

PROPOSED

Covered Source Permit Review Summary (Renewal)

Application File No.: 0097-03

Permit No.: 0097-01-C

Applicant: Kauai Island Utility Cooperative

Facility: Port Allen Generating Station
261 Akaula Street
UTM Coordinates: 2422.222 N 439.2516 E
Eleele, Kauai, Hawaii 96705

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Application Dates: July 27, 2004 and additional information dated June 21, 2005

Proposed Project:

The Standard Industrial Classification (SIC) Code is 4911 under *Electric Services*.

This application is for the renewal of Covered Source Permit (CSP) No. 0097-01-C, issued on August 7, 2000. A check for \$3000.00 was submitted by the applicant for a renewal of a covered source permit (PSD source) and processed.

The Kauai Island Utility Cooperative's (KIUC) Port Allen Electric Power Generating Station is situated on a 9.2 acre site on the south side of the island of Kauai, adjacent to Hanapepe Bay and the town of Port Allen. The facility elevation is approximately 12 meters (40 feet) above mean sea level. The surrounding land is predominantly used for growing sugar cane.

PROPOSED

The topography within the immediate vicinity of the generating station is level and gradually slopes down to Hanapepe Bay. The terrain rises rapidly to the northeast towards Ahuaeliku Mountain, approximately 5.5 kilometers (3.4 miles) to an elevation of 1,222 meters (4,032 feet).

The air quality within the area is classified as attainment or unclassifiable for all criteria pollutants. The location is designated as a PSD Class II area.

The Port Allen Generating Station is solely used to generate electric power for the island of Kauai. Power is generated by a mix of nine diesel engine generators, one steam boiler with steam turbine generator, two combustion gas turbines, and one unfired heat recovery steam generator.

There are no changes proposed to the permit except as follows:

- Eliminate Fuel Injection Timing Retard (FITR) on diesel engine generator D-9;
- Allow the use of alternate backup fuels such as naphtha and biodiesel in the combustion gas turbines (GT-1 and GT-2) and biodiesel in the diesel engine generators (D-1 through D-9) and steam boiler S-1. As the facility presently does not have the proper storage tank to store naphtha onsite, a modification would be required to construct such a storage tank;
- Eliminate fuel oil no. 6 as an allowable fuel in the steam boiler S-1 and increase the monthly quantity of specification used oil in steam boiler S-1 from 10,000 gallons to 15,000 gallons;
- Make corrections to some of the full-load concentration limits for diesel engine generators D-6 through D-9 to make them consistent with the lb/hr limits; and eliminate the part-load concentration limits;
- Revise the permit condition requiring sampling and testing of specification used oil collected onsite to make it consistent with the current, approved practice of testing the spec used oil stored in the no. 6 spec used oil tank prior to being transferred to the S-1 day tank.

The Port Allen Station operates its generating units under different modes of operation. Specifically, diesel engine generator D-9 is required to use an SCR for supplemental NO_x emission controls, and the combustion gas turbines may operate in either simple or combined cycle mode. During simple cycle operation the combustion gas is vented directly to the atmosphere without any heat recovery. This mode of operation enables the turbines to rapidly be brought on line to provide peaking or emergency power. Under base load or combined cycle operation the combustion gas is exhausted through a heat recovery steam generator (HRSG). The steam is used in the steam turbine to generate additional power. Because the HRSG requires time to be brought to full operating temperature, this mode of operation is not suitable for peak load conditions.

The power generating facility is permitted to operate 24 hours per days, 365 days per year, for a total of 8,760 hours of operation per year. The facility operates on a demand basis following the required load which under normal operation does not require all units to be operating all of the time. Additionally, selected units will be down for required or emergency maintenance.

PROPOSED

Equipment Description:

1. Power Generating Equipment

The power generating equipment for the facility are presented in the table below.

Unit Number	Manufacturer	Model/ Serial Number	Rated Capacity		
			MW	MMBtu/hr	gal/hr
D-1, D-2	GM EMD Diesel Generator	16-567-D4/ 64-B-10, 64-B-39	1.8 each	19.3 each	140 each
D-3, D-4, D-5	GM EMD Diesel Generator	16-645-E4/ 72-D1-1018, 74-G3-1523, 73-C3-1114	2.5 each	27.2 each	198 each
D-6 through D-9	Stork-Wartsila Diesel Generator	6TM620/ 60600, 60700, 60800, 60900	7.86 each	69.5 each	505 each
S-1	Combustion Engineering Steam Boiler/Turbine	20810/ 20810	10	156.3	1136
GT-1	Hitachi/GE Combustion Gas Turbine	PG 5251 M/ Turbine No. 214354	18.1 (SC) 17.5 (CC) (GT only)	258.8 (SC) 236.8 (CC)	1882 (SC) 1722 (CC)
GT-2	John Brown Combustion Gas Turbine	PG 5431/ Turbine No. 244424	22.8 (SC) 22.1 (CC) (GT only)	303.3 (SC) 291.4 (CC)	2206 (SC) 2119 (CC)

