Modeling the Effect of Renewable Fuels Standards 2

Prepared For

US Environmental Protection Agency

October 2008

JACOBS™ Consultancy

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Vince DiVita

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Introduction

Jacobs Consultancy was retained to conduct refinery modeling to estimate the cost of the Environmental Protection Agency's (EPA) "Modeling the Effect of Renewable Fuels Standards 2." This work was conducted under subcontract to Southwest Research Institute (Subcontract 899054X, Contract EP-C-05-018).

This assignment builds off work previously developed during the Option Year under Work Assignment 2-1, "Modeling the Effect of E10 in the Gasoline Supply," and President Bush's 2007 Alternative Fuel Standard Proposal (AFS). As part of the Energy Independence and Security Act passed December 8, 2007, Congress specified a revised Renewable Fuels Standard (RFS2), which increased the volumes of renewable fuels to be used by the transportation sector to 36 billion gallons per year (BGY) by the year 2022. Under RFS2, the types of fuels are different and the volumes of renewable fuels are higher than those specified in the previous work assignment.

This work assignment is developed to analyze RFS2, utilizing refinery Linear Program (LP) modeling techniques. The cases selected by the EPA include a Calibrations Case, the Reference Case, and four Control Cases (A, B, C, and D). Some of the methodology used for the previous work is being adjusted for these RFS2 cases, which is outlined in the body of this report.

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Multi-Refinery Configuration and Definitions

- The LP model developed for this study is a multi-refinery, multi-period configuration with transportation. We developed a 5-region US demand model, in which specific regional clean product demands are sold at specific regional terminals. Each regional production center has a unique Petroleum Administration for Defense District (PADD) demand center:
    - PADD 1 Production Center and Terminal A Demand Center
    - PADD 2 Production Center and Terminal B Demand Center
    - PADD 3 Production Center and Terminal C Demand Center
    - PADD 4/5 ex-CA Production Center and Terminal D Demand Center
    - PADD CA Production Center and Terminal E Demand Center
- Demand centers are volumetrically balanced using production, plus imports and intra-PADD transfers. The products being imported and transferred are associated with clean product movements, Mogas and Mogas blending components, Jet, and Distillate.
- We have netted out the intra-PADD transfers, so that the net US transfer mechanisms are direct transfers from PADD 3 to either PADD 1, PADD 2, PADD 4/5 ex-CA, or PADD CA.
- In addition to Clean Product Transfers of Mogas, Jet and Distillate, PADD 3 also transfers gasoline blendstocks to the other PADD regions. Gasoline blendstock imports are also allowed into the PADD regions.
- PADD 3 transfers RBOBs and CBOBs to PADDs 1, 2 or 4/5 ex-CA. Once the BOB is received in either PADD 1 or PADD 2, ethanol is blended at the refining center to produce the final gasoline. Once the final gasoline is produced at the PADD, it is transferred to the Terminal (Terminal A for PADD 1, Terminal B for PADD 2, etc.) for sales to satisfy the region demand balance. Ethanol blended gasoline is not transferred or imported—only BOBs.
- With the exception of clean products (Mogas, Jet, and Distillate), all other products—including LPGs, residual fuel, asphalt, lubes, sulfur, coke, *etc*.—are produced and sold at each refining center. For example, we do not transfer PADD 3 residual fuel to Terminal C or transport to other refining centers PADD 1, Terminal A, PADD 2, Terminal B, *etc*.
- The LP model we developed for this analysis is extremely large by refinery model standards. A few examples of structure that makes the matrix size so large include:

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- Multi-Refinery Configuration with five complex refining regions
- Multi-Season Configuration for summer/winter periods
- Rigorous calculation of gasoline emissions using the Complex Model Phase 2
- Highly recursive and pooling structure to keep up with stream and pool qualities throughout the model
- Process representations are typically delta-based methodology or simulation-derived vectors to provide accurate process yields
- Multiple grades of gasoline, including conventional gasoline, reformulate gasoline and E85. Both conventional gasoline and reformulated gasoline include regular and premium grades
- Multi-Terminal Configuration with five regional demand centers
- Transfers/Transportation of clean products and gasoline blending components to other regions or demand centers (terminals)

- In accordance with discussions with the EPA, the LP produces a single BOB (E10 BOB). This E10 BOB also blends to E20 gasoline and E85 gasoline. We force the E85 gasoline to equal 85% ethanol and 15% BOB, with E10 BOB qualities, for both summer and winter. The E10 BOB can be produced internally, transferred from PADD 3, purchased or imported.

Prices

A complete break-down of prices used in the modeling work is provided in the Appendix. For transportation, the following assumptions were used:

- Transportation from PADD 3 to PADD 1 equals 2.5 cpg pipeline (clean products) and 5.0 cpg barge (blend components)
- Transportation from PADD 3 to PADD 2 equals 1.5 cpg pipeline (clean products) and 3.5 cpg barge (blend components)
- Transportation from PADD 3 to PADD 4/5 equals 1.5 cpg
- Transportation of components from PADD 3 to CA equals 10 cpg

The LP cases that were set-up for this work assignment includes a 2004 Calibration Case, then a year 2022 Reference Case, followed by several 2022 Control Cases. The 2004 Calibration is

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based on historical data and establishes the reasonableness of the LP model to reflect and predict actual, historical operations. The Reference case projects US refinery operations in 2022, using new supply/demand patterns and investment choices. The Control Cases are developed to analyze specific impacts associated with changes and alternatives to the Reference Case.

Calibration Case

In the Calibration effort, we relied on 2004 data from the Energy Information Agency (EIA) and California Air Resources Board (CARB) to establish the supply/demand balance for the United States. It was agreed to calibrate to 2004 because of the refinery upset conditions associated with the Gulf Coast hurricanes in 2005, which also likely affected gasoline production and quality in 2006. Additionally, this calibration case had been reviewed for the first work assignment and, although the newer releases of EIA data were available, it was agreed to focus resources on the Reference Case and Control Cases versus recalibrating to a new data year.

We developed a multi-refinery LP configuration that included the following regions:

- Region 1—PADD 1
- Region 2—PADD 2
- Region 3—PADD 3
- Region 4—PADD 4 and 5, excluding California
- Region 5—California

The PADD 4 & 5 ex-CA configuration was developed using EIA PADD 4 and PADD 5 data, and subtracting California data we obtained from CARB. The California data from CARB are the basis for Region 5—California.

The basis for process unit configurations and calendar day capacities was Oil & Gas Journal data. This data provides the calendar day throughputs for all unit operations. For the Crude, FCC, Coker, and Hydrocracking, we used EIA data which provides exact throughput, not calendar day capacities, to the units during the calibration period. For example, the calendar day capacity of a unit might be 100 MBPD, but the exact throughput during the calibration period could be 97.5 MBPD.

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We developed single blended crude for each regional model. Each blended crude was based on crude import data and domestic data. The final blend API and sulfur was compared to actual EIA crude data for each region. For this study, developing regional crude blends provides the following advantages:

- ***Prevents crude optimization impacts***—Since this study is not about crude optimization or crude valuation, a single blended crude is logical.
- ***Keeps the matrix size much smaller versus running multiple crudes***—This is important with the large multi-refinery, multi-period model for this study.

Table 1 compares our final regional blended crude with EIA data.

Table 1.

