APPENDIX G

SCAQMD REFINERIES PROPOSED CARFG2 MODIFICATIONS
WITH BACT DETERMINATIONS

ARCO – CARSON
PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS
SOURCES WITH BACT DETERMINATIONS

App. No.	Source Description	BACT
274405 &	No.1 Crude Distillation Unit	1) All pumps will be equipped w/ double mechanical seals w/ barrier fluid and are vented to a vapor recovery system. Leak of VOC is considered to be in excess of 500ppm.
274406	No.2 Crude Distillation Unit	2) Valves and flanges leak is in excess of 500ppm. 3) Pump shaft seals are enclosed and vented to a vapor recovery system or a vapor disposal system.

App. No.	Source Description	BACT
284271 &	Naptha Hydrodesulfurization Unit	1) Valves – Bellows sealed valves for sizes 2" and smaller. Valves 3" and larger will utilize API/ANSI design.
284275	Naptha HDS Unit	2) Pumps – Double mechanical seals or equivalent seals, specifically dry running tandem mechanical seals vented to a closed system for all new replacement process pumps in light service. 3) Flanges – Flanged connections will be designed in accordance with ANSI B16.5-1988 pipe flanges and flanged fittings. 4) Pressure relief valves – PRV's routed to a closed system. 5) Process drains – Drain lines will be provided with two normally closed block valves in series, or a single block valve in series w/ a cap or plug. Drain hubs (funnels) will be equipped w/ P-traps and/ or seal pots. 6) Combustion emission controls – SO_x & PM requirements will be met by firing natural gas w/ total sulfur content of less than 100ppm. Low NO_x burners have been selected for controlling NO_x emissions for heaters w/ a fired duty of less than 18 MMBtu/hr. 7) Compressors – Makeup H2 Booster compressor will be equipped w/ oil film or buffer gas as barrier fluid or equivalent seals.

App. No.	Source Description	BACT
284281	Light Gasoline Hydrogenation Unit	No BACT listing in application

App. No.	Source Description	BACT
284291	Hydrogen Production Heater	1) All pumps & compressors are equipped w/ seal venting to a closed vent system. 2) Bellow sealed valves will be employed on valves 2" and smaller, SCR w/ ammonia injections is employed for the control of NO_x emissions from the heater.

App. No.	Source Description	BACT
285601	Fluid Feed Hydrodesulfurization Unit	No BACT listing in application.

App. No.	Source Description	BACT
286485	C5 Alkylation Unit	1) Valves – Bellows sealed valves for sizes 2" and smaller. Valves 3" and larger will utilize API/ANSI design.
286494	Butane Tank Car Loading/ Unloading System	2) Pumps – Double mechanical seals or equivalent seals, specifically dry running tandem mechanical seals vented to a closed system for all new replacement process pumps in light service.
286495	Tank-681, Light Ends	3) Flanges – Flanged connections will be designed in accordance with ANSI B16.5-1988 pipe flanges and flanged fittings.
286496	Tank-682, Light Ends	4) Pressure relief valves – PRV's routed to a closed system.
286497	Tank-683, Light Ends	5) Process drains – Drain lines will be provided with two normally closed block valves in series, or a single block valve in series w/ a cap or plug. Drain hubs (funnels) will be equipped w/ P-traps and/ or seal pots.
286498	Tank-684, Light Ends	

App. No.	Source Description	BACT
286499	No.1 HDS Unit Naptha	1) Valves – Bellows sealed valves for sizes 2" and smaller. Valves 3" and larger will utilize API/ANSI design. 2) Flanges – Flanged connections will be designed in accordance with ANSI B16.5-1988 pipe flanges and flanged fittings. 3) Pressure relief valves – PRV's routed to a closed system. 4) Process drains – Drain lines will be provided with two normally closed block valves in series, or a single block valve in series w/ a cap or plug. Drain hubs (funnels) will be equipped w/ P-traps and/ or seal pots.

App. No.	Source Description	BACT
305323	Hydrogen Production No.2 Plant	1) Valves – Bellows sealed valves for sizes 2" and smaller. Valves 3" and larger will utilize API/ANSI design. 2) Flanges – Flanged connections will be designed in accordance with ANSI B16.5-1988 pipe flanges and flanged fittings.

