APPENDIX H

BAAQMD REFINERIES PROPOSED CARFG2 MODIFICATIONS
WITH BACT DETERMINATIONS

CHEVRON'S PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS SOURCES WITH BACT DETERMINATIONS

New Sources

S-4355 DIB/ Butamer Plant
S-4356 Tertiary Amyl Methly Ether (TAME) Plant
S-3205 Tank, Methanol
S-3206 Tank, Whole Alkylate
S-3207 Tank, FCC Heavy GAsoline
S-3208 Sphere, Butane
S-3209 Sphere, Propane
S-3210 Sphere, Isopropane

Modified Sources

S-4291 Alkylation Plant
S-4357 C4 Treating Plant
S-6053 Alky/TAME Cooling Water Tower Bay
S-6016 FCC Flare
S-6019 Alky/Poly Flare
S-4285 Fluid Catalytic Cracker Unit (FCCU)
S-4353 #3 Naptha Hydrotreater
S-4032 #3 Naptha Hydrotreater, F101
S-4033 #3 Naptha Hydrotreater, F102
S-4346 Gas Recovery Unit
S-4348 H_2 Recovery Plant
S-4282 Aromatics Saturation Plant

Best Available Control Technology (BACT) – Regulation 2-2-301 states that BACT must be applied to sources emitting POC, NPOC, NOx, SOx, TSP, PM10, or CO in excess of 5 pounds per highest day or 365 pounds per year. The following are the units triggering this Regulation and their methods of compliance with BACT unless otherwise noted.

Flanges

Application	Condition	BACT
All flanges	All new flanges inspected quarterly. Leaks of POC defined as 100ppmv.	Use graphite-based gaskets or equivalents for this level of POC control.

Valves

Application	Condition	BACT
All valves	Valves inspected quarterly. Leaks of POC defined as greater than 100ppmv.	Use bellows valves, lived loaded valves, graphitic packing, or equivalent. All other valves will utilize upgraded packing for this level of POC control.

Pumps

Application	Condition	BACT
All pumps	Pumps inspected quarterly. Leaks of POC defined as greater than 500ppmv.	Use double mechanical seals and barrier fluid or equivalent. Will use double mechanical seals with heavy liquid barrier fluid and/or Chevron's seal vapor recovery system at all light liquid service pumps for this level of POC control.

Compressors

Application	Condition	BACT
All compressors	Compressors inspected quarterly. Leaks of POC defined as greater than 500ppm.	Use double mechanical seals and barrier fluid or equivalent. Use wet enclosed seals and/or Chevron's seal vapor recovery system for this level of POC control.

Relief Valves

Application	Condition	BACT
All relief valves	All pressure relief valves will be vented to a flare gas recovery system, furnace, or flare for POC control.	

Process Drains

Application	Condition	BACT
All process drains	Use p-trap or equivalent method. All new process units will have new process drains with p-traps installed for POC control.	

Alkylation Plant

Only new emission from this source is fugitive POC. Will comply with all BACT conditions as stated in tables above with exception of sulfuric acid services.
Sulfuric acid degrades graphitic packing and gaskets, therefore, use Teflon gaskets for flanges and Teflon/graphitic based packing for valves.

Deisobutanizer/ Butamer Plant

Only new emission from this source is fugitive POC. Will comply with all BACT conditions as stated in tables above.

C4 Treating Plant

Only new emission from this source is fugitive POC. Will comply with all BACT conditions as stated in tables above.

TAME Plant

Only new emission from this source is fugitive POC. Will comply with all BACT conditions as stated in tables above.

Hydrogen Recovery Plant

Only new emission from this source is fugitive POC. Will comply with all BACT conditions as stated in tables above.

Aromatics Saturation Unit

Only new emission from this source is fugitive POC. Will comply with all BACT conditions as stated in tables above. Valves which are 2 inches or less and are on process streams with greater than 2 wt% benzene shall wherever feasible (but no less than 95% of these valves) be Bellows-sealed valves or District approved technology. Fugitive sources with greater than 10 wt% benzene shall be inspected monthly.

