SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	PAGES 19	PAGE 1
STATIONARY SOURCE COMPLIANCE DIVISION	APPL NO 535798 & 535802	DATE 5/22/2015
PERMIT APPLICATION PROCESSING AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY CO1

Permits to Construct (New Construction)

Applicant — Irvine Ranch Water District (IRWD), Michelson Water Recycling Plant (MWRP)

Mailing Address — P.O. Box 5700, Irvine, CA 92619-7000

Equipment Location — 3512 Michelson Drive Irvine, CA 92612

Equipment Description
APPLICATION 535798, FACILITY ID 3513

BIOSOLIDS RECEIVING, HEAT DRYING, AND LOAD OUT SYSTEM, CONSISTING OF:

I. BIOSOLIDS RECEIVING SYSTEM, CONSISTING OF:

1. TRUCK LOADING AND UNLOADING STATION.
2. TWO IMPORTED CAKE SOLIDS RECEIVING BINS, EACH 3,528 CUBIC FEET CAPACITY (14'-0" W. X 18'-0" L. X 14'-0" H.), WITH PUMPS.
3. TWO CAKE DISTRIBUTION CONVEYORS, HORIZONTAL.
4. THREE WET BIOSOLIDS BINS, ANDRITZ, MODEL DDS 60-015, EACH WITH 2,500 CU. FT. CAPACITY, WET BIOSOLIDS SCREW CONVEYORS, 310 CU. FT./HR PROCESS RATE, AND A PUMP, 18,567 LBS/HR.
5. DRUM MIXER, 56,000 LBS/HR PROCESSING RATE, 7'-6" L. X 4'-0" DIA.

II. BIOSOLIDS HEAT DRYING SYSTEM, CONSISTING OF:

6. FURNACE, FABER, MODEL WB-I-20-IFGR, 31 MMBTU/HR, DIRECT FIRED, DIGESTER GAS, NATURAL GAS/DIGESTER GAS BLEND OR NATURAL GAS FIRED, WITH EXHAUST HEAT RECOVERY SYSTEM FROM CONDENSER.
7. ROTARY DRUM DRYER, ANDRITZ-GRAZ, MODEL DDS 60, TRIPLE PASS, 13' DIA. X 33'-8" L.
8. PRESEPARATOR, ANDRITZ, MODEL DDS 60-003, 16'-2" H. X 9'-0" W. X 9'-11" D., VENTED TO CONDENSER.
9. POLYCYCLONE, PROCESS EQUIPMENT, MODEL 37 STD 9CBK-15-7X6W, 14,000 LB CAPACITY, WITH BLOWER, 37,000 ACFM CAPACITY, VENTED TO CONDENSER.
10. CONDENSER, VENTED TO A VENTURI SCRUBBER AND REGENERATIVE THERMAL OXIDIZER, UNDER APPLICATION 535802 OR SUBSEQUENT.

III. BIOSOLIDS PELLET SIZING AND RECYCLING SYSTEM, CONSISTING OF:

11. PRESEPARATOR/POLYCYCLONE SCREW CONVEYOR, 34,000 LBS/HR PROCESS RATE, 14'-10" L. X 1'-0" DIA.
12. VIBRATING SIZING SCREEN, ANDRITZ SPROUT BAUER, OR EQUIVALENT, TRIPLE DECK, 42,000 LBS/HR CAPACITY.
13. WASTE BIN, LARGE INORGANIC MATERIALS.
14. ROLLER CRUSHER, ROSKAMP, MODEL TRC 1200-24, 30,000 LBS/HR CAPACITY, 6'-6" L. X 3'-9" W. X 3'-9" H.
15. RECYCLE SCREW CONVEYOR, 42,000 LBS/HR CAPACITY, TO RECYCLE FEED BUCKET ELEVATOR.
16. RECYCLED PRODUCT BUCKET ELEVATOR, ANDRITZ, MODEL BE-144, 800 CU. FT./HR CAPACITY, TO RECYCLE BIN.

17. RECYCLE BIN, 800 CU. FT./HR CAPACITY, VENTED TO A DUST COLLECTOR.
18. DUST COLLECTOR, NO. 1, SCHENCK PROCESS, MODEL 96AVR32, 2,500 CFM, 425 SQ. FT. TOTAL FILTER AREA, VENTING A RECYCLE BIN, VIBRATING SIZING SCREEN, ROLLER CRUSHER, RECYCLE SCREW CONVEYORS, RECYCLED PRODUCT BUCKET ELEVATOR, FINAL PRODUCT BUCKET ELEVATOR, PELLET COOLER, AND PNEUMATIC TRANSPORTER, VENTED TO THE ODOR CONTROL SYSTEM UNDER APPLICATION 535800 OR SUBSEQUENT.
19. RECYCLE SCREW CONVEYOR, 37,000 LBS/HR CAPACITY TO DRUM MIXER.
20. FINAL PRODUCT BUCKET ELEVATOR, 150 CU. FT./HOUR PROCESS RATE.
21. PELLET COOLER, 10 CU. FT. BATCH CAPACITY, 5,200 LBS/HR PROCESS RATE.
22. PELLET TRANSPORTER, PNEUMATIC, 15 CU. FT. CAPACITY, 2.6 TONS/HR PROCESS RATE, 3'-0" DIA. X 6'-0" H.

IV. BIOSOLIDS CAKE AND PELLET LOADOUT SYSTEM, CONSISTING OF:

23. LOADOUT SILO, CLASS B CAKE, 24' L. X 18' W. X 17' H.
24. TWO FINAL PRODUCT STORAGE SILOS, CLASS A PELLETS, 20'-0" DIA. X 28'-0" H.
25. TWO DUST COLLECTORS, NOS. 2 AND 3, SCHENCK PROCESS, MODEL 72AVS36, EACH WITH 2,000 CFM, 227 SQ. FT. TOTAL FILTER SURFACE AREA, AND A DUST COLLECTION BIN, EACH VENTING A STORAGE SILO, VENTED TO THE ODOR CONTROL SYSTEM UNDER APPLICATION 535800 OR SUBSEQUENT.

Equipment Description
APPLICATION 535802, FACILITY ID 3513

AIR POLLUTION CONTROL SYSTEM, VENTING THE ROTARY DRUM DRYER UNDER A/N 535798, CONSISTING OF:

1. VENTURI WET SCRUBBER, DIAMOND FIBERGLASS, MODEL CUSTOM, WITH MIST ELIMINATOR, OPTIONAL SULFURIC ACID INJECTION SYSTEM, RECIRCULATION PUMPS, AND EXHAUST FAN, 6,000 CFM.

2. REGENERATIVE THERMAL OXIDIZER (RTO), GULF COAST ENVIRONMENTAL SYSTEMS, CUSTOM, THREE CHAMBERS WITH CERAMIC MEDIA BED, NATURAL GAS FIRED, 2,600,000 BTU/HR, LOW NOX BURNER, MAXON, MODEL KINEDIZER LE, COMBUSTION BLOWER, 564 CFM, AND A FULLY MODULATING TEMPERATURE CONTROL SYSTEM.

3. EXHAUST BLOWER, VENTING A ROTARY DRUM DRYER VIA A CONDENSER, MAXIMUM CAPACITY 11,000 CFM.

4. EXHAUST STACK, MINIMUM OF 79' 0" H. WITH NO RAIN CAP.

Background

The above applications were submitted on April 6, 2012 for two new construction Permits to Construct for a biosolids receiving, heat drying, and loadout system and an air pollution control system. The biosolids receiving, heat drying, and loadout system consists of a sludge cake receiving and loadout area, sludge cake mixer, sludge furnace and rotary heat dryer, and dried sludge pellet conveying, classifying, storage and loadout system. The heat drying system uses a triple pass rotary drum dryer to produce marketable Class A biosolids pellets. Excess Class B biosolids will be removed from the site for disposal. Utilizing the drying system reduces the volume and weight of solids hauled from the plant, which in turn reduces trucking traffic and trucking emissions. The air pollution control system consists of a venturi wet scrubber and a natural gas fired 2.6 mmBtu/hr regenerative thermal oxidizer (RTO).

These applications were submitted along with ten (10) other applications to expand the plant to allow for biosolids management processes, including thickening, acid-phase anaerobic digestion, dewatering, drying/pelletizing, energy generation with microturbines, and use of pellets as a fertilizer or e-fuel. Since 1988, all biosolids from MWRP have been directed to Orange County Sanitation District (OCSD) for processing, reuse, and disposal. In 2009 IRWD decided to implement solids handling facilities, instead of transporting sludge to OCSD.

The maximum operating schedule for this equipment is 24 hours/day, 7 days/week, 52 weeks/year, 730 hours/month. There is no school within 1000 feet of emission source. There have been no Notices to Comply, Notices of Violation, or complaints in the last two years.

Rule 301 identifies the following equipment as a Schedule D fee: Sewage sludge drying, conveying, storage, load-out including, but not limited to, all or part of the following: conveyors, bins, hoppers, bucket elevators, loading arms.

Process Description

Permit unit A/N 535798 incorporates many systems to produce sludge pellets. It includes a sludge cake receiving and mixing system, sludge rotary heat drying system, and dried sludge pellet conveying, classifying, storage, and loadout system.

Sludge Cake Receiving/Mixing System

The sludge cake receiving/sludge cake loadout/pellet loadout facility accepts imported sludge cake and exports pellets (final product) and excess sludge cake. IRWD will accept dewatered biosolids from the Los Alisos Water Recycling Plant (LAWRP) facility and other plants in the region. The imported cake solids will be delivered with live bottom trucks and discharged into two cake receiving bins. The sludge cake bins will be located in the basement level of the cake receiving area. A sliding frame and screw conveyors at the bottom of the receiving bins will feed cake into progressive cavity cake pumps. The cake pumps transfer cake via distribution conveyors to three wet material bins, located upstream of the sludge dryer.

Sludge produced in-house will be dewatered to approximately 25% solids by three dewatering centrifuges. Two of the three dewatering centrifuges are expected to be operated, while the third will be standby. The dewatered sludge is then conveyed to three inclined shaft-less screw conveyors, one screw conveyor dedicated to each centrifuge, and then sent to one of two horizontal distribution conveyors. The distribution conveyors allow IRWD to divert cake solids (Class B solids) away from the dryer, directly to the cake load out silo for discharge into hauling trucks or to one of three wet material bins. The cake load out silo will be vented to the odor control system.

Imported cake and dewatered in-house cake from the three wet material bins, each with a dedicated cake pump, will be sent to either the cake load-out silo or the drum mixer. The drum mixer will combine dewatered cake with existing pellets from the recycle bin to produce small spheres with dry solid centers covered by a layer of wet dewatered sludge. The dry inside, moist outside of the mixed sludge spheres allow for efficient drying by exposing the moist outer layer directly in contact with hot air from the furnace.

Sludge Rotary Heat Drying System and Control System

The mixed sludge spheres are conveyed pneumatically through the triple pass rotary drum dryer to produce dry sludge pellets (Class A biosolids). A maximum of 56,000 lbs/hr of biosolids will be processed through the dryer. Drying the biosolids decreases the volume and weight of solids hauled from

the plant. The dryer is heated with a 31 mmBtu/hr furnace fired on digester gas, a digester gas/natural gas blend, or natural gas. It is expected that the furnace will typically operating on a digester gas/natural gas blend or natural gas when digester gas is not available. The furnace will have a normal operating temperature of 850°F-1000°F, with the maximum process air temperature entering the dryer to be 1300°F and the expected rotary dryer outlet air temperature of 195°F-205°F. The dryer system is designed to evaporate 6,000 kg of water/hr (13,227.7 lbs of water/hr). The dryer system will be located in the Solids Handling Building.

Most of the exhaust air from the dryer drum is returned back to the furnace burner after passing through a pre-separator and polycyclone to remove entrained particulate matter, a 40,000 acfm blower, and a condenser to remove moisture from the vapor stream. From the condenser the vapor stream is split, sending approximately 85% of the exhaust to the furnace burner and 15% of the exhaust to the venturi scrubber to control ammonia with sulfuric acid. The venturi fan conveys the vapors from the venture scrubber to a regenerative thermal oxidizer (RTO) to control VOCs including air toxic contaminants (TACs), and an 11,000 acfm exhaust blower before being released to atmosphere. Water in the condenser that is heated from the dryer exhaust is sent to a heat recovery system to facilitate in heating the digesters. A central vacuum system will be available to the heat dryer area to provide for dust cleanup.

The centrifuge capacity will match the heat dryer feed capacity, so that the dryer is only operated when sufficient wet biosolids cake is available to operate the dryer continuously for several consecutive days. During initial operations the expected average daily sewage influent flow is approximately 23.6 MGD (wet sludge ~ 1% solids), resulting in approximately 28.4 dry tons per day of sludge. The dryer is anticipated to be operated 3 days/week during initial operations. During design capacity operations 28 MGD of influent sewage (wet sludge ~ 1% solids) is expected to result in 44.3 dry tons per day of sludge. Also an additional 32.3 dry tons per week (6.46 dry tons/day) from LAWRP and 30.2 dry tons per week (6.04 dry tons/day) from other sources will be trucked in and sent to the drying system. The dryer is anticipated to be operated 5 days/week during design capacity operation. The digested sludge dewatering system will normally only operate when the heat drying system is in operation.

The venturi scrubber has a venturi throat and a subsequent wet scrubber. The venturi throat has a pressure drop of 18-26 inches W.C. +/- 1 inch W.C. (not including the scrubber downstream of the venturi). Sulfuric acid is used as the scrubbing liquid to control ammonia emissions and reduce scaling in the RTO downstream. The pH range of the scrubbing solution is 3-6. The recirculation design flow for the venturi throat is 100 gpm and 50 gpm to the wet scrubber. The regenerative thermal oxidizer controls/treats VOC/TAC vapors that are emitted during the biosolids drying process. The maximum process air temperature in the RTO is 1500°F. The maximum process vapor flowrate expected from the biosolids dryer to the RTO is 6,700 cfm (using an 11,000cfm blower).

Dried Sludge Pellet Conveying, Classifying, Storage, and Loadout System

The dried pellets are pneumatically conveyed from the drum dryer along with the saturated air to a pre-separator. The pre-separator removes gross solids and diverts process air to a polycyclone to remove dust and fines. The removed particulates are joined with the gross solids in the polycyclone screw conveyor before being sent to a triple deck vibrating sizing screen. The sizing screen separates the solids into 1) large inorganic materials which are conveyed to a waste bin, 2) oversized pellets which are conveyed to a roller crusher for size reduction and then to the recycle product screw conveyor, 3) undersized or fine pellets which are conveyed to the recycle product screw conveyor, and 4) product-size pellets (Class A) which are conveyed to a bucket elevator, pellet cooler, pellet transporter, and then to two final product pellet storage silos for truck loadout. The pellet silos will include live bottom hoppers to facilitate truck loading. Each pellet silo will be vented to a dust collector (baghouse) and its exhaust will be vented to the odor control system. The recycle product screw conveyor sends the recycle product to a bucket elevator, recycle bin, and then back to the drum mixer. The recycle bin is vented to a dust collector (baghouse) and

its exhaust will be vented to the odor control system. The cake receiving/cake loadout/pellet loadout truck bays will be in an enclosed building that will be vented to the odor control system. It is expected that the sludge will need to go through seven cycles to produce final product sized Class A biosolids pellets.

Emission calculations for A/N 535798 (Receiving, drying, loadout)

Fuel usage from the furnace

NG consumption = 31,000,000 Btu/hr x ft^3/1,050 Btu
= 29,524 ft^3/hr = 492 ft^3/min

Combustion products flow rate
= 492 ft^3/min x 13.5 ft^3/min combustion products/ ft^3/min gas
= 6,642 ft^3/min

DG consumption = 31,000,000 Btu/hr x ft^3/550 Btu
= 56,364 ft^3/hr = 939 ft^3/min

Assume combustion products flow rate has the same expansion as natural gas
= 939 ft^3/min x 13.5 ft^3/min combustion products/ ft^3/min gas
= 12,677 ft^3/min [used for dryer estimate]

Maximum monthly fuel usage limit: 31,000,000 Btu/hr x 24 hours/day x 365 days/year x year/12 month = 22,630,000,000 Btu/month

Extraction preseparator blower maximum flow rate (pre-condenser): 40,000 acfm
Exhaust RTO blower expected flow rate: 6,850 acfm (per Form 400-PS)
Exhaust RTO blower maximum flow rate: 11,000 acfm (per applicant)[used for RTO worst case estimate]
(vs/Ts) x Ta = va
40,000 acfm x (460 + 60) °R/(460 + 200)°R = 31,515 scfm [used for dryer estimate]
11,000 acfm x (460 + 60) °R/(460 + 187)°R = 8,841 scfm [used for RTO worst case estimate]

Assume VOC and TACs have a 95% control efficiency due to RTO.

Bolded emissions will be the emissions used for this application.

CO emissions from the furnace
Assume CO emissions from the furnace have 85% control efficiency due to 85% exhaust recirculation.
Emission from natural gas combustion: 35 lbs/1E6 cf(natural gas)^
R1 = 35 lbs/1E6 ft^3^ x 29,524 ft^3/hr = 1.03 lbs/hr = 25.06 lbs/day (NSR)
R2 = 35 lbs/1E6 ft^3^ x 29,524 ft^3/hr x (1.0-0.85) = 0.16 lbs/hr = 3.89 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

Emission from digester gas combustion: 35 lbs/1E6 cf(natural gas)^ Assume EF can be used for DG.
R1 = 35 lbs/1E6 ft^3^ x 56,364 ft^3/hr = 1.97 lbs/hr = 47.94 lbs/day (NSR)
R2 = 35 lbs/1E6 ft^3^ x 56,364 ft^3/hr x (1.0-0.85) = 0.30 lbs/hr = 7.30 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)
Maximum monthly emission: 0.30 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 219 lbs/month

CO Rule 1303 Modeling Requirement: (>30, ≤ 40 mmBtu/hr): 72.1 lbs/hr > 0.30 lbs/hr

NOx emissions from the furnace (R1=R2)
Emission from natural gas combustion: 130 lbs/1E6 cf(natural gas)^

130 lbs/1E6 ft^3^ x 29,524 ft^3/hr = 3.84 lbs/hr = 93.44 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

Emission from digester gas combustion: 130 lbs/1E6 cf(natural gas)^ Assume EF can be used for DG.
130 lbs/1E6 ft^3^ x 56,364 ft^3/hr = 7.33 lbs/hr = 178.36 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

NOx Rule 1147 Requirement & manufacturer guarantee: (furnace/dryer, process temperature >800°F < 1200°F) 30ppmd @ 3%O2 or 0.036 lb/mmBtu
NG or DG: 30 ppmd @ 3%O2 / [(20.9 – 3)/(20.9 – 10.84*)] = 16.9 ~ 17 ppm
17 ppm x 46 lbsNOx/lbmole x lbmole/379E6scf x 12,677 scfm x 60 min/hr
= 1.56 lbs/hr = 37.96 lbs/day (NSR)
*Assumed oxygen content based on June 11, 2009 source test of another rotary dryer (A/N 505120)
OR
0.036 lb/mmBtu x 31 mmBtu/hr = 1.12 lbs/hr = 27.25 lbs/day (NSR)
Maximum monthly emission: 1.12 lbs/hr x 24 hr/day x 365days/yr x yr/12month = 817.6 lbs/month

NOx Rule 1147 Requirement: (furnace/dryer, process temperature ≥ 1200°F) 60ppmd @ 3%O2 or 0.073 lb/mmBtu
NG or DG: 60 ppmd @ 3%O2 / [(20.9 – 3)/(20.9 – 10.84*)] = 33.7 ~ 34 ppm
34 ppm x 46 lbsNOx/lbmole x lbmole/379E6scf x 12,677 dscfm x 60 min/hr
= 3.11 lbs/hr = 75.68 lbs/day (NSR)
*Assumed oxygen content based on June 11, 2009 source test of another rotary dryer (A/N 505120)
OR
0.073 lb/mmBtu x 31 mmBtu/hr = 2.26 lbs/hr = 54.99 lbs/day (NSR)

NOx Rule 1303 Modeling Requirement: (>30, ≤ 40 mmBtu/hr): 1.31 lbs/hr > 1.12 lbs/hr

PM10 emissions
Please note PM10 produced by the drying, conveying, and storage processes will be associated with the dryer for NSR purposes. PM10 produced by the combustion of fuel in the RTO will be associated with the RTO for NSR purposes.

Assume all of the processes vented to dust collectors have 95% PM10 control efficiency.

I. PM emissions from fuel combustion from the furnace
A1. PM emissions from natural gas combustion from the furnace
Emission from natural gas combustion: 7.50 lbs/1E6 cf(natural gas)^
R1 = 7.50 lbs/1E6 ft^3^ x 29,524 ft^3/hr = 0.22 lbs/hr = 5.35 lbs/day (NSR)
R2 = 7.50 lbs/1E6 ft^3^ x 29,524 ft^3/hr x (1.0-0.95) = 0.01 lbs/hr = 0.24 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

A2. PM emissions from digester gas combustion from the furnace
Emission from digester gas combustion: 7.50 lbs/1E6 cf(natural gas)^ Assume EF can be used for DG.
R1 = 7.50 lbs/1E6 ft^3^ x 56,364 ft^3/hr ft^3/hr = 0.42 lbs/hr = 10.22 lbs/day (NSR)
R2 = 7.50 lbs/1E6 ft^3^ x 56,364 ft^3/hr ft^3/hr x (1.0-0.95) = 0.02 lbs/hr = 0.49 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

II. PM10 fugitive emissions from sludge handling** (R1=R2):
Tertiary crushing results in 3/16 in (4.8 mm) to 1 in 25 cm. Fines crushing results in < 3/16 in (4.8 mm).
E = 0.0024 lbs/ton (uncontrolled tertiary crushing)

E = 0.00054 lbs/ton (controlled tertiary crushing)
E = 0.0150 lbs/ton (uncontrolled fines crushing)
E = 0.0012 lbs/ton (controlled fines crushing)
E = 0.0087 lbs/ton (uncontrolled screening)
E = 0.00074 lbs/ton (controlled screening)
E = 0.072 lbs/ton (uncontrolled fines screening)
E = 0.0022 lbs/ton (controlled fines screening)
E = 0.00110 lbs/ton (uncontrolled loading/unloading/conveyor transfer point)
E = 0.000046 lbs/ton (controlled loading/unloading/conveyor transfer point)
E = 0.00010 lbs/ton (truck loading-conveyor)
where:
E = Emission factor
**Based on EPA AP-42, 11.19.2, Table 11.19.2-2 (8/2004)
Emission factor must be multiplied by the number of transfer points (where materials drop from one point to another)
Handling of wet sludge is assumed to have no PM10 contribution. It is assumed that the handling of sludge that has passed through the dryer contributes PM10 emissions.
Assume the material flow is equivalent to nine transfer points/handling events.

Event 1- conveying dried pellets to pre-separator (uncontrolled), vented to dust control
Event 2- conveying dried pellets from pre-separator to vibrating sizing screen (uncontrolled), vented to dust control
Event 3- screening/size classifying using vibrating sizing screen (uncontrolled), vented to dust control
Event 4- conveying from screen to: waste bin (trash), roller crusher (oversize), final product bucket elevator (product), recycle screw conveyor (fines) (uncontrolled), vented to dust control
Event 5- roller crushing (oversize) (uncontrolled), vented to dust control
Event 6- conveying from roller crusher to recycle screw conveyor (oversize), final product bucket elevator to pellet cooler (product), recycle screw conveyor to recycle bucket elevator (fines) (uncontrolled), vented to dust control
Event 7- conveying from recycle screw conveyor to recycled bucket elevator (oversize), pellet cooler to transporter (product), recycle bucket elevator to recycle bin (fines) (uncontrolled), vented to dust control
Event 8- conveying from recycled bucket elevator to recycle bin (oversize), transporter to final product silos (product), recycle bin to drum mixer (fines) (uncontrolled), vented to dust control
Event 9- conveying from recycle bin to drum mixer (oversize) (uncontrolled), vented to dust control
Event 10- truck loading from final product silos (uncontrolled)

R1 = [(0.00110 lbs/ton x 7 transfer points-uncontrolled conveying) + (0.072 lbs/ton x 1 fines screening-uncontrolled) + (0.0150 lbs/ton x 1 fines crushing) + (0.00010 lbs/ton x 1 transfer point-truck loading)] x ton/2000lbs x 56,000 lbs/hr = 2.65 lb/hr = 64.48lbs/day (NSR)

R2 = [(0.00110 lbs/ton x 7 transfer points-uncontrolled conveying) + (0.072 lbs/ton x 1 fines screening-uncontrolled) + (0.0150 lbs/ton x 1 fines crushing) + (0.00010 lbs/ton x 1 transfer point-truck loading)] x (1.0-0.95) x 56,000 lbs/hr x ton/2000lbs = 0.13 lb/hr = 3.16 lbs/day (NSR)

Total PM10 emissions

R1 = PM10(combustion) + PM10(fugitive)
= 0.42 lbs/hr + 2.65 lbs/hr = 3.07 lbs/hr = 74.70 lbs/day (NSR)

R2 = PM10(combustion) + PM10(fugitive)
= 0.02 lbs/hr + 0.13 lbs/hr = 0.15 lbs/hr = 3.65 lbs/day (NSR)
Maximum monthly emission: 0.15 lbs/hr x 24 hr/day x 365days/yr x yr/12month = 109.5 lbs/month
Please note fugitive PM10 will be associated with the dryer application for NSR purposes.

PM Rule 404 Requirement (furnace): 12,677 scfm (calculated exhaust flow rate) → 0.0724 grains/dcf
0.0724 grains/dcf x 12,677 scfm x 60min/hr x lb/7000grains = 7.87 lbs/hr > 0.15 lbs/hr

PM Rule 405 Requirement (furnace): 56,000 lbs/hr*** → 14.948 lbs/hr > 0.15 lbs/hr
***Maximum permitted throughput

PM10 Rule 1303 Modeling Requirement: (>30, ≤ 40 mmBtu/hr): 7.9 lbs/hr > 0.15 lbs/hr

Recycle Bin Baghouse PM Calculations
PM Rule 404 Requirement (recycle bin baghouse): 2,500 scfm^^^ → 0.133 grains/dcf
0.133 grains/dcf x 2,500 scfm x 60min/hr x lb/7000grains = 2.85 lbs/hr > 0.15 lbs/hr
^^^Maximum permitted baghouse exhaust flow rate

Air to Filter Ratio: 2,500 scfm / 425 sq. ft. = 5.88 ft/min

Product Bin Baghouses PM Calculations
PM Rule 404 Requirement (each final product bin baghouse): 2,000 scfm^^^ → 0.145 grains/dcf
0.145 grains/dcf x 2,000 scfm x 60min/hr x lb/7000grains = 2.49 lbs/hr > 0.15 lbs/hr
^^^Maximum permitted baghouse exhaust flow rate

Air to Filter Ratio: 2,000 scfm / 227 sq. ft. = 8.81 ft/min

VOC emissions (TOC=VOC) (R1=R2)
Please note VOC produced by the drying, conveying, and storage processes will be associated with the dryer for NSR purposes. VOC produced by the combustion of fuel in the RTO will be associated with the RTO for NSR purposes.

I. VOC non-fugitive emissions from sludge drying (24hrs/day, 5day/wk, 52wk/yr)
Assume the furnace/dryer has an 85% VOC control efficiency due to 85% exhaust recirculation.
Assume the RTO has a 95% VOC control efficiency.
R1 = inlet of dryer, R1-2 = outlet of dryer/inlet of RTO-A/N 535802, R2 = outlet of RTO-A/N 535802

A. VOC emissions from fuel combustion from the furnace
A1. VOC emissions from natural gas combustion from the furnace
Emission from natural gas combustion: 7.00 lbs/1E6 cf(natural gas)^
R1 = 7.00 lbs/1E6 ft^3^ x 29,524 ft^3/hr = 0.21 lbs/hr = 5.11 lbs/day (NSR)
R1-2 = 7.00 lbs/1E6 ft^3^ x 29,524 ft^3/hr x (1.0-0.85) = 0.03 lbs/hr = 0.73 lbs/day (NSR)
R2 = 7.00 lbs/1E6 ft^3^ x 29,524 ft^3/hr x (1.0-0.85) x (1.0-0.95) = 0.002 ~0 lbs/hr = 0 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

A2. VOC emissions from digester gas combustion from the furnace
Emission from digester gas combustion: 7.00 lbs/1E6 cf(natural gas)^ Assume EF can be used for DG.
R1 = 7.00 lbs/1E6 ft^3^ x 56,364 ft^3/hr = 0.39 lbs/hr = 9.49 lbs/day (NSR)
R1-2 = 7.00 lbs/1E6 ft^3^ x 56,364 ft^3/hr x (1.0-0.85) = 0.06 lbs/hr = 1.46 lbs/day (NSR)
R2 = 7.00 lbs/1E6 ft^3^ x 56,364 ft^3/hr x (1.0-0.85) x (1.0-0.95) = 0.003 ~ 0 lbs/hr = 0 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

B. VOC emissions from sludge drying

Estimated VOC concentration in biosolids = 500 ppmw or mg/kg, based on Andritz chemical analysis
Assume 56,000 wet lbs/hr of biosolids has a solids content of 25% → 14,000 dry lbs/hr
R1 = 500 ppmw / 1E6 x 14,000 dry lbs/hr = 7.00 lbs/hr = 170.33 lbs/day (NSR)
R1-2 = 500 ppmw / 1E6 x 14,000 dry lbs/hr x (1.0 – 0.85) = 1.05 lbs/hr = 25.55 lbs/day (NSR)
R2 = 500 ppmw / 1E6 x 14,000 dry lbs/hr x (1.0 – 0.85) x (1.0 – 0.95)
= 0.0525 ~ 0.05 lbs/hr = 1.22 lbs/day (NSR)

B1. VOC emissions limits at RTO exhaust

Assume the maximum estimated exhaust flow rate from the RTO.
R2 = (0.003 lbs/hr(combustion) +0.0525 lbs/hr(drying) + 0.02 lbs/hr$_{RTO_A/N535802}$) = 0.0755 lbs/hr
0.0755 lbs/hr / 16 lbs/lbmole x 379E6 cf/lbmole / 8,841 scfm / 60 min/hr = 3.37 ppmv

Applicant requested RTO emission limit (based on Andritz): 0.55 lbs/hr
R2 = 0.55 lbs/hr / 16 lbs/lbmole x 379E6 cf/lbmole / 8,841 scfm / 60 min/hr = 24.6 ~ 25 ppmv

R2(A/N 535798) = 0.55 lbs/hr - 0.02 lbs/hr$_{RTO_A/N535802}$ = 0.53 lbs/hr = 12.90 lbs/day (NSR)

B2. VOC emissions limits at dryer exhaust

R1-2 = 0.06 lbs/hr(combustion) + 1.05 lbs/hr(drying) = 1.11 lbs/hr
1.11 lbs/hr / 16lbs/lbmole x 379E6 cf/lbmole / 12,677 scfm / 60 min/hr = 34.6 ~ 35 ppmv

Applicant requested emission limit (based on Andritz): 0.55 lbs/hr
R2(A/N 535798) = 0.55 lbs/hr - 0.02 lbs/hr$_{RTO_A/N535802}$ = 0.53 lbs/hr = 12.90 lbs/day (NSR)
R1-2(A/N 535798) = 0.53 lbs/hr / (1.0 – 0.95) = 10.60 lbs/hr = 257.93 lbs/day (NSR)
R1-2 = 10.60 lbs/hr / 16 lbs/lbmole x 379E6 cf/lbmole / 12,677 scfm / 60 min/hr = 330.1 ~ 330 ppmv
R1(A/N 535798) = 10.60 lbs/hr / (1.0 – 0.85) = 70.67 lbs/hr = 1,719.64 lbs/day (NSR)

II. VOC fugitive emissions from sludge handling/stockpiling (24hrs/day, 7day/wk, 52wk/yr)

Dry solids for Table 1-5 emission factors represents the weight of material after it has been processed by a sludge dewatering unit.

A. VOC emissions from sludge cake receiving/conveying

Sludge Conveyor: 1.7 E-9 lbs VOC/lb dry biosolids processed/minute residence time, from Table 1-5, 1993 JEIP report.
R1=R2 = 1.7 E-9 lbs VOC/ lb dry biosolids processed/minute residence time x 56,000 lbs dry biosolids/hr
= 0.0000952 lbs/hr ~ 0 lbs/hr = 0 lbs/day (NSR)

Sludge Cake Handling Conveyor: 0.03 lb/yr/mgd, from Table 1-7, 1993 JEIP report.
R1=R2 = 0.03 lb/yr/mgd x 28mgd x yr/365days x day/24 hrs
= 0.0000959 lbs/hr ~ 0 lbs/hr = 0 lbs/day (NSR)

B. VOC emissions from sludge cake storage

Sludge Cake Storage: 2.3 E-9 lbs VOC/lb dry biosolids processed/minute residence time, from Table 1-5, 1993 JEIP report.
R1=R2 = 2.3 E-9 lbs VOC/ lb dry biosolids processed/minute residence time x 56,000 lbs dry biosolids/hr
= 0.000129 lbs/hr ~ 0 lbs/hr = 0 lbs/day (NSR)

Sludge Cake Storage: 6.10 lb/yr/mgd, from Table 1-7, 1993 JEIP report.
R1=R2 = 6.10 lb/yr/mgd x 28mgd x yr/365days x day/24 hrs

= 0.0195 lbs/hr ~ 0.02 lbs/hr = 0.49 lbs/day (NSR)

C. VOC emissions from sludge cake loadout

Sludge Truck Loading: 1.4 E-9 lbs VOC/lb dry biosolids processed/minute residence time, from Table 1-5, 1993 JEIP report.

