States near ground level. EPA and states then make attainment designations based on air quality surveillance programs that measure pollutants in a network of nationwide monitoring stations known as the State and Local Air Monitoring Stations (SLAMS), National Air Monitoring Stations (NAMS), and Photochemical Monitoring Stations (PAMS) (EPA, 1998b). NAMS are a subset of the SLAMS focused on urban and multi-source areas. PAMS are also a subset of the SLAMS, and focus on areas of the country with ozone nonattainment issues. Appendix D of Part 58 of the Code of Federal Regulations establishes air quality monitoring network design specifications. Ambient monitoring concentrations from EPA's Aerometric Information Retrieval System (AIRS) database were obtained for the years 2000-2004 for all monitoring stations within 75 kilometers from the project site. The maximum recorded values from these stations are summarized in Table 2-6, and the locations of the monitoring stations are shown in Figure 2-6. There are no monitoring locations with CO data within 75 miles of the IWP site, and so the most conservative (highest concentration) data from the nearest monitoring location in Baltimore County was selected for this comparison.

FIGURE 2-6 LOCATION OF MONITORING STATIONS IN THE VICINITY OF INGENCO FACILITY

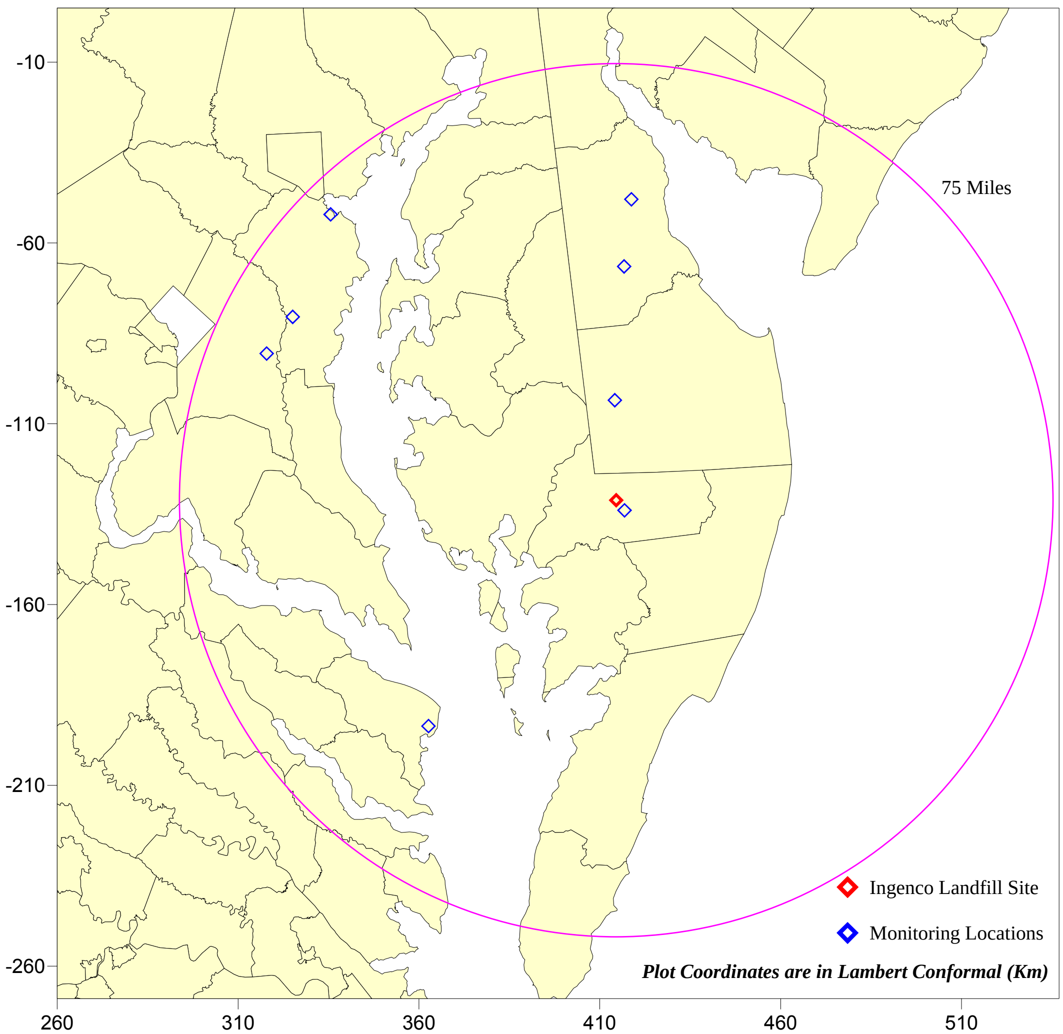


Table 2-6 Summary of Maximum Concentration at Monitoring Locations[1]

Pollutant	Averaging Period	Maximum Concentration[2] (μg/m³)
CO[3]	8-hour	4,581
	1-hour	10,650
$PM_{2.5}$	Annual	18
	24-hour	90
PM_{10}	Annual	25
	24-hour	43
SO_2	Annual	18
	24-hour	79
	3-hour	270
NO_2	Annual	21

Notes:
1. All concentrations are in μg/m³.
2. Monitoring locations within 75 miles of the IWP facility were considered.
3. Monitoring data from Baltimore County is presented.

2.4.6 *Model Results and Discussion*

Summaries of the maximum concentrations predicted for each averaging period for each set of receptors are presented in Table 2-7 (for ISCST3) and Table 2-8 (for AERMOD). Predicted concentrations are uniformly lower outside of the fenced landfill area for both models. Tables 2-9 and 2-10 present the overall concentration results after adding background concentrations to the model predicted values for ISCST3 and AERMOD, respectively. In these tables, the maximum 2nd high modeled concentration is used for comparison to the short-term NAAQS, in accordance with requirements for assessing NAAQS attainment (EPA, 2003). The overall concentrations are considerably less than the NAAQS for all pollutants.

Table 2-7 Summary of Maximum Predicted Impacts Using ISCST3

		Maximum Concentration (µg/m³)		Within Landfill Property (µg/m³)		Outside Landfill Property (µg/m³)	
Pollutant	**Averaging Period**	**1st Highest Concentration**	**2nd Highest Concentration**	**1st Highest Concentration**	**2nd Highest Concentration**	**1st Highest Concentration**	**2nd Highest Concentration**
CO	8-hour	632.18	610.28	612.65	557.25	632.18	610.28
	1-hour	382.89	313.82	382.89	313.82	361.27	261.12
PM_{10}	24-hour	24.33	10.54	24.33	10.54	17.69	9.48
	Annual	0.58	-	0.36	-	0.58	-
SO_2	3-hour	79.37	58.75	63.30	54.59	79.37	58.75
	24-hour	36.54	15.82	36.54	15.82	26.56	14.23
	Annual	0.41	-	0.25	-	0.41	-
NO_x	Annual	1.56	-	0.97	-	1.56	-

Notes:
1. All concentrations are in µg/m³

Table 2-8 Summary of Maximum Predicted Impacts Using AERMOD

		Maximum Concentration (µg/m³)		Within Landfill Property (µg/m³)		Outside Landfill Property (µg/m³)	
Pollutant	**Averaging Period**	**1st Highest Concentration**	**2nd Highest Concentration**	**1st Highest Concentration**	**2nd Highest Concentration**	**1st Highest Concentration**	**2nd Highest Concentration**
CO	8-hour	1,833.20	1,774.80	1,833.20	1,774.80	1,168.34	1,157.88
	1-hour	2,150.77	2,127.78	2,150.77	2,127.78	1,515.31	1,463.28
PM_{10}	24-hour	146.94	106.90	146.94	106.90	88.79	65.23
	Annual	6.12	-	6.12	-	3.55	-
SO_2	3-hour	272.24	266.58	272.24	266.58	194.83	188.06
	24-hour	220.67	160.53	220.67	160.53	133.34	97.95
	Annual	4.33	-	4.33	-	2.51	-
NO_x	Annual	16.47	-	16.47	-	9.54	-

Notes:
1. All concentrations are in µg/m³

Table 2-9 Comparison of Model Prediction with Ambient Standards Based on ISCST3

Pollutant	Averaging Period	Maximum Modeled Concentration (μg/m³)	Background Concentration (μg/m³)	Modeled+ Background (μg/m³)	NAAQS
CO	8-hour	610.28	4,581	5,191.28	10,000
	1-hour	313.82	10,650	10,963.82	40,000
PM_{10}	24-hour	10.54	43	53.54	150
	Annual	0.58	25	25.58	50
SO_2	3-hour	58.75	270	328.75	1300
	24-hour	15.82	79	94.82	365
	Annual	0.41	18	18.41	80
NO_x	Annual	1.56	21	22.56	100

Notes:
1. All concentrations are in μg/m³

Table 2-10 Comparison of Model Prediction with Ambient Standards Based on AERMOD

Pollutant	Averaging Period	Maximum Modeled Concentration (μg/m³)	Background Concentration (μg/m³)	Modeled+ Background (μg/m³)	NAAQS
CO	8-hour	1,774.80	4,581	6,356	10,000
	1-hour	2,127.78	10,650	12,778	40,000
PM_{10}	24-hour	106.90	43	149.90	150
	Annual	6.12	25	31	50
SO_2	3-hour	266.58	270	537	1300
	24-hour	160.53	79	240	365
	Annual	4.33	18	22	80
NO_x	Annual	16.47	21	38	100

Notes:
1. All concentrations are in μg/m³

The maximum predicted 24-hour concentrations of PM_{10} and SO_2 are presented graphically in Figures 2-7 and 2-8, respectively for both ISCST3 and AERMOD. The maximum concentration occurs to the east of the facility for both SO_2 and PM_{10} and for both models. The impacts are higher close to the stack and decrease rapidly with distance from the source, due to the short stacks and the effects of building downwash. It can be seen that though AERMOD predicts concentrations significantly higher than ISCST3, the higher concentrations using AERMOD are closer to the stack than those predicted by ISCST3. The concentration estimates using AERMOD are less than 5 $\mu g/m^3$ within 300 m of the stacks.

The summation of background concentration and impacts from the proposed engines are observed to be well below the NAAQS for each pollutant, as shown in Tables 2-9 and 2-10, with the exception of PM_{10}. Although PM_{10} is also below the NAAQS, it lies relatively close to the NAAQS threshold. The stack height and diameter were determined to avoid exceedances with the PM_{10} NAAQS. However, it should be noted that the maximum impacts from the engines occur in areas close to the landfill that are relatively isolated from the effects of other background sources; therefore, the results reported in Tables 2-9 and 2-10 represent conservative estimates for all pollutants.

2.4.7 *Summary and Conclusion*

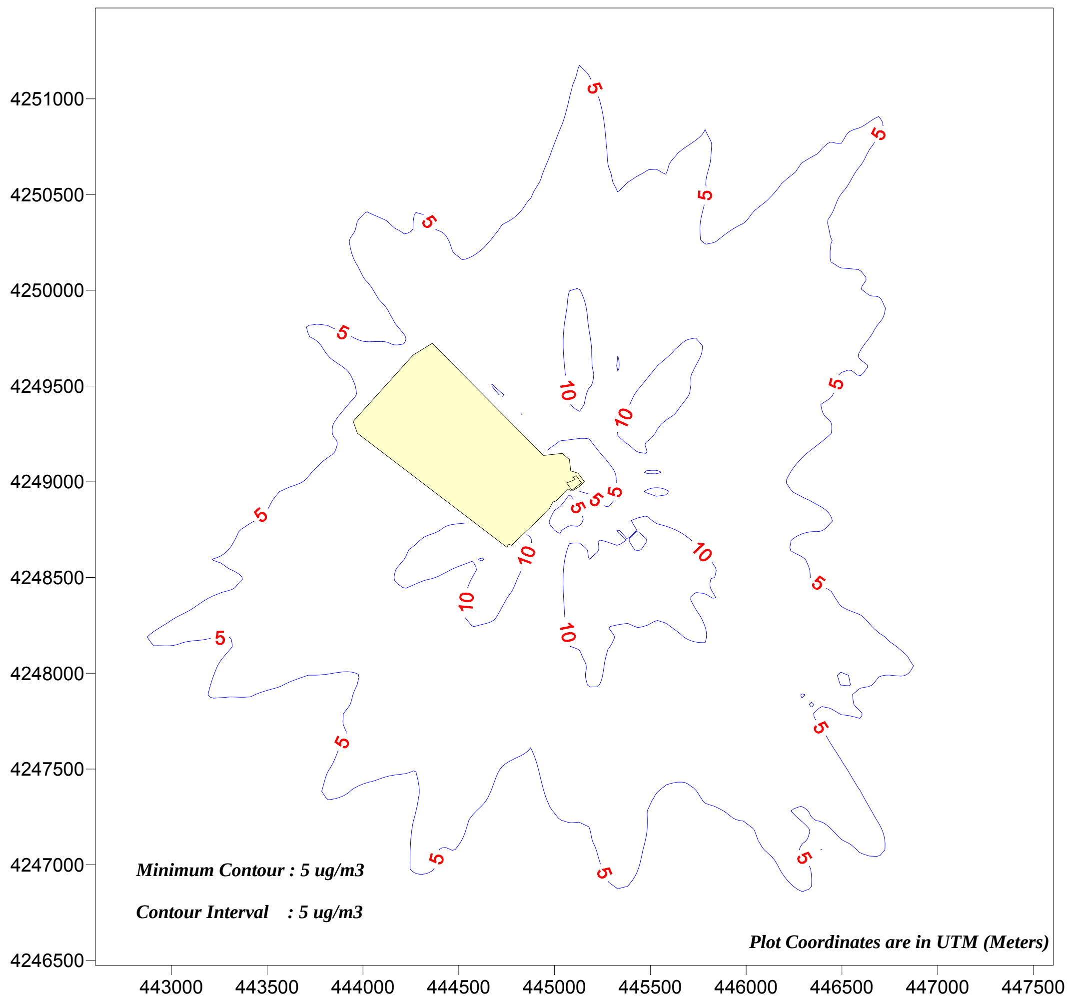
The ambient air quality impacts from the proposed operation of IWP engines were evaluated using ISCST3 and AERMOD with five years of meteorological data to evaluate compliance with the NAAQS. The impacts were predicted on a refined receptor grid extending up to 2.5 kilometers from the stacks. A refined modeling analysis is not required for the proposed sources as it is not a major source from a PSD perspective; however, the State evaluated the project to ensure that it would not adversely affect the NAAQS in the vicinity of the source. Overall, the modeling results indicate that predicted maximum ambient air concentrations of NO_2, CO, SO_2, and PM_{10}, based on maximum engine emissions, do not adversely impact the NAAQS for these stack pollutants.

2.5 *APPLICABLE AIR REGULATION EVALUATION*

Based on the source types and projected emissions, this section outlines the Federal, State, and local air quality requirements to which the IWP project will be subject. These requirements are in addition to the emission limits outlined in Section 2.3 to avoid NA-NSR and PSD. Appendix B summarizes the Maryland air requirements from the Code of Maryland Regulations (COMAR) that apply to the IWP project. Details of key

