TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Lee County Department of Solid Waste Management

10500 Buckingham Road
Fort Myers, Florida 33905-7012

Lee County Resource Recovery Facility
Facility ID No. 0710119

PROJECT

Draft Permit No. 0710119-009-AC/PSD-FL-151F
Application for Minor Source Air Construction Permit
Biosolids Combustion in Municipal Waste Combustor Unit Nos. 1, 2 & 3

COUNTY

Lee County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
Minerals & Metals - Key Industry Group
2600 Blair Stone Road, MS#5505
Tallahassee, Florida 32399-2400

February 7, 2012

1. GENERAL PROJECT INFORMATION

Air Pollution Regulations

Projects at stationary sources with the potential to emit air pollution are subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize the Department of Environmental Protection (Department) to establish regulations regarding air quality as part of the Florida Administrative Code (F.A.C.), which includes the following applicable chapters: 62-4 (Permits); 62-204 (Air Pollution Control - General Provisions); 62-210 (Stationary Sources - General Requirements); 62-212 (Stationary Sources - Preconstruction Review); 62-213 (Operation Permits for Major Sources of Air Pollution); 62-296 (Stationary Sources - Emission Standards); and 62-297 (Stationary Sources - Emissions Monitoring). Specifically, air construction permits are required pursuant to Rules 62-4, 62-210 and 62-212, F.A.C.

In addition, the U. S. Environmental Protection Agency (EPA) establishes air quality regulations in Title 40 of the Code of Federal Regulations (CFR). Part 60 specifies New Source Performance Standards (NSPS) for numerous industrial categories. Part 61 specifies National Emission Standards for Hazardous Air Pollutants (NESHAP) based on specific pollutants. Part 63 specifies NESHAP based on the Maximum Achievable Control Technology (MACT) for numerous industrial categories. The Department adopts these federal regulations on a quarterly basis in Rule 62-204.800, F.A.C.

Facility Description and Location

This facility is an existing municipal waste combustor plant, which is categorized under Standard Industrial Classification Code No. 4953. This existing plant is located in Lee County at 10500 Buckingham Road, Fort Myers. UTM Coordinates are: Zone 17, 424.21 km East and 2945.70 km North. Latitude is: 26° 37’ 54” North; and, Longitude is: 81° 45’ 41” West.

This site is in an area that is in attainment (or designated as unclassifiable) for all air pollutants subject to state and federal Ambient Air Quality Standards (AAQS).

Facility Regulatory Categories

- The facility is a major source of hazardous air pollutants (HAP).
- This facility does not operate units subject to the acid rain provisions of the Clean Air Act.
- The facility is a Title V major source of air pollution in accordance with Chapter 213, F.A.C.
- The facility is a major stationary source in accordance with Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.

Project Description

As part of the project to modify miscellaneous AC/PSD permit conditions (Project No. 0710119-008-AC/PSD-FL-151E), the applicant requested to combust biosolids in Municipal Waste Combustor Units 1, 2 & 3.

Application Processing Schedule

Requested Changes to PSD/air construction permits dated and received from Lee County on July 22, 2011.

Request for Additional Information dated and sent via e-mail on August 15, 2011.

Additional Information Response from HDR (consultant) dated and received via e-mail on November 11, 2011.

Additional Information from Lee County dated and received via e-mail on November 23, 2011.

{These documents are posted and available on the Department’s world wide web site (Link to Air Projects - Division of Air Resource Management - FDEP).}

Relevant Documents

- PSD-FL-151, A and B (Unit Nos. 1 and 2).
- Permit No. 0710119-005-AC/PSD-FL-151D (Unit No. 3).
- Permit No. 0710119-008-AC/PSD-FL-151E (Unit Nos. 1, 2 & 3)

2. PSD APPLICABILITY

General PSD Applicability

For areas currently in attainment with the state and federal AAQS or areas otherwise designated as unclassifiable, the Department regulates major stationary sources of air pollution in accordance with Florida's PSD preconstruction review program as defined in Rule 62-212.400, F.A.C. Under preconstruction review, the Department first must determine if a project is subject to the PSD requirements ("PSD applicability review") and, if so, must conduct a PSD preconstruction review. A PSD applicability review is required for projects at new and existing major stationary sources. In addition, proposed projects at existing minor sources are subject to a PSD applicability review to determine whether potential emissions *from the proposed project itself* will exceed the PSD major stationary source thresholds. A facility is considered a major stationary source with respect to PSD if it emits or has the potential to emit:

- 5 tons per year or more of lead;
- 250 tons per year or more of any regulated air pollutant; or
- 100 tons per year or more of any regulated air pollutant and the facility belongs to one of the following 28 PSD-major facility categories: fossil fuel-fired steam electric plants of more than 250 million British thermal units per hour heat input, coal cleaning plants (with thermal dryers), Kraft pulp mills, portland cement plants, primary zinc smelters, iron and steel mill plants, primary aluminum ore reduction plants, primary copper smelters, municipal incinerators capable of charging more than 250 tons of refuse per day, hydrofluoric, sulfuric, and nitric acid plants, petroleum refineries, lime plants, phosphate rock processing plants, coke oven batteries, sulfur recovery plants, carbon black plants (furnace process), primary lead smelters, fuel conversion plants, sintering plants, secondary metal production plants, chemical process plants, fossil fuel boilers (or combinations thereof) totaling more than 250 million British thermal units per hour heat input, petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels, taconite ore processing plants, glass fiber processing plants and charcoal production plants.