	LP Blends		EIA Data	
Region	**Sulfur**	**API**	**Sulfur**	**API**
PADD 1	0.87	31.7	0.90	32.0
PADD 2	1.41	31.7	1.37	32.0
PADD 3	1.64	29.8	1.64	29.7
PADD 4 & 5, Ex-CA	1.30	30.2	1.35	32.6
PADD 5	1.34	26.3	1.27	27.7
Total US	1.45	30.0	1.43	30.2

The C_5+ liquid yields are set to ±5% of material balance basis for clean products: gasoline, jet fuel, and diesel fuel. The tolerance is set at +/-5% for a variety of reasons:

- To allow sufficient flexibility to solve. Often, fixing too many constraints translates into difficulty in solving
- To offset reliability of data, and inconsistent data. For example, California data is not provided in the same format as EIA PADD data.
- To compensate for the 2-season (summer/winter) calibration periods. For example, an import could theoretically come in the summer, go to inventory, and consumed in the winter.
- Our experience shows that 5% is a reasonable constraint that balances the validity of the model with the accuracy of the data to provide an overall reasonable representation of a large, regional LP model

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All models produce both regular and premium grades; any mid-grade gasoline was proportioned to the regular and the premium grade.

All models developed for the study are multi-period, representing summer and winter seasons. Our assumption is that the summer season is 152 days and the winter season is 213 days.

For a variety of reasons, we did not set rigorous limits on C_4^- or solid material, including but not limited to: LPG (C_3s and C_4s), fuel gas (C_2s, C_1s), purchased gas, produced fuel gas, petroleum coke, FCC coke, sulfur, and hydrogen. The reason for this includes:

- Data gaps. For example, the composition of fuel gas is not known as it could have C3's and C4's, but the composition is refinery specific
- Our independent efforts have shown discrepancies between reported data and market knowledge
- The study primarily focuses on differential analysis regarding various cases, with an emphasis on gasoline blending, not an emphasis on petroleum coke production for example.
- Gasoline emissions and qualities for each region, by grade and season, were provided by the EPA for comparison to our LP predictions. For all grades of gasoline, we tracked RVP, sulfur, benzene, aromatics, E200, E300, olefins, and oxygen content. For reformulated gasoline (RFG), we tracked summer VOC, annual average TO_X, and seasonal NO_X. For conventional gasoline (CG) emissions we tracked annual average Exhaust Toxics and NO_X.

Regional pricing by product and season was developed by Jacobs Consultancy. For each region, we made the following assumptions for regional pricing:

- PADD 1—New York Harbor
- PADD 2—Chicago
- PADD 3—US Gulf Coast
- PADD 4/5 ex: CA—Seattle and Denver
- PADD CA—Los Angeles

The EPA provided the ethanol balance to use for 2004:

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Table 2.

	Gallons of ETOH			
	CG	**OXY***	**RFG****	**Total**
PADD 1	55,185	0	660,053,766	660,108,952
PADD 2	1,072,397,953	0	543,751,450	1,616,149,403
PADD 3	31,383,720	21,177,300	26,335,119	78,896,139
PADD 4	0	83,194,450	0	83,194,450
PADD 5***	45,179,700	88,656,404	74,771,719	208,607,823
California	0	0	853,043,234	853,043,234
	1,149,016,558	**193,028,154**	**2,157,955,288**	**3,500,000,000**

2022 Reference Case

The basis for the Reference Case was to grow the US refining industry to simulate 2022 supply/demand patterns and to force the RFS mandate to 13.18 BGY, per the EPA. The material balance is from the previous AFS work. The EPA specified total U.S. gasoline demand at 169.3 BGY and total Highway Diesel of 69.27 BGY. This case assumes there is a ban on MTBE and there is no oxygen mandate; rather, the RFS mandate is being met with 13.18 BGY ethanol. The Reference Case assumes a 0.62 vol% MSAT 2 benzene standard calibrating the PADD-by-PADD benzene levels to those EPA projected in its MSAT 2 modeling analysis. Additionally, the gasoline pool sulfur is 30 ppm maximum. The combination of 30 ppm and MSAT 2 eliminates the need to rigorously limit exhaust toxics and NOx baselines for conventional gasoline, although the LP tracks these emissions. RFG has limits for reduction in VOC, Toxics, and NOx.

We assume the crude slate quality in the Reference Case is the same as the calibration case. We acknowledge that the crude slate will be different; however, given the nature of this study, we believe that rebalancing the crude would have insignificant differential impacts on the results of the ethanol blending analysis.

Sufficient process capacity is included to produce 100% low sulfur (30 ppm) gasoline and 100% ULSD (15 ppm).

The supply/demand balance begins with data from the *Annual Energy Outlook (AEO) 2006,* which has balances for major products. We coupled these data with our in-house knowledge to develop the supply/demand requirements for the LP. We proportioned the overall US demands by regions, based on historical growth rates by PADDs. The same methodology was used for imports, exports, and refinery runs.

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It was agreed to use the pricing established from the previous work, which was a lower crude price environment versus today's prices. We developed the original pricing forecast for all products by region. We first forecast refining margins and crude prices, and then developed major product prices. We used historical differentials between PADDs to establish PADD pricing. The EPA recognizes that many of the flows associated with the model are insensitive to price (gasoline sales are fixed, ethanol is fixed, *etc*.), and the focus of the study is on material flows and gasoline production. EPA specified the national ethanol, gasoline and diesel fuel volumes for the Reference case.

The EPA provided the ethanol price differentials to use between PADDs, based on PADD 2 historical price difference between ethanol and gasoline, and then for other PADDs on transportation costs to each refining center. All ethanol pricing for all the scenarios is provided by the EPA. All pricing data for the regions are provided in the Appendix.

The Reference and Control Cases A & B have a fixed volume ethanol constraint, so from that fixed perspective, total ethanol demand is price inelastic in the LP. The distribution of ethanol between PADDs is, however, optimized by the modeling optimization techniques. The final economics are sensitive to price—a higher ethanol price will lower the margin, a lower ethanol feedstock price will raise the margin.

Future regional configuration to meet demand is determined by a combination of LP investment decisions, coupled with our judgment and discretion for refining investment strategy. For example, we know the lowest capital location factor occurs on the USGC, which influences higher capital spending in PADD 3 versus other regions. We also know that higher capacity creep has traditionally occurred on the USGC versus other regions, and PADD 3 has more capacity that any other region. This translates for example, that if both PADD 1 and PADD 3 were to creep at an identical 1% per year, PADD 3 capital would be much higher because PADD 3 has much more absolute capacity versus PADD 1. Restated, 1% creep for 8 million BPD requires more capital than 1% creep for 1.5 million BPD. The focus of the study - as it relates to capital - emphasizes the differential impacts between the cases for total capital spending.

The 2022 US gasoline demand volume is estimated by EPA to be 11,043.7 MBPD (169.3 BGY), and we force the model to meet this US demand requirement exactly. We allow the regional locations to have ±2.5% of 2022 estimated production, but the overall US demand is fixed.

2022 Control Cases

For all control cases, the capital investments made for the 2004 base case are sunk, but the investments made in the reference cases incremental to the base case are not. All the

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environmental programs that are modeled in the reference case are also modeled in the control cases. The vehicle fuel efficiency standards required by EISA and their impacts on fuel demand are assumed to apply for all control cases.

A summary of the control cases' gasoline, diesel fuel, ethanol and the change in imports volumes is in Table 3.

Table 3.

Volumes for Refinery Modeling Analysis (BGY in 2022)					
	Gasoline	**Highway Diesel**	**E10 Vol**	**Total ethanol**	**Change in Inports**
Reference Case (2022)	169.3	69.27	As Appropriate	13.18	none
Control A	176.7	68.5	As Appropriate	34.13	-250,000 BPD
Control B	176.7	68.5	30.3	34.13	-250,000 BPD
Control C	171.4	68.5	As Appropriate	As Appropriate	-42,000 BPD
Control D	171.4	68.5	As Appropriate	As Appropriate	-42,000 BPD

The control cases volumes are estimated to provide the same energy demand as the reference case. The volumes increase due to the addition of low energy content ethanol. While Jacobs Consultancy did not model the addition of biodiesel and renewable diesel fuel in its refinery modeling work, we did accommodate its addition by decreasing the diesel fuel volume consistent with the volume and energy content of the added biodiesel and renewable diesel fuel.

