San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

NOV - 8 2012

Wilson Nolan
Liberty Energy
P O Box 80727
Bakersfield, CA 93380

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: S-1080996

Dear Mr. Nolan:

Enclosed for your review and comment is the District's analysis of Liberty Energy's application for an Authority to Construct for a biosolids/biomass-fired power plant, at 12421 Holloway Road, Lost Hills.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. Please submit your written comments on this project within the 30-day public comment period which begins on the date of publication of the public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Allan Phillips of Permit Services at (661) 392-5500.

Sincerely,

David Warner
Director of Permit Services

DW: MRB/cp

Enclosures

Seyed Sadredin
Executive Director/Air Pollution Control Officer

Northern Region
4800 Enterprise Way
Modesto, CA 95356-8718
Tel: (209) 557-6400 FAX: (209) 557-6475

Central Region (Main Office)
1990 E. Gettysburg Avenue
Fresno, CA 93726-0244
Tel: (559) 230-6000 FAX: (559) 230-6061

Southern Region
34946 Flyover Court
Bakersfield, CA 93308-9725
Tel: 661-392-5500 FAX: 661-392-5585

www.valleyair.org www.healthyairliving.com

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

NOV - 8 2012

Mike Tollstrup, Chief
Project Assessment Branch
Stationary Source Division
California Air Resources Board
PO Box 2815
Sacramento, CA 95812-2815

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: S-1080996

Dear Mr. Tollstrup:

Enclosed for your review and comment is the District's analysis of Liberty Energy's application for an Authority to Construct for a biosolids/biomass-fired power plant, at 12421 Holloway Road, Lost Hills.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. Please submit your written comments on this project within the 30-day public comment period which begins on the date of publication of the public notice.

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NOV - 8 2012

Gerardo C. Rios (AIR 3)
Chief, Permits Office
Air Division
U.S. E.P.A. - Region IX
75 Hawthorne Street
San Francisco, CA 94105

Re: Notice of Preliminary Decision - Authority to Construct
Project Number: S-1080996

Dear Mr. Rios:

Enclosed for your review and comment is the District's analysis of Liberty Energy's application for an Authority to Construct for a biosolids/biomass-fired power plant, at 12421 Holloway Road, Lost Hills.

The notice of preliminary decision for this project will be published approximately three days from the date of this letter. Please submit your written comments on this project within the 30-day public comment period which begins on the date of publication of the public notice.

Thank you for your cooperation in this matter. If you have any questions regarding this matter, please contact Mr. Allan Phillips of Permit Services at (661) 392-5500.

Sincerely,

David Warner
Director of Permit Services

DW: MRB/cm

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www.valleyair.org www.healthyairliving.com

Bakersfield Californian

NOTICE OF PRELIMINARY DECISION
FOR THE PROPOSED ISSUANCE OF
AN AUTHORITY TO CONSTRUCT

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Unified Air Pollution Control District solicits public comment on the proposed issuance of Authority to Construct to Liberty Energy for a biosolids/biomass-fired power plant, at 12421 Holloway Road, Lost Hills.

The analysis of the regulatory basis for this proposed action, Project #S-1080996, is available for public inspection at http://www.valleyair.org/notices/public_notices_idx.htm and the District office at the address below. Written comments on this project must be submitted within 30 days of the publication date of this notice to **DAVID WARNER, DIRECTOR OF PERMIT SERVICES, SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT, 34946 FLYOVER COURT, BAKERSFIELD, CA 93308.**

San Joaquin Valley Air Pollution Control District

Authority to Construct Application Review

Biomass/Biosolids-fired BFB power plant

Facility Name:	Liberty Composting Inc. dba Liberty Energy, Inc. / Liberty Energy V	Date:	November 5, 2012
Mailing Address:	1601 Skyway Dr. Suite 205	Engineer:	Dolores Gough
	Bakersfield, Ca 93380	Lead Engineer:	Allan Phillips
Contact Person/	Wilson Nolan, CEO 661-391-5840		
Telephone:	Steve Ketler, Manager of Engineering, 778-565-4655, Cel 778-288-7488		
Fax:	Mr. Nolan: 661-391-5844		
E-Mail:	Mr. Nolan: WENOLAN@MCCARTHYFARMS.COM		
Application #(s):	S-360-7-0, '-10-0 through '-15-0, '-28-0, '-29-0, '-33-0 through '-39-0, and '-42-0		
Project #:	S-1080996		
Deemed Complete:	August 20, 2012 (Revised proposal)		

Project timeline:

09/27/2011	Confirmed by Ester Davila has received RMR/AQIA request
10/11/2011	Draft BFB BACT guideline for boilers sent to ABP for review
10/18/2011	Draft BFB BACT Guideline approved by ABP, forwarded to LMS for review
10/28/2011	Draft BFB BACT sent to Carlos Garcia
12/21/2011	Carlos Garcia responded to proposed BACT guideline with comments
01/11/2012	Incorporated Carlos comments and re-submitted proposed BACT guideline
01/19/2012	Submitted copy of Notice of Determination (NOD) to Patia in Fresno, requesting CEQA wording for application review.
02/01/2012	Resubmitted draft BACT guideline to Carlos
02/03/2012	Received final approval of RMR and AQIA modeling
02/14/2012	Received CEQA wording from Patia/Dan Barber
03/08/2012	New BACT guideline for biomass/Biosolids BFB < 10 MW approved by Dave Warner.
03/8/2012	Waiting on Liberty to identify the ERCs to be used for offsets
05/29/2012	Liberty identified the ERCs to be used for only one unit
07/02/2012	Liberty were issued ERC S-3855-2
08/15/2012	Received list of units from original proposal that will be permitted; other units will be cancelled.

Table of Contents

Appendices

I. Proposal

Liberty Energy Resources, Inc. / Liberty Energy V (Liberty Energy) has requested an Authority to Construct (ATC) permit for the installation of a nominal 6.5 MW power plant powered by one 6.5 MW Von Roll bubbling fluidized bed (BFB) reactor. The BFB reactor has a maximum proposed heat input rating of 211.52 MMBtu/hr (reference 9/16/2011 email from Steve Ketler).

Initially, the proposal was for a 19.5 MW power plant that will consist of three identical 6.5 MW power trains, each fired on a mixture of biomass and biosolids. Since the original proposal, Liberty Energy has revised their project. With this revised project, only one power train will be authorized.

Rule 4565 compliance schedule

Composting/co-composting facilities subject to Rule 4565, *Biosolids, Animal Manure, and Poultry Litter Operations*, with throughputs greater than 100,000 wet tons per year must be in full compliance by March 15, 2010. However operators planning to convert to energy operations (section 7.4) have until September 15, 2012 to be in compliance with Rule 4565 for the remainder of the operation (remaining portion of the operation used for composting). Due to some delays, Liberty is unable to meet this compliance deadline.

Rule 4565, Section 7.4.4 allows a facility that was originally planned for conversion to energy generation operation that has not been converted to implement three (3) Class One mitigation measures and operated in-vessel composting systems, for both the active and curing phases of composting on or after September 15, 2012. Liberty has just successfully completed a pilot study to use a membrane cover that meets the VOC control efficiency required by the rule. Hence, Liberty has applied to use this technology to meet this compliance deadline. However, Liberty still plans to get an ATC for one of the power trains that were initially proposed.

Project proposal:

The project proposal includes biomass receiving, screening and conveying equipment as well as biosolids receiving and conveying equipment. The 6.5 MW bubbling bed boiler (BFB) is part of one power "train". The train includes biosolids storage silos (2), biomass and biosolids fuel feed equipment, sand silo, hydrated lime storage silo, limestone silo, activated carbon silo, ash silo and ash truck load out, and cooling tower with three (3) cells. The BFB is served by nonselective catalytic reduction (NSCR); turbosorp flues gas scrubber, activated carbon storage and injection, bag house, low temperature selective catalytic reduction (SCR) and biofilter.

The applicant has stated that this is a "gasification" project. However, the unit is simply a bubbling bed combustor. The biomass and biosolids are burned in the bubbling bed chamber. The fuels are not "gasified" with resulting syngas going to a burner. Therefore this project description and the associated ATCs will not refer to "gasification" of the biosolids and/or biomass.

BACT and Offsets

Best Available Control Technology (BACT) and Offsets are both triggered under District New Source Review Rule 2201 and have been addressed by the applicant.

CEQA

The project is subject to the California Environmental Quality Act (CEQA) and the applicant's Environmental Impact Report (EIR) has been evaluated by Kern County (the lead agency). Kern County approved a notice of determination on December 14, 2010.

Title V

The facility does not have a Title V permit, but will be submitting application in the future as their emissions are expected to exceed Title V thresholds.

II. Applicable Rules

Rule 2201 New and Modified Stationary Source Review Rule (9/21/2006)

Rule 2520 Federally Mandated Operating Permits (6/21/01)

Rule 4001 New Source Performance Standards

40 CFR 60 Subpart **Cb**, Emission Guidelines and Compliance Times for Large Municipal Waste Combustors Constructed on or Before 9/20/1994.

Not Applicable, not constructed before 9/20/1994.

40 CFR 60 Subpart **Da**, Standards of Performance for Electric Utility Steam Generating Units (9/18/1978)

Not applicable. Da only applies to "Electric Utility Steam Generating Units" with a heat input rating > 250 MMBtu/hr (73 MW). The proposed units are 211 MMBtu/hr each.

40 CFR 60 Subpart **Db**, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units (6/13/2007) Db applies to steam generating units > 100 MMBtu/hr.

40 CFR 60 Subpart **Dc**, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units (6/13/2011)

Not applicable, Dc applies to units < 100 MMBtu/hr.

40 CFR 60 Subpart **Eb** (12/19/1995) Standards of Performance for Large Municipal Waste for Which Construction Commenced is Commenced After September 20, 1994 or for Which Modification or Reconstruction is Commenced After June 19, 1996

Not applicable – the definition of Municipal Solid Waste (60.51b) excludes sewage sludge, wood pallets and clean wood.

40 CFR 60 subpart **AAAA** (12/6/2000), Standards of Performance for Small Municipal Waste Combustion Units for Which Construction Commenced After August 30, 1999 or for which Modification or Reconstruction is Commenced After June 6, 2001

Not applicable. This subpart applies to units with a capacity to combust at least 35 tons per day but no more than 250 tpd of municipal solid waste or refuse-derived fuel. Applicant is proposing to combust 750 tpd per unit.

40 CFR 60 subpart **BBBB** (12/6/2006) Emission Guidelines and Compliance Times for Small Municipal Waste Combustors Constructed on or Before 9/20/1994

Not Applicable, not constructed before 9/20/1994.

40 CFR 60 Subpart **CCCC** (2000), Standards of Performance for Commercial and Industrial Solid Waste Incineration Units (***CISWI***)

Not applicable, as these Commercial Solid Waste incinerators are used for energy recovery (boilers creating steam used to generate power).

> 60.2265 defines "Commercial and Industrial Solid Waste Incinerators" and "Energy Recovery" as follows:
>
> "Commercial or industrial waste means solid waste (as defined in this subpart) that is combusted at any commercial or industrial facility using controlled flame combustion in an enclosed, distinct operating unit: Whose design does not provide for energy recovery (as defined in this subpart); or operated without energy recovery (as defined in this subpart). Commercial or industrial waste also means solid waste (as defined in this subpart) combusted in an air curtain incinerator that is a distinct operating unit of any commercial or industrial facility."
>
> Energy Recovery definition: "Energy recovery means the process of recovering thermal energy from combustion for useful purposes such as steam generation or process heating."

40 CFR 60 Subpart EEEE (12/16/2005), Standards of Performance for New Stationary Sources: Other Solid Waste Incineration (OSWI)

Not applicable. Only applies to very small MSW and ISW incinerators, of which these BFBs are neither.

40 CFR 60 Subpart **IIII** (6/28/2011), Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

40 CFR 60 Subpart **LLLL** (3/11/11) Standards of Performance for New Sewage Sludge Incineration Units

Not applicable: 60.4780 states *"This subpart exempts combustion units that incinerate sewage sludge and are not located at a wastewater treatment facility designed to treat domestic sewage sludge."*

Rule 4002 National Emission Standard for Hazardous Air Pollutants (**NESHAPs**) 40CFR61 and 40CFR63

40 CFR 61 Subpart **A**, General Provision

40 CFR 61 Subpart **C** (61.30), National Emission Standard for Beryllium

40 CFR 61 Subpart **E** (61.50), National Emission Standard for Mercury

40 CFR **63 Subpart DDDDD** (63.7480), National Emission Standard for Hazardous Air Pollutants (HAPs) for Industrial, Commercial, and Institutional Boilers and Process Heaters (9/13/2004)

Not applicable: Pursuant to 60.4785, this subpart only applies to boilers and heaters which are part of a major source of HAP (> 10 tpy of one HAP or > 25 tpy of all HAPs combined). This source is not a major source of HAP.

Rule 4101 Visible Emissions (2/17/05)

Rule 4102 Nuisance (12/17/92)

Rule 4201 Particulate Matter Concentration (12/17/92)

Rule 4202 Particulate Matter - Emission Rate (12/17/92)

Rule 4301 Fuel Burning Equipment (12/17/92)

Rule 4305 Boilers, Steam Generators and Process Heaters – Phase II (8/21/03)

Solid fuel boilers are **exempt** per 4305 section 4.1.1

Rule 4306 Boilers, Steam Generators & Process Heaters – Phase III (3/17/05)

Solid fueled boilers are **exempt** per 4306.4.1.1

Rule 4320 Advanced Emissions Reduction Options for Boilers, Steam Generators, and Process Heaters > 5.0 MMBtu/hr (10/16/08)

Solid fueled boilers are **exempt** per 4320.4.1.1

Rule 4351 Boilers, Steam Generators & Process Heaters — Phase I (8/21/03)

Solid fueled boilers are **exempt** per 4351.4.1.2

Rule 4352 Solid Fuel Fired Boilers, Steam Generators & Process Heaters (12/15/11)

Rule 4565 Biosolids, animal manure, and poultry litter operations (3/15/07)

Rule 4702 Internal Combustion Engines (8/18/2011)

Rule 4801 Sulfur Compounds (12/17/92)

Rule 7012 Hexavalent Chromium – Cooling Towers (12/17/92)

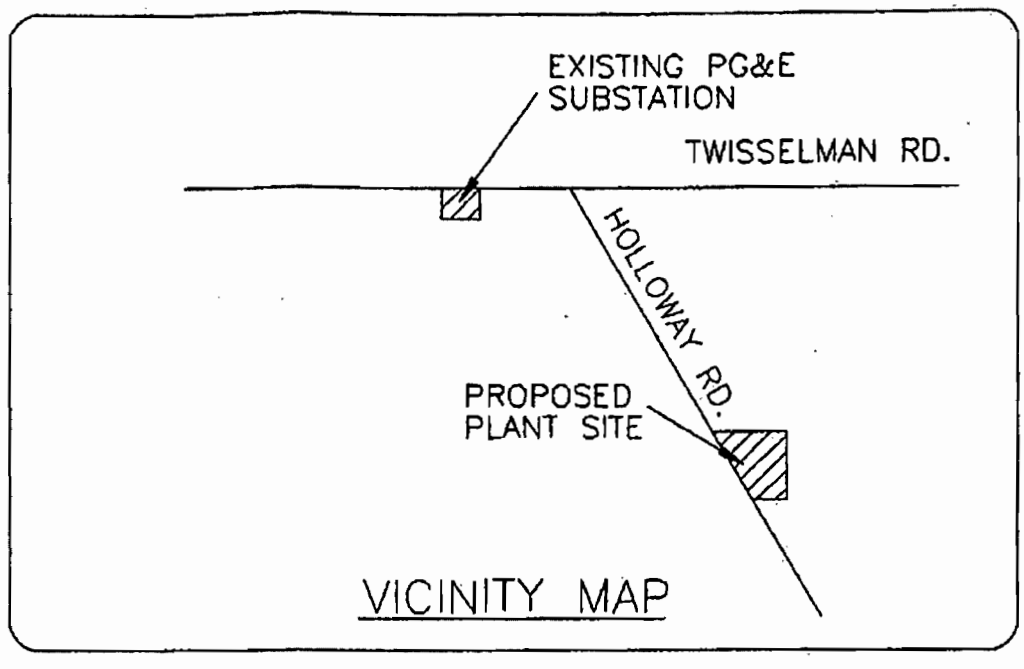
CH&SC 41700 Health Risk Assessment

CH&SC 42301.6 School Notice

Public Resources Code 21000-21177: California Environmental Quality Act (CEQA)
California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387: CEQA Guidelines

III. Project Location

The facility is located at 12421 Holloway Road, Lost Hills, CA 93249. The proposed operations are on the property just east of Holloway Road, across the road from the current composting operations.



The equipment is not located within 1,000 feet of the outer boundary of a K-12 school. Therefore, the public notification requirement of California Health and Safety Code 42301.6 is not applicable to this project. The proposed site plan is shown in the following drawing.

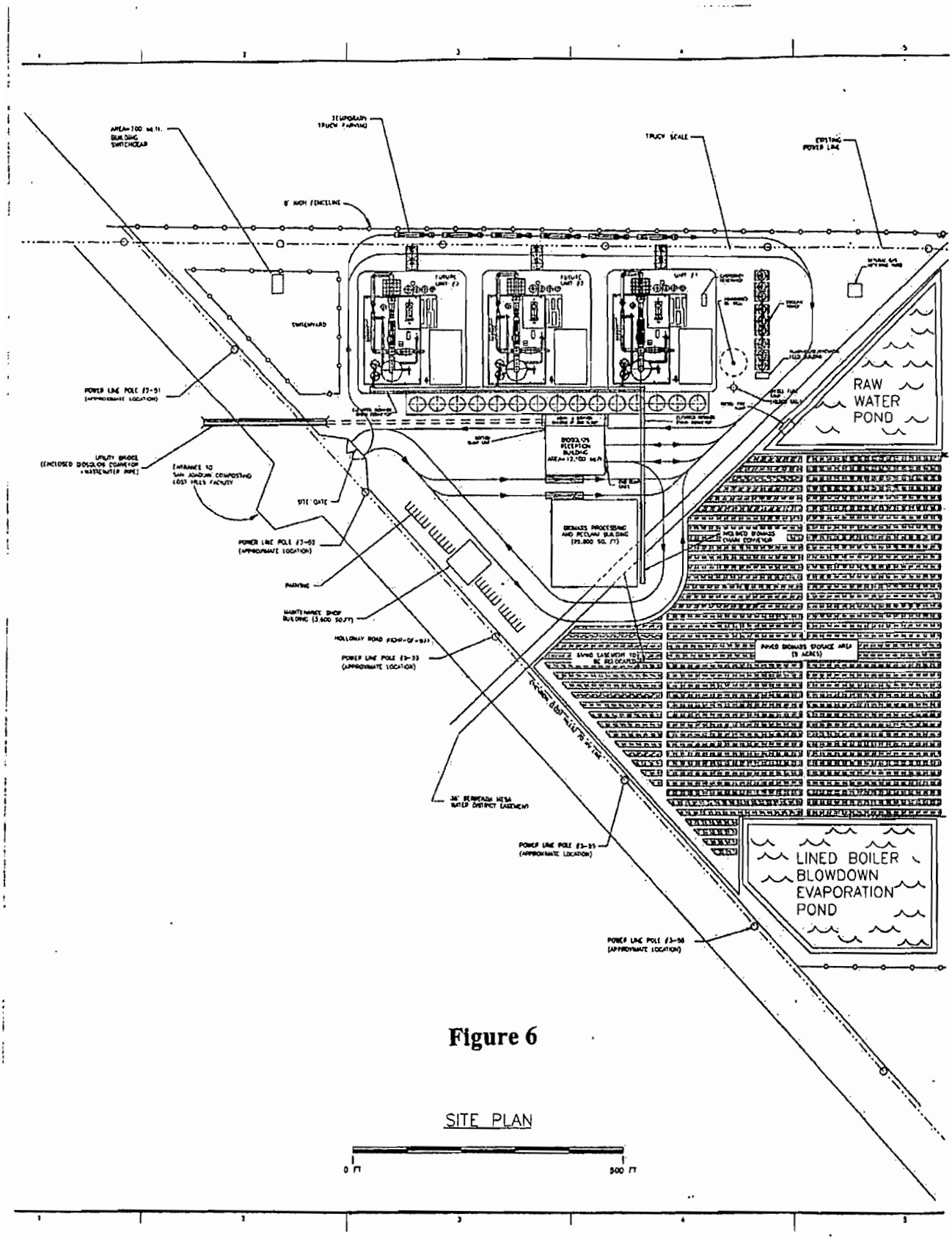

RAW
WATER
POND
LINED BOILER
BLOWDOWN
EVAPORATION
POND
SITE PLAN
0 FT
500 FT

Figure 6

IV. Process Description

General overview of the proposed project:

The major business of Liberty Energy is disposing of biosolids. They currently do this by composting biosolids at their facility and then shipping the finished compost to their farms (the operation is owned by McCarthy Farms). With this current project, they propose to incinerate sewage sludge and create electricity.

Liberty Energy will be a nominal 6.5 MW power plant. The facility will fire biosolids and biomass as fuels. Biosolids are the solids recovered from municipal wastewater treatment plants, also known as sewage sludge. The facility is designed to accommodate both undigested and digested sewage sludge. Biomass used by this facility will include agricultural waste and urban green waste (grass, brush, and tree clippings), clean dimensional lumber, urban forestry waste, and horticultural waste.

The bubbling fluidized bed (BFB) boiler generates steam used to run a turbine, which in turn produces electricity. The BFB boiler will have its own cooling tower with high efficiency mist eliminators to minimize the cooling tower drift and the resultant PM10 emissions.

The proposed facility is an integral part of the Rule 4565 compliance plan for the Liberty Composting facility, i.e., energy conversion option per Rule 4565, Section 7.4.

Biomass receiving and storage

Onsite roads and the biomass areas will be paved to reduce dust generated from vehicular traffic and prevent mud track-out onto the site paved roads or Holloway Road. An average of 90 truck trips per day will deliver fuel to the facility as limited by the applicant's CUP.

Biomass Fuels

Biomass fuel will consist of cellulose organic matter which includes:

- Agricultural waste (vines, prunings, field wastes, stalks, etc.).
- Arbor waste (waste from trimming trees and damaged trees).
- Green waste or garden waste (grass, leaves, trimmings).
- Clean dimensional lumber (scrap wood from manufacturing, packing wood & saw dust).

Liberty Energy proposes to avoid biomass better suited for composting, while focusing on the more difficult to compost materials as fuel sources. Liberty proposes to use biomass fuels which do not contain chemical preservatives or potentially toxic materials.

Fuel contamination:

Applicant states that the feedstock may include glass, plastic, paper, stones and soil. Biomass will be hand-picked down to $\leq$ 1% contamination[1]. Applicant proposes a maximum of 0.25% by weight plastics in the biomass which goes to the combustor to be incinerated.

[1] 2% proposed in an email received from Steve Ketler 4/24/2011, then lowered to 1% per telephone conversation 3/13, 2012..

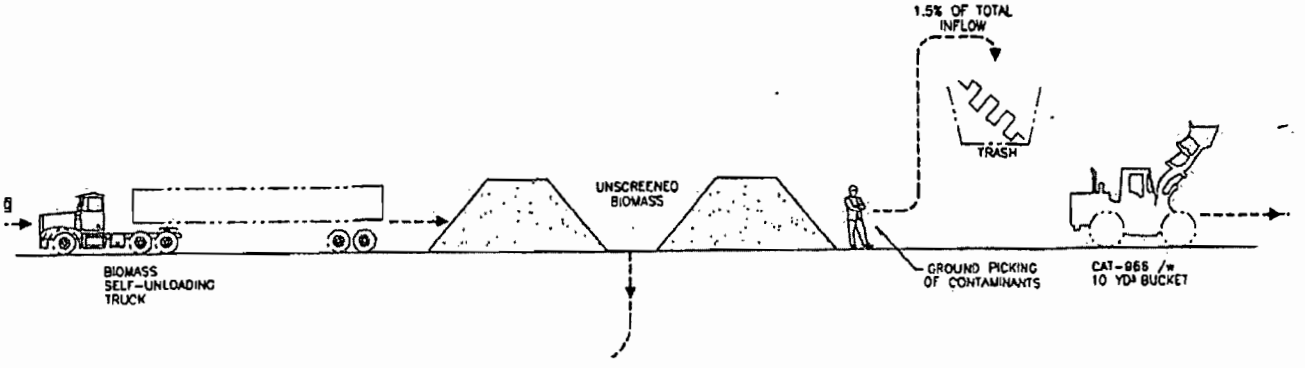


Figure 1
Biomass receiving

Biomass will be delivered to the site in self unloading tractor-trailers at various locations within the biomass storage areas, depending on the type of biomass. The biomass storage area will total approximately 9 paved acres. Up to 75,000 tons of biomass proposed to be stored on the site, which is approximately a 90-day supply of fuel at the maximum biomass firing rate (the portion of biomass which will be mixed with biosolids prior to incineration – the facility will not be fired solely on biomass).

The boiler will be equipped with two 60 MMBtu/hr natural gas/propane-fired burners which will be used during startup of the boilers. The facility will fire up to 741 tons/day, or a maximum 251,850 tons per year biomass (Combined biomass and biosolids $\leq$ 733,994 tpy).

Biomass piles will be manipulated to prevent heating which can result in fires. Pile height will not exceed 15 feet. Fuel storage areas will be swept and cleaned when not in use.

Biomass grinding, screening and conveying

The grinding, screening and conveying equipment are all powered by electric motors (no IC engines proposed). All biomass processing (grinding and screening) will occur inside the biomass processing and reclaim building.

A portion of the biomass will be delivered as boiler ready fuel while other material will be ground to a four inch minus size using an electric motor powered shredder (shown as M-11 in the schematics). Applicant is proposing to control dust by adding moisture to the product as needed to eliminate visible emissions.

The biomass grinder discharges to an electric motor powered trommel screen M-13 (shown below).

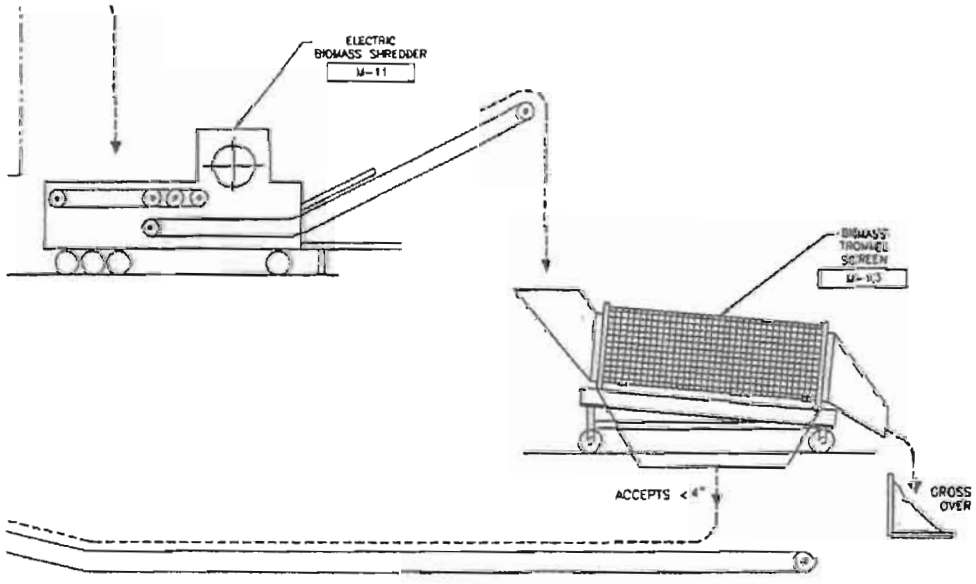


Figure 2
Grinder (S-360-35-0) and trommel screen (S-360-36-0)

The "accepts" (biomass < 4 inches) from the trommel screen discharge onto stacking conveyor C-13A, which then transfers the product into the screened product pile or the "live storage" area. All of this is done indoors of the building.

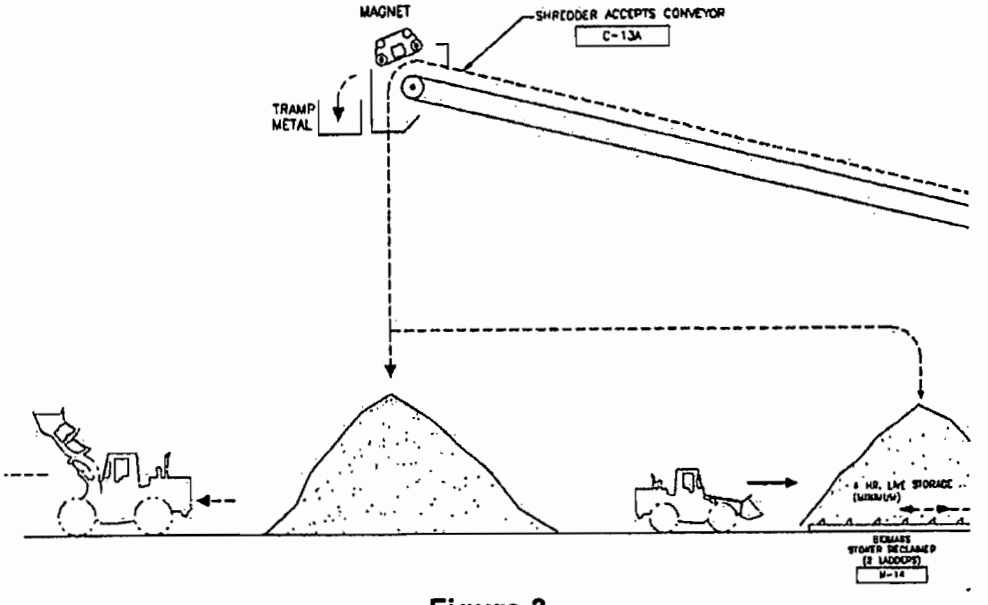


Figure 3
Live storage biomass reclaimer

Screened "boiler ready" fuel may be placed on the "live storage pile" via front loaders.

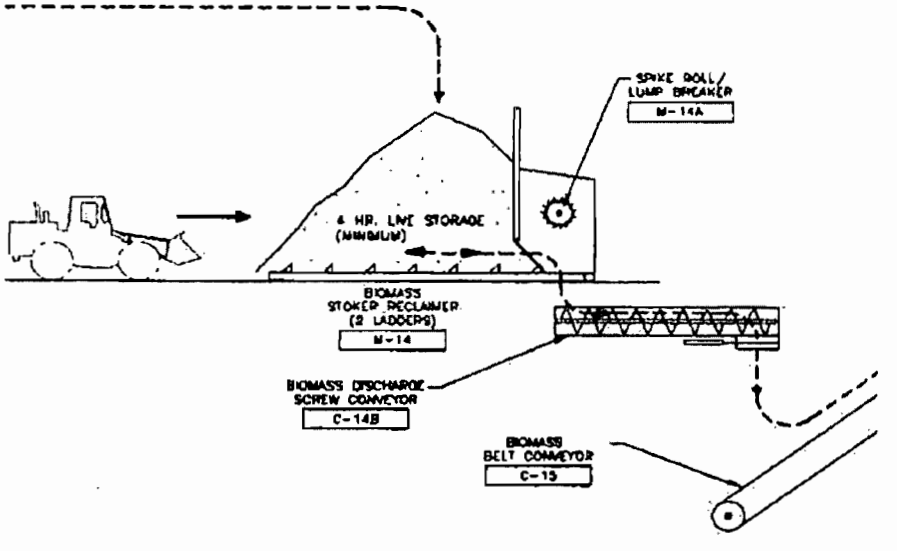


Figure 4
Biomass reclaimer with lump breaker (S-360-37-0)

The "live storage" reclaimer has two under-pile ladder conveyors (M-14) which drag product to spike roll/lump breaker M-14A. From the live pile lump breaker, the biomass is conveyed via screw auger conveyor C-14B to belt conveyor C-15 to star screen M-15. From the star screen, the "accepts" are discharged to chain conveyor C-16 which discharges to chain conveyor C-17 which discharges the biomass to conveyor C-19. From there the biomass goes through a distribution chute to the biomass

screw conveyors, which then discharge to the respective feed bin (FBR feed bin #1, bin #2 or bin #3). The surge bins are located near the combustion units.

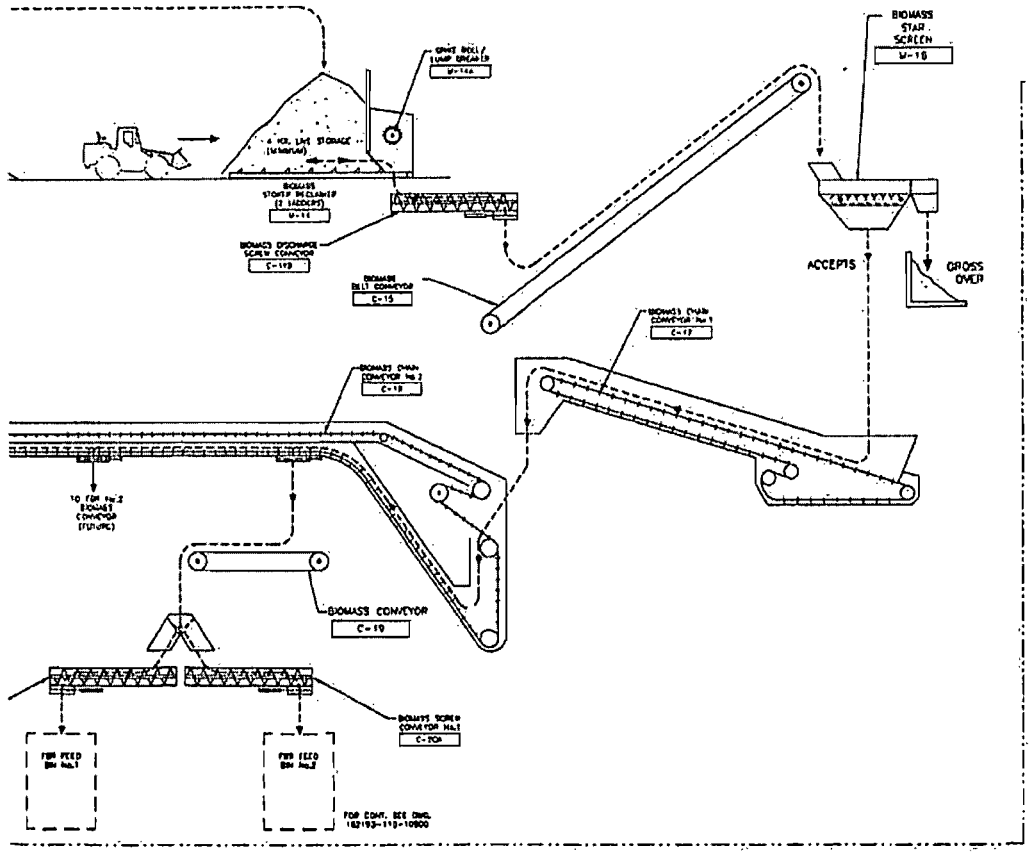


Figure 5
Biomass conveying (All indoors, included in permit S-360-37-0)

The biomass fuel is delivered to the combustion units through either an auger or blow line. Boiler-ready fuel has the appearance of small wood chips. The facility is not designed to operate on biomass only. The biomass reclaim unit will store several hours' fuel supply. Reclaim unit loading will occur as needed over the course of an operating day.

The conveyors will be covered. The biomass processing building will be under negative pressure with building air ducted to the outside through roof vents equipped with mesh filters.

Biosolids receiving, storage and conveying

Biosolids will be delivered to the site by tarped tractor trailers with an expected average capacity of 24 tons. Biosolids trucks will self-unload into dedicated biosolids reception units. In the diagrams below it show three methods of unloading 1) truck unloading, 2) trailer unloading or 3) bottom unloading.

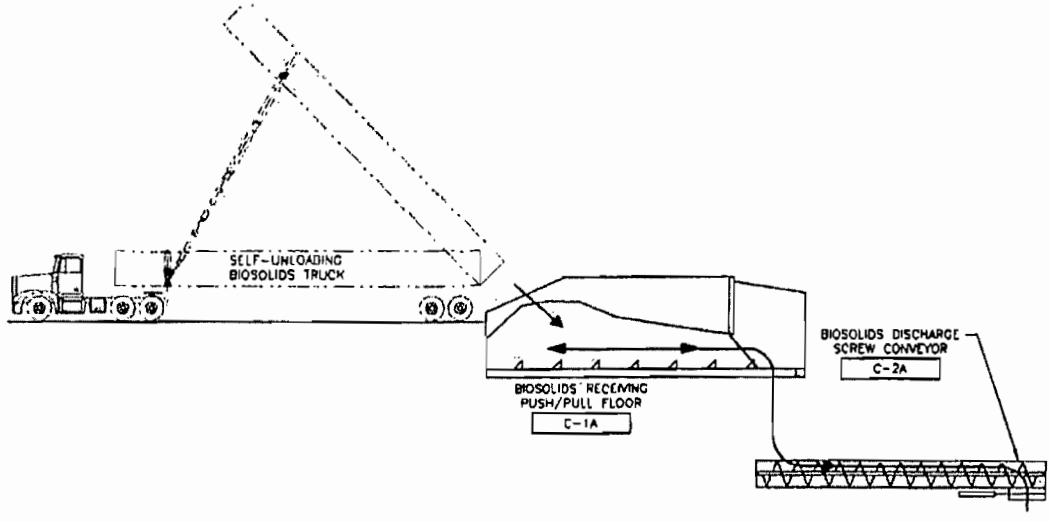


Figure 6
Biosolids unloading using self-unloading truck

Sewage sludge delivered will be in a semi solid state with about 75% moisture content. A single biosolids reception building (with multiple reception units inside the building) is proposed. Incoming trucks will unload into the reception units which will be equipped with self-unloading floors discharging into screw conveyors. The reception units are approximately 15 ft. long, 12 ft. wide and 5 ft. deep. Biosolids delivery trucks may washout at the reception units. All wash water will drain into the reception units and will be conveyed to the silos for discharge to the furnace with the biosolids fuel.

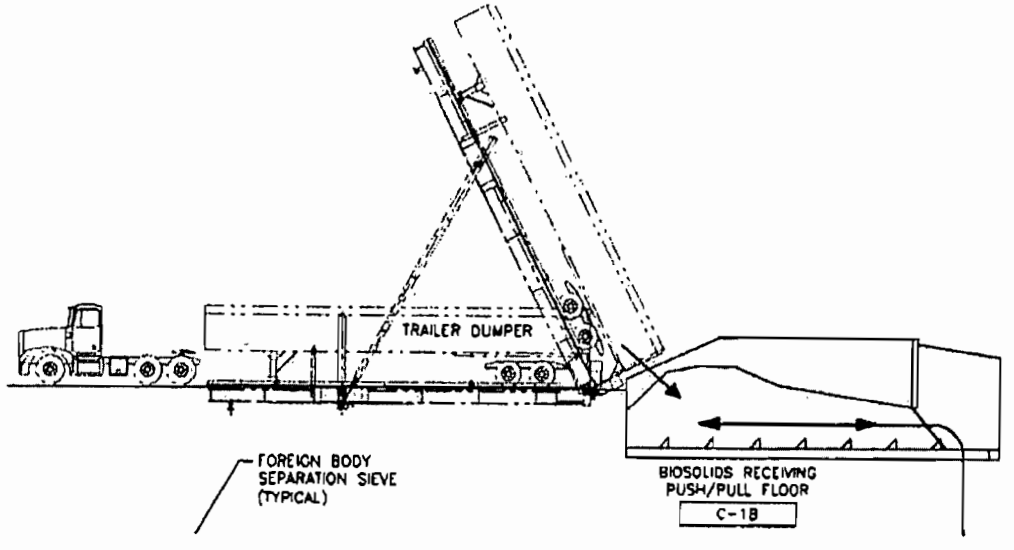


Figure 7 (above)
Trailer dump

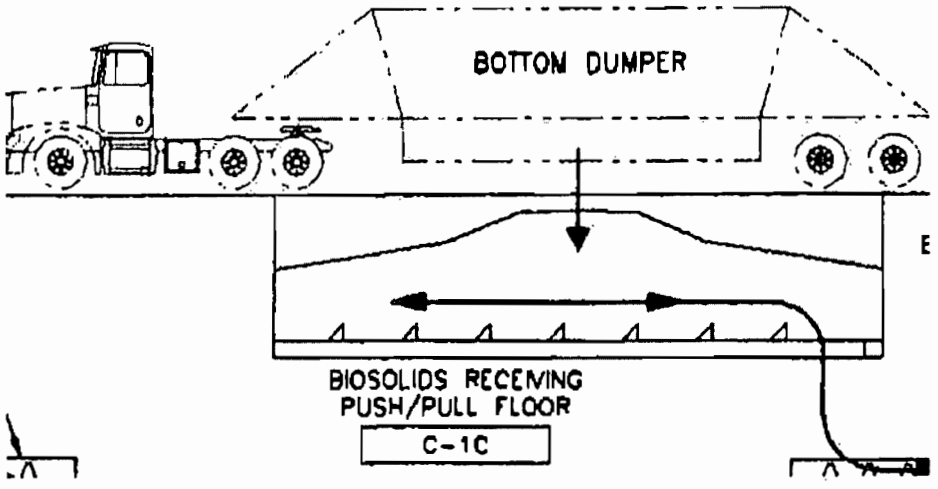


Figure 8
Biosolids bottom trailer unloading

The screw conveyors supply piston type pumps which move the biosolids into the 5 biosolids storage silos located near each corresponding combustion unit (5 for each combustion unit). Each silo will hold approximately 1450 tons with up to 15 silos provided for a total storage capacity of 21,750 tons. Each silo is approximately 30 ft. in diameter and 70 ft. in height.

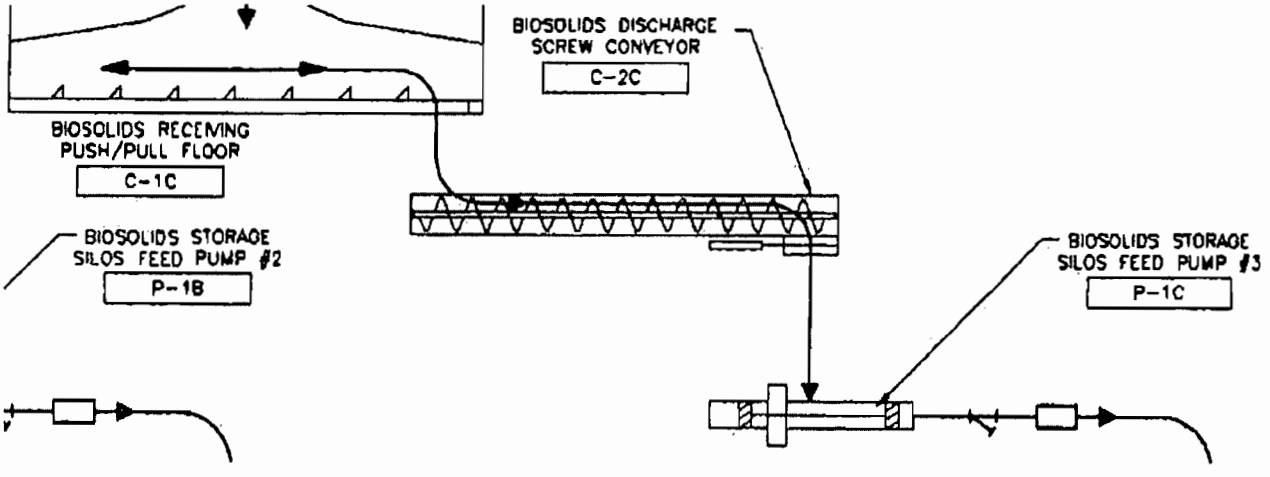


Figure 9
Example of biosolids storage feed screw pump

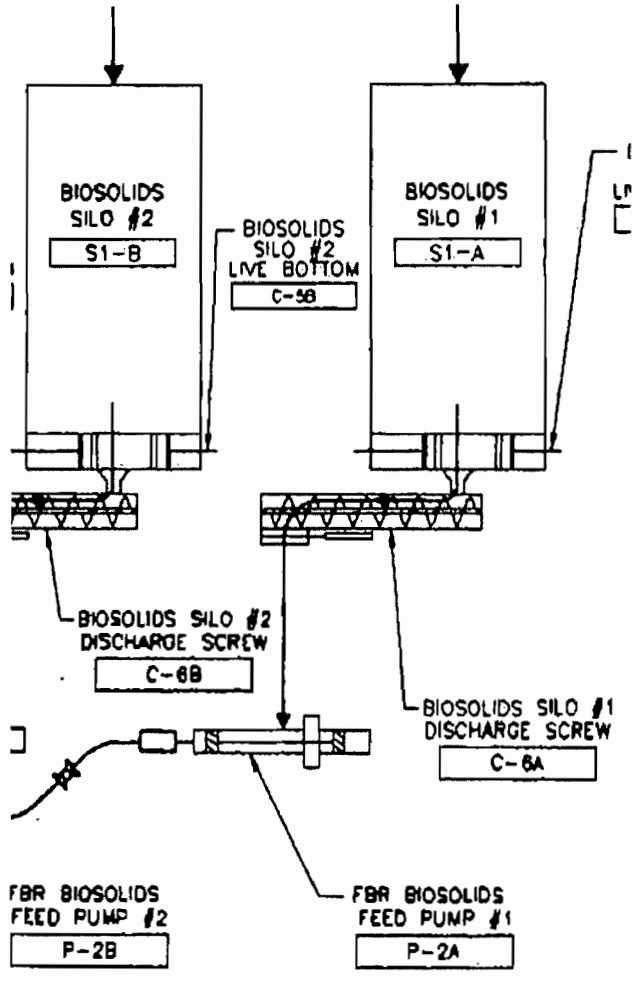


Figure 10
Enclosed biosolids storage silos

Biosolids are reclaimed from the bottom of the silos and pumped directly to the BFB through pipes. Biosolids fuel to the boiler will be supplied by an enclosed delivery system. The fuel delivery system will terminate at a gun or shatter nozzle that disperses the biosolids within the boiler combustion zone.

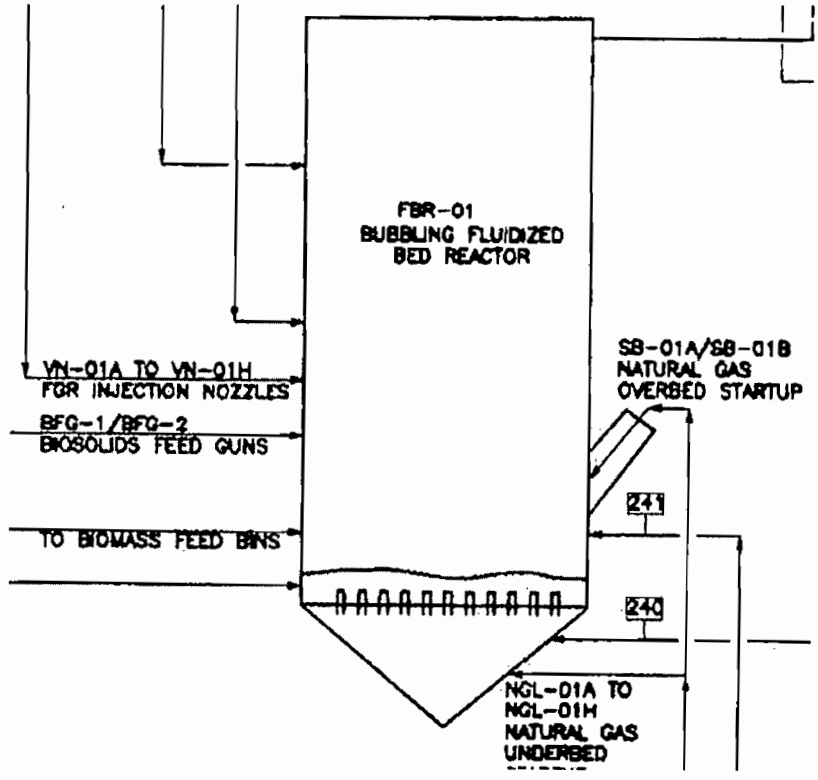


Figure 11

Biosolids feed guns into BFB combustor

During loading operations, foul air from the biosolids building and reception units, and silos will be ducted to the combustion air fans. The silos will also be fitted with activated carbon filters. Up to 15 storage silos may be provided. A single biosolids reception building will serve all three power trains.

In summary, the application states that biosolids will be contained at all times within silos and pumped directly to the BFB; biosolids will not be handled in the open.

Foul air from unloading trucks is controlled by ducting to the boiler. The facility will fire up to 1800 tons per day biosolids or approximately 75 truckloads daily in combination with biomass fuel. Biosolids fuel will be delivered 24 hours per day and 7 days per week. The annual biosolids firing rate is expected to be approximately 657,000 tons per year with a 100 percent capacity factor. This capacity factor will be reduced in actual practice due to CUP feedstock delivery constraints.

Ash

LV will produce fly ash at a maximum rate of approximately 300 tons per day, which will be stored in silos and removed daily. The ash handling/storage and loadout are shown below.

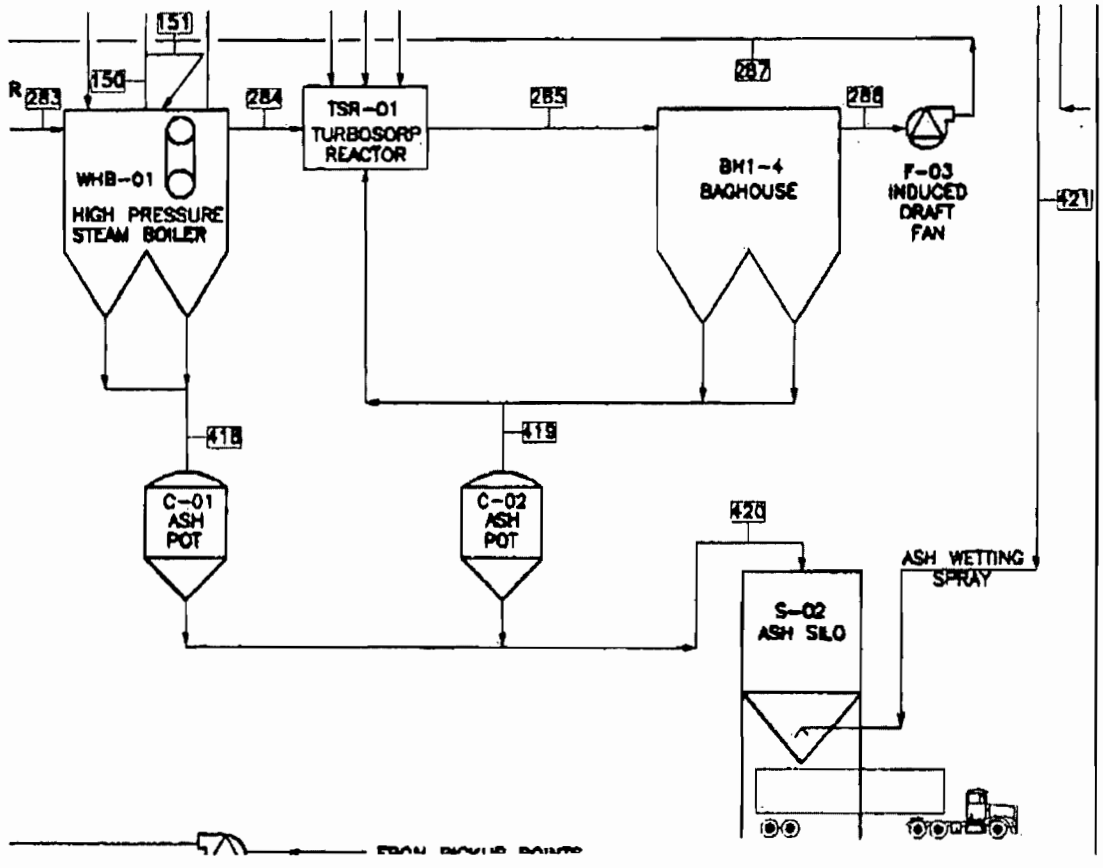


Figure 12

Ash handling/storage and loadout

Ash will be removed from the site and used as an additive in concrete manufacturing. Any portion of the ash not recycled would be trucked to a landfill. Up to 300 tons per day of ash will be generated by the facility, requiring approximately 19 trucks per day, each removing approximately 15-19 tons of ash. Ash will be wetted as it is loaded into the haul trucks. Ash will be hauled in tarped, open top trailers of the bulk materials type. Biosolids delivery trucks may remove ash as a backhaul.

Biosolids delivery trucks come from outside the SJV air basin. Biomass will be derived from sources inside and outside the SJV air basin.

Bulk materials used for pollution control

Liberty Energy will consume moderate quantities of bulk materials required for pollution control measures. These materials include, but are not limited to, limestone, hydrated lime, powdered activated carbon, sand, and ammonia. The frequency of delivery for these materials varies widely, because consumptions rates vary on a daily basis. The number of trucks delivering this material to the site, on a daily basis, will be relatively small in comparison to fuel deliveries.

Bubbling Fluidized Bed (BFB) combustor – Power Train 1

The Bubbling Fluidized Bed (BFB) combustor uses biosolids and biomass for fuel producing approximately 6.5 MW (gross) of electricity. The BFB is part of a "power island" as shown in the site plan contained on the following page of this application review. A typical power island (power train) is shown in Figure 13.

Liberty Energy will utilize a bubbling fluidized bed (BFB) to combust the mixture of biosolids and biomass. Biomass and biosolids will be injected into the combustor via completely independent systems. Biosolids will be pumped using double-acting piston pumps similar to those used to pump wet cement. Biomass may be delivered by enclosed twin auger screw conveyors or blow lines. The fuel then mixes with the hot suspended bed material and is incinerated. Hot fuel gas is provided with staged combustion air in the upper furnace where combustion occurs. Liberty Energy will utilize a mixture of sand and limestone as the bed material. This mixing of bed material and fuel helps to ensure a complete combustion and control of emissions. Bubbling fluidized bed technology is well suited for wet fuels.

The BFB combustor is designed to operate at furnace temperatures of approximately 1500+ °F for proper combustion of the fuel (also incinerates organic compounds). The BFB combustor will be limited to a maximum heat input of 211.54 MMBtu/hr.

The boiler will be equipped with two 60 MMBtu/hr natural gas/propane-fired burners which will be used during startup/shutdown of the boilers. The maximum natural gas (or equivalent BTU propane fuel) proposed to be burned during startup and shutdown is 2,880,000 std. cu. ft. per day and 38,000,000 scf per year.

The facility will fire up to 741 tons/day, or a maximum 251,850 tons per year biomass (Combined biomass and biosolids $\leq$ 733,994 tpy).

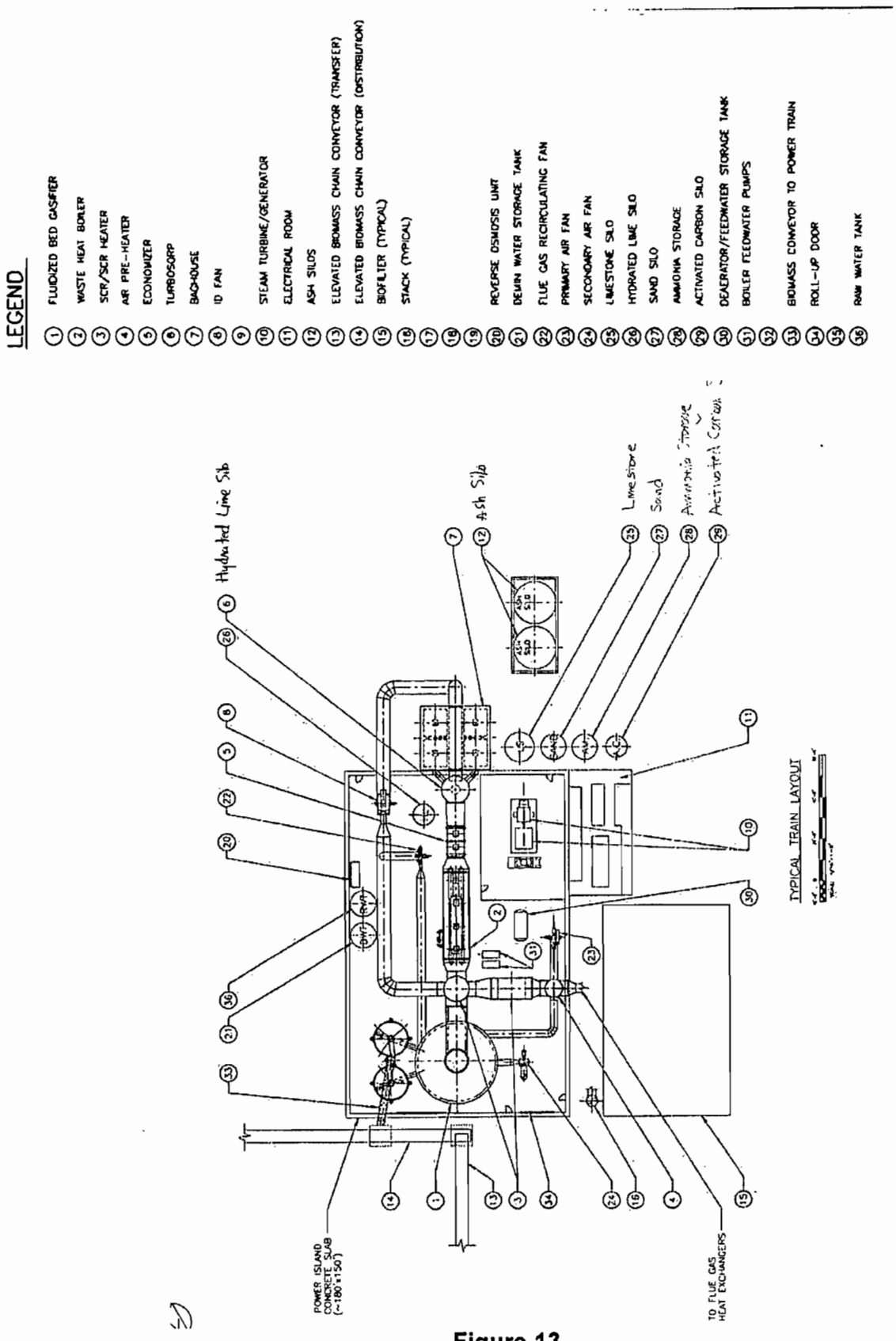


Figure 13
Typical power train

The proposed power train uses the following air pollution controls:

Bubbling Fluidized Bed (BFB) combustor operating at approximately 1500 degrees F using staged air combustion. These conditions incinerate Volatile Organic Compounds (VOCs). The high temperatures are not expected to completely destroy PCBs, PAH and dioxin/furans, which is why the plastics content in the fuel will be limited to $\leq$ 0.25% by weight.