Alkylation/ TAME Cooling Water Tower Bay

For particulate control, will equip S-6053 Cooling Tower with a high efficiency drift eliminator to reduce drift loss. BACT for POC emissions from this source consists of good operating practice and minimizing POC leaks from process equipment into the cooling water system.

Flare

BACT is not triggered because incremental increase in emissions from S-6016 and S-6019 are less than 1 pound per day.

Storage Tanks

All non-LPG tanks equipped with external floating roof tanks. Design criteria will meet but not be limited to dual seals with zero gap secondary seal. All roof penetrations are gasketed, adjustable roof legs fitted with vapor seal boots, and with no slots above liquid level on guide poles. Guide poles with organic liquid inside will have a float fitted with wiper seals.

FCCU Gasoline Hydrotreater

Only new emission from this source is fugitive POC. Will comply with all BACT conditions as stated in tables above.

FCC Unit

Application	Condition	BACT
POC	Will comply with all BACT conditions as stated in tables above for POC control. Compliance shall be based on annual source tests that demonstrate Chevron will not exceed 6.1 tons POC emissions per year.	
NOx	24hr operating day avg: 220ppmv NOx, 3% O_2, dry Rolling 30 day avg: 180ppmv NOx, 3% O_2, dry Calendar year avg: 150ppmv NOx, 3% O_2, dry	
SOx	24 hr day avg: 330ppmv SO_2, 3% O_2, dry	
CO	Rolling 30 day avg: 67ppmv CO, 3% O_2, dry Calendar year avg: 50ppmv CO, 3% O_2, dry	
PM10	Compliance shall be based on source tests that demonstrate Chevron will not exceed 21 lb/hr average of 4 source tests per calendar year.	

SHELL'S PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS SOURCES WITH BACT DETERMINATIONS

UNIT DESCRIPTION

A-4002 Delayed Coking Unit SCR
A-4005 Delayed Coking Unit Coke Barn Particulate Fabric Filter
A-4006 Delayed Coking Unit Railcar Loading Particulate Fabric Filter
A-4161 Hydrogen Plant – 3 SCR
A-4180 Sulfur Recovery Unit #4 SCOT Unit
A-4181 Sulfur Recovery Unit #4 Tailgas Thermal Oxidizer
A-4190 Boiler 6 Selective Catalytic Reduction
A-4191 Boiler 6 Catalytic Oxidation
A-4192 Boiler 6 Selective Catalytic Reduction
A-4193 Boiler 6 Catalytic Oxidation
A-4201 Flare Gas Recovery System
S-4001 Delayed Coker Unit
S-4002 Delayed Coker Unit – Furnace No. 1
S-4003 Delayed Coker Unit – Furnace No. 2
S-4004 Delayed Coker Unit – Furnace No. 3
S-4005 Delayed Coker Unit – Coke Handling
S-4010 Coker Gasoline Splitter Column
S-4020 Distillate Hydrotreater
S-4021 DHT Recycle Gas Heater
S-4022 DHT Fractionator Reboiler Heater
S-4023 DHT Heater SCR
S-4030 Cracked Gasoline Bottoming Column
S-4031 Cracked Gasoline Bottoming Column Reboiler Heater
S-4040 Distillate Saturation Unit – 2
S-4041 Distillate Saturation Unit – 2 Feed Heater
S-4042 Distillate Saturation Unit – 2 Reboiler Heater

UNIT DESCRIPTION

S-4050 Light Cracked Gasoline Treater
S-4080 C5/C6 Isomerization Unit
S-4090 Alkylation Unit
S-4100 Light Cracked Gaosline Hydrotreater
S-4101 LGHT Feed Heater
S-4130 Catalytic Reformate Bottoming Column
S-4140 Heavy Cracked Gasoline Hydrotreater
S-4141 HGHT Feed Heater
S-4150 Butane Isomerization Unit
S-4160 Hydrogen Plant – 3
S-4161 Hydrogen Plant – 3 SMR Furnace
S-4170 Lube Hydrotreater – 2
S-4171 Lube Hydrotreater (LHT-2)Feed Heater
S-4180 Sulfur Recovery Unit #4
S-4182 Sour Water Stripper
S-4183 Sour Water Stripper
S-4190 Boiler 6 Gas Turbine #1
S-4191 Boiler 6 Supplmt Steam Generator #1
S-4192 Boiler 6 Gas Turbine #2
S-4193 Boiler 6 Supplemental Steam Generator #2
S-4201 Flare
S-4210 Cooling Tower
S-4211 Maintenance Drop Out Vessel
S-4212 Maintenance Drop Out Vessel
S-4338 Pentane Loading Facility
S-4347 Sulfur Pit
S-4350 Process Wastewater Tank
S-4356 Process Wastewater Tank

