

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

ENGINEERING DIVISION

APPLICATION PROCESSING AND CALCULATIONS

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Equipment Location

Kimberly-Clark Worldwide Inc. Fullerton Mill
 2001 E. Orangethorpe Ave.
 Fullerton, California 92634

MODIFICATION
 PERMIT TO CONSTRUCT

Equipment Description

PROCESS 7: GAS TURBINE POWER GENERATION					
Equipment	Device ID	Connected To	Source Type/ Monitoring Unit	Emissions	Equipment Specific Conditions
TURBINE, SOLAR, MODEL TITAN 130, NATURAL GAS, 454-2 162 MMBTU PER HOUR. GENERATOR, 13.4 MW BOILER, HEAT RECOVERY STEAM GENERATOR STEAM TURBINE, 2-MW Reference A/N 440202 505173 Modification	D-84	C-86	NOX: MAJOR SOURCE	CO: 2000 PPMV NATURAL GAS (5) [RULE 407]; CO: 6 5 PPMV NATURAL GAS (4) [RULE 1303(a)(1)-BACT]; NH3: 5 PPMV NATURAL GAS(4) [RULE 1303(a)(1)-BACT]; NOX 2.5 PPMV NATURAL GAS(4) [RULE 2005] NOX: 96PPMV (8) [40CFR 60 Subpart GG]; PM: 0.01 GR/SCF (5A) [RULE 475, PM: 11 LBS/HR (5B) [RULE 475]; PM: 0.1 GRAINS/SCF (5) [RULE 409]; VOC: 0.0027 lb/mmbtu (4) [RULE 1303(a)(1)-BACT] SO2: 150 PPMV (8) [40CFR 60 Subpart GG]	A99.1, A99.2, A99.3, A195.1, A195.2, A195.3, A327.2, C1.4, D12.5, D29.2, D29.3, D82.2, D82.3, E193.1, K40.2

Conditions:

- A99.1 The 2.5 PPM NOX emission limit shall not apply during start-up or shut-down. Start-up/Shut-down shall not exceed 4 hours in any one day.
- A99.2 The 6 5 PPM CO emission limit shall not apply during start-up or shut-down. Start-up/Shut-down shall not exceed 4 hours in any one day.
- A99.3 The 5 PPM NH3 emission limit shall not apply during start-up or shut-down. Start-up/Shut-down shall not exceed 4 hours in any one day.

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A195.1 The 5 PPM NH3 emission limit is average over 60 minutes, at 15 percent oxygen, dry.

A195.2 The 2.5 PPM CO emission limit is average over 60 minutes, at 15 percent oxygen, dry.

A195.3 The 6.5 PPM CO emission limit is average over 60 minutes, at 15 percent oxygen, dry.

A327.2 For the purpose of determining compliance with District Rule 475, combustion contaminant emissions may exceed the concentration limit or the mass emission limit listed, but not both limits at the same time.

C1.4 The operator shall limit the duration of startup or shutdown to no more than 4 hours(s).

For the purpose of this condition, duration of start-up or shutdown shall be defined as the period of time during which the equipment is heated to operating temperature from a cold or ambient temperature (start-up) or allowed to cool from a normal operating temperature to a cold or ambient temperature (shut-down).

D12.5 The operator shall install and maintain a(n) non-resettable totalizing fuel meter to accurately indicate the fuel usage of the gas turbine.

The measuring device or gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The operator shall also install and maintain a device to continuously record the parameter being measured.

D29.2 The operator shall conduct source test(s) for the pollutant(s) identified below.

POLLUTANT(S) TO BE TESTED	REQUIRED TEST METHOD(S)	AVERAGING TIME	TEST LOCATION
SOX EMISSIONS	APPROVED DISTRICT METHOD	DISTRICT-APPROVED AVERAGING TIME	OUTLET OF THE SCR
NOX EMISSIONS	APPROVED DISTRICT METHOD	DISTRICT-APPROVED AVERAGING TIME	OUTLET OF THE SCR
CO EMISSIONS	APPROVED DISTRICT METHOD	DISTRICT-APPROVED AVERAGING TIME	OUTLET OF THE SCR
ROG EMISSIONS	APPROVED DISTRICT METHOD	DISTRICT-APPROVED AVERAGING TIME	OUTLET OF THE SCR
PM10 EMISSIONS	APPROVED DISTRICT METHOD	DISTRICT-APPROVED AVERAGING TIME	OUTLET OF THE SCR
NH3 EMISSIONS	APPROVED DISTRICT METHOD	DISTRICT-APPROVED AVERAGING TIME	OUTLET OF THE SCR
PM EMISSIONS	APPROVED DISTRICT METHOD	DISTRICT-APPROVED AVERAGING TIME	OUTLET OF THE SCR

The test shall be conducted in accordance with a District approved source test protocol. The protocol shall be submitted to the engineer identified on the permit to construct no later than 45 days before the proposed test date and shall be approved by the district before the test

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commences. The test protocol shall include the proposed operating conditions of the turbine during the test, the identity of the testing laboratory, a statement from the test laboratory certifying that it meets the criteria of rule 304, and a description of a.