Lime or limestone injection into the BFB bed for the first stage of SO_2 control.

Selective Non-Catalytic Reduction (SNCR) to reduce oxides of nitrogen (NOX) by injecting Ammonia into the upper region of the combustion chamber where the temperature of the gas is optimal for the NOx and ammonia to react with each other to produce nitrogen and water as harmless by-products.

Selective Catalytic Reduction (SCR) to reduce oxides of nitrogen (NOx) emissions - similar to the SNCR process, but the reaction takes place in the presence of a catalyst, typically a platinum grid. The proposed low-temperature catalyst (approximately 600 degrees F) enhances the reaction between the Ammonia and the NOx, similar to what occurs in the catalytic converter in cars and trucks. Applicant is proposing to reduce NOx emissions by 90% using SCR, thereby lowering NOx emissions from approximately 155 ppmv down to 15.5 ppmv. The precious metals found inside the catalytic converter dramatically increase ammonia's ability to break down the NOx into nitrogen and water. Applicant is proposing to limit ammonia slip to no more than 15 ppmv[2].

Semi-dry flue gas Scrubber (Turbosorp) to control acid gases (primarily SO_2, HCL, furans and dioxins).

An alkaline substance (such as hydrated lime) is injected into the flue gas which neutralizes the acid gas by breaking it down into harmless salt like compounds (see Figure 14). Fly ash, the resulting byproduct of the entire Liberty V process is partially comprised of the material collected from the semi-dry scrubber as well as the fabric filter (baghouse). No liquid is discharged from the scrubber.

Powdered activated carbon (PAC) will also be injected into the flue gas in the semi-dry Scrubber. PAC removes Mercury from the flue gas and captures any trace amounts of dioxins/furans that may still be present. PAC is a very spongy material with a large surface area well suited for mercury capture and control. The various phases of Mercury are absorbed and securely fixed to the carbon molecules that are large enough to be captured by the baghouse. Mercury in this form is considered stable because it does not vaporize back into the atmosphere. The PAC system will also have a controlling effect on volatile organic compounds, e.g., use of activated carbon is a well-known VOC control technique.

[2] As identified in the application package and confirmed in email dated 4/24/2011, from Steve Ketler of Liberty Energy.

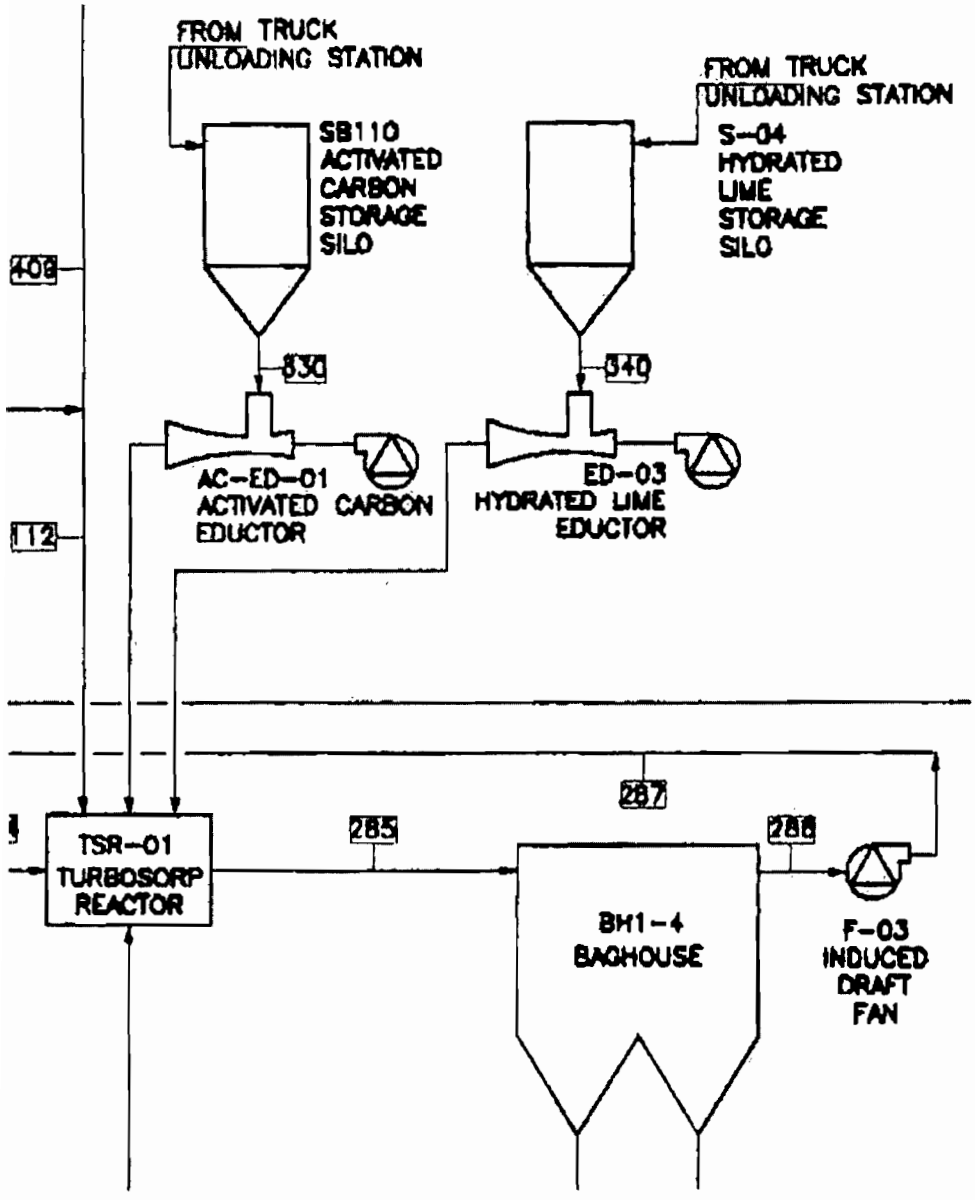


Figure 14
Turbosorp flue gas scrubber

A **baghouse** designed to capture very small particulate matter in the flue gas will follow the PAC injection system. The baghouse, works by forcing the flue gas through a series of large tubes that are lined with a woven filter. Sensors inside the tubes sense when enough material is blocking the flow of air and subsequently blast a short pulse of air in the opposite direction. This causes the built up material to drop into collection hoppers which contributes towards the systems fly ash production (Figure 15). The proposed baghouse is a Wheelbrator model 192-6P with 342 bags per compartment (each 6 in. dia.) and pulse jet cleaning.

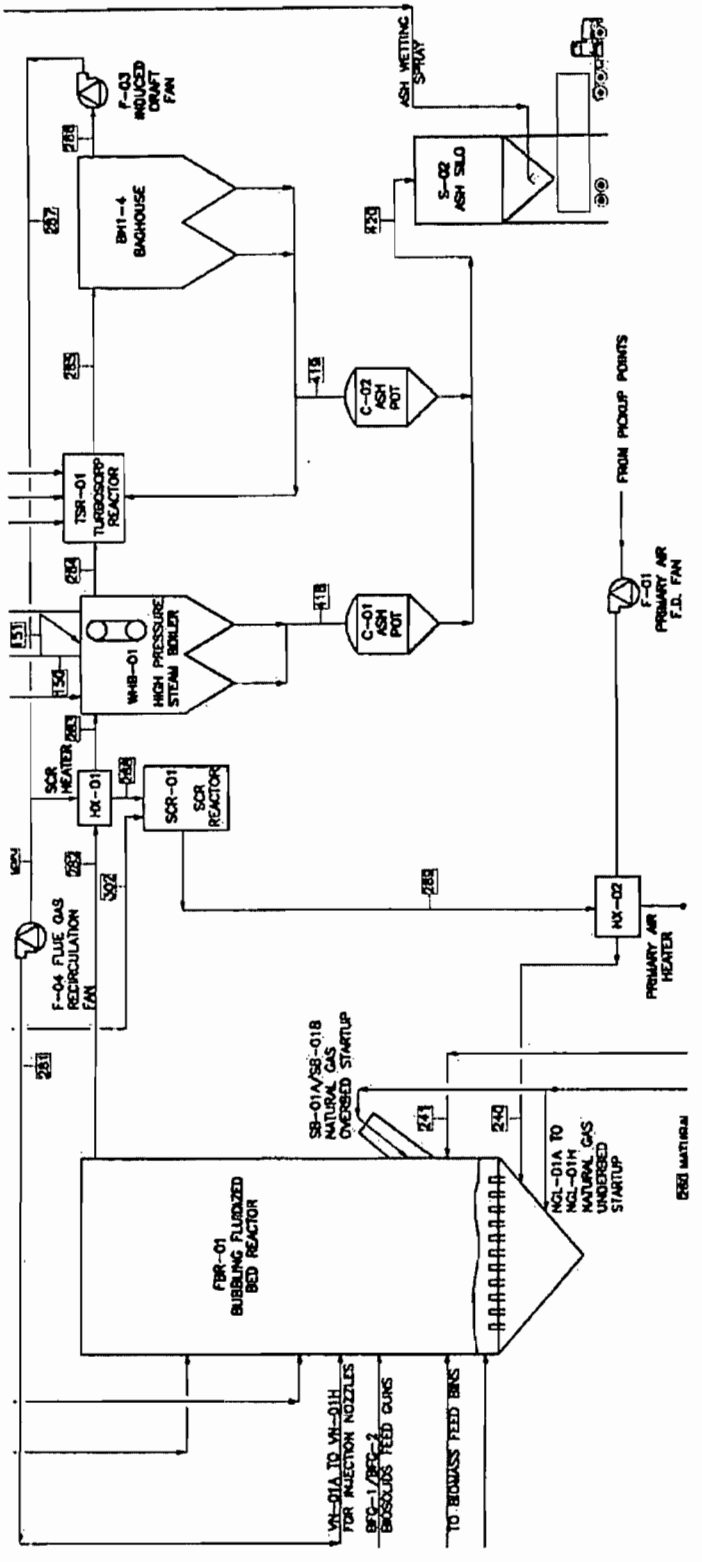


Figure 15
SCR, Dry scrubber and baghouse

The final stage of flue gas cleaning and emissions control will occur in the biofilter. Exhaust gas from the biofilter will be re-heated on the hot side of the tubular flue gas cooler and then discharged through the stack (one per power train as noted on Figure 15). The biofilter will be a multiple chamber unit approximately 100 ft. long, 60 ft. wide and 60 ft. high, of fully enclosed steel construction and will include a flue gas cooler /recuperator and air distribution plenums and humidity control system. The proposed 48,400 SCFM airflow results in an empty bed biofilter residence time of 45 seconds or longer. Internal media will be a material such as Biorem XLD or equivalent. Applicant is proposing 40% NOx control as the flue gas passes through the biofilter.

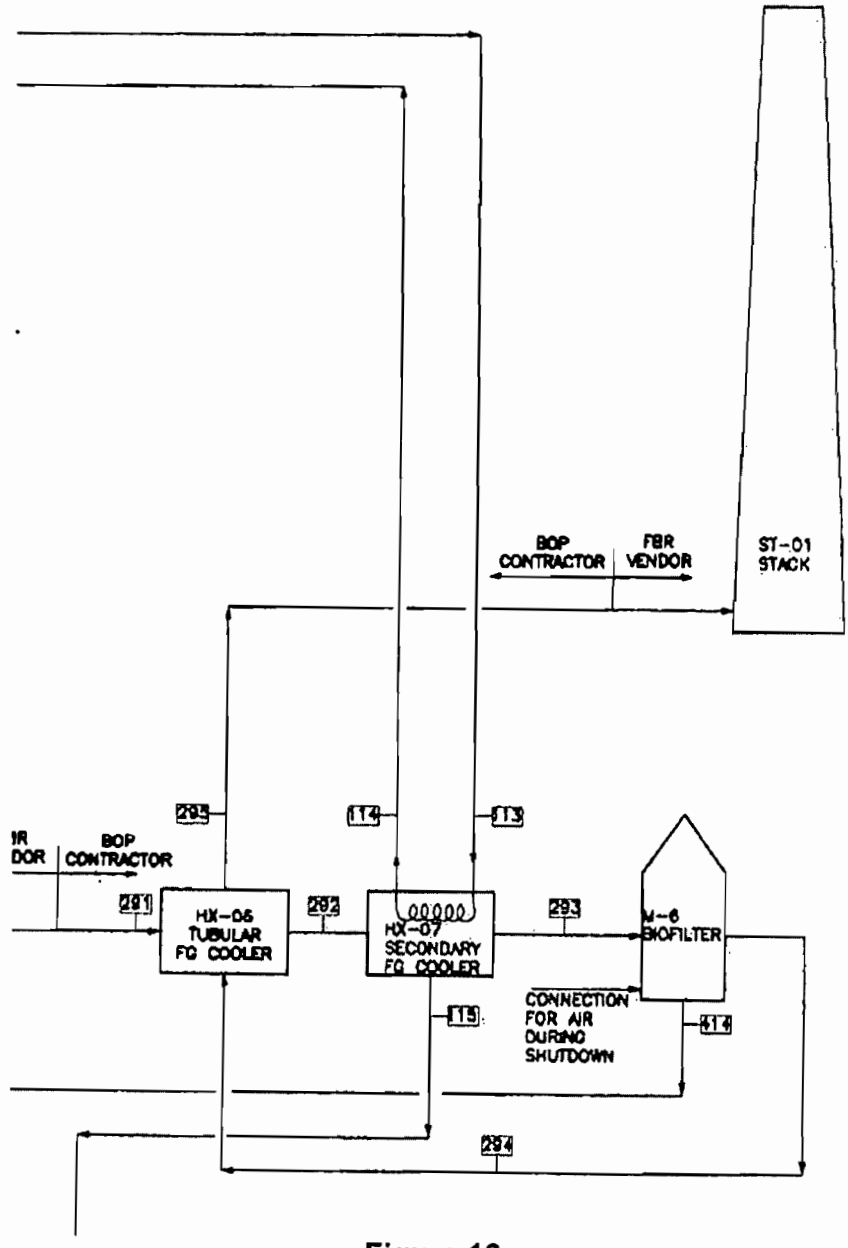


Figure 16
Flue gas cooling and biofilter scrubber

The BFBs produce ash which is collected in ash silos (one serving each train). The ash is then loaded into trucks to be hauled off (see figures 12 and 15).

BFB emissions control

PM10 emissions from the BFBs are controlled with the use of a bag house. NOx emissions will be controlled with the use of NSCR, SCR and a biofilter. Applicant is proposing 4.8 PPMV NOx at the point of discharge into the atmosphere. VOC emissions (which would have otherwise occurred by composting the biomass and biosolids together) will be controlled using the BFB. SOx emissions will be controlled with the use of limestone injection, hydrated lime injection, and the Turbosorp scrubber. The Turbosorp scrubber will also remove SOx and HCL from the flue gas. The powdered activated carbon is expected to result in some control of dioxins, furans, mercury and VOCs from the flue gas. The NSCR, SCR and biofilter will be used to remove NOX emissions. The biofilter will also remove VOC and NH3 emissions from the exhaust stream, even though that is not the primary purpose of the biofilter (primarily installed as a NOx control device).

Cooling towers

S-360-10-0

The cooling tower will consist of 3 cells and has a 8,831 gal/min water flow rate and an air flow rate of 320,000 acfm per cell[3]. The cooling tower is equipped with a high efficiency mist eliminator to minimize cooling tower drift and the resultant PM10 emissions. The PM10 emissions are due to total dissolved solids (TDS) in the cooling water.

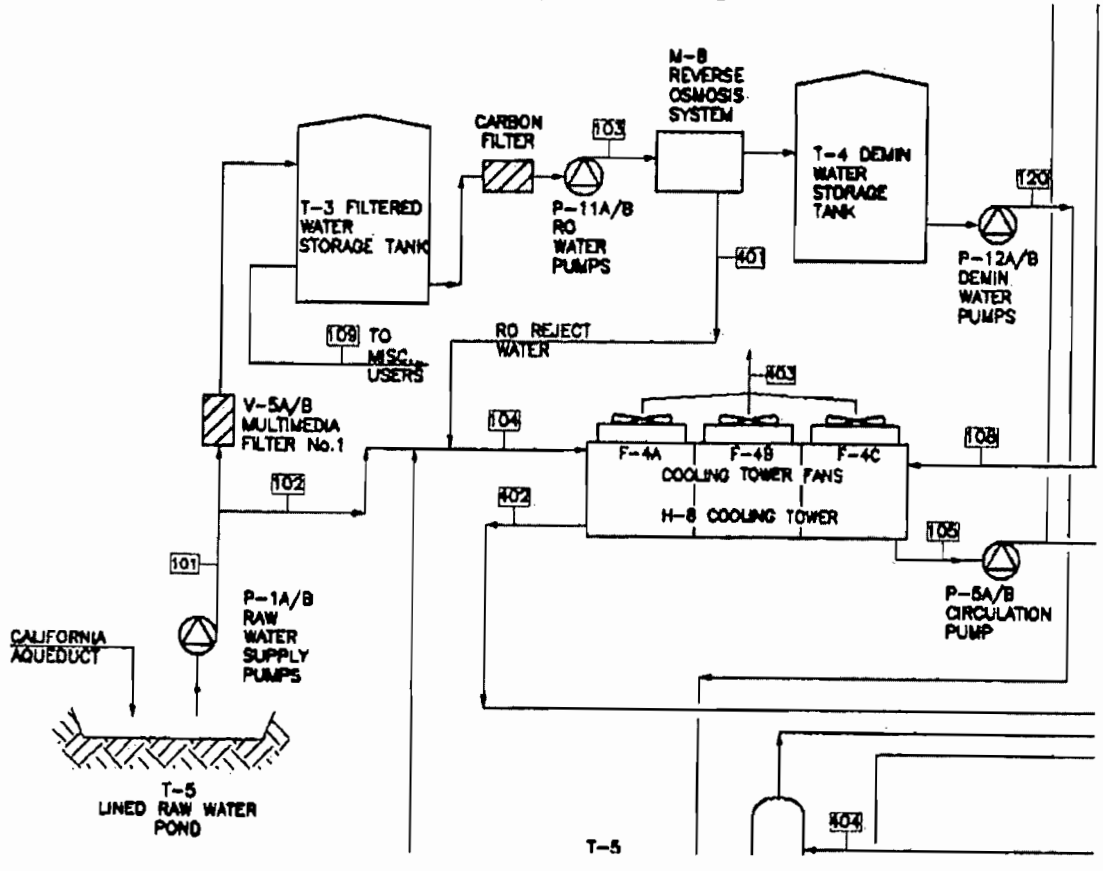


Figure 17
Typical cooling tower (one per train)

[3] Cooling tower airflow rate provided in email from Steve Ketler in email dated 4/24/2011.

V. Equipment Listing

New Equipment (ATCs):

S-360-7-0 6.5 MW (211.52 MMBTU/HR) BIOMASS/BIOSOLIDS-FIRED BUBBLING FLUIDIZED **BED BOILER (BFB) # 1** WITH TWO 60 MMBTU NATURAL/PROPANE GAS-FIRED STARTUP BURNERS (ONE OVERBED AND ONE UNDERBED), SNCR, FGR, O2 CONTROLLER, SEMI-DRY TURBOSORP FLUEGAS SCRUBBER, WHEELABRATOR MODEL 192-6P BAGHOUSE, LOW TEMPERATURE CORMATECH SCR, BIOFILTER, AND NOX, CO, SO2 AND OPACITY CEMS. POWER TRAIN 1

Low temperature Cormatech SCR operates at approximately 600 degrees F, for 90% NOX reduction (153.5 → 15.4 PPMV). Surface area approx = 539 m2/m3, catalyst volume approx 39.4 m3 with approx 2 inch pressure drop.

Biofilter is 100' long x 60' W x 60' H with 45 sec retention time @ 48,400 scfm, for 40% NOx reduction (proposing 4.8 ppmv NOx @ 3% O2 in the exhaust)

Baghouse is a Wheelbrator model 192-6P with 342 bags per compartment, 6 in. dia. X 192 in long, pulse jet cleaning, 0.0021 grains/dscf. Specifications say the BH can operate at 102,082 acfm.

Turbosorp scrubber contains powdered activated carbon which removes SOx, HCL, Mercury and VOCs.

Stack details: 125 ft height, 7 ft diameter, approx 111,000 acfm (48,037 scfm), exhaust temperature approx 250 degrees F.

POWER TRAIN:

S-360-10-0 8,831 GALLON PER MINUTE 3 CELL MECHANICAL DRAFT/COUNTER FLOW **COOLING TOWER**, INCLUDING A HIGH EFFICIENCY MIST ELIMINATOR, SERVING POWER TRAIN 1

Design details (three identical cooling towers – one cooling tower per train): 3 cells, 320,000 acfm per cell, drift rate = 0.0005%, exit height = 23.5 ft, cell diameter = 12.75 ft

S-360-11-0 **HYDRATED LIME** RECEIVING AND STORAGE OPERATION, INCLUDING 2,042 CU. FT. (10' X 26') ENCLOSED SILO, PNEUMATIC LOADING, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT) SERVING TRAIN 1

S-360-12-0 **SAND** RECEIVING AND STORAGE OPERATION, INCLUDING 3,506 CU. FT. (12' X 31') ENCLOSED SILO, PNEUMATIC LOADING, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT) SERVING TRAIN 1

S-360-13-0 **LIMESTONE** RECEIVING AND STORAGE OPERATION, INCLUDING 5,080 CU. FT. (14'X33') ENCLOSED SILO, PNEUMATIC LOADING, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT) SERVING TRAIN 1

S-360-14-0 **POWDERED ACTIVATED CARBON** RECEIVING AND STORAGE OPERATION, INCLUDING 2,042 CU. FT. (10 ' X 26') ENCLOSED SILO, PNEUMATIC LOADING, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT) SERVING TRAIN 1

S-360-15-0 **ASH** RECEIVING AND STORAGE OPERATION, INCLUDING TWO 8,000 CU.FT. (24' X 38') ENCLOSED SILOS, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT) WITH 1000 CFM FAN SERVING TRAIN 1

FUEL RECEIVING:

S-360-28-0 **BIOSOLIDS** RECEIVING AND STORAGE OPERATION INCLUDING 1,450 TON (30' DIA.X 70' HIGH) ENCLOSED **SILO # 1**, CARBON VENT FILTER AND VAPOR PIPING TO COMBUSTION AIR FAN

S-360-29-0 **BIOSOLIDS** RECEIVING AND STORAGE OPERATION INCLUDING 1,450 TON (30' DIA.X 70' HIGH) ENCLOSED **SILO # 2**, CARBON VENT FILTER AND VAPOR PIPING TO COMBUSTION AIR FAN

S-360-33-0 174 BHP CUMMINS MODEL CFP7E-F10 TIER 3 CERTIFIED DIESEL-FIRED, TURBO CHARGED, **EMERGENCY IC ENGINE** POWERING A **FIREWATER PUMP** *(Application revised per 7/15/2011 email, to propose Tier 3 engine)*

EPA Standard Engine Family: ACEXL0409AAB
CARB Executive Order U-R-002-0516

S-360-34-0 **BIOMASS RECEIVING** AND STORAGE OPERATION, INCLUDING TRUCK UNLOADING

S-360-35-0 **BIOMASS SHREDDING** OPERATION, INCLUDING ELECTRIC MOTOR POWERED KOMPTECH CRAMBO MODEL 6000 SCHREDDER M-11 DISCHARGING TO SCREEN PERMIT S-360-37

S-360-36-0 **BIOMASS SCREENING** OPERATION INCLUDING ELECTRIC MOTOR POWERED KOMPTECH EASY STAR TROMMEL SCREEN M-13, DISCHARGING TO "ACCEPTS" CONVEYOR C-13A AND THEN TO STORAGE PILE OR RECLAIMER (S-360-39-0) LIVE PILE

S-360-37-0 **BIOMASS RECLAIM OPERATION**, INCLUDING LIVE STORAGE PILE, RADAR MODEL 50655 STOKER RECLAIMER M-14 WITH LUMP BREAKER M-14A, DISCHARGING TO SCREW CONVEYOR C-14B, DISCHARGING TO BELT CONVEYOR C-15, WHICH DISCHARGES TO STAR SCREEN M-15 THEN TO CONVEYORS C-17, C-18, C-19, C-20 THEN TO THE FUEL FEED BINS INTO THE COMBUSTORS

S-360-38-0 **BIOSOLIDS** RECEIVING AND CONVEYING OPERATION UTILIZING SELF UNLOADING TRUCKS, TRUCK TRAILER DUMP AND/OR BOTTOM DUMP TRUCKS AND INCLUDING PUSH/PULL FLOOR (C-1A), BIOSOLIDS DISCHARGE SCREW CONVEYOR C-2A AND FEED PUMP P-1C

S-360-39-0 TRAIN 1 **ASH LOADOUT** TO TRUCK FROM ELEVATED SILOS USING TWO SIDED TRUCK ENCLOSURE. LOADING DRY ASH TO TRUCK USING A RETRACTABLE COAXIAL SPOUT VENTED TO ASH SILO DUST COLLECTOR, OR LOADING CONDITIONED (MIXED WITH WATER IN AUGER PRIOR TO DISCHARGE INTO TRUCK) ASH TO TRUCK USING A RETRACTABLE COAXIAL SPOUT, EQUIPPED WITH SKIRT, VENTED TO ASH SILO DUST COLLECTOR

S-360-42-0 550[4] BHP DETROIT DIESEL MODEL S60 TIER 3 CERTIFIED DIESEL-FIRED EMERGENCY STANDBY IC ENGINE WITH TURBOCHARGER AND AIR COOLER

VI. Emission Control Technology Evaluation

The proposed operations are expected to be the source of PM_{10} and combustion air contaminant emissions. PM_{10} emissions are expected from the biomass and fuel additives - receiving, storage and conveying, and from the cooling towers. Combustion air contaminants are expected as a result of burning the mixture of biosolids and biomass (producing PM_{10}, SOx, VOC, NOx and CO emissions). There is also the potential for odors associated with the feedstocks (biosolids and biomass), NH3 from the biosolids, and VOC from both feedstocks. Odors associated with biomass are generally not considered obnoxious, whereas odors from biosolids are typically considered objectionable. Incinerating Biosolids also results in Mercury emissions, and the plastic contamination in the biomass fuel results in dioxins. The Turbosorp acid gas scrubber will be used to minimize mercury and dioxin emissions in the flue gas. The proposed emission controls are identified and evaluated in the following paragraphs.

PM_{10}

PM_{10} emissions are expected from receiving, storage and handling of biomass, sand, hydrated lime, limestone and activated carbon. PM_{10} emissions are also expected from each of the three cooling towers and the ash load out operations. Combustion PM_{10} is expected from the biomass/biosolids-fired bubbling fluidized bed boilers.

PM_{10} from biomass receiving and truck unloading:

Applicant uses self-unloading trucks and then moves the biomass to the shredder using front loaders. The moisture content of the materials will be maintained so as to minimize visible emissions.

[4] Specifications for this model engine, obtained from Project 1060588, show the Tier 3 engine maximum rated standby and limited power as 550 bhp.

PM_{10} from biomass shredding, screening, and reclaim operations:

The shredder and screen are inside the biomass processing and reclaim building. Applicant is proposing to maintain moisture content to eliminate visible emissions.

The reclaimer pulls material from the pile using an under pile conveyor, therefore no visible emissions are expected from the reclaim live storage conveyor. The lump breaker is enclosed and no visible emissions are expected from the operation.

PM_{10} from bulk material receiving (and storage) in silos:

PM_{10} emissions are generated during the receiving and storage of sand, hydrated lime, limestone and activated carbon. Each of these products is transferred pneumatically from delivery truck into enclosed storage silos. Each silo will vent to atmosphere through an engineered passive bin vent filter sized for the loading rate of the silo (truck or railcar unloading airflow).

The applicant provided spec sheets for a list of typical passive bin vent filters which may be used, but did not identify a specific unit. Silo bin vent filters are typically designed to serve storage silos which receive material pneumatically from trucks. Pneumatic truck unloading of sand, hydrated lime, PCC and limestone is done pneumatically to enclosed silos. But to conservatively estimate emissions, an airflow of 1000 cfm will be assumed for each silo. The Staclean bin vent identified in the original proposal is designed with a 4.14:1 air-to-cloth ratio (with 240 square feet cloth area and designed to handle up to 1000 cfm). AP-42 says that a properly designed dust collector filter will have an Air to Cloth (A:C) ratio between 1 and 5 feet per minute. The applicant is proposing to control the particulate from the bin vent filters such that the grain loading at the vent filters do not exceed 0.005 grains/scf. Comparing with Delano Energy fabric filter dust collectors serving biomass handling, the Delano permits were approved with A:C ratios between 5 and 8, and airflows between 300 and 1,000 cfm.

Example design calculation for unloading velocity of a bulk material:

Hydrated lime bulk density = 30 lb/cubic foot (given).
Required air velocity to move bulk material of 30 lb/cu.ft. = 5,050 ft/minute[5]

Assuming a 6 inch diameter line, resulting cfm to the silo is calculated below

$(Pi)r^2$ x (minimum velocity) = cfm to the silo bin vent filter

$$= (3.14) \times (3/12 \text{ ft})^2 \times (5{,}050 \text{ ft/min}) = 991 \text{ cfm.}$$

Therefore the proposed 1,000 cfm bin vent filter appears to be adequately sized and is expected to provide at least 99% PM_{10} control.

[5] Handling of Bulk Solids and Packaging of Solids and Liquids. Grantes J Raymus, President, Raymus Associates, Packaging Consultants . Bulk densities are as follows; Limestone: 30 lb/ft^3, Sand: 100 lb/ft^3, Limestone: 87 lb/ft^3, PAC: 5 lb/ft^3

PM_{10} from ash conveying, storage and truck load out:

Bubbling fluidize bed furnaces produce fly ash. Fly ash will separate from the flue gas stream in the convection section due to changes in flue gas velocity or obstructions in the flue gas path. Ash entrained in the flue gas will be removed by the semi-dry scrubber, and subsequently by the baghouse. All flue gas is passed through fabric filter bags that trap ash particulate while allowing flue gas to pass through. Periodically a section of the baghouse is isolated from the flue gas flow and the ash is automatically removed. This process, known as pulsing, is accomplished by passing a jet of high-pressure air backwards through the bags knocking the ash off the bags and into the hopper below.

Ash will be transported by enclosed conveyor from each drop point and carried to the ash silo; each unit will have a dedicated ash handling and storage system. Under normal operating conditions each unit will produce up to 100 tons of ash per day for a facility total of approximately 300 tons per day. The ash will then be used as an admixture in concrete production. .

There are two ash silos serving each train. Ash is loaded into the silos via enclosed conveyors. One silo will be equipped with a fabric filter dust collector, which is shared with the second silo. The truck loading area below the elevated silos will be enclosed on two sides. Both ends remain open allowing the truck to drive through.

Both silos will discharge into a bi-directional screw conveyor. Only one silo will discharge at any given time. Operation in one direction will deliver fly ash to the conditioning system (water added) and discharge using the retractable spout with a skirt at the point of discharge. Contact will be maintained between the skirt and the material in the trailer. The retractable spout is vented to the ash silo fabric filter dust collector.

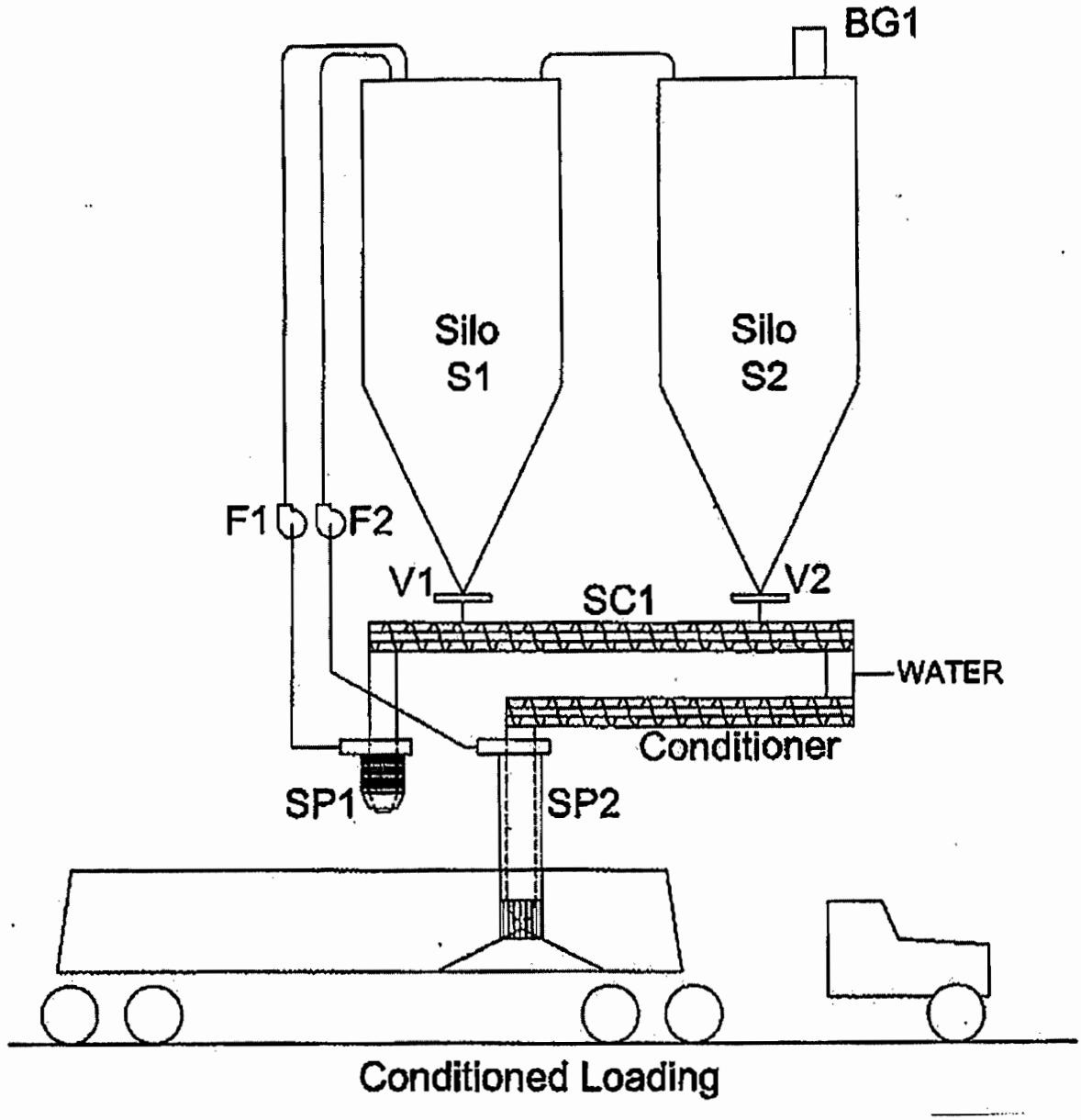


Figure 18
Conditioned Loading (adding water and using the coaxial spout SP2 with skirt)

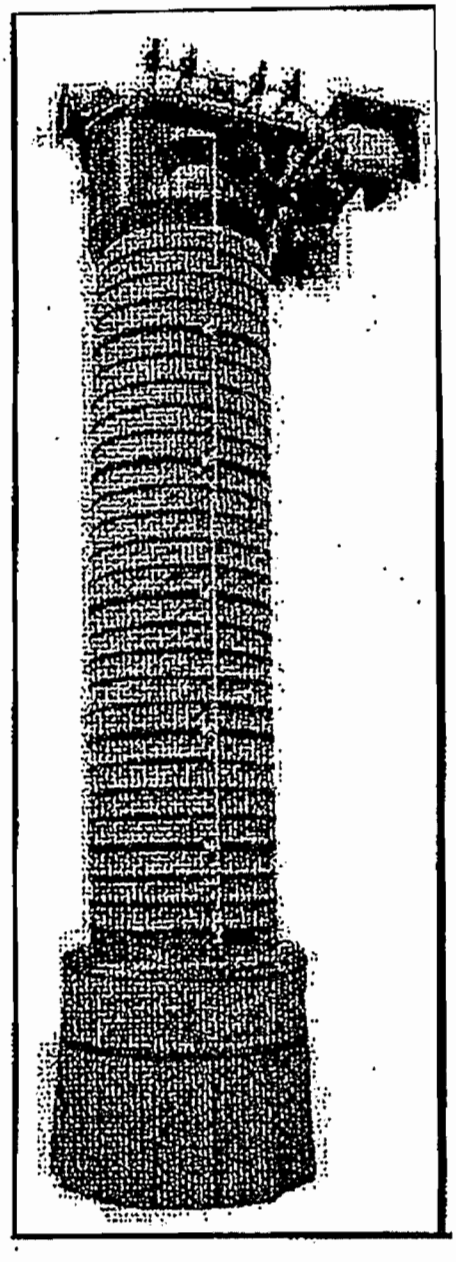


Figure 19
Conditioned coaxial ash loading spout **SP2**

Dry ash loading to truck

Operation of the screw conveyor in the other direction will direct the dry fly ash to the dry loading spout. An enclosed truck with top hatch will be positioned with the hatch directly below the spout. The spout will extend until the cone seats in the hatch ring. The discharge air connection on the spout is routed to the exhaust fan which discharges to the ash silo fabric filter dust collector.

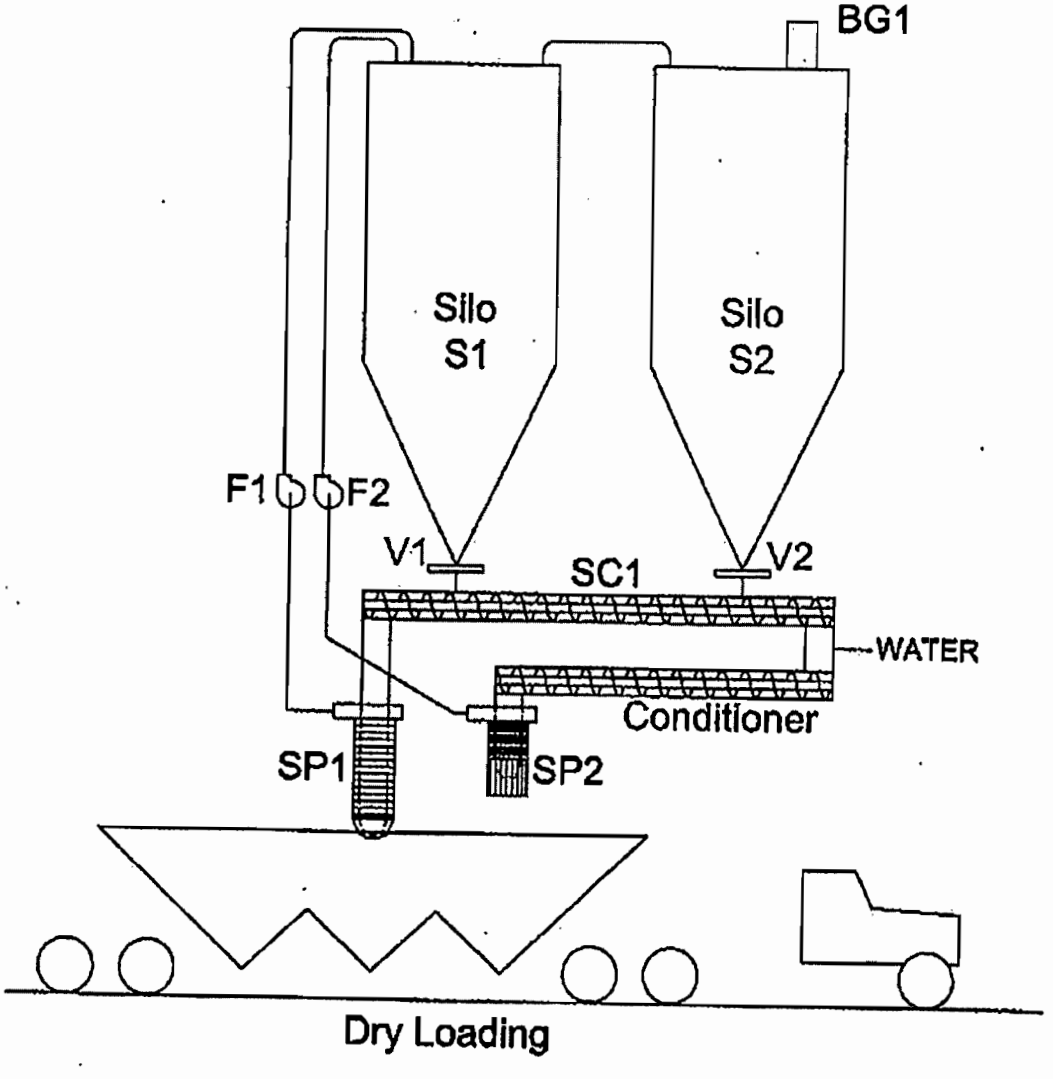


Figure 20
Dry loading using coaxial spout **SP1**

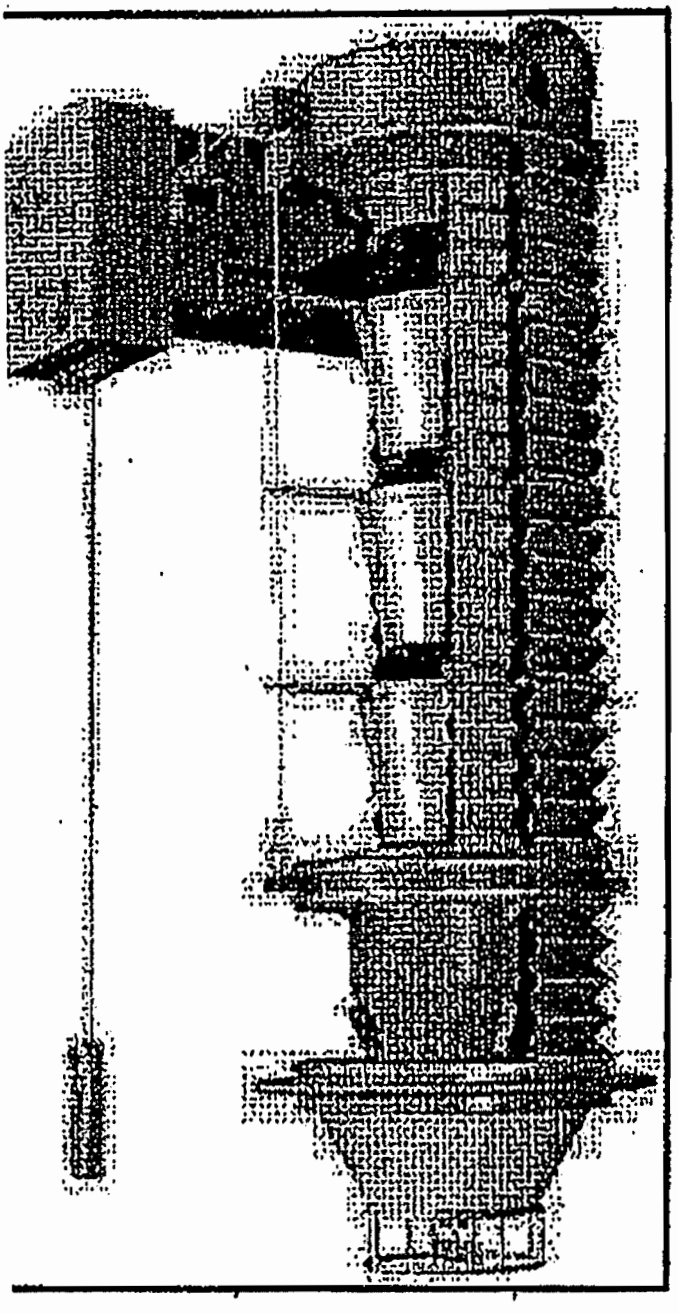


Figure 21
Dry loading coaxial spout **SP1**

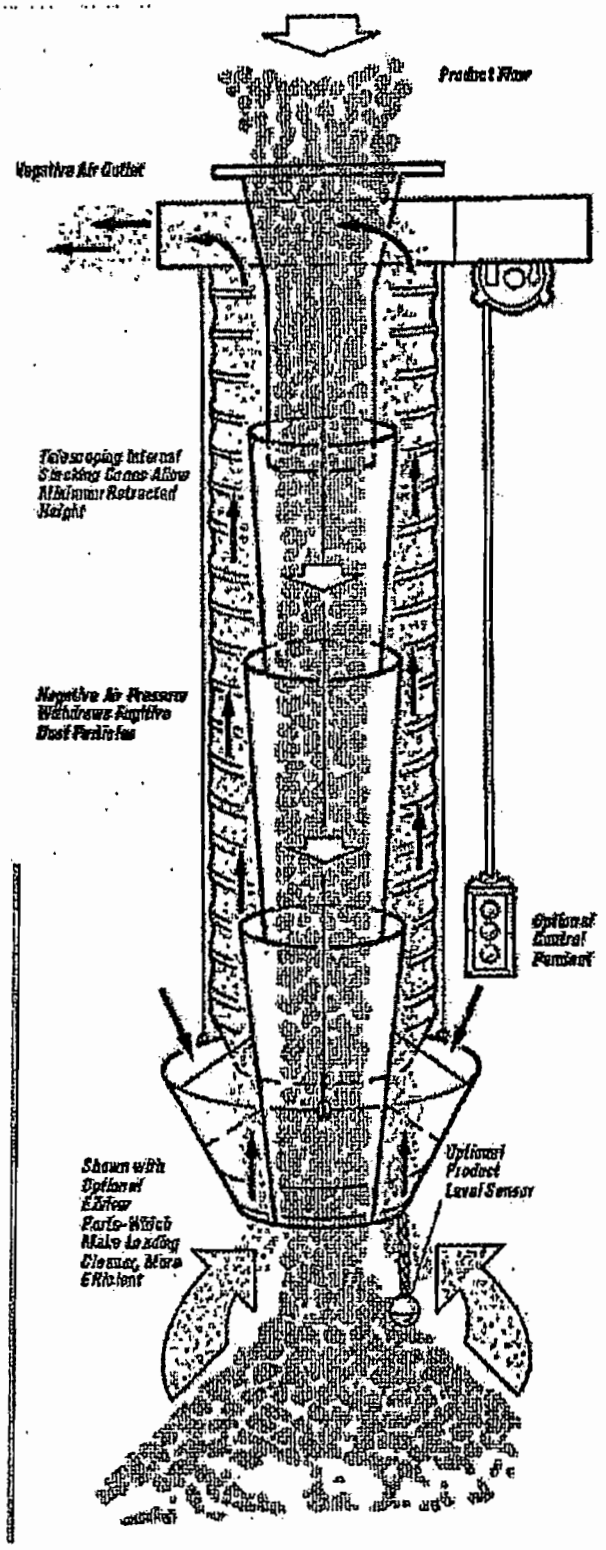


Figure 21
Dry loading coaxial spout **SP1 airflow** to dust collector

PM_{10} from cooling towers:

The cooling towers are a source of PM_{10} emissions. PM_{10} emissions are due to the total dissolved solids (TDS), mostly salts, in the cooling water. In the cooling process, some of the cooling water (and TDS) is carried out. This is referred to as drift. Some portion of the drift dries in the air before settling to ground, and its TDS content can thereby become airborne PM. Applicant has conservatively assumed that all drift will remain suspended in the air and will dry to PM_{10}. This approach overstates PM_{10} emissions.

The PM_{10} from cooling towers is a function of the recirculation rate and the drift elimination factor. The proposed cooling towers are designed to operate with a drift elimination factor of 0.0005%.

Each cooling tower consists of 3 cells and has a water flow rate of 8,831 gal/min and an air flow rate of 320,000 acfm per cell. Each cooling tower is equipped with a high efficiency mist eliminator to minimize cooling tower drift and resultant PM_{10} emissions.

Odors, VOC and NH3 emissions from biosolids receiving, storage and conveying

The receiving and storage of biosolids is expected to result in VOC, NH3 and odors. The incoming biosolids will be stored in silos and augured through enclosed piping to the BFBs. Each silo is equipped with a powdered charcoal filter to minimize silo breathing odors or possible VOC emissions. Each silo is also enclosed and vented to a vapor collection system which pipes the vapors to the BFBs for combustion.

Therefore the odors, VOC and NH3 emissions are expected to be negligible.

Combustion air contaminants (2 engines and 3 boilers)

Combustion air contaminants are expected from the 174 bhp diesel-fired water pump (S-360-34-0) engine and the 550 bhp diesel-fired emergency IC engine (S-360-43-0).

<u>174 bhp diesel-fired emergency firewater pump S-360-34-0</u>

The emergency engine powers a firewater pump. Other than emergency operation, the engine may be operated up to 100 hours per year for maintenance and testing purposes. The applicant has proposed to install a Tier 3 certified diesel-fired IC engine that is fired on very low-sulfur diesel fuel (0.0015% by weight sulfur maximum).

The proposed engine meets District BACT requirements as outlined in the top-down BACT analysis. See Appendix B for a copy of the engine specifications.

The use of very low-sulfur diesel fuel (0.0015% by weight sulfur maximum) reduces SO_X emissions by over 99% from standard diesel fuel.

<u>550 bhp diesel-fired emergency IC engine S-360-42-0</u>

The applicant has proposed to install a Tier 3 certified diesel-fired IC engine that is fired on very low-sulfur diesel fuel (0.0015% by weight sulfur maximum).

The proposed engine meets District BACT requirements as outlined in the top-down BACT analysis performed for the engine. See Appendix C for a copy of the engine specifications.

The use of very low-sulfur diesel fuel (0.0015% by weight sulfur maximum) reduces SO_X emissions by over 99% from standard diesel fuel.

Bubbling Fluidized Bed Boiler:

Emissions from the biosolids/biomass-fired BFBs include NO_X, CO, VOC, PM_{10}, SO_X and toxic air contaminants.

NOx control (BFB):

NO_X is the major pollutant of concern when burning biosolids/biomass fuel. NO_X formation is either due to thermal fixation of atmospheric nitrogen in the combustion air (thermal NO_X) or due to conversion of chemically bound nitrogen in the fuel (fuel NO_X). Formation of thermal NO_X is affected by four furnace zone factors: (1) nitrogen concentration, (2) oxygen concentration, (3) peak temperature, and (4) time of exposure at peak temperature.

The applicant is proposing to reduce NOx emissions with the use of four (4) control techniques. Selective Non-Catalytic Reduction (SNCR), flue gas recirculation (FGR), low temperature SCR and a biofilter for final "polishing" of the exhaust gas prior to being discharged into the atmosphere. Using a biofilter to control NOx emissions is feasible as seen by the documentation provided in Appendix D, which shows biofilters are capable of NOx control. The use of this technology for NOx control is an expensive control option which would not typically be cost effective with the proposed high volumes of flue gas generated from these combustors (cost goes up as airflow increases). An article evaluating the cost effectiveness of using a biofilter for NOx emissions control with high volumes of exhaust gas is included in Appendix E.

Selective Non-Catalytic Reduction (SNCR) – ammonia injection

Selective Non-Catalytic Reduction (SNCR) is used to reduce oxides of nitrogen (NOX) by injecting ammonia into the upper region of the combustor bed where the temperature of the gas is optimal for the NOx and ammonia to react with each other to produce nitrogen and water as harmless by products.

Ammonia (NH_3) is injected through wall mount injectors into the exhaust stream where it reacts to remove approximately 50% of the NO_x through the following reactions:

$6NO + 4NH_3 \rightarrow 6H_2O + 5N_2$
$6NO_2 + 8NH_3 \rightarrow 12H_2O + 7N_2$

Ammonia (aqueous form -19%) will be pumped through a heat exchanger where it is evaporated before being injected into the boiler SNCR system or the low temperature SCR system. The ammonia will be injected into the flue gas at the point where the flue gas is in the 1650 - 1850° F temperature window for the reactions to occur. (BFB

combustion beds operate in the 1550 – 2020° F range, with typical temperatures between 1600 - 1900° F).

The effectiveness of the ammonia injection is dependent on complete mixing of the NH3 and NOx and sufficient residence time. These parameters provide an NH3 molecule the opportunity to encounter a NOx molecule within the proper temperature range.

NOx control - flue gas recirculation (FGR)

Flue gas recirculation (FGR) reduces NO_X emissions by recirculating a percentage of the exhaust gas back into the windbox. This reduces the oxygen concentration in the air-fuel mixture and regulates the combustion process, lowering the combustion temperature. The lowered availability of oxygen in conjunction with lowered combustion temperature reduces the formation of NO_X.

NOx control - low temperature SCR (selective catalytic reduction)

Selective Catalytic Reduction (SCR) is similar to the SNCR process, but the reaction takes place in the presence of a catalyst, typically a platinum grid. The low-temperature catalyst enhances the reaction between the Ammonia and the NOx, similar to what occurs in the catalytic converter in cars and trucks. The precious metals found inside the catalytic converter dramatically increase ammonia's ability to break down the NOx into nitrogen and water. Ammonia slip levels are not anticipated to exceed 15 ppmv. The applicant is proposing to use a Cormetech, or equivalent, honeycomb catalyst designed to operate at 600 degrees F, with an area of approximately 539 m2/m3, catalyst volume of approx 39.4 m3, 90% NOx reduction across the catalyst is proposed. See specifications in Appendix F.

NOx control- biofilter

The biofilter will provide the final stage of NOx emissions control (and also provide a final stage of control for the other criteria air contaminants, as well as toxic air contaminants).

The media (such as Biorem XLD or equivalent) biofilter will process approximately 48,400 scfm of exhaust gas with an empty bed residence time $\geq$ 45 seconds. Applicant is proposing approximately 40% NOx control.

The biofilter will be a multiple chamber unit approximately 100 ft long x 60 ft wide x 60 ft high, made of fully enclosed steel construction and will include a flue gas cooler/recuperator, air distribution plenums and humidity control system. Exhaust from the biofilter will be re-heated on the hot side of the tubular flue gas cooler and then discharged through the stack (one for each power train).

Carbon Monoxide (CO) and Volatile Organic Compound (VOC) control (BFBs):

CO and VOC will be minimized with the use of good combustion practices. The VOC emissions will be minimal as most VOCs are destroyed during combustion of the fuels. The use of the powdered activated carbon (PAC) in the semi-dry flue gas scrubber will serve to further reduce the VOC emissions (and HCL, mercury, and other organics).

The biofilter will provide the final (unquantified) stage of CO and VOC control.

Combustion PM_{10} control (BFBs):

Particulate Matter is controlled through the design and staging of the following systems: (1) initial separation of PM in the boiler heat recovery section, (2) separation of PM in the boiler economizer section, (3) PM capture in semi-dry scrubber, and (4) final PM control in the fabric filter. The biofilter will provide the final stage of PM10 control.