The pricing for E-85 (shown below), calculated and provided by the EPA, includes various factors, including the cost to "incentivize" drivers to use E85, the cost to drive to stations which deliver E85, and the cost associated with more frequent fillings, to name a few.

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Table 4.

E85 PRICING		Conventional		Reformulated	
		$/B	cpg	$/B	cpg
PADD 1	Summer	32.0	76.0	34.2	81.0
	Winter	28.2	67.0	30.4	72.0
PADD 2	Summer	31.3	75.0	33.6	80.0
	Winter	27.6	66.0	29.8	71.0
PADD 3	Summer	31.0	74.0	33.3	79.0
	Winter	27.3	65.0	29.5	70.0
PADD 4/5	Summer	35.5	84.0	37.7	80.0
	Winter	31.7	75.0	33.9	81.0
PADD CA	Summer			36.2	86.0
	Winter			32.5	77.0

The EPA also provided the maximum percentage limit of E-85 into any gasoline market by region. These volume consumption maximums were based on EPA's estimates of the maximum amount of E85 that the projected number of fuel flexible vehicles in the light-duty vehicle fleet in 2022 could consume. These limits are below:

Table 5.

E85 Pct Limit by Region	
PADD 1	27
PADD 2	21
PADD 3	23
PADD 4/5	21
PADD CA	32

Control Case A RFS in 2022

Versus the Reference Case, Control Case A increases gasoline from 169.3 BGY to 176.7 BGY, and Highway Diesel drops from 69.27 BGY to 68.5 BGY. All Control Cases have Highway Diesel set at 68.5 BGY. Control Case A has a maximum allowable reduction in imports of 250,000 BPD.

Control Case B Mid-Level Ethanol Blend

In Control Case B, the gasoline is blended as combination of E10, E20, and E85. The E10 blend continues to receive a 1.0 psi RVP waiver. At least 15% of any gasoline market must be E10, and this is assumed to be the "premium" grade.

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The blending of E20 is allowed into the rest of the gasoline market, also assuming that the 1.0 psi RVP waiver applies for summertime conventional gasoline. E20 is assumed to be the "regular" grade.

Some volume of E85 must be used to meet the renewable fuel volumes specified, but the blending of E85 to any particular market is limited according to the maximum E85 percent in Table 5 above.

Control Case B has a maximum allowable reduction in imports of 250,000 BPD.

Control Case C 100% E10 in 2022

Control Case C is a 100% E10 gasoline blending scenario using the volumes specified in Table 5 above. Maximum allowable reduction of imports is 42,000 BPD.

Control Case D 100% E10 – Low RVP Waiver Rescinded

Control Case D is a 100% E10 gasoline blending scenario using the volumes specified in Table 5. In Control Case D, the 1.0 summertime RVP waiver for conventional gasoline is removed. So, this case is essentially Control Case C without the RVP waiver.

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Results

Calibration Case

Some highlights of the calibration case are below. Refer to the Appendix for a detailed balance of the Calibration Case.

Table 6.

	Calibration MBPD
Crude	16,102
Mogas & Comp Imports	616
Ethanol	228
Mogas	9,463
Middle Distillates	5,885
Heavy Fuels	1,295
Conversion (FCC+HYK+COK	8,688
Reformer	3,104
Alkylation	826
FCC	5,573
Coker	2,003
Hyk	1,111
PD 3 Transfers	4,113

During the calibration period, the US refining industry blended MTBE—over 103 MBPD—so RFG was produced with both MTBE and ethanol. Mogas imports (excluding components) were about 441 MBPD, and distillate imports were about 341 MBPD.

PADD 3 is the largest production center, refining about 48% of the total US 16.1 MMBPD crude runs. Transfers of products and components from PADD 3 to the other refining centers exceed 4 MMBPD.

EPA provided the seasonal average gasoline qualities for each PADD. The refinery model was then calibrated to these gasoline qualities.

Table 7 shows our modeling results of annual average gasoline qualities by region for the Calibration Case and those provided by EPA. The comparison of LP results with EPA for RVP and OXY is not valid for the following reasons:

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- Much of winter gasoline reporting by refiners to the EPA is incorrect. Because the EPA emission model uses a default winter 8.7 RVP specification, regardless of the actual RVP produced, many refiners report 8.7 versus actual produced vapor pressure. We estimated more appropriate RVP levels.
- Oxygen data have been updated to reflect total US ethanol blending per EPA ethanol balance.

Table 7.

	PADD 1		PADD 2		PADD 3		PADD 4/5		TOTAL	
	LP	EPA	LP	EPA	LP	EPA	LP	EPA	LP	EPA
RVP	10.9	8.7	11.3	9.0	10.3	9.2	11.1	9.1	10.7	9.0
Sulfur ppm	112	116	119	129	112	106	100	88	113	112
API	61.3	59.8	59.5	60.5	62.0	60.0	57.8	59.8	60.8	60.1
Aromatics	21.8	22.8	26.0	25.2	24.1	24.1	27.5	27.7	24.6	24.5
Benzene	0.79	0.74	1.20	1.26	0.83	0.85	1.49	1.44	0.98	0.99
Olefins	12.2	13.4	11.7	8.1	11.5	12.0	7.9	9.2	11.4	11.0
Oxygen, wt%	2.1	1.6	1.7	0.7	0.8	0.6	1.0	0.0	1.3	0.7
E200	54	51	53	50	53	48	52	47	53	49
E300	76	84	93	83	83	81	89	85	85	82
T10	113	n/a	110	n/a	116	n/a	111	n/a	113	n/a
T50	192	n/a	193	n/a	194	n/a	196	n/a	194	n/a
T90	360	n/a	284	n/a	329	n/a	302	n/a	319	n/a
DVI	1106	n/a	1028	n/a	1086	n/a	1057	n/a	1070	n/a
V/L	125	n/a	123	n/a	129	n/a	125	n/a	126	n/a

The quality comparison of the overall gasoline pool is reasonable. The RVP and Oxygen discrepancies have been resolved above. Qualities for T10, T50, T90, Driveability Index, and V/L were not available from the EPA.

United States crude oil demand in 2004 was 16 million BPD, with gasoline and distillate production of 9 and 5.5 million BPD, respectively. Ethanol blended to US gasoline in 2004 was 228 MBPD.

Reference Case

For this case and the ones that follow, we will present some key highlights of the overall US refinery model. For specific PADDs and more detailed data, refer to the Appendix.

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From 2004 to 2022, crude throughput increases by about 12%, or 0.6% per year. Gasoline demand increases by about 17%, distillate demand by 15%, and heavy oils (residual, lube, asphalt, gasoil) by 15 percent. The US refining industry increases crude throughput by 1.9 MMBPD. This crude increase, coupled with 0.8 MMBPD increase of ethanol, gasoline components, and imports, amounts to a feed increase of about 2.8 MMBPD. This feed increase in volume is similar to the 2.7 MMBPD increase in production, broken down by 1.6 MMBPD of gasoline, 0.9 MMBPD of middle distillate, and 0.2 MMBPD of heavy fuels. The percent of RFG increases from 32% to 38% in the Reference Case, while premium production stays at 15 percent.