Note: SC - simple cycle operation

CC - combined cycle operation

All equipment calculated using fuel oil no. 2, HHV of 137,500 Btu/gal

The large diesel engine generators (D-6 through D-9) are used for baseload generation, along with the steam boiler and steam turbine generator. The small diesels (D-1 through D-5) and the combustion gas turbines in simple cycle are used for peaking loads. The combustion gas turbines may also be used in combined cycle mode with heat recovery for intermediate load operations. Under normal conditions, unit GT-2 operates in a combined cycle mode approximately 16 hours per day, with GT-1 serving as a backup to GT-2.

PROPOSED

2. Fuel Storage Tanks

The fuel storage tanks at the facility are listed in the table below.

Tank Number	Tank Contents	Capacity (gallons)	Configuration
Diesel Storage Tank A	Diesel or fuel oil no. 2	42,635	Vertical
Diesel Storage Tank B	Diesel or fuel oil no. 2	39,226	Vertical
Fuel Oil No. 6 Day Tank	Spec Used Oil or no. 2	11,424	Vertical
Clean Lube Oil Tank	Clean Lube Oil	19,992	Vertical
EMD Lube Oil Tank A	EMD Lube Oil	3,024	Horizontal
EMD Lube Oil Tank B	EMD Lube Oil	3,990	Horizontal
SWD Used Oil Tank	Specification Used Oil	8,022	Vertical
Oil Sludge Tank	Oil Sludge	3,024	Vertical
C/E Waste Oil Day Tank	Specification Used Oil	2,000	Rectangular Cross Section

Air Pollution Controls:

1. Diesel engine generators D-6 through D-8 are equipped with Variable Fuel Injection Timing Retard (FITR).
2. Diesel engine generator D-9 is equipped with a Selective Catalytic Reduction (SCR) System as part of a NO_x control technology demonstration project. This project was deemed successful and shows the *technical* feasibility of a SCR system. The economic feasibility was not shown, however.
3. Low sulfur fuel (0.4%) fuel oil no. 2 and/or biodiesel is used for diesel engine generators D-1 through D-9.
4. Low sulfur fuel (0.4%) fuel oil no. 2, naphtha and/or biodiesel is used for combustion gas turbine GT-1 and GT-2.
5. The steam boiler S-1 is equipped with low-NO_x burners.
6. Low sulfur fuel (0.4%) fuel oil no. 2 and/or biodiesel is used for steam boiler S-1.

Insignificant Activities:

Tank Number	Tank Contents	Capacity (gallons)	Justification
Diesel Storage Tank A	Diesel or fuel oil no. 2	42,635	HAR 11-60.1-82(f)(7)
Diesel Storage Tank B	Diesel or fuel oil no. 2	39,226	HAR 11-60.1-82(f)(1)
Fuel Oil No. 6 Day Tank	Spec Used Oil or no. 2	11,424	HAR 11-60.1-82(f)(1)
Clean Lube Oil Tank	Clean Lube Oil	19,992	HAR 11-60.1-82(f)(1)
EMD Lube Oil Tank A	EMD Lube Oil	3,024	HAR 11-60.1-82(f)(1)
EMD Lube Oil Tank B	EMD Lube Oil	3,990	HAR 11-60.1-82(f)(1)
SWD Used Oil Tank	Specification Used Oil	8,022	HAR 11-60.1-82(f)(1)

PROPOSED

Oil Sludge Tank	Oil Sludge	3,024	HAR 11-60.1-82(f)(1)
C/E Waste Oil Day Tank	Specification Used Oil	2,000	HAR 11-60.1-82(f)(1)
Degreasing Tank	Petroleum Solvents	30	HAR 11-60.1-82(f)(1)

Fuels:

The diesel engine generators (D-1 through D-9) and combustion gas turbines (GT-1 and GT-2) operate exclusively on fuel oil no. 2. The steam boiler S-1 primarily operates on fuel oil no. 2 and also has the capability and is permitted to burn specification (spec) used oil and transformer specification used oil when blended with fuel oil no. 2.

Proposed fuel changes consist of the following:

- Allow the use of alternate backup fuels such as naphtha and biodiesel in the combustion gas turbines (GT-1 and GT-2) and biodiesel in the diesel engine generators (D-1 through D-9) and steam boiler (S-1);
- Eliminate fuel oil no. 6 as an allowable fuel in the steam boiler S-1 and increase the monthly quantity of specification used oil in steam boiler S-1 from 10,000 gallons to 15,000 gallons.