The test shall be conducted to determine the oxygen levels in the exhaust. In addition, the test shall measure the fuel flow rate (CFH), the flue gas flow rate, and the turbine generation output (MW).

The test shall be conducted only after notifying the District of the date and time of the test at least 10 days prior to the test.

The test shall be conducted within 60 days of installation.

D29.3 THE OPERATOR SHALL CONDUCT SOURCE TEST(S) FOR THE POLLUTANT(S) IDENTIFIED BELOW.

POLLUTANT(S) TO BE TESTED	REQUIRED TEST METHOD(S)	AVERAGING TIME	TEST LOCATION
NH3 EMISSIONS	APPROVED DISTRICT METHOD	DISTRICT-APPROVED AVERAGING TIME	OUTLET OF THE SCR

The test shall be conducted quarterly during the first 12 months of operation and at least annually thereafter

The NOx concentration, as determined by the certified CEMS, shall be simultaneously recorded during the ammonia slip test. If the CEMS is inoperable or not yet certified, a test shall be conducted to determine the NOx emissions using District Method 100.1 measured over a 60-minute averaging time period.

The test shall be conducted and the results submitted to the District within 60 days after the test date. The AQMD shall be notified of the date and time of the test at least 10 days prior to the test.

The test shall be conducted to demonstrate compliance with Rule 1303 concentration limit.

D82.2 The operator shall install and maintain a CEMS to measure the following parameters:

The CEMS shall be installed and operated in accordance with an approved AQMD rule 218 CEMs plan application. The operator shall not install the CEMs prior to receiving initial approval from the AQMD

CO concentration in ppmv.

Concentrations shall be corrected to 15 percent oxygen on a dry basis.

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D82.3 The operator shall install and maintain a CEMS to measure the following parameters:

The CEMS shall be installed and operating no later than 12 months after the initial start-up of the turbine. During the interim period between the initial start-up and the provisional certification date of the CEMS, the operator shall comply with the monitoring requirements of rule 2012(H)(3). The operator shall provide written notification of the turbine initial start-up date. Notification shall be submitted within two weeks of initial start-up of the turbine

NOX concentration in ppmv

Concentrations shall be corrected to 15 percent oxygen on a dry basis.

E193.1 The operator shall restrict the operation of this equipment as follows:

The natural gas used by the boilers (D-39 and D-40) shall not exceed 96 million cubic feet per month

The boiler D39 shall not be operated with the boiler D-40 when the gas turbine D-84 is in operation

The gas turbine D-84 shall not be operated when the boiler D-40 is fired on fuel oil or butane gas

The natural gas used by the boilers (D39 and D40) and the gas turbine (D84) shall not exceed ~~404~~ 103 million cubic feet per month

K40.2 THE OPERATOR SHALL PROVIDE TO THE DISTRICT A SOURCE TEST REPORT IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS:

Emission data shall be expressed in terms of lbs/MM cubic feet.

Source test results shall also include turbine and generator output under which the test was conducted.

All moisture concentration shall be expressed in terms of percent corrected to 15 percent oxygen.

Source test results shall be submitted to the District no later than 60 days after the source test was conducted.

All exhaust flow rate shall be expressed in terms of dry standard cubic feet per minute (DSCFM) and dry actual cubic feet per minute (DACFM).

Source test results shall also include turbine fuel flow rate under which the test was conducted.

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Emission data shall be expressed in terms of concentration (ppmv), corrected to 15 percent oxygen, dry basis.

Emission data shall be expressed in terms of mass rate (lbs/hr). In addition, solid PM emissions, if required to be tested, shall also be reported in terms of grains per DSCF.

Background

Kimberly-Clark Worldwide Inc., Facility ID# 21887, is NOx/SOx RECLAIM facility that manufactures various paper products located at 2001 E. Orangethorpe Ave., Fullerton, CA. The initial Title V permit was issued on October 6, 1999, and a second Title V renewal permit was issued to this facility on October 6, 2009.

Kimberly-Clark submitted application no. 505173 as a modification to the existing cogen system by replacing the gas turbine with the identical model Titan 130 manufactured by Solar. However, the new model has a higher rating (increased the rating from 151.2 mmbtu/hr to 162 mmbtu/hr). Currently the existing cogen system and boilers D39 and D40 are subject to the 101 million cubic feet natural gas per month limit. The applicant is asking for an increase the monthly fuel usage from 101 to 103 million cubic feet of natural gas per month. BACT will remain the same for NOX at 2.5 ppm but will decrease for CO from 6 ppm to 5 ppm. The co-generation plant is configured as a combined cycle operation. The gas turbine drives a generator to produce electricity while the heat recovery steam generator (HRSG) generates steam from the gas turbine exhaust. The HRSG will not contain a separate duct burner. Steam from the boiler is used in the mill's manufacturing operations. Any excess steam drives a steam turbine generator for additional production of electricity.