Once it is determined that a project is subject to PSD preconstruction review, the project emissions are compared to the "significant emission rates" defined in Rule 62-210.200, F.A.C. for the following pollutants: carbon monoxide (CO); nitrogen oxides (NO_X); sulfur dioxide (SO_2); particulate matter (PM); particulate matter with a mean particle diameter of 10 microns or less (PM_{10}); volatile organic compounds (VOC); lead (Pb); fluorides (F); sulfuric acid mist (SAM); hydrogen sulfide (H_2S); total reduced sulfur (TRS), including H_2S; reduced sulfur compounds, including H_2S; municipal waste combustor organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans; municipal waste combustor metals measured as PM; municipal waste combustor acid gases measured as SO_2 and hydrogen chloride (HCl); municipal solid waste landfills emissions measured as non-methane organic compounds (NMOC); and mercury (Hg). In addition, significant emissions rate also means any emissions rate or any net emissions increase associated with a major stationary source or major modification which would construct within 10 kilometers of a Class I area and have an impact on such area equal to or greater than 1 $\mu g/m^3$, 24-hour average.

If the potential emission exceeds the defined significant emissions rate of a PSD pollutant, the project is considered "significant" for the pollutant and the applicant must employ the Best Available Control Technology (BACT) to minimize the emissions and evaluate the air quality impacts. Although a facility or project may be *major* with respect to PSD for only one regulated pollutant, it may be required to install BACT controls for several "significant" regulated pollutants.

PSD Applicability for Project

There are no expected new air emissions or significant emission rate increases from the proposed project. Mercury emissions were estimated to increase slightly, yet are estimated to be below the significant emission rate. The project therefore is not subject to PSD preconstruction review.

3. DEPARTMENT REVIEW

As part of the project to modify miscellaneous AC/PSD permit conditions (Project No. 0710119-008-AC/PSD-FL-151E), the Lee County Resource Recovery Facility (LCRRF) requested to combust biosolids in Municipal Waste Combustor Unit Nos. 1, 2 & 3. The applicant requested the authorization to combust "biosolids" (treated sewage sludge) formerly known as "domestic wastewater residuals" in the Department's domestic wastewater treatment rule, Chapter 62-640, F.A.C. The applicant requested to combust biosolids (includes Class B, A and AA biosolids) that are not liquid biosolids.

Biosolids from the domestic wastewater treatment plants in the Lee County municipal area are planned to be combusted in municipal solid waste combustor Unit Nos. 1, 2 and 3.

The MWC Unit Nos. 1-3 have a total charging rate of 1,980 TPD of municipal solid waste (MSW). The applicant requested a maximum of 5% biosolids on an as received (i.e., wet) basis to be combusted in the MWC units. This is equivalent to a maximum mass of 99 tons per day (TPD) facility-wide.

<u>Biosolids Defined</u>

Several definitions and uses of the term "biosolids" exist.

In 1991, the Water Environment Federation (also known as the "WEF"), which is an internationally recognized wastewater treatment organization, officially coined the term "biosolids."[1] Within the wastewater treatment industry, "biosolids" commonly refers to treated and tested sewage sludge.[2] The term "sewage sludge" has remained unchanged and is the residue generated during the treatment of domestic (human) wastewater in a domestic wastewater treatment facility.

In the state of Florida, by rule in the Florida Administrative Code (F.A.C.) the term "biosolids" and "liquid biosolids" are defined in a domestic wastewater treatment rule, specifically in Chapter 62-640, F.A.C. as follows:

> "**62-640.200 Definitions.**
>
> …
>
> (6) "Biosolids" means the solid, semisolid, or liquid ***residue generated during the treatment of domestic wastewater {emphasis added}*** in a domestic wastewater treatment facility, formerly known as "domestic wastewater residuals" or "residuals." Not included is the treated effluent or reclaimed water from a domestic wastewater treatment plant. Also not included are solids removed from pump stations and lift stations, screenings and grit removed from the preliminary treatment components of domestic wastewater treatment facilities, other solids as defined in subsection 62-640.200(31), F.A.C., and ash generated during the incineration of biosolids. Biosolids include products and treated material from biosolids treatment facilities and septage management facilities regulated by the Department.
>
> …
>
> (28) "Liquid biosolids" means any biosolids that are less than 12% solids by weight, or that are determined to contain free liquids as defined by Method 9095B (Paint Filter Liquids Test), November 2004, as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (EPA Pub. No. SW-846), January 3, 2008, 73 FR 486, which is hereby adopted and incorporated by reference and is available from the Department of Environmental Protection, Domestic Wastewater Section, M.S. 3540, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400 or any of the Department's District Offices.
>
> …"