Fuel Oil No. 2	
Sulfur, wt. %	0.4 max
Heat content, Btu/gal	138,000
Specification Used Oil	
Heat content, Btu/gal (typical)	140,000
Sulfur, wt. %	2.0 max
Arsenic, ppm	5 max
Cadmium, ppm	2 max
Chromium, ppm	10 max
Lead	100 max
Total Halogens, ppm	1000 max
PCBs, ppm	49 max
Naphtha	
Reid vapor pressure, psia	6.4 max
Sulfur, wt. %	0.01 max
Heating value, Btu/gal	115,000
Biodiesel	
Sulfur, wt. %	0.0054
Heating value, Btu/gal	119,200

PROPOSED

Stack Parameters:

Unit Number	Stack Height (m)	Exit Diameter (m)	Exit Velocity (m/s)	Exit Temperature (K)
D-1, D-2 (each) no stack extensions with stack extensions	12.19	0.56	30.55	677.0
	15.24	0.56	30.55	677.0
D-3, D-4, D-5 (each)	12.19	0.56	41.38	677.0
D-6, D-7, D-8 (each) 50% load 75% load 90% load 100% load	28.96	1.11	16.76	637.4
	28.96	1.11	23.41	621.9
	28.96	1.11	28.26	621.9
	28.96	1.11	34.02	635.8
D-9 50% load 75% load 90% load 100% load	28.96	1.11	16.76	637.4
	28.96	1.11	23.41	621.9
	28.96	1.11	28.26	621.9
	28.96	1.11	34.02	635.8
S-1 no stack extension	22.25	2.5	6.9	451.3
GT-1	12.50 (SC) 16.76 (CC)	2.13 (SC) 3.14 (CC)	52.50 (SC) 18.39 (CC)	783.0 (SC) 519.1 (CC)
	GT-2	10.67 (SC) 16.76 (CC)	2.44 (SC) 3.14 (CC)	56.50 (SC) 21.28 (CC)
Notes: SC - simple cycle operation CC - combined cycle operation				

Alternate Operating Scenarios:

No alternate operating scenarios were identified in the application.

Applicable Requirements:

Hawaii Administrative Rules (HAR)

Title 11, Chapter 59	Ambient Air Quality Standards
Title 11, Chapter 60.1	Air Pollution Control
Subchapter 1	General Requirements
Subchapter 2	General Prohibitions
HAR 11-60.1-31	Applicability
HAR 11-60.1-32	Visible Emissions
HAR 11-60.1-38	Sulfur Dioxides from Fuel Combustion
HAR 11-60.1-39	Storage of Volatile Organic Compounds

PROPOSED

Subchapter 5	Covered Sources
Subchapter 6	Fees for Covered Sources, Noncovered Sources, and Agricultural Burning
HAR 11-60.1-111	Definitions
HAR 11-60.1-112	General Fee Provisions for Covered Sources
HAR 11-60.1-113	Application Fees for Covered Sources
HAR 11-60.1-114	Annual Fees for Covered Sources

Non-applicable Requirements:

Hawaii Administrative Rules (HAR)

Title 11, Chapter 60.1	Air Pollution Control
Subchapter 7	Prevention of Significant Deterioration
Subchapter 8	Standards of Performance for New Stationary Sources (NSPS)
Subchapter 9	Hazardous Air Pollution Sources

Federal Requirements

40 CFR Part 60 - Standards of Performance for New Stationary Sources (NSPS)

Subpart GG - Standards of Performance for Stationary Gas Turbines, is applicable to stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules per hour, constructed, modified or reconstructed after 10/3/77. The gas turbines, units GT-1 and GT-2, were built before 10/3/77, and did not undergo modification or reconstruction after 10/3/77. They did, however, receive "New Technology" upgrades in 1988 and 1989 (see Sierra Research's letters of 10/15/96 and 8/15/97) that had the potential to trigger a modification under 40 CFR Part 60 (NSPS) and a major modification under 40 CFR Part 52.21 (PSD). These "New Technology" upgrades to GT-1 and GT-2 were latter concurred by EPA's Region IX (Bob Baker) *not* to be a modification under NSPS nor a major modification under PSD.

40 CFR Part 61 - National Emission Standards for Hazardous Air Pollutants (NESHAP)

40 CFR Part 63 - National Emission Standards for Hazardous Air Pollutants for Source Categories (Maximum Achievable Control Technologies (MACT) Standards)

Subpart ZZZZ - National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. (RICE NESHAP) - applicable to RICE greater than 500 bhp located at major sources of HAPs. This site is not a major source for HAPs.

Prevention of Significant Deterioration (PSD):

PSD is not applicable because this facility is not a *new* major stationary source nor does this application propose any *major modifications* to a major stationary source as defined in HAR 11-60.1-131.