The proposed Wheelabrator fabric filter dust collector (or equivalent) is an automatic pulse jet bag house designed with an air cloth ratio of 2.86:1 (or with one module down for maintenance = 3.82:1). The bag house is designed with a proposed maximum outlet grain loading = 0.0025 grains/dscf. Comparing this proposed unit to the bag house system serving Covanta Delano (biomass-fired BFB), the Covanta Delano bag house was approved with a 4:1 air to cloth ratio and emission limit of 0.010 gr/dscf @12% CO2 (of filterable particulate).

Bag house design check calculations:

Per the manufacturer's specifications:

Total cloth area is 35,676 sq.ft (Module cloth area = 8,919 sq.ft x 4 modules).
One module cycles out for shaking leaving a net air to cloth ratio of 3.82:1

Total maximum airflow bag house is designed to handle = 102,082 acfm, applicant is proposing to operate at 66,000 acfm (35,216 dscfm at 0% O2).

The design specifications of 3.82:1 air to cloth ratio is in the range per AP-40 Air Pollution Engineering Manual (1973), pg 128, which states that "if the grain loading is greater than average or the particle size is small, the filtering velocity should be reduced to 5 fpm or less.

Therefore the baghouse, with a 3.82:1 air to cloth ratio (3.82 fpm) is properly sized. The applicant will use an appropriate bag material suited to the temperatures of the flue gas coming from the combustors.

Sulfur Control – SOx (from the BFBs)

SOx emissions control will occur in multiple locations and will utilize limestone and hydrated lime. Limestone will be injected into the furnace bed as the primary method to control and reduce sulfur conversion to SOx. This is the first stage of SOx control. Hydrated lime will be sprayed into the semi-dry scrubber to further reduce sulfur conversion into SOx emissions. The hydrated lime neutralizes the acid gas by breaking it down into salt like compounds (both SOx and HCL are removed by this scrubber). The biofilter will provide the final stage of SOx control.

Mercury and Dioxin Control (in BFB flue gas):

When biosolids are used as fuel, fuel bound mercury is volatilized and carried in the flue gas. Powdered Activated Carbon (PAC) will be injected into the semi-dry acid gas scrubber where it will react with mercury in the flue gas and bind the mercury into the ash. This method of mercury control has proven successful at other facilities firing biosolids and facilities burning coal. The large spongy surface area works well for capturing the mercury. PAC injection also helps control VOCs and dioxins. Some dioxins are destroyed in the furnace; however, a small amount of dioxin formation may occur as the flue gas cools down passing through the boiler. PAC injection is expected to result in further dioxin removal. No liquid is discharged from the dry scrubber (unlike wet scrubbers used in coal power plants). The biofilter will provide the final stage of mercury and dioxin control.

Beryllium Control

The combination of controls proposed for the BFBs will ensure the facility does not exceed the beryllium standards required by EPA NESHAPs standards. Source testing on startup will verify the facility is compliance with the emissions limit.

Other combustion toxic air contaminants (Arsenic, cadmium, chromium, lead & nickel)

Each BFB boiler is vented through a series of controls - flue gas scrubber, baghouse, and biofilter, which will act to minimize the emissions of arsenic, cadmium, chromium, lead and nickel. Heavy metals attach to particulate matter – which is controlled with the above mentioned controls. Some of the heavy metals end up in the ash coming from the boilers.

Visible emissions and/detached plume:

Biomass-fired BFB's can sometimes be the source of detached visible plumes. Studies have identified the source of these plumes as ammonia chloride in the flue gas exiting the stack. The HCL (usually becomes a problem once it reaches 8 ppmv or higher in the flue gas) combines with the NH3 in the flue gas as the gas cools coming out of the stack to create ammonia chloride. Ammonia chloride is a particulate and is reflects light very well, creating visible emissions.

Because the applicant is utilizing an acid gas scrubber, the HCL is expected to remain below the level at which visible emissions begin to occur (3 ppmv HCL at a stack temperature of approximately 250 degrees F)[6]. Therefore visible emissions from the formation of ammonia chloride (the result of slipped ammonia combining with chlorine emitted from burning biomass fuel) are not expected to occur.

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[6] Particulate Plume Abatement at the Soledad Energy Plant, October 1992, L.J. Muzio, T.D. Martz, Fossil Energy Research Corp., Laguna Hills, CA 92653.

VII. General Calculations

A. Assumptions

The facility may operate up to 24 hours/day, 365 days per year.

S-360-7-0: BUBBLING FLUIDIZED BED BOILER (BFB)

- Pollutants generated:

  Criteria combustion air contaminants – NOx, SOx, PM10, CO and VOC
  Non-toxic air contaminants – HCL and NH_3
  Toxic combustion air contaminants (heavy metals) – Beryllium, mercury, arsenic, cadmium, chromium, lead and nickel

- 6.5 MW BFB "train" fired on combination of biomass and biosolids.
- BFB is identified as having a maximum heat input rating of 211.54 MMBtu/hr (5,076 MMBtu/day).
- BFB is equipped with the following (proposed by applicant):
  Two natural gas-fired 60 MMBtu/hr startup burners (1 overbed, 1 underbed).
  NSCR (ammonia injection)
  FGR
  O2 control
  Semi-dry flue gas scrubber (Mercury, Dioxin, HCL, SOx and VOC control)
  Baghouse operates at maximum 38,614 dscfm (0% O2) and maximum outlet grain loading of 0.0023 gr/dscf.
  Low temperature SCR (NOx control). 600°F, 90% CE (142.5→14.25 ppmv @ 3% O2)
  Biofilter. 45 second empty bed residence time at 48,400 scfm. 40% NOx reduction proposed (14.25 → 8.6 ppmv at 3% O2).

-F-factor

Applicant has identified the following F-factors (7/27/11 email) for the proposed fuels:

- Biomass 9,826 dscf/MMBtu at 0% O2
- Biosolids = 10,153 dscf/MMBtu at 0% O2
- Therefore F-factor was calculated for the combined fuels by averaging the two numbers. Given the variability of each fuel and the variability in the mixture, this is a reasonable estimate. This compares to AP-42 identified biomass F-factor of 9,240 dscf/MMBtu.

F-factor = 9,989.5 dscf/MMBtu at 0% O2.

- Exhaust stack: 125 ft H, 7 ft dia, 250° F; 111,000 acfm (38,611 dscfm at 0% O2)

BFB Toxic air contaminants

Heavy metals:

Applicant is proposing 95% control efficiency (CE) of mercury by virtue of the Turbosorp scrubber, and the exhaust gas being vented to baghouse and biofilter before being discharged into the atmosphere. For the other heavy metals, applicant proposes 99.9% control. Typically less than 1%, by weight, of the heavy metals in dried sludge gets emitted at the stack[7]. And given the PM_{10} is controlled by both a baghouse and biofilter in this proposed operation – the proposed 99% CE is realistic. Proposed emission rates are comparable to source test data examined from the Green Bay sewage sludge incinerator (Wisconsin).

Total heavy metals emitted from the BFBs = Emissions from (biomass + biosolids)
Biomass = lb/MMBtu x (MMBtu/hr) x (1-CE) = lb/hr
Biosolids = EF (lb/dry ton) x (dry ton/hr) x (1-CE) = lb/hr

Other toxic air contaminants (excluding heavy metals):

Each pollutant emitted (per BFB) = Emissions from (biomass + biosolids)

Biomass = lb/MMBtu x (MMBtu/hr) x (1-CE) = lb/hr

Biosolids = EF (lb/dry ton) x (dry ton/hr) x (1-CE) = lb/hr

[7] As seen in testing of sewage sludge incineration at the Green Bay sludge incinerator, which shows tested % of each heavy metal actually emitted at the stack. Demonstrated that less than 1% actually goes out the stack. Therefore the proposed 99.9% CE is plausible given the multiple PM10 control devices proposed.

S-360-10-0: COOLING TOWERS (Mechanical-draft counter-flow)

Pollutants generated: PM_{10} and some minute quantities of toxic air contaminants

Each cooling tower water recirculation rate = 8,831 gallons/minute.
Density of water = 8.34 lb/gallon
Cooling water total dissolved solids (TDS) = 1,044 ppmw
Cooling tower drift eliminator drift rate = 0.0005% (% of circulated water emitted)

Equation for calculating emissions:
(Recirculation rate) x (drift rate) x (TDS) x (density of water) = PM_{10} emissions

The applicant calculated toxic air contaminant emissions based on a water sample and a mass basis assuming the pollutants are emitted into the air (see calculations section for the summary of emission rates of toxic air contaminants).

S-360-11-0: HYDRATED LIME RECEIVING AND STORAGE
S-360-12-0: SAND RECEIVING AND STORAGE
S-360-13-0: LIMESTONE RECEIVING AND STORAGE
S-360-14-0: POWDERED ACTIVATED CARBON (PAC) RECEIVING AND STORAGE

Pollutant generated: PM_{10}

- For conservative emission estimates, emissions calculated assuming:
  - Daily hours silo loading = 2 x applicant proposed (conservative assumption)
  - Annual hours BV blower operation = # annual silo loadings (applicant) x (hrs/fill)

Storage silos (PM_{10})
S-360-11-0 through 14-0

ATC # S-360-	Silo product & silo size	Density (lb/ft³)	Air velocity (CFM)	Maximum # silo deliveries		Max loading (hr) per silo		BV filter outlet grain loading (grain/dscf)
				Day	Year	Daily	Annual	
11	Hydrated Lime (2,042 ft³)	30	1,000	N/A	130	2 hr	260	0.005
12	Sand (3,056 ft³)	100	1,000	N/A	6	3 hr	18	0.005
13	Limestone (5,080 ft³)	87	1,000	N/A	95	6 hr	570	0.005
14	PAC (2,042 ft³)	5	1,000	N/A	60	2 hr	120	0.005

S-360-15-0: ASH RECEIVING AND STORAGE

Pollutant generated: PM_{10}

- Each power train's ash goes into two (2) ash silos with shared 1,000 cfm BV filter.

- Ash loaded into enclosed silos using an enclosed conveyor. (Applicant)

- Each BV filter also filters return air from silo unloading to truck. (Applicant)
- 1 lb = 7,000 grains. (Given)

- Ash silo loading emissions calculated using 1,000 cfm, 24 hr/day, and 365 days/year.

PM_{10}, from BV serving each set of 2 silos = (BV airflow) x (BV grain loading EF)

Ash storage silo S-360-15-0				
ATC # S-360-	Bin Vent air flow	Minutes/day	Days/year	BV filter outlet **grain loading** (grain/dscf)
'-15-0	1,000 cfm	1,440	365	0.005

S-360-28-0 through '-29-0: BIOSOLIDS STORAGE SILOS

Pollutants generated: Potential VOC, NH_3 and bad odors – however no emissions proposed or expected due to enclosed operation. Biosolids are received, transferred and stored in enclosed conveyors and silos, with vapors vented to BFB the combustion air fan, therefore no odors or quantifiable VOC and NH_3 emissions are expected.

- Biosolids building, reception units and biosolids storage silos (qty =5) vented to combustion air fans during loading operations. (Applicant)

- Each silo is equipped with activated carbon filter(s). (Applicant)

- Wash water pumped to biosolids storage silos for discharge to BFBs. (Applicant)

- Each BFB ("train") uses maximum 750 tpd biosolids fuel (typically mixed with up to 247 tpd biomass). (Applicant)

- Biosolids pumped to BFBs through enclosed piping. (Applicant)

Therefore, no emissions calculations performed for biosolids receiving/storage.

S-360-33-0: EMERGENCY FIRE WATER PUMP IC ENGINE

Pollutants generated: Combustion air contaminants – NOx, SOx, PM10, CO and VOC

Proposed engine is a 174 bhp BHP Cummins model CFP7E-F10 TIER 3 certified diesel-fired, turbo charged, emergency IC engine powering a firewater pump.

EPA Standard Engine Family: ACEXL0409AAB
CARB Executive Order U-R-002-0516

Emergency operating schedule:	24 hours/day
Non-emergency operating schedule:	up to 100 hours/year
Density of diesel fuel:	7.1 lb/gal
EPA F-factor (adjusted to 60 °F):	9,051 dscf/MMBtu
Fuel heating value:	137,000 Btu/gal
BHP to Btu/hr conversion:	2,542.5 Btu/bhp-hr
Thermal efficiency of engine:	commonly ≈ 35%
PM_{10} fraction of diesel exhaust:	0.96 (CARB, 1988)

S-360-34-0: BIOMASS RECEIVING AND STORAGE OPERATION

Pollutant generated: PM_{10}

PM_{10} emissions generated when unloading trucks and from storage piles.

VOC and NH3 are emitted from the biomass fuel storage piles. But no increase is expected from the facility as the facility wide operation is already limited by their current CUP and any biomass diverted to the BFBs is already accounted for in the emissions associated with permit S-360-1. There will not be any increase in the amount of biomass received at the facility.

Biomass receiving parameters (S-360-34-0)			
Storage pile area	Maximum material received		Applicant proposed
	Tons per monthly averaged day	tons/year	
9 acres Max 60,000 tons[8]	750	251,850	

PM_{10} = tons x emission factor (EF) lb-PM_{10}/ton

Selection of an applicable emission factor is discussed in the emission factor section.

[8] 60,000 tons of biomass is equivalent to approximately 75 days of fuel (per applicant).

S-360-35-0: BIOMASS SHREDDING OPERATION

Pollutant generated: PM_{10}

One grinder
Two emission points - 1 feed hopper, 1 conveyor transfer point (shredder to conveyor)

Maximum throughput = 750 tpd and 251,850 tpy

80% PM10 emissions control assumed using water sprays as necessary (up to 70% control per (AP-42[9])) in combination with operating in a building vented to the BFB fuel chutes and/or combustion chamber (conservative additional 50% control assumed[10]).

S-360-36-0: BIOMASS SCREENING OPERATION

Pollutant generated: PM_{10}

One screen
Three transfer points (feed hopper, discharge to conveyor and conveyor stackout)

Maximum throughput = 750 tpd and 251,850 tpy

80% PM10 emissions control – same as S-360-35-0.

S-360-37-0: BIOMASS RECLAIM OPERATION

Pollutant generated: PM_{10}

Lump breaker, star screen inlet hopper and 6 conveyor transfer points.

Maximum throughput = 750 tpd and 251,850 tpy

80% PM10 emissions control – same as S-360-35-0.

[9] Water spray PM_{10} control efficiency is typically at least 70% (AP-42, Section 11.19.1, *Sand and Gravel Processing*)

[10] In Dec 2011 email, revising proposal from the original 10,000 cfm fans to four 2,807 cfm fans. Then subsequently committing to vent to BFBs.

S-360-38-0: BIOSOLIDS RECEIVING AND CONVEYING (TO STORAGE SILOS) UTILIZING SELF UNLOADING TRUCKS, TRUCK TRAILER DUMP AND/OR BOTTOM DUMP TRUCKS AND INCLUDING PUSH/PULL FLOOR (C-1A), BIOSOLIDS DISCHARGE SCREW CONVEYOR C-2A AND FEED PUMP P-1C

Pollutants generated: Potential VOC, NH_3 and bad odors

However no emissions are proposed or expected due to enclosed operation. Biosolids are received, transferred and stored in enclosed conveyors and silos, with vapors vented to BFB the combustion air fan, therefore no odors or quantifiable VOC and NH_3 emissions are expected.

- Biosolids building, reception units and storage silos (qty =5) are vented to combustion air fans during loading operations, each silo is equipped with activated carbon filter(s), and wash water is pumped to biosolids storage silos for discharge to BFBs. (Applicant)
- Each BFB ("train") may use up to 1,320 tpd biosolids fuel (Applicant)
- Biosolids pumped to BFBs through enclosed piping. (Applicant)

Therefore, no emissions calculations were performed for biosolids receiving/storage.

S-360-40-0 and 41-0: ASH LOADOUT TO TRUCK

Pollutant generated: PM_{10}

- Each power train served by 2 ash silos vented to shared 1,000 cfm BV filter.
- Each BV filter also filters the return air from silo unloading to truck.
- Ash is loaded to truck using dry loading (retractable spout SP1 vented to silo filter) or conditioned loading - water mixed with ash in auger as it is loaded using spout SP2.
- Control efficiency of 99% assumed.
- Emissions from bin vent already accounted for silo loading calculations (24 hr/day).
- Total ash unloaded = 100 tpd per train and 36,500 tpy per train (applicant)

Formula for emissions calculation:

PM_{10} for ash load out, each set of 2 ash silos = (tons loadout) x (EF in lb/ton) x (1-CE)

S-360-42-0: 550 BHP TIER 3 EMERGENCY DIESEL-FIRED IC ENGINE

Emergency operating schedule: 24 hours/day
Non-emergency operating schedule: 50 hours/year
Density of diesel fuel: 7.1 lb/gal
EPA F-factor (adjusted to 60 °F): 9,051 dscf/MMBtu
Fuel heating value: 137,000 Btu/gal
BHP to Btu/hr conversion: 2,542.5 Btu/bhp-hr
Thermal efficiency of engine: commonly ≈ 35%
PM_{10} fraction of diesel exhaust: 0.96 (CARB, 1988)
SB→

B. Emission factors

S-360-7-0: BUBBLING FLUIDIZED BED BOILER (BFB)

Criteria combustion air contaminants – NOx, SOx, PM10, CO and VOC
Non-toxic air contaminants – HCl and NH_3
Toxic (includes heavy metals) from combustion of biomass/biosolids – Beryllium, mercury, arsenic, cadmium, chromium, lead and nickel

The following emissions factors (in ppmvd at 11% O_2) were proposed by the applicant.

Applicant proposed emission factors (ppmvd) at 11% O_2					
Pollutant	ppmvd @ 11% O_2 (before biofilter)	x	Proposed Biofilter CE	=	ppmvd @ 11% O_2 after biofilter
NO_x	7.9	x	(1-.4) 40% control	=	4.74
SO_x	3.6	x	(1-.5) 50% control	=	1.80
CO	16.0	x	(1-.4)	=	9.6
VOC	4.8	x	(1-.9)	=	0.48
HCL	2.5	x	(1-.5)	=	1.25
NH_3	15.0	x	(1-.6)	=	6.0

Applicant proposed EF (ppmvd) corrected to 7%, 3% and 0% excess O_2								
ppmvd at 11% O2 x conversion factor[11] = ppmvd at the new O2								
Pollutant	ppmvd @ 11% O_2 (after biofilter)	x	**7%** See footnote 1.402 =	ppmvd @7%	**3%** 1.804 =	**ppmvd @ 3%**	**0%** 2.106 =	ppmvd @ 0%
NO_x	4.74	x	1.402 =	6.65	1.804 =	**8.6**	2.106 =	9.98--> 10
SO_x	1.80	x	1.402 =	2.52	1.804 =	**3.3**	2.106 =	3.79 → 4
CO	9.6	x	1.402 =	13.46	1.804 =	**17.3**	2.106 =	20.22 → 21
VOC	0.48	x	1.402 =	0.67	1.804 =	**0.9**	2.106 =	1.01 →1
HCL	1.25	x	1.402 =	1.75	1.804 =	**2.3**	2.106 =	2.63 → 3
NH_3	6.0		Achieved-in-practice BACT =			**10.0**	---→	11.7

[11] See calculations below table.

Correcting ppmvd from 11% to other excess O_2 levels:

The proposed emission factors were

1) Calculated to 7% (VOC and CO) for the purpose of showing compliance with standardized NESHAP limits (standardized to 0% moisture and 7% O_2),
2) Calculated to 3% O_2 for SJVAPCD purposes (Rule compliance determination and permit limits), and

3) Calculated to 0% O_2 to facilitate emissions calculations.

Formula for converting ppmv from one excess O2 basis to another:

$$\frac{20.95 - \text{desired } O_2}{20.95 - \text{measured } O_2} \times \text{ppmv measured} = \text{ppmv at desired } O_2$$

Applicant proposed emission factors were at 11% O_2. The following formula was used to correct to other excess O_2 levels (7%, 3%, and 0% O_2) by multiplying the ppmvd at 11% times 1.402, 1.804 or 2.106 (respective, for 7%, 3% and 0%).

To convert from 11%:

$$\frac{20.95 - \text{desired } O_2}{20.95 - \text{measured } O_2} \times \text{ppmv measured} = \text{ppmv at desired } O_2$$

Converting to **7% O_2**:

$$[(20.95 - 7)/ (20.95 - 11)] \times \text{ppmvd at 11\% } O_2 = \text{ppmvd at 7\%}$$

$$1.402 \times \text{ppmvd at 11\% } O_2 = \text{ppmvd at 7\%}$$

Converting to **3% O_2**:

$$[(20.95 - 3)/ (20.95 - 11)] \times \text{ppmvd at 11\% } O_2 = \text{ppmv at 3\%}$$

$$1.804 \times \text{ppmvd at 11\% } O_2 = \text{ppmvd at 3\%}$$

Converting to **0% O_2**:

$$[(20.95 - 3)/ (20.95 - 11)] \times \text{ppmvd at 11\% } O_2 = \text{ppmv at 0\%}$$

$$2.106 \times \text{ppmvd at 11\% } O_2 = \text{ppmvd at 0\%}$$

PM_{10} emissions (from baghouse serving the BFB):

PM_{10} Emission Factor		
Pollutant	Max baghouse airflow proposed (1 BFB firing at 211.52 MMBtu/hr)	Max baghouse outlet grain loading proposed *(before applying biofilter control efficiency)*
PM_{10}	35,216 dscfm at 0% O_2	0.0023 grains/dscf

PM_{10} emissions factor

lb/MMBtu = (max stack airflow) x (grain loading) x (lb/7000 gr) (1- biofilter CE) x (hr/211.52 MMBtu)

lb/MMBtu = (2,112,960 dscf/hr) x (0.0023 grains/dscf) x (lb/7000 grains) x (1-.4) x hr/211.52 MMBtu

= 0.0020 lb-PM_{10}/MMBtu

Toxic air contaminants:

Heavy Metals

Heavy metal Uncontrolled emission factors (proposed by applicant)			
Pollutant	Biomass #/MMBtu		Biosolids lb/dry ton
Antimony	7.90E-06		2.27E-03
Arsenic	2.20E-05		2.91E-03
Beryllium	1.10E-06		2.11E-06
Cadmium	4.10E-06		1.43E-03
Chromium 6	3.50E-06		1.26E-02
Lead	4.80E-05		2.33E-02
Manganese	1.60E-03		4.66E-02
Mercury	Controlled emission rate = 2.3E-03 lb/hr		
Nickel	3.30E-05		2.07E-02
Selenium	2.80E-06		2.80E-06
Zinc	4.20E-04		4.20E-04

Other toxics

See following table for applicant proposed toxic air emissions.

Solid Fuel Boiler Toxics Emissions Calculations
Per Boiler Basis

Fuel:	Biomass	Biosolids	Manure	Total
As Fired tons/hr:	9.58	25.00	0.00	34.58
Fuel Wt Fraction:	0.28	0.72	0.00	1.00
Btu/lb :	5390	1651	0	
MMBtu/hr:	103.31	82.55	0.00	185.86
Dry tons per hour:	Na	6.25	0.00	

Uncontrolled Emission Rates

Substance	Biomass lb/mmbtu	*Biosolids lbs/dry ton*	Biosolids lb/mmbtu	Manure lb/mmbtu	Control Fra Biomass	Biosoli
Total PAHs w/o Napth.	6.00E-07	*4.26E-04*	3.23E-05	6.70E-07	0.990	0.990
Naphthalene	2.53E-06	*3.23E-01*	2.45E-02	8.32E-07	0.990	0.990
2378 Dioxins	na	*na*	na	na	0.990	0.990
Acetaldehyde	8.30E-04	*1.28E-02*	9.69E-04	0.00E+00	0.990	0.990
Acetophenone	3.20E-09	*4.93E-08*	3.73E-09	0.00E+00	0.990	0.990
Acrolein	4.00E-03	*3.08E-04*	2.33E-05	0.00E+00	0.990	0.990
Ammonia	0.00E+00	*0.00E+00*	0.00E+00	0.00E+00	0.990	0.990
Benzene	4.20E-03	*6.80E-04*	5.15E-05	0.00E+00	0.990	0.990
Bromomethane	1.50E-05	*1.39E-01*	1.05E-02	0.00E+00	0.990	0.990
Bis 2ethyl-hexyl phtal	4.70E-08	*1.39E-01*	1.05E-02	0.00E+00	0.960	0.960
Carbon Tet	4.50E-05	*4.08E-05*	3.09E-06	0.00E+00	0.990	0.990
Chlorine	4.46E-04	*1.22E-02*	9.24E-04	0.00E+00	0.990	0.990
Chlorobenzene	3.30E-05	*1.70E-05*	1.29E-06	0.00E+00	0.990	0.990
Chlorofrom	2.80E-05	*6.80E-03*	5.15E-04	0.00E+00	0.990	0.990
Chloromethane	2.30E-05	*3.54E-04*	2.68E-05	0.00E+00	0.990	0.990
2 Chlorophenol	2.40E-08	*3.70E-07*	2.80E-08	0.00E+00	0.990	0.990
1-4 Dichlorobenzene	1.67E-03	*2.57E-02*	1.95E-03	0.00E+00	0.990	0.990
1-2 Dichloroethane	2.90E-05	*4.47E-04*	3.38E-05	0.00E+00	0.990	0.990
1-2 Dichloropropane	3.30E-05	*5.08E-04*	3.85E-05	0.00E+00	0.990	0.990
2-4 Dinitrophenol	1.80E-07	*2.77E-06*	2.10E-07	0.00E+00	0.990	0.990
Ethylbenzene	3.10E-05	*8.50E-05*	6.44E-06	0.00E+00	0.990	0.990
Formaldehyde	7.27E-05	*6.78E-02*	5.13E-03	4.45E-05	0.990	0.990
Isobutyraldehyde	1.20E-05	*1.85E-04*	1.40E-05	0.00E+00	0.990	0.990
MEK	5.40E-06	*8.32E-05*	6.30E-06	0.00E+00	0.990	0.990
2 Methyl naphthalene	1.60E-07	*2.46E-06*	1.86E-07	0.00E+00	0.990	0.990
Methylene Chloride	2.90E-04	*2.38E-03*	1.80E-04	0.00E+00	0.990	0.990
2 Nitrophenol	2.40E-07	*3.70E-06*	2.80E-07	0.00E+00	0.990	0.990
4 Nitrophenol	1.10E-07	*1.69E-06*	1.28E-07	0.00E+00	0.990	0.990
Pentachlorophenol	5.10E-08	*7.85E-07*	5.94E-08	0.00E+00	0.990	0.990
Phenol	5.10E-05	*7.85E-04*	5.94E-05	0.00E+00	0.990	0.990
Propionaldehyde	6.10E-05	*9.39E-04*	7.11E-05	0.00E+00	0.990	0.990
Styrene	1.90E-03	*2.93E-02*	2.22E-03	0.00E+00	0.990	0.990
Tetrachloroethene	3.80E-05	*4.08E-04*	3.09E-05	0.00E+00	0.990	0.990
Toluene	9.20E-04	*1.19E-03*	9.01E-05	0.00E+00	0.990	0.990
111 Trichloroethane	3.10E-05	*8.84E-04*	6.69E-05	0.00E+00	0.990	0.990
Trichloroethene	3.00E-05	*1.02E-04*	7.72E-06	0.00E+00	0.990	0.990
Trichlorotrifluorometh	4.10E-05	*6.31E-04*	4.78E-05	0.00E+00	0.990	0.990
246 Trichlorophenol	2.20E-08	*3.39E-07*	2.57E-08	0.00E+00	0.990	0.990
Vinyl Chloride	1.80E-05	*2.77E-04*	2.10E-05	0.00E+00	0.990	0.990
Xylenes (o,m,p)	2.50E-05	*3.85E-04*	2.91E-05	0.00E+00	0.990	0.990

S-360-10-0: COOLING TOWERS (Mechanical-draft counter-flow)

Emissions calculated using inputs identified in assumption section.
PM_{10} = (Recirculation rate) x (drift rate) x (TDS) x (density of water)

S-360-11-0: HYDRATED LIME RECEIVING AND STORAGE
S-360-12-0: SAND RECEIVING AND STORAGE
S-360-13-0: LIMESTONE RECEIVING AND STORAGE
S-360-14-0: ACTIVATED CARBON RECEIVING AND STORAGE

PM_{10} = EF = 0.005 grains/dscf of air exhausted through the bin vent.

S-360-15-0: ASH RECEIVING AND STORAGE

Silo loading emissions (2 silos per train, sharing 1 BV filter):
Applicant proposed outlet grain loading emission factor **(EF) = 0.005 grains/dscf**
PM_{10} = (bin vent airflow) x (bin vent outlet grain loading EF)

S-360-28-0 through '-29-0: BIOSOLIDS RECEIVING AND STORAGE INTO ENCLOSED SILOS 1 THROUGH 5, WITH CARBON VENT FILTERS AND VAPOR PIPING TO COMBUSTION AIR FAN

There are no applicable emission factors for this operation.

S-360-33-0: 174 BHP DIESEL-FIRED IC ENGINE POWERING AN EMERGENCY FIRE WATER PUMP

Proposed emissions are from Manufacturer's specification sheet (see Appendix B)

Emission Factors **S-360-33-0** IC Engine powering fire water pump		
Pollutant	**Emission Factor (g/bhp-hr)**	**Source**
NO_X	2.475	Manufacturer's specifications
SO_X	0.0051	Mass Balance Equation Below
PM_{10}	0.111	Manufacturer's specifications
CO	1.193	Manufacturer's specifications
VOC	0.062	Manufacturer's specifications

$$\frac{0.000015\ lb-S}{lb-fuel}\times\frac{7.1\ lb-fuel}{gallon}\times\frac{2\ lb-SO_2}{1\ lb-S}\times\frac{1\ gal}{137{,}000\ Btu}\times\frac{1\ bhp\ input}{0.35\ bhp\ out}\times\frac{2{,}542.5\ Btu}{bhp-hr}\times\frac{453.6\ g}{lb}=0.0051\ \frac{g-SO_x}{bhp-hr}$$

Comparing the proposed emission factors to the Tier 3 standards listed below shows that the proposed emissions meet Tier 3 requirements for this size engine.

Tier 2 and Tier 3 Diesel-Fired IC Engines NO_X and VOC Emissions Standard						
Horsepower Range (bhp)	Combined Standard, NO_X + VOC (g/bhp-hr)		Estimated NO_X Emissions (g/bhp-hr)		Estimated VOC Emissions (g/bhp-hr)	
	Tier 2	Tier 3	Tier 2	Tier 3	Tier 2	Tier 3
≥ 50 to < 100	5.6	3.5	5.2	3.3	0.4	0.2
≥ *100 to < 175*	4.9	*3.0*	4.5	*2.8*	0.4	*0.2*
≥ 175 to < 300	4.9	3.0	4.5	2.8	0.4	0.2
≥ 300 to < 600	4.8	3.0	4.5	2.8	0.3	0.2
≥ 600 to < 750	4.8	3.0	4.5	2.8	0.3	0.2
≥ 750	4.8	N/A	4.5	N/A	0.3	N/A

S-360-34-0: BIOMASS RECEIVING AND STORAGE OPERATION

PM_{10} emissions are emitted during truck unloading and windblown emissions from storage piles. PM_{10}, VOC and NH3 emitted from biomass stock piles if green waste is placed in the stock piles. However, VOC and NH3 emissions will not be calculated as the material is already at the site and covered under their other permits. No increase in the biomass throughput is proposed for the facility.

There are no AP-42 emission factors for PM_{10} from receiving and storing biomass. The District chose to use an emission factor of 0.0025 lb/ton - the emission factor listed in AP-42 Table 9.9.1-2 for "Grain processing, Animal Feed Mill, truck receiving - uncontrolled". Grain unloading is the operation listed in AP-42 most similar to the material proposed to be handled in this current application (biomass receiving and storage). The 0.0025 lb/ton EF appears reasonable and compares to AP-42 0.0033 lb-PM_{10}/ton for uncontrolled aggregate transfer points (AP-42 table 11.12-2) and 0.0026 lb-PM_{10}/ton[12] for aggregate handling and storage piles (AP-42 13.2.4-1 11/06). AP-42 chapter 13 does not appear to be appropriate for calculating emissions from biomass handling because the moisture content bound up inside the biomass does not mitigate the emissions caused by chaffing of the product and the dirt received (it is not possible to ascertain an appropriate moisture content for use in the calculation).

Biomass EF – truck unloading and storage piles		
Pollutant	EF (lb-PM_{10}/ton)	Reference
PM_{10}	0.0025	AP-42, Table 9.9.1-2 (4/03) *Grain processing, animal feed mill – uncontrolled truck receiving. See discussion above.*

[12] 0.0026 lb-PM10 per ton was calculated using AP-42 Chapter 13 "Aggregate handling and storage piles". This emission factor calculated assuming 7.0 mph average wind speed and moisture content = 1.5%.

S-360-35-0: BIOMASS GRINDER

Grinding emission factor:

Biomass grinder EF		
Pollutant	**EF (lb-PM_{10}/ton)***	**Reference**
PM_{10}	0.0030	* Based on discussion provided below.

Grinding PM_{10} EF was determined based on the wood chipping (grinding) total PM EF of 0.00005 kg/tonne (controlled with cyclone); from NCASI Technical Bulletin 884 (Used in District approval of Westlake Farms C-1043946). Note, tonne refers to metric ton, which is 2,204.62 lb. Assuming 99% control efficiency using the cyclone, uncontrolled EF is:

$EF_{(uncontrolled)}$ = [0.00005 kg/tonne x 2.2046 lb/kg x 2,000 lb/ton x tonne/2,204.62 lb]/ (1-.99)
= 0.01 lb-PM_{10}/ton

Water spray PM10 control efficiency = 70%[13]
Building vented to BFB = 50% CE

EF (controlled) = 0.01 lb-PM_{10}/ton x (1-0.70) (1-.5) = 0.0015 lb-PM_{10}/ton

Transfer point emission factor (2 transfer points total):

Biomass grinder transfer point EF		
Pollutant	**EF (lb-PM_{10}/ton)**	**Reference**
PM_{10}	0.0025 per transfer point.	AP-42, Table 9.9.1-2 (4/03) Same as biomass receiving permit S-360-34-0.

S-360-36-0: BIOMASS SCREENING *(Screen M-13)*

Screen M-13 emission factor:

Biomass screen M-13 EF		
Pollutant	**EF (lb-PM_{10}/ton)***	**Reference**
PM_{10}	0.0015	* Same as grinder EF S-360-35-0, see above.

Screen M-13 transfer point emission factor (for each of the three transfer points):

Biomass screen transfer point EF		
Pollutant	**EF (lb-PM_{10}/ton)**	**Reference**
PM_{10}	0.0025 Per transfer point.	AP-42, Table 9.9.1-2 (4/03) Same as biomass receiving permit S-360-34-0.

[13] Water spray PM_{10} control efficiency is typically at least 70% (AP-42, Section 11.19.1, *Sand and Gravel Processing*)

S-360-37-0: BIOMASS RECLAIM OPERATION

Reclaimer screen M-15 emission factor:

Biomass screen M-15 EF		
Pollutant	**EF (lb-PM_{10}/ton)***	**Reference**
PM_{10}	0.0015	* Same as grinder EF S-360-35-0, see above.

Reclaimer transfer point emission factor (for each of the three transfer points):

Biomass reclaim transfer point EF		
Pollutant	**EF (lb-PM_{10}/ton)**	**Reference**
PM_{10}	0.0025 Per transfer point.	AP-42, Table 9.9.1-2 (4/03) Same as biomass receiving permit S-360-34-0.

S-360-39-0: ASH LOADOUT TO TRUCK

Truck loadout emissions calculated using 99% control and AP-42 Table 11.12-2 uncontrolled EF of 0.46 PM/ton for cement unloading to silo.

Controlled EF = 0.0046 lb-PM_{10}/ton).

Ash truck loadout EF		
Pollutant	**EF (lb-PM_{10}/ton)**	**Reference**
PM_{10}	0.0046	* AP-42 cement silo loading x 99% control, see above.

S-360-42-0: 550 BHP TIER 3 EMERGENCY IC ENGINE

IC Engine emission factors (S-360-42-0)		
Pollutant	Emission Factor (g/bhp-hr)	Source
NO_x	2.49	Engine Manufacturer
SO_x	0.0051	Mass Balance Equation Below
PM_{10}	0.14	Engine Manufacturer
CO	0.87	Engine Manufacturer
VOC	0.13	Engine Manufacturer

$$\frac{0.000015\ lb-S}{lb-fuel} \times \frac{7.1\ lb-fuel}{gallon} \times \frac{2\ lb-SO_2}{1\ lb-S} \times \frac{1\ gal}{137{,}000\ Btu} \times \frac{1\ bhp\ input}{0.35\ bhp\ out} \times \frac{2{,}542.5\ Btu}{hp \cdot hr} \times \frac{453.6\ g}{lb} = 0.0051\ \frac{g-SO_x}{bhp-hr}$$

Save this Section break→
← SB

C. Calculations

All permit units in this project are new, therefore PE1 for each of those emissions units = 0 lb/day for all pollutants.

2. Post Project Potential to Emit (PE2)

S-360-7-0: BUBBLING FLUIDIZED BED BOILER (BFB)

NOx, SOx, CO, VOC, HCL and NH3

Given the proposed emission factors (ppmvd) the daily emissions for NOx, SOx, CO, VOC, HCL and NH3 can be calculated using the following equation:

lb/day = MW/lb-mole x ppmd/10^6 x $dscf_{exhaust\ gas}$/hr x 24 hr/day x lb-mole/379 scf

BFB emission calculation input parameters		
Pollutant	MW (molecular weight)	ppmvd at 0% O_2
NOx (as NO_2)	46 lb NO_2/lb-mole	10
SOx (as SO_2)	64 lb SO_2/lb-mole	4
CO	28 lb CO/lb-mole	21
VOC	16 lb VOC/lb-mole	1
HCL	36 lb HCL/lb-mole	3
NH_3	17 lb NH_3/lb-mole	13

The amount of exhaust gas ($dscf_{exhaust\ gas}$) = (F-factor identified in assumptions) x (maximum heat input rating of BFB). The applicant has proposed their worse-case daily emissions as a scenario in which two BFBs each operate at 211.52 MMBtu/hr while one unit operates at 151.96 MMBtu/hr. Therefore the emissions will be calculated (as described above) to establish an SLC emissions limit for the three units combined.

An F-factor of 9,989.5 dscf/MMBtu at 0% excess O_2 was used to calculate exhaust gas flowrate below: (e.g. 9,989.5 dscf/MMBtu x MMBtu/hr = dscf/hr).

Exhaust gas flowrate (at 0% O_2)				
Firing rate	MMBtu/hr	dscf/hr exhaust gas	MMBtu/day	dscf/day exhaust gas
Reduced firing rate	151.96	1,518,004	3,647	36,432,096
Maximum firing rate	211.52	2,112,960	5,076	50,711,040

Daily emissions for the above identified pollutants calculated as follows:

Using the following formula,

lb/day = MW/lb-mole x ppmd/10^6 x $dscf_{exhaust\ gas}$/hr x 24 hr/day x lb-mole/379 scf

Emissions were calculated for a BFB at 151.96 MMBtu/hr and 211.54 MMBtu/hr. The maximum daily emissions for any BFB will be the emissions calculated at 211.52 MMBtu/hr for a 24 hour period. And then the SLC (bubbled emissions for the three BFBs combined) was estimated by adding the emissions from all three units operating (Two at 211.52 MMBtu/hr and one at 151.96 MMBtu/hr). The resulting lb/MMBtu emission factors were rounded to 4 decimal places.

Emission calculations (1 BFB at 151.96 MMBtu/hr)
NO_x, SO_x, CO, VOC, HCL and NH_3

Pollutant	MW lb-mole	x	At 0% excess O_2 ppmvd / 10^6	x	$dscf_{eq}$ / hr	x	24 hr / day	x	lb-mole / 379	=	lb/day	Hourly x 8760 hr/year = **lb/yr**
NO_x	46		10		1,518,004		24		1/379	=	44.2	16,140
SO_x	64		4		1,518,004		24		1/379	=	24.6	8,982
CO	28		21		1,518,004		24		1/379	=	56.5	20,631
VOC	16		1		1,518,004		24		1/379	=	1.5	561
HCL	36		3		1,518,004		24		1/379	=	10.4	3,789
NH_3	17		13		1,518,004		24		1/379	=	21.2	7,754

Emission calculations (1 BFB at 211.52 MMBtu/hr)
NO_x, SO_x, CO, VOC, HCL and NH_3 PM10 = 9.1 lb/day

Pollutant	MW lb-mole	x	At 0% excess O_2 ppmvd / 10^6	x	$dscf_{eq}$ / hr	x	24 hr / day	x	lb-mole / 379	=	**lb/hr**	**lb/day**	**lb/yr**	**lb/MM Btu**
NO_x	46		10		2,112,960		24		1/379	=	**2.57**	**61.6**	**22,466**	**0.0121**
SO_x	64		4		2,112,960		24		1/379	=	**1.43**	**34.3**	**12,503**	**0.0067**
CO	28		21		2,112,960		24		1/379	=	**3.28**	**78.7**	**28,717**	**0.0155**
VOC	16		1		2,112,960		24		1/379	=	**0.09**	**2.1**	**781**	**0.0004**
HCL	36		3		2,112,960		24		1/379	=	**0.60**	**14.5**	**5,275**	**0.0028**
NH_3	17		13		2,112,960		24		1/379	=	**1.23**	**29.6**	**10,793**	**0.0028**
PM_{10}	See page 64 for PM_{10} calculations										**0.43**	**10.2**	**3,723**	

PM_{10} emissions

PM10 emissions are controlled using a bag house followed by a biofilter for an emissions factor of 0.002 lb-PM10/MMBtu (see emissions factor section) from the final control device (biofilter). Therefore, using the maximum firing rate of 211.52 MMBtu/hr the maximum emissions from one BFB are:

PM_{10} emissions = (EF) x MMBtu/hr x 24hr/day

= 0.0020 lb/MMBtu x 211.52 MMBtu/hr x 24 hr/day

= 10.2 lb-PM_{10}/day

Maximum Daily PM10 Emissions (1 BFB at 211.52 MMBtu/hr)							
Pollutant	MMBtu/hr	x	24 hr/day	x	lb-PM_{10}/MMBtu	=	lb-PM_{10}/day
PM_{10}	211.52	x	24	x	0.002	=	1 BFB = 10.2
All three **(3) BFBs** in a combined SLC							
PM_{10}	575.0	x	24	x	0.002	=	3 BFBs (SLC) = 27.6

Maximum Annual PM10 Emissions (1 BFB at 211.52 MMBtu/hr)					
Pollutant	lb/day	x	365 days/yr	=	lb-PM_{10}/year
PM_{10}	10.2	x	365	=	One BFB unit = 3,723 lb/year
All three **(3) BFBs** in a combined SLC					
PM_{10}	27.6	x	365	=	SLC for all 3 units combined = 10,074 lb/year

Toxic air contaminants

Total BFB toxic air emissions (each contaminant) = Emissions from (biomass + biosolids)

Biomass = lb/MMBtu x (MMBtu/hr) x (1-CE) = lb/hr

Biosolids = EF (lb/dry ton) x (dry ton/hr) x (1-CE) = lb/hr

	Uncontrolled Emission Rates				Control Fraction		Controlled Emissions-1 Boiler			Emissions-All Boilers	
Substance	Biomass lb/mmbtu	*Biosolids lbs/dry ton*	Biosolids lb/mmbtu	Manure lb/mmbtu	Biomass	Biosolids	lbs/hr	lbs/day	lbs/yr	lbs/day	lbs/yr
Antimony	7.90E-06	*2.27E-03*	1.72E-04	0.00E+00	0.999	0.999	1.50E-05	3.60E-04	1.31E-01	1.08E-03	3.94E-01
Arsenic	2.20E-05	*2.91E-03*	2.20E-04	5.01E-07	0.999	0.999	2.05E-05	4.91E-04	1.79E-01	1.47E-03	5.38E-01
Beryllium	1.10E-06	*2.11E-06*	1.60E-07	9.99E-08	0.999	0.999	1.27E-07	3.04E-06	1.11E-03	9.13E-06	3.33E-03
Cadmium	4.10E-06	*1.43E-03*	1.08E-04	2.11E-07	0.999	0.999	9.36E-06	2.25E-04	8.20E-02	6.74E-04	2.46E-01
Chromium 6	3.50E-06	*1.26E-02*	9.54E-04	5.67E-07	0.999	0.999	7.91E-05	1.90E-03	6.93E-01	5.70E-03	2.08E+00
Cobalt	6.50E-06	*2.27E-03*	1.72E-04	0.00E+00	0.999	0.999	1.49E-05	3.57E-04	1.30E-01	1.07E-03	3.90E-01
Lead	4.80E-05	*2.33E-02*	1.76E-03	8.42E-07	0.999	0.999	1.51E-04	3.61E-03	1.32E+00	1.08E-02	3.96E+00
Manganese	1.60E-03	*4.66E-02*	3.53E-03	2.86E-06	0.999	0.999	4.57E-04	1.10E-02	4.00E+00	3.29E-02	1.20E+01
Mercury	na	*na*	na	na	0.950	0.950	2.30E-03	5.52E-02	2.01E+01	1.66E-01	6.04E+01
Nickel	3.30E-05	*2.07E-02*	1.57E-03	4.58E-06	0.999	0.999	1.33E-04	3.19E-03	1.16E+00	9.56E-03	3.49E+00
Selenium	2.80E-06	*1.63E-04*	1.23E-05	2.50E-07	0.999	0.999	1.31E-06	3.14E-05	1.15E-02	9.42E-05	3.44E-02
Zinc	4.20E-04	*0.00E+00*	0.00E+00	4.52E-05	0.999	0.999	4.34E-05	1.04E-03	3.80E-01	3.12E-03	1.14E+00
Total PAHs w/o Napth.	6.00E-07	*4.26E-04*	3.23E-05	6.70E-07	0.990	0.990	2.72E-05	6.54E-04	2.39E-01	1.96E-03	7.16E-01
Naphthalene	2.53E-06	*3.23E-01*	2.45E-02	8.32E-07	0.990	0.990	2.02E-02	4.85E-01	1.77E+02	1.45E+00	5.31E+02
2378 Dioxins	na	*na*	na	na	0.990	0.990	3.27E-08	7.85E-07	2.87E-04	2.36E-06	8.60E-04
Acetaldehyde	8.30E-04	*1.28E-02*	9.69E-04	0.00E+00	0.990	0.990	1.66E-03	3.98E-02	1.45E+01	1.19E-01	4.36E+01
Acetophenone	3.20E-09	*4.93E-08*	3.73E-09	0.00E+00	0.990	0.990	6.39E-09	1.53E-07	5.60E-05	4.60E-07	1.68E-04
Acrolein	4.00E-03	*3.08E-04*	2.33E-05	0.00E+00	0.990	0.990	4.15E-03	9.96E-02	3.64E+01	2.99E-01	1.09E+02
Ammonia	0.00E+00	*0.00E+00*	0.00E+00	0.00E+00	0.990	0.990	8.89E-01	2.13E+01	7.79E+03	6.40E+01	2.34E+04
Benzene	4.20E-03	*6.80E-04*	5.15E-05	0.00E+00	0.990	0.990	4.38E-03	1.05E-01	3.84E+01	3.15E-01	1.15E+02
Bromomethane	1.50E-05	*1.39E-01*	1.05E-02	0.00E+00	0.990	0.990	8.70E-03	2.09E-01	7.62E+01	6.27E-01	2.29E+02
Bis 2ethyl-hexyl phtal	4.70E-08	*1.39E-01*	1.05E-02	0.00E+00	0.960	0.960	3.48E-02	8.34E-01	3.04E+02	2.50E+00	9.13E+02
Carbon Tet	4.50E-05	*4.08E-05*	3.09E-06	0.00E+00	0.990	0.990	4.90E-05	1.18E-03	4.30E-01	3.53E-03	1.29E+00
Chlorine	4.46E-04	*1.22E-02*	9.24E-04	0.00E+00	0.990	0.990	1.22E-03	2.94E-02	1.07E+01	8.81E-02	3.21E+01
Chlorobenzene	3.30E-05	*1.70E-05*	1.29E-06	0.00E+00	0.990	0.990	3.52E-05	8.44E-04	3.08E-01	2.53E-03	9.24E-01
Chloroform	2.80E-05	*6.80E-03*	5.15E-04	0.00E+00	0.990	0.990	4.54E-04	1.09E-02	3.98E+00	3.27E-02	1.19E+01
Chloromethane	2.30E-05	*3.54E-04*	2.68E-05	0.00E+00	0.990	0.990	4.59E-05	1.10E-03	4.02E-01	3.30E-03	1.21E+00
2 Chlorophenol	2.40E-08	*3.70E-07*	2.80E-08	0.00E+00	0.990	0.990	4.79E-08	1.15E-06	4.20E-04	3.45E-06	1.26E-03
1-4 Dichlorobenzene	1.67E-03	*2.57E-02*	1.95E-03	0.00E+00	0.990	0.990	3.33E-03	8.00E-02	2.92E+01	2.40E-01	8.76E+01
1-2 Dichloroethane	2.90E-05	*4.47E-04*	3.38E-05	0.00E+00	0.990	0.990	5.79E-05	1.39E-03	5.07E-01	4.17E-03	1.52E+00
1-2 Dichloropropane	3.30E-05	*5.08E-04*	3.85E-05	0.00E+00	0.990	0.990	6.58E-05	1.58E-03	5.77E-01	4.74E-03	1.73E+00
2-4 Dinitrophenol	1.80E-07	*2.77E-06*	2.10E-07	0.00E+00	0.990	0.990	3.59E-07	8.62E-06	3.15E-03	2.59E-05	9.44E-03
Ethylbenzene	3.10E-05	*8.50E-05*	6.44E-06	0.00E+00	0.990	0.990	3.73E-05	8.96E-04	3.27E-01	2.69E-03	9.81E-01
Formaldehyde	7.27E-05	*6.78E-02*	5.13E-03	4.45E-05	0.990	0.990	4.31E-03	1.04E-01	3.78E+01	3.11E-01	1.13E+02
Isobutyraldehyde	1.20E-05	*1.85E-04*	1.40E-05	0.00E+00	0.990	0.990	2.40E-05	5.75E-04	2.10E-01	1.73E-03	6.30E-01
MEK	5.40E-06	*8.32E-05*	6.30E-06	0.00E+00	0.990	0.990	1.08E-05	2.59E-04	9.44E-02	7.76E-04	2.83E-01
2 Methyl naphthalene	1.60E-07	*2.46E-06*	1.86E-07	0.00E+00	0.990	0.990	3.19E-07	7.66E-06	2.79E-03	2.30E-05	8.38E-03
Methylene Chloride	2.90E-04	*2.38E-03*	1.80E-04	0.00E+00	0.990	0.990	4.48E-04	1.08E-02	3.93E+00	3.23E-02	1.18E+01
2 Nitrophenol	2.40E-07	*3.70E-06*	2.80E-07	0.00E+00	0.990	0.990	4.79E-07	1.15E-05	4.20E-03	3.45E-05	1.26E-02
4 Nitrophenol	1.10E-07	*1.69E-06*	1.28E-07	0.00E+00	0.990	0.990	2.19E-07	5.26E-06	1.92E-03	1.58E-05	5.76E-03
Pentachlorophenol	5.10E-08	*7.85E-07*	5.94E-08	0.00E+00	0.990	0.990	1.02E-07	2.44E-06	8.91E-04	7.33E-06	2.67E-03
Phenol	5.10E-05	*7.85E-04*	5.94E-05	0.00E+00	0.990	0.990	1.02E-04	2.44E-03	8.91E-01	7.33E-03	2.67E+00
Propionaldehyde	6.10E-05	*9.39E-04*	7.11E-05	0.00E+00	0.990	0.990	1.22E-04	2.92E-03	1.07E+00	8.76E-03	3.20E+00
Styrene	1.90E-03	*2.93E-02*	2.22E-03	0.00E+00	0.990	0.990	3.79E-03	9.11E-02	3.32E+01	2.73E-01	9.97E+01
Tetrachloroethene	3.80E-05	*4.08E-04*	3.09E-05	0.00E+00	0.990	0.990	6.48E-05	1.55E-03	5.67E-01	4.66E-03	1.70E+00
Toluene	9.20E-04	*1.19E-03*	9.01E-05	0.00E+00	0.990	0.990	1.02E-03	2.46E-02	8.98E+00	7.38E-02	2.69E+01
111 Trichloroethane	3.10E-05	*8.84E-04*	6.69E-05	0.00E+00	0.990	0.990	8.73E-05	2.09E-03	7.65E-01	6.28E-03	2.29E+00
Trichloroethene	3.00E-05	*1.02E-04*	7.72E-06	0.00E+00	0.990	0.990	3.74E-05	8.97E-04	3.27E-01	2.69E-03	9.82E-01
Trichlorotrifluorometh	4.10E-05	*6.31E-04*	4.78E-05	0.00E+00	0.990	0.990	8.18E-05	1.96E-03	7.17E-01	5.89E-03	2.15E+00
246 Trichlorophenol	2.20E-08	*3.39E-07*	2.57E-08	0.00E+00	0.990	0.990	4.39E-08	1.05E-06	3.85E-04	3.16E-06	1.15E-03
Vinyl Chloride	1.80E-05	*2.77E-04*	2.10E-05	0.00E+00	0.990	0.990	3.59E-05	8.62E-04	3.15E-01	2.59E-03	9.44E-01
Xylenes (o,m,p)	2.50E-05	*3.85E-04*	2.91E-05	0.00E+00	0.990	0.990	4.99E-05	1.20E-03	4.37E-01	3.59E-03	1.31E+00

S-360-10-0: COOLING TOWER (Mechanical-draft counter-flow)

PM_{10} = (Recirculation rate) x (drift rate) x (TDS) x (density of water)

Daily PM_{10}

= (8,831 gal/min) x (1440 min/day) x ($5x10^{-6}$) x (1044 lb $PM_{10}/10^6$ lb-H_2O) x (8.34 lb- H_2O/gal)

= 0.5536 → 0.6 lb-PM_{10}/day per tower

Annual PM_{10}

= (8,831 gal/min) (1440 min/day) (365 day/yr) ($5x10^{-6}$) (1044 lb-$PM_{10}/10^6$ lb-H_2O) (8.34 lb- H_2O/gal)

= 202 lb-PM_{10}/year per tower

Cooling Tower **PM_{10} emissions**		
ATC	Maximum PM_{10} emissions	
	lb/day	lb/year
S-360-10-0	0.6	202

Toxic air emissions proposed by the applicant are shown in the table on the following page.

Calculation of Hazardous and Toxic Pollutant Emissions from Cooling Towers

				Op Hrs/Day:	24			ppm
Cells per Tower:	3	Max Tower Drift Rate:	22.1	lbs/hr	Op Hrs/Yr:	8760	Max Tower Flow TDS:	1044
# of Identical Towers:	3						C of C:	1.00

			Total Single Tower			Single Cell			Total All Towers		
Constituent	Concentration in Cooling Tower Water		Emissions, lb/hr	Emissions, lb/day	Emissions, ton/yr	Emissions, lb/hr	Emissions, lb/day	Emissions, ton/yr	Emissions, lb/hr	Emissions, lb/day	Emissions, ton/yr
Ammonia	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Arsenic	0.006	ppm	1.33E-07	3.18E-06	5.81E-07	4.42E-08	1.06E-06	1.94E-07	3.98E-07	9.55E-06	1.74E-06
Cadmium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chromium (assumed C	0.006	ppm	1.33E-07	3.18E-06	5.81E-07	4.42E-08	1.06E-06	1.94E-07	3.98E-07	9.55E-06	1.74E-06
Copper	0.006	ppm	1.33E-07	3.18E-06	5.81E-07	4.42E-08	1.06E-06	1.94E-07	3.98E-07	9.55E-06	1.74E-06
Lead	0.003	ppm	6.63E-08	1.59E-06	2.90E-07	2.21E-08	5.30E-07	9.68E-08	1.99E-07	4.77E-06	8.71E-07
Mercury	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nickel	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	0.015	ppm	3.32E-07	7.96E-06	1.45E-06	1.11E-07	2.65E-06	4.84E-07	9.95E-07	2.39E-05	4.36E-06
Beryllium	0.003	ppm	6.63E-08	1.59E-06	2.90E-07	2.21E-08	5.30E-07	9.68E-08	1.99E-07	4.77E-06	8.71E-07
Manganese	0.015	ppm	3.32E-07	7.96E-06	1.45E-06	1.11E-07	2.65E-06	4.84E-07	9.95E-07	2.39E-05	4.36E-06
Barium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vanadium	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Aluminum	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chlorine	342	ppm	7.56E-03	1.81E-01	3.31E-02	2.52E-03	6.05E-02	1.10E-02	2.27E-02	5.44E-01	9.93E-02
Iron	0.084	ppm	1.86E-06	4.46E-05	8.13E-06	6.19E-07	1.49E-05	2.71E-06	5.57E-06	1.34E-04	2.44E-05
Boron	0.3	ppm	6.63E-06	1.59E-04	2.90E-05	2.21E-06	5.30E-05	9.68E-06	1.99E-05	4.77E-04	8.71E-05
Selenium	0.006	ppm	1.33E-07	3.18E-06	5.81E-07	4.42E-08	1.06E-06	1.94E-07	3.98E-07	9.55E-06	1.74E-06
*	0	ppm	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Notes: (1) Water analysis data supplied by project applicant.