R1=R2 = 1.4 E-9 lbs VOC/ lb dry biosolids processed/minute residence time x 56,000 lbs dry biosolids/hr
= 0.0000784 lbs/hr ~ 0 lbs/hr = 0 lbs/day (NSR)

Sludge Cake Truck Loading Operations: 1.73 lb/yr/mgd, from Table 1-7, 1993 JEIP report.
R1=R2 = 1.73 lb/year/mgd x 28mgd x yr/365days x day/24 hours
= 0.00553 lbs/hr ~ 0.01 lbs/hr = 0.24 lbs/day (NSR)

Total VOC emissions

R1 = VOC(fuel combustion+sludge drying) +VOC(sludge cake convey) + VOC(sludge cake storage) + VOC(sludge cake loadout)
= 70.67 lbs/hr + 0.0000959 lbs/hr+ 0.0195 lbs/hr + 0.00553 lbs/hr
= 70.70 lbs/hr = 1,720.37 lbs/day (NSR)

R2 = VOC(fuel combustion+sludge drying) +VOC(sludge cake convey) + VOC(sludge cake storage) + VOC(sludge cake loadout)
= 0.53 lbs/hr + 0.0000959 lbs/hr+ 0.0195 lbs/hr + 0.00553 lbs/hr
= 0.56 lbs/hr = 13.63 lbs/day (NSR)

Maximum monthly emission: 0.56 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 408.8 lbs/month

SOx emissions (R1=R2)

Emission from natural gas combustion: 0.60 lbs/1E6 cf(natural gas)^
0.60 lbs/1E6 ft^3^ x 29,524 ft^3/hr ft^3/hr = 0.02 lbs/hr = 0.49 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

Emission from digester gas combustion: 0.60 lbs/1E6 cf(natural gas)^ Assume EF can be used for DG.
0.60 lbs/1E6 ft^3^ x 56,364 ft^3/hr ft^3/hr = 0.03 lbs/hr = 0.73 lbs/day (NSR)
^Emission Factor (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A)

DG (applicant provided): 20 ppmvH2S(inDG) x 56,364 ft^3/hr DG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.19 lbs/hr = 4.62 lbs/day (NSR)

Rule 431.1 compliance: 1) NG ≤ 16 ppmv, 2) Facility wide emission < 5 lbs/day, 3) 40 ppmv w/CFGMS
1) 16 ppmv x 29,524 ft^3/hr x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2
= 0.08 lbs/hr SOx (as SO2) = 1.95 lbs/day (NSR)
2) 5 lbs/day H2S x lb-mole/34.08 lbsH2S x 64.07 lbsSOx/lb-mole = 9.40 lbs/day SOx (as SO2)
= 0.39 lbs/hr SOx (as SO2)
3) 40 ppmvH2S(in DG) x 56,364 ft^3/hr DG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.38 lbs/hr = 9.25 lbs/day (NSR)

Maximum monthly emission: 0.38 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 277.4 lbs/month

Annual Emissions (AER 2013) SOx emission: 0.004 tons/yr
0.004 tons/yr x 2,000lbs/ton x 1yr/365days = 0.0009 lbs/hr SOx = 0.0219 lbs/day SOx

CO2 emissions

EPA AP 42 Emission Factors (NG): 120,000 lb/mmscf
NG: 120,000 lb/mmscf x 31 mmBtu/hr / 1050 Btu/scf = 3,542.86 lbs/hr = 86,209.59 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 53.06 kg/mmBtu
NG: 53.06 kg/mmBtu x 2.2046 lb/kg x 31 mmBtu/hr = 3,626.26 lbs/hr = 88,238.99 lbs/day (NSR)

1) The Climate Registry 2013 Default Emission Factors (DG): 52.07 kg/mmBtu
DG: 52.07 kg/mmBtu x 2.2046 lb/kg x 31 mmBtu/hr = 3,558.60 lbs/hr = 86,592.60 lbs/day (NSR)

2) Assume DG is 40% CO2.
40% x 56,364 ft^3/hr DG x lb-moleH2S/379 ft^3 x 44 lbs CO2/lbmole CO2
= 2,617.43 lbs/hr = 63,690.80 lbs/day (NSR)

Total emissions
3,558.60 lbs/hr + 2,617.43 lbs/hr = 6,176.03 lbs/hr = 150,283.40 lbs/day (NSR)
Maximum monthly emission: 6,176.03 lbs/hr x 24 hr/day x 365day/yr x yr/12month = 4,508,501.9 lbs/month

CH4 emissions
EPA AP 42 Emission Factors (NG): 2.3 lb/mmscf
NG: 2.3 lb/mmscf x 31 mmBtu/hr / 1050 Btu/scf = 0.07 lbs/hr = 1.70 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 0.0009 kg/mmBtu
NG: 0.0009 kg/mmBtu x 2.2046 lb/kg x 31 mmBtu/hr = 0.06 lbs/hr = 1.46 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (DG): 0.0032 kg/mmBtu
DG: 0.0032 kg/mmBtu x 2.2046 lb/kg x 31 mmBtu/hr = 0.22 lbs/hr = 5.35 lbs/day (NSR)
Maximum monthly emission: 0.22 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 160.6 lbs/month

N2O emissions
EPA AP 42 Emission Factors (NG): 0.64 lb/mmscf
NG: 0.64 lb/mmscf x 31 mmBtu/hr / 1050 Btu/scf = 0.02 lbs/hr = 0.49 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 0.0009 kg/mmBtu
NG: 0.0009 kg/mmBtu x 2.2046 lb/kg x 31 mmBtu/hr = 0.06 lbs/hr = 1.46 lbs/day (NSR)
Maximum monthly emission: 0.06 lbs/hr x 24 hr/day x 365day/yr x yr/12month = 43.8 lbs/month

The Climate Registry 2013 Default Emission Factors (DG): 0.00063 kg/mmBtu
DG: 0.00063 kg/mmBtu x 2.2046 lb/kg x 31 mmBtu/hr = 0.04 lbs/hr = 0.97 lbs/day (NSR)

Emission calculations for A/N 535802 (RTO)

Fuel consumption = 2,600,000 Btu/hr x ft^3/1,050 Btu
= 2,476 ft^3/hr = 41 cfm
= 41 cfm natural gas x 13.5 scfm combustion products/cfm gas
= 553.5 ~ 554 cfm of combustion products

Maximum monthly fuel usage limit: 2,600,000 Btu/hr x 24 hours/day x 365 days/year x year/12 month = 1,898,000,000 Btu/month

Exhaust RTO combustion blower flow rate: 5,650 cfm (blower curve)
Exhaust RTO blower expected flow rate: 6,850 cfm (per Form 400-PS)
Exhaust RTO blower maximum flow rate: 11,000 acfm (per applicant)[used for RTO worst case estimate]

(vs/Ts) x Ta = va
11,000 acfm x (460 + 60) °R/(460 + 187)°R = 8,841 scfm [used for RTO worst case estimate]
Control Efficiency: 99%

Bold emissions shall be used for NSR purposes.

Natural gas combustion emissions
Fuel consumption = 2,600,000 Btu/hr x ft^3/1,050 Btu = 2,476 ft^3/hr
Emission Factors (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A):
R1=R2
CO: 35 lbs/1E6 ft^3 x 2,476 ft^3/hr = 0.09 lbs/hr = 2.19 lbs/day (NSR) = 65.7 lbs/month (NSR)
NOX: 130 lbs/1E6 ft^3 x 2,476 ft^3/hr = 0.32 lbs/hr = 7.79 lbs/day (NSR) = 233.6 lbs/month (NSR)
PM10: 7.5 lbs/1E6 ft^3 x 2,476 ft^3/hr = 0.02 lbs/hr = 0.49 lbs/day (NSR) = 14.6 lbs/month (NSR)
ROG: 7 lbs/1E6 ft^3 x 2,476 ft^3/hr = 0.02 lbs/hr = 0.49 lbs/day (NSR) = 14.6 lbs/month (NSR)
SOX: 0.6lbs/1E6 ft^3 x 2,476 ft^3/hr = 0.0015 ~ 0 lbs/hr = 0 lbs/day (NSR) = 0 lbs/month (NSR)

Rule 1147 NOx emissions
NOx, thermal oxidizer ≥ 1200°F: 60 ppm@3%O2 or 0.073 lb/mmBtu
60 ppmv@3%O2 x (20.9-10)/(20.9-3) x 8,841 scfm x 60min/hr x lbmole/379E6ft^3 x 46 lbsHexane/lbmole
[Estimate 10% O2 at exhaust.] = 2.35 lbs/hr = 57.18 lbs/day (NSR)
OR
0.073 lb/mmBtu x 2.6mmBtu/hr = 0.19 lbs/hr = 4.62 lbs/day (NSR)
Maximum monthly emission: 0.19 lbs/hr x 24 hr/day x 365 day/12month = 138.7 lbs/month

Manufacturer NOx emissions guarantee
NOx, thermal oxidizer: 30 ppm @3%O2
30 ppmv@3%O2 x (20.9-10)/(20.9-3) x 8,841 scfm x 60min/hr x lbmole/379E6ft^3 x 46 lbsHexane/lbmole
[Estimate 10% O2 at exhaust.] = 1.18 lbs/hr = 28.71 lbs/day (NSR)

CO2 emissions
EPA AP 42 Emission Factors (NG): 120,000 lb/mmscf
NG: 120,000 lb/mmscf x 2.6 mmBtu/hr / 1050 Btu/scf = 297.14 lbs/hr = 7,230.41 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 53.06 kg/mmBtu
NG: 53.06 kg/mmBtu x 2.2046 lb/kg x 2.6 mmBtu/hr = 304.14 lbs/hr = 7,400.74 lbs/day (NSR)
Maximum monthly emission: 304.14 lbs/hr x 24 hr/day x 365 day/12month = 222,022.2 lbs/month

CH4 emissions
EPA AP 42 Emission Factors (NG): 2.3 lb/mmscf
NG: 2.3 lb/mmscf x 2.6 mmBtu/hr / 1050 Btu/scf = 0.006 ~ 0.01 lbs/hr = 0.24 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 0.0009 kg/mmBtu
NG: 0.0009 kg/mmBtu x 2.2046 lb/kg x 2.6 mmBtu/hr = 0.01 lbs/hr = 0.24 lbs/day (NSR)
Maximum monthly emission: 0.01 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 7.3 lbs/month

N2O emissions
EPA AP 42 Emission Factors (NG): 0.64 lb/mmscf
NG: 0.64 lb/mmscf x 2.6 mmBtu/hr / 1050 Btu/scf = 0.0016 ~ 0.00 lbs/hr = 0 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 0.0009 kg/mmBtu
NG: 0.0009 kg/mmBtu x 2.2046 lb/kg x 2.6 mmBtu/hr = 0.01 lbs/hr = 0.24 lbs/day (NSR)

Maximum monthly emission: 0.01 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 7.3 lbs/month

Emissions Summary

Permit Unit Emissions (based on NSR lbs/day values)

A/N 535798 (biosolids dryer)

CO	= 0.30 lbs/hr	= 7.30 lbs/day	= 2,628 lbs/year	= 1.31 tons/year
NOx	= 1.12 lbs/hr	= 27.25 lbs/day	= 9,811.2 lbs/year	= 4.91 tons/year
PM10	= 0.15 lbs/hr	= 3.65 lbs/day	= 1,314 lbs/year	= 0.66 tons/year
ROG	= 0.56 lbs/hr	= 13.63 lbs/day	= 4,905.6 lbs/year	= 2.45 tons/year
SOx	= 0.38 lbs/hr	= 9.25 lbs/day	= 3,328.8 lbs/year	= 1.66 tons/year
CO2	= 6,176.03 lbs/hr	= 150,283.40lbs/day	= 54,102,022.8 lbs/year	= 27,051.01 tons/year
CH4	= 0.22 lbs/hr	= 5.35 lbs/day	= 1,927.2 lbs/year	= 0.96 tons/year
N2O	= 0.06 lbs/hr	= 1.46 lbs/day	= 525.6 lbs/year	= 0.26 tons/year

A/N 535802 (RTO)

CO	= 0.09 lbs/hr	= 2.19 lbs/day	= 788.4 lbs/year	= 0.39 tons/year
NOx	= 0.19 lbs/hr	= 4.62 lbs/day	= 1664.4 lbs/year	= 0.83 tons/year
PM10	= 0.02 lbs/hr	= 0.49 lbs/day	= 175.2 lbs/year	= 0.09 tons/year
ROG	= 0.02 lbs/hr	= 0.49 lbs/day	= 175.2 lbs/year	= 0.09 tons/year
SOx	= 0 lbs/hr	= 0 lbs/day	= 0 lbs/year	= 0 tons/year
CO2	= 304.14 lbs/hr	= 7,400.74 lbs/day	= 2,664,266.4 lbs/year	= 1,332.13 tons/year
CH4	= 0.01 lbs/hr	= 0.24 lbs/day	= 87.6 lbs/year	= 0.04 tons/year
N2O	= 0.01 lbs/hr	= 0.24 lbs/day	= 87.6 lbs/year	= 0.04 tons/year

Total

CO	= 0.39 lbs/hr	= 9.49 lbs/day	= 3,416.40 lbs/year	= 1.70 tons/year
NOx	= 1.31 lbs/hr	= 31.87 lbs/day	= 11,475.60 lbs/year	= 5.74 tons/year
PM10	= 0.17 lbs/hr	= 4.14 lbs/day	= 1,489.20 lbs/year	= 0.75 tons/year
ROG	= 0.58 lbs/hr	= 14.12 lbs/day	= 5,080.80 lbs/year	= 2.54 tons/year
SOx	= 0.38 lbs/hr	= 9.25 lbs/day	= 3,328.8 lbs/year	= 1.66 tons/year
CO2	= 6,480.17 lbs/hr	= 157,684.14 lbs/day	= 56,766,289.20 lbs/year	= 28,383.14 tons/year
CH4	= 0.23 lbs/hr	= 5.59 lbs/day	= 2,014.80 lbs/year	= 1.00 tons/year
N2O	= 0.07 lbs/hr	= 1.70 lbs/day	= 613.20 lbs/year	= 0.30 tons/year

Toxic Risk Analysis (dryer & RTO emissions assessed at the outlet of RTO)

Nearest Residential Receptor Distance:	2,300 ft. (701 m)
Nearest Commercial Receptor Distance:	1,388 ft. (423 m)
Exhaust stack flow rate:	11,000 acfm (per applicant)
Exhaust gas temperature:	187 °F
Stack height:	79 ft. (24.1 m)
Stack Diameter:	26 in. (0.66 m)
Rain cap present:	No
Building height:	33 ft. (10 m)
Building dimensions	50 ft. (15 m) x 54 ft. (16 m)

Compound	MW (lbs/lbmole)	Dryer Emissions (lbs/hr)	Dryer Metals & H_2S Emissions (lbs/hr)	Total Dryer Emissions (lbs/hr)	RTO Emissions (lbs/hr)
Acetaldehyde	44.06	4.37E-07		4.37E-07	1.06E-05

Acrolein	56.06	3.80E-07		3.80E-07	6.69E-06
Ammonia	17.03	1.33E-02		1.33E-02	4.46E-02
Arsenic	74.92		5.70E-05	5.70E-05	
Benzene	78.11	8.17E-07		8.17E-07	1.98E-05
Cadmium	112.41		5.41E-05	5.41E-05	
Chromium, hexavalent	51.996		1.19E-05	1.19E-05	
Copper	63.55		2.08E-03	2.08E-03	
Ethylbenzene	106.16	9.72E-07		9.72E-07	2.35E-05
Formaldehyde	30.03	1.73E-06		1.73E-06	4.21E-05
Hexane	86.18	6.48E-07		6.48E-07	1.56E-05
Hydrogen sulfide	34.08		6.09E-02	6.09E-02	
Lead	207.2		4.16E-04	4.16E-04	
Mercury	200.59		2.36E-05	2.36E-05	
Naphthalene	128.173	4.23E-08		4.23E-08	7.43E-07
Nickel	58.71		5.82E-04	5.82E-04	
PAH	252.3	1.41E-08		1.41E-08	2.48E-07
Selenium	78.96		1.39E-04	1.39E-04	
Toluene	92.13	3.73E-06		3.73E-06	9.06E-05
Xylenes	106.2	2.78E-06		2.78E-06	6.74E-05

Two toxic risk assessments were conducted: one for the emissions from the dryer (A/N 535798) and one for the emissions from the RTO (A/N 535802). The total dryer emissions are the sum of 1) the maximum dryer emission rates calculated from AB2588 AER Emission Factors for Natural Gas and Digester Gas External Combustion Equipment (10-100mmBtu/hr) with a 95% control efficiency from the RTO and 2) Metal calculated by Andritz (manufacturer) and H2S emissions provided by the applicant scaled up to maximum capacity (indicated in "IRWD DDS60 Andritz Emissions 09-29-14_1.pdf" and "Response to AQMD 053013.pdf", respectively). The RTO emissions are calculated from AB2588 AER Emission Factors for Natural Gas External Combustion Equipment (<10mmBtu/hr). The final emission release point for both the dryer and the RTO is the RTO exhaust stack, with its information shown above.

Tier III analysis was used to incorporate building downwash even though the nearest receptor is greater than 25 meters in distance from the exhaust stack and the exhaust stack has no rain cap. Tier III risk analysis was based on the outlet emissions listed in the above table. The MICR values for the dryer are determined to be 1.03×10^{-6} for residential and 2.30×10^{-7} for commercial receptors. The MICR values for the RTO are determined to be 3.07×10^{-9} for residential and 3.79×10^{-10} for commercial receptors. Both the dryer and RTO have HIA and HIC less than 1 and Cancer Burden less than 0.5.

Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- This project is exceeding the following:

Volatile Organic Compounds	30 lbs/day
Nitrogen Oxides	40 lbs/day

Not exceeding the following:

PM10	30 lbs/day
Sulfur Dioxide	60 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212 (c)(3)(A)(i)- Facility-wide max MICR is estimated to be below 10 in a million.
Public Notice is required.

Rule 401: Visible Emissions
No violations are expected limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected. Compliance is expected.

Rule 404: Particulate Matter-Concentration
No violations are expected limits are listed under Rule 404 Table 404(a).

Rule 405: PM-Weight
No violations are expected, limits are listed under Table 405(a).
Process weight: 56,000 lbs/hr. Table 405(a): 14.948 lbs/hr > 0.15 lbs/hr

Rule 407: Liquid and Gaseous Air Contaminants
Rule 407(a)(1)- CO: 2000 ppmvd.
Rule 407 (c)- Provisions of this subsection (a)(2) shall not apply to equipment which is subject to the emission limits and requirements of source specific rules in Reg XI.
Compliance is expected.

Rule 409: Combustion Contaminants
Combustion contaminants are not expected to exceed 0.1 grain per cubic foot of gas calculated to 12% CO2 at standard conditions averaged over a minimum of 15 consecutive minutes. Compliance is expected.

Rule 431.1: Sulfur Content of Gaseous Fuels
Rule 431.1(c)(1)- Natural gas contains ≤ 16 ppmv sulfur compounds as H2S.
Rule 431.1(c)(2)- Sewage digester gas ≤ 40 ppmv sulfur compounds as H2S, averaged daily or ≤ 40 ppmv sulfur compounds as H2S, averaged monthly and ≤ 500 ppmv sulfur compounds as H2S, averaged over 15minutes.
Other gases ≤ 40 ppmv sulfur compounds as H2S, averaged over 4 hours.
Rule 431.1(d)(1)- If burning gaseous fuels, other than exclusively natural gas, in stationary equipment shall have a properly operating continuous fuel gas monitoring system (CFGMS) to determine the sulfur content, calculated as H2S, of the fuel gas prior to burning; or a continuous emission monitoring system (CEMS) to determine SOx emissions after burning. All continuous monitors require District approval, which shall be based on the requirements as specified in Attachment A.
Rule 431.1(d)(1)(B)- A person subject to paragraph (c)(4) of this rule shall comply with paragraphs (d)(1) & (d)(2) no later than 12 months after the date a Permit to Construct is issued by the District for a sulfur removal system or comply with paragraph (d)(3).
Rule 431.1(d)(1)(C)- Compliance with the Table 1 sulfur limits shall be determined based on readings obtained from an approved continuous monitor.
Rule 431.1(d)(2)- A person installing a continuous monitor shall submit to the District for approval, a quality assurance procedure as specified in U.S. EPA 40 CFR, Part 60, Appendix F, Procedure 1 for CEMS and, as applicable, for CFGMS.
Rule 431.1(d)(2)(A)- The quality assurance procedure shall be submitted to the District for written approval by the Executive Officer prior to the CFGMS or CEMS final certification.
Rule 431.1(d)(2)(B)- Any CFGMS or CEMS deemed to be out of control, as specified in Attachment A, according to the facility quality assurance procedure approved by the Executive Officer shall be corrected within 72 hours.

Rule 431.1(d)(2)(B)(i)- The person operating the CFGMS or CEMS shall notify the Executive Officer by telephone or facsimile of any breakdown(s) of the monitoring systems if the duration of the breakdown is in excess of 60 minutes or if there are three or more breakdowns in any one day within 24 hours of the occurrence of the breakdown which triggers notification. Such report shall identify the time, location, equipment involved, and contact person.
Rule 431.1(d)(2)(B)(ii)- The person who complies with the provisions of clause (d)(2)(B)(i) and paragraph (e)(3) shall not be considered in violation of this rule for the 72 hour period of breakdown provided that the breakdown did not result from operator error, neglect or improper operation or maintenance procedures.
Rule 431.1(d)(3)- A person burning landfill gas or sewage digester gas, or who is subject to paragraph (c)(4) of this rule may use an alternative monitoring method, in lieu of the requirements in paragraphs (d)(1) and (d)(2), that ensures compliance with the daily total sulfur content limitation as specified in Table 1. Alternative monitoring methods shall not be used unless first approved in writing by the Executive Officers of the District, the CARB, and the Regional Administrator of the EPA, Region IX, or their designees.
Rule 431.1(d)(3)(A)- At a minimum, the alternative monitoring method shall meet the guidelines of Attachment A, Section III.
Rule 431.1(d)(3)(B)- A person subject to (c)(4) of this rule shall submit an alternative monitoring method for approval no later than 45 days after the date a Permit to Construct a sulfur removal system is issued.
Rule 431.1(d)(3)(C)- All monitoring shall comply with the approved alternative monitoring method.
Rule 431.1(g)(8)- Any facility which emits less than 5 pounds per day total sulfur compounds, calculated as H2S from the burning of gaseous fuels other than natural gas (not applicable to (c)(1)).
This facility is expected to comply either with sulfur limits as required or exemption requirement under Rule 431.1(g)(8). Compliance is expected.

Rule 53A: Orange County – Specific Contaminants (Contained in Addendum to Reg IV)
Rule 53- Sulfur compound emission limit, as SO_2 500 ppmv.
Compliance is expected.

Rule 1147 NOx Reductions From Miscellaneous Sources
Rule 1147(a)- Applicability: Applicable, since equipment is not required to comply with a NOx limit by other District XI rules.
Rule 1147(c)(1)-A/N 535798, 500-1300 °F: Dryer with process temperature < 1200 °F: 30 ppm NOx or 0.036 lb/mmBtu. Dryer with process temperature ≥ 1200 °F: 60 ppm NOx or 0.073 lb/mmBtu.
A/N 535802, >1500 °F: Thermal oxidizer with process temperature ≥ 1200°F: 60 ppm NOx or 0.073 lb/mmBtu. Equipment is in compliance with both NOx emission limits based on manufacturer guaranteed emission limits for the dryer and RTO.
Rule 1147(c)(3)- Shall determine compliance with emission limit using a District approved test protocol. The test protocol shall be submitted to the District at least 90 days prior to the scheduled test and approved by the District Source Testing Division.
Rule 1147(c)(7)-Owner or operator shall perform combustion system maintenance in accordance with the manufacturer's schedule and specifications as identified in the manual and other written materials supplied by the manufacturer or distributor. Owner or operator shall maintain on site a copy of the manufacturer's, distributor's, installer's or maintenance company's written maintenance schedule and instructions and retain a record of maintenance activity for a period of not less than three years. The owner or

operator shall maintain on site a copy of the District certification or District approved source test reports, conducted by an independent third party, demonstrating the specific unit complies with the emission limit. The source test report(s) must identify that the source test was conducted pursuant to a District approved protocol. The model and serial numbers of the specified unit shall be indicated on the source test report(s). The owner or operator shall maintain on the unit in an accessible location a permanent rating plate. The maintenance instructions, maintenance records and the source test report(s) or District certification shall be made available to the Executive Officer upon request.
Rule 1147(c)(8)- If complying with the lbs/mmBtu limit, shall install and maintain in service a non-resettable, totalizing, fuel meters for each unit's fuel(s) prior to compliance determination. A unit with a combustion system that operates at only one firing rate that comply with the lbs/mmBtu limit, shall install a non-resettable, totalizing, time or fuel meter for each fuel.
Rule 1147(c)(9)- Meters that require electric power to operate shall be provided a permanent supply of electric power that cannot be unplugged, switched off, or reset except by the main power supply circuit for the building and associated equipment or the unit's safety shut-off switch. Any person operating a unit subject to this rule shall not shut off electric power to a unit meter unless the unit is not operating and is shut down for maintenance or safety.
Rule 1147(c)(10)- Shall demonstrate compliance with applicable emission limit in Table 1 on or before the compliance date, pursuant to (d) or (e).
Rule 1147(c)(12)(A) New Manufactured Units: Display the model number and rated heat input capacity on a permanent rating plate and District certificate status.
Rule 1147(c)(13)- The owner or operator shall maintain on site a copy of all documents identifying the unit's rated heat input capacity for as long as the unit is retained on-site. The rated heat input capacity shall be identified by a manufacturer's or distributor's manual or invoice and a permanent rating plate attached to the unit.
Rule 1147(d)(1)- All emission determinations shall be calculated:
(A)- Using a District approved test protocol averaged over a period of at least 15 minutes and no more than 60 consecutive minutes; (B)- After unit start up; and (C)- In the unit's as-found operating condition.
Each compliance determination shall be made in the maximum heat input range at which the unit normally operates. An additional compliance determination shall be made using a heat input of less than 35% of the rated heat input capacity of units with process temperature less than 1200 °F that operate with variable heat input that falls below 50% rated heat input capacity during normal operation.
Rule 1147(d)(4)- If complying with lbs/mmBtu limit, NOx emissions shall be calculated using procedures in 40 CFR 60, Appendix A, Method 19, Sections 2 & 3.
Rule 1147(d)(5)- Records of source tests shall be maintained for 10 years and made available to District personnel upon request. Emissions determined to exceed any limits established by this rule through the use of any of the test methods specified in subparagraphs (d)(3)(A) through (d)(3)(F) shall constitute a violation of this rule.
Rule 1147(d)(6)- All compliance determinations shall be made using an independent contractor to conduct testing, which is approved by the Executive Officer under the Laboratory Approval Program for the applicable test methods.
Rule 1147(d)(7)- Equipment with two or more units in series with a common exhaust, the owner/operator may demonstrate compliance by one of the following:
(A)- Test each unit separately and demonstrate each unit's compliance, or
(B)- Test only after the last unit in the series when all units are operating and demonstrate compliance with either:

(i)- Lowest emission in Table 1 applicable to any unit in series (30 ppm NOx or 0.036 lb/mmBtu), or
(ii)- Heat input weighted average of all applicable Table 1 emission limits.
Compliance with Rule 1147 is expected.

Rule 1155: Particulate Matter (PM) Control Devices
Rule 1155(d)(1)- No visible emissions.
Rule 1155(d)(3)- PM control shall be operated and maintained in accordance with manufacturer's operation and maintenance manual or other similar written materials supplied by the manufacturer or distributor of a control device to ensure that the control device remains in proper operating condition.
Rule 1155(d)(4)- The baghouse does not use a manual shaker.
Rule 1155(d)(9)- The operator shall discharge material collected in a permitted PM control device for disposal or bring the material back to the process through a controlled material transfer system to prevent fugitive emissions during material transfer, including, but not limited to, shrouding or use of dust suppressants to stabilize the material.
Rule 1155(e)(1)- The operator of any baghouse or other PM control device shall have the trained person conduct a continuous five-minute visible emissions observation using EPA Method 22 once a week and shall maintain records for each observation and any necessary subsequent action(s) taken to eliminate visible emissions pursuant to subdivision (f).
Compliance is expected.

Reg. XIII: Rule1303(a)(2)- The regenerative thermal oxidizer (RTO), various baghouse/dust collectors, and odor control system are considered as BACT for the biosolids dryer and biosolids processing equipment. The biosolids dryer and RTO have low-NOx burners that with manufacturer guarantees that are expected to comply with Rule 1147 compliant. SCAQMD proposed the installation of a Regenerative Selective Catalytic Reduction (RSCR) System for NOx LAER/BACT to control the biosolids dryer and/or RTO NOx emissions. It was determined that current RSCR systems shall not be considered as LAER/BACT, since no known manufacturers offer a RSCR system in the appropriate size range for IRWD's 31mmBtu/hr biosolids dryer system. Existing RSCR systems are designed for mid-sized biomass units ranging from 155-560 mmBtu/hr.
Rule 1303(b)(1)- Modeling for VOC and SOx is not required (1303 Appendix A).
CO, NOx, and PM10 are less than the allowable emissions in Table A-1, no further analysis is required (1303 Appendix A).
Rule 1303(b)(2)- There are emission increases for this project. Since the facility is an essential public service, any required offsets shall be provided through priority reserve.
Compliance with Regulation XIII is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(B)- MICR less than 10×10^{-6} with T-BACT.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.

Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.

Reg XVII: Rule 1703(a)(1)- Each permit unit complies with applicable rules.
Rule 1703(a)(2)- BACT is applied.

Rule 1703(a)(3)- Not applicable, not a major stationary source (less than 250 TPY of any pollutant).

Rule 1714(d)- Not applicable since the modification is not otherwise subject to PSD review and the GHG emission increase is > 75,000 TPY < 100,000 TPY CO2e (pursuant to 40CFR52.21(b)(v)(b)).

Reg. XXX: Expansion of the facility to include a biosolids receiving, heat drying, and load out system and other equipment is part of an Initial Title V permit process, which will be subject to a 45 day EPA review under Rule 3003(j). A public notice is required under Rule 3003(n)(2) and Rule 212(g).
Rule 3001(c)(2)- NOx & VOC > 10 tons/yr, Title V permit required.
Rule 3002(b)(1) & (b)(2)- Applicant submitted Title V application on 4/2/2014.
Rule 3002(c)(2)- Compliance with Rules & Regulations is expected.
Rule 3003(a)(3)- Facility was determined to potentially trigger Title V emission thresholds in December 2013. IRWD reviewed possible operating limitations enforced via permit conditions to ensure that Title V thresholds were not triggered. In March 2014 after IRWD's review, it was confirmed that this project would trigger Title V thresholds based on potential to emit calculations and shall enter the Title V permit program. This application was submitted 4/2/2014 (within 180 days of subject date).
Rule 3003(b)(1)- Appropriate forms and fees were submitted.
Rule 3004(a)(4)(C)- The (ground, non-elevated) flare is used for air pollution control. Appendix A of the Periodic Monitoring Guidelines for Title V Facilities requires an exhaust temperature limit, continuous monitoring of exhaust temperature and recording with a strip chart or digital data acquisition system. LAER/BACT already requires exhaust temperature limit and continuous monitoring.
Compliance is expected.

Conclusions and Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Construct is recommended for 535798 and 535802 after EPA review and public notice. For Permit Conditions please see Sample Permit.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	PAGES 5	PAGE 1
ENGINEERING AND COMPLIANCE DIVISION	APPL NO 535800	DATE 5/22/2015
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY CDT

Permit to Construct (New Construction)

Applicant Irvine Ranch Water District (IRWD) –Michelson Water Recycling Plant (MWRP)

Mailing Address P.O. Box 57000
Irvine, CA 92619-7000

Equipment Location 3512 Michelson Drive
Irvine, CA 92612

APPLICATION 535800, FACILITY ID 003513
Equipment Description

ODOR CONTROL SYSTEM CONSISTING OF:

1. ODOR SCRUBBER, DANIEL MECHANICAL, MODEL CUSTOM, THREE STAGES, TWO STAGES IN SERIES, ONE IN STANDBY, EACH STAGE WITH VERTICAL COUNTER CURRENT FLOW WET PACKED TYPE, 27' H. X 12' DIAM., WITH A MINIMUM DEPTH OF 12 FEET OF JAEGGER TRI-PACK, VERANTIS TELLERETTES, PROPYLENE PACKING MEDIA OR EQUIVALENT, AND OUTLET MIST ELIMINATOR, WITH TWO 450-GPM RECIRCULATION PUMPS.
2. TWO STORAGE TOTES, SULFURIC ACID, 275 GALLONS EACH, WITH ASSOCIATED PUMPS.
3. STORAGE TANK, SODIUM HYDROXIDE, 5,200 GALLONS, WITH ASSOCIATED PUMPS.
4. STORAGE TANK, SODIUM HYPOCHLORITE, 8,500 GALLONS, WITH ASSOCIATED PUMPS.
5. EXHAUST SYSTEM WITH TWO 200 H.P. BLOWERS, 41,500 CFM CAPACITY, VENTING THE FOUL AIR COLLECTION SYSTEM, WHICH VENTS THE FOLLOWING EQUIPMENT:
   - A. PRIMARY SLUDGE, WASTE ACTIVATED SLUDGE, AND BLEND INLET WETWELLS.
   - B. PRIMARY SLUDGE AND WASTE ACTIVATED SLUDGE PUMP STATIONS.
   - C. FOUR THICKENING CENTRIFUGES.
   - D. TWO THICKENED SLUDGE WETWELLS.
   - E. THREE DEWATERING CENTRIFUGES.
   - F. SLUDGE SCREENINGS DUMPSTER ROOM.
   - G. TWO SLUDGE CAKE RECEIVING BINS.
   - H. SIX CONVEYORS.
   - I. THREE WET MATERIAL BINS.
   - J. TWO TRUCK LOADING AND UNLOADING BAYS.
   - K. THREE DRYER SYSTEM DUST COLLECTORS.
   - L. CAKE LOADOUT HOPPER.
   - M. TWO FATS, OILS, AND GREASE (FOG) STORAGE TANKS.