PROPOSED

Best Available Control Technology (BACT):

A Best Available Control Technology (BACT) analysis is required for new or modified sources that have the potential to cause a net increase of air pollutant emissions above significant levels as defined in HAR 11-60.1. Since this is not a new source nor are any modifications proposed that have the potential to cause a significant net increase in air emissions, a BACT analysis is not required. Note that the use of a 20% blend of biodiesel may increase NO_x emissions by 2%, but less than the significant level. See Table 7 for details.

Major Source/Synthetic Minor Source Applicability:

This facility is classified as a major source.

Consolidated Emissions Reporting Rule (CERR):

40 CFR Part 51, Subpart A - Emission Inventory Reporting Requirements, determines CER based on the emissions of criteria air pollutants from Type A or Type B point sources (as defined in 40 CFR Part 51, Subpart A), that emit at the CER triggering levels as shown in the table below.

Pollutant	Type A CER Triggering Levels ¹ (tpy)	Type B CER Triggering Levels ¹ (tpy)	Pollutant	In-house Total Facility Triggering Levels ² (tpy)	Total Facility Emissions (tpy)
NO _x	≥2500	≥100	NO _x	≥25	6240.1
SO ₂	≥2500	≥100	SO ₂	≥25	2092.4
CO	≥2500	≥1000	CO	≥250	1102.3
PM ₁₀ /PM _{2.5}	≥250/≥2500	≥100/100	PM/PM ₁₀	≥25/25	PM = 279.8 PM ₁₀ = 269.2 PM _{2.5} = 269.2
VOC	≥250	≥100	VOC	≥25	485.1
			HAPS	≥5	18.67

¹ Based on actual emissions

² Based on potential emissions

This facility emits at the CER triggering levels. Therefore, CER requirements are applicable.

The Clean Air Branch also requests annual emissions reporting from those facilities that have facility-wide emissions of a single air pollutant exceeding in-house triggering levels. Annual emissions from these facilities are used within the Department and are not inputted into the AIRS database. Since the in-house triggering levels are exceeded, annual emissions reporting for the facility will be required for in-house recordkeeping purposes.

Compliance Assurance Monitoring (CAM):

40 CFR Part 64

Applicability of the CAM rule is determined on a pollutant specific basis for each affected emission unit. Each determination is based upon a series of evaluation criteria. In order for a source to be subject to CAM, each source must:

- Be located at a major source per Title V of the Clean Air Act Amendments of 1990;
- Be subject to federally enforceable applicable requirements;
- Have pre-control device potential emissions that exceed applicable major source thresholds;
- Be fitted with an “active” air pollution control device; and
- Not be subject to certain regulations that specifically exempt it from CAM.

Emission units are any part or activity of a stationary source that emits or has the potential to emit any air pollutant.

Compliance Assurance Monitoring (CAM) is currently applicable for this permit renewal. The only control devices in operation that are required to meet established emissions standards, and thus are subject to CAM requirements, are the FITR systems on the diesel engines for Units D-6 through D-8 and the SCR system on Unit D-9. The purpose of these devices is the control of NO_x emissions. The covered source permit requires KIUC to continuously monitor NO_x emissions from Units D-6 through D-9. Thus compliance with the CAM requirements is achieved through the use of CEMs on Units D-6 through D-9.

Synthetic Minor Source:

Not applicable, this facility is a major source.

Project Emissions:

The applicant proposes to eliminate fuel oil no. 6 as an allowable fuel in the steam boiler S-1 and increase the monthly quantity of specification used oil in steam boiler S-1 from 10,000 gallons to 15,000 gallons. Table 1 compares the emissions for the change. Note that the use of 100% fuel oil no. 6 in the steam boiler results in the highest emissions.

PROPOSED

Table 1 - Steam Boiler S-1: Comparison of Emissions Changes from Eliminating Fuel Oil No. 6 and Increasing Allowable Monthly Specification Used Oil Use from 10,000 Gallons to 15,000 Gallons

Pollutant	Fuel Oil No. 2 and 15,000 gal/mo Spec Used Oil (lb/hr)	Fuel Oil No. 2 and 15,000 gal/mo spec used oil (tpy)	Fuel Oil No. 2 and 10,000 gal/mo spec used oil (lb/hr)	Fuel Oil No. 2 and 10,000 gal/mo spec used oil (tpy)	100% Fuel Oil No. 6 (lb/hr)	100% Fuel Oil No. 6 (tpy)
NO _x	23.4	102.5	23.2	101.5	54.4	238.3
SO ₂	68.7	301.1	66.9	293.1	325.1	1423.9
CO	5.7	24.9	5.7	24.9	5.1	22.3
PM ₁₀	2.7	11.9	2.6	11.2	23.3	102.1
VOC	0.24	1.0	0.23	1.0	0.8	3.5

Maximum hourly emission rates for steam boiler S-1, diesel engine generators D-1 through D-5, and combustion gas turbines GT-1 and GT-2 are calculated from the maximum hourly heat input or fuel rates shown in Table 2 and the emission factors shown in Table 3. Maximum hourly emission rates for diesel engine generators D-6 through D-9 are taken from the limits in Covered Source Permit No. 0097-01-C. Table 4 shows the maximum hourly emission rates in lbs/hr from multiplying the maximum hourly heat input or fuel rates by the emission factors.