Natural gas is supplied from an existing gas supply pipeline, compressed via two gas compressors and delivered to the gas turbine. The turbine exhaust enters the HRSG where it passes through the oxidation catalyst. The oxidation catalyst will be required to meet the Best Available Control Technology (BACT) limits of 5 parts per million Carbon Monoxide, and 2 parts per million VOC (0.0027 lb/mmbtu).

The gas turbine is equipped with a Low-NOx combustor. This equipment stages the combustion of natural gas to reduce the amount of NOx formed. NOx will also be controlled via a Selective Catalytic Reduction (SCR) system, which was installed to reduce the NOx stack emissions to less than 2.5 ppmv. The SCR system will selectively reduce NOx emissions by injecting ammonia into the exhaust prior to the catalyst module, which is internal to the boiler gas passage. An aqueous ammonia storage and supply system supplies the SCR with ammonia. Currently the existing system met the BACT limit of 2.5 ppm NOX (dry basis, corrected to 15% O2) by testing which was conducted on October 24, 2002 and through the use of the NOx CEMS. Ammonia was also below the required limit of 5ppm NH3.

The gas turbine co-generation system is used to supply the facility with its electricity and steam needs. The co-gen system may be operated at variable loads depending upon demand.

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BACT Evaluation:

Kimberly-Clark is seeking to replace the existing gas turbine with a new gas turbine with slightly higher rating (increased rating from 151.2 MMbtu/hr to 162 MMbtu/hr). In addition to the rate increase, the applicant is proposing an increase in the gas usage from 101 million cubic feet per month to 103 million cubic feet month. Currently gas turbine D84 and boilers D39 and D40 have a 101 million cubic feet natural gas monthly cap. Kimberly Clark had installed the co-generation plant in order to offset the current increased electrical rates and potential increases in the future. The purpose of the plant is to offset costs and provide steam for the manufacturing process. The Boiler's, D39 & D40, gas usage will remain capped at 96 million cubic feet natural gas per month. The current BACT for this size turbine 15 MW is NOx emissions at 2.5 ppm, CO emissions at 5.0 ppm, and VOC at 2 ppm (0.0027 lb/mmbtu). The existing cogen unit has limits of 2.5 ppm NOx, 6.0 ppm CO, and 0.0027 lb/mmbtu VOC. The current Low NOx burner technology and existing SCR unit will meet the NOX 2.5 ppm limit. Kimberly Clark understands that the new unit will be required to meet the 5.0 ppm for CO. Source Testing will be performed to ensure compliance with the emission limits.

Emissions Calculations

Co-gen(505173)

Operating schedule 8736 hrs/yr, 30day-ave 360 day/yr

D-84 162 mmbtu/hr

This equipment has to meet the BACT limits of:

- NOx: 2.5 ppm limit
- CO: 5 ppm
- NH3: 5 ppm
- VOC: 0.0027 lb/mmbtu

Apart from the ppm limitations, PM10 emission factor was provided by the manufacturer and SOx from the Annual emission reporting data.

Cogen has a natural gas cap of 101 million cubic feet per month which is being increased by 2.0 million cubic feet per month.

$$ROG: = \frac{101.0 \text{ Mmcf}}{\text{Mnth}} \left(\frac{1050 \text{ btu}}{\text{cft}} \right) \left(\frac{0.0027 \text{ lb}}{\text{mmbtu}} \right) = \frac{286.3 \text{ lb}}{\text{month}} \left(\frac{\text{month}}{30 \text{ day}} \right) = \frac{9.54 \text{ lbs}}{\text{day}}$$

$$ROG: = \frac{103.0 \text{ Mmcf}}{\text{Mnth}} \left(\frac{1050 \text{ btu}}{\text{cft}} \right) \left(\frac{0.0027 \text{ lb}}{\text{mmbtu}} \right) = \frac{292.01 \text{ lb}}{\text{month}} \left(\frac{\text{month}}{30 \text{ day}} \right) = \frac{9.73 \text{ lbs}}{\text{day}}$$

Delta @ 2.0 million cubic feet per month

$$ROG: = \frac{2.0 \text{ Mmcf}}{\text{Mnth}} \left(\frac{1050 \text{ btu}}{\text{cft}} \right) \left(\frac{0.0027 \text{ lb}}{\text{mmbtu}} \right) = \frac{5.67 \text{ lb}}{\text{month}} \left(\frac{\text{month}}{30 \text{ day}} \right) = \frac{0.19 \text{ lbs}}{\text{day}}$$

30day-ave:(Increase)

$$\frac{0.0 \text{ lb}}{\text{day}}$$

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NOx:

Uncontrolled:

$$\text{NOx:} = \frac{101.0 \text{ mmcft}}{\text{month}} \left(\frac{1050 \text{ btu}}{\text{cft}} \right) \left(\frac{8710 \text{ dscf}}{\text{mmbtu}} \right) \left(\frac{15 \text{ ppm}}{10^5} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{46 \text{ lb NOx}}{385 \text{ scf}} \right) = 5,864.2 \text{ lb} \frac{(\text{month})}{\text{month 30 day}} = 195.5 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

$$\text{NOx:} = \frac{103.0 \text{ mmcft}}{\text{month}} \left(\frac{1050 \text{ btu}}{\text{cft}} \right) \left(\frac{8710 \text{ dscf}}{\text{mmbtu}} \right) \left(\frac{15 \text{ ppm}}{10^5} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{46 \text{ lb NOx}}{385 \text{ scf}} \right) = 5,980.3 \text{ lb} \frac{(\text{month})}{\text{month 30 day}} = 199.3 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

Controlled:

$$\text{NOx:} = \frac{101.0 \text{ mmcft}}{\text{month}} \left(\frac{1050 \text{ btu}}{\text{cft}} \right) \left(\frac{8710 \text{ dscf}}{\text{mmbtu}} \right) \left(\frac{2.5 \text{ ppm}}{10^5} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{46 \text{ lb NOx}}{385 \text{ scf}} \right) = 977.4 \text{ lb} \frac{(\text{month})}{\text{month 30 day}} = 32.58 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

$$\text{NOx:} = \frac{103.0 \text{ mmcft}}{\text{month}} \left(\frac{1050 \text{ btu}}{\text{cft}} \right) \left(\frac{8710 \text{ dscf}}{\text{mmbtu}} \right) \left(\frac{2.5 \text{ ppm}}{10^5} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{46 \text{ lb NOx}}{385 \text{ scf}} \right) = 996.7 \text{ lb} \frac{(\text{month})}{\text{month 30 day}} = 33.22 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

Delta @ 2.0 million cubic feet per month

$$\text{NOx:} = \frac{2.0 \text{ mmcft}}{\text{month}} \left(\frac{1050 \text{ btu}}{\text{cft}} \right) \left(\frac{8710 \text{ dscf}}{\text{mmbtu}} \right) \left(\frac{2.5 \text{ ppm}}{10^5} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{46 \text{ lb NOx}}{385 \text{ scf}} \right) = 19.35 \text{ lb} \frac{(\text{month})}{\text{month 30 day}} = 0.64 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

NOx increase:

$$\frac{0.64 \text{ lb}}{\text{day}} \quad \text{RTCs}$$

Controlled:

RECLAIM emission factor of 0.6 lbs/mmscf

$$\text{Sox:} = \frac{101.0 \text{ mmcft}}{\text{month}} \left(\frac{0.6 \text{ lbs SOx}}{\text{mmcft}} \right) = 61.6 \text{ lb} \frac{(\text{month})}{\text{month 30 day}} = 2.02 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

$$\text{Sox:} = \frac{103.0 \text{ mmcft}}{\text{month}} \left(\frac{0.6 \text{ lbs SOx}}{\text{mmcft}} \right) = 61.8 \text{ lb} \frac{(\text{month})}{\text{month 30 day}} = 2.06 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

Delta @ 2.0 million cubic feet per month

$$\text{Sox:} = \frac{2.0 \text{ mmcft}}{\text{month}} \left(\frac{0.6 \text{ lbs SOx}}{\text{mmcft}} \right) = 1.2 \text{ lb} \frac{(\text{month})}{\text{month 30 day}} = 0.04 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

Assuming 65% of the SO2 converts to SO3

$$\text{Sox} = 0.04 \text{ lb/day} \times 0.35 = 0.014 \text{ lbs} \frac{(\text{month})}{\text{day}}$$

SOX increase:

$$\frac{0.0 \text{ lb}}{\text{day}}$$

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CO:

Uncontrolled

$$\text{CO:} = 101.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) \left(\frac{8710 \text{dscf}}{\text{mmbtu}} \right) \left(\frac{25 \text{ppm}}{10^6} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{28.01 \text{lb CO}}{385 \text{scf}} \right) = 5,951.3 \frac{\text{lb}}{\text{month}} = 198.4 \frac{\text{lbs}}{30 \text{ day}}$$

$$\text{CO:} = 103.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) \left(\frac{8710 \text{dscf}}{\text{mmbtu}} \right) \left(\frac{25 \text{ppm}}{10^6} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{28.01 \text{lb CO}}{385 \text{scf}} \right) = 6,069.2 \frac{\text{lb}}{\text{month}} = 202.3 \frac{\text{lbs}}{30 \text{ day}}$$