FIGURE 2-7 CONTOUR PLOT OF MAXIMUM CONCENTRATION FOR SO2 AND PM10 USING ISCST3

(A) MAXIMUM 24-HOUR SO2 CONCENTRATIONS



(B) MAXIMUM 24-HOUR PM10 CONCENTRATIONS

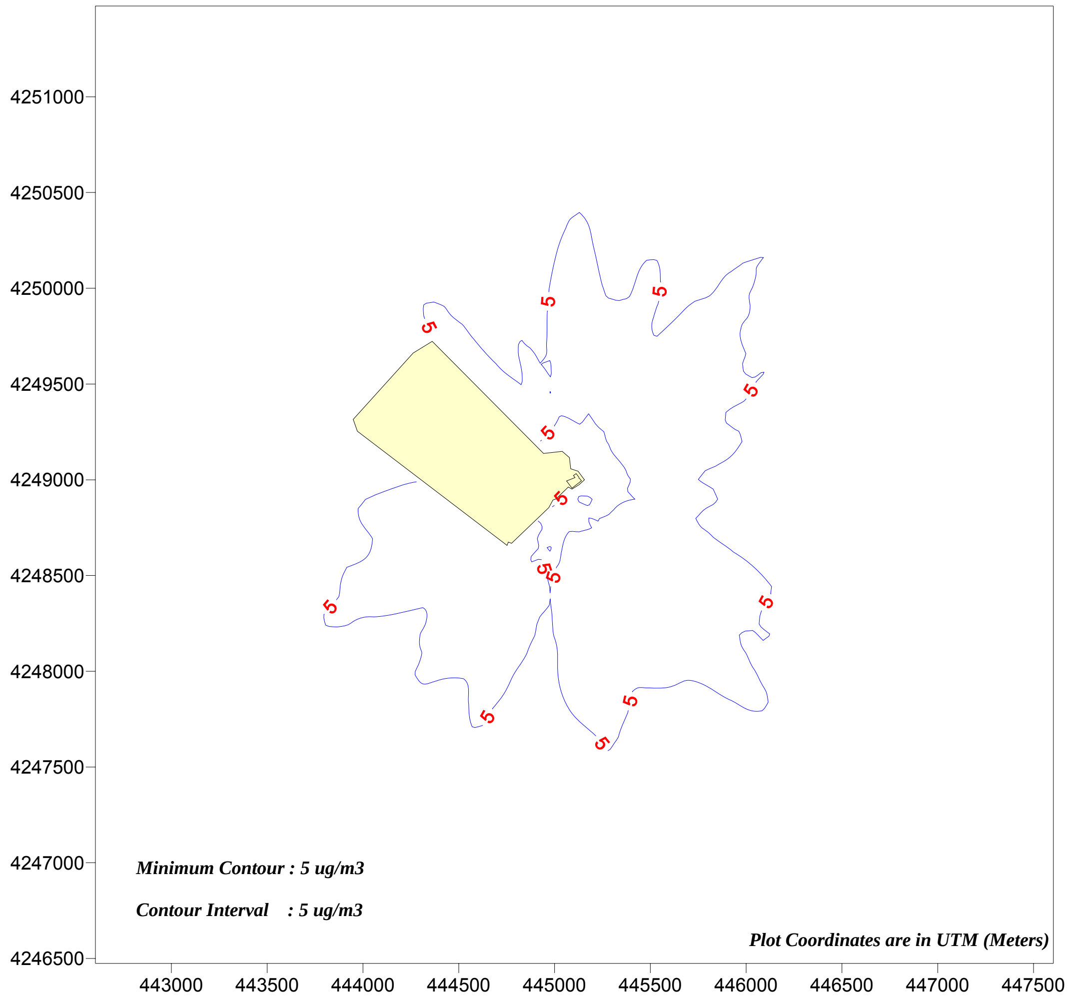
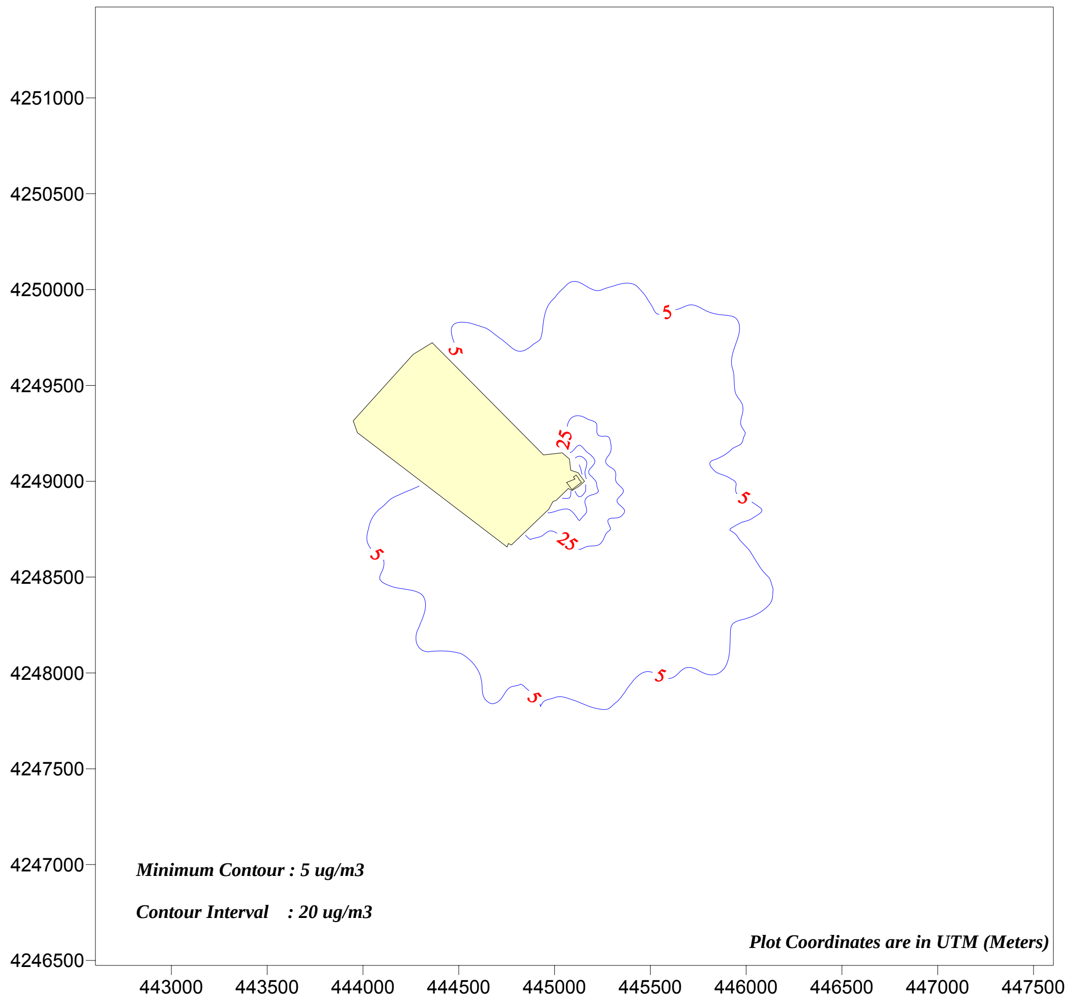
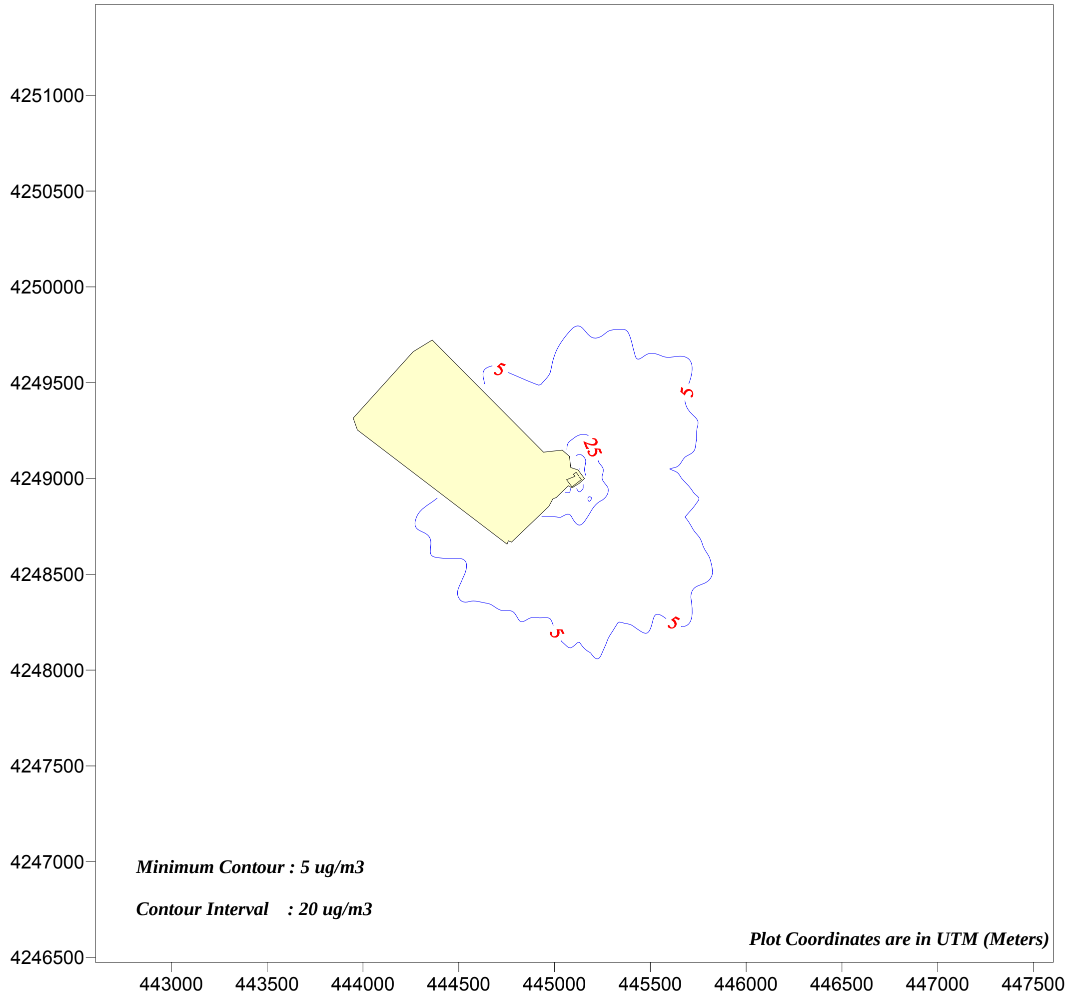


FIGURE 2-8 CONTOUR PLOT OF MAXIMUM CONCENTRATION FOR SO2 AND PM10 USING AERMOD

(A) MAXIMUM 24-HOUR SO2 CONCENTRATION



(B) *MAXIMUM 24-HOUR PM10 CONCENTRATION*



Federal regulatory requirements are discussed in Section 2.5.1; Maryland requirements are discussed in Section 2.5.2.

2.5.1 *Potentially Applicable Federal Air Requirements*

2.5.1.1 *National Emission Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR Part 61 and 63)*

The proposed project will not be subject to any NESHAP in 40 CFR Part 61. The project as permitted will not be a major source of HAPs and will therefore not be subject to the Stationary Reciprocating Internal Combustion Engine (RICE) Maximum Achievable Control Technology (MACT) Standard (40 CFR 63 Subpart ZZZZ), or any other MACT standard promulgated as of January 2006.

2.5.1.2 *New Source Performance Standards (40 CFR Part 60)*

Landfills (40 CFR Part 60 Subpart Cc and WWW)

Because the IWP proposed system is considered to be a new source and not part of the Newland Park Landfill, the NSPS Subparts Cc and WWW for landfills are not applicable to the project. Compliance with these standards, if applicable, would be the responsibility of Wicomico County.

Stationary Gas Turbines (40 CFR Part 60 Subpart GG)

Under 40 CFR Part 60 Subpart GG, "Standards of Performance for Stationary Gas Turbines," a stationary gas turbine is defined as any simple cycle gas turbine, regenerative cycle gas turbine or any gas turbine portion of a combined cycle steam/electric generating system that is not self propelled.

The Detroit Diesel engines for the proposed LFG generation facility are not subject to 40 CFR Part 60 Subpart GG, because the stationary engines of the proposed system do not fall under the definition of a "stationary gas turbine"(§60.331).

Stationary Compression Ignition Internal Combustion Engines (40 CFR Part 60 Subpart IIII)

On 11 July 2005, EPA issued the proposed rule: "Standards of Performance for Stationary Compression Ignition (CI) Internal Combustion Engines (ICE)" in the Federal Register Volume 70, No. 131 (NSPS, 2005). The proposed rule indicates that electric power generation, transmission, or distribution sources constructed or modified after 11 July

2005 are regulated under the proposed rule. The date of construction is the date the engine is ordered by the owner or operator. However, the proposed rule goes on to state that, stationary CI ICEs that are not fire pump engines that are manufactured prior to 1 April 2006 shall not be considered constructed after 11 July 2005. Because the proposed IWP LFG generation facility engines were manufactured prior to 1 April 2006, the IWP LFG generation facility is exempt from this subpart (IWP #5, 2005).

2.5.1.3 Acid Rain Program (40 CFR Part 72)

The proposed IWP engines combined are capable of generating approximately 6 MW of electricity for sale. However, the project is exempt from the requirements of the Acid Rain Program because it is a non-utility generator under 40 CFR 72.6(b)(8).

2.5.1.4 Accidental Release Prevention (40 CFR Part 68)

A facility that handles more than a threshold quantity of a regulated toxic or flammable substance is covered under EPA's Chemical Accident Prevention program (40 CFR Part 68). Upon review of the applicable substances (40 CFR §68.130), IWP will not use any of the applicable chemicals above threshold levels and therefore is not subject to the Chemical Accident Prevention program requirements.

2.5.1.5 Compliance Assurance Monitoring (CAM) (40 CFR Part 64)

Compliance Assurance Monitoring (CAM) applies to emissions units at "major" sources that are required to obtain a Title V operating permit, and that meet all three of the following criteria (40 CFR 64.2a):

"(1) The unit is subject to an emission limitation or standard for the applicable regulated air pollutant (or a surrogate thereof), other than an emission limitation or standard that is exempt under paragraph (b)(1) of this section;

(2) The unit uses a control device to achieve compliance with any such emission limitation or standard; and

(3) The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source."

IWP will not be using any control devices; therefore, CAM will not apply.

2.5.2 *Maryland Air Regulations*

Several Maryland air regulations apply to the operation and emissions of the IWP LFG generation facility project to be installed at the Newland Park Landfill. These regulations, included in the Code of Maryland Regulations (COMAR), limit the emissions of PM, visible emissions, nuisance pollutants, and odor from the engines and cooling towers. In addition, several recordkeeping, monitoring and reporting requirements apply to the proposed project. Appendix B summarizes the Maryland air regulations that apply to the proposed IWP system.

2.5.3 *Summary of Applicable Requirements*

Based on currently available data, the proposed electrical generating system will meet all requirements of applicable Federal and Maryland air regulations if the project operates under the restrictions contained in the recommended licensing conditions (in Section 6).

2.6 *SUMMARY OF AIR QUALITY EVALUATION*

IWP has agreed to take an annual emission restriction on the 18 new engines, limiting operations so that NO_x and VOC emissions from the LFG generation facility system will not exceed 100 tpy and 50 tpy, respectively, to avoid triggering NA-NSR. Similarly, CO emissions from the LFG generation facility will be limited to 250 tpy to avoid triggering PSD requirements. Overall, the modeling results indicate that predicted maximum ambient air concentrations of NO_2, CO, SO_2, and PM_{10}, based on maximum engine emissions, do not adversely impact the NAAQS for these stack pollutants. Further, potential HAP emissions are less than the HAP "major source" threshold and, therefore, are not subject to any restrictions.

Based on the information available to date, the engines as designed and if operated under the conditions outlined in Section 6 will meet all applicable state and federal air regulatory requirements.

3.0 NOISE IMPACTS

This licensing review incorporates an evaluation of noise impacts to ensure compliance with State regulations. The analysis of potential noise impacts focuses on the potential for sound pressure from generating equipment to exceed numerical limitations at the landfill property boundary. PPRP has estimated the expected future noise levels at the property boundary, and has compared those levels to the relevant State limits. PPRP's analysis indicates that the proposed units will comply with the State noise limits based on the applicant's use of an acoustical enclosure and silencers in the exhaust stacks.

3.1 SUMMARY OF REGULATORY REQUIREMENTS

Maryland State noise regulations specify maximum allowable noise levels, shown in Table 3-1 (COMAR 26.02.03). The maximum allowable noise levels specified in the regulations vary with zoning designation and time of day. Maximum allowable noise levels for residential areas are 55 dBA (A-weighted decibel scale) for nighttime hours and 65 dBA for daytime hours.

Table 3-1 Maximum Allowable Noise Levels (dBA) for Receiving Land Use Categories

	Zoning Designation		
	Industrial	**Commercial**	**Residential**
Day	75	67	65
Night	75	62	55

Source: COMAR 26.02.03

Note: Day refers to the hours between 7 AM and 10 PM; night refers to the hours between 10 PM and 7 AM.

The State regulations provide certain exemptions for specified noise sources and noise generating activities. For example, motor vehicles on public roads are exempt from Maryland noise regulations; however, while on industrial property, trucks are considered part of the industrial source and are regulated as such.

Noise from construction activities may not exceed 90 dBA at any receiving property line during daytime hours under the State regulations. Construction activities must comply with the nighttime limits listed in Table 3-1.

3.2 ESTIMATES OF NOISE EMISSIONS FROM THE GENERATING EQUIPMENT

The applicant indicated that the engines to be installed at the Newland Park Landfill are the same make and model as those currently in operation at IWP's Plant in Amelia County, Virginia. According to the information provided by the applicant, the combined sound pressure level from eight six-packs (48 engines) at that Amelia Plant site was estimated to be 55.9 dB(A) at a reference distance of 200 meters. As a conservative assumption, PPRP used this noise level when predicting noise impacts for the proposed LFG generating facility. In fact, the noise emissions are expected to be lower than the estimated level because IWP is installing only three six-packs (18 engines) at the Newland Park site.

PPRP estimated the maximum noise that would result at various receptors surrounding the Newland Park Landfill when the proposed facility is operating. The locations of greatest interest are shown on Figure 3-1 and include:

- The receptor to the east, which represents the nearest offsite residence to the east of the site;
- The receptor to the northeast, which represents a nearby community;
- The receptor to the northwest, which represents another nearby community; and
- The receptor to the southwest, which represents the nearest offsite residence in the southwest direction.

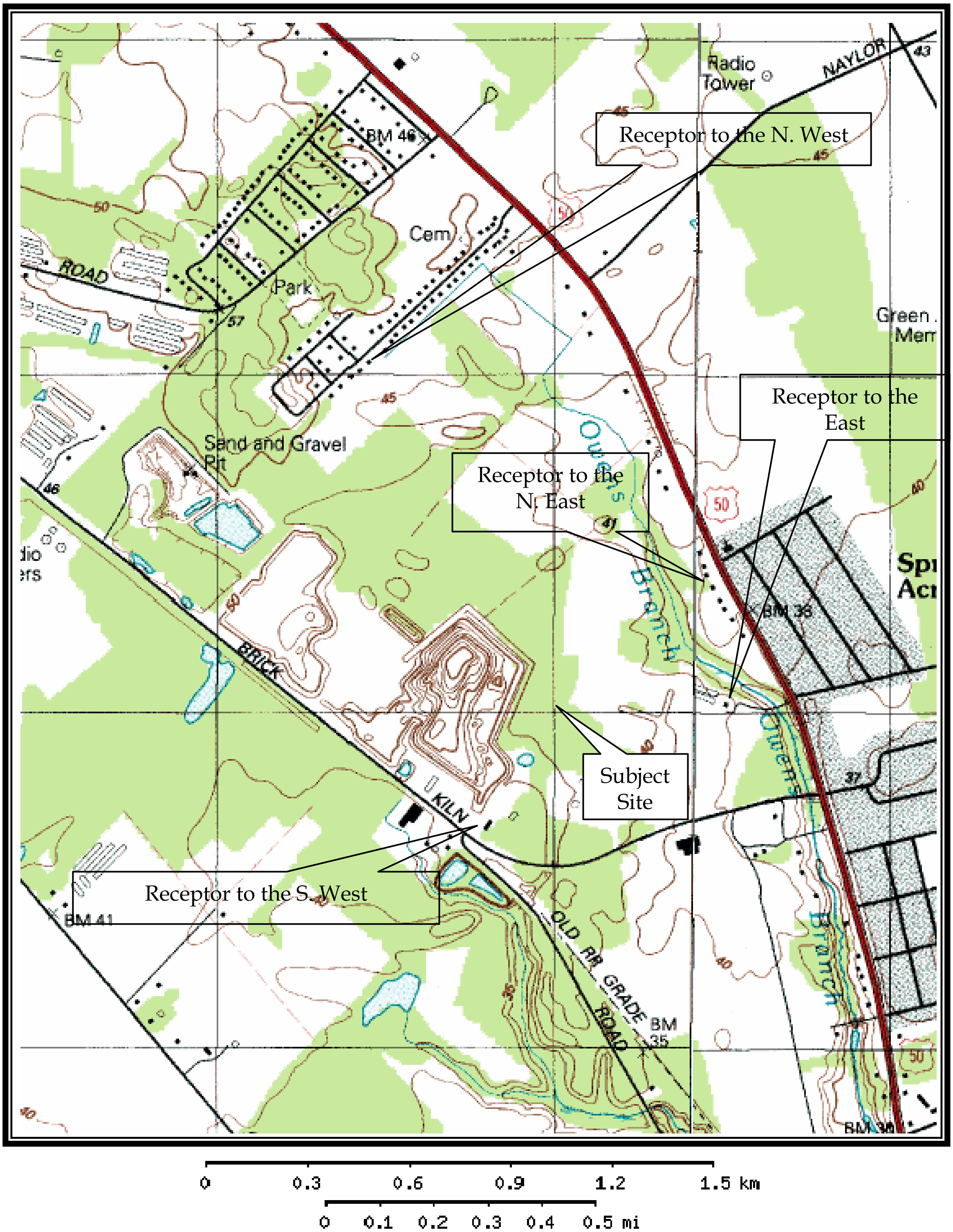
Noise impacts at varying distances were calculated using the following derived formula (EEI, 1984):

$Lp_2 = Lp_1 - 20 \log (r_2/r_1)$ where:

Lp_1 is the known sound pressure level at one point;

r_1 is the distance from that point (where Lp_1 is known) to the noise source;

Figure 3-1
Noise Receptor Locations
INGENCO Wholesale Power, LLC
Salisbury, Maryland



Source: USGS 15-min Topographic Map
Hebron Quadrangle (1992)

Lp_2 is the (unknown) sound pressure level at the point of interest;

r_2 is the distance from the noise source to the point of interest.