The U.S. EPA on its Biosolids web site[3] refers to "biosolids" as follows:

> "Biosolids are the nutrient-rich organic materials resulting from the ***treatment of sewage sludge {emphasis added}*** (the name for the solid, semisolid or liquid untreated residue generated during the treatment of domestic sewage in a treatment facility). When treated and processed, sewage sludge becomes biosolids which can be safely recycled and applied as fertilizer to sustainably improve and maintain productive soils and stimulate plant growth."

In the U.S. EPA federal regulation covering air pollutant emissions from municipal waste combustors (MWCs) (the NSPS 40 CFR 60, Subpart Eb for 'new' MWCs and the Emission Guidelines 40 CFR 60, Subpart Cb for 'existing' MWCs), U.S. EPA excludes "sewage sludge" from the definition of municipal solid waste (MSW) or municipal-type solid waste (see 40 CFR 60.51b Definitions, excerpt below).

> "**60.51b Definitions.**
>
> …
>
> *Municipal solid waste* or *municipal-type solid waste* or *MSW* means household, commercial/retail, and/or institutional waste. Household waste includes material discarded by single and multiple residential dwellings, hotels, motels, and other similar permanent or temporary housing establishments or facilities. Commercial/retail waste includes material discarded by stores, offices, restaurants, warehouses, nonmanufacturing activities at industrial facilities, and other similar establishments or facilities. Institutional waste includes material discarded by schools, nonmedical waste discarded by hospitals, material discarded by nonmanufacturing activities at prisons and government facilities, and material discarded by other similar establishments or facilities. Household, commercial/retail, and institutional waste ***does not include {emphasis added}*** used oil; ***sewage sludge {emphasis added}***; wood pallets; construction, renovation, and demolition wastes (which includes but is not limited to railroad ties and telephone poles); clean wood; industrial process or manufacturing wastes; medical waste; or motor vehicles (including motor vehicle parts or vehicle fluff). Household, commercial/retail, and institutional wastes include:
>
> (1) Yard waste;
> (2) Refuse-derived fuel; and
> (3) Motor vehicle maintenance materials limited to vehicle batteries and tires except as specified in §60.50b(g).
>
> …"

It is widely known that sewage sludge is not part of the MSW stream. MSW's typical composition is shown by the following pie chart from Franklin Associates[4]:

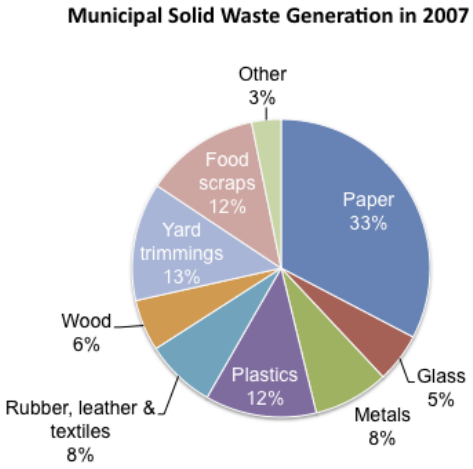

Figure 1.

Therefore, EPA does not consider "biosolids" or "sewage sludge" to be included in the MSW definition, in other words as part of the typical MSW going to an MWC. Although biosolids (treated sewage sludge) is not considered to

be part of the typical MSW, the federal regulations of 40 CFR 60, Subparts Cb/Eb do not prohibit it from being combusted in an MWC.[5]

Neither the U.S. EPA federal air regulations nor the state of Florida air pollution rules specifically define "biosolids." The U.S. EPA's recently promulgated on March 21, 2011 the NSPS 40 CFR 60, Subpart LLLL for 'new' Sewage Sludge Incineration (SSI) Units. This NSPS 40 CFR 60, Subpart LLLL applies to 'new' SSI Units located at wastewater treatment plants. This federal regulation does specifically define "sewage sludge" as:

> "**40 CFR 60.4930 Definitions.**
>
> …
>
> Sewage sludge means solid, semi-solid, or liquid ***residue generated during the treatment of domestic sewage {emphasis added}*** in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incineration unit or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works."

When comparing the definition of "sewage sludge" from the NSPS 40 CFR 60, Subpart LLLL it is somewhat similar to the one in the state of Florida's domestic wastewater treatment rule for "biosolids." This could cause confusion when trying to use the domestic wastewater treatment definition in the air pollutant emission regulatory context.