App. No.	Source Description	BACT
305363	C5 Alkylation Pretreating System	1) Valves – Bellows sealed valves for sizes 2" and smaller. Valves 3" and larger will utilize API/ANSI design. 2) Flanges – Flanged connections will be designed in accordance with ANSI B16.5-1988 pipe flanges and flanged fittings.

App. No.	Source Description	BACT
		2) Flanges – Flanged connections will be designed in accordance with ANSI B16.5-1988 pipe flanges and flanged fittings.
App. No.	Source Description	BACT
305942	Hydrocracking Unit	1) Valves – Bellows sealed valves for sizes 2" and smaller. Valves 3" and larger will utilize API/ANSI design. 2) Flanges – Flanged connections will be designed in accordance with ANSI B16.5-1988 pipe flanges and flanged fittings.
App. No.	Source Description	BACT
323940	C4 Alkylation Unit	1) Valves – Bellows sealed valves for sizes 2" and smaller. Valves 3" and larger will utilize API/ANSI design. 2) Flanges – Flanged connections will be designed in accordance with ANSI B16.5-1988 pipe flanges and flanged fittings. 3) Pressure relief valves – PRV's routed to a closed system. 4) Process drains – Drain lines will be provided with two normally closed block valves in series, or a single block valve in series w/ a cap or plug. Drain hubs (funnels) will be equipped w/ P-traps and/ or seal pots.
App. No.	Source Description	BACT
331848	Emergency Flare System	No BACT listing in application.

CHEVRON – EL SEGUNDO
PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS SOURCES WITH BACT DETERMINATIONS

BACT

BACT is applied to all new emissions sources. The SCAQMD's Regulation XIII and RECLAIM Rule 2005 requires BACT on any new permit unit, and any modification to an existing permit unit that results in a net increase in emissions or relocation of existing units.

The equipment that would require BACT includes furnaces, pumps, flares, storage tanks, compressors, process valves, and pressure-relief devices with the potential to emit regulated air contaminants such as NOx, SOx, VOC< CO, and PM10.

	Application	BACT
Furnaces	NO_x	Low NOx burners in conjunction with Selective Catalytic Reduction, converting NOx to non-polluting agents.
	SO_x	Controlled by maintaining sulfur content in the fuel gas below 100 ppm.
	PM_{10}	Control measure is the use of refinery gas or natural gas.
Pumps	All pumps	BACT standards include use of seal-less pumps with dual seals with barrier fluids or with dry-running dual seals, vented to a closed system.
Compressors	All compressors	BACT for compressors is the use of a barrier-type device, such as an oil film or gas seal vented to a vapor recovery system, accompanied by proper inspection and maintenance.
Process valve	All process valves	BACT for controlling fugitive VOC emissions from valves is to be determined by cost analysis in the SCAQMD. Process valves two inches or less in diameter are to use bellows-sealed valves for BACT. For larger valves, an inspection and maintenance program in conjunction with a performance standard for leaks (500 ppm) is BACT.
Flanges	All flanges	BACT for controlling fugitive VOC emissions from flanges is a gasket rated at 150 percent of actual working pressure, at service temperature, and a SCAQMD approved inspection and maintenance program.
Pressure relief valves	All Pressure relief valves	Released VOC's are vented to a vapor recovery system and then to a flare system. The vented VOC is routed to flares and burned off, yielding SO_x, NO_x, nonpolluting carbon dioxide and water.

MOBIL – TORRANCE
PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS SOURCES WITH BACT DETERMINATIONS

App. No.	Source Description	BACT
280595	Jet Fuel Finishing System	BACT not required.
280596	Saturated Gas Plant Unit No.7	Requirements are currently being reviewed.
280597	Unsaturated Gas Plant Unit No. 8	Requirements are currently being reviewed.
280599	LPG Merox Unit (App. Cancelled)	Requirements are currently being reviewed.
280600	Naptha Pretreater Unit Unit No. 20	Requirements are currently being reviewed.
280604	Butane Processing Unit	Requirements are currently being reviewed.
280605	Hydrogen Plant No.2 Unit No. 24	Requirements are currently being reviewed.
265076	Storage Tank w/ External Floating Roof, Gasoline	Application cancelled 2/23/96
272170	Storage Tank w/ External Floating Roof, Gasoline	No BACT listing in application.
272172	Storage Tank w/ External Floating Roof, Gasoline	Application cancelled 2/13/96 No BACT listing in application.
274395	Storage Tank w/ External Floating Roof, MTBE	No BACT listing in application.
280594	Crude Distillation Unit Unit No. 1	Application cancelled 3/3/94
281301	FCC Feed Hydrotreater Unit 25	Requirements are being determined.
281302	Selective Catalytic Reduction Unit serving 30 F-2 boiler	SCR system is BACT for new steam boilers.
281303	Selective Catalytic Reduction Unit serving steam generator 30 F-1	SCR system is BACT for new steam boilers.