Background/Process Description

The above application was submitted on April 6, 2012 as a New Construction Permit to Construct application type for an odor control system. This application was submitted along with eleven (11) other applications to expand the plant to allow for biosolids management processes, including thickening, acid-phase anaerobic digestion, dewatering, drying/pelletizing, energy generation with microturbines, and use

of pellets as a fertilizer or e-fuel. Since 1988, all biosolids from MWRP have been directed to Orange County Sanitation District (OCSD) for processing, reuse, and disposal. In 2009 IRWD decided to implement solids handling facilities, instead of transporting sludge to OCSD.

This vertical counter current flow wet packed bed odor scrubber has three stages. Normal operation will consist of two scrubbers in series, with the third as a standby unit. The odor scrubber is constructed of fiberglass reinforced plastic (FRP) with corrosion resistance resin. Two blowers pull foul air up through each stage's packing material as scrubbing liquid sprays over and runs down through the packing material. The odorous gases deodorize at the reaction at the liquid gas interface. Prior to discharge into atmosphere the deodorized air passes through a mist eliminator.

A control system regulates the amount of sodium hydroxide (NaOH) and sodium hypochlorite (NaOCl) is metered into the water solution to remove hydrogen sulfide (H2S) based on pH level and Oxidation Reduction Potential (ORP). This odor scrubber system is expected to have a 99% control efficiency of H2S. Sulfuric acid (H2SO4) may be used to control ammonia. Each stage has two 450 gpm recirculation pumps to supply scrubbing solution. Differential pressure gauges will be used to indicate the scrubber packing bed pressure drop, which should not exceed 5.0 inches W.C.

The odor control system will be installed and used to vent and control odors from the following sources: three inlet wetwells (primary sludge, waste activated sludge, and blend), primary sludge and waste activated sludge pump stations, four thickening centrifuges, two thickened sludge wetwells, three dewatering centrifuges, sludge screenings dumpster room, two sludge cake receiving bins, six conveyors, three wet material bins, two truck loading and unloading bays, the dryer system's three fugitive dust collection baghouses (which vent pellet silos, recycle bin, recycle conveyor, pellet cooler, and pneumatic transporter), cake loadout hopper, and fats, oils, grease (FOG) storage tanks.

The maximum operating schedule is 24 hours/day, 7 days/week, 52 weeks/year. There is no school within 1000 feet of emission source. There have been no Notices to Comply, Notices of Violation, or complaints issued in the last two years.

Emission Calculations

ROG emissions
R1 = R2 = 0 lbs/hr = 0lbs/day
Please note all ROG emissions from the equipment this unit is venting are associated with the sewage treatment plant or drying system under A/N 535794 and 535798, respectively, instead of the control equipment, such as this permit unit for an odor scrubber.

Hydrogen Sulfide (H2S) Calculations
CAAQS H2S concentration threshold
Outlet concentration is based on the maximum concentration to be in compliance. 30 ppb is the California Ambient Air Quality Standard at the facility property boundary. This standard was adopted to protect against nuisance odor for the general public. 30ppb is the H2S concentration limit at the facility boundary/fenceline.

Concentration associated with 30ppbv:
30ppbv = 0.030ppmv

= 0.030ppmv x 34.08lbsH2S/lbmole / 0.02404 = 42.53 ug/m^3

Calculate the effluent concentration of H2S based on screen 3 modeling. Screen 3 modeling was only used for H2S nuisance calculations. Screen 3 using an emission rate of 1 lb/hr results in a concentration of 14.59 ug/m^3 (maximum) at the receptor distance 100m, which is greater than the fenceline distance.

The equivalent emission rate associated with 30ppbv at the receptor (100m) is:
= 42.53 ug/m^3 x 1lb/hr / 14.59 ug/m^3 = 2.92 lbs/hr
Concentration of H2S at exhaust with a concentration of 30ppbv at the receptor (100m):
2.92 lbs/hr x 1E6/1 / 41,500cfm / 60min/hr x 379cft/lbmole / 34.08lbsH2S/lbmole = 13.0 ~ 13 ppmv H2S

OEHHA H2S concentration threshold
Outlet concentration is based on the maximum concentration to be in compliance. 8 ppb is inhalation reference exposure level and odor threshold according to Office of Environmental Health Hazard Assessment (OEHHA). 8ppb is the H2S concentration limit at the facility boundary/fenceline.

Concentration associated with 8ppbv:
8ppbv = 0.008ppmv
= 0.008ppmv x 34.08lbsH2S/lbmole / 0.02404 = 11.34 ug/m^3

Calculate the effluent concentration of H2S based on screen 3 modeling. Screen 3 modeling was only used for H2S nuisance calculations. Screen 3 using an emission rate of 1 lb/hr results in a concentration of 14.59 ug/m^3 (maximum) at the receptor distance 100m, which is greater than the fenceline distance.

The equivalent emission rate associated with 8ppbv at the receptor (100m) is:
= 11.34 ug/m^3 x 1lb/hr / 14.59 ug/m^3 = 0.78 lbs/hr
Concentration of H2S at exhaust with a concentration of 8ppbv at the receptor (100m):
0.78 lbs/hr x 1E6/1 / 41,500cfm / 60min/hr x 379cft/lbmole / 34.08lbsH2S/lbmole = 3.47 ppmv H2S

Hydrogen Sulfide (H2S) Emissions
1.0 ppmv will be used as the permit condition H2S limit for the application. 1.0 ppmv passes HIA & HIC threshold limits and will result in less than 8ppbv at receptor distance.

R2 = 1.0ppmv x $ft^3/10^6ft^3$ x 41,500cfm x 60min/hr x lbmole/$379ft^3$ x 34.08lbsH2S/lbmole = 0.224 lb/hr
R1 = 1.0ppmv / (1 – 0.99)
= 100ppmv x $ft^3/10^6ft^3$ x 41,500scfm x 60min/hr x lbmole/$379ft^3$ x 34.08lbsH2S/lbmole = 22.39 lbs/hr

Toxic Risk Analysis

Nearest Residential Receptor Distance:	2,300 ft. (701 m)
Nearest Commercial Receptor Distance:	1,396 ft. (426 m)
Nearest Property Boundary Distance:	225 ft. (69 m)
Stack height:	79.00 ft. (24.1 m)
Stack inner diameter:	54 in. (1.37 m)
Exhaust temperature:	68 °F
Exhaust stack flow rate:	41,500 acfm
Rain cap on exhaust stack:	No
Solids handling building dimensions:	69 ft (21.0m) tall, 144 ft (43.9m) x 160 ft (48.8m)

Compound	Inlet Concentration (ppmv)	MW (lb/mole)	Control Efficiency	Outlet Concentration (ppmv)
H2S	100	34.08	0.99	1.0

Tier II analysis was used since the nearest receptor is greater than 25m from the exhaust stack and the exhaust stack has no rain cap. Tier II risk analysis was based on the outlet concentrations listed in the above table. H2S is not currently considered a carcinogen, therefore no MICR was calculated. HIA and HIC were 0.154 and 0.0309 respectively and therefore less than 1. Cancer Burden was less than 0.5.

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- This project is exceeding the following:

Volatile Organic Compounds	30 lbs/day
Nitrogen Oxides	40 lbs/day

Not exceeding the following:

PM10	30 lbs/day
Sulfur Dioxide	60 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212 (c)(3)(A)(i)- Facility-wide max MICR is estimated to be below 10 in a million.
Public Notice is required.

Rule 401: Visible Emissions
No violations are expected limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected.

Reg. XIII: This equipment shall be considered as BACT. There is no increase of emissions from this equipment. Therefore BACT, modeling, and offsets are not required. Compliance is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6} limit.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are less than 1 respectively.

Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.

Reg. XXX: Expansion of the facility to include a biosolids receiving, heat drying, and load out system and other equipment is part of an Initial Title V permit process, which will be subject to a 45 day EPA review under Rule 3003(j). A public notice is required under Rule 3003(n)(2) and Rule 212(g).
Rule 3001(c)(2)- NOx & VOC > 10 tons/yr, Title V permit required.
Rule 3002(b)(1) & (b)(2)- Applicant submitted Title V application on 4/2/2014.
Rule 3002(c)(2)- Compliance with Rules & Regulations is expected.
Rule 3003(a)(3)- Facility was determined to potentially trigger Title V emission thresholds in December 2013. IRWD reviewed possible operating limitations enforced

via permit conditions to ensure that Title V thresholds were not triggered. In March 2014 after IRWD's review, it was confirmed that this project would trigger Title V thresholds based on potential to emit calculations and shall enter the Title V permit program. This application was submitted 4/2/2014 (within 180 days of subject date).
Rule 3003(b)(1)- Appropriate forms and fees were submitted.
Rule 3004(a)(4)(C)- The (ground, non-elevated) flare is used for air pollution control. Appendix A of the Periodic Monitoring Guidelines for Title V Facilities requires an exhaust temperature limit, continuous monitoring of exhaust temperature and recording with a strip chart or digital data acquisition system. LAER/BACT already requires exhaust temperature limit and continuous monitoring.
Compliance is expected.

Conclusions and Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Construct is recommended for application 535800 after EPA review and public notice. For Permit Conditions please see Sample Permit.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	PAGES 12	PAGE 1
STATIONARY SOURCE COMPLIANCE DIVISION	APPL NO 535803 through 535806, & 552110	DATE 5/21/2015
PERMIT APPLICATION PROCESSING AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY CDT

Permits to Construct (New Construction)

Applicant — Irvine Ranch Water District (IRWD), Michelson Water Recycling Plant (MWRP)

Mailing Address — P.O. Box 5700,
Irvine, CA 92619-7000

Equipment Location — 3512 Michelson Drive
Irvine, CA 92612

Equipment Description

APPLICATION 535803, FACILITY ID 3513

MICROTURBINE SYSTEM, NO. 1, CONSISTING OF:

1. DIGESTER GAS FUEL TREATMENT SYSTEM (COMMON TO MICROTURBINE SYSTEM NOS. 2, 3, 4, AND 5), CONSISTING OF:
   - A. SILOXANE REMOVAL VESSELS.
   - B. NATURAL GAS FUEL BLENDING SYSTEM.
   - C. GAS COMPRESSORS.
   - D. AFTERCOOLER.
2. GAS MICROTURBINE, CAPSTONE, MODEL CR200, 2,280,000 BTU PER HOUR, DIGESTER GAS, DIGESTER GAS/NATURAL GAS BLEND, OR NATURAL GAS FIRED, DRIVING A 200 KW ELECTRICAL GENERATOR.
3. HEAT RECOVERY UNIT.

APPLICATION 535804, FACILITY ID 3513

MICROTURBINE SYSTEM, NO. 2, CONSISTING OF:

1. DIGESTER GAS FUEL TREATMENT SYSTEM (COMMON TO MICROTURBINE SYSTEM NOS. 1, 3, 4, AND 5), CONSISTING OF:
   - A. SILOXANE REMOVAL VESSELS.
   - B. NATURAL GAS FUEL BLENDING SYSTEM.
   - C. GAS COMPRESSORS.
   - D. AFTERCOOLER.
2. GAS MICROTURBINE, CAPSTONE, MODEL CR200, 2,280,000 BTU PER HOUR, DIGESTER GAS, DIGESTER GAS/NATURAL GAS BLEND, OR NATURAL GAS FIRED, DRIVING A 200 KW ELECTRICAL GENERATOR.
3. HEAT RECOVERY UNIT.

APPLICATION 535805, FACILITY ID 3513

MICROTURBINE SYSTEM, NO. 3, CONSISTING OF:

1. DIGESTER GAS FUEL TREATMENT SYSTEM (COMMON TO MICROTURBINE SYSTEM NOS. 1, 2, 4, AND 5), CONSISTING OF:
   - A. SILOXANE REMOVAL VESSELS.
   - B. NATURAL GAS FUEL BLENDING SYSTEM.
   - C. GAS COMPRESSORS.
   - D. AFTERCOOLER.

2. GAS MICROTURBINE, CAPSTONE, MODEL CR200, 2,280,000 BTU PER HOUR, DIGESTER GAS, DIGESTER GAS/NATURAL GAS BLEND, OR NATURAL GAS FIRED, DRIVING A 200 KW ELECTRICAL GENERATOR.

3. HEAT RECOVERY UNIT.

APPLICATION 535806, FACILITY ID 3513
MICROTURBINE SYSTEM, NO. 4, CONSISTING OF:

1. DIGESTER GAS FUEL TREATMENT SYSTEM (COMMON TO MICROTURBINE SYSTEM NOS. 1, 2, 3, AND 5), CONSISTING OF:
   A. SILOXANE REMOVAL VESSELS.
   B. NATURAL GAS FUEL BLENDING SYSTEM.
   C. GAS COMPRESSORS.
   D. AFTERCOOLER.

2. GAS MICROTURBINE, CAPSTONE, MODEL CR200, 2,280,000 BTU PER HOUR, DIGESTER GAS, DIGESTER GAS/NATURAL GAS BLEND, OR NATURAL GAS FIRED, DRIVING A 200 KW ELECTRICAL GENERATOR.

3. HEAT RECOVERY UNIT.

APPLICATION 552110, FACILITY ID 3513
MICROTURBINE SYSTEM, NO. 5, CONSISTING OF:

1. DIGESTER GAS FUEL TREATMENT SYSTEM (COMMON TO MICROTURBINE SYSTEM NOS. 1, 2, 3, AND 4), CONSISTING OF:
   A. SILOXANE REMOVAL VESSELS.
   B. NATURAL GAS FUEL BLENDING SYSTEM.
   C. GAS COMPRESSORS.
   D. AFTERCOOLER.

2. GAS MICROTURBINE, CAPSTONE, MODEL CR200, 2,280,000 BTU PER HOUR, DIGESTER GAS, DIGESTER GAS/NATURAL GAS BLEND, OR NATURAL GAS FIRED, DRIVING A 200 KW ELECTRICAL GENERATOR.

3. HEAT RECOVERY UNIT.

Background/Process Description

Applications 535803 through 535806 were submitted on April 6, 2012 for new construction Permits to Construct for four identical FlexEnergy MT250 digester gas or digester gas/natural gas blend fired 3.16 mmBtu/hr microturbines each producing 250kW. Application 552110 was submitted on June 4, 2013 for a new construction Permit to Construct for an additional microturbine. Also the applicant had decided to pursue utilizing five Capstone CR200 digester gas, digester gas/natural gas blend, or natural gas fired 2.28 mmBtu/hr microturbines each producing 200kW, instead of the original FlexEnergy units. The overall power output remains the same, although one additional microturbine will be used. Due to the much later subsequent application submittal of the fifth microturbine, A/N 552110 will not be considered as identical equipment with regards to permit processing fees.

The original set of microturbine applications were submitted along with eight (8) other applications to expand the plant to allow for biosolids management processes, including thickening, acid-phase anaerobic

digestion, dewatering, drying/pelletizing, energy generation with microturbines, and use of pellets as a fertilizer or e-fuel. Since 1988, all biosolids from MWRP have been directed to Orange County Sanitation District (OCSD) for processing, reuse, and disposal. In 2009 IRWD decided to implement solids handling facilities, instead of transporting sludge to OCSD.

The microturbines will be installed and used to produce power by combusting digester gas produced by the methane phase digesters. Digester gas from the methane phase digesters will pass through a foam separator, a digester gas pre-treatment system consisting of iron sponge(s), gas boosters, and a gas dryer with chiller. After pre-treatment, digester gas can proceed to the flare, two boilers, biosolids dryer, or to the digester gas fuel treatment system. The digester gas passes through the fuel treatment system consisting of siloxane removal vessels, a natural gas blending system, gas compressor, and aftercooler, before being used in the microturbines.

Natural gas will be blended with the digester gas for flexible microturbine operation to allow full load operation of all units. The applicant also requested that the microturbines are permitted to be fired on 100% natural gas during initial start-up and for troubleshooting purposes. The facility plans to limit the amount of natural gas used in the microturbines to 25% of the total fuel on a BTU basis to comply with grant funding requirements for the Self Generation Incentive Program (SGIP). The electricity produced from the microturbines is to be used in the liquid treatment processed and/or the biosolids facilities. Heat exchangers will recover waste heat for reuse. It is planned that the facility may expand with an additional three microturbines in the future.

The applicant provided operating schedule for this equipment is 24 hours/day, 7 days/week, 52 weeks/year. There is no school within 1000 feet of emission source. There have been no Notices to Comply, Notices of Violation, or complaints in the last two years.

Emission Calculations (for each microturbine)

Maximum heat input rate: 2.28 mmBtu/hr
Each driving a 200kW electrical generator
Natural gas HHV: 1,050 Btu/scf
Natural gas F-Factor: 8,710 dscf/mmBtu
Estimated digester gas HHV: 550 Btu/scf
O2 concentration at outlet = 18.15% (based on PR12272 source test report for Ralphs Grocery, ID 20604)
Exhaust flow rate= 4,104 dscfm (based on PR12272 source test report for Ralphs Grocery, ID 20604)

Fuel consumption (NG) = 2,280,000 Btu/hr x scf/1,050 Btu = 2,171 scfh = 36 scfm
Fuel consumption (DG) = 2,280,000 Btu/hr x scf/550 Btu = 4,145 scfh = 69 scfm

Applicant provided (Form 400-PS) exhaust flow rate: 4,600 acfm
(vs/Ts) x Ta = va
4,600 acfm x (460 + 60) °R/(460 + 590)°R = 2,278 scfm

CO emissions
EPA AP 42 Emission Factors (NG): 0.082 lb/mmBtu
NG: 0.082 lb/mmBtu x 2.28 mmBtu/hr = 0.19 lbs/hr = 4.62 lbs/day (NSR)

EPA AP 42 Emission Factors (DG): 0.017 lb/mmBtu
DG: 0.017 lb/mmBtu x 2.28 mmBtu/hr = 0.04 lbs/hr = 0.97 lbs/day (NSR)

SCAQMD AER Emission Factors (NG): 35 lbs/mmscf
NG: 35 lbs/mmscf x 2.28 mmBtu/hr / 1050 Btu/scf = 0.08 lbs/hr = 1.95 lbs/day (NSR)

CR200 NG (NG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 40 ppmvd @ 15% O2, 1.10 lb/MWhe
NG: 40 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 28 lbs/lb-mole = 0.19 lbs/hr = 4.62 lbs/day (NSR)
NG: 1.10 lb/MWhe x MW/1000kW x 200 kW = 0.22 lbs/hr = 5.5 lbs/day (NSR)

CR200 NG CARB (NG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 8 ppmvd @ 15% O2, 0.20 lb/MWhe
NG: 8 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 28 lbs/lb-mole = 0.04 lbs/hr = 0.97 lbs/day (NSR)
NG: 0.20 lb/MWhe x MW/1000kW x 200 kW = 0.04 lbs/hr = 0.97 lbs/day (NSR)

Rule 1303 BACT requirement (NG): 10 ppmvd @ 15% O2
NG: 10 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 28 lbs/lb-mole = 0.05 lbs/hr = 1.22 lbs/day (NSR)

Rule 1303 BACT requirement (DG) & CR200 Digester (DG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 130 ppmvd @ 15% O2
DG: 130 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 28 lbs/lb-mole = 0.61 lbs/hr = 14.84 lbs/day (NSR)
Maximum monthly emission: 0.61 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 445.3 lbs/month

CR200 Digester (DG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 3.6 lb/MWhe
3.6 lb/MWhe x MW/1000kW x 200 kW = 0.72 lbs/hr = 17.52 lbs/day (NSR)

Rule 1303 Modeling requirement (>2, < 5 mmBTU/hr), CO: 17.1 lbs/hr > 0.61 lbs/hr

<u>NOx emissions (as NO2)</u>
EPA AP 42 Emission Factors (NG): 0.32 lb/mmBtu
NG: 0.32 lb/mmBtu x 2.28 mmBtu/hr = 0.73 lbs/hr = 17.76 lbs/day (NSR)

EPA AP 42 Emission Factors (DG): 0.16 lb/mmBtu
DG: 0.16 lb/mmBtu x 2.28 mmBtu/hr = 0.36 lbs/hr = 8.76 lbs/day (NSR)

SCAQMD AER Emission Factors (NG): 130 lbs/mmscf
NG: 130 lbs/mmscf x 2.28 mmBtu/hr / 1050 Btu/scf = 0.28 lbs/hr = 6.81 lbs/day (NSR)

CR200 NG CARB (NG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 4 ppmvd @ 15% O2, 0.14 lb/MWhe
NG: 4 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 46 lbs/lb-mole = 0.03 lbs/hr = 0.73 lbs/day (NSR)
NG: 0.14 lb/MWhe x MW/1000kW x 200 kW = 0.03 lbs/hr = 0.73 lbs/day (NSR)

CR200 NG (NG) & CR200 Digester (DG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 0.40 lb/MWhe

NG & DG: 0.40 lb/MWhe x MW/1000kW x 200 kW = 0.08 lbs/hr = 1.95 lbs/day (NSR)

Rule 1303 BACT requirement (NG), CR200 NG (NG), & CR200 Digester (DG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 9 ppmvd @ 15%O2
NG & DG: 9 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 46 lbs/lb-mole = 0.07 lbs/hr = 1.70 lbs/day (NSR)
Maximum monthly emission: 0.07 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 51.1 lbs/month

Rule 1303 BACT requirement (DG): 25 ppmvd @ 15% O2
DG: 25 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 46 lbs/lb-mole = 0.17 lbs/hr = 4.14 lbs/day (NSR)

Rule 1303 Modeling requirement (>2, < 5 mmBTU/hr), NOx: 0.31 lbs/hr ≥ 0.07 lbs/hr

PM10 emissions
EPA AP 42 Emission Factors (NG): 0.0066 lb/mmBtu
NG: 0.0066 lb/mmBtu x 2.28 mmBtu/hr = 0.02 lbs/hr = 0.49 lbs/day (NSR)

EPA AP 42 Emission Factors (DG): 0.012 lb/mmBtu
DG: 0.012 lb/mmBtu x 2.28 mmBtu/hr = 0.03 lbs/hr = 0.73 lbs/day (NSR)
Maximum monthly emission: 0.03 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 21.9 lbs/month

SCAQMD AER Emission Factors (NG): 7.5 lbs/mmscf
NG: 7.5 lbs/mmscf x 2.28 mmBtu/hr / 1050 Btu/scf = 0.02 lbs/hr = 0.49 lbs/day (NSR)

Rule 1303 BACT requirement (DG): Fuel Gas Treatment for Particulate Removal

Rule 1303 Modeling requirement (>2, < 5 mmBTU/hr), PM10: 1.9 lbs/hr > 0.03 lbs/hr

Rule 404 requirement: Exhaust flow rate: 2,278 dscfm, 0.138 grains/dscf
0.138grains/dscf x 2,278 dscfm x 60min/hr x 1lb/7000grains = 2.69 lbs/hr > 0.03 lbs/hr

Rule 409 requirement: 0.1 grain/scf @ 12% CO2
0.1 grains/dscf @ 12% CO2 x 2,278 dscfm x 60min/hr x 1lb/7000grains = 1.95 lbs/hr > 0.03 lbs/hr

ROG emissions
EPA AP 42 Emission Factors (NG): 0.0021 lb/mmBtu
NG: 0.0021 lb/mmBtu x 2.28 mmBtu/hr = 0.005 ~ 0.01 lbs/hr = 0.24 lbs/day (NSR)

EPA AP 42 Emission Factors (DG): 0.0058 lb/mmBtu
DG: 0.0058 lb/mmBtu x 2.28 mmBtu/hr = 0.006 ~ 0.01 lbs/hr = 0.24 lbs/day (NSR)

SCAQMD AER Emission Factors (NG): 7.0 lbs/mmscf
NG: 7.0 lbs/mmscf x 2.28 mmBtu/hr / 1050 Btu/scf = 0.02 lbs/hr = 0.49 lbs/day (NSR)

CR200 NG CARB (NG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 3 ppmvd @ 15% O2, 0.04 lb/MWhe
NG: 3 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 16 lbs/lb-mole = 0.01 lbs/hr = 0.24 lbs/day (NSR)
NG: 0.04 lb/MWhe x MW/1000kW x 200 kW = 0.01 lbs/hr = 0.24 lbs/day (NSR)

CR200 NG CARB (NG) & CR200 Digester (DG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 0.10 lb/MWhe
NG & DG: 0.10 lb/MWhe x MW/1000kW x 200 kW = 0.02 lbs/hr = 0.49 lbs/day (NSR)

CR200 NG CARB (NG) & CR200 (DG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008: 7 ppmvd @ 15%O2
NG & DG: 7 ppmvd @ 15% O2 x (20.9-18.15)/(20.9-15) x 2,278 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 16 lbs/lb-mole = 0.02 lbs/hr = 0.49 lbs/day (NSR)
Maximum monthly emission: 0.02 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 14.6 lbs/month

SOx emissions
EPA AP 42 Emission Factors (NG): (0.94 x %sulfur) lb/mmBtu
NG: (0.94x 0.000016) lb/mmBtu x 2.28 mmBtu/hr = 0.00 ~ 0 lbs/hr = 0 lbs/day (NSR)

EPA AP 42 Emission Factors (DG): 0.0065 lb/mmBtu
DG: 0.0065 lb/mmBtu x 2.28 mmBtu/hr = 0.01 lbs/hr = 0.24 lbs/day (NSR)

SCAQMD AER Emission Factors (NG): 0.6 lbs/mmscf
NG: 0.6 lbs/mmscf x 2.28 mmBtu/hr / 1050 Btu/scf = 0.001 ~ 0.00 lbs/hr = 0 lbs/day (NSR)

DG (applicant estimate): 20 ppmvH2S(inDG) x 4,145 scfhDG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.01 lbs/hr = 0.24 lbs/day (NSR)

Rule 1303 BACT requirement (NG): Rule 431.1 compliance: 1) Natural gas ≤ 16 ppmv, 2) Facility wide emission < 5 lbs/day, 3) 40 ppmv w/CFGMS
1) 16 ppmv x 2,171 scfh x lbmoleH2S/379x10^{6}ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.0059 ~ 0.01 lbs/hr SOx (as SO2)
2) 5 lbs/day H2S x lb-mole/34.08 lbsH2S x 64lbsSOx/lb-mole x day/24 hr = 0.39 lbs/hr SOx (as SO2) = 9.49 lbs/day SOx (as SO2) (NSR)
   DG: 0.39 lbs/hr (5 lbs/day limit) → 609 ppmv H2S (in DG)
3) **40 ppmvH2S(in DG) x 4,145 scfhDG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.03 lbs/hr = 0.73 lbs/day (NSR)**
Maximum monthly emission: 0.03 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 21.9 lbs/month

Annual Emissions (AER 2013) SOx emission: 0.004 tons/yr
0.004 tons/yr x 2,000lbs/ton x 1yr/365days = 0.0009 lbs/hr SOx = 0.0219 lbs/day SOx

H2S emissions
40 ppmvH2S(inDG) x 4,145 scfhDG x lb-mole/379x10^6 ft^3 x 34.08 lbsH2S/lbmole = 0.0149 ~ 0.02 lbs/hr

CO2 emissions
EPA AP 42 Emission Factors (NG): 110 lb/mmBtu
NG: 110 lb/mmBtu x 2.28 mmBtu/hr = 250.80 lbs/hr = 6,102.80 lbs/day (NSR)

EPA AP 42 Emission Factors (DG): 27 lb/mmBtu
DG: 27 lb/mmBtu x 2.28 mmBtu/hr = 61.56 lbs/hr = 1,497.96 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 53.06 kg/mmBtu
NG: 53.06 kg/mmBtu x 2.2046 lb/kg x 2.28 mmBtu/hr = 266.71 lbs/hr = 6,489.94 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (DG): 52.07 kg/mmBtu
DG: 52.07 kg/mmBtu x 2.2046 lb/kg x 2.28 mmBtu/hr = 261.73 lbs/hr = 6,368.76 lbs/day (NSR)

1) CR200 NG (NG), CR200 NG CARB (NG), & CR200 Digester (DG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008, not including the CO2 in the DG fuel: 1,330 lb/MWhe
1,330 lb/MWhe x MW/1000kW x 200 kW = 266.00 lbs/hr = 6,472.67 lbs/day (NSR)

2) Assume DG is 40% CO2.
40% x 4,145 scfhDG x lb-moleH2S/379 ft^3 x 44 lbsCO2/lbmole CO2
= 192.49 lbs/hr = 4,683.92 lbs/day (NSR)

Total emissions
266.00 lbs/hr + 192.49 lbs/hr = 458.49 lbs/hr = 11,156.59 lbs/day (NSR)
Maximum monthly emission: 458.49 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 334,697.7 lbs/month

CH4 emissions
EPA AP 42 Emission Factors (NG): 0.0086 lb/mmBtu
NG: 0.0086 lb/mmBtu x 2.28 mmBtu/hr = 0.02 lbs/hr = 0.49 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 0.001 kg/mmBtu
NG: 0.001 kg/mmBtu x 2.2046 lb/kg x 2.28 mmBtu/hr = 0.005 ~ 0.01 lbs/hr = 0.24 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (DG): 0.0032 kg/mmBtu
DG: 0.0032 kg/mmBtu x 2.2046 lb/kg x 2.28 mmBtu/hr = 0.02 lbs/hr = 0.49 lbs/day (NSR)
Maximum monthly emission: 0.02 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 14.6 lbs/month

N2O emissions
EPA AP 42 Emission Factors (NG): 0.003 lb/mmBtu
NG: 0.003 lb/mmBtu x 2.28 mmBtu/hr = 0.01 lbs/hr = 0.24 lbs/day (NSR)
Maximum monthly emission: 0.01 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 7.3 lbs/month

The Climate Registry 2013 Default Emission Factors (NG): 0.001 kg/mmBtu
NG: 0.0001 kg/mmBtu x 2.2046 lb/kg x 2.28 mmBtu/hr = 0.0005 ~ 0.00 lbs/hr = 0 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (DG): 0.00063 kg/mmBtu
DG: 0.00063 kg/mmBtu x 2.2046 lb/kg x 2.28 mmBtu/hr = 0.003 ~ 0.00 lbs/hr = 0 lbs/day (NSR)

Toxic Risk Analysis

Nearest Residential Receptor Distance:	2215 ft. (675 m)
Nearest Commercial Receptor Distance:	1565 ft. (477 m)
Stack height:	9.92 ft. (3.02 m)
Stack inner diameter:	12 in. (0.30 m)
Rain cap:	Yes
Exhaust temperature:	590°F
Exhaust flow rate:	4,600 acfm
Building height:	69 ft. (21.0 m)
Building dimensions	144 ft. (43.9 m) x 160 ft. (48.8 m)

Compound	MW (lbs/lbmole)	Outlet emission (Maximum of NG and DG) (lb/hr)
Acetaldehyde	44.06	1.32E-04
Acrolein	56.06	1.46E-05
Ammonia	17.03	3.91E-02
Arsenic	74.92	5.72E-06
Benzene	78.11	2.74E-05
1,3-Butadiene	54.09	2.44E-05
Cadmium	112.41	1.44E-06
Carbon Tetrachloride	153.24	4.97E-05
Chlorobenzene	112.56	3.65E-05
Chloroform	119.38	4.23E-05
Chromium (hexavalent)	51.996	2.74E-06
1,4-Dichlorobenzene	147.01	4.97E-05
Ethylbenzene	106.16	7.30E-05
Ethylene dichloride	98.96	3.73E-05
Formaldehyde	30.03	1.62E-03
Hydrogen sulfide	34.08	1.49E-02
Lead	207.2	8.46E-06
Methylene chloride	84.94	3.23E-05
Naphthalene	128.173	2.96E-06
Nickel	58.71	4.97E-06
PAH	252.3	5.02E-06
Propylene Oxide	58.08	6.61E-05
Selenium	78.96	2.74E-05
Tetrachloroethylene	165.83	5.22E-05
Toluene	92.13	2.96E-04
Trichloroethylene	130.4	4.48E-05
Vinyl chloride	62.5	8.95E-05
Vinylidene chloride	96.95	3.42E-05
Xylenes	106.2	1.46E-04

The emission rates for the toxic air contaminants (TACs) listed above are the maximum emissions of emissions calculated from 1) AP 42, 3.1 Stationary Gas Turbines, Natural Gas, 2) AP 42, 3.1 Stationary Gas Turbines, Digester Gas, 3) AB2588 AER Emission Factors for Natural Gas Turbines, 4) AB2588 AER Emission Factors for Digester Gas Turbines, and the Hydrogen Sulfide calculation above.