Table 2 - Maximum Hourly Fuel and Heat Input Rates

Equipment	Load (kW)	Heat Rate (Btu/kWh)	Fuel	Fuel HHV (Btu/gal)	Maximum Hourly Fuel Rate (gal/hr)	Maximum Hourly Heat Input Rate (MMBtu/hr)
S-1	10,000	15,627	Fuel oil no. 2 and/or spec used oil	137,500	1,136	156.3
D-1, D-2	1,800 each	10,717	Fuel oil no. 2	137,500	140 each	19.3 each
D-3, D-4, D-5	2,500 each	10,882	Fuel oil no. 2	137,500	198 each	27.2 each
D-6, D-7, D-8, and D-9	7,860 each	8,834	Fuel oil no. 2	137,500	505 each	69.5 each
GT-1 (simple cycle)	18,100 (GT only)	14,300	Fuel oil no. 2	137,500	1,882	258.8
GT-1 (combined cycle)	17,540 (GT only)	13,500	Fuel oil no. 2	137,500	1,772	256.8
GT-2 (simple cycle)	22,845 (GT only)	13,280	Fuel oil no. 2	137,500	2,206	303.3
GT-2 (combined cycle)	22,110 (GT only)	13,180	Fuel oil no. 2	137,500	2,119	291.4

Table 3 - Emission Factors

Equipment	NO _x	SO ₂	CO	VOC	PM/PM ₁₀ /PM _{2.5}
S-1 (spec used oil)	53.6 ^{1,3,5}	320.4 ^{1,4}	5 ^{1,5}	0.76 ^{1,5}	23 ^{1,5}
S-1 (fuel oil no. 2)	20 ^{1,3,6}	55.7 ^{1,4}	5 ^{1,6}	0.2 ^{1,6}	2 ^{1,6}
D-1, D-2, D-3, D-4, D-5	3.2 ^{2,7}	0.405 ^{2,7}	0.85 ^{2,7}	0.08 ^{2,7}	0.0697/0.0496/0.0496 ^{2,7}
GT-1, GT-2	0.698 ^{2,8}	0.405 ^{2,8}	0.048 ^{2,8}	0.017 ^{2,8}	0.038 ^{2,8}

¹ lb/1000 gal

² lb/MMBtu

³ NO_x emission factors for boiler S-1 adjusted to reflect 20% control for low-NO_x burners

⁴ SO₂ emissions from stoichiometric calculations based on maximum allowable sulfur content of fuel (2.0 wt% for spec used oil and 0.4 wt % for fuel oil no. 2) and fuel densities and heat contents (8.1 lb/gal and 146,000 Btu/gal for spec used oil; 6.96 lb/gal and 137,500 Btu/gal for fuel oil no. 2)

⁵ Based on AP-42, 7/93 (Table 1.3-2, 1.3-4: Utility Boilers, Residual Oil), S=2%

⁶ Based on AP-42, 9/98 (Table 1.3-1, 1.3-3: Utility Boilers, Distillate Oil), S=0.4%

⁷ Based on AP-42, 10/96 (Table 3.4-1, 3.4-2: Large Stationary Diesel Engines), S=0.4%

⁸ Based on AP-42, 7/93 (Table 3.1-1: Large Uncontrolled Gas Turbines), S=0.4%

Table 4 - Maximum Emission Rates - Criteria Air Pollutants (lbs/hr)

Equipment ³	NO _x	SO ₂	CO	VOC	PM/PM ₁₀ /PM _{2.5}
S-1 ¹	23.4	68.7	5.7	0.2	2.7
D-1	61.6	7.8	16.4	1.6	1.3/1.0/1.0
D-2	61.6	7.8	16.4	1.6	1.3/1.0/1.0
D-3	87.1	11.0	23.1	2.2	1.9/1.4/1.4
D-4	87.1	11.0	23.1	2.2	1.9/1.4/1.4
D-5	87.1	11.0	23.1	2.2	1.9/1.4/1.4
D-6	185.22	33.14	23.9	22.8	7.85
D-7	185.22	33.14	23.9	22.8	7.85
D-8	185.22	33.14	23.9	22.8	7.85
D-9	68.28	33.14	45.0	22.8	7.85
GT-1 ²	180.7	104.8	12.4	4.4	9.8
GT-2 ²	211.8	122.9	14.6	5.2	11.5

¹ Fuel oil no. 2 plus spec used oil

² Simple cycle

³ The worst case operating scenario was based on the following: gas turbines GT-1 and GT-2 operating in simple cycle, diesel engines D-1 and D-2 operating with the stacks extended and with no fuel restrictions, diesel engines D-3 through D-5 operating, diesel engines D-6 through D-9 operating at the maximum emission limits, and the steam boiler S-1 operating on fuel oil no. 2.