PADD 3 continues to be the workhorse refining center. Transfers from PADD 3 to the other regions increase by about 10% versus the calibration—over 400 MBPD—and PADD 3 has the highest capital spending in the US. We estimate about $79.6 billion of capital investment going from 2004 to 2022, with 47% of the amount being spent in PADD 3. The allocation of investment dollars by region is strongly driven by the location index assumptions. We also estimate incremental fixed costs associated with capital spending. Incremental fixed costs include labor, administrative, overhead, maintenance and supplies, sustaining capital, taxes, and insurance. Going from 2004 to 2022, the industry spends capital to produce 100% 30 ppm gasoline and 100% ULSD. Both programs require substantial capital investment. Over half of the investment dollars are associated with hydrotreating and hydrogen production

Crude throughput increases by 12%, while conversion (defined as FCC + Hydrocracking + Coking) increases by 11%, closely matching crude increase. Alkylation capacity has a significant 337 MBPD increase, but reforming remains flat. Versus 2004, the ethanol increase of 631 MBPD provides a strong octane boost to the pool, causing the reformers to remain flat while also under-running the isomerization units, which produce a high RVP gasoline blending component. The octane boost from ethanol also results in the import of a much lower octane gasoline blending components.

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Table 8.

	Calibration 2004 MBPD	Reference 2022 MBPD	Delta
Crude	16,102	18,072	1,970
Mogas & Comp Imports	616	832	217
Ethanol	228	860	631
Mogas	9,463	11,044	1,581
Middle Distillates	5,885	6,786	901
Heavy Fuels	1,295	1,487	192
Conversion (FCC+HYK+COK)	8,688	9,611	923
Reformer	3,104	3,122	18
Alkylation	826	1,163	337
			Location
Total Capex ($MM)		79,624	Factor
PADD 1		14%	1.50
PADD 2		12%	1.29
PADD 3		47%	1.00
PADD 4/5		19%	1.40
CA		8%	1.48

The overall gasoline pool of 2022 Reference Case versus our 2004 Calibration Case is depicted in Table 9.

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Table 9.

Overall US Gasoline Pool		
	Calibration 2004	**Reference 2022**
RVP	10.6	10.9
Sulfur ppm	104	21
Density, Lb/B	257.8	258.6
(R+M)/2	87.9	87.9
Aromatics	24.5	22.6
Benzene	1.00	0.61
Olefins	10.7	10.9
Oxygen (wt%)	1.52	3.00
E200	53	55
E300	86	88
T10	114	112
T50	194	189
T90	315	305
DVI	1,070	1,041
V/L	127	125
Energy (MMBtu/Bbl)	5.044	4.983

Table 9 shows the Reference Case in compliance with low sulfur gasoline and MSAT 2. There is also a reduction in the energy content of the gasoline, associated with the increase in ethanol blending. The octane associated with ethanol allows the gasoline to be blended with less aromatics because the reformate production/reformate severity is lower. Ethanol has a T50 suppression effect, which is shown in the table.

Control Cases

All of the Control Cases have the option to reoptimize investment decisions while complying with the Control Case constraints described above. Table 10 highlights some key changes between the Reference Case and the Control Cases.

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Table 10.

	Reference MBPD	Control A MBPD	Control B MBPD	Control C MBPD	Control D MBPD
Mogas Demand	11,044	11,526	11,526	11,181	11,181
Non-Oxy	20%	0%	0%	0%	0%
E10	80%	88%	15%	100%	100%
E20	0%	0%	84%	0%	0%
E85	0%	12%	1%	0%	0%
Ethanol	860	2,226	2,226	1,129	1,129
Mogas & Comp Imports	832	579	568	782	782
Crude	18,072	17,308	17,298	17,894	17,894
Conversion (FC+HK+CK)	9,611	9,108	9,161	9,530	9,582
Reformer	3,122	2,801	2,607	2,885	2,901
Alkylation	1,163	985	1,123	1,164	1,183

Only the Reference Case produces any volume of non-oxygenated gasoline. All Control Cases produce oxygenated gasoline with a combination of E10, E20, and E85. The production of E20 and E85 is accomplished with the blending of an E10 BOB which results in octane giveaway for E20 and E85 blends.

There is a clear influence on ethanol volume and refinery operations and capital decisions. As ethanol volume changes, the following responses are observed:

- Crude throughput is inversely proportional to ethanol. Higher volumes of ethanol result in lower crude throughput.

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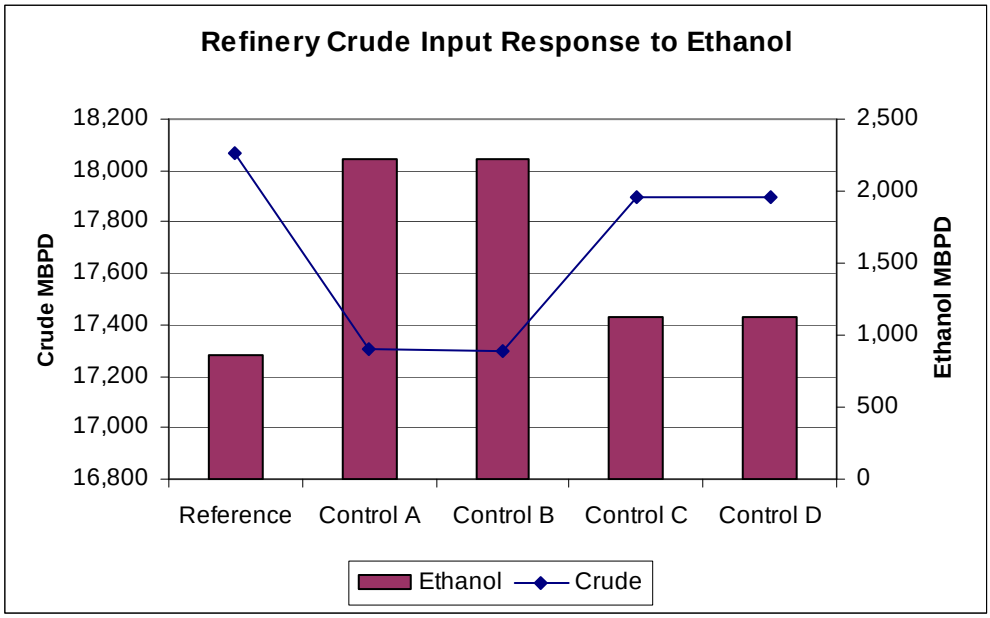
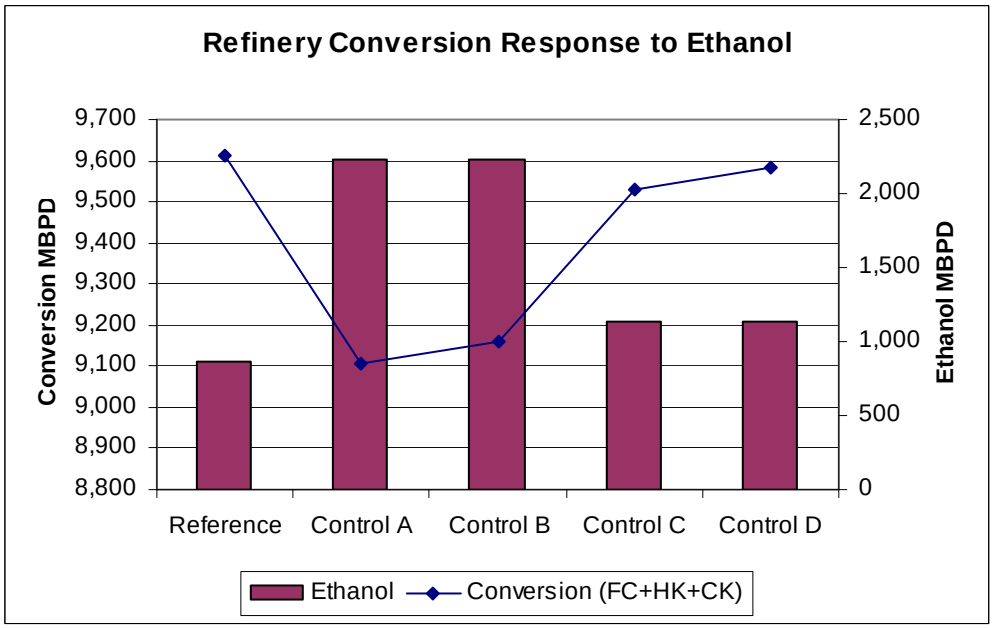
Figure 1.