Tier III analysis was used since the exhaust stack has a rain cap. Tier III risk analysis was based on the emission rates listed in the above table. The MICR values are determined to be 6.38×10^{-7} for residential and 1.69×10^{-7} for commercial receptors. HIA and HIC were less than 1. Cancer Burden was less than 0.5.

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- This project is exceeding the following:

Volatile Organic Compounds	30 lbs/day
Nitrogen Oxides	40 lbs/day

Not exceeding the following:

PM10	30 lbs/day
Sulfur Dioxide	60 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212 (c)(3)(A)(i)- Facility-wide max MICR is estimated to be below 10 in a million.
Public Notice is required.

Rule 401: Visible Emissions
No violations are expected, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected with proper operation, monitoring and maintenance.
Compliance is expected.

Rule 404: Particulate Matter
No violations are expected. PM limits are listed under Rule 404 Table 404(a).

Rule 407: Liquid and Gaseous Air Contaminants
Rule 407(a)(1)- CO < 2000 ppmvd.
Rule 407(a)(2)- This provision does not apply, since equipment complies with Rule 431.1 per 407(c)(2).
Compliance is expected.

Rule 409: Combustion Contaminants
Combustion contaminants are not expected to exceed 0.1 grain per cubic foot of gas calculated to 12% CO2 at standard conditions averaged over a minimum of 15 consecutive minutes. Compliance is expected.

Rule 431.1: Sulfur Content of Gaseous Fuels
Rule 431.1(c)(1)- Natural gas contains ≤ 16 ppmv sulfur compounds as H2S.
Rule 431.1(c)(2)- Sewage digester gas ≤ 40 ppmv sulfur compounds as H2S, averaged daily or ≤ 40 ppmv sulfur compounds as H2S, averaged monthly and ≤ 500 ppmv sulfur compounds as H2S, averaged over 15minutes.
Other gases ≤ 40 ppmv sulfur compounds as H2S, averaged over 4 hours.
Rule 431.1(d)(1)- If burning gaseous fuels, other than exclusively natural gas, in stationary equipment shall have a properly operating continuous fuel gas monitoring system (CFGMS) to determine the sulfur content, calculated as H2S, of the fuel gas prior to burning; or a continuous emission monitoring system (CEMS) to determine SOx emissions after burning. All continuous monitors require District approval, which shall be based on the requirements as specified in Attachment A.
Rule 431.1(d)(1)(B)- A person subject to paragraph (c)(4) of this rule shall comply with paragraphs (d)(1) & (d)(2) no later than 12 months after the date a Permit to Construct is issued by the District for a sulfur removal system or comply with paragraph (d)(3).
Rule 431.1(d)(1)(C)- Compliance with the Table 1 sulfur limits shall be determined based on readings obtained from an approved continuous monitor.

Rule 431.1(d)(2)- A person installing a continuous monitor shall submit to the District for approval, a quality assurance procedure as specified in U.S. EPA 40 CFR, Part 60, Appendix F, Procedure 1 for CEMS and, as applicable, for CFGMS.
Rule 431.1(d)(2)(A)- The quality assurance procedure shall be submitted to the District for written approval by the Executive Officer prior to the CFGMS or CEMS final certification.
Rule 431.1(d)(2)(B)- Any CFGMS or CEMS deemed to be out of control, as specified in Attachment A, according to the facility quality assurance procedure approved by the Executive Officer shall be corrected within 72 hours.
Rule 431.1(d)(2)(B)(i)- The person operating the CFGMS or CEMS shall notify the Executive Officer by telephone or facsimile of any breakdown(s) of the monitoring systems if the duration of the breakdown is in excess of 60 minutes or if there are three or more breakdowns in any one day within 24 hours of the occurrence of the breakdown which triggers notification. Such report shall identify the time, location, equipment involved, and contact person.
Rule 431.1(d)(2)(B)(ii)- The person who complies with the provisions of clause (d)(2)(B)(i) and paragraph (e)(3) shall not be considered in violation of this rule for the 72 hour period of breakdown provided that the breakdown did not result from operator error, neglect or improper operation or maintenance procedures.
Rule 431.1(d)(3)- A person burning landfill gas or sewage digester gas, or who is subject to paragraph (c)(4) of this rule may use an alternative monitoring method, in lieu of the requirements in paragraphs (d)(1) and (d)(2), that ensures compliance with the daily total sulfur content limitation as specified in Table 1. Alternative monitoring methods shall not be used unless first approved in writing by the Executive Officers of the District, the CARB, and the Regional Administrator of the EPA, Region IX, or their designees.
Rule 431.1(d)(3)(A)- At a minimum, the alternative monitoring method shall meet the guidelines of Attachment A, Section III.
Rule 431.1(d)(3)(B)- A person subject to (c)(4) of this rule shall submit an alternative monitoring method for approval no later than 45 days after the date a Permit to Construct a sulfur removal system is issued.
Rule 431.1(d)(3)(C)- All monitoring shall comply with the approved alternative monitoring method.
Rule 431.1(g)(8)- Any facility which emits less than 5 pounds per day total sulfur compounds, calculated as H2S from the burning of gaseous fuels other than natural gas (not applicable to (c)(1)).
This facility is expected to comply either with sulfur limits as required or exemption requirement under Rule 431.1(g)(8). Compliance is expected.

Rule 53: Orange County – Specific Contaminants (Contained in Addendum to Reg IV)
Rule 53- Sulfur compound emission limit, as SO_2 500 ppmv. Compliance can be expected based on other similar category permits issued in SCAQMD.

Reg IX: Part 60, Chapter I, Title 40 of Code of Federal Regulations, Subpart GG- Standards of Performance for New Stationary Sources of Stationary Gas Turbines
60.330 Applicability: Not applicable. The stationary gas turbine does not have a heat input at peak load ≥ 10.7 gigajoules (10 mmBtu/hr) based on LHV of fuel fired.

Part 60, Chapter I, Title 40 of Code of Federal Regulations, Subpart KKKK- Standards of Performance for New Stationary Sources of Stationary Combustion Turbines

60.4305 Applicability: Not applicable. The stationary gas turbine does not have a heat input at peak load ≥ 10.7 gigajoules (10 mmBtu/hr) based on HHV of fuel fired.

Reg X: Part 63, Chapter I, Title 40 of Code of Federal Regulations, Subpart YYYY- National Emissions Standards for Hazardous Air Pollutants for Stationary Combustion Turbines 63.07485- Applicability: Not applicable. The stationary combustion turbine is not located at a major source of HAP emissions.

Rule 1134 Emissions of Oxides of Nitrogen From Stationary Gas Turbines
The provisions of this Rule are not applicable since the stationary gas turbines are neither existing, nor 0.3 MW or larger.

Rule 1135 Emissions of Oxides of Nitrogen From Electric Power Generating Systems
This rule does not apply since the facility is not selling power to So Cal Edison, LA DWP, City of Burbank, City of Glendale, City of Pasadena, or any of their successors.

Rule 1147 NOx Reductions From Miscellaneous Sources
Rule 1147(a)- Applicability: Not applicable turbines.

Reg XIII: Rule 1303(a)- BACT is required. The microturbines are considered as LAER/BACT.
LAER NG: CO: 10 ppmvd @ 15%O2, NOx: 9 ppmvd @ 15%O2, VOC: 7 ppmvd @ 15%O2, per A/N 561475, ID 114910 Providence Holy Cross NG microturbines.
BACT NG: CO: 10 ppmvd @ 15%O2, NOx: 9 ppmvd @ 15%O2, Ammonia: 9 ppmvd @ 15%O2.
LAER DG: CO: 130 ppmvd @ 15%O2, NOx: 9 ppmvd @ 15%O2, VOC: 7 ppmvd @ 15%O2, per CR200 Digester (DG) Capstone Emissions Technical Reference 410065 Rev. B, April 2008.
BACT DG: CO: 130 ppmvd @ 15%O2, NOx: 25 ppmvd @ 15%O2, PM10: Fuel Gas Treatment for PM removal, and SOx: Compliance with Rule 431.1.
Rule 1303(b)(1)- Modeling for VOC and SOx is not required (1303 Appendix A). NOx, CO and PM10 are less than the allowable emissions in Table A-1, no further analysis is required (1303 Appendix A).
Rule 1303(b)(2)- Since the facility is an essential public service, any required offsets shall be provided through priority reserve.
Compliance with Reg XIII is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6}.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.
Compliance is expected.

Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.

Reg. XXX: Expansion of the facility to include a biosolids receiving, heat drying, and load out system and other equipment is part of an Initial Title V permit process, which will be subject to a 45 day EPA review under Rule 3003(j). A public notice is required under Rule 3003(n)(2) and Rule 212(g).
Rule 3001(c)(2)- NOx & VOC > 10 tons/yr, Title V permit required.

Rule 3002(b)(1) & (b)(2)- Applicant submitted Title V application on 4/2/2014.
Rule 3002(c)(2)- Compliance with Rules & Regulations is expected.
Rule 3003(a)(3)- Facility was determined to potentially trigger Title V emission thresholds in December 2013. IRWD reviewed possible operating limitations enforced via permit conditions to ensure that Title V thresholds were not triggered. In March 2014 after IRWD's review, it was confirmed that this project would trigger Title V thresholds based on potential to emit calculations and shall enter the Title V permit program. This application was submitted 4/2/2014 (within 180 days of subject date).
Rule 3003(b)(1)- Appropriate forms and fees were submitted.
Rule 3004(a)(4)(C)- The (ground, non-elevated) flare is used for air pollution control. Appendix A of the Periodic Monitoring Guidelines for Title V Facilities requires an exhaust temperature limit, continuous monitoring of exhaust temperature and recording with a strip chart or digital data acquisition system. LAER/BACT already requires exhaust temperature limit and continuous monitoring.
Compliance is expected.

Conclusions & Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Construct is recommended for applications 535803, 535804, 535805, 535806, and 552110 after EPA review and public notice. For Permit Conditions please see Sample Permit.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	PAGES 9	PAGE 1
STATIONARY SOURCE COMPLIANCE DIVISION	APPL NO 535809 & 535810	DATE 3/24/2015
PERMIT APPLICATION PROCESSING AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY COT

Permits to Construct (New Construction)

Applicant Irvine Ranch Water District (IRWD), Michelson Water Recycling Plant (MWRP)

Mailing Address P.O. Box 5700, Irvine, CA 92619-7000

Equipment Location 3512 Michelson Drive Irvine, CA 92612

Equipment Description

APPLICATION 535809, FACILITY ID 3513

BOILER, NO. 1, SUPERIOR, FIRETUBE TYPE, MODEL SEMINOLE 6-5-1000-W100-STJ-G/DG, 8.4 MMBTU PER HOUR, DIGESTER OR NATURAL GAS FIRED, WITH A LOW NOX BURNER, ST. JOHNSON, MODEL NM200A10V.

APPLICATION 535810, FACILITY ID 3513

BOILER, NO. 2, SUPERIOR, FIRETUBE TYPE, MODEL SEMINOLE 6-5-1000-W100-STJ-G/DG, 8.4 MMBTU PER HOUR, DIGESTER OR NATURAL GAS FIRED, WITH A LOW NOX BURNER, ST. JOHNSON, MODEL NM200A10V.

Background/Process Description

The above applications were submitted on April 6, 2012 for new construction Permits to Construct for two digester gas or natural gas fired 8.4 mmBtu/hr low-NOx boilers (firetube). These applications were submitted along with ten (10) other applications to expand the plant to allow for biosolids management processes, including thickening, acid-phase anaerobic digestion, dewatering, drying/pelletizing, energy generation with microturbines, and use of pellets as a fertilizer or e-fuel. Since 1988, all biosolids from MWRP have been directed to Orange County Sanitation District (OCSD) for processing, reuse, and disposal. In 2009 IRWD decided to implement solids handling facilities, instead of transporting sludge to OCSD.

The boilers will be installed and used to supplement the heat recovery system when there isn't sufficient process waste heat from other sources to meet overall heating demands of the digestion system. The boilers are expected to only operate when supplemental heat is needed. The boilers will be fired on digester gas or natural gas. They will be fired on 100% natural gas when there is not sufficient digester gas due to it being used by the microturbines.

The applicant provided operating schedule for this equipment is 24 hours/day, 2 days/week, 36 weeks/ year. For emission calculation purposes, the maximum operating schedule is 24 hours/day, 7 days/week, 52 weeks/year. There is no school within 1000 feet of emission source. There have been no Notices to Comply, Notices of Violation, or complaints in the last two years.

Emission Calculations

Maximum heat input rate: 8.4 mmBtu/hr
Natural gas HHV: 1,050 Btu/scf
Natural gas F-Factor: 8,710 dscf/mmBtu
Applicant estimated digester gas HHV: 550 Btu/scf
Assume O2 concentration at outlet = 5.28% (based on A/N 503050, ID 19159 evaluation)

Fuel consumption (NG) = 8,400,000 Btu/hr x scf/1,050 Btu
= 8,000.0 scfh = 133 scfm
= 133 scfm natural gas x 13.5 scfm combustion products/scfm gas
= 1,800 scfm (exhaust flow rate)

Fuel consumption (DG) = 8,400,000 Btu/hr x scf/550 Btu
= 15,272.7 scfh = 255 scfm
= 255 scfm natural gas x 13.5 scfm combustion products/scfm gas (assumed)
= 3,436 scfm (exhaust flow rate)

Exhaust temperature: 305 °F (per Form 400-PS)
vs x Ta/Ts = va → 3,436 scfm x (460 + 305)°R / (460 + 60) °R = 5,055 acfm

CO emissions
AER Emission Factors (NG): 84.00 lb/mmscfNG
NG: 84.00 lb/mmscfNG x mmscfNG/1E6scfNG x 8,000.0scfhNG
= 0.67 lbs/hr = 16.30 lbs/day (NSR)

Rule 1146 requirement: 400 ppmvd @ 3% O2 (NG) or 0.30 lbs/mmBtu (NG)
NG: 400 ppmvd @ 3% O2 x 7.27E-8 lb/ppm-scf x 8710 dscf/mmBtu x 20.9/(20.9-3) x 8.4 mmBtu/hr
= 2.48 lbs/hr = 60.35 lbs/day (NSR)
or
NG: 0.30 lbs/mmBtu x 8.4 mmBtu/hr = 2.52 lbs/hr = 61.32 lbs/day (NSR)

Rule 1146 requirement: 400 ppmvd @ 3% O2 (DG)
DG: 400 ppmvd @ 3% O2 x (20.9-5.28)/(20.9-3) x 3,436 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 28 lbs/lb-mole = 5.32 lbs/hr = 129.45 lbs/day (NSR)

Rule 1303 BACT requirement (NG): 50 ppmvd @ 3% O2 (firetube)
NG: 50 ppmvd @ 3% O2 x 7.27E-8 lb/ppm-scf x 8710 dscf/mmBtu x 20.9/(20.9-3) x 8.4 mmBtu/hr
= 0.31 lbs/hr = 7.54 lbs/day (NSR)

Rule 1303 BACT requirement (DG): 100 ppmvd @ 3% O2
DG: 100 ppmvd @ 3% O2 x (20.9-5.28)/(20.9-3) x 3,436 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 28 lbs/lb-mole = 1.33 lbs/hr = 32.36 lbs/day (NSR)
Maximum monthly emission: 1.33 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 970.9 lbs/month

Rule 1303 Modeling requirement (>5 < 10mmBTU), CO: 25.9 lbs/hr > 1.33 lbs/hr

NOx emissions (as NO2)
AER Emission Factors (NG): 100.00 lb/mmscfNG
NG: 100.00 lb/mmscfNG x mmscfNG/1E6scfNG x 8,000.0scfhNG
= 0.80 lbs/hr = 19.47 lbs/day (NSR)

Rule 1146 NG requirement: 9 ppmvd @ 3% O2 or 0.011 lbs/mmBtu
NG: 9 ppmvd @ 3% O2 x 1.194E-7 lb/ppm-scf x 8710 dscf/mmBtu x 20.9/(20.9-3) x 8.4 mmBtu/hr
= 0.09 lbs/hr = 2.19 lbs/day (NSR)
or
NG: 0.011 lbs/mmBtu x 8.4 mmBtu/hr = 0.09 lbs/hr = 2.19 lbs/day (NSR)

Rule 1146 NG requirement: 15 ppmvd @ 3% O2
DG: 15 ppmvd @ 3% O2 x (20.9-5.28)/(20.9-3) x 3,436 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 46 lbs/lb-mole = 0.33 lbs/hr = 8.03 lbs/day (NSR)
Maximum monthly emission: 0.33 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 240.9 lbs/month

Rule 1303 BACT requirement (NG): 12 ppmvd @ 3% O2
NG: 12 ppmvd @ 3% O2 x 1.194E-7 lb/ppm-scf x 8710 dscf/mmBtu x 20.9/(20.9-3) x 8.4 mmBtu/hr = 0.12 lbs/hr = 2.92 lbs/day (NSR)

Rule 1303 BACT requirement (DG): 30 ppmvd @ 3% O2
DG: 30 ppmvd @ 3% O2 x (20.9-5.28)/(20.9-3) x 3,436 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 46 lbs/lb-mole = 0.66 lbs/hr = 16.06 lbs/day (NSR)

Rule 1303 Modeling requirement (>5 < 10mmBTU), NOx: 0.47 lbs/hr ≥ 0.33 lbs/hr

PM10 emissions
AER Emission Factors (NG): 7.60 lb/mmscfNG
NG: 7.60 lb/mmscfNG x mmscfNG/1E6scfNG x 8,000.0scfhNG x 0.97PM10/PM* = 0.06 lbs/hr = 1.46 lbs/day (NSR)

AER Emission Factors (DG): 7.60 lb/mmscfDG (assume emission factor for NG is the same for DG)
DG: 7.60 lb/mmscfNG x mmscfNG/1E6scfNG x 15,272.7 scfhDG x 0.97PM10/PM* = 0.11 lbs/hr = 2.68 lbs/day (NSR)
Maximum monthly emission: 0.11 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 80.30 lbs/month
*Based on Weight Fraction for PM Category by Size Distribution for Utility Boilers-Residual

Rule 1303 BACT requirement (NG): Using natural gas

Rule 1303 BACT requirement (DG): 0.1 grain/scf @ 12% CO2 (Rule 409)
DG: 0.1 grain/scf @ 12% CO2 x 3,436 scfm x 60 min/hr x 1lb/7000grains x 0.97PM10/PM* = 2.86 lbs/hr = 69.59 lbs/day (NSR)
*Based on Weight Fraction for PM Category by Size Distribution for Utility Boilers-Residual

Rule 1303 Modeling requirement (>5 < 10mmBTU), PM10: 2.80 lbs/hr > 0.11 lbs/hr

Rule 404 requirement (NG): Exhaust flow rate: 1,800 dscfm, 0.151 grains/dscf
NG: 0.151 grains/dscf x 1,800 dscfm x 60min/hr x 1lb/7000grains = 2.33 lbs/hr > 0.06 lbs/hr

Rule 404 requirement (DG): Exhaust flow rate: 3,436 dscfm, 0.118 grains/dscf
DG: 0.118 grains/dscf x 3,436 dscfm x 60min/hr x 1lb/7000grains = 3.48 lbs/hr > 0.11 lbs/hr

Rule 409 requirement (NG): 0.1 grain/scf @ 12% CO2
NG: 0.1 grains/dscf @ 12% CO2 x 1,800 dscfm x 60min/hr x 1lb/7000grains = 1.54 lbs/hr > 0.06 lbs/hr

Rule 409 requirement (DG): 0.1 grain/scf @ 12% CO2
DG: 0.1 grains/dscf @ 12% CO2 x 3.436 dscfm x 60min/hr x 1lb/7000grains = 2.86 lbs/hr > 0.11 lbs/hr

ROG emissions
AER Emission Factors (NG): 5.50 lb/mmscfNG
NG: 5.50 lb/mmscfNG x mmscfNG/1E6scfNG x 8,000.0 scfhNG = 0.04 lbs/hr = 0.97 lbs/day (NSR)

AER Emission Factors (DG): 5.50 lb/mmscfDG (assume emission factor for NG is the same for DG)
DG: 5.50 lb/mmscfNG x mmscfNG/1E6scfNG x 15,272.7 scfhDG
= 0.08 lbs/hr = 1.95 lbs/day (NSR)
Maximum monthly emission: 0.08 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 58.4 lbs/month

SOx emissions
AER Emission Factors (NG): 0.60 lb/mmscfNG
NG: 0.60 lb/mmscfNG x mmscfNG/1E6scfNG x 8,000.0 scfhNG = 0.0048~0.00 lbs/hr = 0 lbs/day (NSR)

AER Emission Factors (DG): 0.60 lb/mmscfDG (assume emission factor for NG is the same for DG)
DG: 0.60 lb/mmscfNG x mmscfNG/1E6scfNG x 15,272.7 scfhDG = 0.01 lbs/hr = 0.24 lbs/day (NSR)

DG (applicant provided): 20 ppmvH2S(inDG) x 15,272.7 scfhDG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.05 lbs/hr = 1.22 lbs/day (NSR)

Rule 1303 BACT requirement (NG): Using natural gas

Rule 431.1 compliance: 1) NG ≤ 16 ppmv, 2) Facility wide emission < 5 lbs/day, 3) 40 ppmv w/CFGMS
1) 16 ppmv x 8,000.0 scfhNG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.02 lbs/hr SOx (as SO2)
2) 5 lbs/day H2S x lb-mole/34.08 lbsH2S x 64lbsSOx/lb-mole x day/24 hr = 0.39 lbs/hr SOx (as SO2) = 9.49 lbs/day SOx (as SO2) (NSR)
3) **40 ppmvH2S(in DG) x 15,272.7 scfhDG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.10 lbs/hr 2.43 lbs/day (NSR)**
Maximum monthly emission: 0.10 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 73.0 lbs/month

Annual Emissions (AER 2013) SOx emission: 0.004 tons/yr
0.004 tons/yr x 2,000lbs/ton x 1yr/365days = 0.0009 lbs/hr SOx = 0.0219 lbs/day SOx

H2S emissions
40 ppmvH2S(inDG) x 15,272.7 scfhDG x lbmole/379x$10^6$$ft^3$ x 34.08 lbsH2S/lbmole = 0.0549~0.05 lbs/hr

CO2 emissions
EPA AP 42 Emission Factors (NG): 120,000 lb/mmscf
NG: 120,000 lb/mmscf x 8.4 mmBtu/hr / 1050 Btu/scf = 960.0 lbs/hr = 23,360.00 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 53.06 kg/mmBtu
NG: 53.06 kg/mmBtu x 2.2046 lb/kg x 8.4 mmBtu/hr = 982.60 lbs/hr = 23,909.93 lbs/day (NSR)

1) The Climate Registry 2013 Default Emission Factors (DG): 52.07 kg/mmBtu
DG: 52.07 kg/mmBtu x 2.2046 lb/kg x 8.4 mmBtu/hr = 964.27 lbs/hr = 23,463.90 lbs/day (NSR)

2) Assume DG is 40% CO2.
40% x 15,272.7 scfhDG x lb-moleH2S/379 ft^3 x 44 lbsCO2/lbmole CO2
= 709.29 lbs/hr = 17,258.05 lbs/day (NSR)

Total emissions
964.27 lbs/hr + 964.27 lbs/hr = 1,673.50 lbs/hr = 40,721.83 lbs/day (NSR)
Maximum monthly emission: 1,673.50 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 1,221,655.0 lbs/month

CH4 emissions
EPA AP 42 Emission Factors (NG): 2.3 lb/mmscf
NG: 2.3 lb/mmscf x 8.4 mmBtu/hr / 1050 Btu/scf = 0.02 lbs/hr = 0.49 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 0.0009 kg/mmBtu
NG: 0.0009 kg/mmBtu x 2.2046 lb/kg x 8.4 mmBtu/hr = 0.02 lbs/hr = 0.49 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (DG): 0.0032 kg/mmBtu
DG: 0.0032 kg/mmBtu x 2.2046 lb/kg x 8.4 mmBtu/hr= 0.06 lbs/hr = 1.46 lbs/day (NSR)
Maximum monthly emission: 0.06 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 43.8 lbs/month

N2O emissions
EPA AP 42 Emission Factors (NG): 0.64 lb/mmscf
NG: 0.64 lb/mmscf x 8.4 mmBtu/hr / 1050 Btu/scf = 0.005 ~ 0.01 lbs/hr = 0.24 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 0.0009 kg/mmBtu
NG: 0.0009 kg/mmBtu x 2.2046 lb/kg x 8.4 mmBtu/hr= 0.02 lbs/hr = 0.49 lbs/day (NSR)
Maximum monthly emission: 0.02 lbs/hr x 24 hr/day x 365 day/yr x yr/12month = 14.60 lbs/month

The Climate Registry 2013 Default Emission Factors (DG): 0.00063 kg/mmBtu
DG: 0.00063 kg/mmBtu x 2.2046 lb/kg x 8.4 mmBtu/hr = 0.01 lbs/hr = 0.24 lbs/day (NSR)

Toxic Risk Analysis

Nearest Residential Receptor Distance:	2300 ft. (701 m)
Nearest Commercial Receptor Distance:	2000 ft. (610 m)
Stack height:	40.1 ft. (12.2 m)
Stack inner diameter:	19.75 in. (0.50 m)
Rain cap:	No
Exhaust temperature:	305°F
Exhaust flow rate:	5,055 acfm
Building height:	33 ft. (10 m)
Building dimensions	50 ft. (15 m) x 54 ft. (16 m)

Compound	MW (lbs/lbmole)	Outlet emission (Maximum of NG and DG) (lb/hr)
Acetaldehyde	44.06	6.57E-05
Acrolein	56.06	4.12E-05
Ammonia	17.03	1.44E-01
Benzene	78.11	1.22E-04
Ethyl benzene	106.16	1.45E-04
Formaldehyde	30.03	2.60E-04
Hexane (n-)	86.18	9.62E-05
Hydrogen Sulfide	34.08	5.49E-02
Naphthalene	128.17	4.58E-06
PAHs	252.3	1.53E-06
Propylene	42.08	5.85E-03
Toluene	92.13	5.59E-04
Xylenes	106.2	4.15E-04

The emission rates for the toxic air contaminants (TACs) listed above are the maximum emissions of emissions calculated from 1) AB2588 AER Emission Factors for Natural Gas Boilers, 2) AB2588 AER Emission Factors for Digester Gas Boilers, 3) Natural Gas Boiler Rule 1401 spreadsheet calculations, and the Hydrogen Sulfide calculation above.

Tier II analysis was used since the nearest receptor is greater than 25 m in distance and the exhaust stack does not have a rain cap. Tier II risk analysis was based on the emission rates listed in the above table. The MICR values are determined to be 4.68×10^{-8} for residential and 5.84×10^{-9} for commercial receptors. HIA and HIC were less than 1. Cancer Burden was less than 0.5.

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- This project is exceeding the following:

Volatile Organic Compounds	30 lbs/day
Nitrogen Oxides	40 lbs/day

Not exceeding the following:

PM10	30 lbs/day
Sulfur Dioxide	60 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212 (c)(3)(A)(i)- Facility-wide max MICR is estimated to be below 10 in a million.
Public Notice is required.

Rule 401: Visible Emissions
No violations are expected, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected with proper operation, monitoring and maintenance. Compliance is expected.

Rule 404: Particulate Matter
No violations are expected. PM limits are listed under Rule 404 Table 404(a).

Rule 407: Liquid and Gaseous Air Contaminants
Rule 407 (c)- Provisions of this subsection (a)(2) shall not apply to equipment which is subject to the emission limits and requirements of source specific rules in Reg XI.

Rule 409: Combustion Contaminants
Combustion contaminants are not expected to exceed 0.1 grain per cubic foot of gas calculated to 12% CO2 at standard conditions averaged over a minimum of 15 consecutive minutes. Compliance is expected.

Rule 431.1: Sulfur Content of Gaseous Fuels
Rule 431.1(c)(1)- Natural gas contains ≤ 16 ppmv sulfur compounds as H2S.
Rule 431.1(g)(8)- Any facility which emits less than 5 pounds per day total sulfur compounds, calculated as H2S from the burning of gaseous fuels other than natural gas (not applicable to (c)(1)). Compliance is expected.

Rule 53: Orange County – Specific Contaminants (Contained in Addendum to Reg IV)

Rule 53- Sulfur compound emission limit, as SO_2 500 ppmv. Compliance can be expected based on other similar category permits issued in SCAQMD.

Reg X: Part 63, Chapter I, Title 40 of Code of Federal Regulations, Subpart DDDDD- National Emissions Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters
63.7485- Not applicable, since an industrial, commercial, or institutional boiler or process heater is not located at or part of a major source of HAP.

Part 63, Chapter I, Title 40 of Code of Federal Regulations, Subpart JJJJJJ- National Emissions Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources
63.11195(e)- This boiler is not subject to this subpart since it is a gas-fired boiler.

Rule 1146: Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers
Rule 1146(a)- Rule applicable to boiler ≥ 5 mmBtu/hr in all industrial, institutional, and commercial operations. Equipment is applicable to this rule.
Rule 1146(c)(1)(I)- Digester gas fired, NOx emission limit: 15 ppmd 3%O2. Manufacture guaranteed 15 ppm NOx emission for DG.
Rule 1146(c)(1)(I)- Group III Units 75% or more, NOx emission limit (effective 1/1/2013): 9 ppmd 3%O2 or 0.011 lbs/mmBtu (NG). Manufacture guaranteed 9 ppm NOx emission for NG.
Rule 1146(c)(3)- Dual fuel co-fired combustion may limit NOx to:
$[(CL_A \times Q_A) + (CL_B \times Q_B)] / (Q_A + Q_B)$, where CL_A = limit for fuel A, CL_B = limit for fuel B, Q_A = heat input from fuel A, Q_B = heat input from fuel B.
Rule 1146(c)(4)- Heat input capacity ≥ 5 mmBtu/hr, shall not exceed CO 400 ppmd 3%O2 or 0.30 lbs/mmBtu (NG).
Rule 1146(c)(8)- Those that choose the lb/mmBtu limit shall install a non-resettable totalizing fuel meter to measure the total of each fuel used by each individual unit, as approved by the Executive Officer.
Rule 1146(c)(10)- All biogas units co-fired with natural gas ≤ 15 ppmd 3%O2, provided the facility monthly average biogas usage by the biogas units ≥ 90% based on HHV of the fuels used.
Rule 1146(c)(10)(A)(i)- May approve the burning of more than 10% up to 25% natural gas in a biogas fired unit at the 15 ppm (digester gas) or 25 ppm (landfill gas) NOx level, when it is necessary, if the only alternative to limiting natural gas to 10% would be shutting down the unit and flaring more biogas.
Rule 1146(c)(10)(A)(ii)- May approve the burning of more than 10% up to 50% natural gas in a digester gas-fired unit at the 15 ppm NOx level, when it is necessary as specified in clause (c) (10)(A)(i) and for units installed on or after September 5, 2008 provided the unit has demonstrated compliance with the NOx limits in paragraph (c)(1) applicable to units fired exclusively on natural gas.
Rule 1146(c)(10)(B)- Any biogas-fired unit burning more than the approved % natural gas per (c)(10)(A) shall comply with the weighted average NOx limit specified in (c)(3).
Rule 1146(d)(4)- NOx and CO emission requirements shall be determined using District approved contractor under the LAP.
Rule 1146(d)(6)(B)- Compliance determination with NOx emission requirements shall be conducted once every 5 years (6 ≤ 10 mmBtu/hr).
Rule 1146(d)(8)(A)- Shall check NOx emissions with a portable NOx, CO and O2 analyzer according to the Protocol for the Periodic Monitoring of Nitrogen Oxides, Carbon Monoxide, and Oxygen from Units Subject to SCAQMD Rules 1146 and 1146.1

at least monthly or every 750 unit operating hours, whichever occurs later. If a unit is in compliance for three consecutive emission checks, without any adjustments to the oxygen sensor set point, then the unit may be checked quarterly or every 2,000 unit operating hours, whichever occurs later, until there is an emission check indicating noncompliance.
Rule 1146(d)(8)(C)- Records shall be maintained for 5 years for Title V facilities and shall be made available to SCAQMD personnel upon request.
Rule 1146(d)(8)(D)- Portable analyzer tests shall only be conducted by a person who has completed District approved training program in the operation of portable analyzers and has received a certification issued by the District.
Rule 1146(d)(9)- Comply with requirements as applied to CO in (d)(8) or (d)(6)(B).
Compliance with all applicable requirements of this Rule is expected.

Rule 1147 NOx Reductions From Miscellaneous Sources
Rule 1147(a)- Applicability: not applicable to boilers subject to SCAQMD Rule 1146.