Controlled:

$$\text{CO:} = 101.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) \left(\frac{8710 \text{dscf}}{\text{mmbtu}} \right) \left(\frac{6 \text{ppm}}{10^6} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{28.01 \text{lb CO}}{385 \text{scf}} \right) = 1,428.3 \frac{\text{lb}}{\text{month}} = 47.61 \frac{\text{lbs}}{30 \text{ day}}$$

$$\text{CO:} = 103.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) \left(\frac{8710 \text{dscf}}{\text{mmbtu}} \right) \left(\frac{5 \text{ppm}}{10^6} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{28.01 \text{lb CO}}{385 \text{scf}} \right) = 1,213.8 \frac{\text{lb}}{\text{month}} = 40.46 \frac{\text{lbs}}{30 \text{ day}}$$

Delta @ 2.0 million cubic feet per month

$$\text{CO:} = 101.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) \left(\frac{8710 \text{dscf}}{\text{mmbtu}} \right) \left(\frac{6 \text{ppm}}{10^6} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{28.01 \text{lb CO}}{385 \text{scf}} \right) = 1,428.3 \frac{\text{lb}}{\text{month}} = 47.61 \frac{\text{lbs}}{30 \text{ day}}$$

$$\text{CO:} = 103.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) \left(\frac{8710 \text{dscf}}{\text{mmbtu}} \right) \left(\frac{5 \text{ppm}}{10^6} \right) \left(\frac{20.9}{20.9 - 15.0} \right) \left(\frac{28.01 \text{lb CO}}{385 \text{scf}} \right) = 1,213.8 \frac{\text{lb}}{\text{month}} = 40.46 \frac{\text{lbs}}{30 \text{ day}}$$

30day-ave:

$$40.46 - 47.61 = -7.15 \frac{\text{lb}}{\text{day}} \text{ (decrease)}$$

PM10 Emission Factor for Gas Turbine from Solar Turbines

PM10 emission factor: 0.006 lb/mmbtu

$$\text{PM10:} = 101.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) (0.006 \frac{\text{lb}}{\text{mmbtu}}) = 636.3 \frac{\text{lb}}{\text{month}} = 21.21 \frac{\text{lbs}}{30 \text{ day}}$$

$$\text{PM10:} = 103.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) (0.006 \frac{\text{lb}}{\text{mmbtu}}) = 648.9 \frac{\text{lb}}{\text{month}} = 21.63 \frac{\text{lbs}}{30 \text{ day}}$$

Delta @ 2.0 million cubic feet per month

$$\text{PM10:} = 2.0 \frac{\text{mmcuft}}{\text{month}} \left(\frac{1050 \text{btu}}{\text{cuft}} \right) (0.006 \frac{\text{lb}}{\text{mmbtu}}) = 12.6 \frac{\text{lb}}{\text{month}} = 0.42 \frac{\text{lbs}}{30 \text{ day}}$$

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Assuming 65% of the SO2 converts to SO3

$$PM_{10} = 0.04 \text{ lb/day} \times 0.65 = 0.026 \frac{\text{lbs}}{\text{day}}$$

$$\text{Total } PM_{10} = 0.42 + 0.026 = 0.446$$

30day-ave:

$$0.0 \frac{\text{lb}}{\text{day}}$$

$$NH_3 = \frac{101.0 \text{ mmcft} (1050\text{btu})}{\text{month}} \frac{(8710\text{dscf})}{\text{cft}} \frac{(5 \text{ ppm})}{\text{mmbtu}} \left(\frac{20.9}{10^6} \right) \frac{(17\text{lb } NH_3)}{20.9 - 15.0} = \frac{722.4 \text{ lb}}{\text{month}} \frac{(\text{month})}{30 \text{ day}} = 24.08 \frac{\text{lbs}}{\text{day}}$$

$$NH_3 = \frac{103.0 \text{ mmcft} (1050\text{btu})}{\text{month}} \frac{(8710\text{dscf})}{\text{cft}} \frac{(5 \text{ ppm})}{\text{mmbtu}} \left(\frac{20.9}{10^6} \right) \frac{(17\text{lb } NH_3)}{20.9 - 15.0} = \frac{736.71 \text{ lb}}{\text{month}} \frac{(\text{month})}{30 \text{ day}} = 24.55 \frac{\text{lbs}}{\text{day}}$$

Delta @ 2.0 million cubic feet per month

$$NH_3 = \frac{2.0 \text{ mmcft} (1050\text{btu})}{\text{month}} \frac{(8710\text{dscf})}{\text{cft}} \frac{(5 \text{ ppm})}{\text{mmbtu}} \left(\frac{20.9}{10^6} \right) \frac{(17\text{lb } NH_3)}{20.9 - 15.0} = \frac{14.3 \text{ lb}}{\text{month}} \frac{(\text{month})}{30 \text{ day}} = 0.47 \frac{\text{lbs}}{\text{day}}$$

30day-ave:

$$0.47 \frac{\text{lb}}{\text{day}} = 0.0 \text{ lb}$$

The cogen natural gas usage will be increased by 2.0 million cubic feet per month. Because BACT will reduce the CO concentration from 6 ppm to 5 ppm, the CO emissions will be decreased. The potential 30-day rolling average emissions from the operation of this turbine are listed below:

30-day ave	ROG	NOx	SOx	CO	PM10	NH3
Current Emissions	9.54	32.580	2.02	47.61	21.21	24.08
New Emissions	9.73	33.22	2.06	40.44	21.63	24.55
Increase	0.0	1.0	0.0	-7.0	0.0	0.0

Current BACT requirement for NOX emissions from a gas turbine is 2.5 ppmv which is the current limit for this unit. For CO however, the BACT requirement is 5 ppmv which will have a reduction in the CO emissions from the new unit.