App. No.	Source Description	BACT
281304	Steam Boiler A-Train	Boilers – SCR is most stringent for boilers, coupled with low NO_x burners. Pumps (light liquid service pump) – install either sealless type or double mechanical or tandem seals with barrier fluid or dry running with closed vent system. Valves (2" or smaller") – install sealed bellows valves Valves (greater than 2") – live loaded with dual seal system or low emission (< or = 500ppm). Requirements shall apply to all valves in gas/vapor & light liquid services. Flanges – ANSI/ API standards Pressure Relief Valves – PRV's not coupled w/ rupture disc shall vent to a vapor recovery system.

App. No.	Source Description	BACT
281307	Fluid Catalytic Cracking Unit	Requirements are currently being reviewed.
281309	Hydrogen Production Plant Unit No. 4	Requirements are currently being reviewed.
288577	LPG Tank Car Loading Facility Unit No. 51/52	Requirements are currently being reviewed.
288829	Emergency Relief System Flares	No information available on this application.

TEXACO – WILMINGTON
PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS
SOURCES WITH BACT DETERMINATIONS

App. No.	Source Description	BACT
281001	Benzene Saturation Unit	Pumps – New light liquid pumps for RFG project will be either sealles, double mechanical or tandem mechanical type of seals. Valves – Texaco will install sealed bellows valves for all 2" or smaller valves. The requirement applies to all valves in gas/vapor and light liquid service except for those specified in permit conditions. Flanges – ANSI /API standard flanges will be used. Pressure Relief Valves – All new PRVs will be vented to vapor recovery system except for those specified in permit conditions.

App. No.	Source Description	BACT
281002	Catalytic Reforming Unit No. 2	Pumps – New light liquid pumps for RFG project will be either sealles, double mechanical or tandem mechanical type of seals. Valves – Texaco will install sealed bellows valves for all 2" or smaller valves. The requirement applies to all valves in gas/vapor and light liquid service except for those specified in permit conditions. Flanges – ANSI /API standard flanges will be used. Pressure Relief Valves – All new PRVs will be vented to vapor recovery system except for those specified in permit conditions.
281003	Catalytic Reforming Unit No. 3	

App. No.	Source Description	BACT
288693	Splitter Reboiler Heater HD-204	SCR is the most stringent BACT for the new heater. Since HD-204 is an existing heater, BACT is not required. Texaco will install low NOx burners on this heater to achieve a net reduction. Two fired heaters H-101 H-102 will be scheduled for shutdown.

App. No.	Source Description	BACT
288694	Storage Tank No. TK-0-6, Naptha	Fixed Roof storage tanks storing volatile materials will be connected to the vapor recovery system.

App. No.	Source Description	BACT
301661	Vapor Recovery System	No BACT listing in application.

App. No.	Source Description	BACT
301662	Storage Tank	Fixed Roof storage tanks storing volatile materials will be connected to the vapor recovery system.
301663	Storage Tank	Same
301664	Storage Tank	Same
301665	Storage Tank	Same
301666	Storage Tank	Same

UNOCAL – CARSON & WILMINGTON
PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS
SOURCES WITH BACT DETERMINATIONS

App. No.	Source Description	BACT
311333	East Flare	1) Surge tank emissions vented to flare w/ control efficiency of 95%
311334	West Flare	2) Flares utilized as control measures to meet BACT for surge tank.

App. No.	Source Description	BACT
281356	Hydrotreating Unit (HDS) FCC Feed Pretreater 120	1) New pumps equipped with single seal, double seals.