Reg XIII: Rule 1303(a)- BACT is required. The boiler is equipped with an ultra low NOx burner.
BACT Natural gas: CO: 50 ppmvd 3%O2(firetube), NOx: 12 ppmvd 3%O2, SOx & PM10: Natural gas.
BACT Digester gas: CO: 100 ppmvd @ 3%O2, NOx: 30 ppmvd @ 3%O2, PM10: 0.1 gram/scf @ 12%CO2.
Rule 1303(b)(1)- Modeling for VOC and SOx is not required (1303 Appendix A). NOx, CO and PM10 are less than the allowable emissions in Table A-1, no further analysis is required (1303 Appendix A).
Rule 1303(b)(2)- There are emission increases for this project. Since the facility is an essential public service, any required offsets shall be provided through priority reserve.
Compliance with Regulation XIII is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6}.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.
Compliance is expected.

Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.

Reg. XXX: Expansion of the facility to include a biosolids receiving, heat drying, and load out system and other equipment is part of an Initial Title V permit process, which will be subject to a 45 day EPA review under Rule 3003(j). A public notice is required under Rule 3003(n)(2) and Rule 212(g).
Rule 3001(c)(2)- NOx & VOC > 10 tons/yr, Title V permit required.
Rule 3002(b)(1) & (b)(2)- Applicant submitted Title V application on 4/2/2014.
Rule 3002(c)(2)- Compliance with Rules & Regulations is expected.
Rule 3003(a)(3)- Facility was determined to potentially trigger Title V emission thresholds in December 2013. IRWD reviewed possible operating limitations enforced via permit conditions to ensure that Title V thresholds were not triggered. In March 2014 after IRWD's review, it was confirmed that this project would trigger Title V thresholds based on potential to emit calculations and shall enter the Title V permit program. This application was submitted 4/2/2014 (within 180 days of subject date).
Rule 3003(b)(1)- Appropriate forms and fees were submitted.

Rule 3004(a)(4)(C)- The (ground, non-elevated) flare is used for air pollution control. Appendix A of the Periodic Monitoring Guidelines for Title V Facilities requires an exhaust temperature limit, continuous monitoring of exhaust temperature and recording with a strip chart or digital data acquisition system. LAER/BACT already requires exhaust temperature limit and continuous monitoring.
Compliance is expected.

Conclusions & Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Construct/ is recommended for applications 535809 and 535810 after EPA review and public notice. For Permit Conditions please see Sample Permit.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	PAGES 8	PAGE 1
STATIONARY SOURCE COMPLIANCE DIVISION	APPL NO 535812	DATE 3/24/2015
PERMIT APPLICATION PROCESSING AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY CDC

Permit to Construct (New Construction)

Applicant Irvine Ranch Water District (IRWD) –Michelson Water Recycling Plant (MWRP)

Mailing Address P.O. Box 57000
Irvine, CA 92619-7000

Equipment Location 3512 Michelson Drive
Irvine, CA 92612

APPLICATION 535812, FACILITY ID 003513

Equipment Description

ENCLOSED FLARE, 41 MMBTU/HR MAXIMUM HEAT INPUT, 4'-8" W. X 6'-5" L. X 23'-3" H. AEREON, MODEL CEB1200, WITH 20 HP COMBUSTION BLOWER, AUTOMATIC AIR CONTROL SYSTEM, DIGESTER GAS FIRED, WITH NATURAL GAS PILOT, TEMPERATURE CONTROLLER, AUTOMATIC FLARE SHUT DOWN SYSTEM, FLARE FAILURE ALARM, AUTOMATIC RESTART.

Background/Process Description

The above application was submitted on April 6, 2012 as a New Construction Permit to Construct application type for a digester gas flare. This application was submitted along with eleven (11) other applications to expand the plant to allow for biosolids management processes, including thickening, acid-phase anaerobic digestion, dewatering, drying/pelletizing, energy generation with microturbines, and use of pellets as a fertilizer or e-fuel. Since 1988, all biosolids from MWRP have been directed to Orange County Sanitation District (OCSD) for processing, reuse, and disposal. In 2009 IRWD decided to implement solids handling facilities, instead of transporting sludge to OCSD. This flare will be installed and used to combust any excess digester gas that is produced.

The flare will be installed and used to control excess digester gas.

The applicant provided operating schedule for this equipment is 24 hours/day, 1 days/week, 11 weeks/ year (264 hours per year). The applicant then revised the operating schedule for the flare to be 24 hours/day, 7 days/week, >1 week a year, for 174 hours/month and 174 hours/year. After it was determined that the facility would be subject to Title V requirements, IRWD indicated they would like to permit the flare without an operating limitation. Therefore the maximum operating schedule of 24 hours/day, 365 days/year will be used for emission calculations. There is no school within 1000 feet of emission source. There have been no Notices to Comply, Notices of Violation, or complaints in the last two years.

Emission Calculations

Maximum heat input rate: 41 mmBtu/hr
Applicant estimated digester gas HHV: 550 Btu/scf
Assume digester gas F-Factor: 9,140 dscf/mmBtu (based on A/N 450049, ID 1179 PO evaluation)
9,140 dscf/mmBtu x 41 mmBtu/hr = 374,740 dscfh = 6,246 dscfm
Assume O2 outlet concentration = 6.13% (based on A/N 475857, ID 7417 November 9, 2011 source test)

41 mmBtu/hr x 1E6Btu/mmBtu / 550 Btu/scf = 74,545.5 scfh digester gas flow rate
41 mmBtu/hr x 1E6Btu/mmBtu / 550 Btu/scf / 60mins/hr = 1,242 scfm digester gas flow rate

CO emissions
Manufacturer emission data: <10 ppm < 0.009 lbs/mmBtu
10 ppm x 6,246 dscfm x 60mins/hr x lbmole/379E6 cf x 28 lbs/lbmole
= 0.28 lbs/hr = 6.81 lbs/day(NSR)
0.009 lbs/mmBtu x 41 mmBtu/hr = 0.37 lbs/hr = 9.00 lbs/day (NSR)

Rule 407 requirement: 2,000 ppmvd

Rule 1303 LAER/BACT requirement (see A/N 02-540ML issued by US EPA): 0.06 lbs/mmBtu
0.06 lbs/mmBtu x 41 mmBtu/hr = 2.46 lbs/hr =59.86 lbs/day (NSR)
Maximum monthly emission: 2.46 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 1,795.8 lbs/month

Rule 1303 modeling requirement for > 30, ≤ 40: 72.1 lbs/hr, for illustration purposes only.
Flare >40mmBtu/hr, Modeling is required
2.46 lbs/hr x 453.6g/lb x hr/3600sec = 0.30996 g/s
0.30996 g/s Using Screen3 → 6.622 ug/m3 @ 485 m receptor distance (maximum)
Background Concentration: 1,718 ug/m3 (1-hour), 1,260 ug/m3 (8-hour)
Modeled + Background Concentration: 1,724 ug/m3 (1-hour), 1,264 ug/m3 (8-year) → Compliant

NOx emissions
Manufacturer emission data: <15 ppm < 0.023 lbs/mmBtu
15 ppm x 6,246 dscfm x 60mins/hr x lbmole/379E6 cf x 46 lbs/lbmole
= 0.68 lbs/hr = 16.55 lbs/day(NSR)
0.023 lbs/mmBtu x 41 mmBtu/hr = 0.94 lbs/hr = 22.87 lbs/day (NSR)

Rule 1303 BACT requirement: 0.06 lbs/mmBtu
0.06 lbs/mmBtu x 41 mmBtu/hr = 2.46 lbs/hr = 59.86 lbs/day (NSR)

Rule 1303 LAER/BACT requirement (see A/N 02-540ML issued by US EPA): 0.025 lbs/mmBtu
0.025 lbs/mmBtu x 41 mmBtu/hr = 1.03 lbs/hr = 25.06 lbs/day (NSR)
Maximum monthly emission: 1.03 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 751.9 lbs/month

Rule 1303 modeling requirement for > 30, ≤ 40: 1.31 lbs/hr, for illustration purposes only.
Flare >40mmBtu/hr, Modeling is required
1.03 lbs/hr x 453.6g/lb x hr/3600sec = 0.12978 g/s
0.12978 g/s Using Screen3 → 2.772 ug/m3 @ 485 m receptor distance (maximum)
Background Concentration: 140 ug/m3 (1-hour), 21 ug/m3 (annual)
Modeled + Background Concentration: 143 ug/m3 (1-hour), 21.5 ug/m3 (annual) → Compliant

PM10 emissions
A/N 457924, ID 10983 Bekaert CEB 350 DG flare permit limit: 0.0056 grains/dscf
0.0056 grains/dscf x 6,246 dscfm x 60min/hr x lb/7,000grains = 0.30 lbs/hr = 7.30 lbs/day (NSR)
Maximum monthly emission: 0.30 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 219 lbs/month

Rule 1303 modeling requirement for > 30, ≤ 40: 7.9 lbs/hr, for illustration purposes only.
Flare >40mmBtu/hr, Modeling is required
0.30 lbs/hr x 453.6g/lb x hr/3600sec = 0.0378 g/s
0.0378 g/s Using Screen3 → 0.8075 ug/m3 @ 485 m receptor distance (maximum)

Background Concentration: 104 ug/m3 (8-hour), 33.4 ug/m3 (annual)
Resulting Concentration: 0.323 ug/m3 (24-hour), 0.0646 ug/m3 (annual) → Compliant

Rule 404 requirement: Exhaust flow rate: 6,246 dcfm, 0.0943 grains/scf
0.0943 grains/scf x lb/7,000grains x 6,246 dscfm x 60min/hr = 5.05 lbs/hr > 0.30 lbs/hr

Rule 409 requirement: 0.1 grain/cf
0.1 grain/cf x lb/7,000grains x 6,246 dscfm x 60mins/hr = 5.35 lbs/hr > 0.30 lbs/hr

ROG emissions
Manufacturer emission data: <10 ppm < 0.004 lbs/mmBtu
10 ppm x 6,246 dscfm x 60mins/hr x lbmole/379E6 cf x 16 lbs/lbmole
= 0.16 lbs/hr = 3.89 lbs/day (NSR)
0.004 lbs/mmBtu x 41 mmBtu/hr = 0.16 lbs/hr = 3.89 lbs/day (NSR)

Rule 1303 LAER/BACT requirement (see A/N 9788 issued by SBCAPCD): 0.038 lbs/mmBtu OR 15 ppmvd 3% O2 as hexane
0.038 lbs/mmBtu x 41 mmBtu/hr = 1.56 lbs/hr = 37.96 lbs/day (NSR)
Maximum monthly emission: 1.56 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 1,138.8 lbs/month
OR
15 ppmv @ 3%O2
15 ppmv @ 3%O2 x (20.9 – 6.13*)/ (20.9 – 3) = 12 ppmv
12 ppmv x 6,246 dscfm x 60mins/hr x lbmole/379E6 cf x 16 lbs/lbmole
= 0.20 lbs/hr = 4.87 lbs/day(NSR)
* A/N 475857, ID 7417 November 9, 2011 source test

Rule 1303 BACT-SJAVPCD: enclosed flare & 0.068 lbs/mmBtu
0.068 lbs/mmBtu x 41 mmBtu/hr = 2.79 lbs/hr = 67.89 lb /day (NSR)

SOx emissions
Rule 407 requirement: 500 ppmvd

BACT requirement: Rule 431.1 compliance: 1) Natural gas ≤ 16 ppmv (NG pilot), 2) Facility wide emission < 5 lbs/day, 3) 40 ppmv w/CFGMS
1) 16 ppmv x 36 scfh NG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2
= 0.00009 lbs/hr SOx (as SO2) = 0 lbs/day (NSR)
2) **5 lbs/day H2S x lb-mole/34.08 lbsH2S x 64lbsSOx/lb-mole x day/24 hr**
= 0.39 lbs/hr SOx (as SO2) = 9.49 lbs/day SOx (as SO2) (NSR)
Maximum monthly emission: 0.39 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 28.47 lbs/month
3) 40 ppmvH2S(in DG) x 74,545.5 scfhDG x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsSO2/lbmole SO2 = 0.50 lbs/hr = 12.17 lbs/day (NSR)

Annual Emissions (AER 2013) SOx emission: 0.004 tons/yr
0.004 tons/yr x 2,000lbs/ton x 1yr/365days = 0.0009 lbs/hr SOx = 0.0219 lbs/day SOx

CO2 emissions
1) The Climate Registry 2013 Default EFs Table 12.1 (DG): 52.07 kg/mmBtu
DG: 52.07 kg/mmBtu x 2.2046 lb/kg x 41 mmBtu/hr = 4,706.53 lbs/hr = 114,525.56 lbs/day (NSR)

2) Assume DG is 40% CO2.
40% x 74,545.5 scfhDG x lb-moleH2S/379 ft^3 x 44 lbsCO2/lbmole CO2

= 3,461.74 lbs/hr = 84,235.67 lbs/day (NSR)

Total emissions

4,706.53 lbs/hr + 3,461.74 lbs/hr = 8,168.27 lbs/hr = 198,761.23 lbs/day (NSR)

Maximum monthly emission: 8,168.27 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 5,962,837.1 lbs/month

CH4 emissions

The Climate Registry 2013 Default EFs Table 12.9 **(DG): 0.0032 kg/mmBtu**

DG: 0.0032 kg/mmBtu x 2.2046 lb/kg x 41 mmBtu/hr = 0.29 lbs/hr = 7.06 lbs/day (NSR)

Maximum monthly emission: 0.29 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 211.7 lbs/month

N2O emissions

The Climate Registry 2013 Default EFs Table 12.9 (DG): 0.00063 kg/mmBtu

DG: 0.00063 kg/mmBtu x 2.2046 lb/kg x 41 mmBtu/hr = 0.06 lbs/hr = 1.46 lbs/day (NSR)

Maximum monthly emission: 0.06 lbs/hr x 24 hr/day x 365 days/yr x yr/12month = 43.8 lbs/month

Natural gas combustion emissions from pilot (R1=R2)

0.6 scfm NG x 60min/hr = 36 scfh NG 1050 Btu/scf x36 scfh NG = 37,800 Btu/hr

Emission Factors (based on the District's Annual Emission Inventory 2007 - 2008, Appendix A):

CO: 35 lbs/1E6 ft^3 x 36 ft^3/hr = 0.001~ 0 lbs/hr = 0 lbs/day (NSR)

NOX: 130 lbs/1E6 ft^3 x 36 ft^3/hr = 0.004~ 0 lbs/hr = 0 lbs/day (NSR)

PM10: 7.5 lbs/1E6 ft^3 x 36 ft^3/hr = 0.003~ 0 lbs/hr = 0 lbs/day (NSR)

ROG: 7 lbs/1E6 ft^3 x 36 ft^3/hr = 0.0003~ 0 lbs/hr = 0 lbs/day (NSR)

SOX: 0.6 lbs/1E6 ft^3 x 36 ft^3/hr = 0.00002 ~ 0 lbs/hr = 0 lbs/day (NSR)

Emission Factors (based on the AP-42 Table 4.1.2 NG combustion):

CO2: 120,000 lbs/1E6 ft^3 x 36 ft^3/hr = 4.32 lbs/hr = 25.06 lbs/day (NSR)

CH4: 2.3 lbs/1E6 ft^3 x 36 ft^3/hr = 0.00008 ~ 0lbs/hr = 0 lbs/day (NSR)

N2O: 0.64 lbs/1E6 ft^3 x 36 ft^3/hr = 0.00002~ 0 lbs/hr = 0 lbs/day (NSR)

Emission Factors (based on The Climate Registry's 2013 Default EFs, Table s 12.1 & 12.9):

CO2: 53.06 kgCO2/1E6Btu x 37,800 Btu/hr x 2.2046 lb/kg = 4.42 lbs/hr = 107.55 lbs/day (NSR)

CH4: 0.001 kgCO2/1E6Btu x 37,800 Btu/hr x 2.2046 lb/kg = 0.00008 ~ 0 lbs/hr = 0 lbs/day (NSR)

N2O: 0.001 kgCO2/1E6Btu x 37,800 Btu/hr x 2.2046 lb/kg = 0.00008 ~ 0 lbs/hr = 0 lbs/day (NSR)

Emissions Summary

Total emission = DG Combustion (waste gas) + NG Combustion (pilot)

CONTAMINANT	LBS/HR		LBS/DAY (NSR)	LBS/MONTH
	R1	R2	R2	R2
CO	2.46	2.46	59.86	1,795.8
NOX	1.03	1.03	25.06	751.9
PM10	0.30	0.30	7.30	219
ROG	1.56	1.56	37.96	1,138.8
SOX	0.39	0.39	9.49	28.47
CO2	8,172.69	8,172.69	198,868.79	5,966,063.7
CH4	0.29	0.29	7.06	211.7
N2O	0.06	0.06	1.46	43.8

Toxic Risk Analysis

Nearest Residential Receptor Distance: 2,168 ft. (661 m)

Nearest Commercial Receptor Distance: 1,590 ft. (485m)
Exhaust stack height: 23.25 ft. (7.09 m)
Exhaust stack inner diameter 3.61 ft. (1.10 m)
Exhaust temperature: 2000°F
Exhaust flow rate: 6,246 dscfm
6,246 dscfm x (460 + 2,000) / (460 +60) = 29.548 acfm
Rain cap on exhaust stack: No
Digester control building dimensions: 33 ft (10.1m) tall, 54 ft (16.5m) x 50 ft (15.2m)

Compound	MW (lb/mole)	Outlet Emissions (lbs/hr)
Acetaldehyde	44.06	1.95E-04
Acrolein	56.06	3.60E-07
Benzene	78.11	9.02E-05
Benzyl chloride	126.58	2.05E-04
Carbon Tetrachloride	153.24	1.66E-04
Chlorobenzene	112.56	1.52E-04
Chloroform	119.38	1.29E-04
1,2-Dibromomethane	187.88	2.54E-04
1,4-Dichlorobenzene	147.01	2.98E-04
1,1-Dichloroethane	98.96	1.34E-04
1,1-Dichloroethylene	96.95	1.31E-04
Ethylbenzene	106.16	5.20E-05
Ethylene dichloride	98.96	1.34E-04
Formaldehyde	30.03	3.68E-04
Hexane	86.18	1.04E-06
Hydrogen sulfide	34.08	9.20E-03
Methylene chloride	84.94	1.15E-04
Naphthalene	128.173	3.96E-07
PAH	252.3	1.08E-07
Tetrachloroethylene	165.83	1.79E-04
Toluene	92.13	1.39E-04
1,1,1,-Trichlorethane	133.42	1.44E-04
Trichloroethylene	130.4	1.07E-04
Vinyl chloride	62.5	6.74E-05
Xylenes	106.2	2.88E-04

The above outlet emission rate is based on the sum of the TAC emission rates from the source test dated 11/9/2011 for a stationary Bekaert, Model CEB 350 digester gas flare under A/N 513835, ID 7417 proportioned up from 9.12mmBtu/hr (source test heat input) to 41 mmBtu/hr (permitted heat input) and the TAC emission rates for natural gas non-refinery flares for the natural gas pilot from AER Reporting Procedures for AB2588 Facilities January 2010, Table B-1.

Tier II analysis was used since the nearest receptor is greater than 25m from the exhaust stack with no rain cap. Tier II risk analysis was based on the outlet emission listed in the above table. MICR was calculated to be 5.40×10^{-8} for residential and 1.48×10^{-8} for commercial receptors. HIC and HIA are less than 1 and Cancer Burden is less than 0.5.

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.

Rule 212 (c)(2)- On-site emission increases from this project do not exceed the following:

Volatile Organic Compounds	30 lbs/day
PM10	30 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212 (c)(2)- On-site emission increases from this project exceed the following:

Nitrogen Oxides	40 lbs/day
Sulfur Dioxide	60 lbs/day

Rule 212 (c)(3)(A)(i)- Facility-wide max MICR is estimated to be below 10 in a million. **Public Notice is required.**

Rule 401: Visible Emissions
No violations are expected, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected with proper operation, monitoring and maintenance. Compliance is expected.

Rule 404: Particulate Matter
No violations are expected limits are listed under Rule 404 Table 404(a).

Rule 407: Liquid and Gaseous Air Contaminants
Rule 407 (a)(1)- CO < 2000 ppmvd.
Rule 407(a)(2)- SOx < 500 ppmvd.
Compliance is expected.

Rule 409: Combustion Contaminants
Combustion contaminants are not expected to exceed 0.1 grain per cubic foot of gas calculated to 12% CO2 at standard conditions averaged over a minimum of 15 consecutive minutes. Compliance is expected. 0.1 grain/cf → 5.35 lbs/hr > 0.30 lbs/hr
Compliance is expected.

Rule 431.1: Sulfur Content of Gaseous Fuels
Rule 431.1(c)(1)- Natural gas contains ≤ 16 ppmv sulfur compounds as H2S.
Rule 431.1(c)(2)- Sewage digester gas ≤ 40 ppmv sulfur compounds as H2S, averaged daily or ≤ 40 ppmv sulfur compounds as H2S, averaged monthly and ≤ 500 ppmv sulfur compounds as H2S, averaged over 15minutes.
Other gases ≤ 40 ppmv sulfur compounds as H2S, averaged over 4 hours.
Rule 431.1(d)(1)- If burning gaseous fuels, other than exclusively natural gas, in stationary equipment shall have a properly operating continuous fuel gas monitoring system (CFGMS) to determine the sulfur content, calculated as H2S, of the fuel gas prior to burning; or a continuous emission monitoring system (CEMS) to determine SOx emissions after burning. All continuous monitors require District approval, which shall be based on the requirements as specified in Attachment A.
Rule 431.1(d)(1)(B)- A person subject to paragraph (c)(4) of this rule shall comply with paragraphs (d)(1) & (d)(2) no later than 12 months after the date a Permit to Construct is issued by the District for a sulfur removal system or comply with paragraph (d)(3).
Rule 431.1(d)(1)(C)- Compliance with the Table 1 sulfur limits shall be determined based on readings obtained from an approved continuous monitor.

Rule 431.1(d)(2)- A person installing a continuous monitor shall submit to the District for approval, a quality assurance procedure as specified in U.S. EPA 40 CFR, Part 60, Appendix F, Procedure 1 for CEMS and, as applicable, for CFGMS.
Rule 431.1(d)(2)(A)- The quality assurance procedure shall be submitted to the District for written approval by the Executive Officer prior to the CFGMS or CEMS final certification.
Rule 431.1(d)(2)(B)- Any CFGMS or CEMS deemed to be out of control, as specified in Attachment A, according to the facility quality assurance procedure approved by the Executive Officer shall be corrected within 72 hours.
Rule 431.1(d)(2)(B)(i)- The person operating the CFGMS or CEMS shall notify the Executive Officer by telephone or facsimile of any breakdown(s) of the monitoring systems if the duration of the breakdown is in excess of 60 minutes or if there are three or more breakdowns in any one day within 24 hours of the occurrence of the breakdown which triggers notification. Such report shall identify the time, location, equipment involved, and contact person.
Rule 431.1(d)(2)(B)(ii)- The person who complies with the provisions of clause (d)(2)(B)(i) and paragraph (e)(3) shall not be considered in violation of this rule for the 72 hour period of breakdown provided that the breakdown did not result from operator error, neglect or improper operation or maintenance procedures.
Rule 431.1(d)(3)- A person burning landfill gas or sewage digester gas, or who is subject to paragraph (c)(4) of this rule may use an alternative monitoring method, in lieu of the requirements in paragraphs (d)(1) and (d)(2), that ensures compliance with the daily total sulfur content limitation as specified in Table 1. Alternative monitoring methods shall not be used unless first approved in writing by the Executive Officers of the District, the CARB, and the Regional Administrator of the EPA, Region IX, or their designees.
Rule 431.1(d)(3)(A)- At a minimum, the alternative monitoring method shall meet the guidelines of Attachment A, Section III.
Rule 431.1(d)(3)(B)- A person subject to (c)(4) of this rule shall submit an alternative monitoring method for approval no later than 45 days after the date a Permit to Construct a sulfur removal system is issued.
Rule 431.1(d)(3)(C)- All monitoring shall comply with the approved alternative monitoring method.
Rule 431.1(g)(8)- Any facility which emits less than 5 pounds per day total sulfur compounds, calculated as H2S from the burning of gaseous fuels other than natural gas (not applicable to (c)(1)).
This facility is expected to comply either with sulfur limits as required or exemption requirement under Rule 431.1(g)(8). Compliance is expected.

Rule 53A: Orange County – Specific Contaminants (Contained in Addendum to Reg IV)
Rule 53- Sulfur compound emission limit, as SO_2 500 ppmv.
Compliance is expected.

Rule 1147 NOx Reductions From Miscellaneous Sources
Rule 1147(a)- Applicability: This equipment is exempt under Rule 1147(g)(3)(B) since the fuel (natural gas) is used only to maintain a pilot for vapor ignition.

Reg XIII: Rule 1303(a)- LAER/BACT is required, emission increases are greater than 1.0 lbs/day. LAER: CO: 0.06 lbs/mmBtu/hr(see A/N 02-540ML issued by US EPA), NOx: 0.025 lbs/mmBtu/hr(see A/N 02-540ML issued by US EPA), VOC: 0.038 lbs/mmBtu/hr(see A/N 9788 issued by SBCAPCD).

BACT: CO: Ground level, shrouded, ≥ 0.6 sec. retention time at ≥ 1400 F, auto combustion air control; NOx: 0.06 lbs/mmBtu; VOC: Ground level, shrouded, ≥ 0.6 sec. retention time at ≥ 1400 F, auto combustion air control, automatic shutoff gas valve and automatic restart system; and PM10: knockout tank.
Rule 1303(b)(1)- Modeling for VOC and SOx is not required (1303 Appendix A). NOx, CO and PM10 are within the allowable threshold based on further analysis.
Rule 1303(b)(2)- Since the facility is an essential public service, required offsets shall be provided through priority reserve.
Compliance is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6} limit.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.

Rule 1401.1: Requirements for New and Relocated Facilities Near Schools
Rule 1401.1(b)- Not applicable, since the facility is an existing facility.

Reg. XXX: Expansion of the facility to include a biosolids receiving, heat drying, and load out system and other equipment is part of an Initial Title V permit process, which will be subject to a 45 day EPA review under Rule 3003(j). A public notice is required under Rule 3003(n)(2) and Rule 212(g).
Rule 3001(c)(2)- NOx & VOC > 10 tons/yr, Title V permit required.
Rule 3002(b)(1) & (b)(2)- Applicant submitted Title V application on 4/2/2014.
Rule 3002(c)(2)- Compliance with Rules & Regulations is expected.
Rule 3003(a)(3)- Facility was determined to potentially trigger Title V emission thresholds in December 2013. IRWD reviewed possible operating limitations enforced via permit conditions to ensure that Title V thresholds were not triggered. In March 2014 after IRWD's review, it was confirmed that this project would trigger Title V thresholds based on potential to emit calculations and shall enter the Title V permit program. This application was submitted 4/2/2014 (within 180 days of subject date).
Rule 3003(b)(1)- Appropriate forms and fees were submitted.
Rule 3004(a)(4)(C)- The (ground, non-elevated) flare is used for air pollution control. Appendix A of the Periodic Monitoring Guidelines for Title V Facilities requires an exhaust temperature limit, continuous monitoring of exhaust temperature and recording with a strip chart or digital data acquisition system. LAER/BACT already requires exhaust temperature limit and continuous monitoring.
Compliance is expected.

Conclusions & Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Construct is recommended for application 535812 after EPA review and public notice. For Permit Conditions please see Sample Permits.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	BACKGROUND & FACILITY INFORMATION	
ENGINEERING & COMPLIANCE	A/N:	558759
	DATE:	3/27/2015
RULE 1110.2 INSPECTION & MONITORING (I & M) PLAN EVALUATION	PROCESSED BY:	AS08
	CHECKED BY:	CDY

BACKGROUND:

SCAQMD Rule 1110.2 was amended on February 1, 2008 with additional rule language that significantly changed the way facilities are required to demonstrate compliance with the rule. Each facility is required to prepare an **Inspection and Monitoring Plan** (I & M Plan) which details the procedures which the facility will implement to ensure compliance with the requirements of Rule 1110.2. Although only one plan is required for each facility, the facility is required to specify in detail how they inspect and monitor every engine in the facility that is subject to Rule 1110.2. The basic I & M requirements are enumerated in Rule 1110.2 (f)(1)(D). An engine that is monitored by a NOx and CO Continuous Emissions Monitoring System (CEMS) is not required to be included in this I & M Plan. If CO CEMS is not required, an I&M plan for CO is still required.

The facility shown below has submitted the required I & M Plan. On the pages following this cover page is a detailed evaluation of whether or not the submitted I & M Plan will satisfy the basic requirements of Rule 1110.2 (f)(1)(D) for each engine that is subject to the plan. The evaluation will show whether or not each basic requirement is "Satisfied", "Deficient" or "Not Applicable". For every "Deficient" determination, additional information/explanation will be provided by the evaluating engineer.

FACILITY INFORMATION:

Facility Name: Irvine Ranch Water District (IRWD), Michelson Water Recycling Plant (MWRP)
ID No.: 003513

Equipment Location Address: 3512 Michelson Drive, Irvine, CA 92612

Name of Person Responsible for Plan Compliance: Lyndy Lewis

Telephone Number/Email Address: Tel: 949-453-5832, Fax: 949-476-1187, Email: lewis@irwd.com

Richard Lao (alternate)

Telephone Number/Email Address: Tel: 949-453-5690, Fax: 949-476-1187, Email: lao@irwd.com

Number of Engines at this Facility Subject to I & M Plan: 5

ENGINE INFORMATION:

Permit No.: See below Application No.: See below Device ID: _____
Engine Make: See below Model No.: See below
BHP Rating: See below RPM: _____ Serial No.: _____
I.C.E. Function:
☒ Elect. Gen. ☒ Pump Driver ☐ Compressor ☐ Co-Gen ☒ Other
Driving electric generator or water pump
Fuel: Primary: Natural gas Stand-By (if any):
Combustion Type:
☒ Rich Burn ☐ Lean Burn
Permit Emission Limits (dry corrected to 15% O2):

Natural Gas Fired	Natural Gas Fired (A/N 557286)
NOx = 11 ppmv	NOx = 11 ppmv
VOC = 30 ppmv	VOC = 30 ppmv
CO = 250 ppmv	CO = 70 ppmv
NH_3 = _____ ppmv	NH_3 = _____ ppmv

Permits Included in this Evaluation:

Permit No.	Appl. No.	Make	Model	BHP	Fuel	Combustion Type
G05854	466394	Caterpillar	G3306TA	203	NG	Rich Burn
G11944	510239	Caterpillar	G3306TA	203	NG	Rich Burn
G28212	557286	Caterpillar	G3306TA	203	NG	Rich Burn
G04635	*464500	Waukesha	L7044GSI	1692	NG	Rich Burn
TBD	*551658	Waukesha	L7044GSI	1692	NG	Rich Burn
G04636	**464501	Waukesha	L7044GSI	1692	NG	Rich Burn
TBD	**551660	Waukesha	L7044GSI	1692	NG	Rich Burn

*These are the same engine driving 1.25 MW generator.
**These are the same engine driving 1.25 MW generator.

CONTROL EQUIPMENT & COMPONENTS:

Emission Control (Check all that apply):
☒ NSCR (3-way Cat.) ☐ SCR (Selective Cat.) ☐ Oxidation Catalyst
NSCR / SCR / OXID.CAT. Make & Model:
A/Ns 466394, 510239, & 557286: DCL, Model 2 DC-49-6
A/Ns 464500/551658 & 464501/551660: DCL, Model 2 DC 76-14
If NSCR/Oxid Cat: **Min. Inlet Temp.:** ° F; **Max. Outlet Temp.:** ° F
(Refer to permit conditions or NSCR manufacturer specs)
A/Ns 466394, 510239, & 557286: Inlet Temp: 750°F-1250°F, Max Outlet Temp: 1350°F
A/Ns 464500/551658 & 464501/551660: Inlet Temp: 600°F-1300°F, Max Outlet Temp: 1350°F
If SCR: **Min. Inlet Temp.:** _____ F; **NH3/NOx Molar Ratio:** _____
Max. Ammonia Slip: _____ **ppmv**
(Refer to permit conditions or SCR manufacturer specs)
Air-To-Fuel Ratio Controller (AFRC) and Oxygen Sensor:
AFRC Make & Model: A/Ns 466394, 510239, & 557286 and A/Ns 464500/551658 & 464501/551660: Altronic, Model EPC-100E
AFRC Setting: ☒ Variable Set Points at Variable Loads- A/Ns 466394, 510239, & 557286 ☒ Single Set Point- A/Ns 464500/551658 & 464501/551660
Oxygen Sensor Type: ☐ Heated Narrow Band (HEGO)
☐ Unheated Narrow Band (EGO) ☐ Universal Wideband (UEGO)
☒ Other (specify) : Heated two-wire element type
Optimum O2 Sensor Range Setting: A/Ns 466394, 510239, & 557286 and A/Ns 464500/551658 & 464501/551660: 500 mV to 950 mV
Oxygen Sensor Location (relative to catalyst):
☒ Upstream Only ☐ Upstream and Downstream
Continuous Emissions Monitoring System (CEMS): ☐NOx ☐CO ☒None
Other Parameters (if any): (for example, differential pressure - ΔP):
Parameter(s): Fuel flow rate, inlet and outlet of catalyst temperature NOx exhaust concentration, O2 concentration, Compliance Limit (s): see adjacent.