- Conversion activity (FCC+HYK+Cok) is inversely proportional to ethanol. Higher volumes of ethanol result in lower process conversion throughput.

Figure 2.



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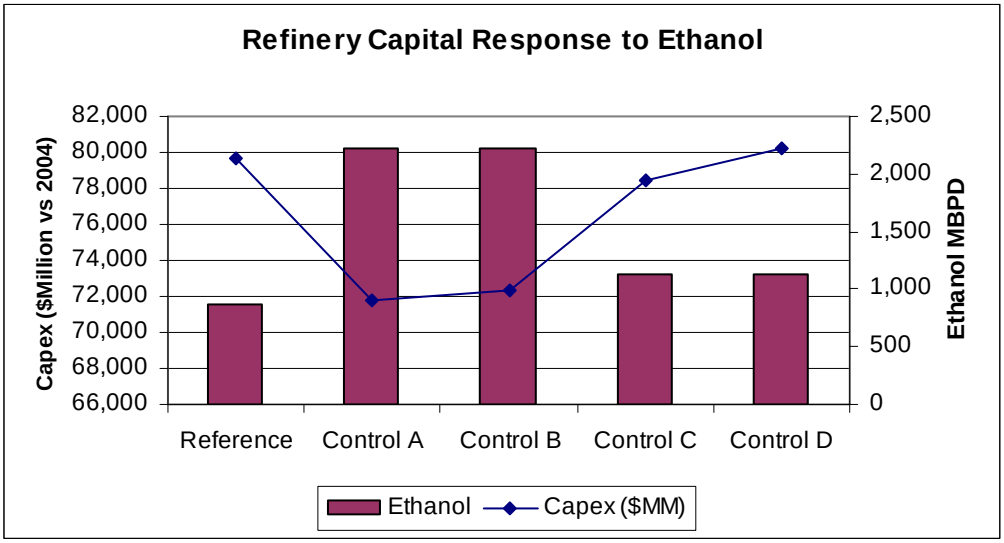
- Capital investment is inversely proportional to ethanol. Higher volumes of ethanol result in lower capital investment.

Figure 3.



With ethanol additions, the octane balance is influenced. One response of the refinery model is to adjust reformer operations, while other responses include adjusting reformer severity and reducing reformer throughput. To analyze the impact of these responses, we multiply the average reformer severity by the reformer throughput to calculate Sev*KBPD. Figure 4 shows how ethanol influences the octane balance, and how the refineries adjust reformer throughput and severity to compensate.

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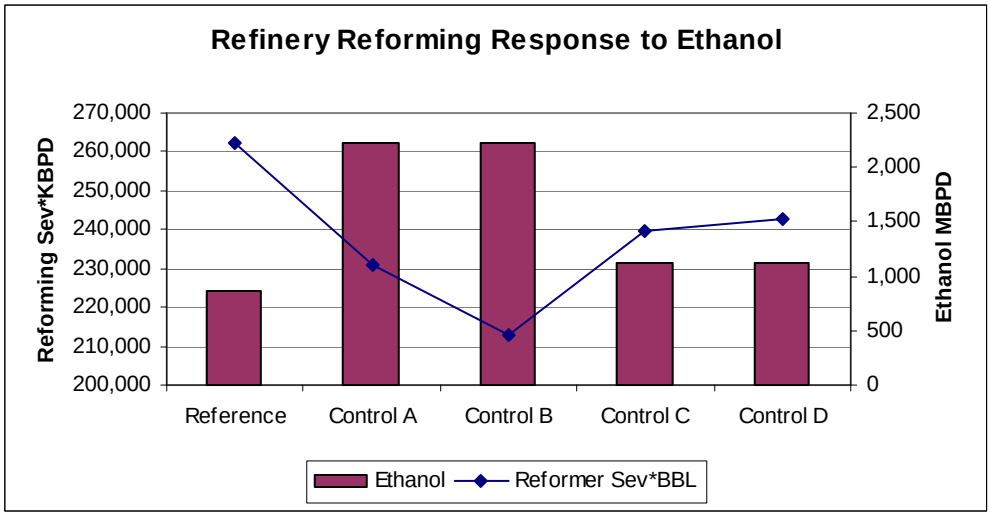
Figure 4.



Ethanol Flows

The following section discusses ethanol distribution and flows for the various cases. Table 11 shows total ethanol and the distribution of ethanol to each region, and total gasoline and the distribution of gasoline to each region.

The ethanol distribution by region essentially mirrors the gasoline demand by region. In Control Cases C and D, where all the gasoline is E10, the ethanol distribution is identical to the gasoline demand distribution.

Table 11.

	Reference	Control A	Control B	Control C	Control D
Ethanol BGY	**13.18**	**34.13**	**34.13**	**17.31**	**17.31**
PADD 1	40%	38%	34%	36%	36%
PADD 2	22%	18%	21%	22%	22%
PADD 3	11%	25%	22%	19%	19%
PADD 4/5	6%	7%	7%	8%	8%
CA	20%	13%	15%	15%	15%
Gasoline Demand BGY	**169.30**	**176.70**	**176.70**	**171.40**	**171.40**
PADD 1	36%	36%	35%	36%	36%
PADD 2	22%	22%	22%	22%	22%
PADD 3	19%	19%	19%	19%	19%
PADD 4/5	8%	8%	8%	8%	8%
CA	15%	15%	16%	15%	15%

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Control Case A can produce E10 and E85, and Table 12 shows the breakdown of these grades by region.

Table 12.

Gasoline Type	PADD 1	PADD 2	PADD 3	PADD 4/5	PADD CA
Non-Oxy	0	0	0	0	0
E10	3,568,518	2,347,411	1,781,390	813,217	1,613,813
E20	0	0	0	0	0
E85	553,829	202,405	430,753	77,777	137,308

	Control A - Gasoline Demand by Type				
Gasoline Type	**PADD 1**	**PADD 2**	**PADD 3**	**PADD 4/5**	**PADD CA**
Non-Oxy	0%	0%	0%	0%	0%
E10	87%	92%	81%	91%	92%
E20	0%	0%	0%	0%	0%
E85	13%	8%	19%	9%	8%

The highest volume of E85 is in PADD 1, which is also the highest demand center. E-85 also has the highest price in PADD 1 versus PADDs 2 or 3. The next highest volume of E85 is PADD 3.

Control Case B can produce E10, E20, and E85, and Table 13 shows the breakdown by region.

Table 13.