NEW TANKS

S-4301 Spent Sulfuric Acid Tank; abated by A-33, Flare Gas Recovery System
S-4307 MDEA Make-up Tank
S-4308 DEA Tank #2
S-4309 DEA Tank #1
S-4310 Sour Water Tank
S-4311 Perchloroethylene Tank (pressurized)
S-4312 Perchloroethylene Tank (pressurized)
S-4319 Recovered Oil Tank; abated by A-56, Vapor Recovery
S-4321 DCU Feed Tank
S-4325 Isom Feed Tank
S-4329 Pentane Tank (pressurized); abated by A-4330, Pentane Vapor Recompression
S-4330 Pentane Tank (pressurized); abated by A-4330, Pentane Vapor Recompression
S-4333 Dimate Tank
S-4334 Alkylate Tank; by A-25, Vapor Recover
S-4335 Crude Oil Tank #1
S-4336 Crude Oil Tank #2
S-4346 Sulfuric Acid Tank
S-4349 Pentane Tank (pressurized); abated by A-4330, Pentane Vapor Recompression
S-4351 Process Wastewater Tank; abated by A-56, Vapor Recovery
S-4350 Olefin Storage (pressurized)
S-4354 Crude Oil Tank #3
S-4355 Crude Oil Tank #4
S-4356 Process Wastewater Tank; abated by A-56, Vapor Recovery

EXISTING TANKS

S-1129 Gaso Interim Tank (Tank 1129)
S-1130 Gaso Interim Tank (Tank 1130)
S-1131 Gaso Interim Tank (Tank 1131)

The following is a breakdown of BACT determinations:

Furnaces

Application	Condition	BACT
All furnaces with a design firing rate greater than or equal to 50 MMBTU/hr	10ppmv corrected to 3% O_2, avg. over 3 hrs	Use combination of low NOx burners & selective catalytic reduction (SCR) for this level of NOx control.
All natural draft furnaces with a design firing rate less than 50 MMBTU/hr	25ppmv corrected to 3% O_2, avg. over 3 hrs	Use low NOx burners for this level of NOx control.
All forced draft furnaces with a design firing rate less than 50 MMBTU/hr	20ppmv corrected to 3% O_2, avg. over 3 hrs	Use combination of low NOx burners and/or flue gas recirculation for this level of NOx control.
All furnaces, except hydrogen plant furnace (S-4161)	Combustion of refinery fuel gas or other gaseous fuel that does not exceed 50ppmv H_2S, avg. over 24 hrs	Use fuel gas amine treating system for this level of SO_2 control.
All furnaces, except S-4161	50ppm at 3% O_2, averaged over 8 hrs	Use an air to fuel ratio controller on each furnace for this level of CO control.
Hydrogen plant furnace S-4161	Combustion of refinery fuel gas and pressure swing absorber (PSA) gas. Refinery fuel gas will not exceed 50ppmv H_2S, avg. over 24 hrs. Total reduced sulfur in the refinery fuel gas will not exceed 100ppm, annual avg. The PSA gas will not exceed 3.6ppm H_2S avg. over 24 hrs. For SO_2 control.	
Hydrogen plant furnace S-4161	Due to its large firing rate, limit of 25ppm at 3% O_2, averaged over 8hrs	

Gas Turbines & Cogeneration plant

Application	Condition	BACT
Cogeneration Plant	5ppmv corrected to 15% , avg. over 3 hrs	Use steam injection & SCR for this level of NOx control.
Gas Turbines	Combustion of refinery fuel gas that does not exceed 50ppmv H_2S, avg. over 24 hrs	Use fuel gas amine treating system for this level of SO_2 control.
Gas Turbines	Limit of 6.5ppm at 15% O_2, avg over 8hrs or 90% overall reduction on a mass basis	Use non-selective catalytic oxidizer for this level of CO control.
Gas Turbine	Precursor Organic Compounds (POC) emissions	Use non-selective catalytic oxidizer for POC control.