App. No.	Source Description	BACT
289725	HDS Unit 120 Heater	1) For refinery heater (rating > 18 through 86.2 MMBtu/hr) for NO_x control is low NO_x burner & selective non-catalytic reduction (SNCR). But with increased efficiency of low NO_x burner, presently, will not install SNCR. SCR is not cost effective will not install. 2) Sulfur compounds in fuel limited to less than 100ppm. Unocal will use natural gas containing total sulfur low as 5ppm. 3) For CO, ROG, & PM, installation of oxygen analyzer is required per condition 5 to measure excess oxygen in ensuring completeness of the combustion reaction.

App. No.	Source Description	BACT
310596 (326109) sub.	Hydrotreating Unit 59	New fugitive components will meet BACT. New pumps equipped w/ seals. New valves (2" & smaller) are bellows sealed.

App. No.	Source Description	BACT
298618 (326115) sub.	Catalytic Reforming Unit 80	New fugitive components will meet BACT. New pump is equipped w/ single mechanical seal for heavy liquid service. New valves (2" & smaller) are bellows sealed.

App. No.	Source Description	BACT
287971 (326116) sub.	Catalytic Reforming Unit 100	New fugitive components will meet BACT. New pumps are equipped w/ tandem seals for light liquid service. New valves (2" & smaller) are bellows sealed.

App. No.	Source Description	BACT
326117	Hydrogen Production Plant Unit 118	Application incomplete no BACT listing.

App. No.	Source Description	BACT
290738 (326118) sub.	Hydrogen Production Plant Unit 118 Heaters	1) BACT for refinery heater (rating > 86.2 MMBtu/hr) for NO_x control is low- NO_x burner & SCR. 2) Sulfur compounds in fuel gas limited to less than 100ppm. Unocal will use refinery gas that contains total sulfur less than 100ppm. 3) For CO, ROG, & PM: Install O_2 analyzer to ensure completeness of combustion reaction.
App. No.	Source Description	BACT
311655 (326121) sub.	Gas Oil Hydrocracker Unit 120	New Valves (2" & smaller) are not bellows sealed since they are instrumental valves.
App. No.	Source Description	BACT
310339	Gasoline Blending Unit	New pumps are equipped w/ BACT (sealless).
App. No.	Source Description	BACT
323067 (326128) sub.	Petroleum Middle Distillate Blending	New pump is equipped w/ BACT (tandem seal).
App. No.	Source Description	BACT
292245 (326130) sub.	Vapor Control System Carbon Adsorber	Carbon adsorber has 98% control efficiency.
App. No.	Source Description	BACT
326164	South Flare	No BACT listing (note: large emission benefit cited for this application).
App. No.	Source Description	BACT
317755 (326166) sub.	Isomerization Unit 60	1) New pumps equipped w/ BACT (single seal type). 2) New valves (2" & smaller) are bellows sealed.
App. No.	Source Description	BACT
327229	Hydrotreating Unit 90	1) New fugitive components will meet BACT. New pumps are equipped w/ tandem seals. 2) New valves (2" & smaller) are bellows sealed.
App. No.	Source Description	BACT
295332 (326343) sub.	Storage Tank No. 2 Light Catalytically Cracked Gasoline	The tank will be equipped w/ double seals.
App. No.	Source Description	BACT
295334 (326345) sub.	Storage Tank No. 3 Naptha	The tank will be equipped w/ double seals.
App. No.	Source Description	BACT
299240 (327360) sub.	Hydrotreating Unit 89	New fugitive components will meet BACT. New pumps are equipped w/ mechanical seals for light liquid service. New valves (2"& smaller) will be bellows sealed.

App. No.	Source Description	BACT
334038	Butamer Unit 60	1) Pumps – Tandem sealed type pumps will be used for Perc and VOC services. 2) Valves – Bellow seals valves will be used for all 2" valves or smaller. The rest of the new valves will be live-loaded or low emission valves. 3) Flanges – BACT is using ANSI/ ASTM standards and I & M program.

App. No.	Source Description	BACT
334429	North Flare	All fugitive components associated with piping of this flare will be equipped w/ BACT. Application does not list what BACT is, however. Previous app. 294014 states that new pump is sealless BACT.

App. No.	Source Description	BACT
337587	Storage Tank 466 Fixed roof	Emissions from the low pressure tank is controlled by a vapor recovery system.

App. No.	Source Description	BACT
338490	Tail Gas Incinerator	Application incomplete. No BACT listing.