The new gas turbine has a lower CO and NOX uncontrolled concentration limits of 25 and 15 ppmv respectively. The existing unit has a CO and NOX uncontrolled concentration limits of 50 and 25 ppmv respectively and as a result, there will not be an emission increase from the new unit during startup and shutdown. Further, emissions from the startup and shutdown were accounted for during the initial permitting of the existing unit under A/N 390694.

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Risk Assessment:

The toxic contaminants listed below are the same that were considered when the Turbine was originally permitted under application 390694. All the emission factors were taken from AP-42, table 3.1-3, except the ammonia and lead. The ammonia emissions were originally determined by EPA Tanks Version 4.09 model. The lead is being included to stay consistent with the previous filing. The change of condition will cause an increase usage of 2.0 million cubic feet per month natural gas. The annual/hourly impacts are as follows;

2.0 mmcuft/month(12 month/yr) = 24 mmcuft/yr
 24 mmcuft/yr(1050 btu/cuft) = 25,200 mmBTU/yr

Annual operating schedule:

24 hr/day, 7days/week, 52 weeks/yr or 8760 hrs/yr

Hourly:

$$25,200 \text{ mmBTU/yr} / (8760 \text{ hrs}) = 2.877 \text{ mmBTU/hr}$$

Toxic Contaminant	MMBTUs/hr	Emission Factor (lbs/mmBTU)	Emissions lb/hr
Lead	2.877	5.0E-07	1.439E-06
1,3 Butadiene	2.877	<4.3E-07	<1.237E-06
Acetaldehyde	2.877	4.0E-05	1.151E-04
Acrolein	2.877	6.4E-06	1.841E-05
Benzene	2.877	1.2E-05	3.452E-05
Ethylbenzene	2.877	3.2E-05	9.206E-05
Formaldehyde	2.877	7.1E-04	2.043E-03
Naphthalene	2.877	1.3E-06	3.740E-06
PAH	2.877	2.2E-06	6.329E-06
Propylene Oxide	2.877	<2.9E-05	<8.343E-05
Toluene	2.877	1.3E-04	3.740E-04
Xylene	2.877	6.4E-05	1.841E-04
Ammonia	2.877	8.53E-02	2.454E-01

The Screening Risk Assessment passed under Tier 2 with the following results:

MICR	
Residential	Commercial
5.72E-07	7.52E-07

The Hazard Index passed for all targeted organs.

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Evaluation & Rule Review

Rule 212 (c)(1): This section requires a public notice for all new or modified permit units that emit air contaminants located within 1,000 feet from the outer boundary of a school.
 No public notice is required since no school is located within 1,000 ft from the above site.

Rule 212 (c)(2): This section requires a public notice for all new or modified facilities that have on-site emission increases exceeding any of the daily maximums as specified by Rule 212(g).
 The modification to the cogen system by replacing the gas turbine will not cause an emission increase exceeding the limits specified in Rule 212(g). No emissions in excess of the daily maximums under 212(g) will be expected. Therefore, a public notice will not be required under this section of the rule.

Rule 212(c)(3): This section requires a public notice for all new or modified permit unit with increases in emissions of toxic air contaminants listed in Table I of Rule 1401 resulting in MICR greater than 1E-6 per permit unit or greater than 10E-6 per facility.
 The proposed project will result in an emission increase of toxic emissions associated with the increase in natural gas usage by the gas turbine. However, as discussed in additional detail in the evaluation, the toxic emissions from this equipment will not result in an increase in MICR of more than 1×10^{-6} nor a hazard index greater than 1.0. Public notice is not required under this section of the rule.

Rule 212(g): This section requires a public notice for all new or modified sources that result in emission increases exceeding any of the daily maximums as specified by Rule 212(g).
 No emission increase in excess of the daily maximums of this rule will be expected:

	Maximum Daily Emissions					
	<u>ROG</u>	<u>NO_x</u>	<u>PM₁₀</u>	<u>SO₂</u>	<u>CO</u>	<u>Pb</u>
Emission increase	0	1.0	0	0	-7.0	0
MAX Limit (lb/day)	30	40	30	60	220	3
Compliance Status	Yes	Yes	Yes	Yes	Yes	Yes

A Rule 212(g) notice will not be required since the emissions from the modification will not exceed the maximum limit of this rule.

Rule 401: With proper maintenance and good operating practices, compliance with this rule is expected.