Flares

Application	Condition	BACT
Flare	Steam assisted ground level flare with staged combustion. Pilots will be fueled with natural gas or LPG. The flare will be operated only during period of emergency upset or breakdown. Routine venting of process gases will go to the flare gas recovery system. For SO_2, CO, and PM control.	
Flare	Steam assisted ground level flare with staged combustion. The hydrocarbon destruction efficiency will be at least 98.5% on a mass basis. Pilots will be fueled with natural gas or equivalent. The flare will be operated only during period of emergency upset or breakdown. Routine venting of process gases will go to the flare gas recovery system. For POC control.	

Sulfur Recovery System

Application	Condition	BACT
Sulfur Recovery System #4 (SRU)	Exhaust from feed to tailgas incinerator will be limited to contain no more than 100ppm total reduced sulfur at 0% O_2. SO_2 and H_2S emissions from the tailgas oxidizer will not exceed 50 and 2.5ppm at 0% O_2. The sulfur pit will be enclosed and vented to the tailgas oxidizer. Sour H_2O strippers will remove 95% wt of the H_2S and NH_3 from the sour H_2O stream. The SRU and SCOT will achieve at least a 99.9% wt conversion of to elemental H_2S sulfur.	Use SCOT (Shell Claus Offgas Treatment) unit and a tailgas thermal oxidizer for this level of SO_2 control.
SRU #4	CO limit of 100ppm in the exhaust from the Thermal Oxidizer.	Meet limit by using good combustion practices.

Pumps

Application	Condition	BACT
Pumps in light liquid hydrocarbon service	Pumps inspected quarterly. Leaks of POC defined as greater than 500ppm.	Use double mechanical seals with a barrier fluid. The barrier fluid shall be either: 1) vented to a control device with a 95% efficiency; or 2) at a higher pressure than the process stream pressure.

Compressors

Application	Condition	BACT
Compressors in hydrocarbon service	Pumps inspected quarterly. Leaks of POC defined as greater than 500ppm.	Use double mechanical seals with a barrier fluid. The barrier fluid shall be either: 1) vented to a control device with a 95% efficiency; or 2) at a higher pressure than the process stream pressure.

Valves

Application	Condition	BACT
Valves in gaseous, light liquid, or toxic services	Valves inspected quarterly. Leaks of POC defined as greater than 100ppm.	Valves will be bellows sealed, lived loaded, graphitic packed, Teflon packed, or equivalent. Control valves will be live loaded with graphite packing and polished stems.

Flanges

Application	Condition	BACT
All flanges	Equipped with graphitic or Teflon gaskets, or equivalent for POC control.	

Pressure Relief Valves

Application	Condition	BACT
All pressure relief valves in hydrocarbon service	All pressure relief valves will be vented to the flare gas recovery system for POC control.	

Tanks

Application	Condition	BACT
Pressurized Tanks (6)	Vapor recompression or operate under a minimum pressure of 15 psig for POC control.	
New Storage Tanks (4)	Use existing vapor recovery systems for POC control.	
Remaining Tanks	Use external floating roof tanks. External floating roof tanks will have zero-gap secondary seals and with the exception of adjustable roof legs, the lowest emitting roof fittings, including: no ungasketted roof penetrations, and no slotted guide poles. Adjustable roof legs will be controlled by vapor seal boots. For POC control.	

Wastewater

Application	Condition	BACT
Maintenance Drop Out vessels	Enclosure and venting to the flare gas recovery system for POC control.	

Cooling Tower

Application	Condition	BACT
Cooling Tower	Installation of a hydrocarbon monitor to enhance the detection of hydrocarbon leaks to the cooling water system for POC control.	