S-360-11-0: HYDRATED LIME RECEIVING AND STORAGE
S-360-12-0: SAND RECEIVING AND STORAGE
S-360-13-0: LIMESTONE RECEIVING AND STORAGE
S-360-14-0: ACTIVATED CARBON RECEIVING AND STORAGE

Sample calculation using hydrated lime storage silo (each silo has its own BV filter):

Daily PM_{10}

1000 cf/min x 60 min/hr x hr/day x 0.005 grain/dscf x lb/7000 grain = 0.043 x hr/day
Example: S-360-11-0 = 0.043 x 2 hr/day = 0.086 → 0.1 lb/day

Annual PM_{10} (S-360-11-0)

Using *hydrated lime silo* as an example, hydrated lime BV filter operates 260 hr/yr.
PM_{10} = 1000 cf/min x 60 min/hr x 260 hr/yr x 0.005 gr/dscf x lb/7000 gr = 11 lb/yr

Storage silos (PM_{10})								
ATC # S-360-	**Silo product**	**Air flow** (CFM)			**Max load time** for each silo		**PM_{10} emissions**	
					hr/day	hr/year	**lb/day**	**lb/year**
'-11-0	Hydrated Lime	1,000			2 hr	260 hr	**0.1**	**11**
'-12-0	Sand	1,000			3 hr	18 hr	**0.1**	**1**
'-13-0	Limestone	1,000			6 hr	570 hr	**0.3**	**24**
'-14-0	PAC	1,000			2 hr	120 hr	**0.1**	**5**

S-360-15-0: ASH RECEIVING AND STORAGE

PM_{10} = Bin Vent airflow x outlet grain loading EF (see following table for inputs).

Daily emissions (for each set of 2 silos vented to shared bin vent filter)

= A x B x D x E

= 1000 ft^3/min x 1440 min/day x 0.005 grain/ft^3 x lb/7000 grains

= 1.0 lb-PM_{10}/day

Annual Emissions

= A x C x D x E
= 1000 ft^3/min x 525,600 min/yr x 0.005 grain/ft^3 x lb/7000 grains = 375 lb-PM_{10}/yr

Ash receiving and storage emission calculations							
	A	B	C	D	E	A*B*D*E	A*C*D*E
ATC # S-360-	Bin Vent exhaust air flow	Minutes per day	Hours per year	BV filter outlet **grain loading** (grain/dscf)	lb/7000 grains	lb/day	lb/yr
'-15-0	1000 cfm	1,440	525,600	0.005	"	1.0	375

S-360-28-0 through '-29-0: BIOSOLIDS RECEIVING/STORAGE W ENCLOSED SILOS 1 THROUGH 5, WITH CARBON VENT FILTERS AND VAPOR PIPING TO COMBUSTION AIR FAN

No emissions are expected from this operation under the proposed operating scenario.

S-360-33-0: 174 BHP DIESEL-FIRED IC ENGINE POWERING AN EMERGENCY FIRE WATER PUMP

The daily and annual PE are calculated as follows:

Sample calculation:

Daily NOx
= 2.48 gram/bhp-hr x 174 bhp x 24 hr/day x lb/453.6 gram = 22.8 lb-NOx/day

Annual NOx
= 2.48 gram/bhp-hr x 174 bhp x 100 hr/yr x lb/453.6 gram =95 lb-NOx/year

Project Emissions (PE2)						
ATC 33-0 Pollutant	**EF (g/bhp-hr)**	**Rating (bhp)**	**Hours of Operation (hrs/day)**	**Annual Hours (hrs/yr)**	**Daily PE2 (lb/day)**	**Annual PE2 (lb/yr)**
NO_X	2.48	174	24	100	**22.8**	**95**
SO_X	0.0051	174	24	100	**0.0**	**0**
PM_{10}	0.11	174	24	100	**1.0**	**4**
CO	1.19	174	24	100	**11.0**	**46**
VOC	0.06	174	24	100	**0.6**	**2**

S-360-34-0: BIOMASS RECEIVING AND STORAGE OPERATION

PM_{10} emissions generated when unloading trucks and from windblown emissions at the storage piles. The biomass is to be used as fuel (no composting to be performed with this feedstock).

PM_{10} = tons received x EF (lb/ton).

The EF accounts for the truck unloading and fugitive emissions from the storage piles.

Daily emissions

PM10 = Monthly averaged daily amount of biomass received x EF (lb-PM_{10}/ton)

= 750 ton/day x 0.0025 lb-PM_{10}/ton = 1.9 lb-PM_{10}/day

Annual Emissions

PM10 = Annual biomass received x EF (lb-PM_{10}/ton)

= 251,850 ton/year x 0.0025 lb-PM_{10}/ton = 630 lb-PM_{10}/year

Biomass receiving/storage emission calculations S-360-34-0							
Pollutant	**Tons biomass received**		**x**	**EF**	**=**	**Daily lb/day**	**Annual lb/yr**
	Per day	Per year					
PM_{10}	750	251,850		0.0025		1.9	630

S-360-35-0: BIOMASS GRINDING OPERATION

The daily and annual PM_{10} are calculated as follows:

Grinding

Daily = EF x max throughput (Q) = 0.0015 lb-PM_{10}/ton x 750 tpd = 1.13 lb-PM_{10}
Annual = EF x max Q = 0.0015 lb-PM_{10}/ton x 251,850 tpy = 378 lb-PM_{10}

Grinder transfer points

Daily = EF x maximum throughput x (# of transfer points)
= 0.0025 lb-PM_{10}/ton x 750 tpd x 2 = 3.75 lb-PM_{10}

Annual = EF x maximum throughput x (# of transfer points)
= 0.0025 lb-PM_{10}/ton x 251,850 tpy x 2 = 1,259 lb-PM_{10}

Biomass grinder S-360-35-0					
Pollutant	**EF (lb-PM_{10}/ton)**	**Max throughput (tpd & tpy)**		**Emissions**	
		daily	**annual**	**lb/day**	**lb/year**
PM_{10}	0.0015	750	251,850	1.13	378
Biomass grinder transfer points					
Pollutant	**EF (lb-PM_{10}/ton)**	**# transfer points**	**Max Q (tpd & tpy)**		**Emissions**
			daily	**annual**	**lb/day**	**lb/year**
PM_{10}	0.0025	2	750	251,850	3.75	1,259
Total PM_{10}					**4.9**	**1,637**

S-360-36-0: BIOMASS SCREEN *(Star trommel screen M-13)*

The daily and annual PM_{10} are calculated as follows:

Screening

Daily = EF x max throughput (Q) = 0.0015 lb-PM_{10}/ton x 750 tpd = 1.13 lb-PM_{10}

Annual = EF x max Q = 0.0015 lb-PM_{10}/ton x 251,850 tpy = 378 lb-PM_{10}

Screener transfer points

Daily = EF x maximum throughput x (# of transfer points)
= 0.0025 lb-PM_{10}/ton x 750 tpd x 3 = 5.6 lb-PM_{10}

Annual = EF x maximum throughput x (# of transfer points)
= 0.0025 lb-PM_{10}/ton x 251,850 tpy x 3 = 1,889 lb-PM_{10}

Biomass screen M-13					
Pollutant	**EF (lb-PM_{10}/ton)**	**Max throughput (tpd & tpy)**		**Emissions**	
		daily	**annual**	**lb/day**	**lb/year**
PM_{10}	0.0015	741	251,850	1.13	378
Biomass screen M-13 transfer points					
Pollutant	**EF (lb-PM_{10}/ton)**	**# transfer points**	**Max Q (tpd & tpy)**		**Emissions**
			daily	**annual**	**lb/day**	**lb/year**
PM_{10}	0.0025	3	741	251,850	5.56	1,889
Total PM_{10}					6.7	2,267

S-360-37-0: BIOMASS RECLAIM OPERATION (includes screen M-15)

Lump breaker, star screen inlet hopper and 6 conveyor transfer points.

The daily and annual PM_{10} are calculated as follows:

Screening

Daily = EF x max throughput (Q) = 0.0015 lb-PM_{10}/ton x 750 tpd = 1.13 lb-PM_{10}

Annual = EF x max Q = 0.0015 lb-PM_{10}/ton x 251,850 tpy = 378 lb-PM_{10}

Reclaimer transfer points

Daily = EF x maximum throughput x (# of transfer points)

= 0.0025 lb-PM_{10}/ton x 750 tpd x 7 = 13.13 lb-PM_{10}

Annual = EF x maximum throughput x (# of transfer points)

= 0.0025 lb-PM_{10}/ton x 251,850 tpy x 7 = 4,407 lb-PM_{10}

Biomass reclaimer screen M-15					
Pollutant	**EF (lb-PM_{10}/ton)**	**Max throughput (tpd & tpy)**		**Emissions**	
		Daily	**annual**	**lb/day**	**lb/year**
PM_{10}	0.0015	750	251,850	1.13	378

Biomass reclaimer transfer points						
Pollutant	**EF (lb-PM_{10}/ton)**	**# transfer points**	**Max throughput (tpd & tpy)**		**Emissions**	
			daily	**annual**	**lb/day**	**lb/year**
PM_{10}	0.0025	7	750	251,850	13.13	4,407
Total PM_{10}					14.3	4,785

S-360-39-0: ASH LOADOUT TO TRUCK

Pollutant generated: PM_{10}

Ash loadout to truck PM_{10} emission calculations					
ATC # S-360-	Ash loadout to trucks		Emission factor (lb-PM_{10}/ton controlled)	Truck PM_{10} loadout emissions (per train)	
	tpd/train	tpy/train		lb/day	lb/year
39-0	100	36,500	0.0046	0.5	168

S-360-42-0: 550 BHP TIER 3 EMERGENCY IC ENGINE

The daily and annual PE are calculated as follows:

Sample calculation:

Daily NOx

= 2.49 gram/bhp-hr x 550 bhp x 24 hr/day x lb/453.6 gram = 72.5 lb-NOx/day

Annual NOx

= 2.49 gram/bhp-hr x 550 bhp x 50 hr/yr x lb/453.6 gram = 151 lb-NOx/year

S-360-42-0 Pollutant	Emissions Factor (g/bhp-hr)	Rating (bhp)	Daily Hours of Operation (hrs/day)	Annual Hours of Operation (hrs/yr)	Daily PE2 (lb/day)	Annual PE2 (lb/yr)
NO_X	2.49	550	24	50	**72.5**	**151**
SO_X	0.0051	550	24	50	**0.1**	**0**
PM_{10}	0.14	550	24	50	**4.1**	**8**
CO	0.87	550	24	50	**25.3**	**53**
VOC	0.13	550	24	50	**3.8**	**8**

3. Pre-Project Stationary Source Potential to Emit (SSPE1)

Pursuant to Section 4.9 of District Rule 2201, the Pre-Project Stationary Source Potential to Emit (SSPE1) is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site.

The pre-project PTO S-360-1-4 does not include a current VOC emission limit, as there were no VOC emission factors available at the time it was originally permitted. However the pre-project potential to emit may now be estimated, given the site specific emission factor of 3.12 lb-VOC/ton emissions factor (explained in the assumption section) and 2.81 lb-NH3/ton. Given, that the amount of biosolids and biomass (combined total) received by the facility is limited to 7,200 tpd (PTO) and 735,000 tpy (CUP), the daily emissions are equal to 22,464.0 lb-VOC/day and annual emissions = 2,293,200 lb-VOC/year (1,146.6 tpy). Therefore these numbers were entered into the table below in establishing the pre-project potential to emit for the facility.

Pre-Project Stationary Source Potential to Emit [SSPE1] (lb/year)					
Permit Unit	NO_X	SO_X	PM_{10}	CO	VOC
S-360-1-1 Composting*	0	0	1,838	0	2,293,200
S-360-2-0 Cancelled	0	0	0	0	0
S-360-3-3 Cancelled	0	0	0	0	0
S-360-4-0 Cancelled	0	0	0	0	0
S-360-5-0 Cancelled	0	0	0	0	0
S-360-6-0 Cancelled	0	0	0	0	0
Pre-Project SSPE (SSPE1)	0	0	1,838	0	2,293,200

** Pre-project NH_3 associated with S-360-1-4 = 20,232 lb/day and 2,065,350 lb/year..*

4. Post Project Stationary Source Potential to Emit (SSPE2)

Pursuant to Section 4.10 of District Rule 2201, the Post Project Stationary Source Potential to Emit (SSPE2) is the Potential to Emit (PE) from all units with valid Authorities to Construct (ATC) or Permits to Operate (PTO) at the Stationary Source and the quantity of emission reduction credits (ERC) which have been banked since September 19, 1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site.

Post-Project Stationary Source Potential to Emit [SSPE2] (lb/year)						
Permit #	Description	NOx	SOx	PM10	CO	VOC
S-360-1-5	Co-composting PTO	0	0	250	0	2,293,200
S-360-2-0	Cancelled PTO	0	0	0	0	0
S-360-3-3	Cancelled PTO	0	0	0	0	0
S-360-4-0	Cancelled PTO	0	0	0	0	0
S-360-5-0	Cancelled PTO	0	0	0	0	0
S-360-6-0	Cancelled PTO	0	0	0	0	0
S-360-7-0	185.54 MM BFB	22,466	12,503	3,723	28,717	781
S-360-10-0	Cooling Tower 1	0	0	202	0	0
S-360-11-0	Hydrated Lime Silo 1	0	0	11	0	0
S-360-12-0	Sand Silo 1	0	0	1	0	0
S-360-13-0	Limestone Silo 1	0	0	24	0	0
S-360-14-0	PAC Silo 1	0	0	5	0	0
S-360-15-0	Ash Silos, Train 1	0	0	375	0	0
S-360-28-0	Biosolids Silo 1	0	0	0	0	0
S-360-29-0	Biosolids Silo 2	0	0	0	0	0
S-360-33-0	174 bhp Tier 3 Firewater IC Engine	95	0	4	46	2
S-360-34-0	Biomass Rec/storage	0	0	630	0	0
S-360-35-0	Biomass Grinding	0	0	1,637	0	0
S-360-36-0	Biomass Screening	0	0	2,267	0	0
S-360-37-0	" Reclaim w screen	0	0	4,785	0	0
S-360-38-0	Biosolids receiving	0	0	0	0	0
S-360-39-0	Ash truck loadout 1	0	0	168	0	0
S-360-42-0	550 bhp Tier 3 Emer IC Engine	151	0	8	53	8
Total	**SSPE2**	**22,712**	**12,503**	**14,090**	**28,816**	**2,293,991**

5. Major Source Determination

Pursuant to Section 3.24 of Rule 2201, a Major Source is a stationary source with post-project emissions or a Post Project Stationary Source Potential to Emit (SSPE2), equal to or exceeding one or more of the following threshold values. However, Section 3.24.2 states, "for the purposes of determining major source status, the SSPE2 shall not include the quantity of emission reduction credits (ERC) which have been banked since 9/19/1991 for Actual Emissions Reductions that have occurred at the source, and which have not been used on-site."

Pursuant to section 3.24.1, fugitives shall only be included for post-project emissions or SSPE2 if the source is included in the list of source categories identified in the major source definition in 40 CFR Part 70.2. Therefore the fugitive VOC emissions from the compost pile (S-360-1) are not included in the table below.

Major Source Determination (lb/year), fugitives excluded					
	NO_X	SO_X	PM_{10}	CO	VOC
Pre-Project SSPE1	0	0	1,838	63,823	0[14]
Post Project SSPE2	22,712	12,503	14,090	28,816	791
Major Source Threshold	50,000	140,000	140,000	200,000	50,000
Major Source?	No	No	No	No	No

As seen above, the facility is not an existing Major Source for any pollutant; and is not becoming a Major Source for NO_X emissions as a result of this project.

6. Baseline Emissions (BE)

BE calculation (lbs/yr) is performed pollutant-by-pollutant for each unit within the project, to calculate the QNEC, and if applicable, to determine amount of offsets required.

Pursuant to Section 3.7 of District Rule 2201, BE = Pre-project Potential to Emit for:

- Any unit located at a non-Major Source,
- Any Highly-Utilized Emissions Unit, located at a Major Source,
- Any Fully-Offset Emissions Unit, located at a Major Source, or
- Any Clean Emissions Unit, located at a Major Source.

otherwise,
BE = Historic Actual Emissions (HAE), calculated pursuant to Section 3.22 of Rule 2201.

The facility will become a major source for NOx (only) with this project approval. All of the new equipment have baseline emissions = 0. The existing equipment is not part of a major source prior to this project approval.

[14] *See section 3.24.1 which documents why composting fugitive VOCs were excluded from SSPE in this table. Source is not included in list of source categories identified in major source definition (40 CFR Part 70.2).*

Therefore Baseline Emissions (BE) = Pre-Project Potential to Emit (PE1).

As calculated in Section VII.C.1 above, PE1 is summarized in the following table:

Baseline emissions (BE) (lb/year)						
Permit #	Description	NOx	SOx	PM10	CO	VOC
S-360-1-1	Co-composting PTO	0	0	1,838	0	2,293,200
S-360-7-0	185.54 MM BFB 1*	0	0	0	0	0
S-360-8-0	185.54 MM BFB 2*	0	0	0	0	0
S-360-9-0	185.54 MM BFB 3*	0	0	0	0	0
S-360-10-0	Cooling Tower 1	0	0	0	0	0
S-360-11-0	Hydrated Lime Silo 1	0	0	0	0	0
S-360-12-0	Sand Silo 1	0	0	0	0	0
S-360-13-0	Limestone Silo 1	0	0	0	0	0
S-360-14-0	PAC Silo 1	0	0	0	0	0
S-360-15-0	Ash Silos, Train 1	0	0	0	0	0
S-360-16-0	Cooling Tower 2	0	0	0	0	0
S-360-17-0	Hydrated Lime Silo 2	0	0	0	0	0
S-360-18-0	Sand Silo 2	0	0	0	0	0
S-360-19-0	Limestone Silo 2	0	0	0	0	0
S-360-20-0	PAC Silo 2	0	0	0	0	0
S-360-21-0	Ash Silos, Train 2	0	0	0	0	0
S-360-22-0	Cooling Tower 3	0	0	0	0	0
S-360-23-0	Hydrated Lime Silo 3	0	0	0	0	0
S-360-24-0	Sand Silo 3	0	0	0	0	0
S-360-25-0	Limestone Silo 3	0	0	0	0	0
S-360-26-0	PAC Silo 3	0	0	0	0	0
S-360-27-0	Ash Silos, Train 3	0	0	0	0	0
S-360-28-0	Biosolids Silo 1	0	0	0	0	0
S-360-29-0	Biosolids Silo 2	0	0	0	0	0
S-360-30-0	Biosolids Silo 3	0	0	0	0	0
S-360-31-0	Biosolids Silo 4	0	0	0	0	0
S-360-32-0	Biosolids Silo 5	0	0	0	0	0
S-360-33-0	Firewater IC Engine	0	0	0	0	0
S-360-34-0	Biomass Rec/storage	0	0	0	0	0
S-360-35-0	Biomass Grinding	0	0	0	0	0
S-360-36-0	Biomass Screening	0	0	0	0	0
S-360-37-0	" Reclaim w screen	0	0	0	0	0
S-360-38-0	Biosolids receiving	0	0	0	0	0
S-360-39-0	Ash truck loadout 1	0	0	0	0	0
S-360-40-0	Ash truck loadout 2	0	0	0	0	0
S-360-41-0	Ash truck loadout 3	0	0	0	0	0
S-360-42-0	Emergency IC Engine	0	0	0	0	0

7. Major Modification

Major Modification is defined in 40 CFR Part 51.165 as "*any physical change in or change in the method of operation of a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the Act.*"

As discussed in Section VII.C.5 above, the facility is not a Major Source and is not becoming a Major source as a result of this project.. Therefore, the project cannot be a significant increase and the project does not constitute a Major Modification.

8. Federal Major Modification

As shown above, this project does not constitute a Major Modification. Therefore, in accordance with District Rule 2201, Section 3.17, this project does not constitute a Federal Major Modification and no further discussion is required.

9. Quarterly Net Emissions Change (QNEC)

The QNEC is calculated solely to establish emissions that are used to complete the District's PAS emissions profile screen. Detailed QNEC calculations are included in Appendix H.

VIII. Compliance

Rule 2201 New and Modified Stationary Source Review Rule

A. Best Available Control Technology (BACT)

1. BACT Applicability

BACT requirements are triggered on a pollutant-by-pollutant basis and on an emissions unit-by-emissions unit basis for the following*:

a. Any new emissions unit with a potential to emit exceeding two pounds per day,

b. The relocation from one Stationary Source to another of an existing emissions unit with a potential to emit exceeding two pounds per day,

c. Modifications to an existing emissions unit with a valid Permit to Operate resulting in an AIPE exceeding two pounds per day, and/or

d. Any new or modified emissions unit, in a stationary source project, which results in a Major Modification.

*Except for CO emissions from a new or modified emissions unit at a Stationary Source with an SSPE2 of less than 200,000 pounds per year of CO.

a. New emissions units – PE > 2 lb/day

As seen in Section VII.C.2 of this evaluation, the applicant is proposing to install new emissions units with a PE greater than 2 lb/day for NO_X, SO_X, PM_{10}, CO, and VOC. BACT is triggered for NO_X, SO_X, PM_{10}, and VOC with proposed PEs > 2 lbs/day; however BACT is not triggered for CO since the SSPE2 for CO is not greater than 200,000 lbs/year for any of the emissions units, as demonstrated in Section VII.C.5 of this document.

BACT is triggered for:

S-360-7-0 (BFB) for all criteria pollutants except CO
S-360-35-0 for PM_{10} from the biomass grinder,
S-360-36-0 and 37-0 for PM_{10} from the biomass screens (PM10 > 2 lb/day), and
S-360-33-0 and '-42-0 (two emergency IC engines) for NOx, PM_{10} and VOC.

b. Relocation of emissions units – PE > 2 lb/day

As discussed in Section I above, there are no emissions units being relocated from one stationary source to another; therefore BACT is not triggered.

c. Modification of emissions units – AIPE > 2 lb/day

No AIPE > 2 lb/day is proposed for any of the existing permit units; therefore BACT is not triggered for AIPE > 2 lb/day.

d. Major Modification

As discussed in Section VII.C.7 above, this project does not constitute a Major Modification; therefore BACT is not triggered for Major mod purposes.

2. BACT Guideline

BACT is triggered (> 2 lb/day) for the following new operations:

BFB (S-360-7-0) for NOx, SOx, PM10, and VOC. There is no guideline for biomass-fired BFB's less than 10 MW, therefore a new BACT guideline has been proposed with this project.

The BACT guidelines, associated with operations triggering BACT, are listed below:

Emergency IC engine S-360-33-0 for NOx only
Emergency IC engine S-360-042-0 for NOx, PM10, and VOC
Biomass grinder S-360-35-0 for PM10
Biomass screen S-360-36-0 for PM10
Biomass reclaimer screen S-360-37-0 for PM10

BACT Guidelines				
ATC # S-360	Description	Pollutants > 2 lb/day	Existing BACT guideline (Y/N)	BACT guideline
7-0	Biomass/biosolids-fired BFBs (3)	NOx, SOx, PM_{10} & VOC	N	X.X.X
33-0	Emer IC engine	NOx	Y	3.1.1
42-0	Emer IC engine	NOx, PM_{10}, & VOC	Y	3.1.1
35-0	Biomass grinder	PM_{10}	Y	6.4.2
36-0	Biomass screen	PM_{10}	Y	6.4.3 or 6.4.1
37-0	Biomass reclaimer screen	PM_{10}	" "	" "

3. Top-Down BACT Analysis

Per Permit Services Policies and Procedures for BACT, a Top-Down BACT analysis shall be performed as a part of the application review for each application subject to the BACT requirements pursuant to the District's NSR Rule.

Pursuant to the attached Top-Down BACT Analysis (see Appendices M, N and O), BACT has been satisfied as follows:

Bubbling Fluidized Bed combustor S-360-7-0

Proposed	*BACT requirement*
NOx: 0.0121 lb/MMBtu (8.6 ppmv @3% O_2)	Applicant proposed
SOx: 3.8 ppmvd at 0% O2 (3.3 @ 3% O_2)	emission rates represent
PM_{10}: 0.0020 lb/MMBtu	most efficient technologically
VOC: 0.00043 lb/MMBtu (0.9 ppmv @ 3% O_2)	feasible option(s)

Emergency IC Engine S-360-33-0

NOx: EPA Tier 3 Certified engine.

Emergency IC Engine S-360-42-0

NOx: EPA Tier 3 Certified engine.

Biomass Grinder S-360-35-0

PM_{10}: Use of water spray and operate in enclosed building vented to BFB boiler for overall CE $\geq$ 80%.

Biomass Screens S-360-36-0 and 37-0

PM_{10}: Use of water spray and operate in enclosed building vented to BFB boiler for overall CE $\geq$ 80%.

B. Offsets

1. Offset Applicability

Pursuant to Section 4.5.3, offset requirements shall be triggered on a pollutant by pollutant basis and shall be required if the Post Project Stationary Source Potential to Emit (SSPE2) equals to or exceeds the offset threshold levels in Rule 2201 Table 4-1.

The following table compares the post-project facility-wide annual emissions in order to determine if offsets will be required for this project.

Offset Determination (lb/year)					
	NO_X	**SO_X**	**PM_{10}**	**CO**	**VOC**
Post Project SSPE (SSPE2)	49,992	27,545	22,013	63,823	313,778 (1,778 non-fugitive only)
Offset Threshold	20,000	54,750	29,200	200,000	20,000
Offsets triggered?	**Yes**	No	No	No	**Yes**

2. Quantity of Offsets Required

As seen above, the SSPE2 is greater than the offset thresholds for NO_X and VOC; therefore offset calculations will be required for this project.

NOx:

Per Sections 4.7.2 and 4.7.3, the quantity of offsets in pounds per year for NO_X is calculated as follows for sources with an SSPE1 less than the offset threshold levels before implementing the project being evaluated.

Offsets required (lb/year) = [(SSPE2 – ROT + ICCE) x DOR]

Where,

SSPE2 = Post Project Stationary Source Potential to Emit
ROT = Respective Offset Threshold, for the respective pollutant indicated in Section 4.5.3.
ICCE = Increase in Cargo Carrier Emissions
DOR = Distance Offset Ratio, determined pursuant to Section 4.8

Per Section 4.6.2, emergency equipment that is used exclusively as emergency standby equipment for electrical power generation or any other emergency equipment

as approved by the APCO that does not operate more than 200 hours per year of non-emergency purposes and is not used pursuant to voluntary arrangements with a power supplier to curtail power, is exempt from providing emission offsets. Therefore, the emissions from permit units S-360-33-0 and S-360-42-0 are not included in the offsets required for the project approval (see below).

Offsets required (lb/year) = [(SSPE2 – Emergency Equipment – ROT + ICCE) x DOR]

SSPE2 (NO_X) = 49,992 lb/year
S-360-33-0 and '-42-0 (NO_X) = (95+151) = 246 lb/year
Offset threshold (NO_X) = 20,000 lb/year
ICCE = 0 lb/year

Assuming offset ratio of 1.5:1, the amount of NO_X ERCs that need to be withdrawn is:

Offsets required (lb/year) = [(22,712 – 246 – 20,000 + 0) x 1.5] = 2,466 x 1.5
= 3,699 lb NO_X/year

Calculating the appropriate quarterly emissions to be offset is as follows:

1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
925	925	925	925

The applicant has stated that the facility will show they own the offsets prior to issuance of the ATCs. The applicant has identified ERC S-3855-2 to be used to offset the ATC.

Proposed Rule 2201 (NOx offset) Conditions:

S-0360-7-0

Prior to operating equipment under this Authority to Construct, permittee shall surrender NOx emissions reduction credit credits for the following quantity of emissions (calculated using a 1.5:1 distance offset ratio): 1st quarter - 925 lbs., 2nd quarter - 925 lbs., 3rd quarter - 925 lbs. and 4th quarter - 925 lbs. Offsets shall be provided per the applicable distance offset ratio specified in Table 4-2 of Rule 2201 (as amended 9/21/06). [District Rule 2201]

VOC:

As seen above, the SSPE2 is greater than the offset thresholds for VOC; therefore offset calculations will be required for this project.

Per Sections 4.7.1 and 4.7.3, the quantity of offsets in pounds per year for VOC is calculated as follows for sources with an SSPE1 greater than the offset threshold levels before implementing the project being evaluated.

Offsets required (lb/year) = (Σ[PE2 – BE] + ICCE) x DOR, for all new or modified emissions units in the project,

Where,
PE2 = Post Project Potential to Emit, (lb/year)
BE = Baseline Emissions, (lb/year)
ICCE = Increase in Cargo Carrier Emissions, (lb/year)
DOR = Distance Offset Ratio, determined pursuant to Section 4.8
BE = Pre-project Potential to Emit for:

- Any unit located at a non-Major Source,
- Any Highly-Utilized Emissions Unit, located at a Major Source,
- Any Fully-Offset Emissions Unit, located at a Major Source, or
- Any Clean Emissions Unit, Located at a Major Source.

otherwise,

BE = Historic Actual Emissions (HAE)

The facility is not a major source for VOC emissions, therefore the baseline emissions = the pre-project potential to emit. Emergency equipment excluded from the calculations (per section 4.6.2). Also, there are no increases in cargo carrier emissions; therefore offsets can be determined as follows:

Offsets required (lb/year) = ([PE2 – BE] + ICCE) x DOR
S-360-1 Co-composting permit and BFBs (S-360-7-0, 8-0 and 9-0)

PE2 (VOC) = 313,768 lb/year
BE (VOC) = 2,293,200 lb/year
ICCE = 0 lb/year

Offsets required (lb/year) = ([312,781 - 2,293,002] + 0) x 1.5

= 0 lb-VOC/year (negative numbers are rounded to zero)

As seen above, no VOC offsets are required for this project approval.

C. Public Notification

1. Applicability

Public noticing is required for:
a. Any new Major Source, which is a new facility that is also a Major Source,
b. Major Modifications,
c. Any new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any one pollutant,
d. Any project which results in the offset thresholds being surpassed, and/or
e. Any project with an SSIPE of greater than 20,000 lb/year for any pollutant.

a. New Major Source

New Major Sources are new facilities, which are also Major Sources. Since this is not a new facility, public noticing is not required for this project for New Major Source purposes.

b. Major Modification

As demonstrated in VII.C.7, this project does not constitute a Major Modification; therefore, public noticing for Major Modification purposes is not required.

c. PE > 100 lb/day

Applications which include a new emissions unit with a Potential to Emit greater than 100 pounds during any one day for any pollutant will trigger public noticing requirements. As seen in Section VII.C.2 above, this project does not include a new emissions unit which has daily emissions greater than 100 lb/day for any pollutant; therefore public noticing for PE > 100 lb/day purposes is not required.

d. Offset Threshold

The following table compares the SSPE1 with the SSPE2 in order to determine if any offset thresholds have been surpassed with this project.

Offset Threshold				
Pollutant	**SSPE1 (lb/year)**	**SSPE2 (lb/year)**	**Offset Threshold**	**Public Notice Required?**
NO_X	0	22,712	20,000 lb/year	**Yes**
SO_X	0	12,503	54,750 lb/year	No
PM_{10}	1,838	14,090	29,200 lb/year	No
CO	0	28,816	200,000 lb/year	No
VOC	2,293,200	312,791	20,000 lb/year	No

As detailed above, offset threshold was surpassed for NO_X with this project; therefore public noticing is required for offset purposes.

e. SSIPE > 20,000 lb/year

Public notification is required for any permitting action that results in a Stationary Source Increase in Permitted Emissions (SSIPE) of more than 20,000 lb/year of any affected pollutant. According to District policy, the SSIPE is calculated as the Post Project Stationary Source Potential to Emit (SSPE2) minus the Pre-Project Stationary Source Potential to Emit (SSPE1), i.e. SSIPE = SSPE2 – SSPE1. The values for SSPE2 and SSPE1 are calculated according to Rule 2201, Sections 4.9

and 4.10, respectively. The SSIPE is compared to the SSIPE Public Notice thresholds in the following table:

Stationary Source Increase in Permitted Emissions [SSIPE] – Public Notice					
Pollutant	**SSPE2 (lb/year)**	**SSPE1 (lb/year)**	**SSIPE (lb/year)**	**SSIPE Public Notice Threshold**	**Public Notice Required?**
NO_x	22,712	0	22,712	20,000 lb/year	**Yes**
SO_x	12,503	0	12,503	20,000 lb/year	No
PM_{10}	14,090	1,838	14,090	20,000 lb/year	No
CO	28,816	0	28,816	20,000 lb/year	**Yes**
VOC	312,791	2,293,200	0	20,000 lb/year	No

As demonstrated above, the SSIPEs for NO_X and CO were greater than 20,000 lb/year; therefore public noticing for SSIPE purposes is required.

2. Public Notice Action

As discussed above, public noticing is required for this project for NO_X emissions crossing the offset threshold, and for an SSIPE > 20,000 lb/year for NOx and CO. Therefore, public notice documents will be submitted to the California Air Resources Board (CARB) and a public notice will be published in a local newspaper of general circulation prior to the issuance of the ATC for this equipment.

D. Daily Emission Limits (DELs)

Daily Emissions Limitations (DELs) and other enforceable conditions are required by Section 3.15 to restrict a unit's maximum daily emissions, to a level at or below the emissions associated with the maximum design capacity. Per Sections 3.15.1 and 3.15.2, the DEL must be contained in the latest ATC and contained in or enforced by the latest PTO and enforceable, in a practicable manner, on a daily basis. DELs are also required to enforce the applicability of BACT.

S-360-7-0: BUBBLING FLUIDIZED BED BOILER (BFB)

The DELs are stated in the form of emissions factors and firing rate. The PM_{10} DEL is based on airflow (2,112,960 dscf/hr at 0% O2) and outlet grain loading (0.0023 grains/dscf) at the emission stack.

Proposed Rule 2201 (DEL) Conditions:

Oxides of Nitrogen emissions (as NO2), except for periods of startup and shutdown as defined in this permit, shall not exceed 8.6 ppmv @ 3% O2 and 2.57 lb/hr. [District Rule 2201]

Sulfur compound emissions (as SO2), except for periods of startup and shutdown as defined in this permit, shall not exceed 3.25 ppmv @ 3% O2 and 1.43 lb/hr. [District Rule 2201]

PM10 emissions, except for periods of startup and shutdown as defined in this permit, shall not exceed 0.0020 lb/MMBtu and 0.43 lb/hr (including condensable particulate). [District Rule 2201]

CO emissions, except for periods of startup and shutdown as defined in this permit, shall not exceed 17.32 PPMV @ 3% O2 and 78.70 lb/hr. [District Rule 2201]

Volatile Organic Compound (VOC) emissions, except for periods of startup and shutdown as defined in this permit, shall not exceed 1 ppmv @ 3% O2 and 0.09 lb/hr. [District Rule 2201]

NH3 emissions shall not exceed 10 ppmv @ 3% O2 and 1.24 lb/hr [District Rule 2201 and 4102]

Daily emissions shall not exceed any of the following limits: NOx (as NO2): 61.6 lb/day, SOx (as SO2): 34.3 lb/day, PM10: 10.2 lb/day (includes condensable particulate), CO: 78.7 lb/day, VOC: 2.1 lb/day, and NH3: 29.6 lb/day. [District Rule 2201]

S-360-10-0: COOLING TOWER

Proposed Rule 2201 (DEL) Conditions:

Total dissolved solids (TDS) in cooling tower water shall not exceed 1044 mg/l. [District Rule 2201]

Recirculating water flow rate shall not exceed 8,831 gal/min. [District Rule 2201]

Drift eliminator drift rate shall not exceed 0.0005% of the circulated water. [District Rule 2201]

PM10 emission rate shall not exceed 0.6 lb/day. [District Rule 2201]

Compliance with the PM10 daily emission limit shall be demonstrated as follows: PM10 lb/day = circulating water recirculation rate x total dissolved solids concentration in the circulating water x manufacturer's design drift rate. [District Rule 2201]

S-360-11-0: HYDRATED LIME RECEIVING AND STORAGE

The silo has its' own bin vent filter so the DEL is based on grain loading and airflow. Therefore each permit will contain the following DEL conditions:

Proposed Rule 2201 (DEL) Conditions:

- *Airflow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]*
- *Grain loading shall not exceed 0.005 grains/dscf. [District Rule 2201]*
- *Silo loading shall not exceed 2 hours/day and 260 hours/year. [District Rule 2201]*

S-360-12-0: SAND RECEIVING AND STORAGE

The silo has its' own bin vent filter so the DEL is based on grain loading and airflow. Therefore each permit will contain the following DEL conditions:

Proposed Rule 2201 (DEL) Conditions:

- *Airflow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]*
- *PM_{10} emissions shall not exceed 0.005 grains/dscf. [District Rule 2201]*
- *Silo loading shall not exceed 3 hours/day and 18 hours/year. [District Rule 2201]*

S-360-13-0: LIMESTONE RECEIVING AND STORAGE

The permit, with its own bin vent filter, will contain the following DEL conditions:

Proposed Rule 2201 (DEL) Conditions:

- *Airflow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]*
- *PM_{10} emissions shall not exceed 0.005 grains/dscf. [District Rule 2201]*
- *Silo loading shall not exceed 6 hours/day and 570 hours/year. [District Rule 2201]*

S-360-14-0: ACTIVATED CARBON RECEIVING AND STORAGE

The permit, with its own bin vent filter, will contain the following DEL conditions:

Proposed Rule 2201 (DEL) Conditions:

- *Airflow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]*
- *PM_{10} emissions shall not exceed 0.005 grains/dscf. [District Rule 2201]*
- *Silo loading shall not exceed 2 hours/day and 120 hours/year. [District Rule 2201]*

S-360-15-0: ASH RECEIVING AND STORAGE

The permit number shown above includes two silos. Each set of two silos is vented to one shared bin vent filter. The DEL is based on grain loading, airflow and 24 hr/day operation (ash is continually fed to the silo and the bin vent filter also serves the ash loadout operation. Therefore each permit will contain the following DEL conditions.

Proposed Rule 2201 (DEL) Conditions:

Airflow through shared bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]
PM_{10} emissions shall not exceed 0.005 grains/dscf. [District Rule 2201]

S-360-28-0 through '-29-0: BIOSOLIDS RECEIVING/STORAGE W ENCLOSED SILOS 1 THROUGH 5, WITH CARBON VENT FILTERS AND VAPOR PIPING TO COMBUSTION AIR FAN

No emissions are expected from this operation under the proposed operating scenario.

S-360-33-0: 174 BHP DIESEL-FIRED EMERGENCY **IC ENGINE**

Emissions from engine shall not exceed any of the following limits: 2.48 g-NOx/bhp-hr, 1.19 g-CO/bhp-hr, or 0.06 g-VOC/bhp-hr. [District Rule 2201 & 17 CCR 93115I]

Emissions from this IC engine shall not exceed 0.11 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201, 4102 and 17 CCR 93115]

Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801 and 17 CCR 93115I]

S-360-34-0: BIOMASS RECEIVING AND STORAGE

Maximum amount of biomass received, to be used as fuel in permits S-360-7, '-8, shall not exceed 750 tons per day nor 251,850 tons per year. [District Rule 2201]

PM_{10} emissions from truck unloading and biomass storage piles shall not exceed 0.0025 lb-PM_{10}/ton. [District Rule 2201]

S-360-35-0: BIOMASS GRINDING

Maximum amount of biomass processed by the grinder shall not exceed 750 tons per day and 251,850 tpy. [District Rule 2201]

The number of transfer points serving the biomass grinding and conveying operation shall not exceed two (2). [District Rule 2201]

PM_{10} emissions shall not exceed 0.0015 lb-PM_{10}/ton from the grinder and 0.0025 lb/ton for each transfer point. [District Rule 2201]

S-360-36-0: BIOMASS SCREEN *(Star trommel screen M-13)*

Maximum daily biomass throughput shall not exceed 750 tons per day and annual throughput shall not exceed 251,850 tpy. [District Rule 2201]

The number of transfer points serving the biomass screening and conveying operation shall not exceed three (3). [District Rule 2201]

PM_{10} emissions shall not exceed 0.0015 lb-PM_{10}/ton from the screen and 0.0025 lb/ton for each transfer point. [District Rule 2201]

S-360-37-0: BIOMASS RECLAIM SCREENING OPERATION (includes screen M-15)

Maximum daily biomass throughput shall not exceed 750 tons per day and annual throughput shall not exceed 251,850 tpy. [District Rule 2201]

The number of transfer points serving the biomass reclaim operation shall not exceed seven (7) (one feed hopper and 6 transfer points). [District Rule 2201]

PM_{10} emissions shall not exceed 0.0015 lb-PM_{10}/ton from the screen and 0.0025 lb/ton for the feed hopper and each transfer point. [District Rule 2201]

S-360-39-0: ASH LOADOUT TO TRUCK

Each permit unit includes two ash silos. The DEL is for each permit (two silos).

Maximum amount of ash loaded into trucks from any single train (2 ash silos) shall not exceed 100 tons per day. [District Rule 2201]

PM_{10} emissions from ash loading to truck shall not exceed 0.0046 lb-PM_{10}/ton. [District Rule 2201]

S-360-42-0: 550 BHP TIER 3 EMERGENCY IC ENGINE

Emissions from this IC engine shall not exceed any of the following limits: 2.49 g-NOx/bhp-hr, 0.87 g-CO/bhp-hr, or 0.13 g-VOC/bhp-hr. [District Rule 2201, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

Emissions from this IC engine shall not exceed 0.14 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

E. Compliance Assurance

1. Source Testing

Bubbling Fluidized Bed combustor S-360-7-0

Source testing of NOx, SOx, PM_{10} and CO will be required upon startup, and annually thereafter. The final control device (the biofilter) is enclosed and vented through a stack to atmosphere. The following NSR test conditions will be placed on the boiler permits:

Compliance with NOx, SOx, PM_{10} and CO emission sampling limits shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days of initial startup and at least once every 12 months thereafter. [District Rule 1081]

Source testing for the following parameters shall be conducted using the stated test methods: NOx - EPA Method 7 or ARB Method 100, NOx (lb/MMBtu) - EPA Method 19, CO - EPA Method 10 or ARB Method 100, stack gas oxygen - EPA Method 3 or ARB Method 100, SOx (lb/MMBtu) - ARB Method 100 or EPA Method 6 or 6C, PM10 - EPA Methods 201A & 202, Stack Gas Flow Rate - EPA Method 2, Moisture Content - EPA Method 4, Ammonia - BAAQMD ST-1B, & Fuel Heating Value - ASTM Method D2015-85 or E711. [District Rules 2201 and 1081] N

Official test results and field data from compliance testing shall be submitted within 60 days after collection. [District Rule 1081]

{109} Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and

a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081] N

The source test plan shall identify which basis (ppmv or lb/MMBtu) will be used to demonstrate compliance. [District Rule 2201] N

NOx and CO emissions during the source test shall be calculated as the arithmetic average of three 30-consecutive-minute test runs. [District Rule 2201] N

Compliance with biomass fuel contamination limits shall be demonstrated by sorting a District approved 25 ton representative sample of biomass fuel within 60 days of initial startup and at least once every 12 months thereafter. [District Rule 4102] N

Data collected during sorting of 25 ton sample of biomass fuel shall be in pounds of material per ton of biomass, by category as identified in fuel contamination limit condition, and official test results and field data shall be submitted within 30 days after collection. [District Rule 4102]

None of the other permit units require source testing for NSR purposes.

NESHAPs testing requirements for Mercury and Beryllium (40 CFR 61 Subparts C and E) are discussed in the NESHAPS rule compliance section. Beryllium testing requirements are discussed on pages 104-105 and Mercury testing requirements are discussed on pages 106-107.

1. Monitoring

Bubbling Fluidized Bed combustors S-360-7-0

The applicant is proposing the use of CEMs to monitor emissions from the BFB. The CEMs will be used to monitor NOx, CO, O_2, SOx and Opacity. Periodic RATA testing will be required and the CEMs will be installed and operated in compliance with 40CFR 60 requirements. The following conditions will be placed on each BFB permit:

Operator shall install, operate, and maintain in calibration, a system which continuously measures and records stack gas volumetric flow rates meeting the performance specifications of 40 CFR Part 52, Appendix E. [District Rule 1080 and 40 CFR 60 Subpart Db]

Operator shall install, operate, and maintain in calibration a system which continuously measures and records control system operating parameters; elapsed time of operation; and exhaust gas opacity, NOx, SOx, CO and O_2 concentrations. The CEMs shall meet the requirements of 40 CFR parts 60 and 75 and shall be capable of monitoring emissions during startups and shutdowns as well as during normal operating conditions. [District Rules 2201, 1080 and 40 CFR 60 Subpart Db] {1835} The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O_2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing. [District Rule 1081]

{1836} Results of continuous emissions monitoring shall be reduced according to the procedure established in 40 CFR, Part 51, Appendix P, paragraphs 5.0 through 5.3.3, or by other methods deemed equivalent by mutual agreement with the District, the ARB, and the EPA. [District Rule 1080]

{1837} Audits of continuous emission monitors shall be conducted quarterly, except during quarters in which relative accuracy and total accuracy testing is performed, in accordance with EPA guidelines. The District shall be notified prior to completion of the audits. Audit reports shall be submitted along with quarterly compliance reports to the District. [District Rule 1080]

{1838} The owner/operator shall perform a relative accuracy test audit (RATA) as specified by 40 CFR Part 60, Appendix F, 5.11, at least once every four calendar quarters. The permittee shall comply with the applicable requirements for quality assurance testing and maintenance of the continuous emission monitor equipment in accordance with the procedures and guidance specified in 40 CFR Part 60, Appendix F. [District Rule 1080]

{1839} The permittee shall submit a written report to the APCO for each calendar quarter, within 30 days of the end of the quarter, including: time intervals, data and magnitude of excess emissions, nature and cause of excess emissions (if known), corrective actions taken and preventive measures adopted; averaging period used for data reporting shall correspond to the averaging period for each respective emission standard; applicable time and date of each period during which the CEM was inoperative (except for zero and span checks) and the nature of system repairs and adjustments; and a negative declaration when no excess emissions occurred. [District Rule 1080]

NOx and PM10 emission data shall be obtained and provided, as required by NSPS 40CFR60.48b "Emissions monitoring for particulate and nitrogen oxides." CEM data shall be provided as required by 60.48b (f). [District Rule 4001]

This facility shall comply in full with the requirements of Rule 4001 New Source Performance Standards part 60 subpart A and subpart Db. [District Rule 4001]

Differential operating pressure shall be monitored and recorded on each day that the baghouse operates. Monitoring shall be conducted while the baghouse is operating. [District Rule 2201]

Any monitoring required for NESHAPS purposes is discussed in the NESHAPS compliance sections (40 CFR 61 Subsections C and E).

3. Recordkeeping

Bubbling Fluidized Bed combustor S-360-7-0

The following conditions will be placed on the BFB permit:

Permittee shall maintain, on a monthly basis, an operating log that includes: 1) The type and quantity of each fuel received, 2) The HHV of each fuel received, 3) Average mix ratio of biomass:biosolids incinerated in the combustor, 4) Actual combustor operating time, in hours, and 5) The average hourly heat input to the combustor. [District Rules 1070, 2201 and 4352]

Records shall be maintained and shall contain: the occurrence and duration of any start-up, shutdown or malfunction, performance testing, evaluations, calibrations, checks, adjustments, maintenance of any CEMs that have been installed pursuant to District Rule 1080, and emission measurements. [District Rule 1080, 7.3 and 40 CFR 60 Subpart Db]

Records of startup and shutdown times and startup and shutdown emissions shall be maintained. [District Rules 1070 and 2201]

Records of dust collector maintenance, inspections, and repair shall be maintained. The records shall include identification of the equipment, date of inspection, corrective action taken, and identification of the individual performing the inspection. [District Rule 2201]

All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 1070]

Any recordkeeping requirements for NESHAPS purposes is discussed in the NESHAPS compliance sections (40 CFR 61 Subsections C and E).

4. Reporting

40 CFR Part 60 Subpart Db, Section 60.49b paragraph (h)(2) requires that the owner submit quarterly excess emission reports for any calendar quarter during which there are excess emissions. It also requires semiannual reports stating that there have been no excess emissions during periods when there have been no excess emissions. Such reporting will be required and will satisfy the reporting requirements for Rule 2201. No additional reporting is required.

Permittee shall submit a CEMs written report for each calendar quarter to the District. The report is due on the 30th day following the end of the calendar quarter. [District Rule 2201, 1080, 8.0 and 40 CFR 60 Subpart Db]

Quarterly report shall include: time intervals, data and magnitude of excess emissions, nature and cause of excess (if known), corrective actions taken and preventive measures adopted; averaging period used for data reporting corresponding to the averaging period specified in the emission test period used to determine compliance with an emission standard; applicable time and date of each period during which the CEM was inoperative (except for zero and span checks) and the nature of system repairs and adjustments; and a negative declaration when no excess emissions occurred. [District Rule 2201, 1080 and 40 CFR 60 Subpart Db]

Any violation of emission standards, as indicated by the CEM, shall be reported by the operator to the APCO within 96 hours. Excess emissions shall be defined as any three-hour period during

which emissions of SOx or NOx as measured by CEM system exceeds the SOx and NOx maximum emission limits set forth for each the pollutants in this permit. [District Rule 1080, 9.0]

Operator shall notify the District no later than one hour after the detection of a breakdown of the CEM. The operator shall inform the District of the intent to shut down the CEM at least 24 hours prior to the event. [District Rule 1080 and 1100]

Any recordkeeping requirements for NESHAPS purposes is discussed in the NESHAPS compliance sections (40 CFR 61 Subsections C and E).

F. Ambient Air Quality Analysis

Section 4.14.1 of this Rule requires that an ambient air quality analysis (AAQA) be conducted for the purpose of determining whether a new or modified Stationary Source will cause or make worse a violation of an air quality standard. The Technical Services Division of the SJVAPCD conducted the required analysis. Refer to Appendix I of this document for the AAQA summary sheet.

The proposed location is in an attainment area for NO_X, CO, and SO_X. As shown by the AAQA summary sheet the proposed equipment will not cause a violation of an air quality standard for NO_X, CO, or SO_X.

The proposed location is in a non-attainment area for PM_{10}. The modeling results are shown below:

Criteria Pollutant Modeling Results*

Diesel ICE	1 Hour	3 Hours	8 Hours	24 Hours	Annual
CO	Pass	X	Pass	X	X
NO_x	Pass	X	X	X	Pass
SO_x	Pass	Pass	X	Pass	Pass
PM_{10}	X	X	X	X[2]	X[2]
$PM_{2.5}$	X	X	X	X	X

*Results were taken from the attached PSD spreadsheet.
[1]The project's Diesel IC Engines are considered as intermittent source as defined in APR-1920. In accordance with APR-1920, compliance with short-term (i.e., 1-hour, 3-hour, 8-hour and 24-hour) standards is not required. However, the boilers were evaluated.
[2]The PM_{10} was evaluated via AERMOD and explained in the following table. $PM_{2.5}$ was not evaluated since the project was deemed complete prior to 4/21/2011.

Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD.

PM_{10} Pollutant Modeling Results*
Values are in $\mu g/m^3$

Category	24 Hours	Annual
Proposed Project	8.2	1.9
Interim Significance Level	10.4[1]	2.08[1]
Result	Pass[2]	Pass[2]

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration and 2.08 for the Annual concentration for projects whose impacts are primarily from fugitive sources.
[2]The PM10 concentration is below the District's interim threshold for fugitive dust sources.

The emissions from the proposed equipment will not cause or contribute significantly to a violation of the State and National AAQS.

The ambient air quality impacts from PM_{10} emissions for the proposed project (does not) exceed the District's 24-hour or Annual interim threshold for fugitive dust sources.

This project is not expected to cause or make worse a violation of an ambient air quality standard.

G. Compliance Certification

Section 4.15.2 of this Rule requires the owner of a new Major Source or a source undergoing a Title I Modification to demonstrate to the satisfaction of the District that all other Major Sources owned by such person and operating in California are in compliance or are on a schedule for compliance with all applicable emission limitations and standards. As discussed in Sections VIII-Rule 2201-C.1.a and VIII-Rule 2201-C.1.b, this facility is a new NOx major source, therefore this requirement is applicable. Included in Appendix K is Liberties compliance certification.

Rule 2520 Federally Mandated Operating Permits

Since this facility's emissions exceed the major source NOx threshold of District Rule 2201, this facility is a major source. Pursuant to Rule 2520 Section 5.1, and as required by permit condition, the facility will have up to 12 months from the date of initial operation to either submit a Title V Application or comply with District Rule 2530 *Federally Enforceable Potential to Emit.*

Rule 4001 New Source Performance Standards (NSPS)

This rule incorporates NSPS from Part 60, Chapter 1, Title 40, Code of Federal Regulations (CFR); and applies to all new sources of air pollution and modifications of existing sources of air pollution listed in 40 CFR Part 60.

40 CFR 60 Subpart Db, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Applicability:

New Source Performance Standards, Code of Federal Regulations 40 part 60, Subpart Db apply to units with heat input capacity of greater than 100 MMBtu/hr. The three boilers S-360-7-0, '-8-0 and '-9-0 (each 211.52 MMBtu/hr) are subject to NSPS Db standards.

SOx Standards:

Section 60.43b lists requirements for SO_X emissions. The SO_X requirements are applicable for facilities that operate coal or oil fired steam generators. The applicant is proposing to operate the boilers on a combination of biomass and biosolids. Therefore SOx standards do not apply.

PM Standards:

Section 60.42b lists requirements for Particulate Matter (PM) emissions, which are applicable to these units fired on biomass and biosolids.

Section 60.43b(c) and 60.43b(h)(3) (Standard for PM) limits units combusting wood with other fuels, to no more than 0.10 lb-PM/MMBtu for facilities burning more than 30% wood.

The following NSR imposed PM10 emission limit ensures compliance:

PM10 emissions, except for periods of startup and shutdown as defined in this permit, shall not exceed 0.0020 lb/MMBtu and 0.425 lb/hr (including condensable particulate). [District Rule 2201]

Excess emissions for PM10 shall be defined as any three hour period during which the average emissions of PM10, as measured by the continuous monitoring system or by a performance test, exceeds an emission limit. [District Rule 2201and 40 CFR 60 Subpart Db]

Daily emissions shall not exceed any of the following limits: NOx (as NO2): 61.6 lb/day, SOx (as SO2): 34.3 lb/day, PM10: 10.2 lb/day (includes condensable particulate), CO: 78.7 lb/day, VOC: 2.1 lb/day, and NH3: 29.6 lb/day. [District Rule 2201]

Combined emissions (SLC) from boilers S-360-7-0, S-360-8-0 and S-360-9-0 shall not exceed: NOx (as NO2): 167.4 lb/day nor 49,746 lb/year, SOx (as SO2): 93.2 lb/day nor 27,545, PM10: 27.6 lb/day nor 10,074 lb/year, CO:213.9 lb/day nor 63,724 lb/year, VOC: 5.7 lb/day nor 1,768 lb/year, and NH3: 80.4 lb/day nor 23,845 lb/year. [District Rule 2201]

Section 60.43b (f) states the facility shall not cause to be discharged into the atmosphere greater than 20 percent opacity (6-minute average), except for one 6 minute period per hour of not more than 27 percent opacity. Section 60.43b (g) states that the PM and opacity standards apply at all times, except during periods of startup, shutdown, or malfunction.

The following visible emissions condition (District Rule 4101 more stringent than NSPS) ensures compliance:

{15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101 and 40CFR60 60.43b (f)]

NOx Standards:

Section 60.44b (d) states that no owner or operator of an affected facility that is subject to the provisions of this section and that simultaneously combusts natural gas with wood, municipal-type solid waste, or other solid fuel, except coal, shall cause to be discharged into the atmosphere NOx in excess of 0.30 lb/MMBtu. Each of the boilers meets the 0.30 lb/MMBtu requirement with a proposed emission rate of 0.0121 lb-NOx/MMBtu.