INSPECTION & MONITORING (I & M) PLAN EVALUATION:

Satisfied	Deficient	N/A	Requirements	Additional Info/Explanation
☒	☐	☐	**PORTABLE ANALYZER (PA) TESTING PROCEDURES:** (1) The plan should have a set procedure for conducting a portable analyzer (PA) test (measuring NOx, CO and O_2) on this engine which includes the following: a) Identification of the person or company who will perform the PA test, including a declaration that this person/company has undergone SCAQMD PA training and is certified in the use of the particular PA equipment, b) A declaration, supported with O & M (operation and maintenance) information, indicating the proper calibration schedule and procedure used for the PA equipment, c) An declaration which indicates that the PA test will be conducted in accordance with the requirements in SCAQMD's "Protocol for the Periodic Monitoring of NOx, CO, and O2 from Stationary Engines Subject to SCAQMD Rule 1110.2" (dated May 2009), OR, the most recently approved USEPA protocol. The facility also should indicate whether Protocol Forms 1, 2 or 3 will be used, d) An indication from the facility whether the PA equipment will measure both NO and NO_2, or, just NO (Note: For NO only, the facility must provide test data that shows that NO_2 emissions are less than 10% of total NOx emissions), and e) An explanation of how the facility intends to store PA test printouts. This statement should indicate the manner, frequency and format of data storage.	*1-a) The facility identified IRWD's mechanics will conduct the PA tests and are trained and SCAQMD certified.* *1-b) The facility indicated they will follow SCAQMD's protocol and manufacturer's specifications and recommendations.* *1 c) The facility indicated the PA will be conducted in accordance with the Protocol. The facility indicated they use software for their ECOM Pas which creates a form similar to Form 3. Hard copies are retained at IRWD's main office.* *1-d) PA equipment measures both NO and NO_2, but is not calibrated for NO_2 since the engines are rich-burn and emit a small fraction of NO_2. NO_2 test data demonstrateNO_2 is less than 10% total NOx.* *1-e) The facility indicated all PA readings are recorded in the ECOM software electronically and hard copies are retained at IRWD's main office.*
☒	☐	☐	(2) The plan should have a set schedule of performing PA tests on this engine at least **once a week**, or, **every 150 engine operating hours**, whichever occurs later. If the engine is in compliance for 3 consecutive emission checks, without any adjustments to the O_2 sensor set points, then the engine may be tested **once a month**, or, **every 750 engine operating hours**, whichever occurs later. If the facility opts for the 150 (or 750) engine operating hours criteria, the facility should indicate on the plan how they intend to get alerted on when a PA test is due.	

Satisfied	Deficient	N/A	Requirements	Additional Info/Explanation
☐	☐	☒	(3) For diesel engines and lean burn engines subject to Reg. XX or have a NOx CEMS, and: a) If the permit contains a CO limit **more stringent than 2000 ppmvd**, then, the plan should have a set procedure and schedule for performing a PA test for **CO only** at least **quarterly** or **every 2,000 engine operating hours**, whichever occurs later. If the facility opts for the 2,000 engine operating hours criteria, the facility should indicate on the plan how they intend to get alerted on when a PA test is due. b) If the permit contains a CO limit that is **NOT more stringent than 2000 ppmvd**, then, **no emission tests** are required.	
☒	☐	☐	(4) The plan shall NOT contain a procedure for performing an engine or control system maintenance or tuning within **72 hours** prior to performing a PA test, unless the maintenance or tuning is a result of an unscheduled, required repair.	
☒	☐	☐	(5) If this engine is operated by a **public agency** or a **contractor hired by a public agency** solely to operate this engine, AND, if the public agency or contractor hired by the public agency opted to perform NOx and CO PA tests in lieu of the CEMS requirement of Rule 1110.2 (f)(1)(A)(ii)(I), THEN, the plan should have a set schedule of performing PA tests on this engine at least **once a week**, or, **every 150 engine operating hours**, whichever occurs later. If the facility opts for the 150 engine operating hours criteria, the facility should indicate on the plan how they intend to get alerted on when a PA test is due.	
☐	☐	☒	(6) If the facility is subject to RECLAIM, then only the CO emissions are to be tested.	
☒	☐	☐	**NSCR, SCR, OXIDATION CATALYST I & M PROCEDURES:** (7) If this engine is **a rich burn engine** with an **NSCR (3-Way Catalyst)**, the plan should have a set procedure for monitoring the temperature of the exhaust gas entering and exiting the NSCR. Engine cold start-ups excluded, the plan should specify the minimum and maximum catalyst temperatures (based on permit conditions, or, if absent on the permit conditions, based on catalyst manufacturer specifications). The plan should have a set procedure for alerting the operator of deviations to the acceptable operating temperature range.	*7) Operator reviews temperature data daily for proper operating temperature range.* *Electric generator ICEs: Catalyst Inlet Temp:600°F -1300°F* *Max Outlet Temp: 1350°F* *Pump ICEs: Catalyst Inlet Temp:750°F -1250°F* *Max Outlet Temp: 1350°F*
☐	☐	☒	(8) If this engine is a rich burn engine with an NSCR (3-Way Catalyst), and a permit condition (or, the catalyst manufacturer specs) requires monitoring of the temperature increase (ΔT) across the catalyst bed, then, the plan should have a set procedure for calculating and monitoring the ΔT and for alerting the operator of any deviations to the acceptable ΔT.	

Satisfied	Deficient	N/A	Requirements	Additional Info/Explanation
☐	☐	☒	(9) If this engine is a rich burn engine with an NSCR (3-Way Catalyst), and a permit condition (or, the catalyst manufacturer specs) requires monitoring of the pressure differential (ΔP) across the catalyst bed, then, the plan should have a set procedure for calculating and monitoring the ΔP and for alerting the operator of any deviations to the acceptable ΔP.	
☒	☐	☐	(10) If a permit condition or the catalyst manufacturer specifications requires cleaning or replacement of the catalyst element upon reaching a parameter milestone (e.g., after a specified number of operating hours, or, when a ΔP or ΔT limit is reached), the plan should have a set procedure for alerting the operator when such parameter milestone is reached.	*10) The facility indicated catalyst cleaning is conducted based on catalyst performance. Catalyst will be inspected for cleaning or replacement after a non-compliant PA check with subsequent AFRC adjustment and follow-up non-compliant PA check.*
☐	☐	☒	(11) If this engine is **a lean burn engine** with an **SCR**, the plan has a set procedure for monitoring the following: (a) The temperature of the exhaust gas entering the SCR. The plan should specify the minimum catalyst inlet temperature for proper reaction to occur in the SCR and the maximum temperature to prevent catalyst decomposition. The plan should have a set procedure to alert the operator whenever the minimum temperature is not reached beyond the normal cold start-up timeframe; and (b) The NOx control algorithm which establishes the acceptable range of reactant (ammonia or urea) flow rate, as a function of engine load. The plan should have a set procedure for establishing the acceptable range of reactant flow rate using a portable NOx and O_2 analyzer.	
☒	☐	☐	**AIR-TO-FUEL RATIO CONTROLLER (AFRC) I & M PROCEDURES:** (12) For an engine operated on **variable loads**, the plan should have a set procedure for establishing the optimum (i.e., compliant with NOx & CO emission limits) AFRC set-points at 25%, 60% and 95% load (± 5%). The loads may also be based on the minimum, midpoint and maximum loads that actually occur during **normal operation** (± 5%). Set points shall be established with the use of a portable NOx, CO and O_2 analyzer. Engine load shall be determined using acceptable means, including but not limited to: (a) generator kilowatt output; (b) fuel flow meter measurement; or (c) evaluation of pump or compressor curves with measurement of RPM and pressure.	*12) The facility uses the PA to create an engine load map that correlates oxygen sensor set point to rpm and load and adjusts AFRC set point to ensure emissions are compliant.* *The pump driving engines are only operated at 50% and 100% load, so set points are set at 50%, 50-100%, and 100%.*

Satisfied	Deficient	N/A	Requirements	Additional Info/Explanation
☒	☐	☐	(13) For an engine operated on **a single load** and is limited to this load by means of a permit condition, the plan should have a set procedure for establishing the optimum (i.e., compliant with NOx & CO emission limits) AFRC set-point based on the defined single load (± 10%). Set point shall be established with the use of a portable NOx, CO and O_2 analyzer. Engine load shall be determined using acceptable means, including but not limited to: (a) generator kilowatt output; (b) fuel flow meter measurement; or (c) evaluation of pump or compressor curves with measurement of RPM and pressure.	*13) The facility uses the PA to create an engine load map that correlates oxygen sensor set point to rpm and load and adjusts AFRC set point to ensure emissions are compliant.*
☒	☐	☐	(14) For both variable-load or single-load operation, the plan should have a set procedure for verifying that the AFRC is controlling the engine to the optimum set-point(s) during the required daily monitoring (see section on General I & M Procedures for details on daily monitoring requirement).	*14) The facility indicated procedures to verify the AFRC is controlling the engine by monitoring the engine and control system for warning lights, alarms, fault codes, set point adjustment issues during the required daily monitoring.*
☒	☐	☐	(15) For both variable-load or single-load operation, the plan should have a set procedure for re-establishing the AFRC set-point(s) whenever a set-point must be **readjusted** or **within 24 hours after the replacement of an oxygen sensor**. If the engine is a **rich burn** engine **with a 3-way catalyst**, the plan should have a set procedure for re-establishing the AFRC set-point(s) <u>again</u> **between 100 and 150 engine operating hours** after an oxygen sensor replacement. The plan shall indicate how the operator will be alerted when 100 operating hours have been reached. Set point shall be re-established with the use of a portable NOx, CO and O_2 analyzer.	*15) The facility indicated staff review engine operating hour records to determine when the oxygen sensor shall be replaced and AFRC set point re-adjustment shall be conducted subsequent to the oxygen sensor replacement.*
☒	☐	☐	(16) The AFRC shall have a malfunction indicator light and audible alarm and the plan shall have procedures for alerting the operator of emission control malfunctions (see item #17 under "General I&M Procedures).	
☒	☐	☐	**<u>GENERAL I & M PROCEDURES:</u>** (17) The plan should have a set procedure for alerting the operator of any malfunctions in the emission control system and the AFRC. If the facility has on-site personnel, operator-alert systems may include malfunction indicator lights on the defective system or an audible alarm. If the facility is unmanned, an operator shall be alerted remotely by either a Supervisor Control and Data Acquisition (SCADA) system or other similar systems. The plan should include a list of malfunctions that will be monitored by the alarm system (including malfunction codes).	*17) The facility indicated procedures for alerting the operator of emission control malfunctions. Malfunction lights and alarms notify the operator during daily monitoring. During unmanned operation the SCADA alerts the operator of malfunctions for further investigation. The facility indicated a list of malfunctions that will be monitored by the alarm system (including malfunction codes).*

Satisfied	Deficient	N/A	Requirements	Additional Info/Explanation
☒	☐	☐	(18) The plan shall describe how the operator will respond to, diagnose and correct breakdowns, faults, malfunctions, alarms, and emissions checks finding emissions in excess of rule or permit limits.	
☒	☐	☐	(19) For breakdown resulting in a violation of Rule 1110.2 or a permit condition, the plan shall contain procedures on how the operator shall correct the problem and demonstrate compliance with another emissions check or shut down the engine at the end of the operating cycle. The breakdown shall be reported per section (H) of Rule 1110.2.	
☒	☐	☐	(20) Within 15 days of the end of each calendar quarter, the operator will submit to the SCAQMD (Attention: Compliance) a completed Form - Rule 1110.2 - Quarterly Report for Stationary Engines that reports each occurrence of a breakdown, fault, malfunction, alarm, engine or control system operating parameter out of the acceptable range established by an I & M plan or permit condition, or an emission check that finds excess emissions. Operator will also report if no incidents occurred.	
☒	☐	☐	(21) For other problems, such as parameters out-of-range, the operator shall correct the problem and demonstrate compliance with another emissions check within 48 hours of first knowing the problem.	
☒	☐	☐	(22) Procedures and schedules for preventive and corrective maintenance. The maintenance schedule shall include the items on the engine and control system that are to be serviced (examples: O2 sensor replacement, catalyst replacements or washes, engines tunes ups, spark plug replacements). The plan shall indicate who will be responsible for maintenance, in-house or contractor. The format for record keeping of maintenance and repairs should include engine operating hours, explanation and description of what was done and why.	22) *IRWD indicated the procedures and schedules for preventative and corrective maintenance. Maintenance is conducted every 1,440 hours or earlier is needed. IRWD indicated in-house staff and outside service contractor, Exterran, Inc. in Bakersfield for outside engine overhauls.*
☒	☐	☐	(23) Procedures for recordkeeping of monitoring and other actions required by the plan.	23) *The facility indicated procedures for recordkeeping of monitoring and other activities. Records kept electronically at HQ and hard copies at the site.*
☒	☐	☐	(24) For any plan revision the operator shall file a new compliance plan.	
☐	☐	☒	**GENERAL DAILY MONITORING PROCEDURES:** (25) The plan need NOT require daily parameter monitoring for diesel engines or lean burn engines which do not have either exhaust gas recirculation or catalytic control devices.	

Satisfied	Deficient	N/A	Requirements	Additional Info/Explanation
☒	☐	☐	(26) Engines will be monitored daily, including weekends and holidays by either remote monitoring or in person or a combination of the two.	26) *The facility indicated the engines will be monitored daily including weekends and holidays in person and may integrate daily record keeping using the SCADA system.*
☒	☐	☐	(27) The Plan specifies which in-house personnel **or** which outside contractor will conduct the daily monitoring.	27) *The facility identified IRWD staff will conduct daily monitoring. Outside staff will be used when necessary.*
☒	☐	☐	(28) The format for the daily monitoring report shall include but not be limited to: name of person doing the monitoring (if not remote monitoring), date/time of monitoring, and all parameters to be monitored.	
☒	☐	☐	**PARAMETERS TO BE MONITORED DAILY** (29) Engine load or fuel flow rate.	
☒	☐	☐	(30) The actual values of the AFRC set points.	
☒	☐	☐	(31) The elapsed time meter operating hours.	
☒	☐	☐	(32) The operating hours since the last emissions check.	*28) The facility indicated that the daily monitoring log will be updated to include this parameter instead of tracking it separately.*
☒	☐	☐	(33) For rich burn engines with 3-way catalysts, the difference between the inlet and outlet temperature (ΔT) of the catalytic converter.	
☒	☐	☐	(34) Engine control systems and AFRC system faults or alarms that affect emissions	
☐	☐	☒	(35) For lean burn engines with SCR, the exhaust temperature at the inlet to the SCR and the reactant flow rate.	
☐	☐	☒	(36) Other parameters to be monitored, for example, if the permit conditions have a pressure drop requirement (ΔP), the pressure drop should be monitored.	

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT ENGINEERING AND COMPLIANCE DIVISION PERMIT APPLICATION EVALUATION AND CALCULATIONS	PAGES 11	PAGE 1
	APPL NO 535813	DATE 5/19/2015
	PROCESSED BY AS08	CHECKED BY OPT

Permits to Construct/Operate (New Construction)

Applicant — Irvine Ranch Water District (IRWD), Michelson Water Recycling Plant (MWRP)

Mailing Address — P.O. Box 5700,
Irvine, CA 92619-7000

Equipment Location — 3512 Michelson Drive
Irvine, CA 92612

Equipment Description

APPLICATION 535813, FACILITY ID 3513
INTERNAL COMBUSTION ENGINE, CATERPILLAR, MODEL C32TA, FOUR STROKE, 12 CYLINDERS, 1502 BHP, DIESEL FUELED, TURBOCHARGED, AFTERCOOLED, WATER COOLED, VENTED TO A CATALYZED PASSIVE CONTINUOUSLY REGENERATED DIESEL PARTICULATE FILTER (DPF), JOHNSON MATTHEY, MODEL CRT+, WITH CRTDM BACKPRESSURE AND TEMPERATURE MONITOR, DATA LOGGER, AND ALARM, DRIVING AN EMERGENCY ELECTRICAL GENERATOR.

Background/Process Description

The above application for the New Construction of an emergency diesel fired internal combustion engine (ICE) to drive an electrical generator was submitted on April 6, 2012 for a Permit to Construct. This application was submitted along with eleven (11) other applications to expand the plant to allow for biosolids management processes, including thickening, acid-phase anaerobic digestion, dewatering, drying/pelletizing, energy generation with microturbines, and use of pellets as a fertilizer or e-fuel. Since 1988, all biosolids from MWRP have been directed to Orange County Sanitation District (OCSD) for processing, reuse, and disposal. In 2009 IRWD decided to implement solids handling facilities, instead of transporting sludge to OCSD.

The emergency diesel engine will be installed and used to supply electricity to selected portions of the facility in the event of a power outage to allow an orderly shut-down of the facilities. The applicant indicated that once the installation is complete, the installer will test the engine to confirm good working operation of the engine. The initial commissioning test of the engine includes a four hour continuous operation test at a specified power rating and four runs of the engine with ramp up to specific loads. The applicant estimated that each of the four runs will have a 15 minute start up time and 30 minutes to ramp up for a total of 45 minutes for each and a total of 3 hours for all four runs. This results in a combined total of 7 hours for initial commissioning tests required by the installer. Normal maintenance and testing (M&T) of the engine shall not exceed 4.2 hours per calendar month and 50 hours per calendar year. Therefore the maximum monthly maintenance and testing opening hours is expected to occur in the first month of operation for 11.2 hours (initial commissioning + M&T). NSR emission calculations will be based on the M&T operation of the first month 11.2 hours/day, 1 days/month, and 50 hours/year operating schedule. The engine shall not operate more than 200 hours per calendar year.

Pursuant to the 9/23/2014 email from Engineering Management, Tier 4F (SCR + DPF) shall not be required as LAER/BACT for emergency diesel engines at this time. The applicant has requested to use a

Johnson Matthey Inc. CRT+ (continuously regenerating technology) DPF for diesel PM control. The CRT+ DPF consists of an oxidation catalyst and a ceramic filter and is called a catalyzed passive continuously regenerated DPF. The DPF has an engine exhaust backpressure and temperature monitor and data logger called CRTdm (diagnostic module). The DPF uses passive self regeneration when the engine's exhaust is 465°F. The CRTdm uses an alarm to indicate the DPF requires regeneration from the backpressure monitor. Engine exhaust passes through a "flow through" platinum coated catalyst, which coverts NO to NO2. The NO2 oxidizes soot which passes through the catalyst and is deposited on the ceramic filter. There is no proposed bypass exhaust stack/valve associated with the DPF.

IRWD supplies water to residential, commercial and agricultural areas in Orange County. It also provides the collection and treatment of municipal sewage and produces recycled water. The facility uses primary, secondary, and tertiary treatment processes. The wastewater influent throughput for the facility is 28 million gallons per day (MGD). There is no school within 1000 feet of emission source. There have been no Notices to Comply, Notices of Violation, or complaints in the last two years.

Emission Calculations

Bold emissions are to be used for NSR purposes. NSR lbs/day values are calculated by: R2 lbs/hr x 11.2 hr/day x 1day/week x 1 weeks/month / 30 days/month

Engine Specifications
Model year: 2014
1502 BHP
Exhaust flow rate: 8,100 acfm (per Form 400-PS)
Exhaust temperature: 1025 °F (per Form 400-PS)
vs = va x Ts/Ta → 8,100 acfm x (460 + 60) °R / (460 + 1025)°R = 2,836 dscfm
Maximum diesel consumption: 24.53 gallons/hr (per applicant provided emissions spreadsheet)
24.53 gallons/hr x cf/7.48 gallon = 3.28 cfh
Ultra low sulfur diesel (15 ppm sulfur max) density: 6.76 lbs/gallon
6.76 lbs/gallon x 24.53 gallons/hr = 165.82 lbs/hr

CO emissions
BACT, Rule 1470, & 40CFR60 Subpart IIII: 2.6 g/bhp-hr
2.6g/bhp-hr x 1502 bhp x lb/453.6g = 8.61 lbs/hr = 3.21 lb/day (NSR)

CEP certified emissions (A/N 452094): 0.34 g/bhp-hr
0.34g/bhp-hr x 1502 bhp x lb/453.6g = 1.13 lbs/hr = 0.42 lb/day (NSR)
Maximum monthly emission: 1.13 lbs/hr x 11.2 hr/month = 12.66 lbs/month

NOx emissions
BACT, Rule 1470, & 40CFR60 Subpart IIII: 4.8 g/bhp-hr (NOX + NMHC) (assume 4.5 g/bhp-hr NOx contribution)
4.5 g/bhp-hr x 1502 bhp x lb/453.6g = 14.90 lbs/hr = 5.56 lb/day (NSR)

CEP certified emissions (A/N 452094): 3.76 g/bhp-hr
3.76g/bhp-hr x 1502 bhp x lb/453.6g = 12.45 lbs/hr = 4.65 lb/day (NSR)
Maximum monthly emission: 12.45 lbs/hr x 11.2 hr/month = 139.44 lbs/month

PM10 emissions
Rule 404 requirement: Exhaust flow rate: 2,836 dscfm, 0.127 grains/dscf
0.127 grains/dscf x 2,836 dscfm x 60min/hr x 1lb/7000grains = 3.09 lbs/hr > 0.45 lbs/hr

BACT, Rule 1470, & 40CFR60 Subpart IIII: 0.15 g/bhp-hr
R1 = 0.15 g/bhp-hr x 1502 bhp x lb/453.6g x 0.96* = 0.48 lbs/hr = 0.18 lbs/day (NSR)
R2 = 0.15 g/bhp-hr x 1502 bhp x lb/453.6g x 0.96* x (1.0 – 0.85)^ = 0.07 lbs/hr = 0.03 lbs/day (NSR)
*Weight Fraction for Stat ICE-Diesel for PM10
^Control efficiency with CARB level 3 DPF.

CEP certified emissions (A/N 452094): 0.052 g/bhp-hr
R1 = 0.052g/bhp-hr x 1502 bhp x lb/453.6g x 0.96* = 0.17 lbs/hr = 0.06 lb/day (NSR)
R1 = 0.052g/bhp-hr x 1502 bhp x lb/453.6g x 0.96* x (1.0 – 0.85)^ = 0.03 lbs/hr = 0.01 lb/day (NSR)
*Weight Fraction for Stat ICE-Diesel for PM10
^Control efficiency with CARB level 3 DPF.
Maximum monthly emission: 0.03 lbs/hr x 11.2 hr/month = 0.34 lbs/month

DPF: NOx/PM ratio = 3.76 g/bhp-hr / 0.052 g/bhp = 72

ROG emissions
BACT, Rule 1470, & 40CFR60 Subpart IIII: 4.8 g/bhp-hr (NOX + NMHC) (assume 0.3 g/bhp-hr ROG contribution)
0.3g/bhp-hr x 1502 bhp x lb/453.6g = 0.99 lbs/hr = 0.37 lb/day (NSR)

CEP certified emissions (A/N 452094): 0.1 g/bhp-hr
0.1g/bhp-hr x 1502 bhp x lb/453.6g = 0.33 lbs/hr = 0.12 lb/day (NSR)
Maximum monthly emission: 0.33 lbs/hr x 11.2 hr/month = 3.70 lbs/month

SOx emissions
BACT: Rule 431.2: Diesel fuel sulfur content ≤ 15 ppm (0.0015%) by weight.
15 lbS/1E6 lbfuel x 165.82 lbsfuel/hr x 64 lbSO2/lbmoleSO2 x lbmoleSO2/lbmoleS x lbmoleS/32 lbS
= 0.002 ~ 0.00 lbs SO2/hr = 0 lbs/day (NSR)
Maximum monthly emission: 0.00 lbs/hr x 11.2 hr/month = 0 lbs/month

AER Form B2 Emissions:
7.10 lb/1000 gallons diesel x 24.53 gallons diesel/hr = 0.17 lbs/hr = 0.06 lbs/day (NSR)

CO2 emissions
The Climate Registry 2013 Default EFs Table 13.1 (Diesel): 10.21 kg/gallon
10.21 kg/gallon x 2.2046 lb/kg x 24.53 gallon/hr = 552.14 lbs/hr = 206.13 lbs/day (NSR)
Maximum monthly emission: 552.14 lbs/hr x 11.2 hr/month = 6,183.97 lbs/month

CH4 emissions
The Climate Registry 2013 Default EFs Table 13.7 (Other non-highway other large utility diesel): 0.58 g/gallon
0.58 g/gallon x kg/1000g x 2.2046 lb/kg x 24.53 gallon/hr = 0.03 lbs/hr = 0.01 lbs/day (NSR)

Maximum monthly emission: 0.03 lbs/hr x 11.2 hr/month = 0.34 lbs/month

N2O emissions

The Climate Registry 2013 Default EFs Table 13.7 (Other non-highway other large utility diesel): 0.26 g/gallon

0.26 g/gallon x kg/1000g x 2.2046 lb/kg x 24.53 gallon/hr = 0.01 lbs/hr = 0.00 lbs/day (NSR)

Maximum monthly emission: 0.01 lbs/hr x 11.2 hr/month = 0.11 lbs/month

Toxic Risk Analysis

Nearest Residential Receptor Distance:	2,240 ft. (683 m)
Nearest Commercial Receptor Distance:	1,539 ft. (469 m)
Stack height:	19 ft. (5.79 m)
Stack inner diameter:	12 in. (0.30 m)
Rain cap:	No, but stack is horizontal, so assume raincap.
Exhaust flow rate:	8,100 acfm
Exhaust stack temperature:	1025 °F
Building height:	33 ft. (10 m) (per Form 400-PS)
Building dimensions	50 ft. (15 m) x 54 ft. (16 m) (per Form 400-PS)

Compound	MW (lbs/lbmole)	Inlet/Outlet emission (lbs/hr)
Diesel PM	N/A	0.03

Tier III analysis was used since the exhaust stack has a horizontal orientation and therefore will be modeled as a rain cap. Tier III risk analysis was based on the emission rates listed in the above table. Building downwash calculations were based on a building dimensions listed above. The MICR values for emissions above are determined to be 4.67×10^{-8} for residential and 3.83×10^{-8} for commercial receptors. HIA and HIC were less than 1. Cancer Burden was less than 0.5.

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- On-site emission increases from this project do not exceed the following:

PM10	30 lbs/day
Sulfur Dioxide	60 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212 (c)(2)- On-site emission increases from this project exceed the following:

Volatile Organic Compounds	30 lbs/day
Nitrogen Oxides	40 lbs/day

Rule 212 (c)(3)(A)(i)- Facility-wide max MICR is estimated to be below 10 in a million.
Public Notice is required.

Rule 401: Visible Emissions
No violations are expected, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance

Nuisance is not expected with proper operation, monitoring and maintenance. Compliance is expected.

Rule 404: Particulate Matter
No violations are expected limits are listed under Rule 404 Table 404(a).

Rule 407: Liquid and Gaseous Air Contaminants
Rule 407 (b)- Provisions of this rule shall not apply to emissions from stationary ICEs.

Rule 409: Combustion Contaminants
Provisions of this rule shall not apply to emissions from ICEs.

Rule 431.2: Sulfur Content in Liquid Fuels
Rule 431.2(e)(2)-Operator shall not purchase any diesel fuel for this equipment, unless the fuel is low sulfur for which the sulfur content shall not exceed 15 ppm (0.0015%) by weight as supplied by the supplier. Compliance is expected.

Rule 53A: Orange County – Specific Contaminants (Contained in Addendum to Reg IV)
Rule 53- Sulfur compound emission limit, as SO_2 500 ppmv. Compliance can be expected based on other similar category ICE permits issued in SCAQMD.

NSPS: Standards of Performance for New Stationary Sources
Part 60, Chapter I, Title 40 of Code of Federal Regulations, Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
60.4200(a)(2)(i)-Applicability: applicable. Commenced construction after 7/11/2005. Manufactured after 4/1/2006. ICE is not a fire pump engine. Engine manufacture date: 7/15/2014.
60.4200(b)- This ICE is not being tested at an engine test cell/stand.
60.4205(b)- 2007 model year and later emergency stationary CI ICE with displacement of less than 30 L/cylinder that are not fire pump engines must comply with emission standards for new nonroad CI engines in 60.4202 for all pollutants, for the same model year and maximum engine power of their 2007 model year and later emergency stationary CI ICE. The displacement is 32.1 L; the number of cylinders is 12 for this engine (32.1L/12cyl = 2.675 L/cyl).

60.4202(a)(2)- For engines ≥ 50 HP, the certification emission standards for new nonroad CI engines for the same model year and maximum engine power in 40 CFR 89.112 & 40 CFR 89.113 for all pollutants beginning in model year 2007.

89.112(a)- NMHC + NOx: 6.4g/KW-hr (4.8 g/BHP-hr); CO: 3.5 g/KW-hr (2.6 g/BHP-hr); and PM 0.20 g/KW-hr (0.15 g/BHP-hr).
89.113(a)- Exhaust opacity from compression-ignition nonroad engines for which this subpart is applicable must not exceed:
89.113(a)(1)- 20 percent during the acceleration mode;
89.113(a)(2)- 15 percent during the lugging mode; and
89.113(a)(3)- 50 percent during the peaks in either the acceleration or lugging modes.

60.4207(b)- Beginning October 1, 2010 stationary CI ICE with displacement < 30 L/cylinder must use diesel fuel that meets the requirements of 40CR 80.510(b) for nonroad diesel fuel.

40CFR 80.510(b)- Beginning June 1, 2010 . Except as otherwise specifically provided in this subpart, all NonRoad (NR) diesel fuel is subject to the following per-gallon standards:

40CFR 80.510(b)(1)(i)- 15 ppm maximum Sulfur content for NR diesel fuel.

40CFR 80.510(b)(2)(i)- A minimum cetane index of 40; or

40CFR 80.510(b)(2)(ii)- A maximum aromatic content of 35 volume percent.

60.4208(a)- May not install stationary CI ICE that do not meet the applicable requirements for 2007 model year engines.

60.4209(a)- Emergency stationary CI ICE must install a non-resettable hour meter prior to startup of the engine.

60.4211(c)- Purchasing an engine certified to emission standards in 60.4205(b).

60.4211(f)- In order for the engine to be considered an emergency stationary ICE under this subpart, any operation other than emergency operation, maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year, as described in paragraphs (f)(1) through (3) of this section, is prohibited. Otherwise, the engine will not be considered an emergency engine under this subpart and must meet all requirements for non-emergency engines.

60.4211(f)(1)-There is no time limit on the use of emergency stationary ICE in emergency situations.

60.4211(f)(2)- The engine may operate under any combination of the purposes specified in (f)(2)(i) through (iii) for a maximum of 100 hours per calendar year. Any non-emergency operation allowed by paragraph (f)(3) counts towards the 100 hours per calendar year allowed in (f)(2).

60.4211(f)(2)(i)- Emergency stationary ICE may be operated for maintenance checks and readiness testing (M&T), as recommended by federal, state or local government, the manufacturer, the vendor, the regional transmission organization or equivalent balancing authority and transmission operator, or the insurance company associated with the engine. Owner/operator may petition the Administrator for approval of additional M&T hours. A petition is not required if the owner/operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency ICE beyond 100 hours per calendar year.

60.4211(f)(2)(ii)- Emergency stationary ICE may be operated for emergency demand response when the Reliability Coordinator under the North American Electric Reliability Corporation (NERC) Reliability Standard EOP-002-3, Capacity and Energy Emergencies (incorporated by reference, see 60.17), or other authorized entity as determined by the Reliability Coordinator, has declared an Energy Emergency Alert Level 2 as defined in the NERC Reliability Standard EOP-002-3.

60.4211(f)(2)(iii)- Emergency stationary ICE may be operated for periods where there is a deviation of voltage or frequency of 5 percent or greater below standard voltage or frequency.

60.4211(f)(3)- Emergency stationary engine operated up to 50 non-emergency hours. The 50 hours are counted as part of the 100 hours listed above, but cannot be used for peak shaving or non-emergency DRP, or to generate income for a facility to an electric grid or supply power as part of a financial arrangement with another entity, except per (f)(3)(i).

60.4211(f)(3)(i)-The 50 hours per year for non-emergency situations can be used to supply power as part of a financial arrangement with another entity if all of the following conditions are met:

(A) The engine is dispatched by the local balancing authority or local transmission and distribution system operator;

(B) The dispatch is intended to mitigate local transmission and/or distribution limitations so as to avert potential voltage collapse or line overloads that could lead to the interruption of power supply in a local area or region.

(C) The dispatch follows reliability, emergency operation or similar protocols that follow specific NERC, regional, state, public utility commission or local standards or guidelines.

(D) The power is provided only to the facility itself or to support the local transmission and distribution system.

(E) The owner or operator identifies and records the entity that dispatches the engine and the specific NERC, regional, state, public utility commission or local standards or guidelines that are being followed for dispatching the engine. The local balancing authority or local transmission and distribution system operator may keep these records on behalf of the engine owner or operator.

60.411(g)(3)- If the engine is not installed, configured, operated, and maintained according to manufacturer's emission related written instructions, must keep a maintenance plan and records of maintenance and must conduct an initial performance test within 1 year of startup, or 1 year after the instructions are not followed and every 8,760 operating hours or 3 years, whichever occurs first, thereafter to demonstrate with emission standards.