Railcar Loading (Pentane)

Application	Condition	BACT
Pentane railcar loading operation	Use existing LPG flare (S-1470) for POC control.	

Coke Handling

Application	Condition	BACT
Coke handling operations	1) Coke moisture content of at least 8% wt; 2) water supression at the crusher and coke barn piles; 3) an enclosed conveying system; 4) an enclosed coke barn controlled by a particulate filter; 5) a shrouded railcar loading operation controlled by a particulate filter; and 6) a vehicle wash-off area inside of the coke barn.	

PACIFIC'S PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS SOURCES WITH BACT DETERMINATIONS

Unit	Description
A-109	Catalytic Converter abating S-270
A-110	SCR system abating S-271
A-270	SCR system abating S-270
A-275	SCR system abating S-275
A-276	Offgas Scrubber
A-278	SCR system abating S-278
A-279	SCR system abating S-279
A-281	North Vapor Recovery System abating S-281 & S-282
A-283	South Vapor Recovery System abating S-283, S-285, S-286, S-287, & S-288
A-368	Electrostatic Precipitator abating S-268
A-378	Oxidizing Catalysts abating S-278
A-379	Catalytic Converter abating S-279
A-468	Wet Gas Scrubber abating S-268
S-250	Crude / Vacuum Unit
S-252	Unifiner Heater 2-H-102
S-253	Unifiner Reboiler 2-H-102
S-254	Fluid Catalytic Cracking Unit
S-255	Feed Heater 3-H-201
S-256	Alkylation Unit
S-257	Diesel Hydrotreater
S-258	Feed Heater 7-H-101
S-273	Isomerization Unit
S-274	Gas Oil Hydrotreater
S-275	Feed Heater 19-H-101
S-276	Sulfuric Acid Regeneration Plant
S-277	Sulfuric Acid Combustor Furnace
S-278	Gas Turbine 79-T-101
S-279	Gas Turbine 79-T-102
S-281	Crude Storage Tank 80-TK-101A
S-282	Crude Storage Tank 80-TK-101B
S-283	Naptha Storage Tank 80-TK-102
S-285	FCCU Feed Tank 82-TK-101A
S-286	FCCU Feed Tank 82-TK-101B
S-287	Diesel Hydrotreater Feed Tank 82-TK-102A
S-288	Diesel Hydrotreater Feed Tank 82-TK-102B
S-296	Cooling Tower
S-79	Unifiner/ Platformer

Crude/ Vacuum Unit (S-250)

Application	Condition	BACT
All Flanges	All new flanges inspected monthly. Leaks of POC defined as 100ppmv.	Use flanges with graphite-based gaskets or equivalent.
Valves (general)	Valves inspected monthly. Leaks defined as greater than 100ppmv.	Use bellows valves, live-loaded valves, graphite-based packing, or equivalent.
New valves in light liquid & gas service 2" and <	Valves inspected monthly. Leaks defined as greater than 100ppmv.	Use bellows valves.
All other valves	Valves inspected monthly. Leaks defined as greater than 100ppmv.	Use upgraded packing for all other valves.
Pumps	Pumps inspected monthly. Leaks defined as 100ppmv or greater.	Use double mechanical seals with heavy liquid barrier fluid, or canned or mag drive pumps.
Compressors	Compressors inspected monthly. Leaks defined as 100mmpv.	Use double mechanical seals and barrier fluid or equivalent.
Relief Valves	Recovery system, furnace or flare must have recovery/destruction efficiency of at least 98%.	Use rupture disks and vent to a fuel gas recovery system, furnace or flare.

Process drains	BACT must achieve approximately 80% control.	Use of p-trap or equivalent method.
Sample connections	N/A	Consists of closed loop sampling systems with an inert purge gas and venting to a control device. Septum sealed jars used for sampling.