The term "biosolids" these days is being used interchangeably with the term "sewage sludge."

For purposes of this specific air construction permit request from the LCRRF to combust "biosolids" in the MWC Unit Nos. 1, 2 & 3, "biosolids" are defined consistent with the state of Florida definition contained in the domestic wastewater treatment rule, Chapter 62-640, F.A.C. The Department considers biosolids to be an allowable non-MSW fuel received as a segregated material.

General - Sources of Biosolids

Biosolids, formerly known as "domestic wastewater residuals," come from the treatment of domestic (human) wastewater. Solids that accumulate during the wastewater treatment process must be wasted periodically at different stages of the process. These semi-solids are referred to as sewage sludge, also now known as "biosolids." Usually at one of the last stages of a wastewater treatment plant the high water content sewage sludge (about 97%) is dewatered using presses, screw conveyors or centrifuges. After this dewatering stage the sewage sludge's water content is reduced to approximately 80% water content. The biosolids still have a high water content. In general, with biosolids having a high water content and containing high levels of inert materials, the net fuel value is often low.

Of interest in the U.S., is that biosolids are classified based on their degree of pathogen reduction and their metals concentrations typically as either "Class AA," "Class A" or "Class B." "Class AA" biosolids have the least amount of pathogens and the lowest metals content. Class AA biosolids have the least amount of water content resulting in a higher fuel value. Class B biosolids has a higher amount of pathogen and metals concentrations. Class AA biosolids are marketed and distributed for fertilizer use. Industry can contribute to higher metals concentrations in the wastewater going to the treatment plant and ultimately result in biosolids with higher metal concentrations.

Biosolids Classifications

Metal Constituent	"Class B" Biosolids Specification (limit), mg/kg [a]	"Class A" Biosolids Specification (limit), mg/kg [a]	"Class AA" Biosolids Specification (limit), mg/kg [b]
Arsenic (As)	75	75	41
Cadmium (Cd)	85	85	39
Copper (Cu)	4300	4300	1500
Lead (Pb)	840	840	300

Mercury (Hg)	57	57	17
Molybdenum (Mo)	75	75	N/A
Nickel (Ni)	420	420	420
Selenium (Se)	100	100	100
Zinc (Zn)	7500	7500	2800

[a] The specification is based on a single sample. The metal constituent specifications are the same for Class B and Class A biosolids. Class A biosolids must meet more stringent pathogen reduction requirements.

[b] The specification is based on a monthly average concentration.

These specifications for biosolids are from Chapter 640, F.A.C. (see http://www.dep.state.fl.us/legal/rules/wastewater/62-640.pdf).

Sewage sludge from small wastewater treatment plants (WWTPs) like the local wastewater treatment plant in Tallahassee typically does not meet Class B standards for biosolids. The sewage sludge from a WWTP typically leaves screw conveyors (presses) or centrifuges then sometimes gets additional treatment prior to leaving the plant. At large WWTPs additional treatment processes (like anaerobic digestion, lime stabilization or composting) are typically used treating the sewage sludge to meet Class B biosolids standards. Biosolids can be further treated to Class A or Class AA standards. [6]

General - Pictures of Biosolids

Picture 1. shows sewage sludge at a dissolved air thickener at a local WWTP in the City of Tallahassee (COT). [7] Sewage sludge exits the dissolved air thickener at about 97% moisture content. At this moisture content the sewage sludge meets the definition of a "liquid biosolid" in Rule 62-640.200, F.A.C. The applicant, LCRRF, for the proposed project is not going to combust "liquid biosolids." More water is removed at the next step of the process at this plant with a screw conveyor. Picture 2. shows the screw conveyor. [8] At other WWTPs screw conveyors are referred to as screw presses. The sewage sludge exits the screw conveyor at approximately 83% moisture content (17% solids content) now in a semi-solid form. At this stage of the treatment process the sewage sludge is no longer a "liquid biosolid" as defined in Rule 62-640.200, F.A.C., i.e., it has greater than or equal to 12% solids.

Picture 1.

Picture 2.

With dissolver air thickening and the use of screw conveyors at the COT WWTP, the sewage sludge's water content is greatly reduced from about 99% entering the plant to 83%, for a total of 16% water removal.

Picture 3. shows dried biosolids that are classified as Class AA biosolids from the COT WWTP. [9] These Class AA biosolids are about 99% solids (only 1% moisture content). These biosolids were produced by sending the sewage sludge (biosolids) exiting the screw conveyor pictured above through a rotary dryer.

Picture 3.

Picture 4. shows the biosolids currently received at the Lee County's landfill and compost facility (the lighter material piles). These are the biosolids that LCRRF proposes to combust in the MWC units. The biosolids pictured here had been unloaded directly from a dump truck from the City of Ft. Myers WWTP. These biosolids have a 15% solids content (85% moisture content). As shown by this picture these biosolids are in a semi-solid form. {Note: The darker material in the back to the right is biosolids mixed with mulch.}

Picture 4.