ULTRAMAR – CARSON & WILMINGTON
PROPOSED CARFG2 OPERATIONAL PHASE EMISSIONS
SOURCES WITH BACT DETERMINATIONS

App. No.	Source Description	BACT
277667	Hot Oil Heaters	1) Sulfur content of gaseous fuel 100ppm 2) NO_x emissions – SCR 3) SO_x emissions – 100 ppm total sulfur fuel gas
App. No.	Source Description	BACT
309044 (277668) prev.	Storage Tank w/ Ext. Floating Roof	External floating roof & seals for control system.
App. No.	Source Description	BACT
277670	Storage Tank, Naptha	Fixed roof w/ vapor recovery system w/ overall system efficiency of 95% or greater, employing carbon adsorption or refrigerated condenser.
App. No.	Source Description	BACT
309043 (277672)	Storage Tank	Tank is equipped with dual seals in accordance w/ District BACT guidelines.
App. No.	Source Description	BACT
281825	Storage Tank 33-V-1 Aqueous Ammonia	No BACT listing in this application.
App. No.	Source Description	BACT
281826	SCR Unit	Is the controlling unit for BACT.
App. No.	Source Description	BACT
281828 281829 281830	Storage Tank 82-TK-3 Storage Tank 82-TK-1 Storage Tank 82-TK-2	No BACT listing in these applications.
App. No.	Source Description	BACT
282620	Naptha Hydrotreater Charge Heater 56-H-1	1) NO_x emissions – SCR 2) SO_x emissions – 100ppm total sulfur fuel gas.
App. No.	Source Description	BACT
271654	Storage Tank 82-T-91	Floating roof & seals for control system.
App. No.	Source Description	BACT
291899 291900	Heater, Gas Oil Hydrotreater SCR	1) All pumps & compressors are equipped w/ seal venting to closed vent system. 2) Bellows sealed valves for valves 2" or smaller. 3) SCR w/ ammonia injection for control of NO_x.
App. No.	Source Description	BACT
291944	Amine Treating Unit	1) All pumps & compressors are equipped w/ seal venting to closed vent system. 2) Bellows sealed valves for valves 2" or smaller. 3) SCR w/ ammonia injection for control of NO_x.

App. No.	Source Description	BACT
257793	Amine Treating Unit	1) Bellows sealed valves. 2) Tandem mechanical seals on the amine pump. 3) Sealless gas scrubber pumps.
App. No.	Source Description	BACT
296076	Amine Regeneration Unit	1) Pumps & compressors equipped w/ seal venting to closed vent system. 2) Bellows sealed valves on valves 2" & smaller. 3) SCR w/ ammonia injection for control of NO_x emissions.
App. No.	Source Description	BACT
256041	Amine Treating Unit No. 45	Bellows sealed valves & sealless pumps.
App. No.	Source Description	BACT
301268	Gas Oil Unibon Hydrotreating Unit No. 80	1) Use bellows sealed valves for ROG emissions of valves 2" or less.
270955	Benzene Reduction Unit No. 51	2) Compressor seal is vented to vapor recovery system.
309049	Flare Gas Treating Unit 97	
App. No.	Source Description	BACT
306175	Storage Tank w/ Fixed Roof	ROG vapor vented from this storage tank to an air pollution control system.
App. No.	Source Description	BACT
306177	Boiler	Use treated fuel gas for PM10 emissions.
App. No.	Source Description	BACT
306179	SCR	For NH_3 emissions by limiting stack concentration to less than 20 ppmv @ 3% O_2 dry basis.
App. No.	Source Description	BACT
307086	Fluid Catalytic Cracking Unit	1) Use bellows sealed valves for ROG emissions of valves 2" or less. 2) Compressor seal is vented to vapor recovery system.
App. No.	Source Description	BACT
307083	Alkylation Unit 68	1) Use bellows sealed valves for valves 2" or less.
App. No.	Source Description	BACT
308206	Isomerization Unit	1) Use bellows sealed valves for ROG emissions of valves 2" or less. 2) Compressor seal is vented to vapor recovery system.
App. No.	Source Description	BACT
307081	Tail Gas Unit 38	1) Use bellows sealed valves for valves 2" or less.
App. No.	Source Description	BACT
309050	MTBE/TAME Production Unit 67	1) Use bellows sealed valves for ROG emissions of valves 2" or less. 2) Compressor seal is vented to vapor recovery system.