Naptha Hydrotreater (S-252 & S-253; heater rated capacity of 24.55 & 23.25 MMBtu/hr)

Application	Condition	BACT
NO_x	Emissions limit of 10ppm NO_x corrected to 3% O_2, dry.	Use low NO_x burners and SCR (A-252) on S-252 & S-253. Will abate approx. 90% of NO_x.
POC	BACT is not determined	Good combustion practices and efficient operation for POC control.
SO_2	Gas used will not have H_2S level greater than 50ppm.	Use natural gas or treated refinery gas fuel for this level of SO_2 control.
PM	BACT 1 is not determined. BACT 2 is triggered.	BACT 2 specifies the use of natural gas or treated refinery fuel gas for PM control.

Isomerization Unit (S-273)

Application	Condition	BACT
POC	Unit emits only fugitive POC.	BACT for control of fugitive POC emissions same as for Crude Unit (S-250) above.

Diesel Hydrotreater (S-257)

Application	Condition	BACT
POC	Unit emits only fugitive POC.	BACT for control of fugitive POC emissions same as for Crude Unit (S-250) above.

Diesel Hydrotreater (S-258 & S-259; heater rated capacity of 28.57 & 32.47 MMBtu/hr)

Application	Condition	BACT
NO_x	Emissions limit of 10ppm NO_x corrected to 3% O_2, dry.	Use low NO_x burners and SCR (A-258) on S-258 & S-259. Will abate approx. 90% of NO_x.
POC	BACT is not determined	Good combustion practices and efficient operation for POC control.
SO_2	Gas used will not have H_2S level greater than 50ppm.	Use natural gas or treated refinery gas fuel for this level of SO_2 control.
PM	BACT 1 is not determined. BACT 2 is triggered.	BACT 2 specifies the use of natural gas or treated refinery fuel gas for PM control.

Gas Oil Hydrotreater (S-274)

Application	Condition	BACT
POC	Unit emits only fugitive POC.	BACT for control of fugitive POC emissions same as for Crude Unit (S-250) above.

Gas Oil Hydrotreater (S-275; heater rated capacity of 59.2 MMBtu/hr)

Application	Condition	BACT
NO_x	Emissions limit of 10ppm NO_x corrected to 3% O_2, dry.	Use low NO_x burners and SCR (A-275) on S-275. Will abate approx. 90% of NO_x.
POC	BACT is not determined	Good combustion practices and efficient operation for POC control.
SO_2	Gas used will not have H_2S level greater than 50ppm.	Use natural gas or treated refinery gas fuel for this level of SO_2 control.
PM	BACT 1 is not determined. BACT 2 is triggered.	BACT 2 specifies the use of natural gas or treated refinery fuel gas for PM control.

Hydrogen Plant (S-269)

Application	Condition	BACT
POC	Unit emits only fugitive POC.	BACT for control of fugitive POC emissions same as for Crude Unit (S-250) above.

Hydrogen Plants (S-270, S-271, S-272; heater rated capacity of 125 MMBtu/hr)

Application	Condition	BACT
NO_x	BACT 1 is not determined. BACT 2 is an emissions limit of 10ppm NO_x corrected to 3% O_2, dry.	Use low NO_x burners and SCR (A-270, A-110, A-112, respectively) on S-270, S-271, S-272. Will abate approx. 90% of NO_x.
POC	BACT is not determined. POC emissions limited to no more than 6.4 lb/day / heater	Use oxidizing catalysts for all three heaters for this level of POC control.
SO_2	Gas used will not have H_2S level greater than 50ppm.	Use natural gas or treated refinery gas fuel for this level of SO_2 control.
PM	BACT 1 is not determined. BACT 2 is triggered.	BACT 2 specifies the use of natural gas or treated refinery fuel gas for PM control.

Fluidized Catalytic Cracking Unit (S-254 & S-266)

Application	Condition	BACT
POC	Unit emits only fugitive POC.	BACT for control of fugitive POC emissions same as for Crude Unit (S-250) above.