Based on these calculations, the engines are expected to produce the noise levels provided in Table 3-2.

Table 3-2 Calculated Noise Levels at Newland Park Landfill Receptor Locations

Receptor Location	Approximate Distance from Proposed Generating Units	Calculated Noise Level (dBA)
Residence to the east	540 meters	47.3
Residence to the northeast	600 meters	46.4
Residence to the northwest	1,080 meters	41.3
Residence to the southwest	420 meters	49.5

It should be noted that this method of calculating noise attenuation is somewhat conservative in that it considers distance spreading only and does not take into account absorption by vegetation or molecular attenuation in air.

3.3 CONCLUSIONS

At the nearby residences, the noise from the proposed generating units is expected to be in compliance with the residential regulatory limits for daytime and nighttime noise levels (65 and 55 dBA, respectively). As shown in Table 3-2, the noise levels at surrounding properties arising from the proposed operations are well below the regulatory limits even when a larger facility is assumed.

In summary, the available information indicates that the proposed LFG generation facility will be able to operate in compliance with all applicable noise regulations. As indicated in the recommended licensing conditions (see Section 6), the applicant shall take the necessary precautions to comply with the State noise limits contained in COMAR 26.02.03. This includes specifying that the acoustical enclosure and the exhaust stack silencers are adequately rated to ensure compliance.

4.0 TERRESTRIAL, ECOLOGICAL, GROUND WATER AND SURFACE WATER IMPACTS

4.1 TERRESTRIAL AND ECOLOGICAL IMPACTS

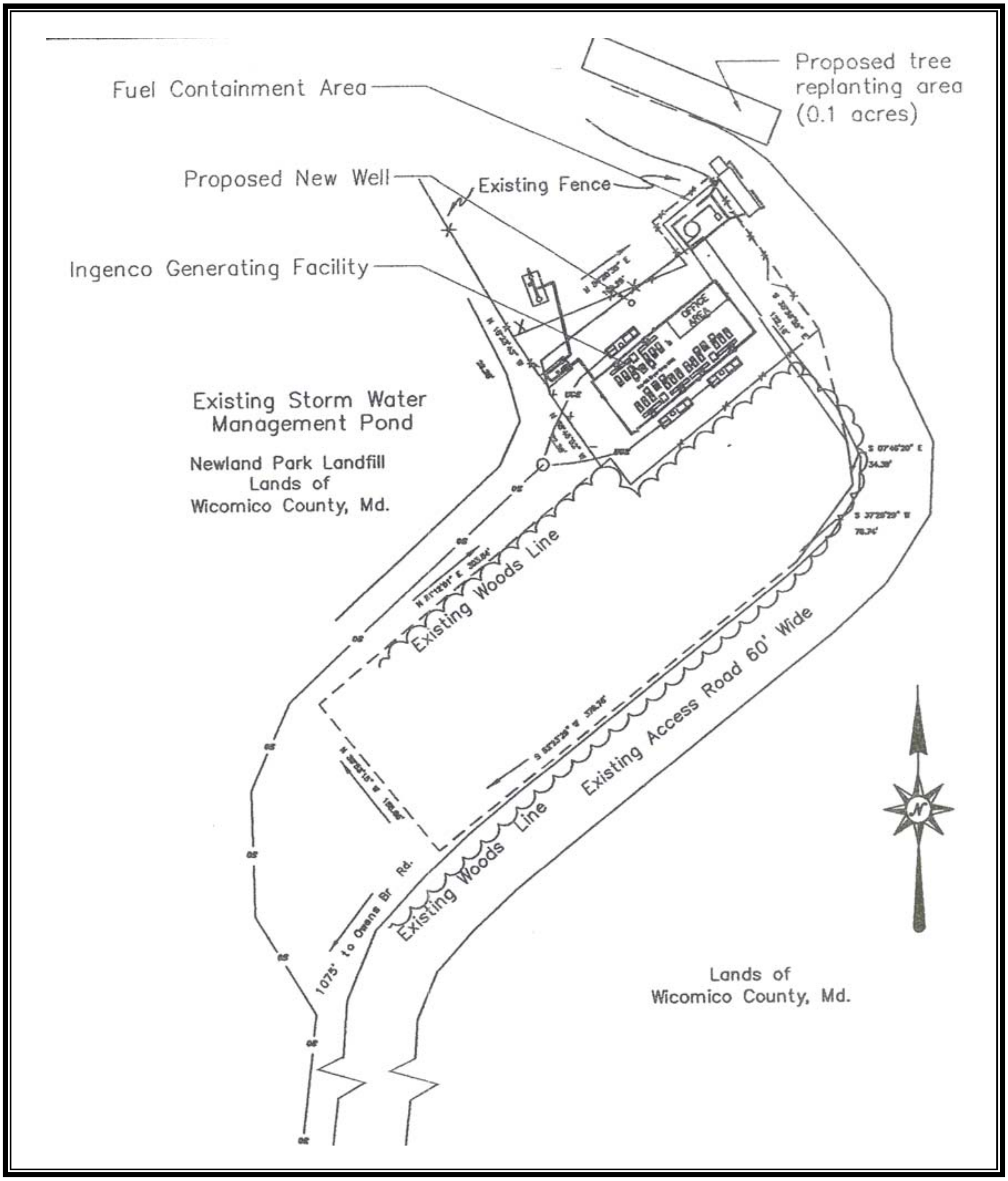
The proposed IWP LFG generation facility would be located on 2.11 acres along the northeastern edge of the Newland Park Landfill property. Within this area, the footprint of the facility would comprise one-half acre and consist of an operations building and a small tank farm.

4.1.1 Habitat, Vegetation, and Wildlife

The proposed IWP LFG generation facility is located in Maryland's Coastal Plain physiographic province, which historically supported the pine-oak forest throughout (Brown and Brown, 1972). At present, due to the operations of the landfill, much of the habitat has been greatly altered from its natural state. Vegetation and land cover currently occupying the proposed project site consists of gravel road tracks, cleared areas vegetated with grasses and weedy herbaceous plants, and a strip of forested habitat comprising one-tenth of an acre. The forest is characteristic of the pine-oak forest community and loblolly pine is the dominant tree species forming the canopy. Various oak species are also common in the understory as well as sweet gum, red maple and American holly. Common lower growing plants include greenbrier, trumpet creeper, and poison ivy.

The forested strip that would be affected by the project is contiguous with a similarly forested area of approximately 2 acres. Similar forested habitat also occurs throughout the landfill property, mostly along its boundary edges. The affected forested area should be exempt from the Forest Conservation Act (FCA) as it is too small. The FCA applies to areas of impact greater than 40,000 square feet or approximately 1 acre. Furthermore, land cleared for electric generating facilities should also receive an exemption. However, the Maryland PSC is charged with considering forest conservation measures when evaluating a project prior to issuing a CPCN. In any event, the proposed LFG project will meet the intent of the FCA in minimizing the loss of forest. IWP will reforest an area of equal size immediately north of the facility. See Figure 4-1 for the location of the reforested area. In consultation with John S. Ayton State Forest Tree Nursery, the area would likely be replanted with loblolly pine (IWP #4, 2005).

Figure 4-1
Proposed Reforested Area Location
INGENCO Wholesale Power, LLC
Salisbury, Maryland



Source: DNR #4, 2005

Construction of the LFG generation facility should not adversely affect most wildlife species. Most of the project area has already been cleared and is used during the course of landfill operations. The forested strip most likely supports a greater diversity of wildlife species; however, identical habitat will remain adjacent to the cleared forest, and the reforested area will provide more habitat diversity through successional regrowth of forest. Large animals such as white-tailed deer (*Odocoileus virginianus*) range more broadly and are therefore unlikely to be affected. Smaller animals such as eastern cottontail (*Sylvilagus floridanus*) and short-tailed shrew (*Blarina brevicauda*) may be displaced, but overall their populations should be unaffected. A few amphibians and reptiles may suffer some direct impact from project construction, but overall local populations should not be adversely affected. Tables 4-1 and 4-2 list species of mammals, amphibians, and reptiles that potentially occur at the project site.

Table 4-1 Mammal Species Potentially Occurring at the IWP Facility[1]

Virginia Opossum	Marsh Rice Rat
Northern Short-tailed Shrew	White-footed Mouse
Least Shrew	Meadow Vole
Eastern Mole	Woodland Vole
Star-nosed Mole	Muskrat
Little Brown Myotis	Southern Bog Lemming
Northern Myotis	Black Rat
Silver-haired Bat	Norway Rat
Eastern Pipistrelle	House Mouse
Big Brown Bat	Meadow Jumping Mouse
Eastern Red Bat	Coyote
Eastern Cottontail	Red Fox
Eastern Chipmunk	Common Gray Fox
Woodchuck	Common Raccoon
Eastern Gray Squirrel	Long-tailed Weasel
Delmarva Fox Squirrel	Mink
Red Squirrel	Striped Skunk
Southern Flying Squirrel	White-tailed Deer
American Beaver	

1. Whitaker and Hamilton, 1998.

Table 4-2 Amphibian and Reptile Species Potentially Occurring at the Proposed IWP Facility[1]

Marbled Salamander	Spotted Turtle
Red-spotted Newt	Northern Red-bellied Cooter
Northern Dusky Salamander	Eastern Box Turtle
Northern Two-lined Salamander	Red-eared Slider
Four-toed Salamander	Northern Fence Lizard
Eastern Red-backed Salamander	Common Five-lined Skink
Eastern Mud Salamander	Broad-headed Skink
Eastern Spadefoot	Little Brown Skink
Eastern American Toad	Common Watersnake
Fowler's Toad	Northern Brownsnake
Eastern Cricket Frog	Northern Red-bellied Snake
Cope's Gray Treefrog	Eastern Gartersnake
Northern Spring Peeper	Eastern Smooth Earthsnake
New Jersey Chorus Frog	Eastern Wormsnake
American Bullfrog	Ring-necked Snake
Northern Green Frog	Eastern Hog-nosed Snake
Pickerel Frog	Northern Scarletsnake
Southern Leopard Frog	Northern Black Racer
Wood Frog	Cornsnake
Carpenter Frog *	Black Ratsnake
Snapping Turtle	Eastern Kingsnake
Eastern Mud Turtle	Milksnake
Stinkpot	Northern Rough Greensnake
Eastern Painted Turtle	Copperhead
* State status – In Need of Conservation; Natural Heritage Rank – S2, very rare State-wide	

1. White and White, 2002.

In like manner, small birds that may occur along the pine-oak forest edge such as northern cardinal (*Cardinalis cardinalis*), rufous-sided towhee (Pipilo erythropthalmus), and pine warbler (*Dendroica pinus*), may be displaced from a small portion of their range but local populations should be unaffected as well. The Newland Park Landfill is a notable bird-watching location, primarily because of the uncommon species of gull it attracts (Wilds, 1992). None of these species should be affected by the proposed project. Table 4-3 lists species of birds known to occur in the vicinity of the project area during the breeding season.

Table 4-3 Bird Species Likely to Occur During the Breeding Season in the Vicinity of the IWP Facility[1]

Great Blue Heron	Horned Lark
Great Egret	Purple Martin
Cattle Egret	Tree Swallow
Green Heron	Northern Rough-winged Swallow
Black-crowned Night Heron	Barn Swallow
Black Vulture	Carolina Chickadee
Turkey Vulture	Tufted Titmouse
Canada Goose	White-breasted Nuthatch
Wood Duck	Carolina Wren
Mallard	House Wren
Osprey	Blue-gray Gnatcatcher
Cooper's Hawk	Eastern Bluebird
Red-shouldered Hawk	Wood Thrush
Red-tailed Hawk	American Robin
American Kestrel	Gray Catbird
Ring-necked Pheasant	Northern Mockingbird
Northern Bobwhite	Brown Thrasher
Killdeer	European Starling
Laughing Gull	Cedar Waxwing
Ring-billed Gull	Yellow Warbler
Herring Gull	Pine Warbler
Royal Tern	Prairie Warbler
Forster's Tern	Black-and-white Warbler
Rock Dove	Prothonotary Warbler
Mourning Dove	Worm-eating Warbler
Black-billed Cuckoo	Ovenbird
Yellow-billed Cuckoo	Louisiana Waterthrush
Great Horned Owl	Kentucky Warbler
Barred Owl	Common Yellowthroat
Chuck-will's-widow	Yellow-breasted Chat
Whip-poor-will	Summer Tanager
Chimney Swift	Scarlet Tanager
Ruby-throated Hummingbird	Eastern Towhee
Belted Kingfisher	Chipping Sparrow
Red-headed Woodpecker	Field Sparrow
Red-bellied Woodpecker	Vesper Sparrow
Downy Woodpecker	Grasshopper Sparrow
Hairy Woodpecker	Song Sparrow
Northern Flicker	Northern Cardinal
Pileated Woodpecker	Blue Grosbeak

Eastern Wood-Pewee	Indigo Bunting
Acadian Flycatcher	Red-winged Blackbird
Eastern Phoebe	Eastern Meadowlark
Great Crested Flycatcher	Common Grackle
Eastern Kingbird	Brown-headed Cowbird
White-eyed Vireo	Orchard Oriole
Yellow-throated Vireo	Baltimore Oriole
Red-eyed Vireo	House Finch
Blue Jay	American Goldfinch
American Crow	House Sparrow
Fish Crow	

1. Sauer et. al., 2005.

The great blue heron is a large, colonially nesting waterbird common along Maryland's Coastal Plain (Robbins, 1996). During a PPRP site visit to the Newland Park Landfill on 13 June 2005, at least one great blue heron nest was observed in the crown of a loblolly pine within the forested area to be cleared for the project. Landfill personnel indicated that the nesting was recent and appeared to be unaffected by landfill operations. At present, the conservation status of the great blue heron is categorized as "Not Currently at Risk" (North American Waterbird Conservation Plan, 2002). Following the site visit, DNR, Wildlife and Heritage Service was contacted for guidance for the management of this species; their response is provided in the Threatened and Endangered Species section that follows.

4.1.2 *Threatened and Endangered Species*

The Maryland Department of Natural Resources, Wildlife and Heritage Service conducted an environmental review of the proposed LFG project and found no State or Federal records for rare, threatened or endangered species within the delineated project area (MD DNR letter dated August 23, 2005). The letter cautioned, however, that the absence of records does not mean that rare, threatened, or endangered species may not be present. The Wildlife and Heritage Service lists 11 animal and 135 plant species with State or Federal listed status in Wicomico County, Maryland (Maryland DNR, 2004). At least one, the State and Federal-listed threatened bald eagle, was observed flying over another part of the landfill facility.

As indicated above, during a PPRP site visit to the project area, at least one great blue heron nest was observed in the crown of a loblolly pine in the forested area to be cleared by the project. This information was passed along to Wildlife and Heritage in the letter requesting environmental review of the project area. In their response, they provided guidance for the protection of heron colonies:

- No nest trees should be cut during the breeding season, from 15 February through 31 July;
- Trees not used as nest sites, but within the outer boundary of the colony, should not be cut during the breeding season. This activity could cause colony abandonment and result in a violation of the U.S. Migratory Bird Treaty Act;
- During the breeding season, significant construction and disturbance near the colony site that might cause colony abandonment and result in a violation of the U.S. Migratory Bird Treaty Act should be avoided; and
- During the breeding season, all human entry into the colony should be restricted to only that essential for protection of the Great Blue Heron colony. Human disturbance of colony sites that results in significant mortality of eggs and/or chicks is considered a prohibited taking under various state and federal regulations.

Wildlife and Heritage also included several recommended guidelines for enhancing colony protection that are based on establishing zones of protection around the colony and limiting the activities in each.

IWP should adhere to the Wildlife and Heritage Service guidance for the protection of the great blue heron during the development of the landfill gas project. As the herons only recently began nesting at the active landfill, operations should continue in the same manner, and the herons will likely resume nesting in similar adjacent habitat.

4.2 GROUND WATER IMPACTS

4.2.1 Construction Impacts

Construction activities at the site include constructing the building to house the engines and a No. 2 fuel oil and lubrication oil storage area. Since no dewatering is expected to support the construction of the project, the potential for ground water at the site to be affected by the construction related activities is small.

4.2.2 *Withdrawal Impacts*

4.2.2.1 *Regulatory Process*

The State of Maryland has a statutory requirement to conserve and protect the water resources of the State and to control the appropriation and use of surface water and ground water. Maryland water allocations are guided by the common law doctrine of reasonable use, which provides all landowners the opportunity to make reasonable use of the water associated with their property, with the assurance that their use will not harm the water resources of the State or other landowners. Additionally, in accordance with COMAR 26.17.06.05A, the use of the water needs to be beneficial, which means that the use of the water is: 1) necessary; 2) non-wasteful; 3) reasonably non-damaging to the resource and other users; and 4) in the best interest of the public.

MDE's statutes and regulations are used to guide the State's recommendations regarding the appropriation request. Once the appropriation of water for a new power plant is authorized, MDE Water Management Administration (WMA) administers the terms of the permit. The permit and the specified appropriation amount will be reviewed every three years in terms of the water use. The permit must also be renewed every twelve years. WMA reserves the right to change the conditions of the permit, or suspend or revoke the permit if any of the terms or appropriations of the permit are violated.

4.2.2.2 *Water Requirement*

IWP has indicated the LFG generation facility will need water to cool the engines, and is proposing to extract ground water at the landfill to meet their water needs. IWP indicated that the LFG generation facility could require up to a maximum of 7,200 gallons per day (IWP Application, 2005). However, IWP indicated on their Application to Appropriate and Use Waters of the State (filed on 29 September 2005) an annual average of 10,000 gpd (total annual use/365 days), and 10,000 gpd during the month of maximum use (highest monthly use/30 days).