PROPOSED

Maximum annual emission rates for steam boiler S-1, diesel engine generators D-1 and D-2 with exhaust stacks increased from 40 to 50 feet, diesel engine generators D-3 through D-5, and combustion gas turbines GT-1 and GT-2, are calculated as 8760 hours per year times the maximum hourly emission rates, as there are no operating restrictions for these units.

Maximum hourly emission rates for diesel engine generators D-6 through D-9 are taken from the limits in Covered Source Permit No. 0097-01-C. Maximum annual emissions for criteria pollutants and hazardous air pollutants are shown in Table 5 and Table 6, respectively. Since naphtha has the same emission factors for NO_x, CO, PM/PM₁₀ and VOC as fuel no. 2 and lower emission factors for SO₂ as fuel oil no. 2, the emissions for gas turbines GT-1 and GT-2 using naphtha are not shown. In addition, the emissions for biodiesel are lower than fuel oil no. 2 for all pollutants except for NO_x, which may be up to 2% higher using a 20% pure biodiesel and 80% fuel oil no. 2 blend in compression ignition reciprocating engines. For a gas turbine engine or steam boiler, the emissions are expected to be the same or lower, as the NO_x increase in compression ignition engines is mainly due to the higher cetane number for biodiesel, compared to fuel oil no. 2, which means biodiesel is easier to ignite. This is similar to advancing the ignition timing, which can increase NO_x emissions. Since a gas turbine or steam boiler does not rely upon compression for ignition, no NO_x emission increases are expected. Therefore, only the diesel engines may have a NO_x increase due to the use of biodiesel fuel. Also, since diesel engine generators D-6 through D-9 already have emission limits for NO_x, only the NO_x emission increase for diesel engine generators D-1 through D-5 are shown in Table 7 below.

A 20% blend of biodiesel and 80% fuel oil no. 2 is equivalent to having a 20% biodiesel fuel limitation on a yearly basis. The annual biodiesel fuel limits for D-1, D-2 and D-3, D-4 and D-5 are calculated as follows:

Annual fuel limit for D-1 and D-2 = 1,716,960 gallons/year x 20% = 343,392 gallons/year

Rated fuel input for D-3, D-4 and D-5 each = 198 gal/hr x 3 units x 8760 hrs/yr x 20% = 1,040,688 gallons/year

PROPOSED

Table 5 - Maximum Annual Emissions - Criteria Air Pollutants (tons/yr)

Equipment ³	NO _x	SO ₂	CO	VOC	PM/PM ₁₀ /PM _{2.5}
S-1 ¹	102.5	301.1	24.9	1.0	11.9
D-1	270.5	34.2	71.9	6.6	5.9/4.2/4.2
D-2	270.5	34.2	71.9	6.6	5.9/4.2/4.2
D-3	381.6	48.3	101.4	9.8	8.3/5.9/5.9
D-4	381.6	48.3	101.4	9.8	8.3/5.9/5.9
D-5	381.6	48.3	101.4	9.8	8.3/5.9/5.9
D-6	811.3	145.2	104.7	99.9	34.4
D-7	811.3	145.2	104.7	99.9	34.4
D-8	811.3	145.2	104.7	99.9	34.4
D-9	299.1	145.2	197.1	99.9	34.4
GT-1 ²	791.3	459.1	54.4	19.3	43.1
GT-2 ²	927.5	538.1	63.8	22.6	50.5
Total	6240.1	2092.4	1102.3	485.1	279.8/269.2/269.2

¹ Fuel oil no. 2 plus spec used oil

² Simple cycle

³ The worst case operating scenario was based on the following: gas turbines GT-1 and GT-2 operating in simple cycle, diesel engines D-1 and D-2 operating with the stacks extended and with no fuel restrictions, diesel engines D-3 through D-5 operating, diesel engines D-6 through D-9 operating at the maximum emission limits, and the steam boiler S-1 operating on fuel oil no. 2.