Oxides of Nitrogen emissions (as NO2), except for periods of startup and shutdown as defined in this permit, shall not exceed 8.6 ppmv @ 3% O2 and 2.57 lb/hr. [Rules 2201]

Excess emissions for NOx, SOx and CO for the continuous monitoring system shall be defined as any 24 hour period during which the average emissions of NOx, SOx or CO exceed any emission limit. [District Rule 2201 and 40 CFR 60 Subpart Db]

Daily emissions shall not exceed any of the following limits: ***NOx (as NO2): 61.6 lb/day,*** *SOx (as SO2): 34.3 lb/day, PM10: 10.2 lb/day (includes condensable particulate), CO: 78.7 lb/day, VOC: 2.1 lb/day, and NH3: 29.6 lb/day. [District Rule 2201]*

Section 60.46b (a) states the NOx emission standards in Section 60.44b shall apply at all times. Section 60.44b (i) states that, except provided under paragraph 60.44b (j), compliance with the emission limits in Section 60.44b (a) is determined on a 30-day rolling average.

PM and NOx Testing Methods and Procedures:

Section 60.46b (b) states that compliance with PM emission standards under 60.43b shall be determined through performance testing as described in paragraph (d) of this section, except as provided in paragraph (i) of this section.

Section 60.46b (c) states that compliance with the NOx limits in Section 60.44b shall be determined through performance testing under paragraph (e) or (f), or under paragraphs (g) and (h) of section 60.46b, as applicable.

Section 60.46b (d) states that , to determine compliance with PM emissions limits and opacity limits under 60.43b, the owner or operator of an affected facility shall conduct an initial performance test as required under 60.8, and subsequent tests using the methods identified in 60.46b(d) (1) through (7).

Section 60.46b (e) states that, to determine compliance with the emission limits for NOx required under Section 60.44b, the owner or operator of an affected facility shall conduct the performance test as required under Section 60.8 using the continuous emission monitoring system for monitoring NOx under 60.48b.

The following conditions will be placed on the BFB boiler permits to ensure compliance:

Operator shall install, operate, and maintain in calibration a system which continuously measures and records stack gas volumetric flow rates meeting the performance specifications of 40 CFR Part 52, Appendix E. [District Rule 1080 and 40 CFR 60 Subpart Db]

Operator shall install, operate, and maintain in calibration, a system which continuously measures and records control system operating parameters; elapsed time of operation; and exhaust gas opacity, NOx, SOx, CO and O2 concentrations. The CEMs shall meet the requirements of 40 CFR parts 60

and 75 and shall be capable of monitoring emissions during startups and shutdowns as well as during normal operating conditions. [District Rules 1080, 2201 and 40 CFR 60 Subpart Db]

{1835} The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing. [District Rule 1081]

The tests for SO2, NOx, CO, and PM10 shall be conducted on an annual basis and at the maximum operating capacity of the facility being tested. Upon written request from Liberty Energy, the District may approve the conducting of performance tests at a lower specified production rate. [District Rule 1081]

Compliance with NOx, SOx, PM10 and CO emission sampling limits shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days of initial startup and at least once every 12 months thereafter. [District Rule 1081]

Source testing for the following parameters shall be conducted using the stated test methods: NOx - EPA Method 7 or ARB Method 100, NOx (lb/MMBtu) - EPA Method 19, CO - EPA Method 10 or ARB Method 100, stack gas oxygen - EPA Method 3 or ARB Method 100, SOx (lb/MMBtu) - ARB Method 100 or EPA Method 6 or 6C, PM10 - EPA Methods 201A & 202, Stack Gas Flow Rate - EPA Method 2, Moisture Content - EPA Method 4, Ammonia - BAAQMD ST-1B, & Fuel Heating Value - ASTM Method D2015-85 or E711. [District Rules 2201 and 1081]

Official test results and field data from compliance testing shall be submitted within 60 days after collection. [District Rule 1081]

{109} Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]

The source test plan shall identify which basis (ppmv or lb/MMBtu) will be used to demonstrate compliance. [District Rule 2201]

NOx and CO emissions during the source test shall be calculated as the arithmetic average of three 30-consecutive-minute test runs. [District Rule 2201]

PM and NOx Emissions Monitoring:

Section 60.48b (a) states that the owner or operator of an affected facility subject to the opacity standard under 60.43b shall install, calibrate, maintain, and operate a continuous opacity monitoring system (COMS).

Section 60.48b (b) states that, except as provided under paragraphs (g), (h), and (i) of section 60.48b, the owner or operator of an affected facility subject to the NOx standard under Section 60.44b shall comply with either paragraphs (b)(1) or (b)(2) of Section 60.48b.

(b)(1) Install, calibrate, maintain, and operate a continuous monitoring system (CEMs), and record the output of the system, of measuring NOx emissions discharged to the atmosphere

The boiler permits will contain the following CEM related conditions:

Operator shall install, operate, and maintain in calibration a system which continuously measures and records stack gas volumetric flow rates meeting the performance specifications of 40 CFR Part 52, Appendix E. [District Rule 1080 and 40 CFR 60 Subpart Db]

Operator shall install, operate, and maintain in calibration, a system which continuously measures and records control system operating parameters; elapsed time of operation; and exhaust gas opacity, NOx, SOx, CO and O2 concentrations. The CEMs shall meet the requirements of 40 CFR parts 60 and 75 and shall be capable of monitoring emissions during startups and shutdowns as well as during normal operating conditions. [District Rules 1080, 2201 and 40 CFR 60 Subpart Db]

{1836} Results of continuous emissions monitoring shall be reduced according to the procedure established in 40 CFR, Part 51, Appendix P, paragraphs 5.0 through 5.3.3, or by other methods deemed equivalent by mutual agreement with the District, ARB, and EPA. [District Rule 1080]

{1837} Audits of continuous emission monitors shall be conducted quarterly, except during quarters in which relative accuracy and total accuracy testing is performed, in accordance with EPA guidelines. The District shall be notified prior to completion of the audits. Audit reports shall be submitted along with quarterly compliance reports to the District. [District Rule 1080]

{1838} The owner/operator shall perform a relative accuracy test audit (RATA) as specified by 40 CFR Part 60, Appendix F, 5.11, at least once every four calendar quarters. The permittee shall comply with the applicable requirements for quality assurance testing and maintenance of the continuous emission monitor equipment in accordance with the procedures and guidance specified in 40 CFR Part 60, Appendix F. [District Rule 1080]

{1839} The permittee shall submit a written report to the APCO for each calendar quarter, within 30 days of the end of the quarter, including: time intervals, data and magnitude of excess emissions, nature and cause of excess emissions (if known), corrective actions taken and preventive measures adopted; averaging period used for data reporting shall correspond to the averaging period for each respective emission standard; applicable time and date of each period during which the CEM was inoperative (except for zero and span checks) and the nature of system repairs and adjustments; and a negative declaration when no excess emissions occurred. [District Rule 1080]

Permittee shall comply with all applicable NSPS requirements, including monitoring, notification and reporting requirements as described in 40 CFR 60 Subparts A and Db. [District Rule 4001]

Recordkeeping and Reporting

Section 60.49b (a) (1) states that the owner or operator of an affected facility shall submit notification of the date of initial startup, as provided by Section 60.7 and shall include the design heat input capacity and identification of the fuels to be combusted.

Section 60.49b (g) requires that affected facilities subject to NOx requirements of 60.44b maintain records for each steam generator unit operating day (g) 1 through (g) 10.

Section 60.49 (h) requires submission of excess emission report (1) for facilities subject to the opacity standards of 60.44b(f) or other operating parameter monitoring requirements of 60.13(i)(1), (2) subject to NOx standard of 60.44b and (ii) has heat input rating < 250 MMBtu/hr and requires CEM. Excess emissions are defined for opacity (6 minutes exceeding standard in 60.43b (f)) and NOx (30 day rolling average) records be kept

The following condition will be added to the permit to assure compliance with this section:

Permittee shall comply with all applicable NSPS requirements, including monitoring, notification and reporting requirements as described in 40 CFR 60 Subparts A and Db. [District Rule 4001]

Records shall be maintained and shall contain: the occurrence and duration of any start-up, shutdown or malfunction, performance testing, evaluations, calibrations, checks, adjustments, maintenance of any CEMs that have been installed pursuant to District Rule 1080, and emission measurements. [District Rule 1080 and 40 CFR 60 Subpart Db]

Records of startup and shutdown times and startup and shutdown emissions shall be maintained. [District Rules 1070 and 2201]

Quarterly report shall include: time intervals, data and magnitude of excess emissions, nature and cause of excess (if known), corrective actions taken and preventive measures adopted; averaging period used for data reporting corresponding to the averaging period specified in the emission test period used to determine compliance with an emission standard; applicable time and date of each period during which the CEM was inoperative (except for zero and span checks) and the nature of system repairs and adjustments; and a negative declaration when no excess emissions occurred. [District Rules 2201, 1080 and 40 CFR 60 Subpart Db]

Conclusion:

Compliance with the requirements of this rule is expected.

40 CFR 60 Subpart CCCC, Standards of Performance for Commercial and Industrial Solid Waste Incineration Units (*CISWI*).

Note: A delay of effective date was published in the Federal Register (Volume 76, No 96, May 18, 2011 (28662)) which states *"The effective dates of the final rule published in the Federal Register on March 21, 2011 (76 FR 15608 and 76 FR 15704), are delayed until such time as judicial review is no longer pending or until the EPA completes its reconsideration of the rules, whichever is earlier.".*

To date, the EPA has not finalized a revised rule.

40 CFR 60 Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

The following table demonstrates how the proposed engines will comply with the requirements of 40 CFR Part 60 Subpart IIII.

40 CFR 60 Subpart IIII Requirements for New Emergency IC Engines Powering Generators (2007 and Later Model Year)	**Proposed Method of Compliance with 40 CFR 60 Subpart IIII Requirements**
Engines must meet the appropriate Subpart IIII emission standards for new engines, based on the model year, size, and number of liters per cylinder.	The applicant has proposed the use of engines that are certified to the latest EPA Tier Certification (Tier 3 engines) level for the applicable horsepower range, guaranteeing compliance with the emission standards of Subpart IIII.

Engines must be fired on 500 ppm sulfur content fuel or less, and fuel with a minimum centane index of 40 or a maximum aromatic content of 35 percent by volume. Starting in October 1, 2010, the maximum allowable sulfur fuel content will be lowered to 15 ppm.	The applicant has proposed the use of CARB certified diesel fuel, which meets all of the fuel requirements listed in Subpart IIII. A permit condition enforcing this requirement was included earlier in this evaluation.
The operator/owner must install a non-resettable hour meter prior to startup of the engines.	The applicant has proposed to install a non-resettable hour meter. **The following condition will be included on both emergency IC engine permits:** • *This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702, 17 CCR 93115, and 40 CFR 60 Subpart IIII]*
Emergency engines may be operated for the purpose of maintenance and testing up to 100 hours per year. There is no limit on emergency use.	The Air Toxic Control Measure for Stationary Compression Ignition Engines (Stationary ATCM) limits this engine maintenance and testing to 50 hours/year for the emergency generator and 100 hours per year for the firewater pump engine. Thus, compliance is expected.
The owner/operator must operate and maintain the engines and any installed control devices according to the manufacturers written instructions.	**The following condition will be included on the permit:** • *This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702 and 40 CFR 60 Subpart IIII]*

Rule 4002 National Emission Standards for Hazardous Air Pollutants (NESHAPS)

40 CFR 61 Subpart A, General Provision

40 CFR 61 Subpart C (61.30), National Emission Standard for Beryllium

§ 61.30 Applicability:

The provisions of this subpart are applicable to the following stationary sources:

(a) Extraction plants, ceramic plants, foundries, incinerators, and propellant plants which process beryllium ore, beryllium, beryllium oxide, beryllium alloys, or beryllium-containing waste.

The proposed incinerators (BFBs) burn biosolids – which are beryllium-containing waste, therefore this subpart applies.

§ 61.31 Definitions.

Terms used in this subpart are defined in the act, in subpart A of this part, or in this section as follows:

(a) Beryllium means the element beryllium. Where weights or concentrations are specified, such weights or concentrations apply to beryllium only, excluding the weight or concentration of any associated elements.

(g) Beryllium-containing waste means material contaminated with beryllium and/or beryllium compounds used or generated during any process or operation performed by a source subject to this subpart.

(h) Incinerator means any furnace used in the process of burning waste for the primary purpose of reducing the volume of the waste by removing combustible matter.

§ 61.32 Emission standard.

(a) Emissions to the atmosphere from stationary sources subject to the provisions of this subpart shall not exceed 10 grams (0.022 lb) of beryllium over a 24-hour period.

Applicant has proposed Beryllium emissions of 3.04E-06 lb/day per boiler based on a beryllium content ≤ 1.10E-06 lb/MMBtu (biomass) and 2.11E-06 lb/dry ton Biosolids.

The following condition will be placed on each BFB permit:

- *Beryllium content of biomass shall not exceed 1.10E-06 lb/MMBtu and beryllium content of biosolids shall not exceed 2.11E-06 lb/dry ton. Beryllium emissions from stack shall not exceed 1.27-07 lb/hr or 3.04E-06 lb/day. [District Rule 4102 and 40 CFR 61 Subpart C]*

Therefore compliance with the standard is expected.

§ 61.33 Stack sampling.

(a) Unless a waiver of emission testing is obtained under §61.13, each owner or operator required to comply with §61.32(a) shall test emissions from the source according to Method 104 of appendix B to this part. Method 103 of appendix B to this part is approved by the Administrator as an alternative method for sources subject to §61.32(a). The emission test shall be performed—

(1) Within 90 days of the effective date in the case of an existing source or a new source which has an initial startup date preceding the effective date; or

(2) Within 90 days of startup in the case of a new source which did not have an initial startup date preceding the effective date.

(b) The Administrator shall be notified at least 30 days prior to an emission test so that he may at his option observe the test.

(c) Samples shall be taken over such a period or periods as are necessary to accurately determine the maximum emissions which will occur in any 24-hour period. Where emissions depend upon the relative frequency of operation of different types of processes, operating hours, operating capacities, or other factors, the calculation of maximum 24-hour-period emissions will be based on that combination of factors which is likely to occur during the subject period and which result in the maximum emissions. No changes in the operation shall be made, which would

potentially increase emissions above that determined by the most recent source test, until a new emission level has been estimated by calculation and the results reported to the Administrator.

(d) All samples shall be analyzed and beryllium emissions shall be determined within 30 days after the source test. All determinations shall be reported to the Administrator by a registered letter dispatched before the close of the next business day following such determination.

(e) Records of emission test results and other data needed to determine total emissions shall be retained at the source and made available, for inspection by the Administrator, for a minimum of 2 years.

The following conditions will be placed on the ATC to ensure compliance with the testing and recordkeeping requirements of subsection C:

Compliance with Beryllium emission sampling limit shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days of startup. [District Rule 1081 and 40 CFR 61.33(a) (2)]

Unless a waiver of beryllium emissions testing is obtained under 40 CFR 61.13, permittee shall test emissions from the source according to method 104 of 40 CFR 61 appendix B. Method 103 of appendix B is approved as an alternate method. Samples shall be taken in accordance with requirements of 40 CFR 61.33(c) and (d). [40 CFR 61.33(a), (c) and (d)]

District shall be notified at least 30 days prior to beryllium emission testing so that they may at their option observe the test. Official test results and field data from compliance testing shall be submitted within 60 days after collection. [40 CFR 61.33(b) and District Rule 1081]

All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 1070]

40 CFR 61 Subpart E (61.50), **National Emission Standard for Mercury**

§ 61.50 Applicability.

The provisions of this subpart are applicable to those stationary sources which process mercury ore to recover mercury, use mercury chlor-alkali cells to produce chlorine gas and alkali metal hydroxide, and incinerate or dry wastewater treatment plant sludge.

§ 61.51 Definitions.

Terms used in this subpart are defined in the act, in subpart A of this part, or in this section as follows:

(a) *Mercury* means the element mercury, excluding any associated elements, and includes mercury in particulates, vapors, aerosols, and compounds.

.....

(l) *Sludge* means sludge produced by a treatment plant that processes municipal or industrial waste waters.

§ 61.52 Emission standard.

(a) Emissions to the atmosphere from mercury ore processing facilities and mercury cell chlor-alkali plants shall not exceed 2.3 kg (5.1 lb) of mercury per 24-hour period.

(b) Emissions to the atmosphere from sludge incineration plants, sludge drying plants, or a combination of these that process wastewater treatment plant sludges shall not exceed 3.2 kg (7.1 lb) of mercury per 24-hour period.

The applicant has proposed a maximum Mercury emissions rate of 2.30E-03 lb/hr, 5.52E-02 lb/day and 20.1 lb/year/boiler.

The following condition will be placed on each BFB permit:

- *Mercury emissions to the atmosphere from each BFB stack shall not exceed 2.30E-03 lb/hr or 5.52E-02 lb/day. [District Rule 4102 and 40 CFR 61 Subpart E]*

Therefore compliance with the standard is expected.

§ 61.53 Stack sampling.

(a) *Mercury ore processing facility. .....N/A*

(b) *Mercury chlor-alkali plant—hydrogen and end-box ventilation gas streams. N/A*

(c) *Mercury chlor-alkali plants—cell room ventilation system. N/A*

(d) *Sludge incineration and drying plants.* (1) Unless a waiver of emission testing is obtained under §61.13, each owner or operator of a source subject to the standard in §61.52(b) shall test emissions from that source. Such tests shall be conducted in accordance with the procedures set forth either in paragraph (d) of this section or in §61.54.

(2) Method 101A in appendix B to this part shall be used to test emissions as follows:

(i) The test shall be performed within 90 days of the effective date of these regulations in the case of an existing source or a new source which has an initial startup date preceding the effective date.

(ii) The test shall be performed within 90 days of startup in the case of a new source which did not have an initial startup date preceding the effective date.

(3) The Administrator shall be notified at least 30 days prior to an emission test, so that he may at his option observe the test.

(4) Samples shall be taken over such a period or periods as are necessary to determine accurately the maximum emissions which will occur in a 24-hour period. No changes shall be made in the operation which would potentially increase emissions above the level determined by the most recent stack test, until the new emission level has been estimated by calculation and the results reported to the Administrator.

(5) All samples shall be analyzed and mercury emissions shall be determined within 30 days after the stack test. Each determination shall be reported to the Administrator by a registered letter dispatched within 15 calendar days following the date such determination is completed.

(6) Records of emission test results and other data needed to determine total emissions shall be retained at the source and shall be made available, for inspection by the Administrator, for a minimum of 2 years.

The following conditions will be placed on each BFB ATC to ensure compliance with the testing and recordkeeping requirements of subsection C:

Compliance with Mercury emission sampling limit shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days of startup. [District Rule 1081 and 40 CFR 61.53(d) (2)]

Unless a waiver of Mercury emissions testing is obtained under 40 CFR 61.13, permittee shall test emissions from the source according to method 101A in Appendix B of 40 CFR 61. Samples shall be taken and analyzed in accordance with requirements of 40 CFR 61.53. [40 CFR 61.53]

District shall be notified at least 30 days prior to Mercury emission testing so that they may at their option observe the test. Official test results and field data from compliance testing shall be submitted within 45 days after collection. [40 CFR 61.53(d) (3) – (5) and District Rule 1081]

All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 1070]

§ 61.54 Sludge sampling.

(a) As an alternative means for demonstrating compliance with §61.52(b), an owner or operator may use Method 105 of appendix B and the procedures specified in this section.

The applicant has not proposed to use this alternate monitoring.

§ 61.55 Monitoring of emissions and operations.

(a) *Wastewater treatment plant sludge incineration and drying plants.* All the sources for which mercury emissions exceed 1.6 kg (3.5 lb) per 24-hour period, demonstrated either by stack sampling according to §61.53 or sludge sampling according to §61.54, shall monitor mercury emissions at intervals of at least once per year by use of Method 105 of appendix B or the procedures specified in §61.53 (d) (2) and (4). The results of monitoring shall be reported and retained according to §61.53(d) (5) and (6) or §61.54 (f) and (g).

The proposed emission are much less than 3.5 lb/day, therefore compliance with this section is expected.

Compliance with 40 CFR 61 Subpart E is expected.

40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Emissions (RICE)

Emergency engines are subject to this subpart if they are operated at a major or area source of Hazardous Air Pollutant (HAP) emissions. A major source of HAP emissions is a facility that has the potential to emit any single HAP at a rate of 10 tons/year or greater or any combinations of HAPs at a rate of 25 tons/year or greater. An area source of HAPs is a facility is not a major source of HAPs. The proposed engines are new stationary RICE located at an area source of HAP emissions; therefore, the engines are subject to this Subpart.

40 CFR 63 Subpart ZZZZ requires the following engines comply with 40 CFR 60 Subpart IIII:

1. New emergency engines located at area sources of HAPs

2. Emergency engines rated ≤ 500 bhp and located at major sources of HAPs

The proposed engines will be in compliance with 40 CFR 60 Subpart IIII (see IIII compliance discussion in previous pages).
Additionally, 40 CFR 63 Subpart ZZZZ requires engines rated greater 500 bhp and located at major sources of HAPs to meet the notification requirements of §63.6645(h); however, that section only applies if an initial performance test is required. Since an initial performance test is not required for emergency engines, the notification requirement is not applicable.

The proposed engines are expected to be in compliance with 40 CFR 63 Subpart ZZZZ.

Rule 4101 Visible Emissions

District Rule 4101, Section 5.0, indicates that no air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour, which is dark or darker than Ringlemann 1 or equivalent to 20% opacity.

Potential visible plume (typical for biomass-fired BFB boilers), S-360-7-0, 8-0 and 9-0

The use of the acid gas scrubber also lowers the concentration of HCL in the flue gas, ensuring no detached visible plume (often seen with biomass-fired BFBs). The small amount of chlorine in the flue gas of a typical biomass boiler is 5 to 10 ppmv and occurs in the form of HCL. Studies have suggested that if HCL can be removed to less than 4 ppmv, there will be no visible plume formation. The acid gas scrubber and biofilter included in this project proposal is expected to lower the HCL to less than 4 ppmv, thereby eliminating the formation of any visible plume.
Other equipment

None of the other equipment is expected to operate with visible emissions. The following condition will be placed on the ATCs issued with this project approval:

> *{15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]*

Compliance with District Rule 4101 is expected.

Rule 4102 Nuisance

Section 4.0 prohibits discharge of air contaminants which could cause injury, detriment, nuisance or annoyance to the public. Public nuisance conditions are not expected as a result of these operations provided the equipment is well maintained. Therefore, compliance with this rule is expected.

California Health & Safety Code 41700 (Health Risk Assessment)

District Policy APR 1905 – Risk Management Policy for Permitting New and Modified Sources specifies that for an increase in emissions associated with a proposed new source or modification, the District perform an analysis to determine the possible impact to the nearest resident or worksite.

An HRA is not required for a project with a total facility prioritization score of less than one. According to the Technical Services Memo for this project (Appendices I and J), the total facility prioritization score including this project was greater than one. Therefore, a health risk assessment was required to determine the short-term acute and long-term chronic exposure from this project.

The cancer risk for this project is shown below:

RMR Summary							
Categories	**Boiler Totals**	**Cooling Tower Totals**	**Ash Silos Totals**	**Biomass Totals**	**Diesel IC Engine Totals**	**Project Totals**	**Facility Totals[1]**
Prioritization Score	>1.0	0.6	0.0	>1.0	0.3	**>1.0**	**>1.0**
Acute Hazard Index	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Chronic Hazard Index	0.07	0.06	0.00	0.04	0.00	**0.2**	**0.4**
Maximum Individual Cancer Risk (10^{-6})	2.63	0.04	0.07	2.83	0.38	**5.95**	**9.87**

[1]Unit 1-4 has a cancer risk of 2.92E-6 and chronic index of 0.1960. Unit 3-1 passed on prioritization. Unit 5-0 has a cancer risk of 1.0E-6. The decrease in throughput proposed for Unit 1-5 from 735,000 TPY to 733,866 TPY is a reduction of 0.15% and will not significantly alter the prior health values (2.915E-6, 0.1957).

Proposed Conditions:

1. {1407} All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]

2. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]

3. Storage silo shall vent only through carbon filter to atmosphere and/or bubbling fluidized bed (BFB) combustor. [District Rules 2201 and 4102]

RMR Boilers				
Categories	**Biomass/ Biosolids Boiler (Unit 7-0)**	**Biomass/ Biosolids Boiler (Unit 8-0)**	**Biomass/ Biosolids Boiler (Unit 9-0)**	**Boiler Totals**
Prioritization Score	8.7	8.7	8.7	>1.0
Acute Hazard Index	0.0	0.0	0.0	0.0
Chronic Hazard Index	0.02	0.02	0.03	0.07
Maximum Individual Cancer Risk (10^{-6})	0.65	0.76	1.22	2.63
T-BACT Required?	**No**	**No**	**Yes**	
Special Permit Conditions?	**Yes**	**Yes**	**Yes**	

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 7-0, 8-0, 9-0

1. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

T-BACT is required for unit 9-0 because of emissions of Toxic Air Contaminants and a cancer risk value greater than 1.0 in a million. In accordance with District policy, BACT for this unit will be considered to be T-BACT.

RMR Cooling Towers				
Categories	**Cooling Tower (Unit 10-0)**	**Cooling Tower (Unit 16-0)**	**Cooling Tower (Unit 22-0)**	**Cooling Tower Totals**
Prioritization Score	0.2	0.2	0.2	0.6
Acute Hazard Index	0.0	0.0	0.0	0.0
Chronic Hazard Index	0.02	0.02	0.02	0.06
Maximum Individual Cancer Risk (10^{-6})	0.012	0.012	0.012	0.04
T-BACT Required?	**No**	**No**	**No**	
Special Permit Conditions?	**Yes**	**Yes**	**Yes**	

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 10-0, 16-0, 22-0

1. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

RMR Ash Silos				
Categories	**Ash Silos (Unit 15-0)**	**Ash Silos (Unit 21-0)**	**Ash Silos (Unit 27-0)**	**Ash Silos Totals**
Prioritization Score	0.0	0.0	0.0	0.0
Acute Hazard Index	0.0	0.0	0.0	0.0
Chronic Hazard Index	0.00	0.00	0.00	0.00
Maximum Individual Cancer Risk (10^{-6})	0.026	0.026	0.026	0.07
T-BACT Required?	**No**	**No**	**No**	
Special Permit Conditions?	**Yes**	**Yes**	**Yes**	

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 15-0, 21-0, 27-0

1. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

Units # 39-0, 40-0, 41-0

1. *{98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]*
2. *Ash loadout to truck shall be performed using a two sided enclosure and retractable coaxial spouts vented to the ash silo dust collector. [District Rules 2201 and 4102]*
3. *Ash silo dust collector fan shall be operating during ash truck loading. [District Rules 2201 and 4102]*
4. *Ash loadout shall be performed such that particulate matter (PM10) emissions are controlled by 99%. [District Rules 2201 and 4102] N*

RMR Biomass Operations					
Categories	**Biomass Storage Yard (Unit 34-0)**	**Biomass Shredding Operation (Unit 35-0)**	**Biomass Screening Operation (Unit 36-0)**	**Biomass Reclaim Operation (Unit 37-0)**	**Biomass Processing Totals**
Prioritization Score	0.4	0.6	0.3	0.3	>1.0[1]
Acute Hazard Index	0.0	0.0	0.0	0.0	0.0
Chronic Hazard Index	0.03	0.01	0.00	0.00	0.04
Maximum Individual Cancer Risk (10^{-6})	2.03	0.4	0.2	0.2	2.83
T-BACT Required?	**Yes**	**No**	**No**	**No**	
Special Permit Conditions?	**No**	**Yes**	**Yes**	**Yes**	

[1]Units 35, 36, and 37 emissions are contained within a building. Building emissions are directed outside via 4 process vents. Process vents 1 and 2 are attributed to unit 35, process vent 3 to unit 36, and process vent 4 to unit 37.

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 35-0, 36-0, 37-0

1. *{98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]*

2. *Operation of this unit shall be conducted in the biomass processing building with at least 80% PM10 control by venting building to the boiler. [District Rules 2201 and 4102]*

T-BACT is required for unit 34-0 because of emissions of Toxic Air Contaminants that are PM10 and a cancer risk value greater than 1.0 in a million. In accordance with District policy, BACT for this unit will be considered to be T-BACT.

RMR Diesel IC Engines			
Categories	**Diesel IC Engine Fire Pump (Unit 33-0)**	**Diesel IC Engine Elec Generator (Unit 42-0)**	**Diesel IC Engine Totals**
Prioritization Score	0.1	0.2	0.3
Acute Hazard Index	0.0	0.0	0.0
Chronic Hazard Index	0.00	0.00	0.00
Maximum Individual Cancer Risk (10^{-6})	0.28	0.1	0.38
T-BACT Required?	**No**	**No**	
Special Permit Conditions?	**Yes**	**Yes**	

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Unit # 33-0

1. The PM10 emissions rate shall not exceed **0.111** g/bhp-hr based on US EPA certification using ISO 8178 test procedure. [District Rules 2201]

2. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

3. This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 100 hours per calendar year. [District Rule 4702 and 17 CCR 93115]

Unit # 42-0

1. The PM10 emissions rate shall not exceed **0.14** g/bhp-hr based on US EPA certification using ISO 8178 test procedure. [District Rules 2201]

2. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

3. This engine shall be operated only for testing and maintenance of the engine,

4. required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed **50** hours per calendar year. [District Rule 4702 and 17 CCR 93115]

District policy APR 1905 also specifies that the increase in emissions associated with a proposed new source or modification not have acute or chronic indices, or a cancer risk greater than the District's significance levels (i.e. acute and/or chronic indices greater than 1 and a cancer risk greater than 10 in a million). As outlined by the HRA Summary in Appendix J of this report, the emissions increases for this project was determined to be less than significant.

Rule 4201 Particulate Matter Concentration

Section 3.1 prohibits discharge of dust, fumes, or total particulate matter into the atmosphere from any single source operation in excess of 0.1 grain per dry standard cubic foot.

S-360-7-0 (BFB)

PM_{10} emissions from the BFB were calculated using a baghouse outlet grain loading of 0.0023 grains/dscf (see the emission calculations section). This is less than the 0.1 grain/dscf allowed by the rule, therefore compliance with Rule 4201 is expected.

The following condition, already being placed on the boiler ATCs for New Source Review Rule 2201 compliance, insures emissions less than 0.1 grain/dscf:

PM10 emissions, except for periods of startup and shutdown as defined in this permit, shall not exceed 0.0020 lb/MMBtu and 0.425 lb/hr (including condensable particulate). [District Rule 2201]

Compliance with Rule 4201 is expected for the BFB boilers.

S-360-33-0 (Emergency IC Engine)

$$0.0051 \quad \frac{g}{hp \cdot hr} \times \frac{1\,hp \cdot hr}{2{,}542.5\,Btu} \times \frac{10^6\,Btu}{9{,}051\,dscf} \times \frac{0.35\,Btu_{out}}{1\,Btu_{in}} \times \frac{15.43\,grain}{g} = \quad 0.0012 \quad \frac{grain}{dscf}$$

Since 0.093 grain/dscf is less than 0.1 grain/dscf, compliance with this rule is expected.

S-360-33-0 (Emergency IC Engine)

$$0.0051 \quad \frac{g}{hp \cdot hr} \times \frac{1\,hp \cdot hr}{2{,}542.5\,Btu} \times \frac{10^6\,Btu}{9{,}051\,dscf} \times \frac{0.35\,Btu_{out}}{1\,Btu_{in}} \times \frac{15.43\,grain}{g} = \quad 0.0012 \quad \frac{grain}{dscf}$$

0.0012 grain/dscf is < 0.1 grain/dscf for both engines, therefore compliance is expected.

Silos using bag houses/bin vent filters

All of the emissions calculations for the bag houses serving equipment were performed using a grain loading of 0.005 grain/dscf, which is < 0.1 grain/dscf. Therefore compliance is expected for all of the bag houses serving equipment in this project.

The engine and silo permits will contain the following condition:

{14} Particulate matter emissions shall not exceed 0.1 grains/dscf in concentration. [District Rule 4201]

Compliance with District Rule 4201 is expected.

Rule 4202 Particulate Matter Emission Rate

Per section 4.1, particulate matter (PM) emissions from any source operation shall not exceed the allowable hourly emission rate (E) as calculated using the following applicable formulas:

Formula #1: $E = 3.59\ P^{0.62}$ (when, P = process weight rate ≤ 30 tons/hr)
Formula #2: $E = 17.31\ P^{0.16}$ (when, P = process weight rate > 30 tons/hr)

Even if the daily emissions for each emissions unit were to be emitted in one hour, the units would all be in compliance with this rule (see table below).

Rule 4202 compliance							
Permit #	Operation	Tons/hr	Applicable formula		**Proposed** (lb/day)	**Allowed** by Rule (lb/hr)	Complies with rule?
			#1	#2			
11-0	Hydrated lime silo	31		x	0.1	30.0	yes
12-0	Sand storage silo	60		x	0.1	33.3	yes
13-0	Limestone storage silo	80		x	0.3	34.9	yes
14-0	Carbon storage silo	5	x		0.1	9.7	yes
15-0	Ash storage silo	4.2	x		1.0	8.7	yes
34-0	*Biomass rec/storage*	*32*		*x*	*1.9*	*30.1*	*yes*
35-0	Grinder	32		x	6.1	30.1	yes
36-0	Screen	32		x	7.9	30.1	yes
37-0	Screen	32		x	15.4	30.1	yes
39-0	Ash loadout	4.2	x		0.5	8.7	yes

The proposed emissions are less than that allowed by the rule for each emissions unit; therefore compliance with this rule is expected.

District Rule 4301 Fuel Burning Equipment

This rule specifies maximum emission rates in lb/hr for SO_2, NO_2, and combustion contaminants (defined as total PM in Rule 1020). This rule also limits combustion contaminants to ≤ 0.1 gr/scf.

S-360-7-0, 8-0 and 9-0 (BFB Boilers)

The proposed BFB boilers are subject to this rule.

District Rule 4301 Limits			
Pollutant	**NO_2**	**Total PM**	**SO_2**
BFB Boiler S-360-7-0	2.6	0.4	1.4
Rule Limit (lb/hr)	140	10	200

The above table indicates compliance with the maximum lb/hr emissions in this rule; therefore, continued compliance is expected.

Rule 4305 Boilers, Steam Generators and Process Heaters – Phase II

The proposed solid fuel boilers are **exempt** per 4305 section 4.1.1

Rule 4306 Boilers, Steam Generators & Process Heaters – Phase III

The proposed solid fueled boilers are **exempt** per 4306.4.1.1

Rule 4320 Advanced Emissions Reduction Options for Boilers, Steam Generators, and Process Heaters > 5.0 MMBtu/hr

The proposed solid fueled boilers are **exempt** per 4320.4.1.1

Rule 4351 Boilers, Steam Generators & Process Heaters — Phase I

The proposed solid fueled boilers are **exempt** per 4351.4.1.2

Rule 4352 Solid Fuel Fired Boilers, Steam Generators & Process Heaters

Requirements (section 5.0)

NOx limit = 115 ppmv@ 3% O2 and CO limit of 400 ppmv @ 3% O2 based on a block 24-hour average except for startup (96 hours) and shutdown (12 hours) periods.

Rule 4352 Emission limits		
	Rule 4352 limit at 3% O_2	Proposed at 3% O_2
NOx	115 ppmv	8.6 ppmv
CO	400 ppmv	17.3 ppmv

As discussed under Rule 2201, the DEL conditions ensure compliance with proposed emission limits – which are in compliance with Rule 4352 as shown in the above table.

Startup and shutdown provisions (section 5.3)

The rule states that the emission limits of 5.0 do not apply during periods of startup or shutdown. Shutdowns shall not exceed 12 hours and start-up shall not exceed 96 hours (up to 192 hours during refractory cure).

The following conditions have been placed on the permit:

Natural gas shall only be used as fuel during startup and shutdown, and shall not exceed 2,880,000 std. cu. ft. per day or 38,000,000 scf per year. [District Rule 2201]

"Startup" is the period of time during which the boiler is heated to operating temperature at steady state load from a lower temperature, not to exceed 96 hours (up to 192 hours during refractory cure). [District Rules 2201 and 4352]

"Shutdown" is the period of time during which the boiler is allowed to cool from its operating temperature at steady state load to a lower temperature, not to exceed 12 hours. [District Rules 2201 and 4352]

"Steady state" load is defined as the operational conditions that generate electrical power at + or - one (1) Megawatt from the target load established and documented by control room log book. [District Rule 2201]

During periods of startup/shutdown emissions shall be minimized to the extent possible using good combustion practices. [District Rule 2201]

Monitoring (section 5.5)

Rule 4352 requires CEMs for monitoring NOx concentrations and emission rates, as well as O2. The applicant has proposed the use of CEMs for NOx and O2, therefore compliance with the monitoring requirements is expected. The following CEM related conditions are being placed on BFB permits S-360-7-0, 8-0 and 9-0.

Continuous monitoring system for flue gas volume flow-rate shall meet E.P.A. monitoring performance specifications in 40 CFR Part 52 appendix E. [40 CFR 60 Subpart Db]

Operator shall install, operate, and maintain in calibration, a system which continuously measures and records control system operating parameters; elapsed time of operation; and exhaust gas opacity, NOx, SOx, CO and O2 concentrations. The CEMs shall meet the requirements of 40 CFR parts 60 and 75 and shall be capable of monitoring emissions during startups and shutdowns as well as during normal operating conditions. [District Rules 1080, 4352 and 40 CFR 60 Subpart Db] N

{1838} The owner/operator shall perform a relative accuracy test audit (RATA) as specified by 40 CFR Part 60, Appendix F, 5.11, at least once every four calendar quarters. The permittee shall comply with the applicable requirements for quality assurance testing and maintenance of the continuous emission monitor equipment in accordance with the procedures and guidance specified in 40 CFR Part 60, Appendix F. [District Rules 1080]

Recordkeeping (section 6.2)

Rule 4352 requires the operator maintain, on a monthly basis, an operating log for each unit that includes:

Type and quantity of fuel used.

The higher heating value of each fuel as determined by section 6.4 (test methods), or as certified by a third party fuel supplier.

Records are required to be kept for a period of five years.

The boiler permits will contain the following recordkeeping conditions:

Permittee shall maintain, on a monthly basis, an operating log that includes: 1) The type and quantity of each fuel received, 2) The HHV of each fuel received, 3) Average mix ratio of biomass:biosolids incinerated in the combustor, 4) Actual combustor operating time, in hours, and 5) The average hourly heat input to the combustor. [District Rules 1070, 2201 and 4352]

Solid fuel HHV of shall be determined by ASTM Method D 2015 or ASTM Method E 711. [District Rule 4352]

All records shall be maintained and retained on-site for a period of at least 5 years and shall be made available for District inspection upon request. [District Rule 1070]

Compliance with this rule is expected.

Rule 4701 Internal Combustion Engines – Phase 1

The purpose of this rule is to limit the emissions of nitrogen oxides (NOx), carbon monoxide (CO), and volatile organic compounds (VOC) from internal combustion engines. Except as provided in Section 4.0, the provisions of this rule apply to any internal combustion engine, rated greater than 50 bhp, that requires a PTO.

The proposed engines are also subject to District Rule 4702, Internal Combustion Engines. Since emissions limits of District Rule 4702 and all other requirements are equivalent or more stringent than District Rule 4701 requirements, compliance with District Rule 4702 requirements will satisfy requirements of District Rule 4701.

Rule 4702 Internal Combustion Engines

The following tables demonstrate how the proposed engines will comply with the requirements of District Rule 4702. The conditions are different for the two engines as one engine is a firewater pump and the other is used for emergency power generation.

Engine S-360-33-0 (Firewater pump)

District Rule 4702 Requirements Emergency Standby IC Engines	Proposed Method of Compliance with District Rule 4702 Requirements
Operation of emergency standby engines is limited to 100 hours or less per calendar year for non-emergency purposes, verified through the use of a non-resettable elapsed operating time meter.	• *{3816} This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. For testing purposes, the engine shall only be operated the number of hours necessary to comply with the testing requirements of the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems", 1998 edition. Total hours of operation for all maintenance, testing, and required regulatory purposes shall not exceed 100 hours per calendar year. [District Rule 4702 and 17 CCR 93115]* • *{3404} This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative.[District Rule 4702]*
Emergency standby engines cannot be used to reduce the demand for electrical power when normal electrical power line service has not failed, or to produce power for the electrical distribution system, or in conjunction with a voluntary utility demand reduction program or interruptible power contract.	• *{3807} An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702]*
The owner/operator must operate and maintain the engine(s) and any installed control devices according to the manufacturers written instructions.	A permit condition enforcing this requirement was shown earlier in the evaluation.
Records of the total hours of operation of the emergency standby engine, type of fuel used, purpose for operating the engine, all hours of non-emergency and emergency operation, and support documentation must be maintained. All records shall be retained for a period of at least five years, shall be readily available, and be made available to the APCO upon request.	• *{3475} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702 and 17 CCR 93115]* • *{3489} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, and the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.). For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115]*

Engine S-360-42-0 (Emergency Power Generation)

The following table demonstrates how the proposed engines will comply with the requirements of District Rule 4702.

District Rule 4702 Requirements Emergency Standby IC Engines	Proposed Method of Compliance with District Rule 4702 Requirements
Operation of emergency standby engines is limited to 50 hours or less per calendar year for non-emergency purposes, verified through the use of a non-resettable elapsed operating time meter.	Engine S-360-42-0 (Emergency IC Engine w Generator) • *{4257} This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702, 17 CCR 93115, and 40 CFR 60 Subpart IIII]* • {4262} This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 50 hours per calendar year. [District Rule 4702, 17 CCR 93115 and 40 CFR Part 60 Subpart IIII]
Emergency standby engines cannot be used to reduce the demand for electrical power when normal electrical power line service has not failed, or to produce power for the electrical distribution system, or in conjunction with a voluntary utility demand reduction program or interruptible power contract.	• *{3807} An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702]* • *{3808} This engine shall not be used to produce power for the electrical distribution system, as part of a voluntary utility demand reduction program, or for an interruptible power contract. [District Rule 4702]*
The owner/operator must operate and maintain the engine(s) and any installed control devices according to the manufacturers written instructions.	{4261} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702 & 40 CFR 60 Subpart IIII].
The owner/operator must monitor the operational characteristics of each engine as recommended by the engine manufacturer or emission control system supplier.	• *{3478} During periods of operation for maintenance, testing, and required regulatory purposes, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]*
Records of the total hours of operation of the emergency standby engine, type of fuel used, purpose for operating the engine, all hours of non-emergency and emergency operation, and support documentation must be maintained. All records shall be retained for a period of at least five years, shall be readily available, and be made available to the APCO upon request.	The following conditions will be included on the IC engine permits: • *{3496} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated*

	testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115] • *{4263} The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115]* • *{3475} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702 and 17 CCR 93115]*

Compliance with Rule 4702 is expected.

Rule 4801 Sulfur Compounds

Rule 4801 requires that sulfur compound emissions (as SO_2) shall not exceed 0.2% by volume. Using the ideal gas equation, the sulfur compound emissions are calculated for the engines (S-360-33-0 and 42-0) as follows:

Volume SO_2 = (n x R x T) ÷ P
n = moles SO_2
T (standard temperature) = 60 °F or 520 °R

R (universal gas constant) = $\frac{10.73\,\text{psi}\cdot\text{ft}^3}{\text{lb}\cdot\text{mol}\cdot{}^\circ\text{R}}$

$$\frac{0.000015\ lb-S}{lb-fuel}\times\frac{7.1\ \text{lb}}{\text{gal}}\times\frac{64\ \text{lb}-SO_2}{32\ \text{lb}-S}\times\frac{1\ \text{MMBtu}}{9{,}051\ \text{scf}}\times\frac{1\ \text{gal}}{0.137\ \text{MMBtu}}\times\frac{\text{lb}-\text{mol}}{64\ \text{lb}-SO_2}\times\frac{10.73\ \text{psi}-\text{ft}^3}{\text{lb}-\text{mol}-{}^\circ\text{R}}\times\frac{520{}^\circ\text{R}}{14.7\ \text{psi}}\times 1{,}000{,}000 = 1.0\ \text{ppmv}$$

Since 1.0 ppmv is ≤ 2,000 ppmv, this engine is expected to comply with Rule 4801. Therefore, the following condition will be listed on the IC engine ATCs to ensure compliance:

- Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

Rule 7012 Hexavalent Chromium – Cooling Tower

Rule 7012 requires cooling towers to limit emissions of hexavalent chromium.

4.0 Exemptions

According to exemption 4.1.2, If a cooling tower circulating water has never had hexavalent chromium containing compounds added, then the cooling tower is exempt from the provisions of the rule.

The following condition will be placed on the cooling tower permits to ensure compliance with the rule:

No hexavalent chromium containing compounds shall be added to cooling tower circulating water. [District Rules 4102 and 7012]

Compliance is expected

California Health & Safety Code 42301.6 (School Notice)

The District has verified that this site is not located within 1,000 feet of a school. Therefore, pursuant to California Health and Safety Code 42301.6, a school notice is not required.

California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) requires each public agency to adopt objectives, criteria, and specific procedures consistent with CEQA Statutes and the CEQA Guidelines for administering its responsibilities under CEQA, including the orderly evaluation of projects and preparation of environmental documents. The San Joaquin Valley Unified Air Pollution Control District (District) adopted its Environmental Review Guidelines (ERG) in 2001. The basic purposes of CEQA are to:

- Inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities.
- Identify the ways that environmental damage can be avoided or significantly reduced.
- Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.
- Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

The County of Kern (County) is the public agency having principal responsibility for approving the Project. As such, the County served as the Lead Agency for the project. On December 14, 2010, the County certified the Environmental Impact Report (EIR), finding that greenhouse gases impacts and cumulative impacts on biological resources would be significant and unavoidable. The County approved the project and adopted a Statement of Overriding Consideration (SOC).

The District is a Responsible Agency for the project because of its discretionary approval power over the project via its Permits Rule (Rule 2010) and New Source Review Rule (Rule 2201), (CEQA Guidelines §15381). As a Responsible Agency the District complies with CEQA by considering the EIR prepared by the Lead Agency, and by reaching its own conclusion on whether and how to approve the project involved (CEQA Guidelines §15096). The District has considered the Final EIR certified by the County.

The District's engineering evaluation of the project (this document) demonstrates that the District would impose permit conditions requiring the applicant to meet BACT and the District would impose permit conditions requiring the applicant to surrender emission reduction credits (ERC). Thus, the District concludes that through a combination of project design elements and permit conditions, project specific stationary source emissions will be reduced and mitigated to less than significant levels.

The County concluded that there would be significant and unavoidable impacts on greenhouse gases emissions and biological resources. The District finds that the impacts on greenhouse gases are within the jurisdiction of the Lead Agency and those impacts on biological resources are within the jurisdiction of the California Department of Fish and Game and U.S. Fish and Wildlife Service. The District has no statutory authority over those emissions and resources and cannot impose additional mitigation measures.

As a Responsible Agency the District is required to issue findings for significant air quality impacts detailed in the Lead Agency's EIR and adopt an SOC. The District has required all feasible mitigation measures to lessen stationary source emissions impacts to air quality from this project. As a single purpose agency, the District lacks the Lead Agency's broader scope of authority over the project and does not believe that it should overrule the decisions made by the Lead Agency. Accordingly, after considering the Lead Agency's EIR, the SOC, and the substantial evidence the Lead Agency relied on in adopting the SOC, the District finds that it had no basis on which to disagree with the SOC and evidence relied on therein. The District therefore adopts the Lead Agency's SOC by reference as its own.

IX. Recommendation

Compliance with all applicable rules and regulations is expected. Pending a successful NSR Public Noticing period, issue the Authorities to Construct included in this project proposal subject to the permit conditions on the attached draft Authorities to Construct in **Appendix Q**.

X. Billing Information

Annual Permit Fees				
Permit Number	**Fee Schedule**	**Fee Range**	**Fee Description**	**Annual Fee**
S-360-7-0	3020-08A-D	Elec Gen < 35 MW	5.888 MW Power Generation	$ 3,062
S-360-10-0 thru 15-0, 28-0 &-29-0	999-99	No fee	Electrical Generation Component	$ 0
S-360-33-0	3020-10-B	100-200 BHP	174 BHP Emergency IC Engine	$ 117
S-360-34-0 through S-360-39-0	999-99	No fee	Electrical Generation Component	$ 0
S-360-42-0	3020-10-D	400-800 BHP	550 BHP Emergency IC Engine	$ 479

Appendices

A: Pre-Project PTO(s)
B: Engine specifications, 174 bhp Emergency IC engine S-360-33-0
C: Engine specifications, 550 bhp Emergency IC engine S-360-42-0
D: Biofilter technology for NOx control
E: Cost effectiveness of NOx emissions control using a biofilter
F: SCR specifications
G: QNEC calculations
H: Air Quality Impact Analysis (AQIA)
I: Risk Management Review (RMR) Summary
J: Applicable SJVAPCD Best Available Control Technology (BACT) Guidelines
K: Top-Down BACT Analysis for the Emergency IC Engines
L: Top-Down BACT Analysis for all other emissions units
M: Top-Down BACT Analysis – BFB's < 10 MW output (New BACT Guideline)
N: Draft Authorities to Construct (ATC)

Appendix A

Pre-Project PTO

San Joaquin Valley
Air Pollution Control District

PERMIT UNIT: S-360-1-4 **EXPIRATION DATE:** 10/31/2015

SECTION: NE04 **TOWNSHIP:** 26S **RANGE:** 20E

EQUIPMENT DESCRIPTION:
MUNICIPAL SEWAGE AND BIOMASS COMPOSTING OPERATION INCLUDING UP TO 300 1/3 HP BLOWERS FOR STATIC PILE AERATION

PERMIT UNIT REQUIREMENTS

1. No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. Total weight of municipal sewage sludge and biomass received shall not exceed 7,200 tons/day. [District Rule 2201]
3. Total weight of compost shipped shall not exceed 3,600 tons/day. [District Rule 2201]
4. Only pretreated municipal sewage sludge, agricultural-generated biomass, tree pruning, animal by-products, food waste, food processing residual, and grass clippings shall be received at the facility. [District Rule 2201]
5. Only fresh water or water recycled from use on-site shall be applied to roads, materials received, compost windrows/piles, and materials loaded out. [District Rule 2201]
6. Cadmium concentration in sludge shall not exceed 171 mg/Kg. [District Rule 2201]
7. Hexavalent chromium concentration in sludge shall not exceed 30 mg/Kg. [District Rule 2201]
8. Air contaminant emissions from the facility shall not exceed the following limits: PM10: 9.4 lb/day; Cadmium: 0.026 lb/day; and Hexavalent Chromium: 0.0045 lb/day. [District Rule 2201]
9. The sludge from each generator shall be tested for cadmium concentrations semi-annually. [District Rule 4102]
10. The sludge from each generator shall be tested for hexavalent chromium concentrations annually and every time the source of the sludge is changed. [District Rule 4102]
11. Source testing to measure cadmium and chromium concentrations in a sludge shall be conducted using EPA Method SW-846. [District Rule 1081]
12. Facility shall keep accurate records of the names of generators supplying sludge, tons of material received and shipped out per day and cadmium and hexavalent chromium test results for a period of 5 years, and shall make such records available for District inspection upon request. [District Rule 1070]

Appendix B

Emergency IC Engine S-360-33-0 Specifications

Fire Power

EPA Tier 3 Emission Data
Fire Pump NSPS Compliant

CFP7E-F10 Fire Pump Driver

Type: 4 Cycle; In-Line; 6 Cylinder
Aspiration: Turbocharged, Charge Air Cooled

15 PPM Diesel Fuel

		Fuel Consumption		D2 Cycle Exhaust Emissions										Exhaust			
				Grams per BHP - HR					Grams per kW - HR					Temperature		Gas Flow	
RPM	BHP	Gal/Hr	L/hr	NMHC	NOx	NMHC+NOx	CO	PM	NMHC	NOx	NMHC+NOx	CO	PM	°F	°C	CFM	L/sec
1470	153	7.9	29.9											906	486	937	442
1760	175	9.0	34.1											821	438	1061	501
1900	162	9.2	34.8											781	416	1079	509
2100	171	9.0	34.1	0.082	2.475	2.537	1.193	0.111	0.083	3.319	3.402	1.600	0.149	795	424	1255	592
2350	172	9.2	34.8											805	429	1375	649
2600	174	9.8	37.1											866	474	1513	714
2700	127	7.2	27.3											877	469	1392	657

The emissions values above are based on CARB approved calculations for converting EPA (500 ppm) fuel to CARB (15 ppm) fuel.

300-4000 PPM Diesel Fuel

		Fuel Consumption		D2 Cycle Exhaust Emissions										Exhaust			
				Grams per BHP - HR					Grams per kW - HR					Temperature		Gas Flow	
RPM	BHP	Gal/Hr	L/hr	NMHC	NOx	NMHC+NOx	CO	PM	NMHC	NOx	NMHC+NOx	CO	PM	°F	°C	CFM	L/sec
1470	153	7.9	29.9											906	486	937	442
1760	175	9.0	34.1											821	438	1061	501
1900	162	9.2	34.8											781	416	1079	509
2100	171	9.0	34.1	0.075	2.686	2.758	1.193	0.127	0.1	3.600	3.700	1.600	0.170	795	424	1255	592
2350	172	9.2	34.8											805	429	1375	649
2600	174	9.8	37.1											866	474	1513	714
2700	127	7.2	27.3											877	469	1392	657

QSB6.7 Base Model Manufactured by Cummins Inc.
- Using fuel rating 91422

Reference EPA Standard Engine Family: ACEXL0409AAB
Reference CARB Executive Order:U-R-002-0516

No special options needed to meet current regulation emissions for all 50 states

Test Methods:
EPA/CARB Nonroad emissions recorded per 40CFR89 (ref. ISO8178-1) and weighted at load points prescribed in Subpart E, Appendix A, for Constant Spee Engines (ref. ISO8178-4, D2).

Diesel Fuel Specifications:
Cetane Number: 40-48
Reference: ASTM D975 No. 2-D

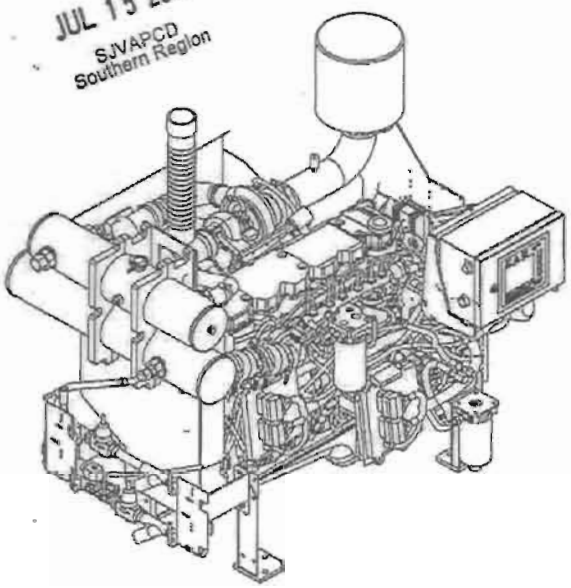
Reference Conditions:
Air Inlet Temperature: 25°C (77°F)
Fuel Inlet Temperature: 40°C (104°F)
Barometric Pressure: 100 kPa (29.53 in Hg)
Humidity: 10.7 g/kg (75 grains H_2O/lb) of dry air; required for NOx correction

Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.