The maximum the facility can operate if 96 percent landfill gas is fired in the engines is approximately 8,500 hours per year. In reality, the facility will likely operate less than this amount because: 1) it will only operate during periods that are economically beneficial, and 2) the more No. 2 fuel oil that will be used will reduce the number of hours of operation to ensure that air emission limits are not exceeded. IWP estimates that the maximum daily operation will be about 16 hours per day, and even then it is likely not all engines will be operating (Greene, 2005).

The maximum and average amounts of ground water used to cool the facility are summarized below.

Maximum Use. Assuming that the peaking facility will operate 8,500 hours per year, the maximum annual amount of ground water needed to cool the facility will be approximately 3,400,000 gallons. This water use amount is based on a maximum hourly rate of 400 gallons (10,000 gpd/24 hours), and a maximum daily rate of 10,000 gpd.

Average Use. Assuming 16 hours of daily operation, the average annual amount of ground water needed to cool the facility will be approximately 2,336,000 gallons. Based on 16 hours per day of operation and a maximum use rate of 400 gallons per hour, the facility will use 6,400 gpd of ground water. If the facility is not operating at full load, the water use will be less than the 2,336,000 gallons per year estimate.

4.2.2.3 Proposed Target Aquifer

The Newland Park Landfill is underlain by more than 5,000 feet of unconsolidated Coastal Plain sediments consisting of gravel, sand, silt and clay. Based on the stratigraphy described in Andreasen and Smith (1997), the first three hydrogeological units that underlie the landfill site are:

- The unconfined Salisbury Aquifer, which includes the sands and gravels of the Pliocene age Beaverdam Sand and the Miocene age Pennsauken Formation (estimated to be 80 feet thick at the Landfill);
- The Miocene age lower confining bed consisting of blue-gray clay, silt and fine sand (estimated to be 20 to 25 feet thick at the Landfill); and
- The Miocene age confined Manokin Aquifer, consisting of clayey and silty, medium-grained sand and interbedded locally with fine gravel (estimated to be 70 feet thick at the Landfill).

Additional Coastal Plain units underlie the Manokin Aquifer; however, the lower units are not germane to IWP's proposed withdrawal of ground water, and are not discussed herein.

IWP indicated in its Application to Appropriate and Use Waters of the State (filed on 29 September 2005) that ground water will be withdrawn from a four-inch diameter well completed at a depth of 100 feet below the ground surface. Based on the geologic log for well Ce 147, located at Mardel By-product Corporation south of the landfill on Brick Kiln Road, a depth of 100 feet places the well in the top of the Manokin Aquifer (Boggess and Heidel, 1968). Additionally, Andreasen and Smith (1997) indicate that the altitude of the top of the Manokin Aquifer is -60 feet above mean sea level in the vicinity of the landfill. The altitude of the land surface at the landfill is about 40 feet above mean sea level. Thus, Andreasen and Smith place the Manokin Aquifer 100 feet below the land surface at the landfill.

The Manokin Aquifer has been described in the literature as having the following characteristics (Owens and Denny, 1979):

- Dark gray, very clayey and silty, medium-grained sand and interbedded locally with fine gravel; and
- Yields small to moderate quantities of water.

Reported yields for two wells completed in the Manokin Aquifer at Mardel By-product Corporation indicate that substantial amounts of water can be withdrawn from the aquifer (Boggess and Heidel, 1968). The following information regarding well yields is reported in Boggess and Heidel (1968):

Well Ce 115 drilled in 1954 to a depth of 190 feet had a reported yield of 300 gallons per minute (gpm) while drawing the water level down from 10 feet to 25 feet below the ground surface; and

Well Ce 148 drilled in 1964 to a depth of 197 feet had a reported yield of 300 gpm while drawing the water level down from 18 feet to 24 feet below the ground surface.

According to well data presented in Boggess and Heidel (1968) and Andreasen and Smith (1997), there are few wells in the Salisbury area completed in the Manokin Aquifer. The little data that are available show well yields in the Manokin Aquifer are variable, indicating that the formation can be heterogeneous in its makeup and ability to yield water. Two wells installed by the City of Salisbury in the Manokin Aquifer located about 3 miles southeast of the Landfill had yields ranging from 1.4 to 40 gpm. Two wells installed at a golf course located 5.5 miles southeast of the Landfill had reported yields ranging from 70 to 275 gpm.

The State recommends that the proposed supply well for the IWP project be placed in the Manokin Aquifer, and the recommended license conditions reflect this recommendation (see Condition 35). The well will need to be completed to a depth greater than 100 feet below the ground surface to ensure that the well has a sufficient length of screen in the Manokin Aquifer. Completing the well in the confined Manokin Aquifer rather than the overlying unconfined Salisbury Aquifer will provide protection from potential sources of water quality degradation in the Salisbury Aquifer because the two units are separated by a 20 foot thick confining bed. Further, literature information indicates that the Manokin Aquifer will yield more than an adequate amount of ground water to supply the IWP LFG generation facility.

4.2.2.4 *Potential Impact to the Manokin Aquifer*

Potential impact to the Manokin Aquifer associated with withdrawal of ground water to support the IWP project was evaluated using a conceptual approach. The conceptual approach consists of a comparison of measured drawdown in the Manokin Aquifer to the available drawdown. COMAR 26.17.06.05.D defines available drawdown in a confined aquifer as 80 percent of the pressure head measured from the top of the aquifer to the pre-pumping potentiometric surface of the aquifer. The available drawdown in the Manokin Aquifer was calculated using the information presented below. Figure 4-2 illustrates the calculation of available drawdown.

The historic pre-pumping potentiometric surface elevation in the Manokin Aquifer in the vicinity of the landfill is estimated to be approximately 32 feet above mean sea level (msl) based on a measurement of the static water level (i.e., non-pumping) collected in 1954 in well Ce 115 at Mardel By-products Corporation (42 feet msl land surface less 10 feet for the measured water level in the well) (Andreasen and Smith, 1997).

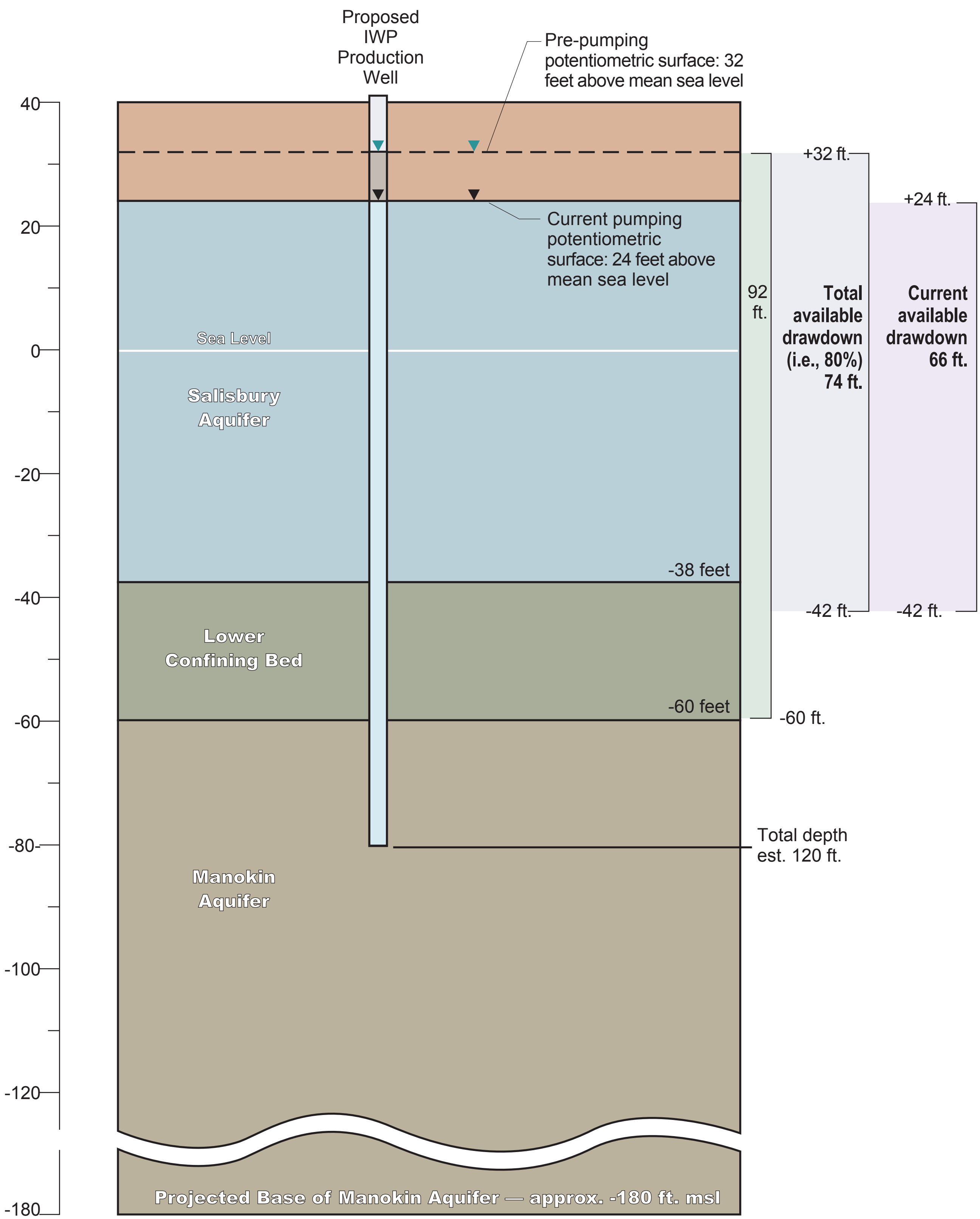
The top of the Manokin Aquifer at the landfill is estimated at an elevation of -60 feet below sea level (Andreasen and Smith, 1997).

The total amount of water level elevation is 92 feet, based on 32 feet msl for the historic water level plus -60 feet msl for the top of the Manokin Aquifer.

Based on the COMAR regulations, the Manokin Aquifer has an available drawdown to -42 feet msl (i.e., 80 percent of 92 feet). The current potentiometric surface in the Manokin Aquifer in the vicinity of the landfill is estimated to be approximately 24 feet above mean sea level (Andreasen and Smith, 1997). Therefore, there is 66 feet of available drawdown that remains in the Manokin Aquifer.

PPRP does not expect that the 400 gallons per hour or 6.7 gpm of ground water withdrawal from the Manokin Aquifer to reduce the amount of available drawdown in the aquifer given the minimal drawdown data created by two wells at Mardel By-products that yield 300 gpm. Additionally, the water level in the aquifer will have time to recover during the periods when the plant is not operating, which will mitigate the effects of the withdrawal.

Figure 4-2
Conceptual Cross-Section Illustrating Available Drawdown in the Manokin Aquifer



4.2.2.5 *Potential Impacts to Other Users*

PPRP requested from the MDE Ground Water Permits Program a survey of wells located within a half-mile radius of the landfill. Approximately 38 wells were identified within the search radius, the majority of which serve residential users. The number of wells within the search radius is approximate because the exact locations of the wells are not always available based on the information presented on the well completion report. Further, the well survey data are limited to wells installed after 1972 when the permitting process was instituted. For example, the wells installed at Mardel By-products were not identified in the survey because the wells were completed in the 1950's and 1960's.

The well completion reports for the wells within the search radius indicated that a majority of the wells were located in the Springhill Acres and Cedarhurst Acres communities. Further, residential wells are located on the properties located along Route 50 west of the landfill. The residential wells for the most part were completed in the Salisbury Aquifer to depths ranging from 70 to 95 feet.

Two wells within the half-mile search radius are interpreted to be completed in the Manokin Aquifer based on the well depths and log. One well is located at the Wicomico County Highway Maintenance shop on Brick Kiln Road. The well log indicates that the well was completed in gray medium sand at a depth of 120 feet, and was used to supply the maintenance shop. The second well is located west of the landfill on Levin Dashiell Road. The permit application indicates that the residential well has a depth of 180 feet; however no well log is available to indicate the geologic materials.

The proposed withdrawal of a maximum amount of 6.7 gpm from the Manokin Aquifer will have no impact on surrounding well users, including limited number of users in the Manokin Aquifer. The amount of the proposed withdrawal is too small to create a drawdown that could impact other users, and the majority of surrounding ground water users have wells completed in the overlying Salisbury Aquifer.

4.2.3 *Potential Ground Water Quality Impacts*

A potential source for ground water quality degradation is associated with the proposed 20,000 gallon No. 2 fuel tank that is planned to be installed as part of the project. The concern relating to ground water quality is the potential for leakage or spills of fuel during the delivery, storage, and distribution processes.

Based on information provided in IWP's Oil Operations Permit Application, the proposed oil storage tank will be placed within a diked concrete containment area capable of holding the contents of two 20,000-gallon oil storage tanks, as well as one 500-gallon lubricating oil tank and one 500-gallon used lubricating oil tank. The containment area will be constructed from concrete and sealed. The dike will be capable of holding 122 percent of the largest tank plus a six-inch rainfall. Further, fuel oil delivery trucks will be unloaded on a sealed concrete loading pad that drains into the containment dike. Responsible handling practices to be used at the IWP facility for the delivery and storage of oil will minimize the potential for releases to ground water.

In addition to the Oil Operations Permit, a Spill Prevention, Control, and Countermeasures (SPCC) Plan is required at a non-transportation related facility which, due to its location, could reasonably be expected to discharge oil in quantities that may be harmful into or upon the navigable waters of the U.S. or adjoining shorelines, and that stores or uses oil in quantities in excess of 1,320 gallons in aboveground containers or equipment (40 CFR 112.1). Because the proposed IWP LFG generation facility exceeds the regulated threshold, IWP will be required to maintain a SPCC plan. The SPCC Plan will identify spill prevention and emergency response measures that will be taken by IWP to prevent oil spills and minimize their potential impact.

4.2.4 Summary

The proposed maximum ground water withdrawal of 10,000 gpd to support the IWP project will not result in unacceptable impacts to the quantity and quality of the ground water resources. The reasons supporting this conclusion are listed below.

- **Reasonableness of Request**. The estimated maximum of 10,000 gpd to be withdrawn from the Manokin Aquifer is reasonable given the assumptions for both operating hours and operating conditions identified by IWP. Literature information indicates that the Manokin Aquifer is capable of providing the volume of ground water needed to operate the proposed power generating plant.
- **Impacts to Ground Water Resources**. The total ground water consumption required by the plant will not adversely impact the availability of ground water in the Manokin Aquifer. Literature information indicates that the small amount of the ground water withdrawal will not create drawdown beyond acceptable levels as defined by COMAR.

- **Impacts to Other Users**. The amount of the proposed withdrawal is too small to create a drawdown that could impact other users, and the majority of surrounding ground water users have wells completed in the overlying Salisbury Aquifer. Therefore, the small amount of water withdrawn to cool the engines will not adversely affect surrounding well users.

4.3 SURFACE WATER AND DRAINAGE IMPACTS

The proposed IWP LFG generation facility will be located adjacent to a storm water retention pond owned by Newland Park Landfill. Most surface water runoff from the facility will likely drain into the pond; however, north of the facility, some water may drain towards Owens Branch, a perennial stream approximately 1,800 feet distant. The storm water retention pond also receives runoff from the eastern flank of the landfill berm as well as the area around the leachate storage facility. The pond does not drain except during periods of significant rainfall. During these periods, the pond drains through an emergency spillway to the south-southeast emptying into a dry drainage ditch. The drainage ditch passes beneath Brick Kiln Road and eventually reaches Owens Creek approximately 2000 feet away. Owens Creek courses southeast, entering Mitchell Pond, which in turn drains into the Wicomico River; in total the distance covered is approximately 2 miles.

The proposed IWP LFG generation facility will require water for cooling during engine operation, and each of the three engine groups will have a small cooling tower. IWP proposes to use ground water as a source of make-up water to these cooling towers. Water will be taken from a well drilled into the Manokin Aquifer. The well will need to be completed to a depth of 120 feet below the ground surface to ensure that the well has a sufficient length of screen in the Manokin Aquifer. It is expected that the cooling tower would operate at about five cycles of evaporative concentration before blowdown, or discharge of the cooling tower water. IWP indicated that they did not intend to treat the water before discharge into a receiving body and estimated up to 1,000 gallons of water would be discharged per day.

At present, two options for effluent disposal are being considered by IWP. The preferred option would be to transport the effluent to the Salisbury Wastewater Treatment Plant along with leachate generated by the landfill. This option may require IWP to install a 2,500-gallon tank to hold effluent prior to disposal. The second option would be to discharge the effluent directly into a ditch that drains the landfill's storm water retention pond. This option would require IWP to obtain an NPDES permit.

To evaluate the characteristics of the potential discharge of processed ground water, a water supply well operated by the landfill was sampled and analyzed for physical and chemical parameters. Table 4-4 presents groundwater concentrations of the parameters, the estimated concentration after five cycles of concentration, and corresponding surface water quality criteria for wastewater discharge. Of the 23 parameters reported, only copper, thallium, and zinc had concentrations that would exceed water quality criteria after five cycles of concentration.

Copper is one of the most toxic heavy metals to freshwater biota affecting both plants and animals (Eisler, 1998). Root growth of pine tree species (*Pinus* spp.) was reduced at a copper concentration of 40 µg/L over 4 weeks and inhibited within 3 days at a concentration of 200 µg/L (Arduini, 1995). Reproduction of spotted salamanders (*Ambystoma maculatum*) failed at high concentrations of copper (>25 µg/L), although concentrations of lead and aluminum were also high (Blem and Blem, 1991). Bluegill larvae (*Lepomis macrochirus*) showed reduced survival at copper concentrations between 40 and 162 µg/L after 90 days (Benoit, 1975). Significant adverse effects of zinc on growth, survival, and reproduction of a wide range of aquatic organisms have been reported (Eisler, 1993). Reproduction of bluegill (Lepomis macrochirus) was inhibited at zinc concentrations between 76 and 235 µg/L; in addition, adults showed hyperactivity at 100 µg/L (Spear, 1981). Mixtures of copper and zinc are generally acknowledged to be more-than-additive in toxicity to a wide range of aquatic organisms (Eisler, 1993). Less information is available on the toxic effects of thallium on natural resources, however, it is generally believed to biomagnify in aquatic environments, eventually accumulating in fish and shellfish (ATSDR, 1992).

It should be noted, however, that the landfill well that was sampled for ground water was only about 80 feet deep, while IWP has indicated they will drill the new well 120 feet deep (IWP #5, 2005). If an NPDES permit is required, IWP will test the ground water from the new well, as before. If the results corroborate the high copper concentration, IWP will evaluate pre- or post-treatment technologies to resolve the issue. At present, IWP has indicated that they may pretreat the ground water source to reduce iron. Details of any additional process controls would need to be provided to obtain an NPDES permit.