	Control B - Gasoline Demand by Type				
Gasoline Type	**PADD 1**	**PADD 2**	**PADD 3**	**PADD 4/5**	**PADD CA**
Non-Oxy	0	0	0	0	0
E10	610,369	382,472	331,821	133,649	270,650
E20	3,458,559	2,167,143	1,770,448	757,245	1,533,588
E85	200	200	109,874	100	100

	Control B - Gasoline Demand by Type				
Gasoline Type	**PADD 1**	**PADD 2**	**PADD 3**	**PADD 4/5**	**PADD CA**
Non-Oxy	0%	0%	0%	0%	0%
E10	15%	15%	15%	15%	15%
E20	85%	85%	80%	85%	85%
E85	0%	0%	5%	0%	0%

In Control Case B, the E10 gasoline is the premium grade and was constrained to be 15% in the regions, and the balance is distributed between E20 and E85. As the table shows, the balance

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is all produced as E20 in the regions with the exception of about 109 MBPD of E85 produced in PADD 3.

To restate Control Case B assumptions, the total volume of ethanol is fixed and total gasoline is fixed; therefore, after satisfying E10 and E20 production, the balance has to blend as E85, which blends in PADD 3. Why does the incremental E85 blend in PADD 3? The high-level answer is this strategy maximized the objective function. A detailed cause and effect impact can not be determined at this time without additional study work.

Gasoline Blending and Qualities

Table 14 shows the quality of the overall US gasoline pool under each case.

Table 14.

TOTAL US GASOLINE PRODUCTION					
	Reference	**Control A**	**Control B**	**Control C**	**Control D**
RVP	10.9	10.9	10.6	10.9	10.7
Sulfur ppm	21	20	20	22	22
Density, Lb/B	258.6	260.0	260.9	258.6	259.3
(R+M)/2	87.9	90.4	89.8	87.9	87.9
Aromatics	22.6	18.9	18.3	21.2	21.3
Benzene	0.61	0.50	0.50	0.57	0.58
Olefins	10.9	9.9	9.9	10.9	10.9
Oxygen (wt%)	3.00	7.09	7.07	3.73	3.72
E200	55	66	64	57	56
E300	88	94	87	88	89
T10	112	113	114	112	114
T50	189	168	172	186	187
T90	305	279	312	305	301
DVI	1,041	952	998	1,030	1,034
V/L	125	121	123	124	126
Energy (MMBtu/Bbl)	4.983	4.792	4.818	4.952	4.961

Control Cases A and B, which have the highest volumes of ethanol, also have the lowest aromatics content due to the reduction in reformer throughput and severity. These cases also have the lowest energy content and the highest octane. Ethanol blending has a T50 suppression impact, so Control Cases A and B have lower T50s than the other cases.

Control Cases C and D—the difference being the elimination of 1.0 PSI summertime conventional gasoline—show the annual average of all gasoline RVP goes from 10.9 psi to 10.7 psi, a 0.2 psi reduction.

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Gasoline Blending Composition

In the Appendix, we provide compositions for all gasoline grades produced for each scenario case. Gasoline Blending is shown by two different methods:

- Production—gasoline qualities produced in the region
- Terminal Sales—gasoline qualities sold in each region

Capital

The Appendix provides a summary of Capital Spending for all the cases.

Control Cases A and B both have 34.13 BGY ethanol versus the 13.18 BGY ethanol in the Reference Case. We see that the substantial increase in ethanol results in less capital spending versus the Reference Case. Both Control Cases A and B have essentially the same capital spending program, about $72 billion and within 1% of each other. The $72 billion is a decrease of about $7.5 billion versus the Reference Case, or about a 10% reduction in capital spending when 34.12 BGY of ethanol flows into the system.

The nature of the capital spending begins with less capital for crude capacity, because less crude is run. With less crude throughput, there is less throughput on conversion units and downstream processing units as well.

Control Cases C and D both have 17.31 BGY ethanol versus the 13.18 BGY ethanol in the Reference Case. Both cases produce 100% E10, but Control Case D with the 1.0 psi waiver removed spends $80.2 billion versus $78.4 billion with the waiver. Although the capital spending difference between the Control Cases C and D is not large (around 2%), we do observe that additional capital is spent on alkylation when the RVP waiver is removed.

Economics

The following tables highlight the economics for each case. Definitions are below:

- Variable Margin = Product Revenues – Feedstock Costs – Variable Costs (Utilities)
- Capex ($MM) = Capital Investment
- Capex ($MM/yr) = Amortized Capital using the EPA's different amortization schedules

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- Fixed ($MM/yr) = Incremental Fixed Costs versus 2004 associated with Capital Investment
- EBITDA (Earnings Before Interest, Tax, Depreciation and Amortization), as defined for these calculations = Variable Margin – Amortized Capital – Incremental Fixed

To reiterate, the fixed costs are NOT the absolute, total fixed costs; rather a differential fixed cost versus 2004 basis associated with capital spending. Therefore the economics should be analyzed on a DIFFERENTIAL basis, not an absolute basis. So, the EBITDA defined below is for the differential analysis associated with each program cost.

The estimated costs presented from the refinery modeling do not necessarily reflect the entire fuel economy cost of using low energy content ethanol. The refinery modeling captures feedstock costs, product revenues, capital, incremental variable, and incremental fixed cost. Additionally, Control Case volumes are estimated to provide the same energy demand as the Reference Case. There could be additional program costs - outside of the refinery modeling effort - which EPA deems appropriate in the overall cost calculation.

The capital amortization factors provided by the EPA are:

- 7% ROI Before Taxes, the Factor is 0.11
- 6% ROI After Taxes, the Factor is 0.12
- 10% ROI After Taxes, the Factor is 0.16

Table 15.

7% ROI Before Taxes	Reference	Control A	Control B	Control C	Control D
Variable Margin ($MM/YR)	74,736	54,387	70,797	74,237	73,843
Capex ($MM) vs 2004	79,624	71,737	72,316	78,398	80,174
Capex ($MM/Yr) Amortized	8,759	7,891	7,955	8,624	8,819
Fixed ($MM/Yr) incremental vs '04	2,384	2,143	2,159	2,348	2,403
EBITDA ($MM/Yr)	63,593	44,353	60,683	63,265	62,621
Delta EBITDA vs Reference		-19,240	-2,910	-328	-972

6% ROI After Taxes	Reference	Control A	Control B	Control C	Control D
Variable Margin ($MM/YR)	74,736	54,387	70,797	74,237	73,843
Capex ($MM) vs 2004	79,624	71,737	72,316	78,398	80,174
Capex ($MM/Yr) Amortized	9,555	8,608	8,678	9,408	9,621
Fixed ($MM/Yr) incremental vs '04	2,384	2,143	2,159	2,348	2,403
EBITDA ($MM/Yr)	62,797	43,636	59,960	62,481	61,820
Delta EBITDA vs Reference		-19,161	-2,837	-316	-977

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10% ROI After Taxes	Reference	Control A	Control B	Control C	Control D
Variable Margin ($MM/YR)	74,736	54,387	70,797	74,237	73,843
Capex ($MM) vs 2004	79,624	71,737	72,316	78,398	80,174
Capex ($MM/Yr) Amortized	12,740	11,478	11,571	12,544	12,828
Fixed ($MM/Yr) incremental vs '04	2,384	2,143	2,159	2,348	2,403
EBITDA ($MM/Yr)	59,612	40,766	57,067	59,346	58,613
Delta EBITDA vs Reference		-18,846	-2,545	-267	-999

Control Case C versus Control Case D demonstrates the impact of removing the 1.0 psi summertime RVP waiver for conventional gasoline. On a cpg basis, the cost of removing the waiver at 7% ROI BT, 6% ROI AT, and 10% ROI AT is 0.38 cpg, 0.39 cpg, and 0.43 cpg, respectively, where the cost is defined across all barrels of gasoline. Conventional gasoline is about 62% of the pool, so the program cost in terms of conventional gasoline is about 0.40 cpg divided by 62% CG, which equals about 0.65 cpg. The RVP waiver program only impacts the summertime gasoline, whereas the calculations above are across the year.