60.4212-Source test information.

60.4214(b)- The emergency CI stationary IC engine, the owner or operator is not required to submit an initial notification. Starting with the model years in Table 5 to this subpart, if the emergency engine does not meet the standards applicable to non-emergency engines in the applicable model year, the owner or operator must keep records of the operation of the engine in emergency and non-emergency service that are recorded through the non-resettable hour meter. The owner must record the time of operation of the engine and the reason the engine was in operation during that time.

Table 5 :HP $\geq$ 175: Starting model year 2011

Compliance is expected.

NESHAPS: Part 63, Chapter I, Title 40 of Code of Federal Regulations, Subpart ZZZZ- National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

63.6585(a)- Applicability: Applicable.

63.6590(a)(2)(iii)- New stationary RICE: stationary RICE located at an area source of HAPs if commenced construction on or after June 12, 2006. Manufacture date: TBD.

63.6590(c) - An affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 CFR 60 subpart IIII for CI engines. No further requirements apply for such engines under this part.

63.6590(c)(1)-New or reconstructed stationary RICE located at an area source.

Compliance is expected.

Rule 1110.2: Emissions From Gaseous and Liquid-Fueled Engines

Rule 1110.2(d)- Equipment is exempt under Rule 1110.2(i)(2).

Rule 1110.2(i)(2)- Subdivision (d) shall not apply to: Emergency standby engines, which have permit conditions that limit operation to 200 hours or less per year as determined by an elapsed operating time meter.

Rule 1110.2(e)(3)- Stationary Engine CEMS

Rule 1110.2(e)(3)(B)- CEMS is not required.

Rule 1110.2(e)(4)(A)- I&M plan has been submitted. Determination has not yet been made for this application.

Rule 1110.2(e)(5)(B)- These engines are exempt from Rule 1110.2(d) requirements, therefore Rule 1110.2(e)(5)(B) does not apply.

Rule 1110.2(f)(1)- These engines are exempt from Rule 1110.2(d)(1) requirements, therefore Rule 1110.2(f)(1) does not apply.

Rule 1110.2(f)(3)- All data, logs, test reports and other information required by this rule shall be maintained for at least five years and made available for inspection.

Compliance with all applicable requirements of this Rule can be expected.

Rule 1147 NOx Reductions From Miscellaneous Sources

Rule 1147(a)- Applicability: not applicable to internal combustion engines subject to District Rule 1110.2.

Reg XIII: Rule 1303(a)- BACT applies, since there is an increase of emissions > 1.0 lbs/day.

BACT/LAER for diesel emergency ICEs does not currently include a CARB verified Level 3 DPF per 9/19/2014 email.

BACT stationary, emergency CI ICE ≥ 750 HP: CO: 2.6 g/bhp-hr, NOx + NMHC: 4.8 g/bhp-hr, PM 0.15 g/bhp-hr & compliance with Rule 1470 (see evaluation below).

M&T ≤ 50 hrs/year & Total operations ≤ 200 hrs/year. Operation beyond 50 M&T hrs/year are allowed only in the event of a loss of grid power or up to 30 minutes prior to a rotating outage provided that the electrical grid operator or electric utility has ordered rotating outages in the control area where the engine is located or has indicated that it expects to issue such an order at a certain time, and the engine is located in a control area that is subject to the rotating outage.

The engine must be certified by U.S. EPA or CARB to meet the Tier 1, 2 or 3 emission requirements of 40 CFR Part 89 – Control of Emissions from New and In-use Nonroad Compression-Ignition Engines shown in the table– or otherwise demonstrate that it meets the Tier 1, 2 or 3 emission limits. If there is no new engine from any manufacturer that meets the above standards, then the engine must meet the family emission limits established by the manufacturer and approved by U.S. EPA. The PM limits apply only to filterable PM.

Rule 1303(a)(2)- The proposed engine is SCAQMD certified Tier 2 engine model. It is considered as BACT.

Rule 1303(b)(1)- Modeling is not required, emergency equipment is exempt under Rule 1304(a)(4): The source is exclusively used as emergency standby equipment for nonutility electrical power generation or any other emergency equipment as approved by the Executive Officer or designee, provided the source does not operate more than 200 hours per year as evidences by an engine-hour meter or equivalent method.

Rule 1303(b)(2)- Offsets are not required; emergency equipment is exempt under Rule 1304(a)(4), see above. Furthermore, since the facility is an essential public service, any required offsets shall be provided through priority reserve.
Compliance is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)- Emergency ICEs exempt under Rule 1304 are exempt per Rule 1401(g)(1)(F).
Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6}.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.
Compliance is expected

Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.

Rule 1470: Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines
Rule 1470(c)(1)(A)- This engine shall use CARB diesel fuel (Diesel fuel No. 2-Ultra Low Sulfur), that contains no more than 15 ppmv sulfur by weight.
Rule 1470(c)(2)(A)- This is considered a new engine per definition, installed after January 1, 2005. There are no schools located 500 feet or less from the engine.
Rule 1470(c)(2)(B)- Shall not operate in response to impending rotating outage unless it meets the applicable requirements. Compliance is expected, see permit condition no. 6.
Rule 1470(c)(2)(C)(i)- Shall not operate more than 50 hrs/year for M&T per (b)(43). Compliance is expected, see permit conditions.
Rule 1470(c)(2)(C)(vi)- Shall use a certified engine that emits diesel PM $\leq$ 0.15 g/bhp-hr. ICE application deemed complete after 1/1/2013 and located > 50m at a sensitive receptor. ICE not located on school grounds or < 100 m from a school.
Rule 1470(c)(2)(C)(vii)- New ICE is installed with application deemed complete on or after 1/1/2011, shall meet standards for off-road engines of same max rated power as in Table 2. Table 2, HP>750: NMHC+NOx: 4.8 g/bhp-hr and CO: 2.6 g/bhp-hr.
Rule 1470(c)(2)(C)(viii)- District shall determine appropriate limit of number of hours for demonstrating compliance with rules and initial start-up testing. Hours of operation used solely for testing and demonstration for compliance with rules and for initial start-up testing shall not be included as part of the engine's cumulative annual hours in (c)(2)(C)(i).
Rule1470(d)(3)- Owners or operators who have determined that they are operating their engine in violation of the requirements in Rule1470(c)(1) through (c)(9) shall notify the Executive Officer immediately upon detection of the violation and shall be subject to district enforcement action.
Rule 1470(d)(5)(A)- A non-resettable hour meter with a minimum display capability of 9,999 hours shall be installed on all engines subject to (c)(2) through (c)(9), unless District determines on a case-by case basis a different minimum display capacity is appropriate.
Rule 1470(d)(7)(A)- Keep records and a monthly summary that shall list and document the nature of use in: i) emergency use hours of operation; ii) maintenance and testing hours of operation; iii) hours of operation for emission testing to show compliance with

(c)(2)(C) & (c)(3)(C); iv) initial start-up and testing hours; v) hours of operation for all uses other than those in (d)(7)(A)(i)-(iv); vi) hours of operation to comply with NFPA 25; vii) if applicable, DRP engine hours of operation, viii) hours of operation to demonstrate compliance with District rules, and ix) the fuel used. See permit condition no. 8.

Rule 1470(d)(7)(A)(ix)(I)- Engines operated exclusively on CARB Diesel Fuel, the owner or operator shall document the use of CARB Diesel Fuel through the retention of fuel purchase records indicating that the only fuel purchased for supply to an emergency standby engine was CARB Diesel Fuel; or
Rule 1470(d)(7)(A)(ix)(II)- Engines operated on any fuel other than CARB Diesel Fuel, fuel records demonstrating that the only fuel purchased and added to an emergency standby engine or engines, meets the requirements of paragraph (c)(1). See permit condition no. 10.

Rule1470(d)(7)(B)- In lieu of a log of usage, as specified in (d)(7)(A)(ix), the owner and/or operator may maintain a monthly summary of fuel purchases for the engine.
Rule 1470(d)(7)(C)- Records shall be retained for at least 36 months. Records for the prior 24 months shall be retained on-site, either at a central location or at the engine's location, or at an offsite central location within California, and shall be made immediately available to the District staff upon request. Records for the prior 25 to 36 months shall be made available to District staff within 5 working days from request.
Compliance with Rule 1470 is expected.

Rule 1472: Requirements for Facilities with Multiple Stationary Emergency Standby Diesel ICES
Rule 1472(b)-Facilities with 3 or more stationary emergency standby diesel ICEs, each > 50 BHP: Applicable.
Rule 1472(d)- This engine qualifies for Initial Notification of Exemption from Filing a Compliance Plan pursuant to (d)(1)(C)(i).
Rule 1472(d)(1)(C)(i)- There are no engine groups, since there are not three or more engines that are within 150 meters of one another.
Rule 1472(d)(2)(A)- The initial notification of exemption shall be submitted in writing on or before the applicable compliance plan submittal date pursuant to subdivision (g) and shall stipulate which criteria of paragraph (d)(1) applies to the facility and demonstrate how at least one of the criteria is met.
Rule 1472(d)(2)(B)- Facilities eligible to submit an initial notification and complying with subparagraph (d)(2)(A) are not subject to compliance plan requirements of paragraphs (d)(3) through (d)(6).

Reg. XXX: Expansion of the facility to include a biosolids receiving, heat drying, and load out system and other equipment is part of an Initial Title V permit process, which will be subject to a 45 day EPA review under Rule 3003(j). A public notice is required under Rule 3003(n)(2) and Rule 212(g).
Rule 3001(c)(2)- NOx & VOC > 10 tons/yr, Title V permit required.
Rule 3002(b)(1) & (b)(2)- Applicant submitted Title V application on 4/2/2014.
Rule 3002(c)(2)- Compliance with Rules & Regulations is expected.
Rule 3003(a)(3)- Facility was determined to potentially trigger Title V emission thresholds in December 2013. IRWD reviewed possible operating limitations enforced via permit conditions to ensure that Title V thresholds were not triggered. In March 2014 after IRWD's review, it was confirmed that this project would trigger Title V thresholds

based on potential to emit calculations and shall enter the Title V permit program. This application was submitted 4/2/2014 (within 180 days of subject date).
Rule 3003(b)(1)- Appropriate forms and fees were submitted.
Rule 3004(a)(4)(C)- The (ground, non-elevated) flare is used for air pollution control. Appendix A of the Periodic Monitoring Guidelines for Title V Facilities requires an exhaust temperature limit, continuous monitoring of exhaust temperature and recording with a strip chart or digital data acquisition system. LAER/BACT already requires exhaust temperature limit and continuous monitoring.
Compliance is expected.

Conclusions & Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Construct/Operate is recommended for application 535813 after EPA review and public notice. For Permit Conditions please see Sample Permit.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	PAGES 14	PAGE 1
ENGINEERING AND COMPLIANCE DIVISION	APPL NO 551658 & 551660	DATE 5/19/2015
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY CDT

Permit to Operate (Change of Condition)

Applicant's Name Irvine Ranch Water District (IRWD)
Michelson Drive Pump Station

Mailing Address PO Box 57000
Irvine, CA 92619-7000

Equipment Location 3512 Michelson Drive
Irvine, CA 92612

Equipment Description

APPLICATION 551658, FACILITY ID 003513

INTERNAL COMBUSTION ENGINE, WAUKESHA, MODEL NO. L7044GSI, FOUR STROKE, 12 CYLINDERS, 1692 BHP, NATURAL GAS FIRED, RICH BURN, NATURALLY ASPIRATED, WITH AN AUTOMATIC AIR TO FUEL RATIO CONTROLLER, ALTRONIC, MODEL EPC 100-E, VENTED TO A THREE WAY CATALYST, DCL, MODEL NO. 2DC76-14, DRIVING A 1.25 KW ELECTRICAL GENERATOR.

APPLICATION 551660, FACILITY ID 003513

INTERNAL COMBUSTION ENGINE, WAUKESHA, MODEL NO. L7044GSI, FOUR STROKE, 12 CYLINDERS, 1692 BHP, NATURAL GAS FIRED, RICH BURN, NATURALLY ASPIRATED, WITH AN AUTOMATIC AIR TO FUEL RATIO CONTROLLER, ALTRONIC, MODEL EPC 100-E, VENTED TO A THREE WAY CATALYST, DCL, MODEL NO. 2DC76-14, DRIVING A 1.25 KW ELECTRICAL GENERATOR.

Background/Process Description

The above applications were submitted for Change of Condition application type for two identical internal combustion engines (ICEs) to impose shutdown allowances for catalyst temperature and emission limits, and allow O2 sensor replacement as needed. These applications will also subsume a Change of Condition to impose a single operating load (maximum load) that was previously submitted under A/Ns 534537 & 534538. A/Ns 551658 & 551660 will supersede A/Ns 534537 & 534538 and A/Ns 534537 & 534538 will be cancelled. The ICEs are a non-emergency natural gas fired engine currently operate under A/N 464500, Permit G4635 & A/N 464501, Permit G4636, which will be inactivated upon issuance of A/Ns 551658 & 551660. Each engine is used to drive a 1.25 MW electrical generator at the Irvine Ranch Water District sewage treatment plant located at the Michelson Water Recycling Plant (MWRP). The operating schedule is 24 hours/day, 7 days/week, 6 weeks/year, with a maximum of 1,000 hours per calendar year.

The facility is a municipal water district which accepts and treats municipal sewage at Michelson Water Recycling Plant (MWRP). There is no school within 1000 feet of any of the emission source(s). In the last two years no Notices to Comply, Notices of Violation, or complaints were issued to the above facility.

Emission Calculations

Bold emissions are to be used for NSR purposes.

Engine Specifications (1692 bhp)

Displacement (per applicant): 115 L or 9.58 L/cylinder
Construction (ground breaking) date: June 20, 2002
Construction completed date: November 4, 2002
Engine manufacture date: August 2001
Maximum NG consumption (based on 3/13/2003 source test): 14,918 scfh
Heat Rate(based on 3/13/2003 source test): 15.7 mmBtu/hr
Oxygen (based on 12/14-15/2011 source test): <2.00%
Assume exhaust flow: 150, 202 scfh → 2,503 scfm (based on A/N 464500 engineering evaluation)
Exhaust (catalyst outlet) temperature: 1080°F (based on 12/14-15/2011 source test)

CO emissions
Source Test (2/28/2012) maximum emission (A/N 464501, Engine no. 2): <58.32 ppm @15%O2 dry

Previously permitted emission limit (BACT): 65.5 ppmv @ 15% O2, dry basis
65.5 ppmv CO @ 15% O2, dry basis x (20.9-2.00)/(20.9-15) = 210 ppmv
R2 = 210 ppmv x 2,503 scfm x 60min/hr x lb-mole/379x10^6 x 28 lbs/lb-mole
= 2.33 lb/hr = 56.50 lbs/day (NSR)

Previously permitted A/Ns 464500 & 464501 NSR emission, BACT emission:
R2 = 0.60 grams/bhp-hr x 1692 bhp x 1/453.6grams = 2.24 lbs/hr = 54 lbs/day (NSR)

Rule 1110.2 requirement: 250 ppmvd CO @ 15% O2:
250 ppmvd CO @ 15% O2 x (20.9 – 2.00)/(20.9 – 15) = 881 ppmvd
R2 = 881 ppmvd x 2,503 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 28 lbs/lb-mole
= 9.77 lbs/hr = 236.90 lbs/day (NSR)

Rule 1303 Modeling Requirement (> 10 < 20MMBtu/hr), CO: 47.3 lbs/hr > 2.24 lbs/hr

Uncontrolled startup/shutdown emissions (1 startup/shutdown event/month, 1 hour/month): 41.78 lbs/hr
24 hours/day x 365 days/year x year/12months = 730 hours/month (maximum hours/month)
Maximum monthly emission: 41.78 lbs/hr x 1 hour + 2.24 lbs/hr x 729 hours = 1,674.74 lbs/month
1,674.74 lbs/months x month/30days = **55.82 lbs/day (NSR)**
1000 hours/year operating limit:
41.78 lbs/hr x 12 hr/year + 2.24 lbs/hr x 988 hours/year = **2,714.48 lbs/year (NSR)**

Rule 1303 Modeling requirement (>10, <20MMBTU), CO: 47.3 lbs/hr > 41.78 lbs/hr

NOx emissions
Source Test (12/14/2011) maximum emission (A/N 464500, Engine no. 1): <1.56 ppm @15%O2 dry

Previously permitted emission (BACT): 13 ppmv @ 15% O2, dry basis
13 ppmvd NOx @ 15% O2 x (20.9 – 2.00)/(20.9 – 15) = 42 ppmvd
R2 = 42 ppmvd x 2,503 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 46 lbs/lb-mole
= 0.77 lbs/hr = 18.67 lbs/day (NSR)

Previously permitted A/Ns 464500 & 464501 NSR emission, BACT emission:
R2 = 0.15 g/bhp-hr x 1692 bhp x 1lb/453.6g = 0.56 lbs/hr = 13 lbs/day (NSR)

Rule 1110.2 requirement: 11 ppmvd NOx @ 15% O2:
11 ppmv @ 15% O2, dry basis x (20.9-2.00)/(20.9-15) = 35 ppmv
R2 = 35 ppmv x 2,503 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 46 lbs/lb-mole
= 0.64 lb/hr = 15.52 lbs/day (NSR)

Rule 1303 Modeling requirement (> 10 < 20MMBtu/hr), NOx: 0.86 lbs/hr > 0.56 lbs/hr

Uncontrolled startup/shutdown emissions (1 startup/shutdown event/month, 1 hour/month): 49.61 lbs/hr
24 hours/day x 365 days/year x year/12months = 730 hours/month (maximum hours/month)
Maximum monthly emission: 49.61 lbs/hr x 1 hour + 0.56 lbs/hr x 729 hours = 457.85 lbs/month
457.85 lbs/months x month/30days = **15.26 lbs/day (NSR)**
1000 hours/year operating limit:
49.61 lbs/hr x 12 hr/year + 0.56 lbs/hr x 988 hours/year = **1,148.60 lbs/year (NSR)**

Rule 1303 Modeling requirement (>10, <20MMBTU), NOx: 0.86 lbs/hr < 49.61 lbs/hr
Emission used for modeling evaluation is based on normal operation. Assume worst case emissions for 1 hour of normal operation, since the modeling required is a 1 hour average:
Start-up/Shut-down 49.61 lbs/hr x hr/60min x 30min + normal operation 0.56 lbs/hr x hr/60min x 30min = 25.09 lbs/hr > 0.86 lbs/hr
Modeling analysis is required.
Emission rate: 25.09 lbs/hr x 453.6g/lb x hr/3600sec = 3.16 g/sec
Flow rate: 2,503 scfm x (460 + 1080°F)/(460 + 60°F) = 7,413 acfm
3.16 g/s Using Screen3 → 221.8 ug/m^3 @ 61m receptor distance (maximum)
Background Concentration: 140 ug/m3 (1-hour), 21 ug/m3 (annual)
Modeled + Background Concentration: 362 ug/m3 (1-hour), 39.0 ug/m3 (annual) → Compliant

ROG emissions
Source Test (2/28/2012) maximum emission (A/N 464501, Engine no. 2): 23.69 ppmv @15%O2 dry

Previously permitted emission (BACT): 30 ppmv @ 15% O2, dry basis
30 ppmvd ROG @ 15% O2 x (20.9 – 2.00)/(20.9 – 15) = 96 ppmvd
R2 = 96 ppmvd(as carbon) x 2,503 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 x 16 lbs/lb-mole
= 0.61 lbs/hr = 14.79 lbs/day (NSR)

Previously permitted A/Ns 464500 & 464501 NSR emission, BACT emission:
R2 = 0.15 g/bhp-hr x 1692 bhp x 1lb/453.6g = 0.56 lbs/hr = 13 lbs/day (NSR)

Rule 1110.2 requirement: 30 ppmvd NOx @ 15% O2:
30 ppmv @ 15% O2, dry basis x (20.9-2.00)/(20.9-15) = 96 ppmv
R2 = 96 ppmv x 2,503 scfm x 60 min/hr x lb-mole/379x10^6 ft^3 16 lbs/lb-mole
= 0.61 lbs/hr = 14.79 lbs/day (NSR)

Uncontrolled startup/shutdown emissions (1 startup/shutdown event/month, 1 hour/month): 1.31 lbs/hr
24 hours/day x 365 days/year x year/12months = 730 hours/month (maximum hours/month)
Maximum monthly emission: 1.31 lbs/hr x 1 hour + 0.56 lbs/hr x 729 hours = 409.55 lbs/month
409.55 lbs/months x month/30days = **13.65 lbs/day (NSR)**

1000 hours/year operating limit:
1.31 lbs/hr x 12 hr/year + 0.56 lbs/hr x 988 hours/year = **569.00 lbs/year (NSR)**

PM10 emissions

Previously permitted A/Ns 464500 & 464501 NSR emission, manufacturer provided:
R2 = 0.08 g/bhp-hr x 1692 bhp x 1lb/453.6g = 0.30 lbs/hr = 7.30 lbs/day (NSR)
Maximum monthly emission: 0.30 lbs/hr x 730 hours/month = 219 lbs/month
1000 hours/year operating limit:
0.30 lbs/hr x 1000 hours/year = **300.00 lbs/year (NSR)**

LAER/BACT: Clean Fuels Policy (NG & LPG are clean fuels)

10.00 lb/MMscf* x MMscf/1E6scf x 14,918 scfh x 0.994PM10/PM**
= 0.15 lbs/hr = 3.65 lbs/day (NSR)
*Based on SCAQMD AER Emission Factors (PM) for Natural Gas, 4-stroke, rich burn ICE.
**Weight fraction for particulate matter for stationary ICE-gas

0.0095 lb/MMBtu^ x 1MMBtu/1E6Btu x 1050Btu/scf x 14,918 scfh
= 0.15 lbs/hr = 3.65 lbs/day (NSR)
^Based on EPA AP-42, July 2000 Uncontrolled Emission Factors (PM10) for 4-Stroke Rich-Burn Engines (assuming sulfur content in NG is 2,000 gr/1E6scf).

Rule 404 requirement: Exhaust flow rate: 2,503 dscfm, 0.133 grains/dscf
0.133 grains/dscf x 2,503 dscfm x 60min/hr x 1lb/7000grains = 2.85 lbs/hr > 0.30 lbs/hr

Rule 1303 Modeling requirement (> 10 < 20MMBtu/hr), PM10: 5.2 lbs/hr > 0.30 lbs/hr

SOx emissions
LAER/BACT: Clean Fuels Policy (NG & LPG are clean fuels)

Previously permitted A/Ns 464500 & 464501 NSR emission:
0.60 lb/MMscf* x MMscf/1E6scf x 14,918 scfh = 0.01 lbs/hr = 0 lbs/day (NSR)
***Based on SCAQMD AER Emission Factors (SO2) for Natural Gas, 4-stroke, rich burn ICE.**
Maximum monthly emission: 0.01 lbs/hr x 730 hours/month = 7.3 lbs/month
1000 hours/year operating limit:
0.01 lbs/hr x 1000 hours/year = **10.00 lbs/year (NSR)**

0.000588 lb/MMBtu^ x 1MMBtu/1E6Btu x 1050Btu/scf x 14,918 scfh = 0.01 lbs/hr = 0 lbs/day (NSR)
^Based on EPA AP-42, July 2000 Uncontrolled Emission Factors (SO2) for 4-Stroke Rich-Burn Engines (assuming sulfur content in NG is 2,000 gr/1E6scf).

Rule 431.1 compliance: 1) Natural gas ≤ 16 ppmv, 2)Facility wide emission < 5 lbs/day
1) 16 ppmv x 14,918 scfh x lb-moleH2S/379x10^6 ft^3 x lbmoleSO2/lbmoleH2S x 64 lbsH2S/lbmole SO2
= 0.04 lbs/hr SOx (as SO2) = 0.97 lbs/day (NSR)
2) 5 lbs/day H2S x lb-mole/34.08 lbsH2S x 64 lbsSOx/lb-mole x day/24 hr
= 0.39 lbs/hr SOx (as SO2) = 9.49 lbs/day SOx (as SO2) (NSR)

Annual Emissions (AER 2013) SOx emission: 0.004 tons/yr
0.004 tons/yr x 2,000lbs/ton x 1yr/365days = 0.0009 lbs/hr SOx = 0.0219 lbs/day SOx

CO2 emissions
EPA AP 42, 3.2 Emission Factors (NG): 110 lb/mmBtu
NG: 110 lb/mmBtu x 15.7 mmBtu/hr = 1,727.00 lbs/hr = 42,023.67 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG): 53.06 kg/mmBtu
NG: 53.06 kg/mmBtu x 2.2046 lb/kg x 15.7 mmBtu/hr = 1,836.52 lbs/hr = 44,688.65 lbs/day (NSR)
Maximum monthly emission: 1,836.52 lbs/hr x 730 hours/month = 1,340,659.6 lbs/month
1000 hours/year operating limit:
1,836.52 lbs/hr x 1000 hours/year = **1,836,520.00 lbs/year (NSR)**

CH4 emissions
EPA AP 42, 3.2 Emission Factors (NG): 0.23 lb/mmBtu
NG: 0.23 lb/mmBtu x 15.7 mmBtu/hr = 3.61 lbs/hr = 87.84 lbs/day (NSR)

The Climate Registry 2013 Default Emission Factors (NG) (Table 12.7 4SRB): 0.1044 kg/mmBtu
NG: 0.1044 kg/mmBtu x 2.2046 lb/kg x 15.7 mmBtu/hr = 3.61 lbs/hr = 87.84 lbs/day (NSR)
Maximum monthly emission: 3.61 lbs/hr x 730 hours/month = 2,635.3 lbs/month
1000 hours/year operating limit:
3.61 lbs/hr x 1000 hours/year = **3,610.00 lbs/year (NSR)**

N2O emissions
The Climate Registry 2013 Default Emission Factors (NG) (Table 12.7 4SRB): N/A ~ 0

Toxic Risk Analysis

Nearest Residential Receptor Distance: 1,425 ft. (434 m)
Nearest Commercial Receptor Distance: 565 ft. (172 m)
Stack height: 27 ft. (8.2 m)
Stack inner diameter: 12 in. (0.3 m)
Operating schedule: 24 hr/day, 7 days/week, 6 weeks/yr (1,000 hr/yr)

Compound	MW (lbs/lbmole)	Outlet emission (lb/hr)
Acetaldehyde	44.06	1.01E-3
Acrolein	56.06	9.48E-4
Benzene	78.11	5.69E-4
1,3-Butadiene	54.09	2.39E-4
Carbon tetrachloride	153.24	6.38E-6
Chlorobenzene	112.56	4.65E-6
Chloroform	119.38	4.94E-6
1,1-Dichloroethane	98.96	4.07E-6
Ethyl benzene	106.16	8.93E-6
Ethylene dibromide	187.88	7.67E-6

Ethylene dichloride	98.96	4.07E-6
Formaldehyde	30.03	7.39E-3
Methanol	32.04	1.10E-3
Methylene chloride[1]	84.94	1.48E-5
PolyCyclic Aromatic Hydrocarbon (PAHs)	252.30	1.58E-5
Naphthalene	128.17	3.50E-5
Styrene	104.16	4.29E-6
1,1,2,2-Tetrachloroethane	167.86	9.11E-6
Toluene	92.13	2.01E-4
1,1,2-Trichloroethane	133.42	5.51E-6
Vinyl chloride	62.50	2.59E-6
Xylenes	106.20	7.03E-5

The emission rates for the toxic air contaminants (TACs) are based on Emission Factors for the Rich Burn Engine Data used in Rule 1401 calculation spreadsheet.
[1]Exempt compounds that are not considered as VOCs by Rule 102.

Tier II analysis was used since the receptor distance is greater than 25 m and the exhaust stack does not have a rain cap. Tier II risk analysis was based on the emission rates listed in the above table. The MICR values are determined to be 3.69×10^{-8} for residential and 8.67×10^{-9} for commercial receptors. HIA and HIC were less than 1. Cancer Burden was less than 0.5.

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- On-site emission increases from this project do not exceed the following:

Volatile Organic Compounds	30 lbs/day
PM10	30 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212 (c)(2)- On-site emission increases from this project exceed the following:

Nitrogen Oxides	40 lbs/day
Sulfur Dioxide	60 lbs/day

Rule 212 (c)(3)(A)(i)- Facility-wide max MICR is estimated to be below 10 in a million.
Public Notice is required.

Rule 401: Visible Emissions
No violations are expected, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected with proper operation, monitoring and maintenance.
Compliance is expected.

Rule 404: Particulate Matter
No violations are expected limits are listed under Rule 404 Table 404(a).

Rule 407: Liquid and Gaseous Air Contaminants
Rule 407 (b)- Provisions of this rule shall not apply to emissions from stationary ICEs.

Rule 409: Combustion Contaminants
Provisions of this rule shall not apply to emissions from ICEs.

Rule 431.1: Sulfur Content of Gaseous Fuels
Rule 431.1(c)(1)- Natural gas contains ≤ 16 ppmv sulfur compounds as H2S. Compliance is expected.

Rule 53: Orange County – Specific Contaminants (Contained in Addendum to Reg IV)
Rule 53(a)- Sulfur compound emission limit, as SO_2 500 ppmv. Compliance can be expected based on other similar category ICE permits issued in SCAQMD.

NSPS: Standards of Performance for New Stationary Sources
Part 60, Chapter I, Title 40 of Code of Federal Regulations, Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines
60.4230-Applicability: not applicable.
60.4230(a)- Construction for these ICEs did not commence nor was the ICE modified or reconstructed after June 12, 2006. Construction commenced: 6/20/02, Construction completed: 11/04/2002.
60.4230(b)-These ICEs is not being tested at an engine test cell/stand.
60.4230(f)- These ICEs is not a temporary unit.

NESHAP: Part 63, Chapter I, Title 40 of Code of Federal Regulations, Subpart ZZZZ- National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
63.6585- Applicability: Applicable. Engines are stationary RICE at an area source of HAP emissions.
63.6590(a)- An affected source is any existing, new, or reconstructed stationary RICE, excluding stationary RICE being tested at a stationary RICE test cell/stand.
63.6590(a)(1)(iii)- Existing stationary RICE: stationary RICE located at an area source of HAP emissions if commenced construction or reconstruction before June 12, 2006. Construction commenced: 6/20/02, Construction completed: 11/04/2002.
63.6595(a)(1)- Existing stationary SI RICE located at an area source of HAP shall comply with the applicable emission limitations and operating limitations no later than October 19, 2013.
63.6595(c)- Meet applicable notification requirements in 63.6645 and in 40CFR63, subpart A.
63.6603(a)- Existing stationary RICE at an area source of HAP, must comply with applicable requirements in Table 2d and operating limitations in Table 2b.

Table 2d- Requirements for existing RICE located at Area Sources of HAP Emissions (12) Non-emergency, non-black start 4SRB stationary RICE >500HP, not remote, operate > 24 hours/year.
(a) Install NSCR to reduce HAP emissions from the stationary RICE.
Table 2b- There are no operating limitations for these engines.

63.6612(a)- Existing stationary RICE located at area source of HAP must conduct an initial performance test or other initial compliance demonstration per Tables 4 and 5 that apply within 180 days after the compliance date (October 19, 2013) that is specified for your stationary RICE in 63.6595 and according to 63.7(a)(2) (April 17, 2014).

Table 4: Requirements for Performance Tests

There are no requirements for performance tests for these engines.

Table 5- Initial Compliance With Emission Limitations and Operating Limitations

(14)(a) Existing non-emergency 4SRB stationary RICE >500 HP at an area source of HAP, not remote, stationary RICE and that are operated > 24 hours/ calendar year: Install NSCR.

(i) Conduct initial compliance demonstration per 63.6630(e) to show the average reduction of CO emissions ≥ 75%, the average CO concentration ≤ 270 ppmvd @15% O_2, or the average reduction of THC emissions ≥ 30%;

(ii)- Install a CPMS to continuously monitor catalyst inlet temperature per 63.6625(b), or install equipment to automatically shut down the engine if the catalyst inlet temperature exceeds 1250 °F.

63.6615- Conduct subsequent performance tests as specified in Table 3.

Table 3- No subsequent performance test requirements.

63.6620(d)- Conduct three separate test runs for each performance test required in this section, as specified in 63.7(e)(3). Each test run must last at least 1 hour, unless otherwise indicated. See 63.6630(e) (three 15 minutes tests).

63.6620(i)- The engine percent load during a performance test must be determined by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. A written report of the average percent load determination must be included in the notification of compliance status. The written report must include: the engine model number, the engine manufacturer, the year of purchase, the manufacturer's site-rated brake horsepower, the ambient temperature, pressure, and humidity during the performance test, and all assumptions that were made to estimate or calculate percent load during the performance test must be clearly explained. If measurement devices such as flow meters, kilowatt meters, beta analyzers, stain gauges, etc. are used, the model number of the measurement device, and an estimate of its accurate in percentage of true value must be provided.

63.6625(b)- Install, operate, and maintain continuous parameter monitoring system (CPMS).

63.6625(b)(1)- Prepare site specific monitoring plan to address monitoring system design, data collection, QA/QC elements per (b)(1)(i)-(v) & 63.8(d).

(i)- performance criteria, design specs for CPMS, sample interface, detector signal analyzer, data acquisition, & calculations.

(ii)- sampling interface location for representative measurements.

(iii)- equipment performance evaluations, system accuracy audits.