Table 4-4 Chemical Parameters Measured in Ground Water Sampled from the Well at Newland Park Landfill[1,2]

Substance	Landfill Well	5 Cycles of Concentration	Surface Water Quality Criteria
Antimony (µg/L)	<5	-	6
Arsenic (µg/L)	<5	-	150
Barium (µg/L)	24	120	2000
Beryllium (µg/L)	<10	-	4
Chlorine (µg/L)	<1000	-	-
Chromium (total; µg/L)	<5	-	11
Chromium VI (µg/L)	<5	-	-
Copper (µg/L)	**24**	**120**	9
Lead (µg/L)	<5	-	15
Nickel (µg/L)	<5	-	100
Selenium (µg/L)	<5	-	5
Silver (µg/L)	<5	-	3.4
Thallium (µg/L)	**2.91**	**14.55**	1.7
Zinc (µg/L)	42	**210**	120
pH (SU)	7.7	-	6.5 – 8.5
Iron (mg/L)	1.1	5.5	-
Ammonia (mg/L)	0.2	1	2.18 – 9.6
TDS (mg/L)	50	250	-
TSS (mg/L)	<1	-	-
Sulfate (mg/L)	11.2	56	-
Nitrate (mg/L)	<0.01	-	-

1. IWP #5, 2005.
2. Concentrations in bold would exceed criteria for wastewater discharge.

By the preferred option, effluent disposal at the wastewater treatment facility would entail no direct ecological impact from the proposed project. Alternatively, the direct discharge of untreated effluent, derived from a groundwater source as described above, into the drainage ditch could adversely affect plants and animals occurring therein by exposing them to high concentrations of metals contaminants. As an intermittent stream, the drainage ditch is not likely not to sustain fish or aquatic invertebrates, however semi-aquatic species such as frogs and salamanders likely breed in vernal pools that form in the early spring. Initially, the effects of the contaminated effluent would be more apparent at the point of discharge in the upper section of the ditch. However, continuous discharges of up to 1,000 gallons a day could eventually affect the downstream Owens Creek as the metals contaminants concentrated in the water are carried further along by successive loadings.

The impact on Owens Creek, however, would be lessened in some degree, as the continuous stream flow would dilute the contaminated water. Based on six gages on the eastern shore with drainage areas ranging from 8.1 to 22.3 sq. miles, the 7Q10 flow in Owens Creek, above where the drainage ditch joins it, is estimated to be about 0.104-cfs. The 7Q10 flow is the 7-day low flow expected to occur once in ten years and that flow is often used as a conservative estimate of low flows for a stream. Based on 1,000-gpd (0.00155-cfs) as the maximum flow that might reach Owens Creek in a discharge from the proposed IWP LFG generation facility, the dilution that might occur at that point would be about 67 to 1.

The Maryland Biological Stream Survey (MBSS) is a stream-monitoring program administered by the Maryland Department of Natural Resources (DNR). Streams are monitored for water quality and biological resources including fish species. Although no monitoring sites were located on Owens Creek, a single site was monitored nearby Owens Branch to the east. The site yielded 6 fish species common to coastal plain streams: creek chubsucker, eastern mudminnow, golden shiner, least brook lamprey, pirate perch, and tessellated darter. Although the stream health index based on fish was moderate, an index calculated from physical attributes was relatively low indicating the stream has already been somewhat adversely affected.

4.4 WETLAND IMPACTS

Based on visual observations during the PPRP site visit on 13 June 2005, no wetlands exist on the proposed project site. As noted above, the facility would be adjacent to a storm water retention pond that may have a thin wetland habitat along its margins, but this should be unaffected. Therefore, it is concluded that no wetlands would be affected by the proposed IWP LFG generation facility project.

4.5 SUMMARY

The proposed IWP LFG generation facility project would be constructed at a small site within the Newland Park Landfill, an active, established landfill facility to the west of the City of Salisbury in Wicomico County, Maryland. The small area within the landfill that comprises the project, for the most part, is highly disturbed and exhibits a largely human-influenced ecology. For these reasons, it is concluded that the proposed project would have minimal or no effects on wildlife, sensitive habitats, threatened and endangered species, wetlands, or ground water. At least one nesting site of the great blue heron would be removed during project construction. Provided that project construction is done in accordance with guidance from the MD DNR, Wildlife and Heritage Service, the great blue heron should not be adversely affected and continue to nest in the area.

5.0 SOCIOECONOMIC, AESTHETIC, AND CULTURAL RESOURCE IMPACTS

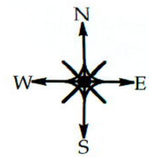
The Newland Park Sanitary Landfill, the only landfill in Wicomico County, covers approximately 125 acres and processes a daily average of 290 tons of solid waste (Wicomico County, 2005). The facility includes a transfer station and a residential drop-off and recycling center. With a lined disposal capacity of about 6 million square yards, Newland Park Landfill has an estimated 60 more years of operational life at the County's current waste disposal rate (MSW Management, 2003).

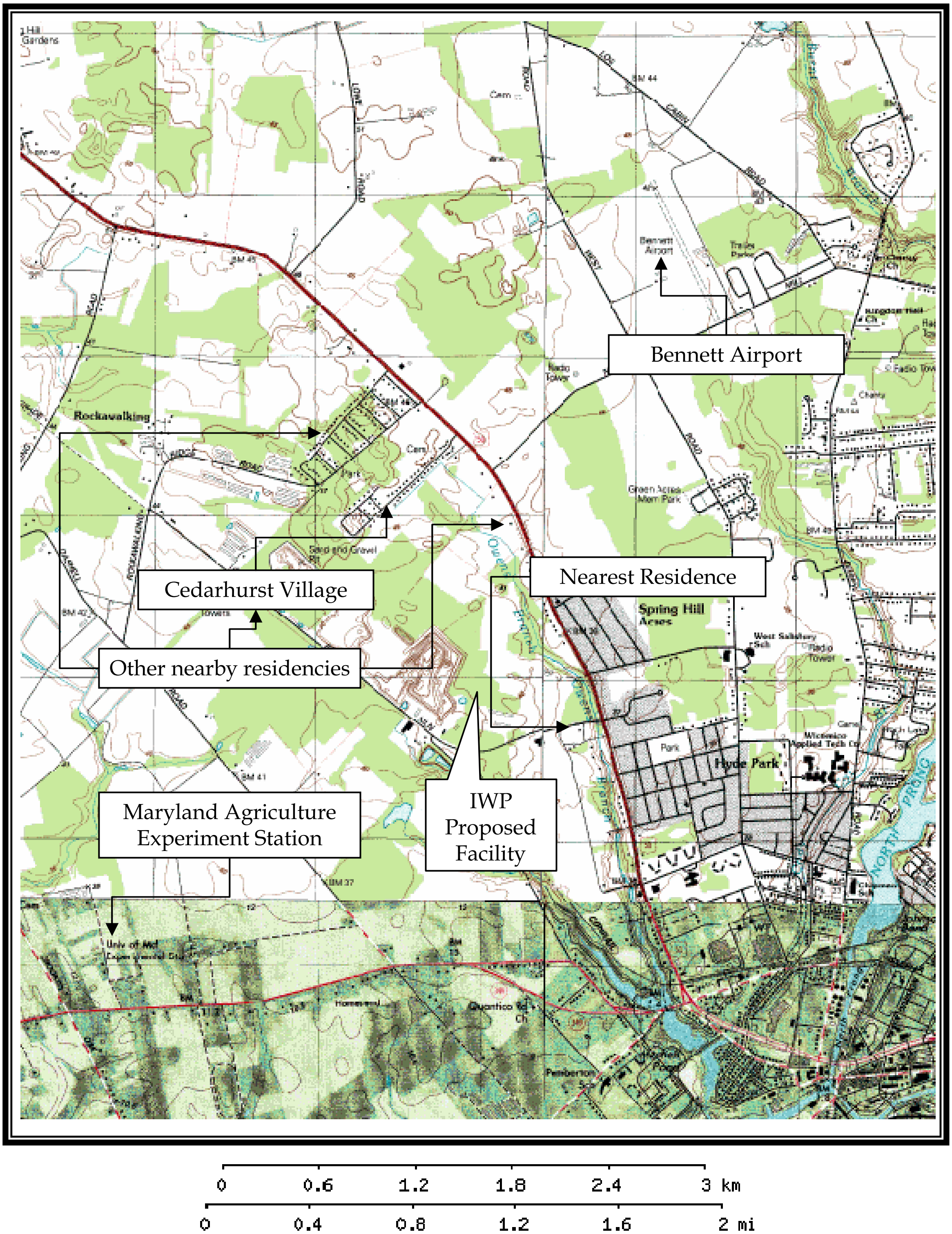
In 1999, EPA's Landfill Methane Outreach Program identified Newland Park as a positive candidate for a LFG generation facility project (EPA, 1999). IWP's application to build a LFG generation facility stems from its successful response to a Wicomico County RFP for construction and operation of such a facility. The facility is consistent with the County's 1998 Comprehensive Plan, which encourages the expansion and diversification of the economic base by recruiting small, select businesses.

The landfill is accessed from Brick Kiln Road, which fronts the facility along its western edge. Bordering the facility to the south is Owens Branch Road, connecting Brick Kiln Road to US 50 (West Salisbury Parkway). US 50 is a primary arterial that parallels the landfill's eastern border. A service road, Stanton Avenue, parallels a portion of Route 50 to its east and gives access to the home that abuts the landfill's property. At its northern end, Brick Kiln Road terminates in a T-intersection at Rockawalkin Ridge Road.

Land uses nearby the landfill include light industrial, agriculture, and residential, with approximately 350 residences within one mile of the proposed location of the IWP facility (Figure 5-1). IWP estimates that the facility would be approximately one-quarter mile from the nearest residence, one of a number of homes that sit to the east of the landfill on the west side of US 50. Landfill property abuts the backyards of all of the residences along this stretch of road. Mature woods along the border of the landfill provide significant year-round visual screening and no visual impact from the proposed facility is expected. To the north of the landfill lies the subdivision of Cedarhurst Village, which is likewise screened by mature woodlands and lies a greater distance away. A small number of residences is scattered to the northwest and west of the landfill. Most of residences to the south are buffered by the University of Maryland Agricultural Experiment Station. Bennett Airport, which has two turf runways, is located about two miles northeast of the landfill. The

Figure 5-1
Neighboring Properties
INGENCO Wholesale Power, LLC
Salisbury, Maryland





Source: USGS Topographic Map
Hebron Quadrangle (1992)

proposed LFG generation facility's distance from the airport and the relatively low height of its stacks exempts IWP from filing a Notice of Proposed Construction with the Federal Aviation Administration (FAA, 2005).

No significant aesthetic impacts are expected from either the construction or operation of the facility. The height of the enclosure would be 20 feet, with 12-inch diameter stacks extending another 22 feet. The facility will be located on a southeast interior portion of the landfill property, completely screened from the view of surrounding properties by existing deciduous and evergreen woodlands. The only open view towards the facility is from Brick Kiln Road at the landfill's transfer entrance. It is not anticipated that there will be any direct view of the facility itself from Brick Kiln Road, and the view is already substantially degraded in any event. While, it is unlikely stack emissions would be visible beyond the landfill, applicable air quality opacity limits described in Section 6, would govern the operation of the facility.

The facility would be constructed on land that has been disturbed by landfill operations. There are no known archaeological sites within the Newland Park Landfill. As a result, excavation for construction is not expected to discover or disturb archeological resources. The Maryland Inventory of Historic Properties lists two sites located within one mile of the proposed LFG generation facility. Bishop Stone house (WI-22) is historically significant as the residence of Bishop William Murray Stone (1779-1838), consecrated as Bishop of Maryland in 1830. The H. Hearn house is representative of the settlement pattern of farms in the 19th century along the main road from Cambridge to Salisbury. The house was constructed c. 1876 and is similar to other modest houses found on the Eastern Shore. A determination of eligibility conducted in 1994 concluded the property is not eligible for the National Register of Historic Places because it lacks architectural significance and is not associated with any known significant event or person. The Maryland Historical Trust has determined that the undertaking would have no effect on historic properties (MHT, 2005).

The construction phase of the facility is expected to last five months, with expenditures for materials and labor totaling between $2.3 and $2.5 million. Some, but not all, of these expenditures would flow to business within the county. Major components, for example the Detroit Diesel Series 60 engines mated to 350 kW generators, are manufactured out-of-state. Once in operation, the facility would make a minor, but positive contribution to County revenues. IWP estimates leasehold improvements to the Newland Park site would range between $500,000 and $600,000 (IWP #4, 2005). The 2005-2006 tax rate on real property in Wicomico

County is $0.993/hundred, and a one-percent "prompt pay" discount may be taken for payments made within a specified time period. As a result, the first year real property revenue from the facility would fall somewhere between $5,958 and $4,915, figures that represent roughly 0.01% of the county's estimated 2005-2006 real property tax revenues of $44.4 million (Wicomico Budget, 2005).

Taxable business personal property would constitute another revenue stream for the county. IWP estimates that approximately $1.2 million worth of personal property would be installed at the facility. Most, if not all of this property would be classified as Category G personal property, which is eligible for a 50% exemption under Maryland law. Wicomico County's FY06 personal property tax rate is $2.483/hundred, yielding first-year revenue of approximately $15,000, or just under 0.13 percent of the county's estimated 2005-2006 personal property tax revenues of $11.6 million (Wicomico Budget, 2005). Subsequent year revenues would be less as the equipment depreciates under the standard 30-year schedule.

In addition, the County would see revenue from lease payments and the sale of the landfill gas, as well on some portion of the facility's operations and maintenance budget, which is estimated by IWP to be approximately $300,000 per year. IWP indicates that three full-time employees will staff the facility. These would be new jobs to the County and would generate additional spending and tax revenue if the employees choose to reside within the County.

No marginal expenditures on infrastructure or services by the County are anticipated. Neither the construction nor operation of the facility is expected to have any impact upon housing or transportation in the County. The short construction schedule means that any workers from outside the County would either commute to the job site or seek temporary lodging. The small scale of the facility means construction crews would also be small in number and their commute to and from the jobsite would likely have no measurable impact on traffic flow. The three full-time employees would have no measurable impact on the County's housing stock.

Traffic associated with the facilities operation and maintenance would have no measurable impact. The most frequent traffic, aside from employee daily commutes, would be the regular delivery of fuel oil. This would, on average, amount to one 3,000-gallon tanker truck per week or two 6,500-gallon loads per month.

6.0 RECOMMENDED LICENSING CONDITIONS

PPRP has completed an environmental review of the proposed landfill gas generation facility project at the Wicomico County Newland Park Landfill through coordination with the following State agencies: Maryland Energy Administration, Maryland Department of the Environment (MDE), Maryland Department of Planning, Maryland Department of Transportation, Maryland Department of Business and Economic Development, and the Maryland Department of Agriculture. This evaluation was prepared by PPRP in close cooperation with IWP for inclusion as part of IWP's CPCN application to the Maryland Public Service Commission (PSC), and has been conducted in accordance with requirements of PSC regulations for the construction of electric generation equipment.

The State's evaluation indicates that based on the available information for this application of converting LFG to energy, this project will not result in any significant adverse environmental impacts if it is operated with the restrictions included in the State's recommended licensing conditions. Limits on the annual emissions of NO_x, VOC, and CO are proposed to exempt IWP from the requirements of major source NA-NSR and PSD permitting. Several Federal and State air pollution control regulations that apply to the engines are recommended to the PSC for inclusion as conditions of the CPCN Final Order. Based on available emissions data, the engines will be in compliance with the applicable regulations. Post-construction performance sampling is recommended for key pollutants to verify emissions estimates and ensure compliance with emissions standards.

An evaluation of the noise impacts from the engines was conducted using the available noise measurements from identical engines in operation at the IWP LFG generation facility located in Amelia County, Virginia. The evaluations indicate that the noise levels from the engines will comply with the applicable noise limits.

No substantive impacts to water quality, terrestrial or biological resources, or socioeconomic, aesthetic, or cultural resources will occur since minimal construction will be required to install the electrical generation system. The system will be located within a new building adjacent to the existing LFG collection and flare system on the existing landfill site. IWP is exploring wastewater discharge options; however, if IWP has a direct discharge into the drainage ditch leading into an intermittent stream, IWP will be required to obtain an NPDES permit (IWP #2, 2005).

Based on the State's evaluation, the following licensing conditions are proposed for consideration by the PSC for incorporation into the CPCN Final Order for the proposed LFG generation facility project.

General

1. Except as otherwise provided for in the following provisions, the application for the Certificate of Public Convenience and Necessity (CPCN) is considered to be part of this CPCN for the INGENCO Wholesale Power, LLC (IWP) gas-to-energy project at the Newland Park Landfill. The application consists of the original application received by the Maryland Public Service Commission (PSC), including Data Request #1, on 11 August 2005 and subsequent data request responses to PPRP on 14 July 2005, 15 August 2005, 30 September 2005, and 7 November 2005. Construction of the landfill gas (LFG) generation facility shall be undertaken in accordance with the CPCN application and subsequent amendments. If there are any inconsistencies between the conditions specified below and the application for the CPCN, the conditions in this CPCN shall take precedence. In the application, estimates of dimensions, volumes, emission rates, operating rates, feed rates and hours of operation are not deemed to constitute enforceable numeric limits except to the extent that they are necessary to make a determination of compliance with applicable regulations.

2. If any provision of this CPCN shall be held invalid for any reason, the remaining provisions shall remain in full force and effect, and such invalid provision shall be considered severed and deleted from this CPCN.

3. Representatives of the Maryland PSC shall be afforded access to the IWP LFG generation facility at any reasonable time to conduct inspections and evaluations necessary to assure compliance with the CPCN. IWP shall provide such assistance as may be necessary to conduct such inspections and evaluations by representatives of the PSC effectively and safely.

4. Representatives of the Maryland Department of the Environment (MDE) and the Wicomico County Health Department shall be afforded access to the IWP LFG generation

facility project site at any reasonable time to conduct inspections and evaluations necessary to assure compliance with the CPCN requirements. IWP shall provide such assistance as reasonably may be necessary to conduct such inspections and evaluations by representatives of the MDE effectively and safely, which may include but need not be limited to the following:

a) Inspecting construction authorized under this CPCN;

b) Sampling any materials stored or processed on site, or any waste, or discharge into the environment;

c) Inspecting any monitoring or recording equipment required by this CPCN or applicable regulations;

d) Having access to or copying any records required to be kept by IWP pursuant to this CPCN or relating to regulations applicable to the construction, operation, maintenance or inspection of the facility;

e) Obtaining any photographic documentation and evidence pursuant to this CPCN or regulations applicable to the construction, operation, maintenance or inspection of the facility; and

f) Determining compliance with the conditions and regulations specified in the CPCN.