Fluidized Catalytic Cracking Unit (S-255; heater rated capacity of 24 MMBtu/hr)

Application	Condition	BACT
NO_x	Emissions limit of 10ppm NO_x corrected to 3% O_2, dry.	Use low NO_x burners and SCR (A-255) on S-275. Will abate approx. 90% of NO_x.
POC	BACT is not determined	Good combustion practices and efficient operation for POC control.
SO_2	Gas used will not have H_2S level greater than 50ppm.	Use natural gas or treated refinery gas fuel for this level of SO_2 control.
PM	BACT 1 is not determined. BACT 2 is triggered.	BACT 2 specifies the use of natural gas or treated refinery fuel gas for PM control.

Fluidized Catalytic Cracking Unit (S-268; heater rated capacity of 35.9 MMBtu/hr)

Application	Condition	BACT
NO_x	BACT 1 not specified. Emissions limit of 10ppm NO_x corrected to 3% O_2, dry.	Use SCR, flue gas recirculation, low-NO_x burners and reduced-air preheat. Use low NO_x burners and SCR (A-268) on S-268.
POC	BACT is not determined	Good combustion practices and efficient operation for POC control.
SO_2	Gas used will not have H_2S level greater than 50ppm.	Use natural gas or treated refinery gas fuel for this level of SO_2 control. S-268 will be equipped with a wet gas scrubber (A-468) that removes SO_2 from the flue gas. The controlled SO_2 level in the flue gas is estimated to be 10ppm corrected to 3% O_2.
PM	BACT 1 is not determined. BACT 2 is triggered.	BACT 2 specifies the use of an electrostatic precipitator (ESP). S-268 will be equipped with an ESP (A-368).

Alkylation Unit (S-256)

Application	Condition	BACT
POC	Unit emits only fugitive POC.	BACT for control of fugitive POC emissions same as for Crude Unit (S-250) above.

Sulfuric Acid Regeneration Plant (S-276)

Application	Condition	BACT
POC	Unit emits only fugitive POC.	BACT for control of fugitive POC emissions same as for Crude Unit (S-250) above.
NO_x & SO_x	Will remove over 94% of the NO_x & SO_x from the plant.	S-276 will be equipped with a "Trimer" tail gas scrubber (A-276) for SO_2 and NOx control.

Storage Tanks – Internal Floating Roof (S-281, S-282, S-283, S-287, S-288)

Application	Condition	BACT
POC	Vapor recovery system overall efficiency of at least 95%. Satisfies BACT 1 (technologically feasible/ cost effective).	Internal floating roof tanks hooked up to one of two vapor recovery systems (A-281 & A-283), each leading to an incinerator. Tanks are also equipped with a nitrogen padding control system to maintain tank pressure.

Storage Tanks – Fixed Roof (S-285, S-286)

Application	Condition	BACT
POC	Vapor recovery system overall efficiency of at least 95%. Satisfies BACT 2 (achieved in practice). BACT 1 not determined.	Fixed roof tanks equipped with a nitrogen padding control system and steam coils. Tanks are hooked up to the A-283 vapor recovery system.

Cogeneration Plants (S-278, S-279; heater rated capacity of 193.5 MMBtu/hr)

Application	Condition	BACT
NO_x	Emissions limit of 5ppm NO_x corrected to 15% O_2, dry.	Use steam injection and SCR (A-278 & A-279) on S-278 & S-279 for this level of NO_x control.
POC	Abatement of at least 50%.	Both turbines will be equipped with oxidation catalysts (A-378 & A-379) which will achieve approximately 90% reduction.
SO_2 & PM_{10}	50ppm H_2S maximum, 29ppm avg.	Use natural gas as primary fuel, and refinery fuel gas and butane as supplemental fuels.

Cooling Tower (S-296)

Application	Condition	BACT
POC		Good operating practice and minimizing POC leaks from process equipment into the cooling water system.
PM		Equip cooling tower with drift eliminator to reduce drift loss to 0.01%.