Revision Date: 24MAR2010

Fire Power	Engine Specification Sheet Cummins Fire Power De Pere, WI 54115 http://www.cumminsfirepower.com	Basic Engine Model CFP7E-F10, F20, F30, F40, F50, F60 Curve Number: FR91422 Revision Date: March 2010



Equipment	Standard	Optional
Air Cleaner	Disposable, Direct Mounted, Indoor Service	Industrial housing with replaceable element
Alternator	12V-DC, 95 AMPS, With Belt Guard	24V-DC, 45 AMPS, With Belt Guard
Cooling Loop	N/A	Maximum Pressure of 300 PSI
Exhaust Protection	Metal Guards on Manifolds and Turbo	N/A
Exhaust Flex Connection	SS Flex, NPT	SS Flex, 150# Flange
Flywheel Power Take-Off	Flywheel	•Drive Shaft System •Stub Shaft
Fuel Connections	Fire Resistant Flexible Supply and Return Lines	N/A
Fuel Injection	Direct Injection	N/A
Fuel Filter	Primary Filter with Priming Pump	N/A
Engine Heater	120V-AC, 1500 Watts	240V-AC, 1500 Watts
Governor, Speed	Constant Speed	N/A
Heat Exchanger	Tube & Shell Type, 60 PSI with NPTF Connections	N/A
Instrument Panel	English and Metric, Tachometer, Hourmeter, Water Temperature, Oil Pressure & Two (2) Voltmeters	N/A
Junction Box	Integral with Instrument Panel; For DC Wiring to Engine Controller	N/A
Lube Oil Cooler	Engine Water Cooled, Plate Type	N/A
Lube Oil Filter	Full Flow with By-Pass Valve	N/A
Lube Oil Pump	Gear Driven	N/A
Manual Start	On Instrument Panel	N/A
Overspeed Controls	Electronic with Reset & Test on Instrument Panel	N/A
Raw Water Solenoid Operation	Automatic from Engine Controller & from Emergency Local Control	N/A
Run-Stop Control	On Instrument Panel	N/A
Run Solenoid	12V-DC	24V-DC
Starters	12V-DC	24V-DC
Throttle Control	Adjustable Speed Control	N/A
Water Pump	Belt Drive with Guard	N/A

Operating Speed (RPM)

Model	1470	1760	1900	2100	2350	2500
CFP7E-F60	218 (163)	250 (186)	232 (173)	244 (182)	245 (183)	249 (186)
CFP7E-F50	205 (153)	235 (175)	218 (163)	229 (171)	231 (172)	234 (174)
CFP7E-F40	192 (143)	220 (164)	204 (152)	215 (160)	216 (161)	219 (163)
CFP7E-F30	179 (133)	205 (153)	190 (142)	200 (149)	201 (150)	204 (152)
CFP7E-F20	136 (124)	160 (142)	176 (131)	186 (138)	187 (139)	189 (141)
CFP7E-F10	153 (114)	175 (130)	161 (121)	171 (128)	172 (128)	174 (130)

Ratings are: HP (kW)

Specifications

Aspiration	Turbocharged and Charge Air Cooled
Rotation	Counter clockwise from flywheel end
Dry Weight - lb (kg) Est.	1500 (675)
Displacement - in^3 (liter)	409 (6.7)
Engine Type	4 Cycle; In-Line, 6 Cylinder
Engine Series	Cummins QSB6.7 Series
Exhaust Emissions	EPA/CARB Tier 3

Appendix C

Emergency IC Engine S-360-42-0 Specifications

DETROIT DIESEL

mtu

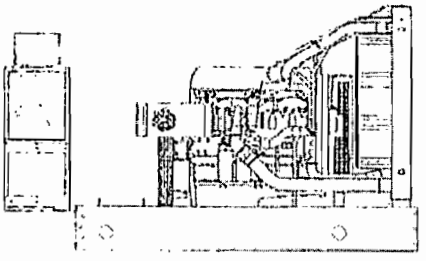
Model: 350DSED

4 Cycle Diesel

208-600 V

Ratings Range

		60 Hz
Standby:	kW	305-365
	kVA	381-456
Prime:	kW	275-330
	kVA	344-413



Standard Features

- Your DDC/MTU Power Generation product distributor provides one-source responsibility for the generating system and accessories.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set complies with ISO 8528-5, Class G3 requirements for transient performance.
- The generator set accepts rated load in one step.
- The 60 Hz genorator set engine is certified by the Environmental Protection Agency (EPA) to conform to Tier 3 nonroad emissions regulations.
- A one-year limited warranty covers all systems and components. Two-, five-, and ten-year extended warranties are also available.
- Alternator features:
  - The pilot-excited, permanent-magnet (PM) alternator provides superior short-circuit capability.
  - The brushless, rotating-field alternator has broadrange reconnectability.
- Other features:
  - Controllers are available for all applications. See controller features inside.
  - The low coolant level shutdown prevents overheating (standard on radiator models only).
  - Integral vibration isolation eliminates the need for under-unit vibration spring isolators.
  - An electronic, isochronous governor delivers precise frequency regulation.
  - Electronic engine controls manage the engine.

Generator Set Ratings

Alternator	Voltage	Ph	Hz	150°C Rise Standby Rating kW/kVA	130°C Rise Standby Rating kW/kVA	125°C Rise Prime Rating kW/kVA	105°C Rise Prime Rating kW/kVA
4M4019	120/208	3	60	355/444	350/438	325/406	325/406
	127/220	3	60	355/444	355/444	325/406	325/406
	139/240	3	60	355/444	355/444	325/406	325/406
	220/380	3	60	305/381	305/381	275/344	275/344
	240/416	3	60	355/444	350/438	325/406	325/406
	277/480	3	60	355/444	355/444	325/406	325/406
4M4021	120/208	3	60	360/450	360/450	325/406	325/406
	127/220	3	60	360/450	360/450	325/406	325/406
	139/240	3	60	360/450	360/450	325/406	325/406
	220/380	3	60	315/394	315/394	285/356	285/356
	240/416	3	60	360/450	360/450	325/406	325/406
	277/480	3	60	360/450	360/450	325/406	325/406
5M4027	120/208	3	60	365/456	365/456	330/413	330/413
	127/220	3	60	365/456	365/456	330/413	330/413
	139/240	3	60	360/450	360/450	325/406	325/406
	220/380	3	60	365/456	365/456	330/413	330/413
	240/416	3	60	365/456	365/456	330/413	330/413
	277/480	3	60	360/450	360/450	325/406	325/406
4M4158	220/380	3	60	360/450	360/450	325/406	325/406
5M4162	220/380	3	60	360/450	360/450	325/406	325/406
4M4266	347/600	3	60	360/450	360/450	325/406	325/406
5M4272	347/600	3	60	365/456	365/456	330/413	330/413

RATINGS: All three-phase units are rated at 0.8 power factor. *Standby Ratings:* Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. *Prime Power Ratings:* Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited. A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and lower load ratings, consult the factory. Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions. The generator set manufacturer reserves the right to change the design specifications without notice and without any obligation or liability whatsoever. GENERAL GUIDELINES FOR DERATION: Altitude: Derate 1.0% per 305 m (1000 ft.) elevation above 183 m (600 ft.) up to a maximum elevation of 3658 m (12000 ft.). *Temperature:* Derate 1.0% per 5.5°C (10°F) temperature above 25°C (77°F). For radiator cooling system capacity derate 1.4°C (2.5°F) per 305 m (1000 ft.) elevation above 183 m (600 ft.).

DETROIT DIESEL

Gen Set
Series 60 (14.0 L) - 6063HV35
550 bhp @ 1800 r/min

Performance Data
06N04M8145

Performance Data	Standby Power 60 Hz - 370 kW.		Prime Power 60 Hz - 320 kW.	
Percent Load, %	Power, bhp	Fuel Consumption, lbs/bhp-h	Power, bhp	Fuel Consumption, lbs/bhp-h
10	55	0.532	48	0.551
25	138	0.394	119	0.409
50	275	0.370	239	0.381
75	413	0.362	358	0.372
100	550	0.343	477	0.360
110	-	-	525	0.361

Performance Data	Limited Power 60 Hz - 370 kW.		Continuous Power 60 Hz - 320 kW.	
10	55	0.532	40	0.531
25	138	0.394	119	0.409
50	275	0.370	238	0.381
75	413	0.362	356	0.372
100	550	0.343	475	0.360

Tolerance for power values shown is +2/-0% at the conditions listed.
Tolerance for fuel values shown has not been specified.

Condition	SAE J1995
Air Inlet Temp.	77 °F
Total Baro. Pressure	30 in. Hg
Dry Baro. Pressure	29 in. Hg
Fuel Inlet Temp.	100 °F
Spec. Fuel Gravity	0.8376
[ref. temp.]	100 °F
Air Inlet Restriction	10 in. H2O
Exhaust Back Pressure	15 in. H2O
Min. Fuel Heat Content	20,500 Btu/lbm
[ref. test spec]	-
Air Density	0.1 lb/ft³
Fuel Density	6.99 lb/gal (US)
Oil Density	7.50 lb/gal (US)

Available power is shown. Data does not include parasitic losses from fans, accessories, etc. Parasitic losses will vary depending on the final product configuration and reduce the available power accordingly.
It is recommended that each engine system be sized based upon the maximum power limit for the calibration.

Certification Data	
Certification Word Code (CWC)	5534
US Nonroad Tier 3	Certified.
SCAQMD	Certified.

Emission Data	
Steady-state Emission Summary	
NOx	- g/h
CO	- g/h
HC	- g/h
SO2 - with .5% sulfur content fuel	427 g/h
SO2 - with .05% sulfur content fuel	42.7 g/h
Particulates	- g/h
D2 - Cycle Emissions	

Engine Load	10%	25%	50%	75%	100%	Cycle Value
			g/h			g/bhp-h
CO	291	211	172	132	261	0.87
HC	73.3	35.5	19.8	17.8	12.5	0.13
SO2 - with 0.5% sulfur content fuel	66.4	123	231	339	427	-
SO2 - with 0.05% sulfur content fuel	6.6	12.3	23.1	33.9	42.7	-
Particulates	10.9	29.0	41.0	28.8	38.8	0.14
NOx	185	300	474	837	1665	2.49
Opacity Mode						
Acceleration				- %		
Lug				- %		
Peak				- %		
Smoke						
Bosch No.				0.4		
@ Peak Torque Speed (- -)				-		

Emission levels of the engine may vary as a function of ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data provided are laboratory results from one engine representing this rating. The data was obtained under controlled environmental conditions with calibrated instrumentation traceable to the United States National Bureau of Standards and in compliance with US EPA regulations found at 40 CFR Part 89 (Control of Emissions From New and In-Use Nonroad Compression-Ignition Engines). The weighted cycle value from each engine is guaranteed to be below the US EPA Standards at the US EPA defined conditions.

Noise Data				
(Total)	Standby Power	Prime Power	Limited Power	Continuous Power
Frequency	-	-	-	-
Surface	-	-	-	-
Exhaust	-	-	-	-
Structureborne, - Longitudinal	-	-	UNCONTROLLED COPY	

Inquiries should be sent to: info@detroitdiesel.com

The user is advised to check the MTU Detroit Diesel Extranet for the latest information.

This page was generated from data available: 28 DEC 2005

	Standby Power 60 Hz - 370 kWe	Prime Power 60 Hz - 320 kWe	Limited Power 60 Hz - 370 kWe	Continuous Power 60 Hz - 320 kWe	
Calibration Details					
Control System	DDEC V Electronics	DDEC V Electronics	DDEC V Electronics	DDEC V Electronics	-
Maximum Power	550	550	550	550	bhp
Maximum Power Speed	1800	1800	1800	1800	r/min
Rated Power Limit	550	477	550	475	bhp
Rated Power Limit Speed	1800	1800	1800	1800	r/min
Typical Low Idle Speed	-	-	-	-	r/min
Typical High Idle Speed	-	-	-	-	r/min
Intended Use	Standby Power applications	Prime Power applications	Limited Run Time Power applications	Continuous Power applications	-
Cooling System					
Coolant Capacity in Engine Circuit	24	24	24	24	qt (US)
Coolant Flow Rate in Engine Circuit	-	-	-	-	gal/min (US)
Heat Rejection to Engine Coolant Circuit	7450	7150	7450	7150	Btu/min
Heat Rejection to Air in Charge Air Circuit	4900	4700	4900	4700	Btu/min
Radiated Heat Rejection	3950	3950	3950	3950	Btu/min
Exhaust System					
Exhaust Flow Rate (volumetric)	3090	2832	3090	2832	ft³/min
Exhaust Temperature	963	908	963	908	°F
Fuel System					
Injector Device	EUI N3	EUI N3	EUI N3	EUI N3	-
Injection System	EUI	EUI	EUI	EUI	-
Injector Timing Height	-	-	-	-	mm
Fuel Flow Rate (mass)	-	-	-	-	lbm/h
Fuel Flow Rate (volumetric)	-	-	-	-	gal/h (US)
Fuel Spill Rate (mass)	-	-	-	-	lbm/h
Fuel Spill Rate (volumetric)	-	-	-	-	gal/h (US)
Fuel Consumption (mass)	188.5	171.5	188.5	170.8	lbm/h
Fuel Consumption (volumetric)	27.0	24.5	27.0	24.4	gal/h (US)
Heat Rejection to Fuel	150	-	150	-	Btu/min
Intake System					
Engine Air Flow Rate (volumetric)	1160	1108	1160	1108	ft³/min
Intake Manifold Pressure	62	54	62	54	in. Hg
Turbocharger Compressor Outlet Temp.	362	342	362	342	°F

Available power is shown. Data does not include parasitic losses from fans, accessories, etc. Parasitic losses will vary depending on the final product configuration and reduce the available power accordingly.

Appendix D

Biofilter technology for NOx control

(Executive Summary - CARB Research Division Final report, "Biofilter technology for NOx control" February 1999, Contract number 96-304, Executive Summary)

CONTRACT NO. 96-304
FINAL REPORT
FEBRUARY 1999

Biofilter Technology for NOx Control

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
AIR RESOURCES BOARD
Research Division

BIOFILTER TECHNOLOGY FOR NO_X CONTROL

FINAL REPORT
CONTRACT NO. 96-304

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SACRAMENTO, CA 95814

FEBRUARY 1999

Contents

EXECTUTIVE SUMMARY

BIOFILTER TECHNOLOGY FOR NOx CONTROL

Little attention has been given to the transformation of nitrogen compounds in vapor phase biofilters. Both production and removal of oxides of nitrogen (NOx) have been demonstrated in laboratory experiments in the Center for Environmental and Water Resources Engineering at the University of California, Davis. Thus there is a potential that under certain operating conditions NOx may be emitted from biofilters designed to remove volatile organic compounds from contaminated air. Additionally it appears possible to design and operate biofilters for the purpose of removing NOx from contaminated air. The number of new companies offering biofilters as economical air pollution control devices for treatment of air contaminated with volatile organic compounds is rapidly growing. Many companies are seeking to apply biofilters to relatively high concentrations, several hundred to the thousand-ppm_v range. Locally anaerobic conditions in which nitrous oxide (N_2O) and nitric oxide (NO) are produced and released to the atmosphere can occur. On the other hand, it appears possible to design biofilters for the aerobic oxidation of N_2O and NO to NO_3^- or the anaerobic reduction of N_2O and NO to N_2. The potential of biological processes for NOx control appears to be considerable.

The specific objectives of this project were:

1. To determine whether significant emission of nitrogen-containing compounds such as NH_3, N_2O, NO or NO_2 occur during normal and/or "upset" biofilter operations.
2. To determine if oxidation of N_2O and NO to NO_3^- can be carried out in biofilters using microbial nitrification.
3. To develop operating parameters for promoting control of NO_X using local anaerobic denitrification and contaminated air feed stock.

Biofiltration of Contaminated Air

Biofiltration is a control technology, which is increasingly utilized to remove biodegradable pollutants from air streams. Biofiltration systems consist of packed bed reactors and the necessary blowers, controls and humidification devices to bring contaminated air into contact with packing material and to provide the appropriate environment for a microbial community growing on the packing. Two general types of biofilter system are in use; conventional biofilters and biotrickling filters (see Figure 1). Conventional biofilters commonly utilize packing materials such as compost - bulking agent mixtures and are maintained at a moisture content of 50 to 60 percent by weight by humidification of the inlet air and periodic water addition. Biotrickling filters usually incorporate more rigid packing materials such as porous rock (e.g. pumice or lava rock), extruded plastic rings or saddles, and extruded diatomaceous earth pellets. A buffered, liquid stream containing required nutrients is continuously recycled over the packing in biotrickling filters. Loading rates used with biofilters and biotrickling filters are similar.

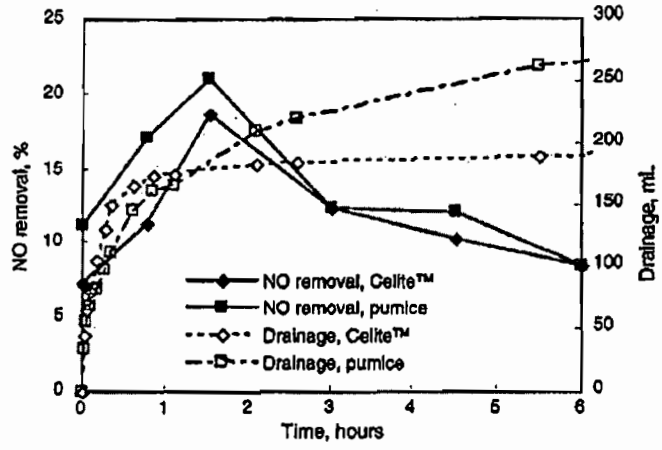

Figure 2.
Effect of column water content on NO removal in biofilters with Celite™ and pumice packings.

Field Studies: Hydrocarbon loadings to the field biofilters varied from 3000 g/m^3-d at the Soil vapor extraction site to less than 10 g/m^3-d at the Joint Water Pollution Control Plant's headworks. Outlet NO concentrations were higher than inlet in all cases. However, the outlet concentrations and the mass emission rates were low enough to be considered insignificant in each instance. The N_2O emissions were more difficult to characterize because the quantification limit was 500 ppb$_v$. Only the biofilter at the bathware plant produced detectable N_2O concentrations. However, the production in this case was low enough to be insignificant

Conclusions

The principal conclusions from this project were:

1. Laboratory biofilters operated at a one minute empty bed contact time and an inlet NO concentration of 100 ppm$_v$ were able to remove 25 ppm$_v$.
2. Mass transfer from the gas to the liquid phase appears to be the rate-limiting factor in removal of NO in biofilters.
3. Field studies at four sites provide no evidence that biofilters installed to treat relatively high hydrocarbon loadings produce significant quantities of NOx.

Appendix E

Cost Effectiveness of biofilter technology for NOx control

(CARB Research Division, summary pages 23-24 of final report Feb 1999, Contract # 96-304)

with an average of 2.3 ppm_v N_2O and standard deviation of 88% (Figure 13). The N_2O level in the lower of the two outlet samples (550 ppb_v) was actually lower than the average N_2O level at the inlet (690 ppb_v). The samples were reanalyzed, but there is still a great discrepancy in the N_2O level in the two outlet samples. The difference in these samples cannot be explained, but for a possible sampling error. If there was production of N_2O in this BTF, the cause may be the high organic loading (providing substrate for denitrification) and the high liquid loading (slowing diffusion and providing time for further denitrification). If the results were reliable, the emission factor would be significantly higher than the NO emission factors (7,700 g-N_2O/ton-HC, 30 g-N_2O/day, 11 kg-N_2O/year) but still not significant. Another indication of diffusion limitation may be the removal efficiency of styrene. Only about 75 percent of the styrene was being removed in the biotrickling filter, although styrene degraded quite rapidly in the laboratory.

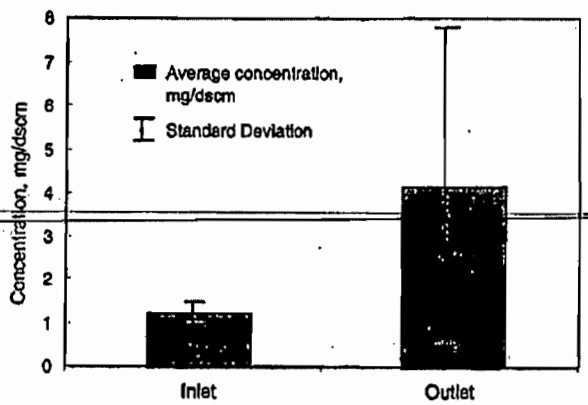

Figure 13.
N_2O production in the bathware manufacturing biotrickling filter Quantification limit = 0.9 mg/dscm (500 ppb_v)

Conclusions From Field Studies

The NO emissions from all units appear to be quite low with most of the NO emitted passing through the units from the inlet stream rather than being generated in the units themselves. However, outlet concentrations were higher than inlet concentrations in all cases and this suggests that some generation occurred in the biofilters. Outlet concentrations of NO are all below 200 µg/dscm. The higher emissions from some units may be due to higher organic loading or possibly operational factors such as liquid loading rate or nutrient (esp. NO_3^-) loading rate.

N_2O results were not conclusive, but the outlet concentrations appear to be less than 5 mg/dscm. The apparent production in this unit may be due both to high organic loading and the saturation of the media with the nutrient solution.

Whatever the net flux of oxides of nitrogen in BFs and BTFs, there does not seem to be any evidence that this flux should be of serious concern from an air pollution perspective.

COST OF NOx REMOVAL BY BIOFILTRATION

The principal components of biofiltration systems are the reactor, humidification system, piping, blower, and pad supporting the system. A large range of costs have been reported for biofiltration systems due largley to the inclusion of elaborate moisture control systems. However, the basic system with a manual moisture control system will cost approximately $10,000 per 100 cfm capacity using a one-minute empty bed contact time. (nominally a 100 ft^3 packing volume with the required ancillary components. The cost of packing is relativey minor, $0.50 to $1.50 per cubic foot for materials such as copost and lava rock, or 0.5 to 1.5 percent of the capital cost. .

Satisfactory NOx removals were not achieved in the laboratory systems operated in this project. Extrapolation of the best results to predict greater than 90 percent NOx removal would result in empty bed contact times of approximately six minutes. The fungal biofilter operated by Woertz (1998) produced nearly complete removal with empty bed contact times of one minute. Thus an optimistic capital cost estimate could be based on an empty bed contact time of one-minute and a conservative, but unguaranteed, estimate could be based on an empty bed contact time of six minutes. The range of capital costs would then be from $10,000 to $60,000 per 100 cfm of capacity. Economies of scale exist but the most likely use of biofilters for NOx control appears to be for small systems such as isolated diesel engines at well sights.

Operating costs for biofilters include electricity to operate blowers, minor system maintenance, and costs of personnel assigned to monitor and operate the systems. Power costs in Northern California for continually operated 100 cfm system (24 hours per day) are approximately $250 per month. Personnel costs will average about 2 hours per week, or possible $100 per month

Total cost of biofiltration, using an 8 percent annual interest rate and an amortization period of five years would fall in the range shown in Table 3:

Table 3
Estimated cost of removing NOx by biofiltration based on five year ammortization period and 8 percent interest rate.

EBCT Min	Capital Cost $	Operating Cost $/mth	Total Cost $/mth
1	10,000	350	550
8	60,000	350	1550

Appendix F

SCR Specifications

SCR Reactor Design Data		
Flue Gas		
Design Pressure	950	mbar
Design Temperature	600	F
Oxygen (Dry, Operating O2)	6.0	vol%
Oxygen (Wet, Operating O2)	3.7	vol%
Reference Oxygen	3	vol%
Water (vol %)	38.2	vol %
Flue Gas Flow Rate wet operating O2	125,577 (317,094 lb/hr)	Nm3/hr
NOx at SCR Inlet (Dry, Reference O2)	315 (153.5 ppmvdc)	mg/Nm3
NOx at SCR Outlet (Dry, Reference O2)	31.5 (15.4 ppmvdc)	mg/Nm3
NOx - REDUCTION	90.0%	
NO2 FRACTION OF TOTAL NOx	5	%
SLIP-NH3 (at end of catalyst life)	10 ppmvdc	ppm
Catalyst Life: Period	16000 EXPECTED	Hours
CATALYST DATA:		
Type	Homogeneous Honeycomb	
Specific Surface Area	539	m2/m3
Pitch	6.9	mm
Element Height	1350	mm
Free Cross Section	81.4	%
Expected Activity at Guarantee End	50	%
Catalyst Volume	39.4	m3
Catalyst Layers Initial Load	2	Layers
Future Catalyst Layers	By System Supplier	Layers
Module Arrangement (x by X)	3 x 3	modules
Modules per Layer	9	modules
Module Dimensions		
L	3.18	ft
W	6.26	ft
H	5.35	ft
Module Weight	3100	lbs
Full Layer Weight	14	short tons
Space Velocity	3190	
Gas Velocity	5.4 m/s at catalyst face	
Pressure Drop over SCR Reactor	2 (total across two layers)	In WC
	5 (total across two layers)	mbar
SO2 Conversion Rate	0.5	mol %
Ammonia Consumption		
Anhydrous	16	lb/hr
19% Aqueous	84	lb/hr

Appendix G

Quarterly Net Emissions Change (QNEC)

Quarterly Emissions Change (QNEC)

The Quarterly Net Emissions Change is used to complete the emission profile screen for the District's PAS database. The QNEC shall be calculated as follows:

QNEC = PE2 - PE1, where:

QNEC = Quarterly Net Emissions Change for each emissions unit, lb/qtr.
PE2 = Post Project Potential to Emit for each emissions unit, lb/qtr.
PE1 = Pre-Project Potential to Emit for each emissions unit, lb/qtr.

S-360-7-0 (new BFB unit)

$PE2_{quarterly}$ = $PE2_{annual} \div 4$ quarters/year
$PE1_{quarterly}$= $PE1_{annual} \div 4$ quarters/year
PE2 quarterly – PE1 quarterly = QNEC

Quarterly NEC [QNEC]					
Pollutant	**$PE2_{annual}$**	**$PE1_{annual}$**	**$PE2_{quarterly}$**	**$PE1_{quarterly}$**	**QNEC = ($PE2_{quarterly}$- $PE1_{quarterly}$)**
NOX	22,466	0	5,617	0	5,617
SOX	12,503	0	3,126	0	3,126
PM10	3,723	0	931	0	931
CO	28,717	0	7,179	0	7,179
VOC	781	0	195	0	195

S-360-10-0 through 15-0 and 34-0 through 39-0 *(PM10 only)*

QNEC = PE2 quarterly – PE1 quarterly.
PE1 = 0 for the new emission units, therefore QNEC = PE2 quarterly

QNEC = PE2 lb/year ÷ 4 quarters/year

Quarterly NEC [QNEC] PM10			
Permit (S-360 - ...)	**Annual PE2 (lb/year)**	**PE2 (lb/qtr)**	**QNEC (lb/qtr)**
10-0	202	51	51
11-0	11	3	3
12-0	1	0	0
13-0	24	6	6
14-0	5	1	1
15-0	375	94	94
34-0	630	158	158
35-0	1,637	409	409
36-0	2,267	567	567
37-0	4,785	1196	1196
38-0	0	0	0
39-0	168	42	42

S-360-33-0 (Emergency IC Engine)

QNEC = PE2 quarterly – PE1 quarterly.
PE1 = 0 for the new emission units, therefore QNEC = PE2 quarterly

QNEC = PE2 lb/year ÷ 4 quarters/year

Quarterly NEC [QNEC]			
	$PE2_{annual}$	$PE2_{quarterly}$	QNEC (lb/qtr)
NO_X	95	24	24
SO_X	0	0	0
PM_{10}	4	1	1
CO	46	12	12
VOC	2	0	0

S-360-42-0 (Emergency IC Engine)

QNEC = PE2 quarterly – PE1 quarterly.

PE1 = 0 for the new emission units, therefore QNEC = PE2 quarterly

QNEC = PE2 lb/year ÷ 4 quarters/year

Quarterly NEC [QNEC]			
	$PE2_{annual}$	$PE2_{quarterly}$	QNEC (lb/qtr)
NO_X	151	38	38
SO_X	0	0	0
PM_{10}	8	2	2
CO	53	13	13
VOC	8	2	2

Appendix H

Air Quality Impact Analysis (AQIA)

The results from the Criteria Pollutant Modeling are as follows:

Criteria Pollutant Modeling Results*

Diesel ICE	1 Hour	3 Hours	8 Hours.	24 Hours	Annual
CO	Pass[1]	X	Pass[1]	X	X
NO_x	Pass[1]	X	X	X	Pass[1]
SO_x	Pass[1]	Pass[1]	X	Pass[1]	Pass[1]
PM_{10}	X	X	X	X[2]	X[2]
$PM_{2.5}$	X	X	X	X	X

*Results were taken from the attached PSD spreadsheet.
[1]The project's Diesel IC Engines are considered as intermittent source as defined in APR-1920. In accordance with APR-1920, compliance with short-term (i.e., 1-hour, 3-hour, 8-hour and 24-hour) standards is not required. However, the boilers were evaluated.
[2]The PM_{10} was evaluated via AERMOD and explained in the following table. $PM_{2.5}$ was not evaluated since the project was deemed complete prior to 4/21/2011.

Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD.

PM_{10} Pollutant Modeling Results*
Values are in $\mu g/m^3$

Category	24 Hours	Annual
Proposed Project	8.2	1.9
Interim Significance Level	10.4[1]	2.08[1]
Result	Pass[2]	Pass[2]

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration and 2.08 for the Annual concentration for projects whose impacts are primarily from fugitive sources.
[2]The PM10 concentration is below the District's interim threshold for fugitive dust sources.

III. Conclusion

The acute and chronic indices are below 1.0 and the cancer risk associated with the project is greater than 1.0 in a million, but less than 10 in a million. **In accordance with the District's Risk Management Policy, the project is approved with Toxic Best Available Control Technology (T-BACT). T-BACT is required for those units whose cancer risk was greater than 1 in a million as noted earlier.**

To ensure that human health risks will not exceed District allowable levels; the permit conditions listed on page 1 of this report must be included for this proposed unit.

These conclusions are based on the data provided by the applicant and the project engineer. Therefore, this analysis is valid only as long as the proposed data and parameters do not change.

The emissions from the proposed equipment will not cause or contribute significantly to a violation of the State and National AAQS.

The ambient air quality impacts from PM_{10} emissions for the proposed project (does not) exceed the District's 24-hour or Annual interim threshold for fugitive dust sources.

Appendix I

Risk Management Review (RMR) Summary

San Joaquin Valley Air Pollution Control District
Risk Management Review

To:	Michael Buss – Permit Services
From:	Matthew Cegielski – Technical Services
Date:	January 31, 2012
Facility Name:	Liberty Energy
Location:	12421 Holloway Road
Application #(s):	S-360-7-0.....42-0
Project #:	S-1080996

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A. RMR SUMMARY

RMR Summary							
Categories	**Boiler Totals**	**Cooling Tower Totals**	**Ash Silos Totals**	**Biomass Totals**	**Diesel IC Engine Totals**	**Project Totals**	**Facility Totals[1]**
Prioritization Score	>1.0	0.6	0.0	>1.0	0.3	**>1.0**	**>1.0**
Acute Hazard Index	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Chronic Hazard Index	0.07	0.06	0.00	0.04	0.00	**0.2**	**0.4**
Maximum Individual Cancer Risk (10^{-6})	2.63	0.04	0.07	2.63	0.38	**5.95**	**9.87**

[1]Unit 1-4 has a cancer risk of 2.92E-6 and chronic index of 0.1960. Unit 3-1 passed on prioritization. Unit 5-0 has a cancer risk of 1.0E-6. The decrease in throughput proposed for Unit 1-5 from 735,000 TPY to 733,866 TPY is a reduction of 0.15% and will not significantly alter the prior health values (2.915E-6, 0.1957).

Units that are Hydrated Lime Silos (11-0, 17-0, 23-0), Sand Silos (12-0, 18-0, 24-0), Limestone Silos (13-0, 19-0, 25-0) and Powdered Activated Carbon (PAC) Silos (14-0, 20-0, 26-0) were evaluated for Toxic Air Contaminants (TACs) and it was determined that none were present. However these units were included for their PM10 contribution during the Ambient Air Quality Analysis (AAQA).

The operating hour limitations presented in the following table were proposed by the applicant and were utilized in determining PM10 emissions during the AAQA.

Silo Type	Max loading per silo (hr) Daily	Max loading per silo (hr) Annual
Hydrated Lime	2	260
Sand	3	18
Limestone	6	570
PAC	2	120

The Biosolids Silo Units' (28-0, 29-0, 30-0, 31-0, 32-0, and 38-0) emissions were evaluated and it was determined that due to engineering controls and moisture content that their emissions were negligible. However the following permit conditions must be included:

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 28-0, 29-0, 30-0, 31-0, 32-0, and 38-0

1. The moisture content of the Biosolids will be greater than 75%. [Rule 2201]
2. Air from the Biosolids building, reception area, and silos is directed to the combustion air for the boilers. [Rule 2201]
3. The Biosolids Silos will be fitted with activated carbon filters. [Rule 2201]

RMR Boilers				
Categories	**Biomass/ Biosolids Boiler (Unit 7-0)**	**Biomass/ Biosolids Boiler (Unit 8-0)**	**Biomass/ Biosolids Boiler (Unit 9-0)**	**Boiler Totals**
Prioritization Score	8.7	8.7	8.7	>1.0
Acute Hazard Index	0.0	0.0	0.0	0.0
Chronic Hazard Index	0.02	0.02	0.03	0.07
Maximum Individual Cancer Risk (10^{-6})	0.65	0.76	1.22	2.63
T-BACT Required?	**No**	**No**	**Yes**	
Special Permit Conditions?	**Yes**	**Yes**	**Yes**	

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 7-0, 8-0, 9-0

1. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

T-BACT is required for unit 9-0 because of emissions of Toxic Air Contaminants and a cancer risk value greater than 1.0 in a million. In accordance with District policy, BACT for this unit will be considered to be T-BACT.

RMR Cooling Towers				
Categories	**Cooling Tower (Unit 10-0)**	**Cooling Tower (Unit 16-0)**	**Cooling Tower (Unit 22-0)**	**Cooling Tower Totals**
Prioritization Score	0.2	0.2	0.2	0.6
Acute Hazard Index	0.0	0.0	0.0	0.0
Chronic Hazard Index	0.02	0.02	0.02	0.06
Maximum Individual Cancer Risk (10^{-6})	0.012	0.012	0.012	0.04
T-BACT Required?	**No**	**No**	**No**	
Special Permit Conditions?	**Yes**	**Yes**	**Yes**	

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 10-0, 16-0, 22-0

1. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

RMR Ash Silos				
Categories	**Ash Silos (Unit 15-0)**	**Ash Silos (Unit 21-0)**	**Ash Silos (Unit 27-0)**	**Ash Silos Totals**
Prioritization Score	0.0	0.0	0.0	0.0
Acute Hazard Index	0.0	0.0	0.0	0.0
Chronic Hazard Index	0.00	0.00	0.00	0.00
Maximum Individual Cancer Risk (10^{-6})	0.026	0.026	0.026	0.07
T-BACT Required?	**No**	**No**	**No**	
Special Permit Conditions?	**Yes**	**Yes**	**Yes**	

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 15-0, 21-0, 27-0

1. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

Units # 39-0, 40-0, 41-0

1. Due to the Engineering controls implemented, 100% of the emissions from the Ash Truck Loadout are directed to the Ash Silo. The collection efficiency of the filter on the Ash Silo is rated at 99%. [District Rule 2201]

RMR Biomass Operations					
Categories	**Biomass Storage Yard (Unit 34-0)**	**Biomass Shredding Operation (Unit 35-0)**	**Biomass Screening Operation (Unit 36-0)**	**Biomass Reclaim Operation (Unit 37-0)**	**Biomass Processing Totals**
Prioritization Score	0.4	0.6	0.3	0.3	>1.0[1]
Acute Hazard Index	0.0	0.0	0.0	0.0	0.0
Chronic Hazard Index	0.03	0.01	0.00	0.00	0.04
Maximum Individual Cancer Risk (10^{-6})	2.03	0.4	0.2	0.2	2.83
T-BACT Required?	**Yes**	**No**	**No**	**No**	
Special Permit Conditions?	**No**	**Yes**	**Yes**	**Yes**	

[1]Units 35, 36, and 37 emissions are contained within a building. Building emissions are directed outside via 4 process vents. Process vents 1 and 2 are attributed to unit 35, process vent 3 to unit 36, and process vent 4 to unit 37.

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Units # 35-0, 36-0, 37-0

1. Operation of this unit will be conducted in the Bioprocess building. The Bioprocess building is under sufficient negative pressure to the boilers to reduce the emissions from Bioprocessing operation units by 80% as evident from the decrease in emissions from the roof process vents. [Rule 2201]

2. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]

T-BACT is required for unit 34-0 because of emissions of Toxic Air Contaminants that are PM10 and a cancer risk value greater than 1.0 in a million. In accordance with District policy, BACT for this unit will be considered to be T-BACT.

RMR Diesel IC Engines			
Categories	**Diesel IC Engine Fire Pump (Unit 33-0)**	**Diesel IC Engine Elec Generator (Unit 42-0)**	**Diesel IC Engine Totals**
Prioritization Score	0.1	0.2	0.3
Acute Hazard Index	0.0	0.0	0.0
Chronic Hazard Index	0.00	0.00	0.00
Maximum Individual Cancer Risk (10^{-6})	0.28	0.1	0.38
T-BACT Required?	**No**	**No**	
Special Permit Conditions?	**Yes**	**Yes**	

Proposed Permit Conditions

To ensure that human health risks will not exceed District allowable levels; the following permit conditions must be included for:

Unit # 33-0

1. The PM10 emissions rate shall not exceed **0.111** g/bhp-hr based on US EPA certification using ISO 8178 test procedure. [District Rules 2201]
2. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]
3. This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 100 hours per calendar year. [District Rule 4702 and 17 CCR 93115]

Unit # 42-0

1. The PM10 emissions rate shall not exceed **0.14** g/bhp-hr based on US EPA certification using ISO 8178 test procedure. [District Rules 2201]
2. The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]
3. This engine shall be operated only for testing and maintenance of the engine,
4. required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed **50** hours per calendar year. [District Rule 4702 and 17 CCR 93115]

B. RMR REPORT

I. Project Description

Technical Services received a request on January 31, 2012, to perform a Risk Management Review and an Ambient Air Quality Analysis for a proposed installation of three 6.5 megawatt Biosolids/biomass-fired bubbling fluidized bed boilers (Units 7, 8, and 9) and associated equipment at the power plant. The associated equipment includes:

1. Three Cooling Towers containing nine cells (Units 10, 16, and 22).
2. Three Hydrated Lime Silos (Units 11, 17, and 23).
3. Three Sand Silos (Units 12, 18, and 24).
4. Three Limestone Silos (Units 13, 19, and 25).
5. Three Powdered Activated Carbon (PAC) Silos (Units 14, 20, and 26).
6. Six Ash Silos, two per unit (Units 15, 21, and 27).
7. Diesel-Fired Emergency IC Engine powering a firewater pump (Unit 33).
8. Biomass Receiving/Storage (Unit 34).
9. Biomass Grinding (Unit 35).
10. Biomass Screening (Unit 36).
11. Biomass Reclaim with Screen (Unit 37).
12. Three Ash Truck Loadouts, two per unit (Units 39, 40, and 41).
13. Diesel-Fired Emergency IC Engine powering an electrical generator (Unit 42).
14. Five Biosolids Silos (Units 28 to 32). The final number of Biosolids silos has not been finalized.
15. Biosolids Receiving (Unit 38).

The emissions from unit 1 (Composting operation) will be decreased from 7,200 tons/day to 7,197 tons/day and from 735,000 tons/year to 733,866 tons/year. The site plan boundary of the proposed project will be added to the original facility boundary of the prior composting operation.

II. Analysis

Technical Services performed a prioritization using the District's HEARTs database. Since the total facility prioritization score was greater than one, a refined health risk assessment was required.

Emissions for the Biomass/Biosolids Boilers and Cooling Towers were provided by the applicant via tables taken from source tests. Chloroform emissions were not included in the applicant's table and were calculated for the Cooling Towers based on the District's accepted conversion of Chlorine to Chloroform value of 0.0034.

Toxic emissions from Biomass operations Unit 34, 35, 36, and 37 were calculated using District approved emission factors based on 2010 Yolo Digester compost source test and US Composting Council STA Compost Specifications.

Toxic emissions from the Biomass/Biosolids Power Plant Ash Silos were based on emission factors from Table 17 in *Trace Metal Mobilization During Combustion of Biomass Fuels* (June 2008) and Table 2.2-8 in AP 42 Chapter 2.2 *Sewage Sludge Incineration.*

Toxic emissions were input into the HEARTs database.

The AERMOD model was used, with the parameters outlined below and meteorological data for 2004-2008 from Missouri Triangle to determine the dispersion factors (i.e., the predicted concentration or X divided by the normalized source strength or Q) for a receptor grid. These dispersion factors were input into the Hot Spots Analysis and Reporting Program (HARP) risk assessment module to calculate the chronic and acute hazard indices and the carcinogenic risk for the project.

The following parameters were used for the review:

Analysis Parameters Unit 7-0, 8-0, 9-0 Boilers			
Source Type	Point	**Location Type**	Rural
Stack Height (m)	38.1	**Closest Receptor (m)**	670
Stack Diameter. (m)	2.13	**Type of Receptor**	Business
Stack Exit Velocity (m/s)	35.48	**Max Hours per Year**	8760
Stack Exit Temp. (°K)	460.93	**Fuel Type**	Biomass/Bio solids
Rating (MW, MMBtu/hr)	6.5, 211.52		

Analysis Parameters Unit 10-0, 16-0, 22-0 Cooling Towers (3 cells/tower/unit)			
Source Type	Point	**Location Type**	Rural
Stack Height (m)	8.23	**Closest Receptor (m)**	670
Stack Diameter. (m)	3.9	**Type of Receptor**	Business
Stack Exit Velocity (m/s)	16.61	**Max Hours per Year**	8760
Stack Exit Temp. (°K)	290		

Analysis Parameters Unit 33-0 Diesel-Fired Emergency IC Engine powering a firewater pump			
Source Type	Point	**Location Type**	Rural
Stack Height (m)	3.05	**Closest Receptor (m)**	670
Stack Diameter. (m)	0.152	**Type of Receptor**	Business
Stack Exit Velocity (m/s)	21.34	**Max Hours per Year**	100
Stack Exit Temp. (°K)	672		

Analysis Parameters Unit 35, 36, 37 Biomass operation Process Vents			
Source Type	Point	**Location Type**	Rural
Stack Height (m)	11.58	**Closest Receptor (m)**	670
Stack Diameter. (m)	0.914	**Type of Receptor**	Business
Stack Exit Velocity (m/s)	70.0	**Max Hours per Year**	8760
Stack Exit Temp. (°K)	290		

Analysis Parameters Unit 42-0 Diesel-Fired Emergency IC Engine powering an Electrical Generator			
Source Type	Point	**Location Type**	Rural
Stack Height (m)	3.66	**Closest Receptor (m)**	670
Stack Diameter. (m)	0.152	**Type of Receptor**	Business
Stack Exit Velocity (m/s)	64.92	**Max Hours per Year**	50
Stack Exit Temp. (°K)	717.04		

Analysis Parameters Unit 11-0, 17-0, 23-0 Hydrated Lime Silo			
Source Type	Volume	**Location Type**	Rural
Release Height (m)	6.4	**Closest Receptor (m)**	670
Length of side (m)	3.05	**Type of Receptor**	Business
Initial Lateral (m)	0.71	**Initial Vertical (m)**	3.69

Analysis Parameters Unit 12-0, 18-0, 24-0 Sand Silo			
Source Type	Volume	**Location Type**	Rural
Release Height (m)	10.52	**Closest Receptor (m)**	670
Length of side (m)	3.05	**Type of Receptor**	Business
Initial Lateral (m)	0.71	**Initial Vertical (m)**	3.69

Analysis Parameters Unit 13-0, 19-0, 25-0 Limestone Silo			
Source Type	Volume	**Location Type**	Rural
Release Height (m)	11.13	**Closest Receptor (m)**	670
Length of side (m)	4.26	**Type of Receptor**	Business
Initial Lateral (m)	0.99	**Initial Vertical (m)**	4.68

Analysis Parameters Unit 14-0, 20-0, 26-0 PAC Silo			
Source Type	Volume	**Location Type**	Rural
Release Height (m)	7.47	**Closest Receptor (m)**	670
Length of side (m)	3.05	**Type of Receptor**	Business
Initial Lateral (m)	0.71	**Initial Vertical (m)**	3.69

Analysis Parameters Unit 15-0, 21-0, 27-0 Ash Silo (Two silos/unit includes Ash Truck Loadout emissions)			
Source Type	Volume	**Location Type**	Rural
Release Height (m)	19.51	**Closest Receptor (m)**	670
Length of side (m)	6.11	**Type of Receptor**	Business
Initial Lateral (m)	1.42	**Initial Vertical (m)**	5.39

Analysis Parameters Unit 34-0 Biomass Receiving and Storage			
Source Type	Area	**Location Type**	Rural
X-Length (m)	219.8	**Closest Receptor (m)**	670
Y-Length (m)	219.8	**Type of Receptor**	Business
Release Height (m)	3	**Pollutant Type**	PM10
[redacted]		**Emission Rate**	0.08 lb/hr

Technical Services performed modeling for criteria pollutants CO, NOx, SOx and PM_{10}; as well as a RMR. The emission rates used for criteria pollutant modeling are provided in the tables below.

Criteria Pollutant Parameters Unit 33-0 Diesel-Fired Emergency IC Engine powering a firewater pump		
Criteria Pollutant Type	**Lb/Day**	**Lb/yr**
CO	11.0	46
NOx	22.8	95
SOx	0	0
PM10	1.0	4
Hours/day	24	[redacted]
Hours/Year	100	

Criteria Pollutant Parameters Unit 42-0 Diesel-Fired Emergency IC Engine powering an Electrical Generator		
Criteria Pollutant Type	Lb/Day	Lb/yr
CO	25.3	53
NOx	72.5	151
SOx	0.1	0
PM10	4.1	8
Hours/day	24	
Hours/Year	50	

Criteria Pollutant Parameters PM10 (These units do not emit CO, NO_x, or SO_x)				
Source	lb/day	lb/yr	Hours/ day	Hours/ Year
Unit 10-0, 16-0, 22-0 Cooling Towers	0.6	202	24	8760
Unit 11-0, 17-0, 23-0 Hydrated Lime Silos	0.1	11	2	260
Unit 12-0, 18-0, 24-0 Sand Silo	0.1	1	3	18
Unit 13-0, 19-0, 25-0 Limestone Silo	0.3	24	6	570
Unit 14-0, 20-0, 26-0 PAC Silo	0.1	5	2	120
Unit 15-0, 21-0, 27-0 Ash Silo	1.46	542.9	24	8760
Unit 35, 36, 37 Biomass operation Process Vents[1]	1.47	491	24	8760

1 The emission amounts listed are the total emissions from the three units divided by 4 process vent.

The results from the Criteria Pollutant Modeling are as follows:

Criteria Pollutant Modeling Results*

Diesel ICE	1 Hour	3 Hours	8 Hours.	24 Hours	Annual
CO	Pass[1]	X	Pass[1]	X	X
NO_x	Pass[1]	X	X	X	Pass[1]
SO_x	Pass[1]	Pass[1]	X	Pass[1]	Pass[1]
PM_{10}	X	X	X	X[2]	X[2]
$PM_{2.5}$	X	X	X	X	X

*Results were taken from the attached PSD spreadsheet.
[1]The project's Diesel IC Engines are considered as intermittent source as defined in APR-1920. In accordance with APR-1920, compliance with short-term (i.e., 1-hour, 3-hour, 8-hour and 24-hour) standards is not required. However, the boilers were evaluated.
[2]The PM_{10} was evaluated via AERMOD and explained in the following table. $PM_{2.5}$ was not evaluated since the project was deemed complete prior to 4/21/2011.

Technical Services performed modeling for the criteria pollutant PM_{10} using AERMOD.

PM_{10} Pollutant Modeling Results*
Values are in $\mu g/m^3$

Category	24 Hours	Annual
Proposed Project	8.2	1.9
Interim Significance Level	10.4[1]	2.08[1]
Result	Pass[2]	Pass[2]

[1]The District has decided on an interim basis to use a threshold for fugitive dust sources of 10.4 $\mu g/m^3$ for the 24-hour average concentration and 2.08 for the Annual concentration for projects whose impacts are primarily from fugitive sources.
[2]The PM10 concentration is below the District's interim threshold for fugitive dust sources.

III. Conclusion

The acute and chronic indices are below 1.0 and the cancer risk associated with the project is greater than 1.0 in a million, but less than 10 in a million. **In accordance with the District's Risk Management Policy, the project is approved with Toxic Best Available Control Technology (T-BACT). T-BACT is required for those units whose cancer risk was greater than 1 in a million as noted earlier.**

To ensure that human health risks will not exceed District allowable levels; the permit conditions listed on page 1 of this report must be included for this proposed unit.

These conclusions are based on the data provided by the applicant and the project engineer. Therefore, this analysis is valid only as long as the proposed data and parameters do not change.

The emissions from the proposed equipment will not cause or contribute significantly to a violation of the State and National AAQS.

The ambient air quality impacts from PM_{10} emissions for the proposed project (does not) exceed the District's 24-hour or Annual interim threshold for fugitive dust sources.

IV. Attachments

A. RMR request from the project engineer
B. HARP summary
C. AAQA summary
D. Toxic emissions summary, Prioritization score, Facility Summary
E. Emissions Spreadsheet

Appendix J

Applicable SJVAPCD BACT Guidelines

Diesel-Fired Emergency IC Engines
S-0360-33-0 and 42-0

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 3.1.1
Last Update: 7/10/2009
Emergency Diesel IC Engine

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
CO	Latest EPA Tier Certification level for applicable horsepower range		
NOX	Latest EPA Tier Certification level for applicable horsepower range		
PM10	0.15 g/hp-hr or the Latest EPA Tier Certification level for applicable horsepower range, whichever is more stringent. (ATCM)		
SOX	Very low sulfur diesel fuel (15 ppmw sulfur or less)		
VOC	Latest EPA Tier Certification level for applicable horsepower range		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

Biomass Grinder
S-0360-35-0

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 6.4.2
Last Update: 4/3/1998
Tub Grinder – Transportable, Wood Waste Processing

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
PM10	Use of a water sprinkler system or maintaining adequate moisture content of the process materials to prevent visible emissions in excess of 5% opacity		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

Biomass Screens
S-0360-36-0 and '-37-0

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 6.4.5
Last Update: 9/7/1998
Biomass – Fuel Receiving, Handling, and Storage

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
PM10	Use of a wet suppression system on all emissions units, transfer points, and raw material stockpiles to maintain an adequate moisture content to prevent visible emissions in excess of 20% opacity		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

Ash load out to truck
S-0360-39-0

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline 8.4.1
Last Update: 10/20/1992
Dry Material Storage and Conveying Operation, 100 tons/day

Pollutant	Achieved in Practice or in the SIP	Technologically Feasible	Alternate Basic Equipment
PM10	Storage, augers, elevators, conveyors all enclosed and vented to a fabric filter baghouse.		

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

Appendix K

Top-Down BACT Analysis for the Emergency IC Engines

Top Down BACT Analysis for the Emergency IC Engines

BACT triggered for NOx only for **S-360-33-0** (174 bhp)
BACT triggered for NOx, PM10 and VOC for **S-360-42-0** (550 bhp)

1. BACT Analysis for NO_X, PM10 and VOC Emissions:

a. Step 1 - Identify all control technologies

The SJVUAPCD BACT Clearinghouse guideline 3.1.1 identifies achieved in practice BACT for emissions from emergency diesel IC engines as follows:

Pollutant	Achieved in Practice
NOx, VOC	Latest EPA Tier Certification level for applicable horsepower range
PM10	0.15 g/hp-hr or the Latest EPA Tier Certification level for applicable horsepower range, whichever is more stringent. (ATCM)

No technologically feasible alternatives or control alternatives identified as alternate basic equipment for this class and category of source are listed.

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from Step 1.

c. Step 3 - Rank remaining options by control effectiveness

No ranking needs to be done because only one control option is listed in Step 1.

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only control option listed for each pollutant. Therefore, a cost effectiveness analysis is not required.

e. Step 5 - Select BACT

BACT for NOx, VOC emissions from these emergency standby diesel IC engines is the latest EPA Tier Certification level for the applicable horsepower range. The applicant has proposed to install two Tier 3 certified emergency standby diesel IC engines, which is the latest Tier Certification for an engine this size as shown in the attached Tier Certification table on the following page.

BACT for PM10 is 0.15 g/hp-hr, or the latest EPA Tier Certification level for the applicable horsepower range, whichever is more stringent. The applicant is proposing Tier three certified engine meets this requirement.

Therefore, BACT is satisfied for these pollutants with the use of Tier 3 engines.

Appendix L

Top-Down BACT Analysis for all other equipment

Table of Contents for Appendix O

Top Down BACT Analysis for

Top Down BACT Analysis for the Biomass Grinder

BACT triggered for PM10 for Grinder **S-360-35-0**

1. **BACT Analysis for PM10 Emissions:**

a. Step 1 - Identify all control technologies

The SJVUAPCD BACT Clearinghouse guideline 3.1.1 identifies achieved in practice BACT for emissions from transportable grinders as follows:

Pollutant	Achieved in Practice
PM10	Use of a water sprinkler system or maintaining adequate moisture content of the process materials to prevent visible emissions in excess of 5% opacity)

No technologically feasible alternatives or control alternatives identified as alternate basic equipment for this class and category of source are listed.

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from Step 1.

c. Step 3 - Rank remaining options by control effectiveness

No ranking needs to be done because only one control option is listed in Step 1.

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only control option listed for each pollutant. Therefore, a cost effectiveness analysis is not required.

e. Step 5 - Select BACT

BACT for PM10 is use of a water sprinkler system or maintaining adequate moisture content of the process materials to prevent visible emissions in excess of 5% opacity

Therefore, BACT is satisfied for PM10.

Top Down BACT Analysis for the Biomass Screens

BACT triggered for PM10 for Screens **S-360-36-0 and '-37-0**

1. BACT Analysis for PM10 Emissions:

a. Step 1 - Identify all control technologies

The SJVUAPCD BACT Clearinghouse guideline 6.4.5 identifies achieved in practice BACT for emissions from biomass screens follows:

Pollutant	Achieved in Practice
PM10	Use of a wet suppression system on all emissions units, transfer points, and raw material stockpiles to maintain an adequate moisture content to prevent visible emissions in excess of 20% opacity

No technologically feasible alternatives or control alternatives identified as alternate basic equipment for this class and category of source are listed.

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from Step 1.

c. Step 3 - Rank remaining options by control effectiveness

No ranking needs to be done because only one control option is listed in Step 1.

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only control option listed for each pollutant. Therefore, a cost effectiveness analysis is not required.

e. Step 5 - Select BACT

BACT for PM10 is use of Use of a wet suppression system on all emissions units, transfer points, and raw material stockpiles to maintain an adequate moisture content to prevent visible emissions in excess of 20% opacity

Therefore, BACT is satisfied for PM10.

Top Down BACT Analysis for Ash Load out to Truck

BACT triggered for PM10 from ash loadout: **S-360-39-0**

1. BACT Analysis for PM10 Emissions:

a. Step 1 - Identify all control technologies

The SJVUAPCD BACT Clearinghouse guideline 8.4.1 identifies achieved in practice BACT for emissions from dry material storage and conveying as follows:

Pollutant	Achieved in Practice
PM10	Storage, augers, elevators, conveyors all enclosed and vented to a fabric filter baghouse.

No technologically feasible alternatives or control alternatives identified as alternate basic equipment for this class and category of source are listed.

b. Step 2 - Eliminate technologically infeasible options

There are no technologically infeasible options to eliminate from Step 1.

c. Step 3 - Rank remaining options by control effectiveness

No ranking needs to be done because only one control option is listed in Step 1.

d. Step 4 - Cost Effectiveness Analysis

The applicant has proposed the only control option listed for each pollutant. Therefore, a cost effectiveness analysis is not required.

e. Step 5 - Select BACT

BACT for PM10 is Storage, augers, elevators, conveyors all enclosed and vented to a fabric filter baghouse.

Therefore, BACT is satisfied for PM10.

Appendix M

Top-Down BACT Analysis – BFB's < 10 MW (New BACT Guideline)

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline X.Y.Z

Emission Unit: Biomass/biomass-fired boiler

Industry Type: Electrical Generation

Last Update: TBD

Equipment Rating: < 10 MW

Pollutant	Achieved in Practice or contained in SIP	Technologically Feasible	Alternate Basic Equipment
NO_x	0.024 lb/MMBtu, block 24 - hour average (Selective Catalytic reduction for ≥ 84% control efficiency, or equivalent, and natural gas auxiliary fuel)	1) 0.0121 lb/MMBtu, block 24-hour average (SNCR, SCR and biofilter for ≥ 91.9% control efficiency, or equivalent, and natural gas auxiliary fuel)	
SO_x	0.025 lb/MMBtu, block 24-hour average (Sorbent injection (e.g. limestone or hydrated lime injected into boiler bed) for ≥ 87.5% control efficiency, or equivalent, and natural gas auxiliary fuel)	1) 0.0067 lb/MMBtu, block 24 –hour average (Dry FGD w baghouse, sorbent injection (into BFB bed) and biofilter for ≥ 96.7% control efficiency, or equivalent, and natural gas auxiliary fuel).	
PM_{10}	0.024 lb/MMBtu, 30 minute average (Multiclone and ESP for ≥ 85.9% control efficiency, or equivalent, and natural gas auxiliary fuel)	1) 0.0020 lb/MMBtu, 30 minute average (baghouse and biofilter for ≥ 98.8% control efficiency, or equivalent, and natural gas auxiliary fuel). *Emission rate includes <u>both</u> filterable and condensable PM_{10}.*	
VOC	0.01 lb/MMBtu, 30 minute average (good combustion practices and natural gas auxiliary fuel)	1) 0.00043 lb/MMBtu, 30 minute average (Semi-dry flue gas scrubber with PAC sorbent injection, baghouse and biofilter for 97.5% control efficiency, or equivalent, and natural gas auxiliary fuel) 2) 0.0004 lb/MMBtu, 30 minute average (Biofilter for ≥ 90% control efficiency, or equivalent, and natural gas auxiliary fuel) 3) 0.004 lb/MMBtu, 30 minute average (Dry Flue Gas Scrubber with Powdered Activated Carbon (PAC) for ≥ 76.5% control efficiency, or equivalent, and natural gas auxiliary fuel)	

BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

***This is a Summary Page for this Class of Source - Permit Specific BACT Determinations on Next Page(s)**

X

1st Quarter 2012

San Joaquin Valley
Unified Air Pollution Control District

Best Available Control Technology (BACT) Guideline X.Y.Z

Emission Unit: Biomass/Biosolids-fired bubbling fluidized bed (BFB) boiler

Equipment Rating: 6.5 MW (211.52 MMBtu/hr)

Facility: Liberty Energy, Inc.