A close up of typical Class B biosolids are shown in Picture 5.[10] These can be land applied under certain constraints. This picture shows their semi-solid form close up.

Picture 5.

General - Biosolids Use and Disposal in Florida

In Florida, biosolids are disposed of by land application, land-filling, and roughly 1/3 is marketed & distributed (see Figure 2.).[11] However, there are pressures to discontinue the land application of biosolids. In Florida, permits will be required by the DEP from sites accepting biosolids by January 2013.

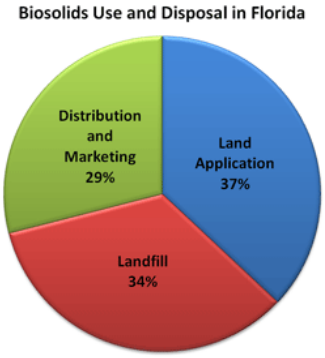

Figure 2.

General - Combustion of Biosolids

Biosolids can be incinerated or co-fired with other combustible materials. Dedicated incinerators can burn exclusively biosolids. Incineration technologies include: hearth furnaces, fluidized beds, rotary kilns and electric incinerators. [12]

Biosolids Heat Content Value

Of interest is that sewage sludge was identified by U.S. EPA as being considered to be a non-traditional alternative fuel (see page 15647 of Federal Register dated March 21, 2011).[13] It has been reported that dried biosolids can have a heat content of up to 10,300 Btu/lb.[14] Biosolids can provide a source of energy when combusted in a municipal waste combustor. However, the cost savings in disposal of biosolids for municipalities is expected to be greater than the benefit in electrical generation.

Dried biosolids typically have a low moisture content. The actual heat content value provided by the LCRRF for the City of Ft. Myer's sewage sludge (biosolids) was 850 Btu/lb at a moisture content of 86%. In comparison, the moisture content of municipal solid waste at the LCRRF plant is typically about 21%.

For information purposes, the table below compares the heat content value of biosolids to other solid wastes/fuels.

Heat Content Value of Biosolids Compared to Other Solid Wastes/Fuels

City of Ft. Myer's Biosolids (a semi-solid)	Dried Biosolids (solid material)	Municipal Solid Waste (MSW)	Distillate oil (a liquid)	Tires (solid material)	Coal (bituminous) (a solid fuel)
850 Btu/lb	10,300 Btu/lb[15]	5,000 Btu/lb	19,910 Btu/lb	15,800 Btu/lb	12,500 Btu/lb

None of the municipal waste combustor facilities in Florida currently accept and combust sewage sludge or biosolids. Most of the air permits specifically prohibit the combustion of sewage sludge or the use of sewage sludge as a fuel. Two plants in the U.S. were identified by the applicant as currently combusting sewage sludge: the Covanta Lancaster County Resource Recovery Facility in Lancaster, Pennsylvania and the Covanta Huntsville Waste-to-Energy Facility in Huntsville, Alabama. The exact type of sewage sludge was not described.

Biosolids Sources for the LCRRF

The biosolids that the LCRRF proposed to combust are from the: (1) City of Ft. Myers Utilities; (2) City of Cape Coral Utilities; and, (3) Lee County Utilities. These wastewater treatment plants are located predominantly in the Ft. Myers metropolitan area which has some light to heavy industry.

The sludge analyses provided by the LCRRF for the 2010 sludge sampling results from the City of Ft. Myer's sludge indicates the following maximum metal constituent values:

City of Ft. Myer's Sludge Sampling Results from 2010

Metal Constituent	Maximum Result, mg/kg
Arsenic	11.9
Cadmium	1.9
Copper	365
Lead	34.3
Mercury	1.25
Molybdenum	10.7
Nickel	21.9
Selenium	9.56
Zinc	1530

The 2010 sludge sampling results for the City of Ft. Myer's sludge meet the Class B biosolids heavy metal specifications. Sludge analyses from the City of Cape Coral Utilities and the Lee County Utilities were not provided.

Handling, Storage and Combustion of Biosolids in the LCRRF MWC Units

The applicant specifically described how the biosolids were to be well mixed with MSW prior to being combusted in the MSW units. The applicant's practices are proposed to be included in the permit to provide reasonable assurances that best management practices in the handling, storing of biosolids and combustion at the LCRRF are followed.

Air Pollution Affects from the Combustion of Biosolids

Review of standard air pollution references like U.S. EPA's AP-42, *Compilation of Air Pollutant Emission Factors* and the A&WMA's *Air Pollution Engineering Manual* provide no air pollution information on the combustion of biosolids or sewage sludge in MWCs.