EXXON'S PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS SOURCES WITH BACT DETERMINATIONS

New Sources		Modified Sources	
S-1020	Heartcut Tower	S-1003	Hydrocracking Unit
S-1021	Heartcut Saturation Unit	S-1007	Alkylation Unit
S-1022	Catalytic T_{90} Reformer	S-1011	Heavy Catalytic Naptha Hydrotreater
S-1023	Catalytic Naptha T_{90} Reformer	S-1014	Virgin Light End Unit
S-1024	Light Catalytic Naptha Hydrofiner	S-151	Waste Water Treatment Plant
S-1025	C5/C6 Splitter	S-21	Hydrogen Furnace F-301
S-220	Hot Oil Furnace	S-22	Hydrogen Furnace F-351
S-227	Pentane (C5) Fixed Storage Tank		
S-228	C5 Fixed Storage Tank		
S-229	C5 Fixed Storage Tank		
S-230	Hot Oil Fixed Storage Tank		
S-231	Aqueous Ammonia Fixed Roof Storage Tank		

Furnaces

Application	Condition	BACT
All furnaces with a design firing rate greater than or equal to 50 MMBTU/hr (S-220)	10ppmv corrected to 3% O_2, avg. over 3 hrs	Use a combination of low NOx burners and selective catalytic reduction (SCR) for this level of NOx control.
Hydrogen furnaces (S-21 & S-22)	Due to a field test in Jan 1992 not triggering BACT for NOx, a BARCT NOx level of 28ppmv is being proposed. ('92 test of furnace determined uncontrolled NOx level of 99.5ppm at 3% O_2)	Use a combination of low NOx burners and/or thermal deNOx to meet a 35ppm NOx level.
All furnaces (S-21, S-22, S-220)	Combustion of refinery fuel gas and/or LPG/pentane gases with a total reduced sulfur concentration not to exceed 65 ppmv, annualized 24hr avg based on BACT cost effectiveness discussion*. Daily limit for these furnaces not to exceed H_2S concentration of 100ppmv, avg. over 24hrs	Based on BACT #1 level being non-cost effective, BACT #2 is to modify the existing MEA scrubbing system to enhance scrubbing capabilities for the removal of H_2S** and this level of SO_2 control.
All furnaces (S-21, S-22, S-220)	28ppmv at 3% O_2, avg. over 8hrs	Best combustion practices as guaranteed by John Zink burner manufacturer for this level of CO control.

* Note: There is no annualized state average. SO2 BACT determination discussion and explanation from Exxon BAAQMD A/C dated 12/2/93, Application #10392 ppg 9-11

** BACT#2 level determination discussion and explanation from Application #10392 as mentioned above.

Pumps

Application	Condition	BACT
Pumps in light liquid hydrocarbon service	Pumps inspected in accordance with Regulation 8, Rule 25. Leaks of POC defined as greater than 500ppm.	Use double mechanical seals with a barrier fluid. The barrier fluid shall be either: 1) vented to a control device with at least 99.5% efficiency; or 2) held at a higher pressure than the process stream pressure for this level of POC control.

Compressors

Application	Condition	BACT
Compressors in hydrocarbon service	Compressors inspected quarterly. Leaks of POC defined as greater than 500ppm.	Use "wet" dual mechanical seals with a heavy liquid barrier fluid or dual gas mechanical seals buffered with inert gases. All reciprocating compressors shall be vented to at least a 99.5% efficient control device for this level of POC control.

Valves

Application	Condition	BACT
All hydrocarbon valves	Accessible valves inspected quarterly and inaccessible valves inspected annually. Leaks of POC defined as greater than 100ppm.	Valves will be lived loaded, bellows, graphitic packed, Teflon packed, or equivalent. All hydrocarbon control valves will be live loaded with graphite packing and polished stems or equivalent for this level of POC control.

Flanges

Application	Condition	BACT
All flanges	Leaks of POC defined as greater than 500ppm.	Equipped with graphitic gaskets, except in services that are not compatible with graphitic material for this level of POC control.

Pressure Relief Valves

Application	Condition	BACT
All pressure relief valves in hydrocarbon service	All pressure relief valves will be vented to the flaring system or fuel gas recovery system for POC control.	

Tanks

Application	Condition	BACT
New pentane storage tanks (S-227, S-228, S-229)	At least 99.5% control	Use existing vapor recovery systems (A-46, A-47, A-48, A-49). Prior to venting to units A-46 through A-49, these storage tanks will have an auto refrigeration vapor recovery system for this level of POC control.