References: S-360-7-0, Project S-1080996

Location: 12421 Holloway Road Lost Hills, CA 93249

Date of Determination: March 8, 2012

Pollutant	BACT Requirements
NO_x	0.0121 lb/MMBtu (8.6 ppmv @ 3% O_2), block 24-hour average, for 91.9% control efficiency using SNCR, SCR, Biofilter and natural gas auxiliary fuel.
SO_x	0.0067 lb/MMBtu (3.3 ppmv@ 3% O2), block 24-hour average, for 96.7% control efficiency using Dry FDG w baghouse, sorbent injection (into BFB bed), biofilter and natural gas auxiliary fuel.
PM10	0.0020 lb/MMBtu, 30-minute average, for 98.8 % control efficiency using baghouse, biofilter and natural gas auxiliary fuel
VOC	0.00043 lb/MMBtu (0.9 ppmv @ 3% O_2), 30-minute average, for 97.5% control efficiency using Semi-dry scrubber with PAC sorbent injection and baghouse, biofilter, natural gas auxiliary fuel and good combustion practices.

BACT Status:

Achieved in practice Small Emitter T-BACT

x Proposed by applicant as Technologically feasible BACT

At the time of this determination achieved in practice BACT was equivalent to technologically feasible BACT

Contained in EPA approved SIP

Alternate Basic Equipment

The following alternate basic equipment was not cost effective:

Mail to: CAPCOA BACT Clearinghouse Project Assessment Branch P.O. Box 2815 Sacramento, CA 95812	For CAPCOA use only Record No.: ;Form No.: ;BLIS District Code: Codes - EPA Source: ;SCAQMD: ;EPA ID No.: ARB Sc: ,Ctrl: ;BLIS Process: ;AIRS Facility No.:

CAPCOA BACT DETERMINATION REPORTING FORM

Instructions: Complete this form when issuing an authority to construct. Please use on form per determination (i.e. pollutant). Please use one form per determination (i.e. pollutant) Section A need only be completed on one form in the case of a source with multiple determinations. See the reverse side for descriptions of the field identifiers used below. Please attach a copy of the permit or permit conditions if practical. Please call (916)327-5601 for clarification of any questions. (1/5/94)

SECTION A. Source Information

Company and Project Name: Liberty Energy, Inc.
Facility Address: 12421 Holloway Road, Lost Hills, CA 93249 SIC Code: 4953

Application No.: 1080996 ; Authority to Construct No.: S-360-7-0 Authority to Construct Issue Date:

District: SJVAPCD ; District Contact: David Warner; Phone No.: (559) 230-5900

Est. Startup Date: ; Today's Date: Jan 11, 2012 ; Permit Unit Status: *New*

Basic Equip./Process (include make and model): 211.52 MMBtu/hr biomass/biosolids-fired bubbling fluidized bed boiler
Rated Capacity: 211.52 MMBtu/hr; Output: N/A ; SCC Code:

Fuel Type: Biomass/Biosolids ; Backup Fuel(s): Natural Gas auxiliary fuel; Project Cost: $

SECTION B. Control Data **Pollutant: NOx**

Control Equip. SNCR, SCR and biofilter

Emissions: Uncontrolled: 0.15 lb/MMBtu x 211.52 MMBtu/hr = 761.5 lbm/day Controlled Limit: 61.4 lbm/day

Enforceable Permit Emissions Limit(s): 0.0121 lb/MMBtu, 61.4 lb/day

Emission Type: Point Cost of Control Equipment: N/A, applicant has proposed tech feasible BACT

Regulatory Requirement: Applicant proposed *Technologically feasible BACT* *Other:* N/A

BACT/LAER Specification: Reference or Basis: SJVAPCD

Mass Emission Rate: 61.4 lb-NOx/day ; Destruction efficiency (%): 91.9 %
Normalized Mass Emission Rate: 0.0121 lb-NOx/MMBtu

Emission Concentration *ppmvd or gr/dscf* at
Other: N/A
Method of Compliance Verification: N/A

Other Relevant Permit Limits: Time of Operation: N/A

Fuel use: 211.52 MMBtu/hr Percent Capacity/Use: 100%
Throughput: N/A
Other: N/A

Remarks: If installed and tested, will establish biofilter as a viable NOx control measure

Mail to: CAPCOA BACT Clearinghouse Project Assessment Branch P.O. Box 2815 Sacramento, CA 95812	For CAPCOA use only Record No.: ;Form No.: ;BLIS District Code: Codes - EPA Source: ;SCAQMD: ;EPA ID No.: ARB Sc: ,Ctrl: ;BLIS Process: ;AIRS Facility No.:

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SECTION A. Source Information

Company and Project Name: Liberty Energy, Inc.
Facility Address: 12421 Holloway Road, Lost Hills, CA 93249 SIC Code: 4953

Application No.: 1080996 ; Authority to Construct No.: S-360-7-0 Authority to Construct Issue Date:

District: SJVAPCD ; District Contact: David Warner; Phone No.: (559) 230-5900

Est. Startup Date: ; Today's Date: 1/11/2012 ; Permit Unit Status: *New*

Basic Equip./Process (include make and model): 211.52 MMBtu/hr biomass/biosolids-fired bubbling fluidized bed boiler
Rated Capacity: 211.52 MMBtu/hr; Output: N/A ; SCC Code:

Fuel Type: Biomass/Biosolids ; Backup Fuel(s): Natural Gas auxiliary fuel; Project Cost: $

SECTION B. Control Data Pollutant: VOC

Control Equip. Powdered activated carbon injection into flue gas scrubber w baghouse, good combustion practices and biofilter.

Emissions: Uncontrolled: (0.017 lb/MMBtu) 86.3 lbm/day Controlled Limit: (0.00043 lb/MMBtu) 2.2 lbm/day

Enforceable Permit Emissions Limit(s): 0.00043 lb/MMBtu, 2.2 lb/day

Emission Type: Point Cost of Control Equipment: N/A, applicant has proposed tech feasible BACT

Regulatory Requirement: Applicant proposed *Technologically feasible BACT* *Other:* N/A
BACT/LAER Specification: Reference or Basis: SJVAPCD

Mass Emission Rate: 2.2 lb-VOC/day ; Destruction efficiency (%): 97.5 %
Normalized Mass Emission Rate: 0.00043 lb-VOC/MMBtu

Emission Concentration *ppmvd or gr/dscf* at
Other: N/A
Method of Compliance Verification: N/A

Other Relevant Permit Limits: Time of Operation: N/A

Fuel use: 211.52 MMBtu/hr Percent Capacity/Use: 100%
Throughput: N/A
Other: N/A

Remarks:

Mail to: CAPCOA BACT Clearinghouse Project Assessment Branch P.O. Box 2815 Sacramento, CA 95812	For CAPCOA use only Record No.: ;Form No.: ;BLIS District Code: Codes - EPA Source: ;SCAQMD: ;EPA ID No.: ARB Sc: ,Ctrl: ;BLIS Process: ;AIRS Facility No.:

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SECTION A. Source Information

Company and Project Name: Liberty Energy, Inc.
Facility Address: 12421 Holloway Road, Lost Hills, CA 93249 SIC Code: 4953

Application No.: 1080996 ; Authority to Construct No.: S-360-7-0 Authority to Construct Issue Date:

District: SJVAPCD ; District Contact: David Warner; Phone No.: (559) 230-5900

Est. Startup Date: ; Today's Date: 1/11/2012 ; Permit Unit Status: *New*

Basic Equip./Process (include make and model): 211.52 MMBtu/hr biomass/biosolids-fired bubbling fluidized bed boiler
Rated Capacity: 211.52 MMBtu/hr; Output: N/A ; SCC Code:

Fuel Type: Biomass/Biosolids ; Backup Fuel(s): Natural Gas auxiliary fuel; Project Cost: $

SECTION B. Control Data Pollutant: PM10

Control Equip. Baghouse, good combustion practices and biofilter.

Emissions: Uncontrolled: 0.17 lb/MMBtu x 211.52 MMBtu/hr = 863.0 lbm/day Controlled Limit: 10.2 lbm/day

Enforceable Permit Emissions Limit(s): 0.0020 lb/MMBtu, 10.2 lb/day

Emission Type: Point Cost of Control Equipment: N/A, applicant has proposed tech feasible BACT

Regulatory Requirement: Applicant proposed *Technologically feasible BACT* *Other:* N/A
BACT/LAER Specification: Reference or Basis: SJVAPCD

Mass Emission Rate: 10.2 lb-PM10/day ; Destruction efficiency (%): 98.8 %
Normalized Mass Emission Rate: 0.0020 lb-PM10/MMBtu

Emission Concentration *ppmvd or gr/dscf* at

Other: N/A
Method of Compliance Verification: N/A

Other Relevant Permit Limits: Time of Operation: N/A

Fuel use: 211.52 MMBtu/hr Percent Capacity/Use: 100%
Throughput: N/A
Other: N/A

Remarks:

Mail to: CAPCOA BACT Clearinghouse Project Assessment Branch P.O. Box 2815 Sacramento, CA 95812	For CAPCOA use only Record No.: ;Form No.: ;BLIS District Code: Codes - EPA Source: ;SCAQMD: ;EPA ID No.: ARB Sc: ,Ctrl: ;BLIS Process: ;AIRS Facility No.:

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SECTION A. Source Information

Company and Project Name: Liberty Energy, Inc.

Facility Address: 12421 Holloway Road, Lost Hills, CA 93249 SIC Code: 4953

Application No.: 1080996 ; Authority to Construct No.: S-360-7-0 Authority to Construct Issue Date:

District: SJVAPCD ; District Contact: David Warner; Phone No.: (559) 230-5900

Est. Startup Date: ; Today's Date: 1/11/2012 ; Permit Unit Status: *New*

Basic Equip./Process (include make and model): 211.52 MMBtu/hr biomass/biosolids-fired bubbling fluidized bed boiler

Rated Capacity: 211.52 MMBtu/hr; Output: N/A ; SCC Code:

Fuel Type: Biomass/Biosolids ; Backup Fuel(s): Natural Gas auxiliary fuel; Project Cost: $

SECTION B. Control Data Pollutant: SOx

Control Equip: Dry Flue Gas Desulfurization, sorbent injection into the BFB boiler bed, baghouse and biofilter.

Emissions: Uncontrolled: 0.20 lb/MMBtu x 211.52 MMBtu/hr = 1,015.3 lbm/day Controlled Limit: 34.0 lbm/day

Enforceable Permit Emissions Limit(s): 0.0067 lb/MMBtu, 34.0 lb/day

Emission Type: Point Cost of Control Equipment: N/A, applicant has proposed tech feasible BACT

Regulatory Requirement: Applicant proposed *Technologically feasible BACT* *Other:* N/A

BACT/LAER Specification: Reference or Basis: SJVAPCD

Mass Emission Rate: 34.0 lb-SOx/day ; Destruction efficiency (%): 96.7 %

Normalized Mass Emission Rate: 0.0067 lb-SOx/MMBtu

Emission Concentration *ppmvd or gr/dscf* at

Other: N/A

Method of Compliance Verification: N/A

Other Relevant Permit Limits: Time of Operation: N/A

Fuel use: 211.52 MMBtu/hr Percent Capacity/Use: 100%
Throughput: N/A
Other: N/A

Remarks:

BACT ANALYSIS
Biomass/Biosolids-fired Boiler

Facility Name:	Liberty Composting Inc. dba Liberty Energy, Inc. / Liberty Energy V	Date:	March 8, 2012
Mailing Address:	1601 Skyway Dr. Suite 205 Bakersfield, CA 93380	Engineer: Lead Engineer:	Michael Buss Allan Phillips
Contact Person/ Telephone:	Wilson Nolan, CEO 661-391-5840 Steve Ketler, Manager of Engineering, 778-565-4655, Cell 778-288-7488		
Fax:	Mr. Nolan: 661-391-5844		
E-Mail:	Mr. Nolan: WENOLAN@MCCARTHYFARMS.COM		
Application #(s):	S-360-7-0, 8-0 and 9-0 (Three identical 6.5 MW power trains)		
Project #:	S-1080996		
Deemed Complete:	November 2, 2009		

I. Proposal

The primary business of Liberty Composting Inc. is co-composting of biosolids and biomass.

Liberty has requested Authority to Construct (ATC) permits for installation of a nominal 19.5 MW power plant powered by three 6.5 MW Von Roll bubbling fluidized bed (BFB) reactors. Each BFB has a maximum heat input rating of 211.52 MMBtu/hr[15], and power a steam turbine producing power to the grid. The proposal includes 3 identical power trains, each fired on a mixture of biomass and biosolids.

The applicant will still do co-composting (composting using biosolids and biomass) at the site, but will limit their compost operations to less than 100,000 tons per year (to avoid being subject to Rule 4565 class 2 mitigation measures). The rest of the feedstock will be diverted to the newly proposed power plant which will provide electricity to the grid.

Best Available Control Technology (BACT) is required for NOx, SO_x, PM_{10} and VOC emissions from the BFBs (reference Table 2). The BACT determination is performed on a unit-by-unit, pollutant-by-pollutant basis. Because all three proposed boilers are identical, the BACT analysis has been performed for one boiler, and the BACT determination applies to all three units.

The proposed new BACT guideline applies to units < 10 MW, whereas existing District BACT Guideline 1.3.2 only applies to units $\geq$ 10 MW.

[15] September 16, 2011 email from Steve Ketler of Liberty Energy.

II. Process Description

The applicant is proposing three identical boilers. Each proposed boiler will be a bubbling fluidized bed (BFB) boiler with a maximum heat input rating of 211.52 MMBtu/hr. The primary boiler fuels are biomass and waste water treatment plant Biosolids. The boiler will also be designed to fire natural gas for a startup fuel and for combustion stabilization, with a maximum natural gas firing rate of less than **60** MMBtu/hr. The primary boiler fuels are biomass and biosolids (from waste water treatment plants). Each boiler will also be designed to fire natural gas for startup fuel, with a maximum heat input rating (all fuels combined) not to exceed 211.52 MMBtu/hr. Natural gas is only used during startup; during normal operation no natural gas is used. The applicant proposes to only use natural gas fuel during startup of the units, with natural gas being less than 1% of the total MMBtu fuel burned per year.

FLUIDIZED BED BOILER TECHNOLOGY

The atmospheric pressure, fluidized bed technology was developed to minimize SO_2 and NO_x emissions from the combustion of high sulfur fuels such as coal and petroleum coke. The fluidized bed boiler combustion process minimizes NO_x formation and removes SO_x in the boiler before post combustion air pollution control systems. Fluidized bed boilers are excellent boilers for firing highly variable and low heat value fuels such as biomass.

In the BFB boiler, the bed of materials including the limestone, fuel, and ash is suspended by the combustion air flowing upward through an air distribution plate. In a BFB boiler, the fluidized bed is about 4 feet deep, and is characterized by a sharp density profile at the top of the bed. The sharp drop off in density indicates the end of the fluidized bed and the space above. Solid material is drained from the bed to maintain the desired bed depth. Some solid material is also entrained in the flue gas and is carried out of the furnace with the flue gas.

The limestone and sand create an abrasive bed of particles which assists in eroding fuel particles and completing the combustion process. Combustion air introduced at the bottom of the furnace keeps the mixture of fuel, limestone, sand, char, and ash "fluidized" in a constantly upward flowing stream. The highly turbulent, erosive conditions of a CFB achieve very high combustion efficiencies even though combustion takes place at relatively low temperatures of 1,500 to 1,650° F.

BFB FUELS

The primary fuels for the BFB boilers will be biomass and biosolids. The boilers will also be equipped with natural gas burners for start-up.

BFB BOILER DESIGN AND CONTROLS

The applicant is proposing to construct a steam/electric generation facility. The facility will be designed to produce a nominal 19.5 MW gross electric generation. Each BFB will be equipped with a steam turbine electric generator set.

Each of the 6.5 MW (211.52 MMBtu) bubbling bed boilers (BFB) is part of one power "train". Each train includes its own biosolids storage silos (2), biomass and biosolids fuel feed equipment, sand silo, hydrated lime storage silo, limestone silo, activated carbon silo, ash silo

and ash truck load out, and cooling tower with three (3) cells. Each BFB is served by its own selective non-catalytic reduction (SNCR); turbosorp semi-dry flue gas scrubber (active carbon and hydrated lime injected into the scrubber), baghouse, selective catalytic reduction (SCR) and biofilter.

BACT is also triggered for the biomass grinder, screens, ash truck load out and Emergency IC engines (NO_x, PM_{10} and VOC). However, only the BFBs are addressed in the top down BACT analysis being presented here.

The applicant is proposing to control NO_x emissions with the use of SNCR (ammonia injection), low temperature SCR and biofilter.

Liberty proposes the use of a baghouse for each BFB "power train" (PM_{10}), a semi-dry flue gas scrubber (with PAC injection for HCL, mercury and Dioxin/furan control, and hydrated lime injection for SO_x control).

BIOFILTER FOR NOX EMISSIONS CONTROL

The biofilter is a new approach to NO_x control and has been documented by CARB[16] as a potential NO_x control technology. The applicant is proposing the biofilter to further polish the NO_x emissions such that less offsets will be required for the project. It is technologically feasible, but not yet established as being cost effective in use. The applicant is currently in the process of performing experimental testing at another site to confirm the viability of the control technology. As far as the District knows - biofilter control of NO_x emissions has not been demonstrated before on this type of operation.

The following table summarizes the proposed control technologies.

[16] "Biofilter Technology for NOx Control", Contract No. 96-304 Final Report, February 1999, California Air Resource Board Research Division. Prepared for CARB by Nate J. Hudepohl and staff of the Department of Civil and Environmental Engineering, University of California, Davis.

Table 1

Proposed control technologies for the Biomass/Biosolids-fired BFB

Pollutant	Proposed Control Technology	Proposed Emission Factor	
		lb/MMBtu	ppmv at 3% O_2
NO_x	SNCR, SCR & biofilter	0.0121	8.55
CO	Biofilter	0.0155	17.3
SOx	Flue gas desulfurization (injecting hydrated lime into the semi-dry Turbosorp flue gas scrubber), sorbent injection (Lime or limestone injection into BFB bed), baghouse and biofilter	0.0067	3.25
PM_{10}	Baghouse and biofilter	0.00197-->0.0020	
VOC	Good combustion practices, Powdered activated carbon injected into the flue gas in the semi-dry Turbosorp flue gas scrubber (also controls mercury, Beryllium and dioxins/furans) & biofilter	0.00043	0.87
HCL	Semi-dry Turbosorp flue gas scrubber with injected Powdered Activated Carbon (PAC)	0.0028	2.26
NH3	Biofilter	0.005	10

As seen above, the proposed emissions factors for Liberty are extremely low because of the combination of control technologies proposed. The District is not aware of any biomass BFB operating with both SNCR, SCR and exhausting to atmosphere through a biofilter for NOx control. The combination of all the proposed controls combined, if installed and proven to be effective, would result in very low emissions of all criteria pollutants.

A summary of uncontrolled emission factors for the 211.52 MMBtu/hr BFB boilers is shown in Table 3 below. The basis for each uncontrolled emission factors (EF) is explained in the top-down BACT analysis included in the following pages.

Operating schedule: 24 hr/day, 365 day/year

III. EMISSION CONTROL TECHNOLOGY EVALUATION:

A. BACT Applicability

District Rule 2201 Section 4.1 requires that BACT shall be applied to any unit with a BACT IPE of any pollutant greater than 2 lb/day. Since the BACT IPE is greater than 2 lb/day for all pollutants for each boiler, BACT is triggered for all criteria air contaminants (except CO).

TABLE 2

Daily Emissions 1 BFB (211.52 MMBtu/hr)			
Pollutant	**lb/day**	**≥ 2 lb/day**	**BACT triggered?**
NO_x	61.4	Yes	**Yes**
SOx	34.0	Yes	**Yes**
PM_{10}	10.2	Yes	**Yes**
CO	78.7	(< 200,000 lb/yr)	No
VOC	2.2	Yes	**Yes**

TABLE 3

Proposed Control Efficiencies						
Pollutant	**Uncontrolled EF** (lb/MMBtu)	**Max heat input** (MMBtu/hr)	**Max PE uncontrolled** (lb/day)	**CE %**	**Controlled EF** (lb/MMBtu)	**Controlled PE** (lb/day)
NO_x	0.1499	211.52	761.0	91.9	0.0121	61.4
SOx	0.20	211.52	1015.3	96.7	0.0067	34.0
PM_{10}	0.17	211.52	863.0	98.8	0.0020	10.2
CO	N/A	N/A	N/A	N/A	0.0155	78.7
VOC	0.017[17]	211.52	86.3	97.6	0.00043	2.2

B. BACT Policy

Since there is no BACT Guideline in the most recent District BACT Clearinghouse which governs this class and category of emissions unit, a new BACT Analysis shall be performed.

The USEPA RACT/BACT/LAER Clearinghouse, the California Air Pollution Control Officers Association (CAPCOA) BACT Clearinghouse, and the Bay Area Air Quality Management District (BAAQMD) BACT Guidelines were reviewed to determine potential control technologies for this class and category of operation but no applicable guidelines were found for biosolids/biomass-fired BFBs.

However, the SJVAPCD recently approved a 3 MW biomass-fired BFB for Musco Olive (N-1145-7-0) which was installed and source tested 4/12/2011 (establishing achieved-in-practice BACT for NOx as 0.024 lb-NOx/MMBtu. Achieved-in-practice emission rates for SOx, PM10 and VOC are

[17] Uncontrolled EF based on uncontrolled established in Oct 2011 approval of WE Energies BFB boiler, Wisconsin.

based on a Massachusetts BACT guidance document (see attachment 1) for biomass-fired Electric Generating facilities.

C. BACT Analysis for Permit Unit S-360-7-0 (and 8-0 and 9-0), Biosolids/biomass-fired *bubbling fluidized bed* boiler.

NOx Emissions

Step 1 - Identify All Possible Control Technologies

There are two major technology categories for controlling NO_x emissions from the BFB boiler: combustion controls and post-combustion controls. Combustion controls include technologies to avoid NO_x formation. Post-combustion controls reduce emissions after NO_x formation.

Combustion Controls

Low NO_x burners (LNB)
Overfire air (OFA) – Staged Combustion
Flue Gas Recirculation (FGR)
Oxygen-Enhanced Combustion (OEC)

Post Combustion Controls

Selective Non-Catalytic Reduction (SNCR)
Selective Catalytic Reduction (SCR)
SCO NO_x
Biofilter (see note below)

Note: The biofilter is listed because it is proposed. It is a not a technology which has been applied to full scale operations and therefore is not considered "demonstrated". The use of a biofilter is not a proven NO_x control measure for BFB boilers.

Alternate Basic Equipment: None

Step 2 - Eliminate Technologically Infeasible Options

Low NO_x burners and Overfire Air

Low NO_x burners (LNB) are designed to control the mixing of the air and fuel to reduce the peak temperatures of combustion. Fluidized bed boilers do not use burners to inject the fuel into the boiler. Therefore LNBs are not technologically feasible for fluidized bed boilers.

Overfire air (staged combustion) is typically used with Low NO_x burners. This technique is used in pulverized coal and stoker-fired boilers to create an oxygen depleted zone where unburned hydrocarbon species act to reduce the NO_x. The overfire air creates an oxidation zone to complete combustion. NO_x formation is minimized by completing combustion in an air-lean environment.

In a fluidized bed boiler, primary air is introduced at the bottom of the boiler to fluidize the bed while secondary air is added at a higher elevation to complete combustion. Staged combustion or overfire air is a part of the standard design for all new fluidized bed boilers (inherent in the design and operation of the boiler) and will therefore not be listed in step 3.
Flue Gas Recirculation

Flue gas recirculation is an additional combustion process often used in conjunction with low NO_x burners to reduce peak flame temperatures and create an oxygen depleted zone in the boiler. Typically FGR would be used in a small pulverized coal-fired boiler. The process is not necessary for a fluidized bed boiler because the peak flame temperatures and NO_x are already minimized by the fluidized bed design. Therefore, FGR is not an applicable NO_x control technology for fluidized bed boilers.

Oxygen-Enhanced Combustion (OEC)

OEC is a combustion control method aimed at reducing the formation of thermal NO_x. Praxiar Technology, Inc. developed a method of using oxygen to achieve additional NO_x reduction from low NO_x burners on pulverized coal-fired boilers. In pilot and full-scale testing, NO_x emissions were reduced[18] by as much as 60%, to levels below 0.15 lb/MMBtu, when a small portion of low- NO_x burner combustion air was replaced with locally injected oxygen.

OEC has never been demonstrated or used on a fluidized bed boiler. Because there is no operational experience with OEC on fluidized bed boilers, and because the application of OEC to fluidized bed boilers has significant technological questions, OEC is not a technologically feasible control option for the Liberty Energy boilers.

Selective Non-Catalytic Reduction (SNCR)

In a selective non-catalytic reduction (SNCR) control system, urea or ammonia is injected into the boiler where the flue gas temperature is approximately 1,600 to 2,100 degrees F. The reagent, urea [$CO(NH_2)_2$] or ammonia [NH3], reacts with NO_x, forming elemental nitrogen [N_2] and water without the need of a catalyst. The U.S. EPA estimates SNCR control efficiencies of 25 – 40% (AP-42, page 1.1-9).

The critical parameters for successful and effective control of NO_x emissions are a proper temperature window and adequate residence time at that temperature for the reaction to occur. The SNCR processes typically require three or four times as much reagent as SCR systems to achieve similar NO_x reductions, and the SNCR cannot achieve NO_x reduction efficiencies as high as SCR systems.

Certain boiler types are more suited for SNCR due to the combustion unit design. Boilers with furnace exit temperatures of 1550° F to 1950° F, residence times greater than one second, and high levels of uncontrolled NO_x are good candidates[19]. Therefore, SNCR is a feasible control option for the biomass/biosolids-fired boiler.

[18] James River Power Station Unit 3, a wall-fired boiler.
[19] From the U.S. EPA document EPA-452/F-03-031, Air Pollution Control Technology Fact Sheet, Selective Non-Catalytic Reduction, at http://www.epa.gov/ttn/catc/dir1/fsncr.pdf.

Selective Catalytic Reduction (SCR)

Selective Catalytic Reduction (SCR) is a post combustion NO_x control system. SCR systems consist of an ammonia injection system and a catalytic reactor. The ammonia injection grid is located upstream of the catalyst. Ammonia reacts with NO_x and O2 in the presence of the catalyst to form molecular nitrogen (N2) and water. The process is called 'selective" because ammonia reacts with NO_x in the flue gas in the presence of a catalyst. A catalyst is used to enhance NO_x reduction and ammonia utilization. For most boiler applications, the SCR catalyst has an optimum operating range of 650-750°F. The "tail gas" SCR system proposed with the Liberty Energy boiler is located downstream of the air heater and particulate control system. Flue gas reheating is necessary to increase the flue gas temperature to the correct operating temperature required by the SCR process.

Tail gas SCR is a technologically feasible control option for biomass-fired boilers (e.g., in use at the Boralex Stratton Energy, LP biomass-fired plant in Maine). The SJVAPCD recently permitted a 3 MW biomass-fired BFB combustor with SCR (Musco Olive permit N-1145-7-0) which was subsequently source tested verifying compliance with their 0.024 lb-NOx/MMBtu emission limit. Therefore achieved-in-practice BACT will be listed as 0.024 lb-NOx/MMBtu for the proposed BFB combustors.

Catalytic Absorption/Oxidation (SCONOx™)

SCONOx™ is a control technology that has been applied in combustion turbine and industrial applications. However, this technology has never been demonstrated on solid fuel-fired boilers.

The SCONOx system is based on a proprietary catalytic oxidation and absorption technology. In operation, NO_x and CO are first oxidized to NO2 and CO2. Next, NO2 is adsorbed onto an adsorption media. When the media is saturated, NO2 is desorbed and treated by the proprietary catalyst; there is effectively no difference between SCONOx and an oxidation catalyst in terms of CO and VOC control.

To date, SCONOx has only been installed on small scale natural gas-fired combustion turbines. Therefore, this technology is not technologically feasible for solid fuel biomass/biosolids-fired boilers.

Biofilter

The use of a biofilter is an emerging control technology. However, this technology is not yet proven with a long term demonstrated level of performance for NO_x control. No full size commercial scale NO_x biofilter has been installed or operated.

Even though there is not a proven record of commercial operation, this emerging control technology will be listed in the technologically feasible column because it is proposed by the applicant.

Conclusion – the following NOx control technologies are considered feasible: SCR, SNCR and biofilter.

Step 3 - Rank Remaining NOx Control Technologies by Control Effectiveness

The "uncontrolled" NO_x emission rate for bubbling fluidized bed (BFB) boilers is 30 – 50% less than the uncontrolled NO_x emission rate for stoker boilers firing biomass fuels. Tail gas SCR systems can be designed for control efficiencies of around 90%. The proposed use of both SNCR and SCR, along with the proposed 40% CE for the biofilter, results in an emission factor of 0.0121 lb/MMBtu. Achieved-in-practice BACT for NOx was established based on the permitted NOx limit for Musco Olive (SJV permit number N-1145-7-0). That unit passed the startup source test - demonstrating compliance with their 0.024 lb-NOx/MMBtu emission limit.

SNCR can achieve control efficiencies between 25 and 40%. It is important to note that the SNCR effectiveness can be reduced dramatically during low load operation of the BFB boilers. At low loads, the fluidized bed temperature can drop below the minimum SNCR operating temperature of approximately 1600°F. Fluctuations in the Btu content of the fuel also affect the SNCR optimal range. The control efficiency of the proposed SNCR system for the proposed boilers is 33%.

Rank by NOx Control Effectiveness			
Rank	**Option**	**% Control**	**Expected emissions (lb/MMBtu)**
I	SNCR, SCR and biofilter, and natural gas auxiliary fuel *(proposed by applicant)*	≥ 91.9	0.0121
I	SCR, or equivalent, and natural gas auxiliary fuel. ***Achieved-in-practice BACT*** - *in use at Musco, SJV PTO # N-1145-7-0.*	≥ 84 %	0.024
II	Biofilter, or equivalent, and natural gas auxiliary fuel	≥ 40%	0.090
III	Selective Non Catalytic Reduction (NSCR), or equivalent, and natural gas auxiliary fuel	≥ 33%	0.100

Step 4 - Cost Effectiveness Analysis

A cost-effective analysis is not required because the applicant is proposing the most effective alternative in the ranking list from step 3.

Step 5 - Select BACT for NOx

The most effective control option not eliminated in Step 4 is BACT for the pollutant and emissions unit under consideration. The applicant is proposing the most effective control option. Therefore, BACT for NO_x emissions from the BFB is the applicant-proposed use of SCR, SNCR and biofilter and natural gas as auxiliary fuel for ≥ 91.9% control efficiency and emissions ≤ 0.0121 lb-NOx/MMBtu.

SOx Emissions

Sulfur dioxide (SO2) emissions from solid fuel-fired boilers result from the oxidation of sulfur compounds in the fuel. A portion of the SO_2 and SO_3 will react with alkaline products in the ash, such as calcium oxide (CaO), sodium hydroxide (NaOH), potassium oxide (K_2O) and water to form calcium sulfate, sodium sulfate, and potassium sulfate. These reaction products are solids which are collected in the fabric filter baghouse as filterable particulate matter. Ash in the boiler and in the filter cake of the fabric filter baghouse will reduce SO_2 emissions.

Step 1 - Identify All Possible Control Technologies

Potential sulfur dioxide (SO_2) control technologies include combustion controls (sorbent injection into the BFB bed) and post combustion controls such as flue gas desulfurization (FGD) and biofilters. The technologies in use for biomass-fired boilers (contained in the U.S. EPA RACT/BACT/LAER Clearinghouse) include duct sorbent injection, limestone injection into the fluidized bed boiler, and wet venturi scrubbers. Emission limits range from 0.014 to 0.80 lb/MMBtu of heat input. Available technologies include wet and dry FGD systems. Uncontrolled emissions = 0.20 lb/MMBtu based on 40CFR60.42.

Option 1: Proposed by applicant. Semi-dry FGD w baghouse, sorbent injection (into BFB bed) and biofilter, for overall 96.7 % control efficiency
Option 2 Wet Flue Gas Desulfurization (wet FGD) - 90% control
Option 3: Sorbent injection – 87.5% control *(based on Massachusetts guideline)*
Option 4: Dry Flue Gas Desulfurization (dry FGD) - 85% control
Option 5: Biofilter – 50% control per applicant
Alternate Basic Equipment: None

Step 2 - Eliminate Technologically Infeasible Options

Wet FGD (Option 2)

Wet FGD is a well demonstrated technology for the control of SOx emissions from coal-fired boilers. They have been installed primarily on large utility scale pulverized coal-fired boilers combusting higher sulfur coals. There are no fluidized bed boilers equipped with wet FGD systems, nor is the District aware of a biomass-fired boiler equipped with a wet FGD system. The proposed operations are designed to operate with a baghouse in conjunction with a dry FGD system. Wet FGD is not technologically feasible because moisture added to the exhaust stream would have an adverse impact on the feasibility of the baghouse (used for PM_{10} control).

Sorbent Injection (Option 3)

Sorbent injection systems inject sorbent, typically sodium or calcium-based substances (i.e. limestone or hydrated lime) into the boiler furnace.

Based on the Massachusetts BACT guideline (attachment 1) – achieved-in-practice BACT is 0.025 lb/MMBtu ($\geq$ 87.5% CE) using sorbent injection into the furnace bed. Therefore achieved-in-practice BACT will be listed as 0.025 lb-SOx/MMBtu on the proposed BACT guideline.

Sorbent Injection technical feasibility.

Dry sorbent injection is a technically feasible control option for this boiler. The applicant has proposed lime or limestone injection into the fluidized bed.

Dry Flue Gas Desulfurization (FGD) (Option 3)

The sorbents used in with dry FGD are typically either sodium or calcium-based and are injected in the downstream ductwork prior to the PM control system. Calcium based sorbents include limestone and hydrated quicklime; sodium-based sorbents include sodium bicarbonate, and trona (sodium sesquicarbonate or $Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$) may be injected into the duct upstream of the PM control system. The fly ash, sorbent reaction products, and unused sorbent are collected in the PM control system. Typical SO2 removal efficiencies range from 25 to 50%, although higher removal efficiencies are reported at high molar ratio sorbent injection rates.

Dry FGD is a well demonstrated technology for the control of SO_2 emissions from coal-fired electric generating units. Like wet FGD systems, dry FGD systems can be divided into several types. Dry FGD systems involve injecting a dry sorbent into the furnace or flue gas duct; the by-product solids are collected with the boiler fly ash. In semi-dry FGD systems, the sorbent is introduced as an aqueous slurry or a humidified dry powder to improve SO_2 control efficiency. The water content is controlled so that the reaction by-products are dry solids. While the flue gas temperature in both types remains above the adiabatic saturation temperature, the semi-dry systems have lower temperatures and a closer approach to the saturation temperature. The primary PM control system for dry FGD applications is often a fabric filter baghouse since they can provide higher reagent utilization.

Dry FGD systems do not have a saturated plume and, therefore, do not require the same design elements related to a saturated and corrosive plume as wet FGD systems. Since the dry FGD reaction products are also dry, there is no need for dewatering equipment or wastewater discharge. The reaction product in dry FGD systems is primarily calcium sulfite, with smaller amounts of calcium sulfate. Because of the calcium sulfite content, the dry FGD byproduct will undergo pozzolanic (cementitious) reactions when wetted. This material has limited commercial value and is typically disposed of as waste material.

Lime Spray Drying Absorber

One of the most widely used dry FGD technologies is the lime spray dry absorber (LSDA). LSDA is a semi-dry FGD technology that is often used on utility scale low sulfur coal-fired boilers. The LSDA process employs a spray dryer absorber (SDA) and a downstream PM control device. The SDA introduces a lime or limestone slurry and flue gas at the top of an absorber vessel. Rotary atomizers or nozzles are used to create a spray of slurry droplets which are dispersed in the flue gas stream. The water in the slurry droplets evaporates as the flue gas passes through the absorber, cooling and humidifying the flue gas stream and rapidly drying the slurry to a powder. In practice, water is added to control the SDA outlet temperature to approximately 155°F, or an approach temperature approximately 25°F above the saturation temperature. SO_2 in the flue gas reacts with calcium hydroxide

in the reactor or on the fabric filter bags to form solid calcium sulfite ($CaSO_3$) and calcium sulfate (CaSO4):

$2Ca(OH)_2$ (s) + $2SO_2$ (g) + $2H_2O$ (g) → $2(CaSO_3 \cdot 2H_2O)$
$2Ca(OH)_2$ (s) + $2SO_2$ (g) + $2H_2O$ (g) + O_2 → $2(CaSO_4 \cdot 2H_2O)$

Fly ash, reaction products, and unreacted lime are captured downstream in the baghouse.

Advanced Semi-Dry FGD Systems

Advanced Semi-Dry FGD systems include circulating fluidized bed (CFB) systems, hydrated lime injection systems such as **Turbosorp**, circulating dry scrubbers (CDS), and flash dry absorbers, also called novel integrated desulphurization system (NIDS). These systems are often utilized in circulating fluidized bed (CFB) boiler applications where excess lime (CaO) produced in the CFB boiler can be used to further reduce SO_2 emissions. The ash captured in the baghouse containing excess lime is hydrated to form calcium hydroxide ($Ca(OH)_2$). The ash is then reinjected into the flue gas in a vessel upstream of the PM control device.

These advanced semi-dry systems may be contrasted with conventional SDA systems in that the ash is humidified but remains a free-flowing solid, as opposed to being hydrated to a slurry as in the SDA process. This lower water content eliminates the need for slurry handling, atomization, and a large reactor. Reinjecting a dry solid also allows the reagent to disperse rapidly in the flue gas. These systems may also be contrasted with conventional SDA systems in that the solids recirculation rate is 30 to 100 times, compared to 3 – 5 times in a conventional SDA system. These semi-dry FGD systems have demonstrated the ability to achieve SO_2 emission reductions equivalent to, and in some cases greater than that achieved by conventional dry FGD systems and LSDA.

Technical feasibility – Using dry FGD lime spray drying or advanced semi-dry FGD

Dry FGD systems, including lime spray drying absorbers, circulating fluidized bed systems, hydrated lime injection systems, and flash dryer absorbers, are all demonstrated for the control of SO2 emissions from coal-fired boilers. While the proposed biomass/biosolids-fired boiler will fire low sulfur fuels, these dry and semi-dry FGD systems are never-the-less technically feasible control options.

Emerging Flue Gas Desulfurization Technologies (none considered technologically feasible).

Emerging SO2 control technologies include Enviroscrub (also known as the Pahlman process), ECO scrubber, REACT, and the Airborne process. These emerging technologies are not yet demonstrated through installation and successful operation on a full scale boiler or are not available or applicable. Of these advanced processes, the ECO system process is closest to commercial operation. The ECO process has been installed as a slip stream unit on a bituminous coal-fired boiler. The ECO system being offered is a redesigned version of the slip stream scrubber taking into account the "lessons learned." The ECO system design has not yet been installed or demonstrated on a full scale on any boiler.

SOx control options (continued)

REACT

The REACT technology from Japan consists of three major process steps: absorption, regeneration, and byproduct recovery. The absorption process utilizes pelletized activated coke (ATC) and ammonia for removal of SO_2 and sulfuric acid from the flue gas. The mechanism for the removal of pollutants is very different between the REACT and wet FGD processes, although they are both located in the flue gas stream downstream of the primary PM control system. The absorption and regeneration processes of the REACT technology are dry, and require secondary particulate removal to collect the reaction product.

Airborne ProcessTM

In October, 2004, the U.S. Department of Energy announced that Peabody Energy's Mustang Energy project will be awarded a $19.7 million Clean Coal Power Initiative grant for demonstrating technology to achieve ultra-low emissions at a proposed facility near Grants, New Mexico. The Project is intended to demonstrate Airborne's emission control process. The technology would combine dry sodium bicarbonate injection with enhanced wet sodium bicarbonate scrubbing. Because the sodium bicarbonate reagent is expensive and the reaction product has limited value, the Airborne Process™ is intended to regenerate the scrubber reagent. The regeneration process would recover the reagent for reuse and convert SO2 and NOx into ammonium sulfate and ammonium nitrate fertilizers.

Emerging FGD desulfurization technologies technical feasibility.

While several advanced FGD technologies show promise in achieving very low SO2 emission rates, these processes are not commercial, nor are they demonstrated in practice. Due to the lack of demonstrated performance, these technologies are not technically feasible control options for the proposed biomass/biosolids-fired boiler.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

Rank by SOx Control Effectiveness			
Rank	**Option**	**Control Efficiency**	**Expected emissions (lb/MMBtu)**
I	Dry flue gas desulfurization (DFGD), baghouse, sorbent injection (into furnace bed) and biofilter, or equivalent, and natural gas auxiliary fuel *(applicant proposed)*	≥ 96.7%	0.0067
II	Sorbent injection (e.g. limestone or hydrated lime injected into the furnace bed), or equivalent, and natural gas auxiliary fuel. (**Achieved-In-*practice BACT*** *per Massachusetts guidance document)*	≥ 87.5%	0.025
III	Dry or semi-dry flue gas desulfurization (FGD) and baghouse, or equivalent, and natural gas auxiliary fuel	≥ 85%	0.03
IV	Biofilter, or equivalent, and natural gas auxiliary fuel	≥ 50%	0.10

SOx control options (continued)

Step 4 - Cost Effectiveness Analysis

A cost-effective analysis is not required because the applicant is proposing the use of the most effective alternative in the ranking list from step 3.

Step 5 - Select BACT

The most effective control option not eliminated in Step 4 is BACT for the pollutant and emissions unit under consideration is BACT. No control options were eliminated in Step 4.

The applicant has proposed the most effective control option listed in step 4. Therefore BACT for SOx emissions from the BFB boiler is the applicant proposed use of Semi-dry FGD (Using Turbosorp semi-dry scrubber with sorbent injection) and Sorbent injection (limestone or hydrated lime injection into the fluidized bed) with flue gas being vented to a baghouse, then exhausted to atmosphere through a biofilter, for an overall control efficiency $\geq$ 96.5% (0.0067 lb/MMBtu).

PM_{10} Emissions

Step 1 - Identify All Possible Control Technologies

Particulate matter (PM) emissions from solid fuel-fired boilers originate from the ash in the fuel, non-combustible matter in the limestone, from products of incomplete combustion, and from the reaction products in flue gas desulfurization systems.

Both filterable (front half) and condensable (back half) emissions are included. In general, fabric filters are expected to have the best control of both filterable and especially condensable PM. The uncontrolled (front half) emission factor from 40CFR60.43 = 0.085 lb/MMBtu, therefore expected uncontrolled combined EF (front and back combined) = 2 x 0.085 = 0.17 lb-PM_{10}/MMBtu[20].

The control technology options include:

Option 1 Baghouse and biofilter *(applicant proposed)*
Option 2 Baghouse or ESP *(85.9% CE, achieved-in-practice per Massachusetts BACT guideline)*
Option 3 Venturi Scrubber
Option 4 Biofilter
Alternate Basic Equipment: None

[20] The combined filterable and condensable emissions are typically twice the filterable emissions for units served by baghouses. This ratio is based on permitted PM10 emissions for Mancelona Renewable (0.012 filterable/0.025 combined), North Michigan University (0.0125/0.025), Nacogdoches Power LLC (0.015/0.032), and Yellow Pine Energy (0.01/0.018).

Step 2 - Eliminate Technologically Infeasible Options

Because the system is a dry system using a baghouse, option 3 is not technologically feasible. All other listed options are infeasible.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

Rank	Control System	Expected performance lb/MMBtu	
		PM Filterable (front half)	PM_{10} Condensable + filterable
I	Baghouse or ESP, and biofilter with ≥ 98.8% control efficiency *(applicant proposed)*	0.001	0.002
II	Baghouse or ESP with 85.9% control, or equivalent, and natural gas auxiliary fuel. (**Achieved-in-*practice BACT*** *per Massachusetts guidance document)*	0.012	0.024
III	Biofilter with 40% control, or equivalent, and natural gas auxiliary fuel		0.10

Step 4 - Cost Effectiveness Analysis

A cost-effective analysis is not required because the applicant is proposing the most effective alternative in the ranking list from step 3.

Step 5 - Select BACT

The most effective control option not eliminated in Step 4 is BACT for the pollutant and emissions unit under consideration. No control options were eliminated, the applicant is proposing the most effective alternative in the ranking list from Step 3.Therefore BACT for PM10 emissions from the BFB is the use of Baghouse and biofilter, and natural gas auxiliary fuel, for 98.8% control.

VOC

Step 1 - Identify All Possible Control Technologies

VOC are emitted from the biomass/biosolids-fired boilers as a result of incomplete combustion. Applicant is proposing VOC emissions of 0.00043 lb/MMBtu (2.2 lb/day/boiler). In reviewing the emission limits for new units (RACT/BACT/LAER Clearinghouse) and existing permits for biomass-fired boilers in the United States, emissions limits vary considerably. Uncontrolled emissions are assumed to be 0.017 lb/MMBtu (determined to be achieved-in-practice BACT for recent approval of uncontrolled WE Energies BFB boiler – using good combustion practices.)

Because the applicant is proposing a Turbosorp flue gas scrubber (with injection of powdered activated carbon (PAC)) and biofilter – it is not surprising to see a proposed emission factor which is more than 1 order of magnitude smaller than the emission factor shown above.

The VOC control technology options include:

Option 1. Dry (or semi-dry) flue gas scrubber with PAC sorbent injection, baghouse and biofilter for 97.5% control efficiency, or equivalent
Option 2. Oxidation Catalyst
Option 3. Thermal Oxidation
Option 4. Biofilter
Option 5. Flue gas scrubber with powdered activation carbon injection
Option 6. Good combustion practices and NG aux fuel

Alternate Basic Equipment: None

Step 2 - Eliminate Technologically Infeasible Options

Oxidation Catalyst (Option 1)

Oxidation catalysts are used to reduce CO emissions - and to a lesser extent VOC emissions – from natural gas or oil-fired combustion turbines, with typical VOC reductions of 50% or less. However, oxidation catalysts have limited demonstration on biomass-fired boilers, and the District is not aware of any demonstration or commercial operation of oxidation catalysts on a fluidized bed boiler. Boilers have several characteristics that make the use of oxidation catalysts technically infeasible, including catalyst fouling and poisoning by the wood fly ash, and low excess oxygen levels in the flue gas.

Oxidation catalysts are generally noble metal catalysts which are susceptible to poisoning from sulfur and calcium bearing compounds. These catalysts may experience rapid deactivation and fouling in biomass fired boiler flue gas streams with high particulate loading. To be effective, the oxidation catalyst must be placed in a location with gas temperatures of at least 600 °F. This location would be near the boiler economizer outlets, a location with high ash loading and low excess oxygen levels.

VOC (continued)

A research effort to assess catalyst deactivation mechanisms was presented at the 2008 Advanced Combustion Engineering Research Center conference which reported that SCR catalyst poisoning is the predominant deactivation mechanism resulting from biomass combustion. Note that oxidation catalysts and SCR catalysts have similar poisoning mechanisms. The study ranks the order of poisoning of the alkali-metals and alkaline-earth metals from having the most effect to lesser effect as potassium, followed by sodium, followed by calcium, and states that the "effects are proportional to basicity of the exhaust gas." [21] The study showed the difference of coal versus biomass ash composition and that the relative proportion of potassium is much greater in the biomass ash than in coal ash.

Because of the presence of these base compounds and the low acid gas constituents such as sulfur dioxide (SO_2), biomass flue gas tends to be basic while especially high sulfur coal combustion flue gas tends to be acidic. This exacerbates the catalyst deactivation and is the primary reason that oxidation catalyst and SCR systems located in a high dust environment are not feasible for biomass combustors. This problem is worsened by the BFB boiler design which has an extremely high dust loading. Erosion, plugging, and blinding are major potential problems in fluidized bed boiler applications due to the very high particulate loading in the boiler.

To reduce the fouling and catalyst poisoning problems, the oxidation catalyst can be located downstream of the particulate matter control device. However, this "tail gas" oxidation catalyst control configuration does not eliminate fouling and deactivation, since the exhaust gas stream remains highly alkaline.

To reduce the ash fouling and catalyst poisoning problems, the oxidation catalyst can be located downstream of the particulate matter control device. However, this "tail gas" oxidation catalyst control configuration has another problem; the lack of sufficient excess oxygen to effectively reduce VOC emissions. Oxidation catalysts operate according to the following reaction for propane as an example:

$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

Typical excess oxygen (O_2) levels in combustion turbines are 12 – 15%, compared to 3 – 6% in biomass-fired boilers. These low excess O_2 levels will limit the effectiveness of the oxidation catalyst.

Because of these serious technical problems and the fact that oxidation catalysts have not been demonstrated on similar fluidized bed biomass boilers, the District has concluded that oxidation catalysts are not a technically feasible CO (or VOC) control technology for these biomass-fired boilers.

[21] Guo,X, et.al. *Poisoning/Deactivation Study of ...SCR Catalysts*, ACERC Annual Conference, February 2008.

VOC (continued)

Thermal Oxidation (Option 3)

Thermal oxidation has never been required nor used on a biomass-fired boiler, and its theoretical ability to reduce VOC emissions from these boilers is questionable. Thermal oxidation would involve injecting additional air into the flue gas and heating the oxygen enriched mixture to approximately 1,500 °F to oxidize VOC to carbon dioxide and water. However, since the combustion of the reheat fuel would itself result in VOC emissions, there is no evidence that thermal oxidation would result in any CO or VOC emission reductions. Since thermal oxidation has never been demonstrated on a biomass-fired boiler, and because there is no evidence that it could reduce VOC emissions, thermal oxidation is not a technically feasible VOC control technology for biomass/biosolids-fired boilers.

Biofilter (Option 4)

A biofilter may be used to control VOC emissions, although it is not in common use as a combustion control device. The applicant has proposed the use of the biofilter primarily for NOx control (lower offsets required). But the biofilter also provides VOC control and a control efficiency of 90% is proposed across the biofilter for VOC emissions.

Therefore this control option is feasible for the proposed operations (BFBs).

Flue gas scrubber with powdered activation carbon injection (Option 5)

The flue gas scrubber proposed with this project is primarily for HCL, Mercury and Dioxin/furan control (acid gas scrubber). However, the powdered activated carbon (PAC) injected into the Turbosorp semi-dry scrubber is effective at VOC control as well. A proposed control efficiency of 76.5% is proposed across the semi-dry PAC flue gas scrubber.

This control option is feasible for the proposed BFB operation.

Good Combustion Practice and natural gas auxiliary fuel (Option 6)

Good BFB combustion practices or combustion controls generally include the following components:

1. Good air/fuel mixing in the combustion zone.
2. High temperatures and low oxygen levels in the primary combustion zone.
3. Overall excess oxygen levels high enough to complete combustion while maximizing boiler thermal efficiency.
4. Sufficient residence time to complete combustion.

In biomass-fired boilers, good combustion practices are the only technically feasible VOC control technology. Combustion efficiency is related to the three "T's" of combustion: *Time, Temperature, and Turbulence*. These components of combustion efficiency are designed into utility boilers to maximize fuel efficiency and reduce the highest single operating cost of a utility boiler – fuel. A fourth critical parameter is the level of oxygen in the boiler, referred to as the excess air or excess oxygen level. Therefore, combustion control is accomplished primarily

through boiler design as it relates to time, temperature, and turbulence, and through boiler operation as it relates to excess oxygen levels. Combustion design for modern boilers is intended to simultaneously minimize formation of VOC and NOx emissions. This is a difficult task, since emissions of NOx and emissions of CO and VOC are inversely related. That is, measures used to reduce NOx emissions often lead to increases in VOC emissions. Therefore, the boiler design to minimize VOC emissions is interrelated with the boiler design to minimize NOx formation.

Step 3 - Rank Remaining Control Technologies by Control Effectiveness

Rank by VOC Control Effectiveness			
Rank	**Option**	**Control**	**Expected emissions (lb/MMBtu)**
I	Dry (or semi-dry) flue gas scrubber with PAC sorbent injection, baghouse and biofilter for 97.5% control efficiency, or equivalent, and natural gas auxiliary fuel	$\geq$ 97.5%	0.00043
II	Biofilter, or equivalent, and natural gas auxiliary fuel	$\geq$ 90%	0.0004
II	Flue gas scrubber with Powdered Activated Carbon (PAC) injection with baghouse, or equivalent, and natural gas auxiliary fuel	$\geq$ 76.5%	0.004
III	Good combustion practices, and natural gas auxiliary fuel *(**Achieved-in-practice BACT**, Massachusetts guidance document)*		0.01

Step 4 - Cost Effectiveness Analysis

A cost-effective analysis is not required because the applicant is proposing the most effective alternative in the ranking list from step 3.

Step 5 - Select BACT

The most effective control option not eliminated in Step 4 is BACT for the pollutant and emissions unit under consideration. The applicant is proposing the most effective alternative in the ranking list from Step 3.

Therefore BACT for VOC emissions from the BFB is the use of biofilter, semi-dry flue gas scrubber with PAC injection, baghouse, and biofilter for a control efficiency of 97.5% with a controlled emission factor of 0.00043 lb/MMBtu.

Attachment 1. *BACT Guidance for Biomass Projects, April 18, 2007, Commonwealth of Massachusetts, Executive Office of Energy & Environmental Affairs, Department of Environmental Protection.*

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MEMORANDUM

To: Biomass Energy Stakeholders
From: James C. Colman, Assistant Commissioner,
Bureau of Waste Prevention, MassDEP
Date: April 18, 2007
Subject: BACT guidance for Biomass Projects

As part of the MassDEP and Massachusetts Division of Energy Resources (DOER) coordination on revised procedures for reviewing biomass facility proposals, MassDEP is publishing the attached BACT (best available control technology) guidance document. This guidance is applicable to biomass facilities in Massachusetts that require a plan approval from MassDEP, and may differ from the proposed "low emission" limits[1] that pertain to qualification under the Massachusetts Renewable Portfolio Standard (RPS) for biomass plants in other states throughout the region. Biomass plants constructed in other states and requesting RPS qualification must meet the air permitting requirements in the permitting state, as well as the MA RPS' low emission limits, but not MassDEP BACT requirements.

This guidance was published in draft on June 23, 2006, and was open for comment until July 21, 2006. The Department received one formal comment, which related to the use of C&D wood waste as a biomass fuel. Specifically, the commenter was concerned about the use of C&D wood waste contaminated with heavy metals and the potential air emissions from such fuel. The commenter was also concerned about the ability of C&D wood fuel suppliers to adequately sort C&D wood waste to prevent the use of contaminated wood waste as a fuel.

MassDEP shares the concern about the potential emissions from contaminated C&D wood, and believes that the attached Guidance addresses this issue. In particular, an applicant proposing to use such fuel will be required to demonstrate that the emission controls on the proposed facility will prevent exceedances of health based standards. The sorting of C&D wood, if required, would be addressed in the Beneficial Use Determination (BUD) that MassDEP would issue for the use of C&D wood as a fuel.

Any questions about this guidance may be directed to Marc Wolman at (617) 292-5515 or Marc.Wolman@state.ma.us

[1] The proposed MA RPS low emission limits include requirements for nitrogen oxides and particulate matter. See http://www.mass.gov/doer/rps/rps-225cmr14-summary.pdf

Best Available Control Technology (BACT) Guidance
Biomass-Fired Electric Generating Units
April 2007

INTRODUCTION

As a result of the Commonwealth's renewable energy programs, there is increasing interest in Massachusetts in building electric generating units that utilize biomass as a fuel. This guidance is meant to provide greater certainty to prospective developers of biomass facilities when preparing plan approval applications for MassDEP under 310 CMR 7.02. It provides guidance on Best Available Control Technology (BACT) for biomass fuel and technology combinations based on MassDEP experience.