Chapter 2 of AP-42 covers solid waste disposal. Specifically, Chapter 2.1 addresses refuse combustion and Chapter 2.1 addresses sewage sludge incineration. Review of these two chapters indicates that no emission factor information has been published for the combustion of biosolids or sewage sludge in MWCs. No other chapters in AP-42 address or contain emission factor information on the co-firing of biosolids with municipal waste (refuse).

No specific air emission information on the co-firing of biosolids or sewage sludge with municipal waste was also found in the A&WMA's Air Pollution Engineering Manual. Also, no technical papers on air emissions from the combustion of biosolids or sewage sludge in MWCs were found in A&WMA's web site resources.

The applicant was not aware of any trial burns while measuring air pollutant emissions in the U.S. Specific air pollutant emissions data was not provided from the previously mentioned two plants that are combusting sewage sludge in the U.S. The applicant indicated that the two plants claim to have experienced no impact on air emissions when co-firing sewage sludge with MSW.

In conclusion, the actual effects on air pollution from the combustion of biosolids or sewage sludge in an MWC have been found to not be documented. Since this would be the first time biosolids are combusted in an MWC in the state of Florida, the air pollution impacts (if any) can be fully evaluated by actual testing.

Potential and Control of Air Pollutant Emissions from the Combustion of Biosolids

Biosolids consist of primarily inert materials, solids. Heavy metal constituents in biosolids are analyzed in order to classify biosolids. Obvious air pollutants of concern from the combustion of biosolids in an MWC are heavy metals, particulate matter and objectionable odors.

Air pollutants specifically regulated under the federal regulations in 40 CFR 60 Subparts Cb/Eb for MWCs are: total particulate matter (PM); metals and metal compounds (cadmium (Cd), mercury (Hg) and lead (Pb)); all acid gases (including, but not limited to, sulfur dioxide (SO_2) and hydrogen chloride (HCl) gases); organic compounds (includes dioxins/furans (D/F)); nitrogen oxides (NOx); and, carbon monoxide (CO).

General - Metals

The MWC units use spray dry absorbers and baghouses for the control of acid gases and particulate matter, selective non-catalytic reduction (SNCR) systems for the control of nitrogen oxides (NOx), and activated carbon injection (ACI) systems for the control of mercury (Hg) and certain organic emissions. Activated carbon is injected into the flue gases prior to the baghouses to control Hg emissions.

In general, heavy metals like arsenic (As), cadmium (Cd), lead (Pb), mercury (Hg) and nickel (Ni) will remain in the sewage sludge combusted material when combustion temperatures are less than 1650 degrees F.[16] Metal oxides of mercury and lead may be emitted. Heavy metal oxides of mercury and lead can also combine with particles and are collected with particulate matter. The precipitated heavy metals onto particles are collected in the baghouses or in the scrubbers. Heavy metals in the air stream are further precipitated with the activated carbon onto particles and collected in the baghouses or in the scrubbers.

Mercury (Hg)

Mercury emissions depend on the mercury containing wastes being combusted. Typical mercury containing wastes are light bulbs, switches, alkaline batteries, thermometers and thermostats. Assuming the combustible fraction of sewage sludge is completely burned, mercury could be volatized during combustion. Mercury emissions from the MWCs could be impacted due to the mercury content in the sewage sludge.

Mercury controls primarily accomplished by activated carbon injection have been removing at least 85% of the mercury emissions in the MWC exhaust. This means that no more than 15% of the mercury emissions have been exiting the stack. It is assumed that the mercury controls will work the same with the co-firing of sewage sludge as with MSW.

In 1989, 709 short tons of Hg were disposed of in the U.S. [17] In 1990, 205 million tons total of MSW was generated in the U.S. [18] Nationally, it could be estimated that municipal solid waste contains only about 0.34×10^{-3} % by weight (ton/ton) of mercury laden waste in the 1990's. Although mercury in the MSW stream twenty years later has been reduced more current data could not be found. Based on the reported sludge values for the City of Ft. Myers, the mercury content of the sludge is 0.10×10^{-3} % by weight (kg/kg).

In the submittal dated November 23, 2011, the applicant estimated mercury emissions from this project. Mercury emissions without burning biosolids are estimated to be 5.69 lbs/year. Hg emissions when combusting up to 5% by weight of biosolids with MSW were estimated to be approximately 6.36 lbs/year. Therefore, mercury emissions when burning up to 5% biosolids are estimated to increase slightly by 0.67 lbs/year. The PSD SER for Hg is 200 lbs/year. The estimated increase in emissions (0.67 lbs/year) is less than the PSD SER.

When up to 5% by weight of biosolids is burned displacing 99 TPD of MSW, mercury emissions while burning biosolids may slightly increase. The impact on mercury emissions from the combustion of biosolids in the MWC units should therefore not result in a significant emission rate increase of mercury.

No Hg test data was available from LCRRF while burning biosolids. Actual testing can confirm the affect on mercury emissions while combusting biosolids.