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- Rule 402: With proper maintenance and good operating practices, nuisance issues are not expected.
- Rule 407 This rule limits CO emissions to 2000 ppm. The CO emissions from the gas turbine will be controlled by an oxidation catalyst to 5 ppmvd @ 15% O2 (1-hr average). Thus, the turbines will be in compliance with the rule, which will be verified with a source test and CO CEMS data.
- Rule 409 Compliance with the PM emission limit of 0.1 grain per cubic foot is anticipated with the use of natural gas as fuel.
- Rule 475: This rule applies to electric power generating equipment greater than 10MW installed after May 7, 1976. The rule requires that the combustion contaminants (combustion contaminants are defined as particulate matter in AQMD Regulation 1) shall not exceed 11 lb/hr or 0.01 gr/scf. Compliance is demonstrated if either the mass limit or the concentration limit is met. A Mass PM10 emission from the gas turbine is estimated to be 0.9 lb/hr and the estimated grain loading will be 0.0045 gr/scf. Thus, the rule requirements of 0.01 gr/scf will be complied with. Actual compliance will be verified during performance test.
- Rule 1135: Emissions of NOx from Electric Power Generating Systems:- As this facility is a RECLAIM facility, compliance with this rule is not required as per R-2001, Table 1.
- Reg IX: NSPS for gas turbines – 40 CFR Part 60 Subpart GG
The NOx emissions from the gas turbine under normal operations will be < 2.5 ppmv corrected to 15% O2 and the SOx emissions will be less than < 1 ppmv corrected to 15%O2. Compliance with this rule is expected. A source test will be conducted to verify compliance with this rule.
- REG XIII: New Source Review. Although Kimberly-Clark is a NOx/SOX RECLAIM facility, compliance with Reg. XIII is still required since the proposed project will result in ROG, CO and PM10 emissions.
- 1303(a) BACT: As indicated earlier in this report, the proposed project is expected to comply with BACT requirements. The co-gen operation will be required to comply with the limits of 2.5 ppm NOx, 5ppm CO, 0.0027 lb/mmbtu VOC, and 5 ppm ammonia slip via the use of an SCR Unit and Oxidation Catalyst.
- 1303(b)(1) Modeling:
The applicant must substantiate with the modeling that the project will not cause a violation, or make significantly worse an existing violation of any state or national ambient air quality standards at any receptor location in the AQMD. For this project, air dispersion modeling is required to determine the impacts from the proposed replacement of the gas turbine.

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Rule 1303 (b) (1) requires modeling analysis for CO and PM₁₀ emissions. As per R-1303 (b)(1), applicant must substantiate with modeling that the project will not cause exceedances of the significant change threshold concentrations for CO and PM₁₀. The maximum project impacts of CO and PM₁₀ emissions were determined using **ISCST3** dispersion model, and representative meteorological data from the Anaheim meteorological station. A review of the modeling analysis conducted by the applicant indicates that the air quality impacts from the proposed project will meet the District's Rule 1303 modeling requirements.

1303(b) Offsets: The proposed project will result in an emission decrease of 7 pounds per day of CO emissions due to the lower BACT limit of 5 ppmv. Further, the increase in ROG and PM10 emissions are considered insignificant.

1303(b)(4): The facility is expected to be in full compliance with all applicable rules and regulations of the District.

1303(b)(5)(A) & 1303(b)(5)(D): The proposed project does not qualify as a major modification at a major polluting facility. Further, the proposed project is exempt from CEQA according to the responses Kimberly-Clark provided on Form 400-CEQA for this project. Their responses in "Review of Impacts Which May Trigger CEQA" on Form 400-CEQA were all marked "No".

1303(b)(5)(B): The Increase in emissions associated with the proposed modification of the cogeneration system does not qualify as a major modification at an existing major polluting facility.

1303(b)(5)(C): A modeling analysis for plume visibility is not required since the net emission increase from the proposed project does not exceed 15 ton/yr of PM10 or 40 ton/yr of NOx.

Reg XIV: Toxics: 1401
The net increase of 2 million cubic feet per month will pass the Tier 2 Screening Risk Assessment with the following values;

MICR	
Residential	Commercial
5.72E-07	7.52E-07

The Hazard Index passed for all targeted organs.
Rule 1401 compliance is expected.

REG XX Kimberly-Clark is a NOx/SOx cycle 2 RECLAIM facility. The proposed modification to the cogen system by the replacement of the turbine is classified as a NOx Major Source. The gas turbine will be vented to an oxidation catalyst and an SCR system. The gas

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turbine will be required to meet a BACT limit of 2.5 ppmv NOx, 5 ppmvd CO, and 0.0027 lb/mmbtu VOC.

RULE 2005(c)(1)(A): The gas turbine will be vented to a oxidation catalyst and an SCR system. The turbine will be limited to a BACT limits of 2.5 ppmv NOX, 5 ppmv CO, and 2 ppmv VOC (0.0027 lb/mmbtu)

RULE 2005(c)(1)(B): The applicant must substantiate with the modeling that the project will not cause a violation, or make significantly worse an existing violation of any state or national ambient air quality standards at any receptor location in the AQMD. For this project, air dispersion modeling is required to determine the impacts from the proposed replacement of the gas turbine.