Control Case A produces the highest volume of E-85 gasoline. The E-85 has the lowest price; therefore the profit associated with Control Case A is the lowest of all the cases.

The most influential changes in the Control Cases are the volume of ethanol and the types of ethanol blended grades. Given this fact, the differential economics are obviously influenced by ethanol price. The differential changes on variable margin, EBITDA, capital spending on Control Case C and Control Case D versus the Reference Case are less than 2%, a relatively small impact.

Control Case A and Control Case B, with the highest volumes of ethanol, both have a reduction of about 10% in capital versus the Reference Case. The margin change of Control Case B versus the Reference Case is about 5%—a relatively small amount.

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Appendices

The following Appendix sections show detailed results of the modeling

- Appendix 1—Supply/Demand, Process Operations & Cash Flow
- Appendix 2—Prices
- Appendix 3—Capital
- Appendix 4—Gasoline Quality by Regional Production
- Appendix 5A—Gasoline Quality by Demand Center for Calibration, Reference & Control A
- Appendix 5B—Gasoline Quality by Demand Center for Control B, Control C & Control D

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Appendix 1.

Supply/Demand, Process Operations & Cash Flow

Appendix 1: Supply/Demand, Process Operations, and Cash Flow

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Refinery Input	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
PADD Crude	1,692,692	1,562,368	1,616,640	3,496,305	3,378,118	3,427,336	7,980,291	7,634,656	7,778,591	1,470,500	1,399,901	1,429,301	1,870,419	1,835,054	1,849,781	16,510,207	15,810,096	16,101,649
GTL Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GTL Diesel																0	0	0
VGO HS	0	0	0	0	0	0	20,000	20,000	20,000	0	0	0	1	46,372	27,062	20,001	66,372	47,062
VGO LS	0	17,815	10,396	66,285	35	27,624	20,000	20,000	20,000	0	0	0	0	0	0	86,285	37,849	58,020
HS AR (A960)	0	0	0	0	0	0	20,000	20,000	20,000	0	0	0	0	0	0	20,000	20,000	20,000
LS AR (Alg)	57,684	78,964	70,102	0	0	0	331,204	333,465	332,524	0	0	0	0	0	0	388,888	412,429	402,626
Normal Butane	0	1,283	749	100	54,727	31,978	1	198,476	115,823	0	40,860	23,845	17,405	16,569	16,917	17,506	311,915	189,312
Isobutane	1	3,176	1,854	34,165	30,385	31,959	61,245	25,107	40,156	0	0	0	1	1	1	95,413	58,668	73,970
MTBE	48,541	48,541	48,541	0	0	0	64,384	48,249	54,968	0	0	0	0	0	0	112,925	96,790	103,509
Ethanol - E10	43,060	43,060	43,060	105,424	105,424	105,424	5,147	5,147	5,147	19,035	19,035	19,035	55,645	55,645	55,645	228,311	228,311	228,311
Ethanol - E20																		
Ethanol - E85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformer Feed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methanol	1,897	1,897	1,897	0	0	0	34,172	34,172	34,172	0	0	0	0	0	0	36,069	36,069	36,069
Natural Gas (FOE)	35,702	29,004	31,793	89,081	83,774	85,984	319,023	327,780	324,133	32,086	31,622	31,815	129,028	147,905	140,044	604,920	620,085	613,769
Hydrogen (MSCF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentanes Plus	0	0	0	42,178	51,240	47,466	112,882	107,934	109,995	31,200	37,118	34,653	0	0	0	186,261	196,292	192,115
Import CBOB 10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import RBOB 10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Alkylate	147,834	161,897	156,041	0	0	0	0	0	0	12,501	100	5,264	0	0	0	160,336	161,997	161,305
Import Raffinate	181,878	1	75,742	0	0	0	0	0	0	1,644	100	743	54,678	0	22,770	238,200	101	99,255
Import Reformate	1	1	1	0	0	0	0	0	0	27,655	41,600	35,793	0	0	0	27,656	41,601	35,794
Import FCC Naphtha	56,834	1	23,668	0	0	0	0	0	0	100	100	100	0	0	0	56,934	101	23,768
Import Lt Naphtha	1	138,425	80,780	0	0	0	0	0	0	100	100	100	0	13,089	7,638	101	151,614	88,518
Import Hvy Naph	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	50,000	5,000	23,740	50,000	5,000	23,740
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	33,501	8,469	18,893	110,475	192,861	158,552	0	0	0	0	0	0	0	0	0	143,976	201,330	177,446
Transfer RBOB 10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	397,627	0	165,587	0	0	0	0	0	0	0	0	0	397,627	0	165,587
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isooctane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isooctene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
X-Fer C5's from Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum Total	2,299,626	2,094,900	2,180,156	4,341,640	3,896,563	4,081,910	8,968,349	8,774,985	8,855,509	1,594,821	1,570,536	1,580,649	2,177,178	2,119,636	2,143,599	19,381,614	18,456,620	18,841,823
Refinery Output	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
Propane	16,135	11,146	13,223	73,954	74,027	73,997	147,341	152,248	150,205	15,316	12,812	13,855	34,987	32,051	33,274	287,732	282,285	284,553
Propylene	56,195	64,378	60,970	34,659	36,638	35,814	191,509	193,931	192,922	36,934	37,306	37,151	64,980	72,797	69,542	384,275	405,050	396,398
Normal Butane	6,696	0	2,788	11,291	0	4,702	108,642	0	45,243	11,158	0	4,647	1	1	1	137,787	1	57,381
Isobutane	0	0	0	0	0	0	0	0	0	340	0	142	15,380	46,724	33,671	15,721	46,724	33,813
PC Naphtha	16,632	12,967	14,493	48,173	30,098	37,625	478,046	408,578	437,507	0	0	0	0	0	0	542,851	451,643	489,626
PC Gasoil	0	0	0	9,151	0	3,811	207,520	193,085	199,096	0	0	0	9,688	9,223	9,417	226,360	202,308	212,324
CG Reg	475,388	345,001	399,299	1,088,074	1,052,849	1,067,518	2,490,063	2,749,432	2,641,420	485,548	526,890	509,674	91,183	86,805	88,628	4,630,256	4,760,977	4,706,540
CG Prem	24,254	673	10,493	0	0	0	327,688	316,523	321,172	0	0	0	13,729	13,070	13,344	365,671	330,266	345,010
CG E10 Reg	0	13,705	7,997	627,307	420,400	506,564	37,378	0	15,566	73,300	66,236	69,178	0	0	0	737,985	500,341	599,305
CG E10 Prem	82,186	67,672	73,716	318,939	303,150	309,725	0	37,253	21,739	115,163	122,227	119,285	0	0	0	516,288	530,301	524,466
RFG E10 Reg	662,688	581,093	615,072	324,324	321,304	322,562	608,683	697,810	660,694	0	0	0	822,461	806,469	813,129	2,418,156	2,406,676	2,411,457
RFG E10 Prem	88,251	171,613	136,898	50,600	50,144	50,334	131,386	49,101	83,368	0	0	0	160,122	166,191	163,663	430,359	437,048	434,263
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to RFG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	397,627	0	165,587	0	0	0	0	0	0	397,627	0	165,587
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	44,384	54,523	50,301	262,029	209,860	231,585	824,054	843,410	835,350	212,021	214,044	213,201	277,377	276,635	276,944	1,619,866	1,598,471	1,607,381
X-Fer Diesel Rundown to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSD Gr 76 (0.2%)	177,691	303,653	251,198	163,382	156,217	159,201	399,328	490,086	452,291	115,888	123,062	120,074	0	0	0	856,289	1,073,018	982,764
LSD Gr 74 (.05%)	320,540	188,157	243,287	805,995	793,905	798,940	1,238,774	1,362,152	1,310,772	263,625	242,429	251,256	0	0	0	2,628,934	2,586,642	2,604,254
ULSD (15 ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	350,094	349,157	349,547	350,094	349,157	349,547
X-Fer C5's to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residual Fuel	110,447	138,347	126,728	54,306	51,529	52,686	290,945	285,604	287,828	106,849	108,111	107,585	81,639	79,112	80,164	644,185	662,702	654,991
Slurry	0	0	0	80,095	72,222	75,500	93,484	41,199	62,972	27,939	3,751	13,824	0	0	0	201,518	117,172	152,297
Asphalt & Wax	132,513	85,076	104,830	178,851	160,195	167,964	120,715	110,869	114,969	67,551	58,219	62,105	42,311	34,525	37,768	541,941	448,884	487,637