Hg emissions from MWC Units 1, 2 & 3 are regulated under the federal regulations for MWCs in 40 CFR 60 Subparts Cb/Eb. Previous BACT determinations may contain a Hg emission standard/limit more stringent than the federal regulations.

To evaluate Hg emissions and to demonstrate compliance with the Hg emission standard/limit while burning biosolids a Hg test will be required.

Lead (Pb)

Like Hg, Lead emissions are a function of the lead containing wastes being combusted.

No Pb test data was available from LCRRF while burning biosolids. Actual testing can confirm the affect on Pb emissions while combusting biosolids.

Pb emissions from MWC Units 1, 2 & 3 are regulated under the federal regulations for MWCs in 40 CFR 60 Subparts Cb/Eb. Previous BACT determinations may contain a Pb emission standard/limit more stringent than the federal regulations.

To evaluate Pb emissions and to demonstrate compliance with the Pb emission standard/limit while burning biosolids a Pb test will be required.

Particulate Matter (PM)

As previously mentioned for the heavy metals, particulate matter can be formed when they precipitate onto particles in the flue gas. The MWC units have baghouses primarily to remove particulate matter. To a minor extent PM will also be removed in the scrubbers. The baghouses have an estimated control efficiency of 99%.

No PM test data was available from LCRRF while burning biosolids. An actual PM test can be performed to evaluate PM emissions while combusting biosolids.

Other metals in the sludge like arsenic, cadmium, copper, molybdenum, nickel, selenium and zinc presumably would behave similar to Hg and Pb. A total metals test can be performed to evaluate the total metal emissions while combusting biosolids. To evaluate total metal emissions while burning biosolids a total metals test will be required.

Total PM emissions from MWC Units 1, 2 & 3 are regulated under the federal regulations for MWCs in 40 CFR 60 Subparts Cb/Eb. Previous BACT determinations may contain a PM emission standard/limit more stringent than the federal regulations.

To evaluate PM emissions and to demonstrate compliance with the PM emission standard/limit while burning biosolids a PM test will be required.

SO_2, NOx and CO

The affects on emissions of SO_2, NOx and CO while burning biosolids are unknown. Biosolids are high in nitrogen content, so NOx emissions could be affected.

No SO_2, NOx and CO emissions data were available from LCRRF while burning biosolids. Actual SO_2, NOx and CO CEMS data could be easily used to evaluate SO_2, NOx and CO emissions while combusting biosolids.

SO_2, NOx and CO emissions from MWC Units 1, 2 & 3 are regulated under the federal regulations for MWCs in 40 CFR 60 Subparts Cb/Eb. Previous BACT determinations may contain SO_2, NOx and CO emission standards/limits more stringent than the federal regulations.

To evaluate SO_2, NOx and CO emissions and to demonstrate compliance with the SO_2, NOx and CO emission standards/limits while burning biosolids a SO_2, NOx and CO test will be required. The test is fulfilled by submitting CEMS data for SO_2, NOx and CO emissions.

Odors

Odors from the MWC facility are controlled by drawing combustion air from the refuse tipping floor area. The applicant proposes to unload and store biosolids within the building enclosing the tipping floor. Odors from the unloaded and stored biosolids within the building should be drawn into the combustion air.

Pathogenic Emissions

The Department does not have a specific air rule regulating pathogenic air emissions from MWCs. Pathogens present in stack gas exhaust could affect public health.

A certain amount of pathogen removal occurs at wastewater treatment plants during the sludge thickening process at what are known as digesters.

Pathogenic destruction also occurs in a combustion process. Combustion of the biosolids co-fired with MSW material takes place in the furnaces. Gases containing potentially pathogens pass through the SNCR with temperatures around 1600-2100 degrees F with a residence time of 1-2 seconds.[19]

In comparison, medical waste incinerator temperatures within a dual chamber unit have secondary chambers (afterburners) which operate between 1,600-1,800 degrees F. Residence times in secondary chambers (afterburners) are typically 1.0 seconds. The Department's medical waste incinerator rule contains temperature and residence time requirements.

In comparison, rotary sludge dryers run with temperatures at around 700 degrees F with a residence time. Rotary dryers effectively further reduce pathogens, resulting in biosolids easily being classified from "Class B" to "Class A."

Obviously, biosolids is different from medical waste. However, the temperature and residence time in an MWC's combustion zone in the furnaces and in the SNCR should be more than adequate to provide complete pathogen destruction resulting in exhaust gases free of pathogens.

Regulation Applicability

In U.S. EPA's recently promulgated (March 21, 2011) Non-Hazardous Secondary Materials (NHSM) rule, sewage sludge was identified as a non-hazardous secondary material (NHSM) and was considered to be a solid waste therefore subject to Section 129, Solid Waste Combustion of the Clean Air Act (CAA). [20] Section 129, Solid Waste Combustion of the CAA includes 40 CFR 60 Subparts Cb/Eb.