Rule 2005 requires modeling analysis for NOx emissions. As per R-2005, applicant must substantiate with modeling that the project will not cause exceedance of the significant change threshold concentrations for NOx. The maximum project impact of NOx emissions was determined using **ISCST3** dispersion model, and representative meteorological data from the Anaheim meteorological station. A review of the modeling analysis conducted by the applicant indicates that the air quality impacts from the proposed project will meet the District’s Rule 2005 modeling requirements.

RULE 2005(c)(2): Kimberly-Clark holds sufficient RTCs to offset the NOx emission increase of 234 lb/yr.

RULE 2005(g)(1): Statewide compliance certification is not required since the proposed project will not result in an increase of 1 pound or more of NOx emissions and therefore does not qualify as a major modification at major polluting facility.

RULES 2005(g)(2) & 2005(g)(3): The proposed project does not qualify as a major modification at a major polluting facility. Further, the proposed project is exempt from CEQA according to the responses Kimberly-Clark provided on Form 400-CEQA for this project. Their responses in “Review of Impacts Which May Trigger CEQA” on Form 400-CEQA were all marked “No”.

RULE 2005(g)(4): A modeling analysis for plume visibility is not required since the net emission increase from the proposed project does not exceed 40 ton/yr of NOx.

REG. XXX

This facility is in the RECLAIM program. The proposed project is considered as a “de minimis significant permit revision” for non-RECLAIM pollutants or hazardous air pollutants (HAPs), and a “minor permit revision” for RECLAIM pollutants to the RECLAIM/Title V permit for this facility.

Non-RECLAIM Pollutants or HAPs

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Rule 3000(b)(6) defines a “de minimis significant permit revision” as any Title V permit revision where the cumulative emission increases of non-RECLAIM pollutants or HAPs from these permit revisions during the term of the permit are not greater than any of the following emission threshold levels:

Air Contaminant	Daily Maximum (lbs/day)
HAP	30
VOC	30
NOx*	40
PM10	30
SOx*	60
CO	220

* Not applicable if this is a RECLAIM pollutant

To determine if a project is considered as a “de minimis significant permit revision” for non-RECLAIM pollutants or HAPs, emission increases for non-RECLAIM pollutants or HAPs resulting from all permit revisions that are made after the issuance of the Title V renewal permit shall be accumulated and compared to the above threshold levels. This proposed project is the 1st permit revision to the Title V renewal permit issued to this facility on October 6, 2009. The following table summarizes the cumulative emission increases resulting from all permit revisions since the Title V renewal permit was issued:

Revision	HAP	VOC	NOx	PM ₁₀	SOx	CO
1 st Revision: Replace turbine with a 162 million btu/hr turbine and increase the natural gas cap to 103 mmcft/month. Reduce CO BACT from 6ppm to 5 ppm.	0.0	0.0	1.0	0.0	0.0	-7.0
Revisions Cumulative	0.0	0.0	1.0	0.0	0.0	-7.0
Maximum Daily	30	30	40	30	60	220

Since the cumulative emission increases resulting from all permit revisions are not greater than any of the emission threshold levels, this proposed project is considered as a “de minimis significant permit revision” for non-RECLAIM pollutants or HAPs.

RECLAIM Pollutants

Rule 3000(b)(12)(A)(v) defines a “minor permit revision” as any Title V permit revision that does not result in an emission increase of RECLAIM pollutants over the facility starting Allocation plus nontradeable Allocations, or higher Allocation amount which has previously undergone a significant permit revision process.

Since NOx is a RECLAIM pollutant for this facility, a separate analysis shall be made to determine if the proposed permit revision is considered a “minor permit revision” for RECLAIM pollutants. Section B of

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the Title V permit shows that this facility's NOx starting Allocation plus the non-tradable Allocation is 45,546 pounds. The proposed project is expected to result in an increase of 0.64 lb/day (234 lbs/year) of NOx emissions from this permit revision, which is less than the starting Allocation plus the non-tradable Allocations of 45,546 pounds. As a result, this proposed project is considered as a "minor permit revision" for RECLAIM pollutants.

RECOMMENDATION

The proposed project is expected to comply with all applicable District Rules and Regulations. Since the proposed project is considered as a "de minimis significant permit revision" for non-RECLAIM pollutants and a "minor permit revision", for RECLAIM pollutant, it is exempt from the public participation requirements under Rule 3006 (b). A proposed permit incorporating this permit revision will be submitted to EPA for a 45-day review pursuant to Rule 3003(j). If EPA does not raise any objections within the review period, a revised Title V permit will be issued to this facility.

Conclusion:

This equipment will operate in compliance with all District Rule and Regulations. A Permit to Construct is recommended for application number 505173 subject to preceding conditions.