PROPOSED

Table 6 - Maximum Annual Emissions - Hazardous Air Pollutant (tons/yr)

Pollutant	S-1	GT-1	GT-2	D-1/D-2	D-3	D-4	D-5	D-6	D-7	D-8	D-9	Totals
Acetaldehyde		0.0287	0.0335	0.00246	0.0030	0.0030	0.0030	0.0077	0.0077	0.0077	0.0077	0.1045
Acrolein		0.0090	0.0105	0.00077	0.0009	0.0009	0.0009	0.0024	0.0024	0.0024	0.0024	0.0326
Benzene	0.0001	1.0075	1.1923	0.08778	0.1070	0.1070	0.1070	0.2729	0.2729	0.2729	0.2729	3.7003
Formaldehyde	0.2773	0.5360	0.6257	0.04607	0.0561	0.0561	0.0561	0.1434	0.1434	0.1434	0.1434	2.2270
Naphthalene		0.1479	0.1727	0.01271	0.0155	0.0155	0.0155	0.0396	0.0396	0.0396	0.0396	0.5382
Phosphorus		0.3414	0.3985	0.02934	0.0357	0.0357	0.0357	0.0913	0.0913	0.0913	0.0913	1.2415
Polychlorinated biphenyls	0.0311											0.0311
Toluene		0.3198	0.3733	0.02748	0.0335	0.0335	0.0335	0.0855	0.0855	0.0855	0.0855	1.1631
Xylene (mixed isomers)		0.2196	0.2564	0.01888	0.0230	0.0230	0.0230	0.0588	0.0588	0.0588	0.0588	0.7991
Antimony compounds		0.0250	0.0292	0.00215	0.0026	0.0026	0.0026	0.0067	0.0067	0.0067	0.0067	0.0910
Arsenic compounds	0.0031	0.0056	0.0065	0.00048	0.0006	0.0006	0.0006	0.0015	0.0015	0.0015	0.0015	0.0235
Beryllium compounds		0.0002	0.0002	0.00001	0	0	0	0	0	0	0	0.0004
Cadmium compounds	0.0012	0.0048	0.0056	0.00041	0.0005	0.0005	0.0005	0.0013	0.0013	0.0013	0.0013	0.0187
Chromium compounds	0.0062	0.0535	0.0624	0.00460	0.0056	0.0056	0.0056	0.0143	0.0143	0.0143	0.0143	0.2007
Cobalt compounds		0.0104	0.0121	0.00089	0.0011	0.0011	0.0011	0.0028	0.0028	0.0028	0.0028	0.0379
Lead compounds	0.0621	0.0647	0.0759	0.00558	0.0068	0.0068	0.0068	0.0174	0.0174	0.0174	0.0174	0.2983
Manganese compounds	0.0178	0.3869	0.4517	0.03325	0.0405	0.0405	0.0405	0.1035	0.1035	0.1035	0.1035	1.4252

PROPOSED

Mercury compounds	0.0000	0.0006	0.0007	0.00005	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0025
Nickel compounds	0.8626	1.3655	1.5941	0.11737	0.1430	0.1430	0.1430	0.3653	0.3653	0.3653	0.3653	5.8298
Polycyclic organic matter	0.0006	0.2412	0.2816	0.02073	0.0253	0.0253	0.0253	0.0645	0.0645	0.0645	0.0645	0.8780
Selenium compounds	0.0032	0.0060	0.0070	0.00052	0.0006	0.0006	0.0006	0.0016	0.0016	0.0016	0.0016	0.0249
Total												18.67

Note

The worst case operating scenario was based on the following: gas turbines GT-1 and GT-2 operating in simple cycle, diesel engines D-1 and D-2 operating with the stacks extended and with no fuel restrictions, diesel engines D-3 through D-5 operating, diesel engines D-6 through D-9 operating at the maximum emission limits, and the steam boiler S-1 operating on fuel oil no. 2. Emissions of PCDD/PCDF can be considered non-detectable in steam boiler S-1.

Table 7 - Maximum Annual NO_x Emissions Comparison - Diesel Engines D-1 to D-5

Equipment	NO _x ¹ (tpy)	NO _x ² (tpy)	NO _x Net Increase (tpy)	Significant Level (tpy)
D-1	270.5	270.5	0	
D-2	270.5	270.5	0	
D-3	381.6	389.2	7.6	
D-4	381.6	389.2	7.6	
D-5	381.6	389.2	7.6	
Total	1685.8	1708.6	22.8	40

¹ Based on firing fuel oil no. 2 only

² Based on firing 20% biodiesel and 80% fuel oil no. 2 per year. In addition, D-1 and D-2 have a 1,716,960 gallon/yr fuel limitation where biodiesel fuel use is weighted 2% higher than fuel oil no. 2 use.