The combustion of biosolids (treated sewage sludge) in MWC units is therefore regulated under 40 CFR 60, Subparts Cb/Eb. 40 CFR 60, Subparts Cb/Eb does not contain any new or additional applicable requirements for when the MWCs are combusting biosolids.

A few federal regulations under 40 CFR Part 60 identified as being potentially applicable to these MWCs when combusting biosolids (treated sewage sludge) were:

1. 40 CFR 60, Subpart MMMM, Emission Guidelines (EG) for Sewage Sludge Incinerators (SSI); and,
2. 40 CFR 60; Subpart LLLL, NSPS for SSIs;

40 CFR 60.5065 of 40 CFR 60, Subpart MMMM specifically exempts combustion units that are not located at a wastewater treatment plant designed to treat domestic sewage sludge. The combustion of biosolids (treated sewage sludge) in the MWCs is therefore exempt from 40 CFR 60, Subpart MMMM, EG for SSIs.

40 CFR 60.4780 of 40 CFR 60, Subpart LLLL specifically exempts combustion units that are not located at a wastewater treatment plant designed to treat domestic sewage sludge. The combustion of biosolids (treated sewage sludge) in the MWCs is therefore exempt from 40 CFR 60, Subpart LLLL, NSPS for SSIs.

Per the U.S. EPA's promulgated NHSM rule, if sewage sludge had not been deemed to be a solid waste under the NHSM rule it would have been subject to the new MACTs under 40 CFR 63. The combustion of biosolids (treated sewage sludge) in MWC units is therefore not subject to any of U.S. EPA's new MACTs under 40 CFR 63. [21]

The older (circa 1975) National Emission Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR 61, Subpart E, NESHAP for Mercury had been identified as being potentially applicable to these MWCs when combusting biosolids (treated sewage sludge). This NESHAP applies to stationary sources that dry or incinerate wastewater treatment plant sludge, therefore, it does apply to the MWC units when combusting biosolids. Subpart E contains a mercury emission limitation of 3.2 kg (7.1 lb) of mercury per 24-hour period from the combined sludge drying/incineration plants. The equivalent mercury emissions limit from MWC Unit Nos. 1, 2 & 3 combined is 0.774

kg/day (24-hours). Compliance with the current mercury limits for MWC Unit Nos. 1, 2 & 3 therefore assures compliance with the less stringent limit under the old NESHAP.

Another federal regulation identified as being potentially applicable to these MWCs when combusting biosolids (treated sewage sludge) was 40 CFR 503, Standards for the Use or Disposal of Sewage Sludge (also commonly referred to as the U.S. EPA's "Part 503 Biosolids Rule").

40 CFR 503.6(c) of 40 CFR 503, Standards for the Use or Disposal of Sewage Sludge, specifically exempts incinerators that co-fire sewage sludge with other wastes. Biosolids (treated sewage sludge) will be co-fired with MSW at the LCRRF. The combustion of biosolids with MSW in the MWC units is therefore exempt from the 40 CFR 503, Standards for the Use or Disposal of Sewage Sludge.

4. PRELIMINARY DETERMINATION

The LCRRF will be the first MWC in the state of Florida permitted to burn biosolids (treated sewage sludge). The LCRRF, with MWC Unit Nos. 1, 2 and 3 which commenced operations in 1994 and 2007, has advanced air pollution control technology and monitors air pollutant emissions on a frequent basis by CEMS and stack testing. MWC Unit No. 3 differs in its control of NOx emissions having flue gas recirculation (FGR). Worst-case air pollutant emissions are therefore anticipated from the older similar MWC Unit Nos. 1 and 2.

The affects on emissions while burning biosolids are unknown. Actual air emissions testing while combusting biosolids can demonstrate initial compliance with the current air emission standards/limits for the identified air pollutants of concern. Actual air emission rates from testing will also be able to confirm that emissions are below the SERs applicable to MWC project modifications for the identified pollutants of concern.

No increase in emissions are expected from the other regulated air pollutants like Cd, HCl (an acid gas), SAM (an acid gas), F (an acid gas) and organic compounds (includes VOC and D/F). SO_2 emissions testing can indicate any acid gas formation like HCl. Actual testing for the heavy metals Hg and Pb can serve as a surrogate for other heavy metal emissions like Cd. Actual testing is therefore not required for Cd, HCl, SAM, F, VOC and D/F emissions.

The Department makes a preliminary determination that the proposed project will comply with all applicable state rules and federal air pollution regulations as conditioned by the draft permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant, and the conditions specified in the draft permit. No air quality modeling analysis is required because the project does not result in a significant increase in emissions.

Mr. Scott M. Sheplak, P.E. is the project engineer responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting him by telephone at 850/717-9074 or by e-mail at scott.sheplak@dep.state.fl.us in the Department's Office of Permitting and Compliance at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

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