(iv)- ongoing operation and maintenance procedures per 63.8(c)(1)&(3).

(v)- reporting & recordkeeping procedures per 63.10(c)(1), (e)(1) & (e)(2)(i).

63.6625(b)(2)- Install, operate, and maintain each CPMS in continuous operation according to the procedures in your site-specific monitoring plan.

63.6625(b)(3)- CPMS must collect data at least once every 15 minutes (63.6635).

63.6625(b)(5)- Conduct CPMS equipment performance evaluation, system accuracy audits, or other procedures in the monitoring plan at least annually.
63.6625(h)- Minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the emission standards applicable to all times other than startup in Tables 1a, 2a, 2c, and 2d. (see Table 2d requirements above)
63.6630(a)- Demonstrate initial compliance with each emission and operating limitation that applies according to Table 5.
63.6630(b)- During initial performance test, establish each operating limitation in Tables 1b & 2b that apply.

Table 1b Operating Limitations for 4SRB stationary RICE
There are no operating limitations for these engines.

63.6630(c)- Submit the Notification of Compliance Status containing the results of the initial compliance demonstration according to the requirements in 63.6645.
63.6630(e)- The initial compliance demonstration required for existing non-emergency 4SRB stationary RICE >500 HP at an area source of HAP, not remote, stationary RICE and operated > 24 hours/calendar year must be conducted according to the following:
(1) The compliance demonstration must consist of at least three test runs.
(2) Each test run must be of at least 15 minute duration, except that each test conducted using the method in appendix A to this subpart must consist of at least one measurement cycle and include at least 2 minutes of test data phase measurement.
(3) If demonstrating compliance with the CO concentration or CO percent reduction requirement, measure CO emissions using one of the CO measurement methods specified in Table 4 of this subpart, or using appendix A to this subpart.
(4) If demonstrating compliance with THC percent reduction requirement, measure THC emissions using Method 25A, reported as propane, of 40 CFR part 60, appendix A.
(5) Measure O_2 using one of the O_2 measurement methods specified in Table 4. Measurements to determine O_2 concentration must be made at the same time as the measurements for CO or THC concentration.
(6) If demonstrating compliance with the CO or THC percent reduction requirement, measure CO or THC and O_2 emissions simultaneously at the inlet and outlet of the control device.
63.6640(a)- Demonstrate continuous compliance with each emission limitation and operating limitation in Tables 1a, 1b, 2a, 2b, 2c, and 2d to this subpart that apply to you according to methods specified in Table 6 to this subpart.

Table 6: Continuous Compliance with Emission Limitations, Operating Limitations, Work Practices, and Management Practices
(15)(a) Existing non-emergency 4SRB stationary RICE >500 HP at an area source of HAP, not remote, and operate > 24 hours/calendar year: Install NSCR.
(i)- Conduct annual compliance demonstrations per 63.6640(c) to demonstrate average reduction of CO emissions ≥ 75%, average CO concentration ≤ 270 ppmvd @15% O_2 or average reduction THC of emissions ≥ 30%; and either
(ii)- Collect the catalyst inlet temperature data per 63.6625(b), reduce these data to 4-hour rolling averages; and maintain the 4-hour rolling averages within the limitation of ≥ 750°F and ≤ 1250°F for the catalyst inlet temperature; or
(iii)- Immediately shut down the ICE if the catalyst inlet temperature > 1250 °F.

63.6640(b)- Report each instance which did not meet each emission limitation or operating limitation in Tables 1a, 1b, 2a, 2b, 2c, and 2d to this subpart that apply. These deviations must be reported per 63.6650. If the catalyst is changed, reestablish the values of the operating parameters measured during the initial performance test. When the values of operating parameters are reestablished, conduct a performance test to demonstrate the required emission limitations are met.
63.6640(c)- The annual compliance demonstration required for existing non-emergency 4SLB/4SRB stationary RICE with a site rating of more than 500 HP at an area source of HAP, not remote, stationary RICE and operated > 24 hours/calendar year must be conducted according to the following:
(1) The compliance demonstration must consist of at least one test run.
(2) Each test run must be of at least 15 minute duration, except that each test conducted using the method in appendix A must consist of at least one measurement cycle and include at least 2 minutes of test data phase measurement.
(3) If demonstrating compliance with the CO concentration or CO percent reduction requirement, measure CO emissions using one of the CO measurement methods in Table 4, or using appendix A to this subpart.
(4) If demonstrating compliance with the THC percent reduction requirement, measure THC emissions using Method 25A, reported as propane, of 40 CFR 60, appendix A.
(5) Measure O_2 using one of the O_2 measurement methods specified in Table 4. Measurements to determine O_2 concentration must be made at the same time as the measurements for CO or THC concentration.
(6) If demonstrating compliance with the CO or THC percent reduction requirement, measure CO or THC and O_2 emissions simultaneously at the inlet and outlet of the control device.
(7) If the results of the annual compliance demonstration show emissions exceeded levels in Table 6, shut down the RICE as soon as safely possible, and take appropriate corrective action (e.g., repairs, catalyst cleaning, catalyst replacement). Retest the RICE within 7 days of being restarted and must meet emissions in Table 6. If the retest shows continued emissions exceedance, shut down the RICE as soon as safely possible, and the RICE may not operate, except for purposes of startup and testing, until emissions testing demonstrate compliance with Table 6 levels.
63.6640(e)- Report each instance which did not meet the requirements in Table 8 to this subpart that apply. (see Table 8).
63.6645(a)(2)- Existing stationary RICE located at an area source of HAP emissions, must submit all of the notifications in 63.7(b) & (c), 63.8(e), (f)(4) & (f)(6), 63.9(b) through (e) & (g) &(h) that apply by the dates specified.
63.6645(g)- If required to conduct a performance test, submit Notification of Intent to conduct the test at least 60 days before the test is scheduled to begin per 63.7(b)(1).
63.6645(h)- If required to conduct a performance test or other initial compliance demonstration per Tables 4 and 5, submit a Notification of Compliance Status per 63.9(h)(2)(ii).
63.6645(h)(1)- For each initial compliance demonstration required in Table 5 that does not include a performance test, must submit the Notification of Compliance Status before the close of business on the 30th day following the completion of the initial compliance demonstration.

63.6645(h)(2)- For each initial compliance demonstration required in Table 5 that includes a performance test conducted according to the requirements in Table 3, must submit the Notification of Compliance Status, including the performance test results, before the close of business on the 60th day following the completion of the performance test according to 63.10(d)(2).

63.6650(a)- Submit each report in Table 7 of this subpart that applies to you.

Table 7: Requirements for Reports

(3)- Existing non-emergency, non-black start 4SRB stationary RICE > 500 HP at an area source of HAP, not remote, and operate > 24 hours/calendar year:

Submit a compliance report

(a)- The results of the annual compliance demonstration, if conducted during the reporting period.

(i)- Semiannually according to the requirements in 63.6650(b)(1)-(5).

63.6650(c)- Compliance reports shall contain:

(1)- Company name and address.

(2)- Statement by a responsible official, with that official's name, title, and signature, certifying the accuracy of the content of the report.

(3)- Date of report and beginning and ending dates of the reporting period.

(4)- If there was a malfunction during the reporting period, the compliance report must include the number, duration, and a brief description for each type of malfunction which occurred and which caused or may have caused any applicable emission limitation to be exceeded. Also include a description of actions taken by an owner or operator during a malfunction to minimize emissions per 63.6605(b), including actions taken to correct a malfunction.

(5)- If there are no deviations from any emission or operating limitations, include a statement indicated as such during the reporting period.

63.6650(e)- For each deviation for a RICE using a CMS, the Compliance report must contain the information in (c)(1)-(4) and (e)(1)-(12)

63.6655(a)(1)- Keep a copy of each notification and report that was submitted to comply with this subpart, including all documentation supporting any Initial Notification or Notification of Compliance Status that was submitted, per 63.10(b)(2)(xiv).

63.6655(a)(2)- Keep records of the occurrence and duration of each malfunction of operation (*i.e.,* process equipment) or the APC and monitoring equipment.

63.6655(a)(3)- Keep records of performance tests and performance evaluations per 63.10(b)(2)(viii).

63.6655(a)(4)- Keep records of all required maintenance performed on the APC and monitoring equipment.

63.6655(a)(5)- Keep records of actions taken during periods of malfunction to minimize emissions per 63.6605(b), including corrective actions to restore malfunctioning process and air pollution control and monitoring equipment to its normal or usual manner of operation.

63.6655(b)- Keep CPMS records:(1)-per 63.10(b)(2)(vi)-(xi), (2)-previous versions of performance evaluation plan, (3)-requests for alternatives to RATA for CPMS.

63.6655(d)- Keep records per Table 6 to show continuous compliance with each emission or operating limitation that applies.

63.6655(e)(3)-Keep records of the maintenance conducted on the existing stationary RICE at an area source of HAP emissions subject to management practices as shown in Table 2d to demonstrate that the RICE and after-treatment control device were operated and maintained per your own maintenance plan.

63.6660(a)- Records must be in a form suitable and readily available for expeditious review according to 63.10(b)(1).
63.6660(b)- Keep each record for 5 years following the date of each occurrence, measurement, maintenance, corrective action, report or record.
63.6660(c)- Keep each record readily accessible in hard copy or electronic form for at least 5 years after the date of the occurrence, measurement, maintenance, corrective action, report, or record.

Compliance with this Regulation is expected.

Rule 1110.2: Emissions From Gaseous and Liquid-Fueled Engines
Rule 1110.2(d)(1)(B)- Stationary engines shall not exceed concentration limits: NOx 11 ppmvd 15% O2, VOC 30 ppmvd 15% O2, CO 250 ppmvd 15% O2.
Rule 1110.2(d)(1)(J)-Engine without Rule 218 approved CEMS shall equip and maintain engine w/ air-to-fuel ratio controller with an oxygen sensor and feedback control, or equivalent technology approved by the Executive Officer, CARB and EPA. AFRC is equipped on the engines.
Rule 1110.2(e)(3)- Stationary Engine CEMS
Rule 1110.2(e)(3)(B)- CEMS is not required, see Rule 1110.2(f)(1)(A)(ii)(VI).
Rule 1110.2(e)(4)- Stationary Engine Inspection and Monitoring (I&M) Plans: I&M plan application has been submitted. Determination has not yet been made for this application.
Rule 1110.2(f)(1)(A)(ii)(I)- CEMS is not required, see Rule 1110.2(f)(1)(A)(ii)(VI).
Rule 1110.2(f)(1)(A)(ii)(VI)- IRWD (public agency) per I&M conducts weekly or every 150 operating hours, whichever is later, emission checks for NOx & CO in lieu of CEMS.
Rule 1110.2(f)(1)(B)- Maintain operational non-resettable totalizing time meter to determine engine elapsed operating time.
Rule 1110.2(f)(1)(C)(i)-Conduct source test for NOx, VOC as carbon, and CO (ppmvd, 15% O2) every two years or every three years if engine operated less than 2000 hours since last test. If engine has not operated within 3 months of required source test date, source test shall be conducted when operation resumes for 7 consecutive days or 15 cumulative days.
Rule 1110.2(f)(1)(C)(ii)- Conduct source test for at least 30 minutes normal operation.
Rule 1110.2(f)(1)(C)(iii)- Use a LAP approved contractor to conduct source testing.
Rule 1110.2(f)(1)(C)(iv)- Source test protocol shall be submitted at least 60 days before scheduled date of the test.
Rule 1110.2(f)(1)(C)(v)- Provide at least 30 days prior notice of source test to have an observer present. Notify Executive Officer asap of any delay in test date and provide 7 days notice to rescheduled date.
Rule 1110.2(f)(1)(C)(vi)- Submit all source test reports within 60 days of test completion.
Rule 1110.2(f)(1)(C)(vii)- Provide (I) Sample ports, stack/duct, (II) Sampling platforms, scaffolding, mechanical lifts, and (III) Utilities for sampling and testing equipment.

Rule 1110.2(f)(1)(D)-I&M Plan application has been submitted. Determination has not yet been made for this application.
Rule 1110.2(f)(1)(D)(ix)- Before any change in I&M plan operations can be implemented, the revised I&M plan shall be submitted to and approved by the Executive Officer. The operator shall apply for a plan revision prior to any change in emission limits or control equipment.
Rule 1110.2(f)(1)(E)- Maintain a monthly engine operating log that includes: (i) Total hours of operation, (ii) Types of liquid and/or type of gaseous fuel, (iii) fuel consumption (cubic feet of gas and gallons of liquid), and (iv) Cumulative hours of operation since the last source test required in (f)(1)(C).
Rule 1110.2(f)(3)- All data, logs, test reports and other information required by this rule shall be maintained for at least 5 years and made available for inspection by the Executive Officer.

Rule 1147 NOx Reductions From Miscellaneous Sources
Rule 1147(a)- Applicability: not applicable to internal combustion engines subject to District Rule 1110.2.

Reg XIII: Rule 1303(a)- There is an increase of emissions (NSR 30 day average). BACT from previous applications is already equipped, if it were not equipped, BACT would apply. BACT from previous applications: CO: 0.6 g/bhp-hr, NOx: 0.15 g/bhp-hr, VOC: 0.15 g/bhp-hr.
Rule 1303(b)(1)- Modeling for VOC and SOx is not required (1303 Appendix A). CO and PM10 are less than the allowable emissions in Table A-1, no further analysis is required (1303 Appendix A). NOx with further analysis is in compliance with Table A-2.
Rule 1303(b)(2)- Since the facility is an essential public service, any required offsets shall be provided through priority reserve.
Compliance is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6}.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.
Compliance is expected

Rule 1401.1: Rule 1401.1(b)- Equipment is exempt since it is located at an existing facility.

Reg. XXX: Expansion of the facility to include a biosolids receiving, heat drying, and load out system and other equipment is part of an Initial Title V permit process, which will be subject to a 45 day EPA review under Rule 3003(j). A public notice is required under Rule 3003(n)(2) and Rule 212(g).
Rule 3001(c)(2)- NOx & VOC > 10 tons/yr, Title V permit required.
Rule 3002(b)(1) & (b)(2)- Applicant submitted Title V application on 4/2/2014.
Rule 3002(c)(2)- Compliance with Rules & Regulations is expected.
Rule 3003(a)(3)- Facility was determined to potentially trigger Title V emission thresholds in December 2013. IRWD reviewed possible operating limitations enforced

via permit conditions to ensure that Title V thresholds were not triggered. In March 2014 after IRWD's review, it was confirmed that this project would trigger Title V thresholds based on potential to emit calculations and shall enter the Title V permit program. This application was submitted 4/2/2014 (within 180 days of subject date).
Rule 3003(b)(1)- Appropriate forms and fees were submitted.
Rule 3004(a)(4)(C)- The (ground, non-elevated) flare is used for air pollution control. Appendix A of the Periodic Monitoring Guidelines for Title V Facilities requires an exhaust temperature limit, continuous monitoring of exhaust temperature and recording with a strip chart or digital data acquisition system. LAER/BACT already requires exhaust temperature limit and continuous monitoring.
Compliance is expected.

Conclusions & Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Operate is recommended for applications 551658 and 551660 after EPA review and public notice. For Permit Conditions please see Sample Permit.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT	PAGES 8	PAGE 1
ENGINEERING AND COMPLIANCE DIVISION	APPL NO 554495 & 554496	DATE 1/27/2015
PERMIT APPLICATION EVALUATION AND CALCULATIONS	PROCESSED BY AS08	CHECKED BY COT

A/N 554495 Permit to Operate (Alteration/Modification without Prior Approval)
A/N 554496 Permit to Operate (PO no PC)

Applicant's Name Irvine Ranch Water District (IRWD), Michelson Water Reclamation Facility (MWRF)

Mailing Address PO Box 57000
Irvine, CA 92619

Equipment Location 3512 Michelson Drive
Irvine, CA 92612

Equipment Description
Application No. 554495, Facility ID 003513

METAL CUTTING TORCH, PLASMA ARC TYPE, WITH POWER SUPPLY, LINCOLN ELECTRIC, MODEL PRO-CUT 125, 18.5 KVA, 40-102 AMPERE INPUT, 220 - 460 VDC INPUT.

Application No. 554496, Facility ID 003513

AIR POLLUTION CONTROL SYSTEM CONSISTING OF:

1. DOWNDRAFT TABLE, LINCOLN ELECTRIC, MODEL DOWNFLEX 400-MS/A, 3'-0" W. X 4'-6" L. X 3'-3" H., WITH CELLULOSE/POLYESTER FIBER FILTER, 560 SQ. FT. FILTER AREA, AND HEPA CARTRIDGE FILTER, 366 SQ. FT. FILTER AREA, MOUNTED ON OUTLET OF DOWNDRAFT TABLE, WITH A REVERSE AIR CLEANING SYSTEM.

2. DOWNDRAFT TABLE EXHAUST SYSTEM WITH A 1,860 CFM BLOWER, VENTING A PLASMA ARC CUTTER.

3. DUST COLLECTOR, MILLER, MODEL SWX-S, 2'-9" L. X 2'-3" W. X 2'-9" H., WALL MOUNTED, HEPA 10 FILTER, 490 SQ. FT. TOTAL FILTER AREA, WITH TWO FUME EXTRACTOR ARMS, 8" DIA., WITH A REVERSE AIR CLEANING SYSTEM.

4. DUST COLLECT EXHAUST SYSTEM WITH AN 875 CFM BLOWER VENTING A PLASMA ARC CUTTER.

Background/Process Description

A/N 554495 & 554496 were submitted on July 23, 2013 as an Alteration/Modification without Prior Approval) and an Equipment Operating Without A Permit, Permit to Operate (PO no PC) application types for a site specific plasma arc cutter and a dust collector air pollution control (APC) system venting the plasma arc cutter, respectively.

The site is located at the Irvine Ranch Water District (IRWD), Michelson Water Recycling Plant (MWRP), which conducts sewage treatment, water reclamation, and recycled water distribution for a 181 square mile area including Irvine, Costa Mesa, Lake Forest, Newport Beach, Orange, Tustin and unincorporated areas of Orange County. There is no school within 1000 feet of emission source. There have been no Notices to Comply, Notices of Violation, or complaints in the last two years.

The plasma arc cutter has an air regulator, coarse air filter, oil coalescing filter, and pressure gauge. The plasma arc cutter is used to make short cuts in metal and uses high velocity ionized gas (air or nitrogen) to cut various metals. Nitrogen is used to cut aluminum or other non-ferrous metals. IRWD uses the plasma arc cutter to cut stainless steel and steel. The plasma jet melts and blows out the metal in the cut generating metal fumes that contain alloy elements. Steel alloys have high chromium and nickel content that must be evaluated for risk under Rule 1401. The plasma arc cutter has two dust collector air pollution control devices that may be used separately or simultaneously to vent the plasma arc cutter when in operation. Most of the time the metal to be cut will be placed on top of the downdraft table. But when the metal is larger than the downdraft table, part of the piece will be placed on the bench next to the downdraft table and the extractor arms will be placed over the bench to collect any fumes not collected by the downdraft table to ensure maximum capture efficiency.

Each dust collector device will be outfitted with a HEPA filter to ensure proper control of the metal fumes from plasma arc cutting activities. All cuts are performed inside the maintenance building. The APC system vents to the building, which to atmosphere through building exhaust vents on the roof at 28 feet above grade. The operating schedule for the plasma arc cutter and its air pollution control equipment will be evaluated for 8 hour/day, 5 days/week, 52 weeks/year, 2080 hours/year, 243.3~ 243 hours/month.

Calculations

The calculations are based on the process information provided by the applicant and summarized in the assumptions listed below. Risk is calculated from the emissions using current SCAQMD Toxics Unit methods. The weight of steel melted and displaced is estimated from the dimensions of the cut. Chromium, nickel, manganese, and copper in the resulting fumes are quantified using emission factors derived from source testing similar processes and weight percent composition for compounds where emission factors were not available. The emission rates are calculated from the listed assumptions. The applicant provided weight percent composition data for the stainless steels to be cut by the plasma arc cutter. Stainless steel (SS) 302/304 has the highest composition of chromium, nickel, manganese, and copper, as shown below. All calculations will assume that only stainless steel 302/304 is cut for a worst case scenario. The applicant requested a total material cut limit of 17,500 inches/year and a stainless steel cut limit of 8,663 inches/year. An annual length cut limit will be determined that will be in compliance with all applicable rules.

Assumptions

Source	= materials submitted in applications 370676, 554495, & 554496
Process weight (PW)	= amount of material in cut
Stainless steel (SS)	
SS 316/316L	= 18 wt% chromium, 14 wt% nickel, 2 wt% manganese, 0 wt% copper
SS 302/304	= 35 wt% chromium, 35 wt% nickel, 10 wt% manganese, 4.5 wt% copper, maximum
0.00022 lb Cr+6 / lb Cr	
Operating time	= 8 hours/day, 5 days/week, 52 weeks/year (2080 hours/year)
Speed of cut (SOC)	= inches cut/hr
Width of cut (WOC)	= 0.125 inch
Max thickness of cut (TOC)	= 0.375 inch
Steel density (P)	= 0.29 lbs/cubic inch (ci)

Emission Factors

Emission Factors and equations based on A/N 184446 by Marco Polo 5/1/91. Also see A/N 398253 for reference for calculations.

PM	= 0.12 (PW)
R1 (Cr)	= 0.33 (PW x wt%Cr)
R1 (Cr+6)	= 0.00022 (PW x wt%Cr)
R1 (Ni)	= PM x wt%Ni
R1 (Cu)	= PM x wt%Cu
R1 (Mn)	= PM x wt%Mn
PW (hourly)	= SOC x WOC x TOC x P

The applicant requested a 17,500 inches/year of total material cut limit including stainless steel cuts. It will be assumed that 17,500 inches/year of stainless steel will be cut for emission calculation purposes.

Emissions Calcuations

PW(annual →hourly)

SOC = 17,500 inch/yr x yr/52 weeks x week/5days x day/8hr = 8.41 inch/hr

SOC = 17,500 inch/yr ~ 1,458 feet cut/year

PW = SOC x WOC x TOC x P
= 8.41 inch/hr x 0.125 inch x 0.375 inch x 0.29 lbs/cubic inch
= 0.114 lbs/hr

PM/PM10 emissions

PM = PM10 emissions

PM = 0.12 x PW

R1 = 0.12 x 0.114 lbs/hr
= 0.0137 lbs/hr = 28.55 lbs/year

R2 = 0.0137 lbs/hr x $[1 - (0.95_{control} \times 0.80_{capture})]$
= 0.0033 lbs/hr = 6.85 lbs/year

R2(aver daily) = R2(PM) maximum monthly emission / 30 days/month
= 0.0033 lbs/hr x 8 hours/day x 5 days/week x 4.33weeks/month / 30 days/month

NSR = 0.0190 lbs/day

Rule 1303 modeling requirement (PM10): 0.41 lbs/hr > 0.0033 lbs/hr

Hexavalent Chromium emissions

Cr+6 = 0.00022 x PW x wt%Cr

R1 = 0.00022 x 0.114 lbs/hr x 0.35
= 8.81E-6 lbs/hr

R2 = 8.81E-6 x $[1 - (0.95_{control} \times 0.80_{capture})]$

R2 = 2.11E-6 lbs/hr

Nickel emissions

Ni = PM x wt%Ni

PM = PM10 emissions

$PM_{(R1)}$ = 0.12 x PW

$PM_{(R1)}$ = 0.12 x 0.114 lbs/hr
= 0.0137 lbs/hr
R1 = 0.0137 lb/hr x 0.35
= 0.00480 lbs/hr
R2 = 0.00480 lbs/hr x [1 – ($0.95_{control}$ x $0.80_{capture}$)]
= 0.00115 lbs/hr

Copper emissions
Cu = PM x wt%Ni
PM = PM10 emissions
$PM_{(R1)}$ = 0.12 x PW
$PM_{(R1)}$ = 0.12 x 0.114 lbs/hr
= 0.0137 lbs/hr
R1 = 0.0137 lb/hr x 0.045
= 6.18E-4 lbs/hr
R2 = 6.18E-4 lbs/hr x [1 – ($0.95_{control}$ x $0.80_{capture}$)]
= 1.48E-4 lbs/hr

Manganese emissions
Mn = PM x wt%Ni
PM = PM10 emissions
$PM_{(R1)}$ = 0.12 x PW
$PM_{(R1)}$ = 0.12 x 0.114 lbs/hr
= 0.0137 lbs/hr
R1 = 0.0137 lb/hr x 0.10
= 1.37E-3 lbs/hr
R2 = 1.37E-3 lbs/hr x [1 – ($0.95_{control}$ x $0.80_{capture}$)]
= 3.29E-4 lbs/hr

Toxic Risk Analysis

Operating Schedule: 8 hours/day, 5 day/week, 52 weeks/year
Source Type: Volume
Area: 20,020 ft.^{2} (1,860 m^2), 140 ft. x 143 ft. (42.7 m x 43.6 m)
Nearest Residential Receptor Distance: 2,038 ft. (621 m)
Nearest Commercial Receptor Distance: 1140 ft. (348 m)
Building height: 28 ft. (8.5 m)

Compound	MW (lbs/lbmole)	Outlet emission (lbs/hr)
Chromium, hexavalent	51.996	2.11E-6
Copper	63.55	1.48E-4
Manganese	54.938	3.29E-4
Nickel	58.71	1.15E-3

Tier II analysis was used since the nearest receptor is greater than 25 meters in distance from the emission source. Tier II risk analysis was based on the outlet emissions listed in the above table. The MICR values

are determined to be 6.03×10^{-8} for residential and 1.39×10^{-7} for commercial receptors. HIA and HIC were less than 1. Cancer Burden was less than 0.5.

Ventilation calculations (uncovered downdraft table)
Q = air flow, 1,860 cfm
A = area of vent opening, sq. feet
L = length of downdraft vent opening, 53.8 in. ~ 4.48 ft.
W = width of downdraft vent opening, 29.5 in. ~ 2.46 ft.
A = L x W =4.48 ft. x 2.46 ft. = 11.02 sq. ft.
X = distance outward along the axis from hood, feet; $X < 1.5 \times (L \times W)^{1/2} \rightarrow X < 4.98$ ft
V = centerline velocity at X distance from hood, 200 fpm

X for a flanged multiple slot openings, 2 or more slots with $0.2 < W/L$
$= \text{sqrt}[(Q/(0.75 \times V) - A) / 10]$
$= [[(1,860 /(0.75 \times 200)) - (11.02)] / 10]^{1/2}$
= 0.37 ft ~ 4.5 inches
The permit unit is for a down draft/side draft table with side panels. Therefore it is expected that X will be much greater than calculated above.

Ventilation calculations (extraction arm)
Q = air flow, 875 cfm (when using one extractor arm), 437.5 cfm (when using two extractor arms)
A = area of hood opening, sq. feet
$A = \pi/4 \times D^2$
D = diameter of round hood, 8.0 in. ~ 0.67 ft.
X = distance outward along the axis from hood, feet; $X < 1.5\ D \rightarrow X < 12$
V = centerline velocity at X distance from hood, 200 fpm

X for a plain opening
$= \text{sqrt}[(Q/V - \pi/4 \times D^2) / 10]$
$= [[(875 / 200) - (\pi/4 \times 0.67^2)] / 10]^{1/2}$
= 0.63 ft ~ 7.6 inches

$= \text{sqrt}[(Q/V - \pi/4 \times D^2) / 10]$
$= [[(437.5 / 200) - (\pi/4 \times 0.67^2)] / 10]^{1/2}$
= 0.43 ft ~ 5.1 inches

Assume the distance of the cut from the hood is less than 5 inches.

Emissions Summary

CONTAMINANT	LB/HR		LB/YEAR	
	R1	R2	R1	R2
PM10	0.0137	0.0033	28.55	6.85
Hexavalent Chromium	8.81E-6	2.11E-06	0.018	0.004
Copper	6.18E-4	1.48E-04	1.28	0.31
Manganese	1.37E-	3.29E-04	2.85	0.69
Nickel	4.80E-3	1.15E-03	9.99	2.40

Rules Evaluation

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.
Rule 212 (c)(2)- On-site emission increases from this project do not exceed the following:

Volatile Organic Compounds	30 lbs/day
PM10	30 lbs/day
Carbon Monoxide	220 lbs/day
Lead	3 lbs/day

Rule 212 (c)(2)- On-site emission increases from this project exceed the following:

Nitrogen Oxides	40 lbs/day
Sulfur Dioxide	60 lbs/day

Rule 212 (c)(3)(A)(i)- Facility-wide max MICR is estimated to be below 10 in a million.
Public Notice is required.

Rule 401: Visible Emissions
No violations are expected with operation of APC, limits are listed under Rule 401(b)(1).

Rule 402: Nuisance
Nuisance is not expected.

Rule 404: Particulate Matter (PM)- Concentration
1,860 cfm → 0.149 grains/cf
0.149 grains/cf x lb/7000grains x 875 cfm x 60min/hr = 1.12 lbs/hr > 0.0033 lbs/hr
< 883 cfm → 0.196 grains/cf
0.196 grains/cf x lb/7000grains x 875 cfm x 60min/hr = 1.47 lbs/hr > 0.0033 lbs/hr
Compliance is expected.

Rule 405: Particulate Matter (PM)-
<220 lbs/hr → 0.99 lbs/hr > 0.0029 lbs/hr
Compliance is expected.

Rule 1155: Particulate Matter (PM) Control Devices
Downdraft table dust collector: Tier 2 baghouse (>500 sq ft, ≤ 7,500 sq ft) w/HEPA.
Wall mounted dust collector: Tier 1 baghouse (≤ 500 sq ft) w/HEPA.
Rule 1155(d)(1)- No visible emissions.
Rule 1155(d)(3)- PM control shall be operated and maintained in accordance with manufacturer's operation and maintenance manual or other similar written materials supplied by the manufacturer or distributor of a control device to ensure that the control device remains in proper operating condition.
Rule 1155(d)(4)- The baghouse shall not use a manual shaker.
Rule 1155(d)(8)- Operator shall install and maintain a ventilation system that meets a minimum capture velocity requirement in the most current Edition of the US Industrual Ventilation Handbook, American Conference of Governmental Industrial Hygienists, at the time of installation.
Rule 1155(d)(9)- The operator shall discharge material collected in a permitted PM control device for disposal or bring the material back to the process through a controlled

material transfer system to prevent fugitive emissions during material transfer, including, but not limited to, shrouding or use of dust suppressants to stabilize the material.
Rule 1155(e)(1)- The operator of any baghouse or other PM control device shall have the trained person conduct a continuous five-minute visible emissions observation using EPA Method 22 once a week and shall maintain records for each observation and any necessary subsequent action(s) taken to eliminate visible emissions pursuant to subdivision (f).
Rule 1155(f)(2)- PM APC venting a non-continuous process is exempt from (e)(1), provided no visible emissions occur when the process activity takes place.
Compliance is expected.
Rule 1155(g)(13)- Except (d)(1), HEPA equipment are exempt from the provisions of this rule.
Compliance is expected.

Reg XIII: Rule 1303(a)(1)- The dust collector APC is considered as BACT/LAER.
Rule 1303(b)(1)- PM10 is less than the allowable emission in Table A-1, no further analysis is required (1303 Appendix A).
Rule 1303(b)(2)- Offsets are not required; since the equipment's potential to emit is less than 0.5 pounds per day.
Compliance is expected.

Rule 1401: Toxic Air Contaminants
Rule 1401(d)(1)(A)- MICR less than 1.0×10^{-6} limit.
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.
Compliance is expected with operation of APC.

Rule 1401.1: Requirements for New and Relocated Facilities Near Schools
Rule 1401.1(b)- Not applicable, since the facility is an existing facility.

Reg. XXX: Expansion of the facility to include a biosolids receiving, heat drying, and load out system and other equipment is part of an Initial Title V permit process, which will be subject to a 45 day EPA review under Rule 3003(j). A public notice is required under Rule 3003(n)(2) and Rule 212(g).
Rule 3001(c)(2)- NOx & VOC > 10 tons/yr, Title V permit required.
Rule 3002(b)(1) & (b)(2)- Applicant submitted Title V application on 4/2/2014.
Rule 3002(c)(2)- Compliance with Rules & Regulations is expected.
Rule 3003(a)(3)- Facility was determined to potentially trigger Title V emission thresholds in December 2013. IRWD reviewed possible operating limitations enforced via permit conditions to ensure that Title V thresholds were not triggered. In March 2014 after IRWD's review, it was confirmed that this project would trigger Title V thresholds based on potential to emit calculations and shall enter the Title V permit program. This application was submitted 4/2/2014 (within 180 days of subject date).
Rule 3003(b)(1)- Appropriate forms and fees were submitted.
Rule 3004(a)(4)(C)- The (ground, non-elevated) flare is used for air pollution control.
Appendix A of the Periodic Monitoring Guidelines for Title V Facilities requires an

exhaust temperature limit, continuous monitoring of exhaust temperature and recording with a strip chart or digital data acquisition system. LAER/BACT already requires exhaust temperature limit and continuous monitoring.
Compliance is expected.

Conclusions & Recommendations

The equipment is in compliance with the Rules and Regulations of the SCAQMD. A Permit to Operate is recommended for the plasma cutter and the air pollution control system under A/N 554495 and A/N 554496, respectively, after EPA review and public notice. For Permit Conditions please see Sample Permit.