Ambient Air Quality Impact Analysis:

An Ambient Air Quality Impact Analysis (AAQIA) is not required for existing facilities with no proposed modifications. The modifications proposed by the applicant change the part load concentration limits (ppmv) for diesel engine generators D-6 thru D-9, but do not change the lb/hr limits, therefore the AAQIA from the initial Title V permit application is still valid, and no new ambient air quality modeling is necessary. The use of biodiesel results in a NO_x emission increase for diesel engine generators D-3, D-4 and D-5, but the ambient air impacts are expected to be negligible since the majority of the ambient air impacts are due to the short stack heights of diesel engine generators D-1 and D-2, which have no NO_x emission increases. Therefore, the facility emissions should have air quality impacts which are below the applicable State and Federal Ambient Air Quality Standards.

Significant Permit Conditions and Discussion:

There are no changes to the existing permit conditions except for as follows:

1. Diesel engine generators D-1, D-2, D-3, D-4, D-5

Change: Allow the use of biodiesel as backup fuel.

Reason: Increase operational flexibility since there will be only a 2% increase in NO_x emissions and decreases in other pollutant emissions.

Change:

For the purposes of Special Conditions Nos. B.3.a, B.3.b and B.4 of this Attachment, 1.0 gallon of fuel oil no.2 is equivalent to 1.0 gallon of fuel and 1.0 gallon of biodiesel is equivalent to 1.02 gallons of fuel.

Reason: A biodiesel blend of 20% biodiesel and 80% fuel oil no. 2 results in a 2% increase in NO_x. Therefore, in order for NO_x emissions to remain the same for D-1 and D-2, biodiesel fuel use is weighted 2% higher than fuel oil no. 2 fuel use.

Change:

Fuel Use Restrictions

- a. The total combined amount of fuel oil no. 2 and biodiesel fired in diesel engine generators D-1 and D-2 shall not exceed 1,716,960 gallons of fuel per any rolling twelve (12) month period.

PROPOSED

- b. The total combined amount of biodiesel fired in diesel engine generators D-1 and D-2 shall not exceed 343,392 gallons per any rolling twelve (12) month period.
- c. The total combined amount of biodiesel fired in diesel engine generators D-3, D-4 and D-5 shall not exceed 1,040,688 gallons per any rolling twelve (12) month period.

Reason: A biodiesel blend of 20% biodiesel and 80% fuel oil no. 2 results in a small NO_x increase of 2%. A limit of 20% of the existing permitted total annual fuel use of 1,716,960 gallons/year for D-1 and D-2 is equal to 343,392 gallons/year and is equivalent on an annual basis to using the 20% biodiesel blend for a year. A limit of 20% of the maximum fuel consumption rate for D-3, D-4 and D-5 is equal to 1,040,688 gallons/yr and is equivalent on an annual basis to using the 20% biodiesel blend for a year.

2. Diesel engine generators D-6 through D-9

Change: Allow the use of biodiesel as backup fuel.

Reason: Increase operational flexibility since there may be only a 2% increase in NO_x emissions and decreases in other pollutant emissions. The permittee still has to comply with the existing emission limits.

Change: Make corrections to some of the full-load concentration limits and eliminate the part-load concentration limits.

Reason: To make the full-load concentration limits consistent with the lb/hr limits. Also, removal of the part-load concentration limits will not increase lb/hr or annual emissions. Therefore, the ambient impacts do not change.

Change: Eliminate testing at part-load concentration limits.

Reason: Part-load concentration limits have been eliminated.

Change: Eliminate FITR on diesel engine generator D-9.

Reason: Existing permit does not require FITR for NO_x control, only SCR. D-9 was initially delivered with FITR installed, permittee would like to remove FITR when changing fuel injectors.

Change: Eliminate the provision in the permit for time-shared NO_x and CO CEMS.

Reason: KIUC upgraded the time-shared NO_x and CO CEMS to individual CEMS.

3. Combustion gas turbines GT-1 and GT-2

Change: Allow the use of naphtha and biodiesel as backup fuel.

Reason: Increase operational flexibility since there are no expected increases in emissions.

4. Steam boiler S-1

Change: Allow the use of biodiesel as backup fuel.

Reason: Increase operational flexibility since there are no expected increases in emissions.

Change: Eliminate fuel oil no. 6 as an allowable fuel in the steam boiler S-1 and increase the monthly quantity of specification used oil burned from 10,000 gallons to 15,000 gallons.

Reason: Fuel oil no. 6 not used and no increase in emissions.

PROPOSED

Change: Revise the permit condition requiring sampling and testing of specification used oil collected onsite to make it consistent with the current, approved practice of testing the specification used oil stored in the no. 6 specification used oil tank prior to being transferred to the S-1 day tank.

Reason: Increase spec used oil sampling flexibility while complying with state and federal requirements for spec used oil.

Conclusion:

Recommend renewing Covered Source Permit No. 0097-01-C, which would supersede Covered Source Permit No. 0097-01-C, issued on August 7, 2000. The permit would incorporate the significant permit conditions listed above and be subject to a 30-day public comment period and 45-day EPA review period.

Reviewer: Darin Lum
Date: 8/05