The initial guidance (issued in April, 2007) addresses solid biomass fuel–fired steam electric generating units; future versions will address other fuel/technology combinations. In general, MassDEP intends to provide two sets of emissions limits for each fuel/technology combination covered. The first table will include limits from recently issued permits for the specific fuel/technology (for example, in the initial guidance below, see Table 1*)*. Any application for a new generating unit of the specific type will need to comply with at least those limits. The second table will include limits MassDEP considers to be technically achievable (for example, in the initial guidance below, see Table 2*)*. The more stringent limits will be based on applying advanced technology for a specific fuel/technology combination and achieving the same level of emission reductions achieved for other fuel sources. MassDEP considers these limits as the starting points from which to make determinations on emission limits for a new generating unit of the specific type based on fuel use, energy, environmental, and economic impacts and other costs.

While this April, 2007 Guidance for new solid fuel-fired steam electric generation units is based on current permits and expectations for technology transfer, MassDEP anticipates that this Guidance will evolve over time and the emission limits for solid fuel-fired steam electric generation units may be amended in the future to reflect advances in technology. This guidance will expire on December 31, 2009. Prior to that date, MassDEP will review its experience with this guidance and initiate a public discussion to determine next steps, such as affirming and/or revising this guidance, or proposing regulations that will codify biomass performance standards.

In order to expedite permitting, and provide greater certainty, transparency and consistency across regions, MassDEP has formed a multi-disciplinary Energy Team[1] to expedite the review of air, solid waste, water, and other issues that may arise from energy projects, as well as to work with the Division of Energy Resources (DOER) on Renewable Portfolio Standard issues. MassDEP strongly encourages project proponents to contact the Regional Director in the appropriate regional office or the Chief of Staff in the Commissioner's Office early in the project planning process in order to discuss the application of this guidance, as well as other applicable regulations, if necessary. This will help reduce delays later in the permitting phase of the project.

[1] The Energy Team is co-chaired by the Assistant Commissioner of the Bureau of Waste Prevention (BWP) and the Associate Commissioner for Operations, and is made up of representatives of the region in which the facility is proposed and Boston staff as appropriate. The Chief of Staff in the Commissioner's Office is the Boston contact for the Energy Team.

BACKGROUND

Before starting construction of a fuel utilization facility (e.g. boiler, combustion turbine, reciprocating engine, etc.) whose energy input capacity will be above the thresholds contained in the regulations (310 CMR 7.02), the owner or operator must obtain written approval of the Plan Application from MassDEP.

The requirement to obtain a Plan Approval before the start of construction is set forth at 310 CMR 7.02(4) and (5). The thresholds for obtaining a Limited Plan Application are set forth at 310 CMR 7.02(4)(a), and for a Comprehensive Plan Application at 310 CMR 7.02(5)(a). Applicants proposing to install internal combustion engines burning a bio-fuel have the option of complying with the standards contained in Engines and Combustion Turbines (310 CMR 7.26(40)-(44)).

A Plan Approval for a fuel utilization facility requires the utilization of BACT, where BACT is defined as:

> BEST AVAILABLE CONTROL TECHNOLOGY means an emission limitation based on the maximum degree of reduction of any regulated air contaminant emitted from or which results from any regulated facility which MassDEP, on a case-by-case basis taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems and techniques for control of each such contaminant. The best available control technology determination shall not allow emissions in excess of any emission standard established under the New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants or under any other applicable section of 310 CMR 7.00, and may include a design feature, equipment specification, work practice, operating standard, or combination thereof. [310 CMR 7.00 Definitions]

In addition, more stringent emission limits than are determined through the BACT analysis are required if MassDEP determines they are necessary to avoid causing a condition of air pollution, which is "the presence in the ambient air space of one or more air contaminants or combinations thereof in such concentrations and of such duration as to:

(a) cause a nuisance;
(b) be injurious, or be on the basis of current information, potentially injurious to human or animal life, to vegetation, or to property; or
(c) unreasonably interfere with the comfortable enjoyment of life and property or the conduct of business."[310 CMR 7.00 Definitions]

This guidance is intended to provide the framework for the application of BACT to biomass energy projects.

GUIDANCE

This guidance contains emissions limits from recently permitted facilities that MassDEP believes represent state of the art limits for some specific fuel/technology combinations. An application that proposes to meet the more stringent of these limits (the "starting point" seen in Table 2) will not be required to perform a top-down BACT analysis as part of the application[2].

[2] While MassDEP believes these limits represent a good starting point for a BACT evaluation, a final determination cannot be made on emissions limits for a specific facility until any required public comment period is completed. Reviews requiring public comment include: Non-attainment New Source Review (310 CMR 7.00 Appendix A) for non-attainment pollutants, and the Massachusetts Environmental Policy Act (MEPA – 301 CMR 11.00). Similarly, for projects subject to Prevention of Significant Deterioration (PSD – 40 CFR 52.21), which is administered in Massachusetts by the US Environmental Protection Agency, EPA cannot make their determination until after the close of the required public comment period.

If the applicant believes the limitations contained in this Guidance (Table 2) are either technologically or economically infeasible, or if the proposal is for a fuel/technology not covered by this guidance, the applicant may request further guidance from MassDEP. The Energy Team will attempt to respond to any such request within 30 days. If an applicant moves ahead with a proposal, the application will be reviewed using MassDEP's standard fee and permitting timelines, unless the applicant opts to use MassDEP's "fast-track" permitting process[3].

BIOMASS-FIRED STEAM ELECTRIC GENERATING UNITS

Two sets of limits are included in the following tables. Table 1 contains limits from recent permits issued for solid fuel biomass-fired boilers. In general, MassDEP expects that any application for a new solid fuel biomass-fired boiler will need to comply with these limits.

Table 2 contains limits MassDEP believes are technically achievable. These more stringent limits are based on applying Selective Catalytic Reduction (SCR – control of NOx), and an Oxidation Catalyst (control of carbon monoxide and unburned hydrocarbons) to biomass-fired boilers[4] to achieve the same level of reduction that has been achieved on other fuel sources. In evaluating technical feasibility (part of the BACT analysis) of achieving the Table 2 limits, MassDEP considers the ability of the applicant to obtain manufacturer guarantees.

MassDEP is concerned with reducing NOx, PM and CO because:

- NOx is a precursor to the formation of ozone, a pollutant for which the Commonwealth is classified non-attainment for the National Ambient Air Quality Standard. NOx is also a precursor to acid deposition and regional haze.

- PM can accumulate in the lungs and produce respiratory and cardio-vascular symptoms. PM emissions contain unburned carbon, toxic metals (depending on the fuel source), and unburned hydrocarbons.

- Unburned hydrocarbons are a precursor to ozone formation, and many of the unburned hydrocarbons are also air toxics.

- Symptoms of high CO exposure include shortness of breath, chest pain, headaches, confusion, and loss of coordination. Achieving low CO levels also minimizes unburned hydrocarbon emissions.

In general, if an applicant proposes the limits in Table 2, MassDEP believes these are approvable as BACT – please see footnote 2. Depending on the fuel(s) being combusted, MassDEP will consider alternative emission limits to Table 2 once the applicant has prepared a complete application, including a BACT determination.
Typical biomass electric generating facilities are smaller than fossil fuel-fired generating facilities. In addition, biomass fuels are generally more variable than fossil fuels, the typical operating temperatures of biomass facilities are lower than in fossil-fuel-fired facilities, and the amount of catalyst needed to meet

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[3] Pursuant to Section 40 of Chapter 149 of the Acts of 2004, MassDEP and a permit applicant may agree upon appropriate fees, related funding and schedules for projects that meet certain criteria.
[4] Although they are not meeting the same stringent limits as in Table 2, there are two wood-fired boilers in New England equipped with SCR. One of these is also equipped with an oxidation catalyst.

the emission limits in Table 2 may be large. Therefore, MassDEP understands that Table 2 emissions limits may not be readily achievable at this time and may not require facilities to achieve these limits in every case. However, given the likely improvements in biomass technology, MassDEP considers believes these limits represent a reasonable starting point for a BACT analysis.

In any case, where MassDEP requires the applicant to design the facility to approach or meet the Table 2 emission limits, MassDEP may adjust the final permit limits after optimization if such optimization demonstrates that the limits cannot be met in practice.

Table 1
New Solid Fuel-Fired Steam Electric Generation Units
Currently Permitted Emission Limitations[1]

Nameplate capacity	Equal to or greater than 25 MW	Equal to or greater than 10 MW and less than 25 MW	Equal to or greater than 1 MW and less than 10 MW
SO2	0.025 lbs/MMBtu	0.025 lbs/MMBtu	0.025 lbs/MMBtu
NOx	0.075 lbs/MMBtu	0.075 lbs/MMBtu	0.093 lbs/MMBtu
Ammonia	13 PPM @ 3%O2	13 PPM @ 3%O2	25 PPM @ 3%O2
CO	0.1 lbs/MMBtu	0.17 lbs/MMBtu	0.25 lbs/MMBtu
PM[2]	0.012 lbs/MMBtu	0.012 lbs/MMBtu	0.012 lbs/MMBtu ← Filterable.
VOC	0.01 lbs/MMBtu	0.01 lbs/MMBtu	0.01 lbs/MMBtu
Toxics[3]	Based on modeling	Based on modeling	Based on modeling
Opacity	10%	10%	10%
HCl (biomass containing chlorinated compounds)	20 ppm @ 3% O2	20 ppm @ 3% O2	20 ppm @ 3% O2
Monitoring	CEMS – NOx, opacity, NH3, SO2 Annual PM test For C&D, also metals[4] testing	CEMS – NOx, opacity, NH3, SO2 Annual PM test. For C&D, also metals[4] testing	PMS Annual PM. For C&D, also metals[4] testing
Reporting	Quarterly, annually	Quarterly, annually	Quarterly, annually

[1] The boilers used to develop these limits are: Schiller Station in Portsmouth, NH, Whitefield Power in Whitefield, NH, Boralex in Stratton, ME, Ware Cogen In Ware, MA, and McNeil Station in Burlington, VT.

[2] The PM limits are designed to ensure compliance with toxics limits, including metals, and will likely require use of a baghouse. Compliance testing for PM emissions are to be tested according to 40 CFR 60 Appendix A Method 5. In addition, testing for condensable PM will be required.

[3] Ambient air quality modeling will be required to demonstrate that the MassDEP's Acceptable Ambient Levels and Threshold Effects Levels will be required for some projects. For example:

1. Where construction and demolition wood is burned. MassDEP may require it for some other fuels of particular environmental concern.
2. For boilers that are major sources of criteria or Hazardous Air Pollutants.

[4] Metals testing is required for facilities burning wood from construction and demolition wood, and possibly other biomass sources. This testing would be required to demonstrate that any limits in a plan approval to prevent exceedances of AALs/TELs are being met.

Table 2

New Solid Fuel-Fired Steam Electric Generation Units
Suggested BACT Starting Point[1]
[The limits more stringent than Table 1 are shaded.]

Nameplate capacity	Equal to or greater than 25 MW	Equal to or greater than 10 MW and less than 25 MW	Equal to or greater than 1 MW and less than 10 MW
SO2	0.02 lbs/MMBtu	0.02 lbs/MMBtu	0.02 lbs/MMBtu
NOx	0.015 lbs/MMBtu	0.015 lbs/MMBtu	0.093 lbs/MMBtu
Ammonia	2 PPM @ 3%O2	2 PPM @ 3 %O2	10 PPM @ 3%O2
CO	0.01 lbs/MMBtu	0.01 lbs/MMBtu	0.25 lbs/MMBtu
PM[2]	0.012 lbs/mmBtu	0.012 lbs/mmBtu	0.012 lbs/MMBtu
VOC	0.01 lbs/MMBtu	0.01 lbs/MMBtu	0.01lbs/MMBtu
Opacity	5%	5%	5%
HCl (biomass containing chlorinated compounds)	20 ppm @ 3% O2	20 ppm @ 3% O2	20 ppm @ 3% O2
Toxics[3] - arsenic, antimony, beryllium, cadmium, chromium III, chromium VI, copper, lead, mercury, nickel, and selenium (wood containing C&D wood)	85% removal of mercury and 99% removal of the other metals, or reduce emissions below the detection limit. Also, ambient modeling to demonstrate MA AALs/TELs are not exceeded.	85% removal of mercury and 99% removal of the other metals, or reduce emissions below the detection limit. Also, ambient modeling to demonstrate MA AALs/TELs are not exceeded.	85% removal of mercury and 99% removal of the other metals, or reduce emissions below the detection limit. Also, ambient modeling to demonstrate MA AALs/TELs are not exceeded.
Monitoring	CEMS – NOx, opacity, NH3, SO2 Annual PM. For, C&D, also metals[4] testing	CEMS – NOx, opacity, NH3, SO2 Annual PM. For C&D, also metals[4] testing	Parametric monitoring will be defined. Annual PM. For C&D, also metals[4] testing
Reporting	Quarterly, annually	Quarterly, annually	Quarterly, annually

[1] These limits are based on applying Selective Catalytic Reduction (SCR) and Oxidation Catalyst to wood fired boilers, to achieve the same level of reduction that has been achieved on other fuel sources. SCR and oxidation catalyst have been used on wood-fired boilers. MassDEP thinks there are opportunities to achieve lower emissions than have been achieved.

[2] The PM limits are designed to ensure compliance with toxics limits, including metals, and will likely require use of a baghouse. Compliance testing for PM emissions are to be tested according to 40 CFR 60 Appendix A Method 5. In addition, testing for condensable PM will be required.

[3] Ambient air quality modeling will be required to demonstrate that the MassDEP's Acceptable Ambient Levels and Threshold Effects Levels will be required for some projects. For example:

1. Where construction and demolition wood is burned. MassDEP may require it for some other fuels of particular environmental concern.
2. For boilers that are major sources of criteria or Hazardous Air Pollutants.

[4] Metals testing is required for facilities burning wood from construction and demolition wood, and possibly other biomass sources. This testing would be required to demonstrate that any limits in a plan approval to prevent exceedances of AALs/TELs are being met.

Appendix N

Draft ATCs

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-7-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
6.5 MW (211.52 MMBTU/HR) BIOMASS/BIOSOLIDS-FIRED BUBBLING FLUIDIZED BED BOILER (BFB) #1 WITH TWO 60 MMBTU NATURAL/PROPANE GAS-FIRED STARTUP BURNERS (ONE OVERBED AND ONE UNDERBED), SNCR, FGR, O2 CONTROLLER, SEMI-DRY TURBOSORP FLUEGAS SCRUBBER, WHEELABRATOR MODEL 192-6P BAGHOUSE, LOW TEMPERATURE CORMATECH SCR, BIOFILTER, AND NOX, CO, SO2 AND OPACITY CEMS

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. {1407} All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]
4. Exhaust stack shall vent upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper OK), roof overhang, or any other obstruction. [District Rule 4102]
5. Boiler shall be equipped with operational sorbent (lime or limestone) injection system. [District Rule 2201]
6. Boiler shall be equipped with operational NSCR, baghouse, SCR and biofilter control equipment, which shall be maintained and operated according to manufacturer's specifications. [District Rule 2201]
7. Flue gas from BFB combustor shall be vented through baghouse, semi-dry Turbosorp flue gas scrubber, SCR and biofilter prior to being vented to atmosphere. [District Rule 2201]
8. Auxiliary burners natural gas supply line(s) shall be equipped with operational volumetric flow-rate indicator(s). [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-7-0 : Oct 31 2012 2:35PM – PHILLIPA : Joint Inspection NOT Required

9. Selective non-catalytic reduction ammonia injection system shall be equipped with operational ammonia volume flow-rate indicator. [District Rule 2201]

10. The baghouse shall be equipped with an operational pressure differential gauge to indicate the pressure drop across the bags. The gauge shall be maintained in good working condition at all times and shall be located in an easily accessible location. [District Rule 2201]

11. {3458} Replacement bags numbering at least 10% of the total number of bags in the baghouse shall be maintained on the premises. [District Rule 2201]

12. Differential operating pressure shall be monitored and recorded on each day that the baghouse operates. Monitoring shall be conducted while the baghouse is operating. [District Rule 2201]

13. Operator shall install, operate, and maintain in calibration a system which continuously measures and records stack gas volumetric flow rates meeting the performance specifications of 40 CFR Part 52, Appendix E. [District Rule 1080 and 40 CFR 60 Subpart Db]

14. Operator shall install, operate, and maintain in calibration, a system which continuously measures and records control system operating parameters; elapsed time of operation; and exhaust gas opacity, NOx, SOx, CO and O2 concentrations. The CEMs shall meet the requirements of 40 CFR parts 60 and 75 and shall be capable of monitoring emissions during startups and shutdowns as well as during normal operating conditions. [District Rules 1080, 4352 and 40 CFR 60 Subpart Db]

15. {1835} The exhaust stack shall be equipped with permanent provisions to allow collection of stack gas samples consistent with EPA test methods and shall be equipped with safe permanent provisions to sample stack gases with a portable NOx, CO, and O2 analyzer during District inspections. The sampling ports shall be located in accordance with the CARB regulation titled California Air Resources Board Air Monitoring Quality Assurance Volume VI, Standard Operating Procedures for Stationary Source Emission Monitoring and Testing. [District Rule 1081]

16. {1836} Results of continuous emissions monitoring shall be reduced according to the procedure established in 40 CFR, Part 51, Appendix P, paragraphs 5.0 through 5.3.3, or by other methods deemed equivalent by mutual agreement with the District, the ARB, and the EPA. [District Rule 1080]

17. {1837} Audits of continuous emission monitors shall be conducted quarterly, except during quarters in which relative accuracy and total accuracy testing is performed, in accordance with EPA guidelines. The District shall be notified prior to completion of the audits. Audit reports shall be submitted along with quarterly compliance reports to the District. [District Rule 1080]

18. {1838} The owner/operator shall perform a relative accuracy test audit (RATA) as specified by 40 CFR Part 60, Appendix F, 5.11, at least once every four calendar quarters. The permittee shall comply with the applicable requirements for quality assurance testing and maintenance of the continuous emission monitor equipment in accordance with the procedures and guidance specified in 40 CFR Part 60, Appendix F. [District Rule 1080]

19. {1839} The permittee shall submit a written report to the APCO for each calendar quarter, within 30 days of the end of the quarter, including: time intervals, data and magnitude of excess emissions, nature and cause of excess emissions (if known), corrective actions taken and preventive measures adopted; averaging period used for data reporting shall correspond to the averaging period for each respective emission standard; applicable time and date of each period during which the CEM was inoperative (except for zero and span checks) and the nature of system repairs and adjustments; and a negative declaration when no excess emissions occurred. [District Rule 1080]

20. This facility shall comply in full with the requirements of Rule 4001 New Source Performance Standards part 60 subpart A and subpart Db. [District Rule 4001]

21. Only PUC quality natural gas, biomass, biosolids, sand, lime, limestone, and on-site generated dewatered cooling tower sludge shall be introduced into boiler. [District Rules 2201 & 4102]

22. "Biomass" means any organic material not derived from fossil fuels, such as agricultural crop residue, orchard prunings and removal, stone fruit pits, nut shells, cotton gin trash, cotton stalks, vineyard prunings, cull logs, eucalyptus logs, bark, lawn, yard and garden clippings, leaves, silvicultural residue, tree and brush pruning, wood and wood chips, and wood waste. Biomass does not include material containing industrial, hazardous, radioactive or municipal solid waste. [District Rules 2201 and 4102]

CONDITIONS CONTINUE ON NEXT PAGE

23. Wood waste includes clean, chipped wood products, plywood, wood products manufacturing wood materials, construction and demolition wood materials, and wood pallets, crates and boxes. [District Rules 2201 and 4102]

24. Contamination of the biomass fuel, as delivered to the boiler, shall not exceed 0.25% by weight plastics or 1% by weight total of the following materials: metals, plastics, paper, painted wood, particle board, wood treated with preservatives, and non-wood roofing materials (except asbestos). [District Rule 4102]

25. Natural gas shall only be used as fuel during startup and shutdown, and shall not exceed 2,880,000 std. cu. ft. per day or 38,000,000 scf per year. [District Rule 2201]

26. "Startup" is the period of time during which the boiler is heated to operating temperature at steady state load from a lower temperature, not to exceed 96 hours (up to 192 hours during refractory cure). [District Rules 2201 and 4352]

27. "Shutdown" is the period of time during which the boiler is allowed to cool from it's operating temperature at steady state load to a lower temperature, not to exceed 12 hours. [District Rules 2201 and 4352]

28. "Steady state" load is defined as the operational conditions that generate electrical power at + or - one (1) Megawatt from the target load established and documented by control room log book. [District Rule 2201]

29. During periods of startup/shutdown emissions shall be minimized to the extent possible using good combustion practices. [District Rule 2201]

30. Removal of ash from ash hoppers by manual means shall only be conducted during breakdown conditions or when boiler is not operating, and there shall be no visible emissions for a period or periods aggregating more than three (3) minutes in any one (1) hour which is as dark or darker than ringelmann 1 or 20 % opacity. [District Rules 4101 & 4102]

31. Limestone, lime, and/or onsite generated cooling tower sludge, shall be injected into boiler at a rate in pounds per ton of biomass/biosolids fuel introduced into boiler which results in compliance with the SOx emission limitations. [District Rule 2201]

32. NOx and PM10 emission data shall be obtained and provided, as required by NSPS 40CFR60.48b "Emissions monitoring for particulate and nitrogen oxides." CEM data shall be provided as required by 60.48b(f). [District Rule 4001]

33. Oxides of Nitrogen emissions (as NO2), except for periods of startup and shutdown as defined in this permit, shall not exceed 8.6 ppmv @ 3% O2 nor 2.57 lb/hr. [District Rule 2201]

34. Sulfur compound emissions (as SO2), except for periods of startup and shutdown as defined in this permit, shall not exceed 3.25 ppmv @ 3% O2 nor 1.43 lb/hr. [District Rule 2201]

35. PM10 emissions, except for periods of startup and shutdown as defined in this permit, shall not exceed 0.0020 lb/MMBtu nor 0.425 lb/hr (including condensable particulate). [District Rule 2201]

36. CO emissions, except for periods of startup and shutdown as defined in this permit, shall not exceed 17.32 PPMV @ 3% O2 nor 78.70 lb/hr. [District Rule 2201]

37. Volatile Organic Compound (VOC) emissions, except for periods of startup and shutdown as defined in this permit, shall not exceed 1 ppmv @ 3% O2 nor 0.09 lb/hr. [District Rule 2201]

38. NH3 emissions shall not exceed 10 ppmv @ 3% O2 nor 1.24 lb/hr [District Rules 2201 and 4102]

39. Beryllium content of biomass shall not exceed 1.10E-06 lb/MMBtu and beryllium content of biosolids shall not exceed 2.11E-06 lb/dry ton. Beryllium emissions from stack shall not exceed 1.27-07 lb/hr nor 3.04E-06 lb/day. [District Rule 4102 and 40 CFR 61 Subpart C]

40. Mercury emissions to the atmosphere shall not exceed 2.30E-03 lb/hr nor 5.52E-02 lb/day. [District Rule 4102 and 40 CFR 61 Subpart E]

41. Daily emissions shall not exceed any of the following limits: NOx (as NO2): 61.6 lb/day, SOx (as SO2): 34.3 lb/day, PM10: 10.2 lb/day (includes condensable particulate), CO: 78.7 lb/day, VOC: 2.1 lb/day, and NH3: 29.6 lb/day. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

42. Combined emissions (SLC) from boilers S-360-7-0, S-360-8-0 and S-360-9-0 shall not exceed any of the following: NOx (as NO2): 167.4 lb/day nor 49,746 lb/year, SOx (as SO2): 93.2 lb/day nor 27,545, PM10: 27.6 lb/day nor 10,074 lb/year, CO:213.9 lb/day nor 63,724 lb/year, VOC: 5.7 lb/day nor 1,768 lb/year, and NH3: 80.4 lb/day nor 23,845 lb/year. [District Rule 2201]

43. Excess emissions for PM10 shall be defined as any three hour period during which the average emissions of PM10, as measured by the continuous monitoring system or by a performance test, exceeds an emission limit. [District Rule 2201 and 40 CFR 60 Subpart Db]

44. Excess emissions for NOx, SOx and CO for the continuous monitoring system shall be defined as any 24 hour period during which the average emissions of NOx, SOx or CO exceed any emission limit. [District Rule 2201 and 40 CFR 60 Subpart Db]

45. Compliance with biomass fuel contamination limits shall be demonstrated by sorting a District approved 25 ton representative sample of biomass fuel within 60 days of initial startup and at least once every 12 months thereafter. [District Rule 4102]

46. Data collected during sorting of 25 ton sample of biomass fuel shall be in pounds of material per ton of biomass, by category as identified in fuel contamination limit condition, and official test results and field data shall be submitted within 30 days after collection. [District Rule 4102]

47. Compliance with NOx, SOx, PM10 and CO emission sampling limits shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days of initial startup and at least once every 12 months thereafter. [District Rule 1081]

48. Compliance with Beryllium emission sampling limit shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days of startup. [District Rule 1081 and 40 CFR 61.33(a)(2)]

49. Unless a waiver of Beryllium emissions testing is obtained under 40 CFR 61.13, permittee shall test emissions from the source according to method 104 of 40 CFR 61 appendix B. Method 103 of appendix B is approved as an alternate method. Samples shall be taken in accordance with requirements of 40 CFR 61.33(c) and (d). [District Rule 1081 and 40 CFR 61.33(a), (c) and (d)]

50. Compliance with Mercury emission sampling limit shall be demonstrated by District-witnessed sample collection by independent testing laboratory within 60 days of startup. [District Rule 1081 and 40 CFR 61.53(d)(2)]

51. Unless a waiver of Mercury emissions testing is obtained under 40 CFR 61.13, permittee shall test emissions from the source according to method 101A in Appendix B of 40 CFR 61. Samples shall be taken and analyzed in accordance with requirements of 40 CFR 61.53. [District Rule 1081 and 40 CFR 61.53]

52. The tests for SO2, NOx, CO, and PM10 shall be conducted on an annual basis and at the maximum operating capacity of the facility being tested. Upon written request from Liberty Energy, the District may approve the conducting of performance tests at a lower specified production rate [District Rule 1081]

53. Source testing for the following parameters shall be conducted using the stated test methods: NOx - EPA Method 7 or ARB Method 100, NOx (lb/MMBtu) - EPA Method 19, CO - EPA Method 10 or ARB Method 100, stack gas oxygen - EPA Method 3 or ARB Method 100, SOx (lb/MMBtu) - ARB Method 100 or EPA Method 6 or 6C, PM10 - EPA Methods 201A & 202, Stack Gas Flow Rate - EPA Method 2, Moisture Content - EPA Method 4, Ammonia - BAAQMD ST-1B, & Fuel Heating Value - ASTM Method D2015-85 or E711. [District Rules 2201 and 1081]

54. Official test results and field data from compliance testing shall be submitted within 60 days after collection. [District Rule 1081]

55. {109} Source testing shall be conducted using the methods and procedures approved by the District. The District must be notified at least 30 days prior to any compliance source test, and a source test plan must be submitted for approval at least 15 days prior to testing. [District Rule 1081]

56. District shall be notified at least 30 days prior to beryllium emission testing so that they may at their option observe the test. Official test results and field data from compliance testing shall be submitted within 60 days after collection. [40 CFR 61.33 (b) and District Rule 1081]

CONDITIONS CONTINUE ON NEXT PAGE

57. District shall be notified at least 30 days prior to Mercury emission testing so that they may at their option observe the test. Official test results and field data from compliance testing shall be submitted within 45 days after collection. [District Rule 1081 and 40 CFR 61.53(d)(3) - (5)]

58. The source test plan shall identify which basis (ppmv or lb/MMBtu) will be used to demonstrate compliance. [District Rule 2201]

59. NOx and CO emissions during the source test shall be calculated as the arithmetic average of three 30-consecutive-minute test runs. [District Rule 2201]

60. Permittee shall maintain, on a monthly basis, an operating log that includes: 1) The type and quantity of each fuel received, 2) The HHV of each fuel received, 3) Average mix ratio of biomass:biosolids incinerated in the combustor, 4) Actual combustor operating time, in hours, and 5) The average hourly heat input to the combustor. [District Rules 1070, 2201 and 4352]

61. Solid fuel HHV of shall be determined by ASTM Method D 2015 or ASTM Method E 711. [District Rule 4352]

62. Records shall be maintained and shall contain: the occurrence and duration of any start-up, shutdown or malfunction, performance testing, evaluations, calibrations, checks, adjustments, maintenance of any CEMs that have been installed pursuant to District Rule 1080, and emission measurements. [District Rule 1080 and 40 CFR 60 Subpart Db]

63. Records of startup and shutdown times and startup and shutdown emissions shall be maintained. [District Rules 1070 and 2201]

64. Records of dust collector maintenance, inspections, and repair shall be maintained. The records shall include identification of the equipment, date of inspection, corrective action taken, and identification of the individual performing the inspection. [District Rule 2201]

65. All records shall be maintained and retained on-site for a period of at least five years and shall be made available for District inspection upon request. [District Rule 1070]

66. Quarterly report shall include: time intervals, data and magnitude of excess emissions, nature and cause of excess (if known), corrective actions taken and preventive measures adopted; averaging period used for data reporting corresponding to the averaging period specified in the emission test period used to determine compliance with an emission standard; applicable time and date of each period during which the CEM was inoperative (except for zero and span checks) and the nature of system repairs and adjustments; and a negative declaration when no excess emissions occurred. [District Rules 2201, 1080 and 40 CFR 60 Subpart Db]

67. Any violation of emission standards, as indicated by the CEM, shall be reported by the operator to the APCO within 96 hours. Excess emissions shall be defined as any three-hour period during which emissions of SOx or NOx as measured by CEM system exceeds the SOx and NOx maximum emission limits set forth for each the pollutants in this permit. [District Rules 2201, 1080 and 40 CFR 60 Subpart Db]

68. Operator shall notify the District no later than one hour after the detection of a breakdown of the CEM. The operator shall inform the District of the intent to shut down the CEM at least 24 hours prior to the event. [District Rules 1080 and 1100]

69. Prior to operating equipment under this Authority to Construct, permittee shall surrender NOx emissions reduction credit credits for the following quantity of emissions (calculated using a 1.5:1 distance offset ratio): 1st quarter - 925 lbs, 2nd quarter - 925 lbs, 3rd quarter - 925 lbs and 4th quarter - 925 lbs. Offsets shall be provided per the applicable distance offset ratio specified in Table 4-2 of Rule 2201 (as amended 9/21/06). [District Rule 2201]

70. ERC Certificate Number S-3855-2 (or a certificate split from this certificate) shall be used to supply the required offsets, unless a revised offsetting proposal is received and approved by the District, upon which this Authority to Construct shall be reissued, administratively specifying the new offsetting proposal. Original public noticing requirements, if any, shall be duplicated prior to reissuance of this Authority to Construct. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-10-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
8,831 GALLON PER MINUTE 3 CELL MECHANICAL DRAFT/COUNTER FLOW COOLING TOWER, INCLUDING A HIGH EFFICIENCY MIST ELIMINATOR, SERVING POWER TRAIN 1

CONDITIONS

1. No hexavalent chromium containing compounds shall be added to cooling tower circulating water. [District Rules 4102 and 7012]
2. Total dissolved solids (TDS) in cooling tower water shall not exceed 1,044 ppmw. [District Rule 2201]
3. Cooling tower recirculating water flow rate shall not exceed 8,831 gal/min. [District Rule 2201]
4. Drift eliminator drift rate shall not exceed 0.0005% of the circulated water. [District Rule 2201]
5. PM10 emission rate shall not exceed 0.6 lb/day. [District Rule 2201]
6. Compliance with the PM10 daily emission limit shall be demonstrated as follows: PM10 lb/day = circulating water recirculation rate x total dissolved solids concentration in the circulating water x manufacturers design drift rate. [District Rule 2201]
7. Compliance with the TDS limit will be demonstrated by cooling water sample analysis by independent laboratory within 60 days of initial operation, and annual analysis by cooling tower chemical vendor or internal laboratory. [District Rules 1081 and 2201]
8. Records of the cooling tower recirculating water flow rate and cooling tower water TDS shall be kept at the facility and made readily available for District inspection upon request for 5 years. [District Rule 1070]

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-10-0 : Oct 31 2012 2:35PM -- PHILLIPA : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-11-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
HYDRATED LIME RECEIVING AND STORAGE OPERATION SERVING TRAIN 1, INCLUDING 2,042 CU. FT. (10' X 26') ENCLOSED SILO, PNEUMATIC LOADING, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT)

CONDITIONS

1. Storage silo shall vent only through bin vent filter. [District Rule 2201]
2. Air flow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]
3. Bin vent filter shall be equipped with an operational differential pressure indicator. [District Rule 2201]
4. The permittee shall obtain written District approval for the use of any equivalent equipment not specifically approved by this Authority to Construct. Approval of the equivalent equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate equipment is equivalent to the specifically authorized equipment. [District Rule 2201]
5. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2201]
6. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct. [District Rule 2201]
7. No emission factor and no emission rate shall be greater for the alternate equipment than for the proposed equipment. [District Rule 2201]
8. Material collected by bin vent filter shall fall by gravity into storage silo. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

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DAVID WARNER, Director of Permit Services

S-360-11-0 : Oct 31 2012 2:38PM -- PHILLIPA : Joint Inspection NOT Required

9. There shall be no emissions in excess of 5% opacity from silo bin vent filter exhaust stack. [District Rule 2201]
10. Silo loading shall not exceed 2 hours per day and 260 hours per year. [District Rule 2201]
11. Particulate matter emissions shall not exceed 0.005 grains/dscf in concentration. [District Rule 2201]
12. Dust collector system shall be thoroughly inspected annually for any evidence of particulate matter leaks and shall be repaired as needed. [District Rule 2201]
13. Dust collector filters shall be thoroughly inspected at least annually when the unit is not in operation for tears, scuffs, abrasions, holes, or any evidence of particulate matter leaks and shall be replaced as needed. [District Rule 2201]
14. Records of dust collector maintenance, hours of operation (silo loading), inspections, and repair shall be maintained. The records shall include identification of the equipment, date of inspection, corrective action taken, and identification of the individual performing the inspection. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-12-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
SAND RECEIVING AND STORAGE OPERATION, INCLUDING 3,506 CU. FT. (12' X 31') ENCLOSED SILO, PNEUMATIC LOADING, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT) SERVING TRAIN 1

CONDITIONS

1. Storage silo shall vent only through bin vent filter. [District Rule 2201]
2. Air flow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]
3. Bin vent filter shall be equipped with an operational differential pressure indicator. [District Rule 2201]
4. The permittee shall obtain written District approval for the use of any equivalent equipment not specifically approved by this Authority to Construct. Approval of the equivalent equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate equipment is equivalent to the specifically authorized equipment. [District Rule 2201]
5. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2201]
6. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct. [District Rule 2201]
7. No emission factor and no emission rate shall be greater for the alternate equipment than for the proposed equipment. [District Rule 2201]
8. Material collected by bin vent filter shall fall by gravity into storage silo. [District Rule 2201]
9. There shall be no emissions in excess of 5% opacity from silo bin vent filter exhaust stack. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-12-0: Oct 31 2012 2:38PM – PHILLIPA : Joint Inspection NOT Required

10. Silo loading shall not exceed 3 hours per day and 18 hours per year. [District Rule 2201]
11. Particulate matter emissions shall not exceed 0.005 grains/dscf in concentration. [District Rule 2201]
12. Dust collector system shall be thoroughly inspected annually for any evidence of particulate matter leaks and shall be repaired as needed. [District Rule 2201]
13. Dust collector filters shall be thoroughly inspected at least annually when the unit is not in operation for tears, scuffs, abrasions, holes, or any evidence of particulate matter leaks and shall be replaced as needed. [District Rule 2201]
14. Records of dust collector maintenance, hours of operation (silo loading), inspections, and repair shall be maintained. The records shall include identification of the equipment, date of inspection, corrective action taken, and identification of the individual performing the inspection. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-13-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
LIMESTONE RECEIVING AND STORAGE OPERATION, INCLUDING 5,080 CU. FT. (14'X33') ENCLOSED SILO, PNEUMATIC LOADING, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT) SERVING TRAIN 1

CONDITIONS

1. Storage silo shall vent only through bin vent filter. [District Rule 2201]
2. Air flow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]
3. Bin vent filter shall be equipped with an operational differential pressure indicator. [District Rule 2201]
4. The permittee shall obtain written District approval for the use of any equivalent equipment not specifically approved by this Authority to Construct. Approval of the equivalent equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate equipment is equivalent to the specifically authorized equipment. [District Rule 2201]
5. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2201]
6. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct. [District Rule 2201]
7. No emission factor and no emission rate shall be greater for the alternate equipment than for the proposed equipment. [District Rule 2201]
8. Material collected by bin vent filter shall fall by gravity into storage silo. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-13-0 : Oct 31 2012 2:36PM -- PHILLIPA : Joint Inspection NOT Required

9. There shall be no emissions in excess of 5% opacity from silo bin vent filter exhaust stack. [District Rule 2201]
10. Silo loading shall not exceed 6 hours per day and 570 hours per year. [District Rule 2201]
11. Particulate matter emissions shall not exceed 0.005 grains/dscf in concentration. [District Rule 2201]
12. Dust collector system shall be thoroughly inspected annually for any evidence of particulate matter leaks and shall be repaired as needed. [District Rule 2201]
13. Dust collector filters shall be thoroughly inspected at least annually when the unit is not in operation for tears, scuffs, abrasions, holes, or any evidence of particulate matter leaks and shall be replaced as needed. [District Rule 2201]
14. Records of dust collector maintenance, hours of operation (silo loading), inspections, and repair shall be maintained. The records shall include identification of the equipment, date of inspection, corrective action taken, and identification of the individual performing the inspection. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-14-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
POWDERED ACTIVATED CARBON RECEIVING AND STORAGE OPERATION, INCLUDING 2,042 CU. FT. (10 ' X 26') ENCLOSED SILO, PNEUMATIC LOADING, VENTED TO STACLEAN MODEL 9-3.2 BDS BIN VENT FILTER (OR EQUIVALENT) SERVING TRAIN 1

CONDITIONS

1. Storage silo shall vent only through bin vent filter. [District Rule 2201]
2. Air flow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]
3. Bin vent filter shall be equipped with an operational differential pressure indicator. [District Rule 2201]
4. The permittee shall obtain written District approval for the use of any equivalent equipment not specifically approved by this Authority to Construct. Approval of the equivalent equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate equipment is equivalent to the specifically authorized equipment. [District Rule 2201]
5. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2201]
6. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct. [District Rule 2201]
7. No emission factor and no emission rate shall be greater for the alternate equipment than for the proposed equipment. [District Rule 2201]
8. Material collected by bin vent filter shall fall by gravity into storage silo. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-14-0 : Oct 31 2012 2:36PM -- PHILLIPA : Joint Inspection NOT Required

9. There shall be no emissions in excess of 5% opacity from silo bin vent filter exhaust stack. [District Rule 2201]
10. Silo loading shall not exceed 2 hours per day and 120 hours per year. [District Rule 2201]
11. Particulate matter emissions shall not exceed 0.005 grains/dscf in concentration. [District Rule 2201]
12. Dust collector system shall be thoroughly inspected annually for any evidence of particulate matter leaks and shall be repaired as needed. [District Rule 2201]
13. Dust collector filters shall be thoroughly inspected at least annually when the unit is not in operation for tears, scuffs, abrasions, holes, or any evidence of particulate matter leaks and shall be replaced as needed. [District Rule 2201]
14. Records of dust collector maintenance, hours of operation (silo loading), inspections, and repair shall be maintained. The records shall include identification of the equipment, date of inspection, corrective action taken, and identification of the individual performing the inspection. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-15-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
ASH RECEIVING AND STORAGE OPERATION, INCLUDING TWO NOMINAL 8,000 CU.FT. (24' X 38') ENCLOSED SILOS AND ENCLOSED FEED CONVEYOR(S), ALL VENTED TO STACLEAN MODEL 9-3.2 BDS DUST COLLECTOR (OR EQUIVALENT) WITH 1000 CFM FAN, SHARED WITH ASH LOADOUT PERMIT S-360-39-0. (TRAIN 1)

CONDITIONS

1. Ash collection system shall use enclosed conveyor(s) and silos, both vented to shared dust collector. [District Rule 2201]]
2. Ash shall not be removed from any ash hopper, conveying system or ash silo by manual means during normal operation. [District NSR Rule]
3. Bin vent filter shall be equipped with an operational differential pressure indicator. [District Rule 2201]
4. The exhaust stack vent shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper OK), roof overhang, or any other obstruction. [District Rule 4102]
5. The permittee shall obtain written District approval for the use of any equivalent equipment not specifically approved by this Authority to Construct. Approval of the equivalent equipment shall be made only after the District's determination that the submitted design and performance of the proposed alternate equipment is equivalent to the specifically authorized equipment. [District Rule 2201]
6. The permittee's request for approval of equivalent equipment shall include the make, model, manufacturer's maximum rating, manufacturer's guaranteed emission rates, equipment drawing(s), and operational characteristics/parameters. [District Rule 2201]
7. Alternate equipment shall be of the same class and category of source as the equipment authorized by the Authority to Construct. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director/APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-15-0 : Oct 31 2012 2:36PM -- PHILLIPA : Joint Inspection NOT Required

8. No emission factor and no emission rate shall be greater for the alternate equipment than for the proposed equipment. [District Rule 2201]
9. Material collected by bin vent filter shall fall by gravity into storage silo. [District NSR Rule]
10. There shall be no visible emissions of 5% opacity or greater from ash conveying, silo loading or silo bin vent filter exhaust stack. [District NSR Rule]
11. Particulate matter emissions shall not exceed 0.005 grains/dscf in concentration. [District Rule 2201]
12. Air flow through bin vent filter shall not exceed 1,000 cfm. [District Rule 2201]
13. Dust collector system shall be thoroughly inspected annually for any evidence of particulate matter leaks and shall be repaired as needed. [District Rule 2201]
14. Dust collector filters shall be thoroughly inspected at least annually when the unit is not in operation for tears, scuffs, abrasions, holes, or any evidence of particulate matter leaks and shall be replaced as needed. [District Rule 2201]
15. Records of dust collector maintenance, inspections, and repair shall be maintained. The records shall include identification of the equipment, date of inspection, corrective action taken, and identification of the individual performing the inspection. [District Rule 2201]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-28-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
BIOSOLIDS RECEIVING AND STORAGE OPERATION INCLUDING 1,450 TON (30' DIA.X 70' HIGH) ENCLOSED SILO # 1, CARBON VENT FILTER AND VAPOR PIPING TO COMBUSTION AIR FAN

CONDITIONS

1. {1407} All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]
2. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
3. Storage silo shall vent only through carbon filter to atmosphere and/or bubbling fluidized bed (BFB) combustor. [District Rules 2201 and 4102]

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director/APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-28-0 : Oct 31 2012 2:36PM – PHILLIPA : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-29-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
BIOSOLIDS RECEIVING AND STORAGE OPERATION INCLUDING 1,450 TON (30' DIA.X 70' HIGH) ENCLOSED SILO # 2, CARBON VENT FILTER AND VAPOR PIPING TO COMBUSTION AIR FAN

CONDITIONS

1. {1407} All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]
2. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
3. Storage silo shall vent only through carbon filter to atmosphere and/or bubbling fluidized bed (BFB) combustor. [District Rules 2201 and 4102]

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-29-0 : Oct 31 2012 2:35PM – PHILLIPA : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-33-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
174 BHP (INTERMITTENT) CUMMINS MODEL CFP7E-F10 TIER 3 CERTIFIED DIESEL-FIRED, TURBO CHARGED, EMERGENCY IC ENGINE POWERING A FIREWATER PUMP

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]
4. {3404} This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702]
5. {3395} Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801 and 17 CCR 93115]
6. {3816} This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. For testing purposes, the engine shall only be operated the number of hours necessary to comply with the testing requirements of the National Fire Protection Association (NFPA) 25 - "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems". Total hours of operation for all maintenance, testing, and required regulatory purposes shall not exceed 100 hours per calendar year. [District Rule 4702 and 17 CCR 93115]

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director/APCO

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DAVID WARNER, Director of Permit Services
S-360-33-0 : Oct 31 2012 2:36PM – PHILLIPA : Joint Inspection NOT Required

7. {3807} An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702]
8. Emissions from this IC engine shall not exceed any of the following limits: 2.48 g-NOx/bhp-hr, 1.19 g-CO/bhp-hr, or 0.06 g-VOC/bhp-hr. [District Rules 2201 and 17 CCR 93115]
9. Emissions from this IC engine shall not exceed 0.11 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102 and 17 CCR 93115]
10. {3475} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702 and 17 CCR 93115]
11. {3489} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, and the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.). For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-34-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
BIOMASS RECEIVING AND STORAGE OPERATION

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. Maximum amount of biomass received shall not exceed 750 tons per day nor 251,850 tons per year. [District Rule 2201]
4. Particulate matter (PM10) emissions shall not exceed 0.0025 lb/ton. [District Rule 2201]
5. The permittee shall keep records of daily biomass received for a period of at least 5 years, and shall make such records readily available to District staff upon request. [District Rules 1070 and 2201]

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Seyed Sadredin, Executive Director/APCO

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DAVID WARNER, Director of Permit Services
S-360-34-0 : Oct 31 2012 2:38PM -- PHILLIPA : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-35-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
BIOMASS SHREDDING OPERATION, INCLUDING ELECTRIC MOTOR POWERED KOMPTECH CRAMBO MODEL 6000 SCHREDDER M-11, DISCHARGING BIOMASS TO SCREENING OPERATION PERMIT S-360-36, LOCATED IN BIOMASS PROCESSING BUILDING VENTED TO BFB FUEL CHUTE(S) AND/OR COMBUSTOR.

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. Operation of this unit shall be conducted in the biomass processing building with at least 80% PM10 control by venting building to the boiler. [District Rules 2201 and 4102]
4. Maximum amount of material processed by grinder shall not exceed 750 tons per day and 251,850 tpy. [District Rule 2201]
5. The number of transfer points serving the biomass grinding and conveying operation shall not exceed two (2). [District Rule 2201]
6. Particulate matter (PM10) emissions shall not exceed 0.0015 lb/ton from the grinder and 0.0025 lb/ton for each transfer point. [District Rule 2201]
7. The permittee shall keep records of daily material throughput for a period of at least 5 years, and shall make such records readily available to District staff upon request. [District Rules 1070 and 2201]

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Seyed Sadredin, Executive Director / APCO

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DAVID WARNER, Director of Permit Services
S-360-35-0: Oct 31 2012 2:35PM -- PHILLIPA : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-36-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
BIOMASS SCREENING OPERATION LOCATED IN BIOMASS PROCESSING BUILDING VENTED TO BFB FUEL CHUTES AND/OR COMBUSTOR, INCLUDING ELECTRIC MOTOR POWERED KOMPTECH EASY STAR TROMMEL SCREEN M-13, DISCHARGING TO "ACCEPTS" CONVEYOR C-13A AND THEN TO STORAGE PILE OR RECLAIMER (S-360-37-0) LIVE PILE

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. Operation of this unit shall be conducted in the biomass processing building with at least 80% PM10 control by venting building to the boiler. [District Rules 2201 and 4102]
4. Maximum amount of material processed by grinder shall not exceed 750 tons per day and 251,850 tpy. [District Rule 2201]
5. The number of transfer points serving the biomass screening and conveying operation shall not exceed three (3). [District Rule 2201]
6. Particulate matter (PM10) emissions shall not exceed 0.0015 lb/ton from the grinder and 0.0025 lb/ton for each transfer point. [District Rule 2201]
7. The permittee shall keep records of daily material throughput for a period of at least 5 years, and shall make such records readily available to District staff upon request. [District Rules 1070 and 2201]

YOU MUST NOTIFY THE DISTRICT COMPLIANCE DIVISION AT (661) 392-5500 WHEN CONSTRUCTION IS COMPLETED AND PRIOR TO OPERATING THE EQUIPMENT OR MODIFICATIONS AUTHORIZED BY THIS AUTHORITY TO CONSTRUCT. This is NOT a PERMIT TO OPERATE. Approval or denial of a PERMIT TO OPERATE will be made after an inspection to verify that the equipment has been constructed in accordance with the approved plans, specifications and conditions of this Authority to Construct, and to determine if the equipment can be operated in compliance with all Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. Unless construction has commenced pursuant to Rule 2050, this Authority to Construct shall expire and application shall be cancelled two years from the date of issuance. The applicant is responsible for complying with all laws, ordinances and regulations of all other governmental agencies which may pertain to the above equipment.

Seyed Sadredin, Executive Director / APCO

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DAVID WARNER, Director of Permit Services
S-360-36-0 : Oct 31 2012 2:36PM -- PHILLIPA : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-37-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
BIOMASS RECLAIM OPERATION, INCLUDING LIVE STORAGE PILE, RADAR MODEL 50655 STOKER RECLAIMER M-14 WITH LUMP BREAKER M-14A, LOCATED IN THE BIOMASS PROCESSING BUILDING VENTED TO BFB FUEL CHUTE(S) AND/OR COMBUSTOR, DISCHARGING BIOMASS TO SCREW CONVEYOR C-14B TO BELT CONVEYOR C-15 TO STAR SCREEN M-15 THEN TO "OVERS" CHUTE OR CONVEYORS C-17, C-18, C-19, C-20 THEN TO THE COMBUSTOR FUEL FEED BINS

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. Operation of this unit shall be conducted in the biomass processing building with at least 80% PM10 control by venting building to the boiler. [District Rules 2201 and 4102]
4. Maximum amount of material processed by grinder shall not exceed 750 tons per day and 251,850 tpy. [District Rule 2201]
5. The number of transfer points serving the biomass reclaim operation shall not exceed seven (7) (one feed hopper and 6 transfer points). [District Rule 2201]
6. Particulate matter (PM10) emissions shall not exceed 0.0015 lb/ton from the grinder and 0.0025 lb/ton for the feed hopper and each transfer point. [District Rule 2201]
7. The permittee shall keep records of daily material throughput for a period of at least 5 years, and shall make such records readily available to District staff upon request. [District Rules 1070 and 2201]

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Seyed Sadredin, Executive Director / APCO

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DAVID WARNER, Director of Permit Services
S-360-37-0 : Oct 31 2012 2:38PM -- PHILLIPA : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-38-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
BIOSOLIDS TRUCK UNLOADING OPERATION UTILIZING SELF UNLOADING TRUCKS, TRUCK TRAILER DUMP AND/OR BOTTOM DUMP TRUCKS AND INCLUDING PUSH/PULL FLOOR (C-1A, C-1B AND/OR C-1C), BIOSOLIDS DISCHARGE SCREW CONVEYORS AND FEED PUMPS DISCHARGING BIOSOLIDS INTO PERMITTED BIOSOLIDS STORAGE SILOS

CONDITIONS

1. {1407} All equipment shall be maintained in good operating condition and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere. [District Rule 2201]
2. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
3. Biosolids shall be conveyed in enclosed conveyors and/or pipelines to the biosolids storage silos. [District Rules 2201 and 4102]

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Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-38-0 : Oct 31 2012 2:38PM – PHILLIPA : Joint Inspection NOT Required

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-39-0

ISSUANCE DATE: DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
TRAIN 1 ASH LOADOUT TO TRUCK FROM ELEVATED SILOS USING TWO SIDED TRUCK ENCLOSURE, ENCLOSED CONVEYORS, REVERSIBLE ASH LOADING SCREW CONVEYOR, ASH CONDITIONER WITH COAXIAL LOADOUT SPOUT VENTED TO DUST COLLECTOR, NON-CONDITIONED RETRACTABLE COAXIAL LOADOUT CHUTE WITH SKIRT

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. Ash loadout to truck shall be performed using a two sided enclosure and retractable coaxial spouts vented to the ash silo dust collector. [District Rules 2201 and 4102]
3. Ash silo dust collector fan shall be operating during ash truck loading. [District Rules 2201 and 4102]
4. Ash loadout shall be performed such that particulate matter (PM10) emissions are controlled by 99%. [District Rules 2201 and 4102]
5. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than 5% opacity. [District Rule 2201]
6. Sufficient water shall be mixed in conditioned ash loadout spout to ensure compliance with the visible emissions limit. [District Rule 2201]
7. Maximum amount of ash loaded into trucks from any single train (2 ash silos)shall not exceed 100 tons per day. [District Rule 2201]
8. Particulate matter (PM10) emissions from ash loading to truck shall not exceed 0.0046 lb-PM10/ton. [District Rule 2201]

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director APCO

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DAVID WARNER, Director of Permit Services
S-360-39-0: Oct 31 2012 2:36PM – PHILLIPA : Joint Inspection NOT Required

9. The permittee shall keep records of daily material throughput for a period of at least 5 years, and shall make such records readily available to District staff upon request. [District Rule 1070]

San Joaquin Valley
Air Pollution Control District

AUTHORITY TO CONSTRUCT

DRAFT

PERMIT NO: S-360-42-0 **ISSUANCE DATE:** DRAFT

LEGAL OWNER OR OPERATOR: LIBERTY COMPOSTING INC
MAILING ADDRESS: P O BOX 80727
BAKERSFIELD, CA 93380-0727

LOCATION: 12421 HOLLOWAY RD
LOST HILLS, CA 93249

EQUIPMENT DESCRIPTION:
550 BHP DETROIT DIESEL MODEL S60 TIER 3 CERTIFIED DIESEL-FIRED EMERGENCY STANDBY IC ENGINE WITH TURBOCHARGER AND AIR COOLER

CONDITIONS

1. {98} No air contaminant shall be released into the atmosphere which causes a public nuisance. [District Rule 4102]
2. {15} No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three minutes in any one hour which is as dark as, or darker than, Ringelmann 1 or 20% opacity. [District Rule 4101]
3. {1898} The exhaust stack shall vent vertically upward. The vertical exhaust flow shall not be impeded by a rain cap (flapper ok), roof overhang, or any other obstruction. [District Rule 4102]
4. {4261} This engine shall be operated and maintained in proper operating condition as recommended by the engine manufacturer or emissions control system supplier. [District Rule 4702 and 40 CFR 60 Subpart IIII]
5. {4257} This engine shall be equipped with an operational non-resettable elapsed time meter or other APCO approved alternative. [District Rule 4702, 17 CCR 93115, and 40 CFR 60 Subpart IIII]
6. {4258} Only CARB certified diesel fuel containing not more than 0.0015% sulfur by weight is to be used. [District Rules 2201 and 4801, 17 CCR 93115, 40 CFR Part 60 Subpart IIII]
7. {4262} This engine shall be operated only for testing and maintenance of the engine, required regulatory purposes, and during emergency situations. Operation of the engine for maintenance, testing, and required regulatory purposes shall not exceed 50 hours per calendar year. [District Rule 4702, 17 CCR 93115 and 40 CFR Part 60 Subpart IIII]

CONDITIONS CONTINUE ON NEXT PAGE

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Seyed Sadredin, Executive Director / APCO

DRAFT

DAVID WARNER, Director of Permit Services
S-360-42-0 : Oct 31 2012 2:36PM – PHILLIPA : Joint Inspection NOT Required

8. {3807} An emergency situation is an unscheduled electrical power outage caused by sudden and reasonably unforeseen natural disasters or sudden and reasonably unforeseen events beyond the control of the permittee. [District Rule 4702]

9. {3808} This engine shall not be used to produce power for the electrical distribution system, as part of a voluntary utility demand reduction program, or for an interruptible power contract. [District Rule 4702]

10. Emissions from this IC engine shall not exceed any of the following limits: 2.49 g-NOx/bhp-hr, 0.87 g-CO/bhp-hr, or 0.13 g-VOC/bhp-hr. [District Rule 2201, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

11. Emissions from this IC engine shall not exceed 0.14 g-PM10/bhp-hr based on USEPA certification using ISO 8178 test procedure. [District Rules 2201 and 4102, 17 CCR 93115, and 40 CFR Part 60 Subpart IIII]

12. {3478} During periods of operation for maintenance, testing, and required regulatory purposes, the permittee shall monitor the operational characteristics of the engine as recommended by the manufacturer or emission control system supplier (for example: check engine fluid levels, battery, cables and connections; change engine oil and filters; replace engine coolant; and/or other operational characteristics as recommended by the manufacturer or supplier). [District Rule 4702]

13. {3496} The permittee shall maintain monthly records of emergency and non-emergency operation. Records shall include the number of hours of emergency operation, the date and number of hours of all testing and maintenance operations, the purpose of the operation (for example: load testing, weekly testing, rolling blackout, general area power outage, etc.) and records of operational characteristics monitoring. For units with automated testing systems, the operator may, as an alternative to keeping records of actual operation for testing purposes, maintain a readily accessible written record of the automated testing schedule. [District Rule 4702 and 17 CCR 93115]

14. {4263} The permittee shall maintain monthly records of the type of fuel purchased. [District Rule 4702 and 17 CCR 93115]

15. {3475} All records shall be maintained and retained on-site for a minimum of five (5) years, and shall be made available for District inspection upon request. [District Rule 4702 and 17 CCR 93115]