5. Except as otherwise provided herein, IWP shall not transfer ownership or control of the LFG generation facility so as to divest IWP of its ability to control the construction or operation of the LFG generation facility without the written consent of the PSC. In the event of any such proposed transfer, IWP shall notify the proposed successor of the existence of the requirements of this CPCN by letter and shall send a copy of that letter to the Secretary of the Public Service Commission, the Director of the Air and Radiation Management Administration of the Maryland Department of the Environment, and the Director of the Power Plant Research Program of the Maryland Department of Natural Resources. Any such successor shall be subject to the CPCN and all applicable requirements and obligations therein. Prior to the commencement of its operations of the LFG generation facility, any such successor shall provide any assurances required by

the PSC that the LFG generation facility will be operated in compliance with this CPCN and its conditions. The approval of the PSC shall not be required if (i) IWP transfers a collateral security interest in the LFG generation facility, or (ii) IWP sells its interest in the LFG generation facility to a person or entity that becomes a passive owner of the LFG generation facility solely for financing purposes, nor shall such transferee or purchaser be subject to the CPCN and the requirements and obligations therein solely by virtue of acquiring and holding such interests. In the event that an entity holding a collateral security interest in the LFG generation facility or passive ownership for financing purposes acquires ownership or control of the LFG generation facility so as to divest IWP of its ability to control the construction or operation of the LFG generation facility, such entity shall be subject to this CPCN and its conditions.

Air Quality

I. General Air Quality Requirements

6. For air permitting purposes, the IWP project shall include eighteen, Detroit Diesel Series 60 engines, with each engine mated to a 350-kW generator. The engines will be grouped into three six-engine modules for a total of 18 engines. Each module shall have one stack no less than 42 feet in height and no greater than one foot in diameter.

7. This CPCN constitutes the air quality construction permit for the IWP gas-to-energy project at the Newland Park Landfill. In accordance with COMAR 26.11.02.04B, the air quality provisions expire if, as determined by MDE Air and Radiation Management Administration (ARMA):

    a) Construction is not commenced within 18 months after the date of issuance of a final CPCN;

    b) Construction is substantially discontinued for a period of 18 months or more after it has commenced; or

    c) Construction is not completed within a reasonable period of time after the date of issuance of a final CPCN.

8. IWP shall be subject to the following conditions related to permits to operate:

   a) At least 60 days prior to the anticipated date of start-up of the source, IWP shall submit to ARMA an application for a temporary State permit to operate; and

   b) IWP shall submit a complete Title V permit application to ARMA no later than 12 months after the date that the source commences operations.

9. All requirements pertaining to air quality that apply to IWP shall apply to all subsequent owners and/or operators of the LFG generation facility. In the event of any change in control or ownership, IWP shall notify the succeeding owner/operator of the existence of the requirements of this CPCN pertaining to air quality by letter, and shall send a copy of that letter to MDE ARMA.

II. Applicable Air Quality Regulations

10. IWP is subject to all applicable federally enforceable State air quality requirements including, but not limited to, the following regulations:

    a) COMAR 26.11.01.04A which requires IWP to follow test methods described in Section C of the regulation to determine compliance;

    b) COMAR 26.11.01.07C which requires IWP to report any excess emissions that are expected to last or actually last for one hour or more;

    c) COMAR 26.11.03.01 which requires IWP, because it is a major source for CO, to apply for a Part 70 permit in a timely manner;

    d) COMAR 26.11.06.03D which requires reasonable precautions to prevent any particulate matter from becoming airborne as a result of material being handled, transported, or stored;

    e) COMAR 26.11.09.05B(2) which prohibits the discharge of emissions from any engine, operating at idle, greater than 10 percent opacity; and

f) COMAR 26.11.09.05B(3) which prohibits the discharge of emissions from any engine, operating at other than idle conditions, greater than 40 percent opacity.

<u>Exceptions</u>:

(1) COMAR 26.11.09.05B(2) does not apply for a period of 2 consecutive minutes after a period of idling of 15 minutes for the purpose of clearing exhaust system;

(2) COMAR 26.11.09.05B(2) does not apply to emissions resulting directly from cold engine start-up and warm-up for the following maximum periods:

(i) Engines that are idled continuously when not in service: 30 minutes; and

(ii) All other engines: 15 minutes;

(3) COMAR 26.11.09.05B(2) and B(3) do not apply while maintenance, repair, or testing is being performed by qualified mechanics.

11. IWP is subject to all applicable State-only enforceable air quality requirements including, but not limited to, the following regulations:

a) COMAR 26.11.02.13A(65) which requires IWP to obtain a State permit to operate;

b) COMAR 26.11.02.19C which requires IWP to maintain records necessary to support the emission certification;

c) COMAR 26.11.02.19D which requires IWP to certify the actual emissions of the regulated pollutants from that source; and

d) COMAR 26.11.06.08 and .09 which generally prohibit the discharge of emissions, including gases, vapors or odors, beyond the property line in such a manner that a nuisance or air pollution is created.

III. Construction and Operation

12. IWP shall only burn landfill gas collected from the Newland Park Landfill and/or No. 2 fuel oil in the eighteen engines. The engines shall be operated with a 24-hr (calendar day) average timing for each operating mode that is no more than one degree different from the timing used in the respective, initial performance tests.

13. IWP shall not combust fuel with a sulfur content in excess of 0.3% by weight (COMAR 26.11.09.07A(1)(c)).

14. Except during periods of start-up, shutdown, or malfunction, IWP shall limit the emissions from each engine to the following:

    PM_{10}: 0.2 lb/MMBtu

    This limit is in force in order for the LFG generation facility to meet the PM_{10} 24-hr NAAQS under COMAR 26.11.04.04.

15. The annual emissions from all 18 engines shall meet the following limits for any consecutive 12-month rolling sum total:

    NO_x: < 100 tpy
    VOC: < 50 tpy
    CO: < 250 tpy

    These limits are in force in order for the LFG generation facility to avoid NA-NSR and PSD applicability requirements.

16. Except during periods of "shifting modes", the LFG generation facility shall only be operated with each engine in one of the following three modes:

    a) Mode 1 – Each engine at maximum production and firing only No. 2 fuel oil.
    b) Mode 2 – Each engine at maximum production and firing No. 2 fuel oil and up to 30 percent landfill gas.
    c) Mode 3 – Each engine at maximum production and firing No. 2 fuel oil with at least 81 percent landfill gas, but no more than 96 percent landfill gas.

    A period of "shifting modes" shall not exceed 15 minutes.

17. The LFG generation facility emissions shall be calculated under the following requirements:

a) monthly as the sum of the emissions under each of the operating modes described below according to the following equations:

$$\text{NOx (lbs)} = \left[\left(\frac{(A \times CV_{liq}) \times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right) \times \text{ENOx(l)}\right] + \left[\left(\frac{(B \times CV_{LFG}) \times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right) \times \text{ENOx (LFG)}\right]$$

$$\text{CO (lbs)} = \left[\left(\frac{(A \times CV_{liq}) \times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right) \times \text{ECOx (l)}\right] + \left[\left(\frac{(B \times CV_{LFG}) \times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right) \times \text{ECOx (LFG)}\right]$$

Given:

A = gallons of No. 2 fuel oil consumed under each operating range for any given time period.
B = cubic feet of landfill gas consumed under each operating range for any given time period.
CV_{liq} = calorific value (heat content) in Btu/gallon of No. 2 fuel oil.
CV_{LFG} = calorific value (heat content) in Btu/cubic foot of treated landfill gas.

And the following fuel-specific emission factors:

ENOx (l) = Emissions factor for NO_x from No. 2 fuel oil
ENOx(LFG) = Emissions factor for NO_x from LFG
ECO(l) = Emissions factor for CO from No. 2 fuel oil
ECO(LFG) = Emissions factor for CO from LFG

b) The fuel-specific ENOx and ECO values used for the IWP LFG generation facility shall be determined based on initial stack testing of the facility emissions. ENOx and ECO values shall be defined thereafter based on the most recent stack testing data. Fuel-specific ENOx values shall be determined for each of the "NO_x operating modes": 100% No. 2 fuel oil, 1 – 30% LFG, and 81 – 96% LFG. Fuel-specific ECO values shall be determined for the "CO operating modes": 0-30% LFG and 81-96% LFG. The method for determining these factors is specified in Condition 20.

c) Each equation is valid only if the total heat input contribution from treated landfill gas is less than or equal to 96% of the total heat input for any period of continuous dual-fuel operation, expressed as the ratio of treated landfill gas heat input to total fuel heat input (for each period of continuous dual-fuel operation), according to the following equation:

$$HI_{LFG} = \frac{B \times CV_{LFG}}{(A \times CV_{liq}) + (B \times CV_{LFG})} \times 100 \leq 96\%$$

d) Subsequently the previous 12-month, rolling emissions will be calculated and recorded for each pollutant by summing the prior consecutive 12 months' emissions.

IV. Monitoring and Testing

18. Compliance stack testing of the engines shall be conducted under the following requirements:

a) Testing shall be performed within 180 days of initial start-up, using approved EPA test methods, to quantify PM_{10} and hazardous air pollutant (HAP) emissions and demonstrate compliance with the emission limits specified in the CPCN. PM_{10} and HAP stack test results will be the average of at least three runs under similar operating conditions. The HAP stack tests shall be performed under "high gas fraction" conditions of 94% LFG (+/- 2%). PM_{10} stack tests shall be performed under 100% No. 2 fuel oil conditions. At least one module of engines shall be tested with at least four engines operating in that module, under similar operating conditions. This is assumed to represent the emissions for all identical engines.

b) Testing shall be performed when operating at a minimum of 90 percent of the design engine load. If testing cannot be performed at the minimum engine load, then the actual engine load during testing shall become the allowable permitted engine load for that operating mode.

c) The following HAPs should be tested for:

Hydrogen Chloride
Benzene
Toluene
Chlorinated HAPs listed in AP-42, Table 2.4-1
Formaldehyde
Acetaldehyde
Polycyclic Aromatic Hydrocarbons

19. Compliance stack testing of the engines shall be conducted under the following requirements:

a) Testing shall be performed within 180 days of initial start-up, using approved EPA test methods, to quantify a site-specific VOC emission factor (in lbs/MMBtu) to be used in calculations when demonstrating compliance with the facility's annual VOC emission limit specified in the CPCN. The VOC emission factor will be the maximum value resulting from two tests. Each test result will be the average of at least three runs, performed under similar operating conditions. Each VOC stack test shall be performed under "high gas fraction" conditions of 94% LFG (+/- 2%). At least one module of engines shall be tested with at least four engines operating in that module, under similar operating conditions. This is assumed to represent the emissions for all identical engines.

b) Testing shall be performed when operating at a minimum of 90 percent of the design engine load. If testing cannot be performed at the minimum engine load, then the actual engine load during testing shall become the allowable permitted engine load for that operating mode. Subsequent stack testing for VOCs shall be performed at least once per Title V permit term (every five years). During each Title V permit term, IWP is required to test the module of engines that has not been tested for the longest duration of time.

20. Compliance stack testing of the engines shall be conducted under the following requirements:

a) Testing shall be performed within 180 days of initial start-up, using approved EPA test methods, to determine the fuel-specific NO_x and CO emission factors (ENOx(l), ENOx(LFG), ECO(l) and ECO(LFG)) for the different "NOx operating modes" and "CO operating modes" that are representative of the emissions from IWP's LFG generation facility. These emission factors shall be used in the equations in Condition 17 to demonstrate compliance with the annual emission limits specified in the CPCN.

b) To determine ENOx(l), ENOx(LFG), ECO(l), and ECO(LFG) for each of the three operating modes, IWP shall perform NO_x and CO stack tests when operating at the following gas fractions/test conditions:

Test No.	Test Condition
1	100% No. 2 fuel oil;
2	28 +/- 2% LFG;
3	83 +/- 2% LFG; and
4	94 +/- 2% LFG.

Operating data will be collected during each stack test to determine A, B, CV_{liq}, and CV_{LFG} as defined in Condition 17.

c) The fuel-specific emission factors (in lbs/MMBtu) resulting from Test #1 will be the emission factors used when operating using 100% No. 2 fuel oil.

d) For operating modes 1% - 30% and 81 – 96%, the fuel-specific emission factors shall be calculated algebraically using one of the two, equivalent methods described in Attachment A to the Recommended Licensing Conditions.

e) At least one module of engines shall be tested with at least four engines operating in that module, under similar operating conditions. This is assumed to represent the emissions for all identical engines. NO_x and CO stack test results will be the average of at least three runs under similar operating conditions. Testing shall be performed when operating at a minimum of 90 percent of the design engine load for Test # 1, 2, and 4. Test #3 shall be performed at the highest practical engine load consistent with operational design and safety. If testing cannot be performed at the minimum engine load, then the actual engine load during testing shall become the allowable permitted engine load for that operating mode. Subsequent stack testing for NO_x and CO shall be performed at least once per Title V permit term (every five years). During each Title V permit term, IWP is required to test the module of engines that has not been tested for the longest duration of time.

21. At least 30 days prior to conducting any compliance stack test, IWP shall submit a test protocol to ARMA for review and approval. Compliance stack testing shall be conducted in accordance with ARMA Technical Memorandum (TM) 91-01, "Test Methods and Equipment Specifications for Stationary Sources" (January, 1991), as amended by Supplement 1 (1 July 1991), 40 CFR 51, 40 CFR 60, or subsequent test protocols approved by ARMA. If EPA Method 19 is used to determine lb/MMBtu emission values, IWP shall use a site-specific F-factor calculated using the LFG constituent data and equations described in Method 19. Test ports shall be located in accordance with TM 91-01 (January 1991), or subsequent or alternative measures approved by ARMA.

22. In accordance with COMAR 26.11.01.04A, IWP may be required to conduct additional stack tests at any time as may be prescribed by ARMA.

V. Recordkeeping and Reporting

23. IWP shall continuously monitor the timing of each engine. IWP shall calculate and record each engine's 24-hour (calendar day) average timing value for each operating mode.

24. IWP shall install, operate and maintain a device that continuously measures and records the flow of treated LFG and No. 2 fuel oil to each engine. This data shall be sorted by the operating mode in which each engine is operating at the time using the operating modes identified in Condition 17.

25. IWP shall measure and record the following:

a) gallons of No. 2 fuel oil consumed under each operating range for any given time period;

b) cubic feet of landfill gas consumed under each operating range for any given time period;

c) percent methane in the LFG at least daily to calculate the heat content of the LFG (In the event of any equipment malfunction causing a failure to record the daily reading, the highest percent methane reading over the previous 30 days shall be used);

d) heat content of No. 2 fuel oil, as provided by the vendor analysis, per shipment; and

e) the sulfur content of No. 2 fuel oil, as provided by the vendor analysis, per shipment.

26. IWP shall calculate the NOx, VOC and CO emissions on a daily basis using the quantities of LFG and No. 2 fuel oil, the gas fraction condition, and the most recent data on heat contents of the LFG and No. 2 fuel oil. At the end of each calendar month, IWP shall record the monthly total emissions of NOx, VOC and CO and re-calculate the 12-month rolling total emissions data for each pollutant for comparison to the annual emission limits.

27. Final results of each compliance stack test must be submitted to MDE ARMA within 60 days of completion of the test. Analytical data shall be submitted to ARMA directly from the emission testing company. IWP shall provide MDE ARMA with copies of the testing results and the new site-specific, fuel-specific emission factors. Upon review and approval by MDE, the new, site-specific ENO_x and ECO values shall be used for the NOx and CO emission calculations.

28. IWP shall furnish written notification to ARMA of the following events:

a) The date construction commenced within 30 days after such date;

b) The anticipated start-up date, not more than 60 or less than 30 days prior to such date;

c) The actual start-up date within 15 days after such date; and

d) The anticipated date of compliance stack testing at least 30 days prior to such date.

29. All records and logs shall be maintained at the LFG generation facility for at least five years after the completion of the calendar year in which they were collected. These data shall be readily available for inspection by representatives of ARMA.

30. IWP shall certify the actual emissions of regulated pollutants per COMAR 26.11.02.19D from the LFG generation facility.

    a) Certification shall be on a form obtained from ARMA and shall be submitted to ARMA no later than April 1 of the year following the year for which certification is required.

    b) The individual making the certification shall certify that the information is accurate to the individual's best knowledge. The certifying individual shall be:

        (i) familiar with each source for which the certification form is submitted; and

        (ii) responsible for the accuracy of the emissions information.

31. IWP shall certify compliance with the regulated terms and conditions of its Part 70 permit per COMAR 26.11.03.06G for the LFG generation facility.

32. All air quality notifications and reports required by this CPCN shall be submitted to:

Administrator, Compliance Program
Maryland Department of the Environment
Air and Radiation Management Administration
1800 Washington Boulevard
Baltimore, Maryland 21230-1720

Other Requirements

33. Operators of the IWP LFG generation facility at the Newland Park Landfill shall take the necessary precautions to comply with the State noise limits contained in COMAR 26.02.03.

34. As directed by MDE Water Management Administration (MDE WMA), IWP shall prepare a Stormwater Pollution Prevention Plan, incorporating best management practices to prevent runoff of contaminated stormwater.

35. This CPCN authorizes IWP to appropriate and use ground waters of the State. The appropriation will be tracked under MDE WMA permit number XXXXX. The ground water appropriation will be subject to the following conditions:

    Allocation. The ground water withdrawal granted by this appropriation is limited to a daily average of 6,400 gallons on a yearly basis and a maximum daily withdrawal of 10,000 gallons for the month of maximum use.

    Use. The water is to be used for non-contact cooling water for the generation of electric power.

    Source. The water shall be taken from one well completed in the Manokin Aquifer to a depth of 120 feet.

    Location. The point of withdrawal shall be located at the Newland Park Landfill in Wicomico County.

36. *Initiation of Withdrawal*. IWP shall notify MDE WMA by certified mail when withdrawals for the uses specified in this appropriation have been initiated. This appropriation shall expire if water withdrawal is not commenced within two years after the effective date of issuance of the CPCN. The time limit may be extended for good cause, at the discretion of MDE WMA, upon written request to the MDE WMA prior to the expiration of the two-year period. Withdrawal associated with plant construction, startup and testing can qualify as initiation.

