ATTACHMENT 1

CALCULATIONS FOR PRODUCTION-BASED
BPT, BCT, AND BAT EFFLUENT LIMITATIONS
FOR
SHELL MARTINEZ REFINERY

References:

1) 40 CFR § 419 Subpart B Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category (Cracking Subcategory)
2) Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category
3) Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry
4) NPDES Application for Permit Reissuance (April 2006)
5) Refinery Production Data July 2003 – May 2006, provided by the facility (Data from November 2004 – October 2005 was selected as the high year based on average production rates and was used in calculations)

Production-Based Effluent Limitations

STEP 1: Determine the size factor based on the refinery feedstock rate. Based on 40 CFR § 419 Subpart B, a total refinery throughput of 148.3 kbbl/d results in a

SIZE FACTOR = 1.35

STEP 2: Determine the process configuration based on the process rates:

Process	Process Feedstock Rate (kbbl/d)	Fraction of Total Throughput	Weight Factor	Process Configuration
Total Refinery Throughput = 135 kbbl/d				
CRUDE:				
Atmospheric Distillation	148.3	1		
Vacuum Crude Distillation	93.0	0.627		
Desalting	148.3	1		
TOTAL	389.6	2.627	1	2.627
CRACKING & COKING:				
Hydrocracking	35.2	0.237		
Delayed Coking	26.4	0.178		
Fluid Catalytic Cracking	65.6	0.442		
Fluid Coking	21.4	0.144		
TOTAL	148.6	1.002	6	6.012
ASPHALT				
Asphalt Production	2.5	0.0169		
TOTAL	2.5	0.0169	12	0.202
TOTAL PROCESS CONFIGURATION =				8.841

(kbbl/d = Thousand Barrels per day)

STEP 3: Determine the process factor. Based on 40 CFR § 419 Subpart B, a total process configuration of 8.841 results in a

PROCESS FACTOR = 1.67

STEP 4: Based on 40 CFR § 419.22(a), 419.23(a), and 419.24(a), the BPT/BAT/BCT effluent limit is equal to

(THROUGHPUT) X (SIZE FACTOR) X (PROCESS FACTOR) X (EFFLUENT LIMIT FACTOR)

EFFLUENT LIMIT = (148.3)(1.35)(1.67)(Effluent Limit Factor)
= (334.3)(Effluent Limit Factor)

Pollutant	Effluent Limit in 40 CFR 419B						Multip-lier	Final Limit Calculated						Final Limit	
	BPT		BAT		BCT			BPT		BAT		BCT			
	Daily Max	30-d Avg	Daily Max	30-d Avg	Daily Max	30-d Avg		Daily Max	30-d Avg	Daily Max	30-d Avg	Daily Max	30-d Avg	Daily Max	30-d Avg
	lb/kbbl	lb/kbbl	lb/kbbl	lb/kbbl	lb/kbbl	lb/kbbl		lb/d	lb/d	lb/d	lb/d	lb/d	lb/d	lb/d	lb/d
BOD_5	9.9	5.5			9.9	5.5	334.3	3310	1839			3310	1839	3310	1839
TSS	6.9	4.4			6.9	4.4	334.3	2307	1471			2307	1471	2307	1471
COD	74	38.4	74	38.4			334.3	24738	12837	24738	12837			24738	12837
O&G	3	1.6			3	1.6	334.3	1003	535			1003	535	1003	535
Phenols (4AAP)*	0.074	0.036					334.3	24.7	12.0					24.7	12.0
NH_3-N	6.6	3	6.6	3			334.3	2206	1003	2206	1003			2206	1003
Sulfide	0.065	0.029	0.065	0.029			334.3	21.7	9.7	21.7	9.7			21.7	9.7
Total Cr	0.15	0.088					334.3	50.1	29.4					50.1	29.4
Hex Cr	0.012	0.0056					334.3	4.01	1.87					4.01	1.87

*The BPT limits for these constituents are applicable only if they are more stringent than BAT limits (see STEP 5) below).

STEP 5: Calculate Amended BAT limits pursuant to 40 CFR § 419.43, for phenolic compounds (4AAP), total and hexavalent chromium. The effluent limit is equal to the sum of the products of each effluent limitation factor times the applicable process feedstock rate.

Pollutant	Process Category	BAT Effluent Limit Factors (lb/kbbl)		Feedstock (kbbl/d)	Effluent Limitation (lb/d)	
		Daily Max.	30-d Average		Daily Max.	30-d Average
Phenolic Compounds (4AAP)	Crude	0.013	0.003	389.6	5.06	1.17
	Cracking & Coking	0.147	0.036	148.6	21.84	5.35
	Asphalt	0.079	0.019	2.5	0.20	0.048
	Reforming & Alkylation	0.132	0.032	37.5	4.95	1.2
				TOTAL	32.05	7.77
Total Chromium	Crude	0.011	0.004	389.6	4.29	1.56
	Cracking & Coking	0.119	0.041	148.6	17.68	6.09
	Asphalt	0.064	0.022	2.5	0.16	0.055
	Reforming & Alkylation	0.107	0.037	37.5	4.01	1.39
				TOTAL	26.14	9.10
Hexavalent Chromium	Crude	0.0007	0.0003	389.6	0.273	0.117
	Cracking & Coking	0.0076	0.0034	148.6	1.129	0.505
	Asphalt	0.0041	0.0019	2.5	0.010	0.005
	Reforming & Alkylation	0.0069	0.0031	37.5	0.259	0.116
				TOTAL	1.671	0.743

STEP 6: Compare Amended BAT limitations for phenolic compounds (4AAP), total chromium, and hexavalent chromium with BPT limitations.

Except for daily maximum limitation for phenolic compounds, the above BAT limits are more stringent than the BPT limits calculated in STEP 4. Therefore, for these constituents, the above BAT limits, the BPT limit for phenolic compounds are considered for inclusion in the permit.