37. *Change of Operations*. IWP shall report any anticipated change in appropriation, which may result in a new or different use, quantity, source, or place of use of water, to MDE WMA by submission of a new application.

38. *Appropriation Review and Renewal*. DNR WMA shall review the appropriation every three years (triennial review). IWP will be queried every three years regarding water use under the terms and conditions of this appropriation. Failure to return the triennial review query will result in suspension or revocation of this appropriation. This appropriation will expire three years from the date that the CPCN was issued. In order to renew the appropriation, IWP shall file a renewal application with MDE WMA no later than 45 days prior to the expiration. MDE WMA may at anytime (including triennial review or when a change application is submitted) revise any condition of this appropriation or add additional conditions concerning the character, amount, means and manner of the appropriation or use, which may be necessary to properly protect, control and manage the water resources of the state. Condition revisions and additions will be accompanied by issuance of a revised appropriation.

39. *Right of Entry*. IWP shall allow authorized representatives of MDE WMA access to the LFG generation facility to conduct inspections and evaluations necessary to assure compliance with the conditions of this appropriation. IWP shall provide such assistance as may be necessary to effectively and safely conduct such inspections and evaluations.

40. *Appropriation Suspension or Revocation*. MDE WMA may suspend or revoke this appropriation upon violation of the conditions of this appropriation, or upon violation of any regulation promulgated pursuant to Title 5 of the environmental article, annotated codes of Maryland (1996 replacement volume) as amended.

41. *Drought Period Emergency Restrictions*. If MDE WMA determines that a drought period or emergency exists, IWP may be required under MDE WMA's direction to stop or reduce water use. Any cessation or reduction of water use must continue for the duration of the drought period or emergency, or until MDE WMA directs IWP that water use under standard appropriation conditions may be resumed.

42. *Non-Transferable*. This appropriation is non-transferable. A new owner may acquire authorization to continue this appropriation by filing a new application with MDE WMA. Authorization will be accomplished by issuance of a new appropriation.

43. IWP shall conduct the following monitoring activities in support of the ground water appropriation:

    Flow Measurement. Measure all ground water used under this appropriation by a method approved by MDE WMA.

    Withdrawal Reports. Submit to MDE WMA, semi-annually (July – December, no later than January 31 and January-June, no later than July 31), pumping records. These records shall show the total quantity of ground water pumped each month under this appropriation.

44. If IWP chooses to discharge waters, rather than transfer effluent to the Salisbury Wastewater Treatment Plant, IWP shall apply for and meet the conditions of an NPDES Permit required for any discharges it may have to the waters of the State.

45. IWP shall apply for and comply with the conditions of an Oil Operations Permit for the LFG generation facility, including, but not limited to the implementation of a Spill Prevention, Control, and Countermeasure (SPCC) Plan.

46. Informational copies of the reports required regarding change of ownership, stack test protocols, stack testing, and other air quality requirements as described in Conditions 5, 9, 21, 27, and 28 shall be sent to the Power Plant Research Program at:

    Power Plant Assessment Division
    Department of Natural Resources
    Tawes State Office Bldg, B-3
    580 Taylor Avenue
    Annapolis, MD 21401
    ATTN: Susan Gray

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Appendix A

Hazardous Air Pollutants (HAPS) Analysis

Comparison of HAP emission factors from Various AP-42 Sources and IWP Mountain View Facility Data and Calculation of Engine Organic and Mercury HAPs Emissions

Individual HAPs[1]	Molecular Weight (lb/lb-mol.)	Landfill AP-42 2.4-1,2 3 (ppmv)	Pre-Destruction Landfill AP-42 2.4-1,2 (lb/MMscf)	Pre-Destruction Landfill AP-42 2.4-1,2 (lb/MMbtu)	Destruction Efficiency[2] (%)	**Landfill Controlled AP-42 2.4-1,2 (lb/MMbtu)**	**Mt. View Landfill Exhaust Data (lb/MMBtu)**	**Diesel - fuel / Small ICE AP-42 3.3-2 (lb/MMbtu)**	**Dual-fuel / Large ICE AP-42 3.4-3,4 (lb/MMbtu)**	**Maximum Emission Factor (lb/MMBtu)**	**Annual Tons (tpy)**
1,1,1-trichloroethane	133.4	0.48	0.17	3.35E-04	93.0%	**2.34E-05**				**2.34E-05** a	**0.0068** b
1,1,2,2-tetrachloroethane	167.9	1.11	0.48	9.74E-04	93.0%	**6.82E-05**				**6.82E-05**	**0.0198**
1,1-dichloroethane	99.0	2.35	0.60	1.22E-03	93.0%	**8.51E-05**				**8.51E-05**	**0.0247**
1,1-dichloroethene	96.9	0.20	0.050	1.01E-04	93.0%	**7.10E-06**	**3.49E-03**			**3.49E-03**	**1.0126**
1,2-dichloroethane	99.0	0.41	0.11	2.12E-04	93.0%	**1.48E-05**				**1.48E-05**	**0.0043**
1,2-dichloropropane	113.0	0.18	0.053	1.06E-04	93.0%	**7.44E-06**				**7.44E-06**	**0.0022**
1,3-butadiene	54.1							**3.91E-05**		**3.91E-05**	**0.0113**
Acetaldehyde	44.1							**7.67E-04**	**2.52E-05**	**7.67E-04**	**0.2225**
Acrolein	56.1							**9.25E-05**	**7.88E-06**	**9.25E-05**	**0.0268**
Acrylonitrile	53.1	6.33	0.87	1.76E-03	86.1%	**2.44E-04**				**2.44E-04**	**0.0708**
Benzene	78.1	1.91	0.39	7.80E-04	86.1%	**1.08E-04**	**1.50E-03**	**9.33E-04**	**7.76E-04**	**1.50E-03**	**0.4352**
Carbon disulfide	76.1	0.58	0.11	2.31E-04	86.1%	**3.21E-05**				**3.21E-05**	**0.0093**
Carbon tetrachloride	153.8	0.017 [3]	0.0068	1.37E-05	93.0%	**9.57E-07**	**3.96E-05**			**3.96E-05**	**0.0115**
Carbonyl sulfide	60.1	0.49	0.076	1.54E-04	86.1%	**2.14E-05**				**2.14E-05**	**0.0062**
Chlorobenzene	112.6	0.25	0.073	1.47E-04	93.0%	**1.03E-05**				**1.03E-05**	**0.0030**
Chloroethane	64.5	1.25	0.21	4.22E-04	93.0%	**2.95E-05**				**2.95E-05**	**0.0086**
Chloromethane	50.5	1.21	0.16	3.19E-04	93.0%	**2.24E-05**	**1.54E-05**			**2.24E-05**	**0.0065**
Chloroform	119.4	0.03	0.0093	1.87E-05	93.0%	**1.31E-06**	**3.16E-05**			**3.16E-05**	**0.0092**
Dichloromethane	84.9	14.3	3.2	6.35E-03	93.0%	**4.44E-04**	**5.81E-03**			**5.81E-03**	**1.6857**
Ethylbenzene	106.2	4.61	1.3	2.56E-03	86.1%	**3.56E-04**				**3.56E-04**	**0.1032**
Ethylene dibromide	187.9	0.001	0.00049	9.82E-07	86.0%	**1.38E-07**				**1.38E-07**	**0.0000**
Formaldehyde	30.0							**1.18E-03**	**7.89E-05**	**1.18E-03**	**0.3424**
Hexane	86.2	6.57	1.5	2.96E-03	86.1%	**4.11E-04**				**4.11E-04**	**0.1194**
Mercury (total)	200.6	0.00029	0.00015	3.06E-07	0.0%	**3.06E-07**				**3.06E-07**	**0.0001**
Methyl ethyl ketone	72.1	7.09	1.3	2.67E-03	86.1%	**3.72E-04**				**3.72E-04**	**0.1078**
Methyl isobutyl ketone	100.2	1.87	0.49	9.79E-04	86.1%	**1.36E-04**				**1.36E-04**	**0.0395**
Napthalene	128.2							**8.48E-05**	**1.30E-04**	**1.30E-04**	**0.0377**
PAHs (Remaining Total)	--							**8.32E-05**	**8.20E-05**	**8.32E-05**	**0.0241**
Perchloroethylene	165.8	3.73	1.6	3.23E-03	93.0%	**2.26E-04**	**5.82E-03**			**5.82E-03**	**1.6886**
Toluene	92.1	39.3	9.4	1.89E-02	86.1%	**2.63E-03**		**4.09E-04**	**2.81E-04**	**2.63E-03**	**0.7634**
Trichloroethylene	131.4	2.82	0.96	1.94E-03	93.0%	**1.36E-04**	**4.73E-03**			**4.73E-03**	**1.3723**
Vinyl chloride	62.5	7.34	1.2	2.40E-03	93.0%	**1.68E-04**	**2.16E-03**			**2.16E-03**	**0.6267**
Xylenes	106.2	12.1	3.3	6.72E-03	86.1%	**9.33E-04**		**2.85E-04**	**1.93E-04**	**9.33E-04**	**0.2708**
TOTAL HAPs											**9.07**

Notes:

1. 1990 CAA Amendments Section 112(b) material listed in USEPA AP-42
2. Default control efficiency values for internal combustion engines AP-42 Table 2.4-3 (11/98), for landfill gas emission factors used
3. Carbon Tetrachloride AP-42 avlue of 0.004 was less than stack test data taken at Mountain View Landfill, therefore the Landfill stack test data of 0.017 ppmv was used

a. Sample calculation, chloroethane emission factor
(0.48 scf TCA/MMMscf LFG)(133.41 lb/lb-mol)/(385 scf/lb-mol) = 0.17 TCA lb/MMscf
(0.17 lb TCA/MMscf)/[(MMbtu/1E+06 btu)(992.65 btu/scf methane)(1E+06 scf/MMscf)(50% methane)] = 3.35E-4 lb/MMbtu
(3.35E-4 lb TCA/MMbtu LFG)(1-0.93) = 2.34E-5 lb TCA/MMbtu LFG

b. Sample calculation, 1,1,1 trichloroethane (TCA) tons per year
(2.34E-5 lb TCA/MMbtu LFG)(3.68 MMbtu/hr/engine)(18 engines)(8760 hr/yr)(ton/2000 lb)
= 0.0068 tpy TCA

Calculation of landfill gas combustion HCl emission factor

Influent Chlorine Compounds	Concentration[1] (ppmv)	Molecular Formula	No. Chlorine Atoms	Resulting HCl Emission Factor (lb/MMbtu)		Annual Tons (tpy)	
1,1,1-trichloroethane	0.48	$C_2H_3Cl_3$	3	2.74E-04	a	0.0741	b
1,1,2,2-tetrachloroethane	1.11	$C_2H_2Cl_4$	4	8.46E-04		0.2283	
1,1-dichloroethane	2.35	$C_2H_4Cl_2$	2	8.96E-04		0.2417	
1,1-dichloroethene	0.2	$C_2H_2Cl_2$	2	7.62E-05		0.0206	
1,2-dichloroethane	0.41	$C_2H_4Cl_2$	2	1.56E-04		0.0422	
1,2-dichloropropane	0.18	$C_3H_6Cl_2$	2	6.86E-05		0.0185	
Bromodichloromethane	3.13	$CBrCl_2$	2	1.19E-03		0.3220	
Carbon tetrachloride	0.004	CCl_4	4	3.05E-06		0.0008	
Chlorobenzene	0.25	C_6H_5Cl	1	4.77E-05		0.0129	
Chlorodifluoromethane	1.3	$CHClF_2$	1	2.48E-04		0.0669	
Chloroethane	1.25	C_2H_5Cl	1	2.38E-04		0.0643	
Chloroform	0.03	$CHCl_3$	3	1.72E-05		0.0046	
Chloromethane	1.21	CH_3Cl	1	2.31E-04		0.0622	
Dichlorobenzene	0.21	$C_6H_4Cl_2$	2	8.01E-05		0.0216	
Dichlorodifluoromethane	15.7	CF_2Cl_2	2	5.99E-03		1.6149	
Dichlorofluoromethane	2.62	$CHFCl_2$	2	9.99E-04		0.2695	
Dichloromethane	14.3	CH_2Cl_2	2	5.45E-03		1.4709	
Fluorotrichloromethane	0.76	$CFCl_3$	3	4.35E-04		0.1173	
Perchloroethylene	3.73	C_2Cl_4	4	2.84E-03		0.7673	
Trichloroethylene	2.82	C_2HCl_3	3	1.61E-03		0.4351	
t-1,2-dichloroethane	2.84	$C_2H_2Cl_2$	2	1.08E-03		0.2921	
Vinyl chloride	7.34	C_2HCl	1	1.40E-03		0.3775	
Total				**0.024**		**6.53**	

Notes:

1. Source: AP-42 Table 2.4-1 (9/97) *Default Concentrations for LFG Constituents*

a. Assumes complete conversion of chlorinated compounds to HCl.
Sample calculation, HCl emission factor for 1,1,1 trichloroethane (TCA)
(0.48 ft3 TCA/MMscf LFG) (3 mol HCl/mol TCA) (36.460 lb HCl/mol)
(mol/385.4 scf HCl)/[(992.65 MMbtu/MMscf methane)(50% methane)] = 2.74E-4

b. Sample calculation, 1,1,1 trichloroethane (TCA) tons per year
(2.74E-4 lb TCA/MMbtu LFG)(3.68 MMbtu/hr/engine)(18 engines)(8760 hr/yr)(ton/2000 lb)
(ton/2000 lb) (0.93) = 0.074 tpy TCA

Appendix B

Ingenco Wholesale Power, LLC
Applicable Requirements Review

Appendix B - INGENCO Wholesale Power, LLC Applicable Requirements Review:
Code of Maryland Regulations (COMAR)
Title 26, Subtitle 11 - Air Quality

Chpt	Sec.	Title	Applicable	Not Applicable	Comment/Explanation
01		**General Administrative Provisions**	✔		
	01	Definitions	✔		
	02	Relationship of Provisions in this Subtitle	✔		
	03	Delineation of Areas	✔		Wicomico County is located in Area VI
	04	A. Compliance Testing, B. Requirements for Monitoring, C. Emissions Test Methods	✔		
	05	Records and Information	✔		
	05-1	Emissions Statements-Wicomico County >50 tpy VOC; >100 tpy Nox		✔	IWP will be permitted to remain under the NO_X and VOC emissions thresholds.
	06	Circumvention	✔		
	07	Malfunctions & Temporary Increases of Emissions (Reporting Excess Emissions) .07C	✔		
	08	Determination of Ground Level Concentrations-Acceptable Techniques	✔		
	09	Vapor Pressure of Gasoline		✔	No gasoline stored at project site
	10	Continuous Emissions Monitoring		✔	
	11	Additional CEM Installation Requirements		✔	
02		**Permits, Approvals, and Registration**	✔		
	01	Definitions	✔		
	02	General Provisions	✔		(B) and (C) to obtain Permit to Construct and State Permit to Operate
	03	Federally Enforceable Permits to Construct and State Permits to Operate	✔		
	04	Duration of Permits	✔		
	05	Violation of Permits and Approvals	✔		
	06	Denial of Applications for State Permits and Approvals	✔		

Appendix B - INGENCO Wholesale Power, LLC Applicable Requirements Review:
Code of Maryland Regulations (COMAR)
Title 26, Subtitle 11 - Air Quality

Chpt	Sec.	Title	Applicable	Not Applicable	Comment/Explanation
	07	Procedures for Denying, Revoking, or Reopening and Revising a Permit or Approval	✔		
	08	Late Applications and Delays in Acting on Applications		✔	
	09	Sources Subject to Permits to Construct and Approvals	✔		
	10	Sources Exempt from Permits to Construct and Approvals	✔		
	11	Procedures for Obtaining Permits to Construct Certain Significant Sources		✔	
	12	Procedures for Obtaining Approvals of PSD Sources and NSR Sources, Permits to Construct, Permit to Construct MACT Determinations On a Case-by-Case Basis in Accordance with 40 CFR Part 63, Subpart B, and Certain 100-Ton Sources		✔	
	13	Sources Subject to State Permits to Operate	✔		Required until Title V issued under A(65)
	14	Procedures for Obtaining State Permits to Operate and Permits to Construct Certain Sources and Permits to Construct Control Equipment on Existing Sources	✔		
	15	Permits - Repealed		✔	
	16	Permit Fees	✔		
	17	Fee Schedule for New or Modified Emissions Units		✔	
	18	Fee Schedule for New or Modified Electric Generating Stations-$20,000	✔		IWP is an electric generating station
	19	Fee Schedule: Title V Permit or a State Permit to Operate-$200/yr + $/ton/yr .19A	✔		
	19	Information Required to be Maintained by Source .19C	✔		Required based on 26.11.02.13(A)(50) applicability

Appendix B - INGENCO Wholesale Power, LLC Applicable Requirements Review:
Code of Maryland Regulations (COMAR)
Title 26, Subtitle 11 - Air Quality

Chpt	Sec.	Title	Applicable	Not Applicable	Comment/Explanation
	19	Emissions Certification .19D	✔		Required based on 26.11.02.13(A)(50) applicability
03		**Permits, Approvals, and Registration -- Title V Permits**	✔		IWP will be a major source for CO
04		**Ambient Air Quality Standards**	✔		
05		**Air Pollution Episode System**		✔	Not a MDE designated source
06		**General Emission Standards, Prohibitions, and Restrictions**	✔		
	01	Definitions	✔		
	02	Visible Emissions: 06.02(C)(1)	✔		Cooling towers are applicable; 26.11.096A(1) take precedence for fuel burning equipment
	03	Particulate Matter: 06.03(B)	✔		Cooling towers are applicable; 26.11.096A(1) take precedence for fuel burning equipment
	03	Particulate Matter from unconfined sources (materials handling/construction): 06.03(D)	✔		
	04	Carbon Monoxide in Areas III and IV		✔	Wicomico County is in Area VI
	05	Sulfur Compounds from Other than Fuel-Burning Equipment		✔	Source does not contain sulfur emissions from non-fuel burning equipment
	06	VOCs		✔	Exempt because subject to 26.11.09
	07	Control of Sources of Fluoride Emissions		✔	No Fl emissions
	08	Nuisance	✔		
	09	Odors	✔		
	10	Refuse Burning Prohibited in Certain Installations		✔	
	11	Repealed		✔	

Appendix B - INGENCO Wholesale Power, LLC Applicable Requirements Review:
Code of Maryland Regulations (COMAR)
Title 26, Subtitle 11 - Air Quality

Chpt	Sec.	Title	Applicable	Not Applicable	Comment/Explanation
	12	Control of NSPS Sources		✔	NSPS not-applicable (40 CFR 60 Subpart Cc & Subpart WWW for landfills; and Subpart GG for combustion turbines, and proposed 11 July 2005 CI ICE rule reviewed). Not applicable to proposed rule if engines manufactured before 1 April 2006.
	13	Repealed		✔	
	14	Control of PSD Sources		✔	
	15	Nitrogen Oxides from Nitric Acid Plants		✔	
	16	Tables		✔	
07		**Open Fires**		✔	
08		**Control of Incinerators**		✔	
09		**Control of Fuel-Burning Equipment, Stationary Internal Combustion Engines, and Certain Fuel Burning Installations**	✔		
	01	Definitions	✔		
	02	Applicability	✔		Clarifies that .09 takes precedence over .06
	03	General Conditions for Fuel-Burning Equipment	✔		
	04	Prohibition of Certain New Fuel-Burning Equipment .09.04(A)-Area VI	✔		
	05	Visible Emissions .09.05(A)(1)-Area VI		✔	COMAR 26.11.09.05B(2) and (3) take precedence
	05	Visible Emissions .09.05(B)(2) & (3) -Stationary IC Engines	✔		
	06	Particulate Emissions .09.06(A)-Area VI	✔		
	07	Control of Sulfur Oxides From Fuel Burning Equipment .09.07(A)(1)-Area VI	✔		IWP is limited to 0.3% sulfur in no. 2 fuel oil
	08	Control of NOx Emissions for Major Stationary Sources		✔	Not a major NOx Source

Appendix B - INGENCO Wholesale Power, LLC Applicable Requirements Review:
Code of Maryland Regulations (COMAR)
Title 26, Subtitle 11 - Air Quality

Chpt	Sec.	Title	Applicable	Not Applicable	Comment/Explanation
	09	Tables and Diagrams		✔	
	10	Requirements to Burn Used Oil		✔	
10		**Control of Iron and Steel Production Installations**		✔	
11		**Control of Petroleum Products Installations, Including Asphalt Paving and Asphalt Concrete Plants**		✔	
12		**Control of Batch Type Hot-Dip Galvanizing Installations**		✔	
13		**Control of Gasoline and Volatile Organic Compound Storage and Handling**		✔	
14		**Control of Emissions from Kraft Pulp Mills**		✔	
15		**Toxic Air Pollutants**		✔	
	01	Definitions		✔	
	02	Control of NESHAP and MACT Sources		✔	Not a major HAP source; no 40 CFR 61 applicability or 40 CFR 63 (subpart ZZZZ reviewed) applicability
	03	Applicability and Exemptions		✔	26.11.15.03(B)(2)(a) exempts fuel burning equipment
	04	Requirement to Quantify Emissions		✔	
	05	Control Technology Requirements		✔	
	06	Ambient Impact Requirement		✔	
	07	General Requirements for Compliance Demonstration		✔	
16		**Procedures Related to Requirements for TAPs**		✔	
17		**Requirements for Major New Sources and Modifications**	✔		
	01	Definitions	✔		
	02	Applicability	✔		
	03	General Conditions	✔		

Appendix B - INGENCO Wholesale Power, LLC Applicable Requirements Review:
Code of Maryland Regulations (COMAR)
Title 26, Subtitle 11 - Air Quality

Chpt	Sec.	Title	Applicable	Not Applicable	Comment/Explanation
	04	Baseline For Determining Credit For Emission and Air Quality Offsets	✔		
	05	Administrative Procedures	✔		
18		**Control of Agriculturally Related Installations**		✔	
19		**VOCs from Specific Processes**		✔	
20		**Mobile Sources**		✔	
21		**Control of Asbestos**		✔	
22		**Vehicle Emissions Inspection**		✔	
23		**Asbestos Accreditation of Individuals, and Approval of Training Courses**		✔	
24		**Stage II Vapor Recovery at Gasoline Dispensing Facilities**		✔	
25		**Control of Glass Melting Furnaces**		✔	
26		**Conformity**		✔	
27		**Post RACT Requirements for NOx Sources-NOx Budget Program**		✔	
28		**Policies and Procedures Relating to Maryland's NOx Budget Program**		✔	
29		**NOx Reduction and Trading Program**		✔	
30		**Policies and Procedures Relating to Maryland's NOx Reduction and Trading Program**		✔	
31		**Small Business Pollution Compliance Program**		✔	
32		**Control of Emissions of Volatile Organic Compounds from Consumer Products**		✔	

Attachment A to the Recommended Licensing Conditions

Sample Calculations

SAMPLE CALCULATIONS

Condition #17 requires that IWP determine the values of the fuel-specific emission factors: ECO(l), ECO(LFG), ENOx(l) and ENOx(LFG) for the different operating ranges specific to the Newland Park facility. These emission factor values are to be used in the equations in Condition #17 in conjunction with process monitoring data to calculate the rolling annual total emissions for the site. Condition #20 discusses the need to collect stack test data under different operating scenarios to accurately calculate the fuel-specific emission factors for the proposed site. These sample calculation methods described below are intended to assist the user in calculating the fuel-specific emission factors from the process and stack test data that will be collected for each operating mode.

In the examples below, the fuel-specific emission factors for NO_x: ENOx(l) and ENOx(LFG) will be determined for the high gas fraction operating mode (between 81% and 96% LFG). The values will be calculated using example data from hypothetical stack test No. 3 (81% gas fraction) and stack test No. 4 (96% gas fraction). The first sample method demonstrates how the values can be found by solving two simultaneous equations for the two unknown emission factor values. The second sample method demonstrates how the values can be determined graphically. Both sample methods are equivalent and will be acceptable for calculating for the fuel-specific emission factors for the proposed project.

The sample data that will be used in both examples can be found in Tables A-1 and A-2 below.

Table A-1 Test No. 3 – 81% Gas Fraction Results

Run #	NOx	A	CV_{liq}	B	CV_{LFG}	NOx	Gas fraction
	(lbs)	(gal)	(Btu/gal)	ft^3	(Btu/ft^3)	(lb/MMBtu)	%
1	2.51	2.3	136000	2850	500	1.44	82
2	2.83	2.7	136000	2950	500	1.54	80
3	2.67	2.5	136000	2900	500	1.49	81
Average	**2.67**	**2.5**	**136000**	**2900**	**500**	**1.49**	**81**

Table A-2 Test No. 4 – 96% Gas Fraction Results

Trial	NOx	A	CV_{liq}	B	CV_{LFG}	NOx	Gas fraction
	(lbs)	(gal)	(Btu/gal)	ft^3	(Btu/ft^3)	(lb/MMBtu)	%
1	1.3	1.0	136500	6700	500	0.37	96
2	1.5	1.1	136500	7100	500	0.41	96
3	1.7	1.2	136500	7500	500	0.43	96
Average	**1.5**	**1.1**	**136500**	**7100**	**500**	**0.40**	**96**

Sample Method #1 – Simultaneous Equations

Equation 1 and Equation 2 are introduced below. Both equations are the equation used to calculate the NOx emissions under an operating mode, as described in Condition #17. Equation 1 describes the emission calculation for Test Condition #3 (subscript 3), while Equation 2 describes the emission calculation for Test Condition #4 (subscript 4).

Equation 1:

$$NOx_3\ (lbs) = \left[\left(\frac{(A_3 \times CV_{liq3}) \times 1MMBtu}{1{,}000{,}000Btu}\right) \times ENOx(l)\right] + \left[\left(\frac{(B_3 \times CV_{LFG\,3}) \times 1MMBtu}{1{,}000{,}000Btu}\right) \times ENOx\ (LFG)\right] \quad (1)$$

Equation 2:

$$NOx_4\ (lbs) = \left[\left(\frac{(A_4 \times CV_{liq4}) \times 1MMBtu}{1{,}000{,}000Btu}\right) \times ENOx(l)\right] + \left[\left(\frac{(B_4 \times CV_{LFG\,4}) \times 1MMBtu}{1{,}000{,}000Btu}\right) \times ENOx\ (LFG)\right] \quad (2)$$

We are solving for ENOx(l) and ENOx(LFG), therefore we must obtain NOx from our stack tests and A, CV_{liq}, B, and CV_{LFG} from the process data collected during the corresponding test. These variables are defined below:

NOx = pounds of NO_x emitted during stack test;
A = gallons of No. 2 fuel oil consumed during stack test;
B = cubic feet of landfill gas consumed during stack test;
CV_{liq} = calorific value (heat content) in Btu/gal of No. 2 fuel oil; and
CV_{LFG} = calorific value (heat content) in Btu/ft^3 of LFG.

Tables A-1 & A-2 summarize hypothetical stack test results and process data for 81% landfill gas fraction and 96% landfill gas fraction scenarios, which represent two of the four tests performed in accordance with Condition #20.

A stack test is comprised of three separate runs under the same operating condition. For the purposes of calculating the fuel-specific emission factors, the NOx emission values, calorific values (CV_{liq} and CV_{LFG}), oil usage (A) and LFG usage (B) used in the equation shall be the average of the values for the three tests.

The next step is to substitute the average stack test values into each equation, only having ENO_x(l) and ENO_x(LFG) as the two unknowns.

SAMPLE CALCULATIONS

$$2.67\text{ lbs} = \left[\left(\frac{(2.5 gal \times 136{,}000 Btu/gal)\times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right)\times \text{ENOx(l)}\right] + \left[\left(\frac{(2{,}900 ft^3 \times 500 Btu/ft^3)\times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right)\times \text{ENOx (LFG)}\right] \quad (1)$$

$$1.5\text{ lbs} = \left[\left(\frac{(1.1 gal \times 136{,}500 Btu/gal)\times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right)\times \text{ENOx(l)}\right] + \left[\left(\frac{(7{,}100 ft^3 \times 500 Btu/ft^3)\times 1\text{MMBtu}}{1{,}000{,}000\text{Btu}}\right)\times \text{ENOx (LFG)}\right] \quad (2)$$

Simplify the equations.

$$2.67\text{ lbs} = [0.34\text{MMBtu} \times \text{ENOx(l)}] + [1.45\text{MMBtu} \times \text{ENOx (LFG)}] \quad (1)$$

$$1.5\text{ lbs} = [0.150\text{MMBtu} \times \text{ENOx(l)}] + [3.55\text{MMBtu} \times \text{ENOx (LFG)}] \quad (2)$$

Now that there are two equations and two unknowns, ENOx(l) and ENOx(LFG) can be solved for. The next step is to rearrange one of the equations (the first one in this example) into a form where one variable is a function of the other. Equation 1 shall be divided by 1.45 to get the following equation for ENOx (LFG):

$$[\text{ENOx (LFG)}] = 1.84 - [0.23 \times \text{ENOx(l)}] \quad (1)$$

This equation is now substituted into equation 2 for ENOx(LFG).

$$1.5\text{ lbs} = [0.15\text{MMBtu} \times \text{ENOx(l)}] + [3.55\text{MMBtu} \times (1.84 - [0.23 \times \text{ENOx(l)}])] \quad (2)$$

$$1.5\text{ lbs} = [0.15\text{MMBtu} \times \text{ENOx(l)}] + 6.54 - [0.83 \times \text{ENOx(l)}] \quad (2)$$

This equation can be simplified and solved for ENOx(l).

$$5.04\text{ lbs} = [0.68\text{MMBtu} \times \text{ENOx(l)}] \quad (2)$$

$$\text{ENOx(l)} = 7.38\text{lbs/MMBtu}$$

Now that the value of ENOx(l) is known, it can be substituted back into the first equation to solve for ENOx(LFG).

$$2.67\text{ lbs} = [0.34\text{MMBtu} \times 7.38\text{lbs/MMBtu}] + [1.45\text{MMBtu} \times \text{ENOx (LFG)}] \quad (1)$$

$$2.67\text{ lbs} = 2.51 + [1.45\text{MMBtu} \times \text{ENOx (LFG)}] \quad (1)$$

$$0.16 \text{ lbs} = \left[1.45\text{MMBtu} \times \text{ENOx (LFG)}\right] \qquad (1)$$

$$\text{ENOx(LFG)} = 0.11\text{lbs/MMBtu}$$

Thus, based on the stack test results and the process data collected at 81% and 96% landfill gas fractions, the ENOx(l) and ENOx(LFG) values have been determined for that operating mode to be 7.51 lbs/MMBtu and 0.08 lbs/MMBtu, respectively. The same calculations should be used with the stack test and process data collected at the other prescribed landfill gas fractions to determine the fuel-specific emission factors for the other operating modes.

Sample Method #2 –Linear/Graphical Calculation

The second way to potentially calculate the ENOx(l) and ENOx(LFG) emission factors is through a linear/graphical calculation. Using this methodology, the emission rate – y (in lb/MMBtu) shall be plotted against the gas fraction – x, where ENOx(l) and ENOx(LFG) can be solved for using the equation of that line. The standard equation for a line is represented in Equations 3 and 4. Equation 3 represents test no. 3 data (at 81% LFG) and Equation 4 represents test no. 4 data (at 96% LFG).

Equation 3:

$$y_3 = m * x_3 + b \qquad (3)$$

Equation 4:

$$y_4 = m * x_4 + b \qquad (4)$$

In Equations 3 and 4, the y-value represents the emission rate (lb/MMbtu) and the x-value represents the landfill gas fraction (%). The b-value represents the intercept at x = 0. The m-value is the slope of the line. The x- and y-values of the two points are known from the stack test data: the x-values are the gas fractions for each stack test ($x_3 = 81$, $x_4 = 96$), and the y-values are the NOx emissions (in lb/MMBtu) ($y_3 = 1.49$, $y_4 = 0.4$). The gas fraction during the test will be monitored and is a function of the amount of energy (Btus) from the LFG and from the No. 2 oil burned during the test. The NOx emissions (in lb/MMBtu) can either be calculated from the hourly emission rate (lbs NOx/hr) and the hourly heat input (MMBtu/hr), or by using the methodology in EPA approved Method 19.

The two points to graph can be represented as:

$(x_3, y_3) = (81, 1.49)$ and $(x_4, y_4) = (96, 0.4)$

Using these points, the values of both m (the slope) and b (the intercept) can be calculated. The slope (m) of the line between the two points is calculated using Equation 5.

Equation 5:

$$m = \frac{y_4 - y_3}{x_4 - x_3} \qquad (5)$$

$$m = \frac{0.4 - 1.49}{96 - 81} \qquad (5)$$

$$m = \frac{0.4 - 1.49}{96 - 81} \qquad (5)$$

$$m = -0.07027$$

To solve for b, we simply use Equation 3 or Equation 4. For this example, we will solve for b (the intercept) using both Equation 3 and Equation 4 to demonstrate that either will work.

$$y_3 = m * x_3 + b \qquad (3)$$

$$1.49 = -0.0727 * 81 + b \qquad (3)$$

$$1.49 = -0.0727 * 81 + b \qquad (3)$$

$$1.49 = -5.89 + b \qquad (3)$$

$$b = 7.38$$

$$y_4 = m * x_4 + b \qquad (4)$$

$$0.4 = -0.0727 * 96 + b \qquad (4)$$

$$0.4 = -6.98 + b \qquad (4)$$

$$b = 7.38$$

Using the graphic solutions method, the values of m (slope) and b (intercept) can now be used to solve for the ENOx(l) and ENOx(LFG) values. ENOx(l) is equal to the y-value (NOx emissions) at x = 0 (a 0% LFG fraction, or 100% liquid fuel), which is the y-intercept, or b-value determined above. Conversely, ENOx(LFG) is the y-value at x = 100 (a 100% LFG fraction). See equations 6 to solve for ENOx (LFG).

Equation 6:

$$ENOx(LFG) = m * x(at\,100\%) + b \qquad (6)$$

$$ENOx(LFG) = -0.0727 * 100 + 7.38 \qquad (6)$$

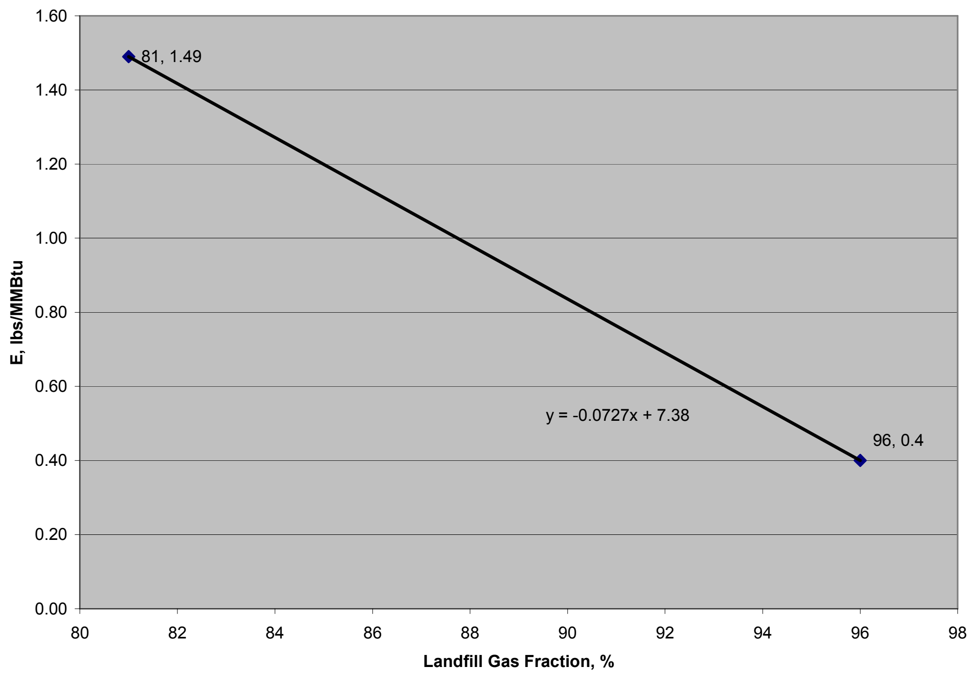
$$ENOx(LFG) = -7.27 + 7.38 \qquad (6)$$

$$ENOx(LFG) = 0.11\,lb/MMBtu$$

While it was important to demonstrate Sample method #2 step-by-step, it should be noted that if the stack test data is plotted onto a graphing program, the graphing program can solve for m (the slope) and b (the intercept) immediately. Since the y-intercept is equal to the value of ENOx(l), all that would be left to solve for is ENOx(LFG).

An example of the graph of NOx emissions (in lb/MMBtu) versus gas fraction is shown in Figure A-1 below for the high gas fraction operating mode.

Figure A-1 Sample Method #2 Graphic Solution



It is important to note that either Sample Method #1 or Sample Method #2 provide the same values for ENOx(l) and ENOx(LFG).