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Gasoil	0	0	0	8,670	6,579	7,449	0	0	0	0	0	0	9,688	9,662	9,673	18,358	16,241	17,123
Lubes	17,204	18,705	18,080	15,894	13,527	14,513	118,274	116,778	117,401	0	0	0	18,422	16,614	17,367	169,794	165,625	167,361
Benzene	8,638	8,638	8,638	8,227	8,227	8,227	40,312	40,312	40,312	0	0	0	0	0	0	57,177	57,177	57,177
Toluene	0	0	0	0	0	0	28,937	28,937	28,937	0	0	0	0	0	0	28,937	28,937	28,937
Xylenes	0	0	0	0	0	0	6,521	6,519	6,520	0	0	0	0	0	0	6,521	6,519	6,520
Transfer Raffinate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	0	0	0	0	0	0	50,000	5,000	23,740	0	0	0	0	0	0	50,000	5,000	23,740
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Blendstock	0	0	0	0	0	0	143,976	201,330	177,446	0	0	0	0	0	0	143,976	201,330	177,446
Sulfur (STons)	1,105	1,040	1,067	4,753	4,723	4,735	13,423	13,070	13,217	1,571	1,549	1,558	3,375	3,516	3,457	24,228	23,898	24,035
Coke (STon)	3,916	3,916	3,916	15,115	15,049	15,076	61,889	61,889	61,889	7,111	7,111	7,111	18,338	18,464	18,411	106,369	106,429	106,404
Sum Total	2,265,014	2,090,191	2,162,994	4,263,543	3,860,009	4,028,056	8,858,560	8,705,726	8,769,372	1,575,139	1,558,481	1,565,418	2,100,830	2,109,145	2,105,682	19,063,087	18,323,552	18,631,523
Check = 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
C3+ Liq Product	2,239,842	2,065,346	2,138,013	4,163,921	3,760,871	3,928,717	8,481,202	8,330,155	8,393,057	1,531,631	1,515,086	1,521,976	1,992,063	1,999,037	1,996,133	18,408,659	17,670,496	17,977,895
C3+ Recovery	98.9%	100.0%	99.5%	97.9%	98.6%	98.3%	98.1%	98.6%	98.4%	98.0%	98.5%	98.3%	97.3%	101.4%	99.7%	98.0%	99.1%	98.6%
Clean Prod Terminal Imports	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	193,632	205,342	200,465	1,181	1,727	1,500	8,124	2,641	4,924	0	0	0	0	0	0	202,937	209,710	206,889
CG Prem	36,882	39,113	38,184	225	329	286	1,547	503	938	0	0	0	0	0	0	38,655	39,945	39,408
CG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Reg	173,903	157,243	164,181	0	0	0	0	0	0	0	0	0	0	0	0	173,903	157,243	164,181
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	33,124	29,951	31,273	0	0	0	0	0	0	0	0	0	0	0	0	33,124	29,951	31,273
Jet/Kero A (450ppm)	37,948	54,699	47,723	1,046	1,046	1,046	578	495	529	0	0	0	0	0	0	39,572	56,240	49,299
HSD Gr 76 (2000ppm)	133,209	189,839	166,256	2,082	1,770	1,900	11,633	1,900	5,953	0	0	0	0	0	0	146,925	193,508	174,109
LSD Gr 74 (500ppm)	104,563	109,201	107,269	4,482	4,675	4,594	2,160	8,485	5,851	0	0	0	0	0	0	111,205	122,360	117,714
ULSD (15 ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Imports	713,261	785,387	755,351	9,016	9,547	9,326	24,043	14,024	18,196	0	0	0	0	0	0	746,320	808,957	782,873
Clean Prod Terminal Sales	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	1,803,440	1,666,224	1,723,366	1,486,831	1,589,842	1,546,944	966,191	1,100,925	1,044,816	485,548	526,890	509,674	91,183	86,805	88,628	4,833,193	4,970,687	4,913,429
CG Prem	260,200	251,265	254,986	225	329	286	130,172	105,547	115,802	0	0	0	13,729	13,070	13,344	404,325	370,211	384,417
CG E10 Reg	0	13,705	7,997	627,307	420,400	506,564	37,378	0	15,566	73,300	66,236	69,178	0	0	0	737,985	500,341	599,305
CG E10 Prem	82,186	67,672	73,716	318,939	303,150	309,725	0	37,253	21,739	115,163	122,227	119,285	0	0	0	516,288	530,301	524,466
RFG E10 Reg	1,109,104	1,093,921	1,100,243	335,173	332,154	333,411	325,320	331,376	328,854	0	0	0	822,461	806,469	813,129	2,592,058	2,563,919	2,575,638
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to RFG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	210,565	207,682	208,883	50,600	50,144	50,334	42,197	42,982	42,655	0	0	0	160,122	166,191	163,663	463,484	466,999	465,535
Jet/Kero A (450ppm)	652,231	678,277	667,431	359,992	353,370	356,127	157,816	132,386	142,976	212,021	214,044	213,201	277,377	276,635	276,944	1,659,438	1,654,711	1,656,679
HSD Gr 76 (2000ppm)	465,859	787,327	653,456	208,927	203,827	205,951	212,540	152,310	177,392	115,888	123,062	120,074	0	0	0	1,003,214	1,266,526	1,156,873
LSD Gr 74 (500ppm)	824,476	846,576	837,373	999,369	987,472	992,426	652,669	632,526	640,914	263,625	242,429	251,256	0	0	0	2,740,139	2,709,002	2,721,969
ULSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	350,094	349,157	349,547	350,094	349,157	349,547
Total Sales	5,408,062	5,612,650	5,527,451	4,387,363	4,240,688	4,301,769	2,524,283	2,535,305	2,530,715	1,265,544	1,294,887	1,282,668	1,714,966	1,698,327	1,705,256	15,300,218	15,381,855	15,347,858
Clean Prod Transfers	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	1,134,420	1,115,882	1,123,602	397,576	535,266	477,926	-1,531,995	-1,651,148	-1,601,528	0	0	0	0	0	0	0	0	0
Blank Terminal Sale																0	0	0
CG Prem	199,064	211,479	206,309	0	0	0	-199,064	-211,479	-206,309	0	0	0	0	0	0	0	0	0
CG E10 Reg																0	0	0
CG E10 Prem																0	0	0
RFG E10 Reg	272,514	355,584	320,991	10,849	10,849	10,849	-283,363	-366,434	-331,840	0	0	0	0	0	0	0	0	0
RFG E20 Reg																0	0	0
CG E20 Reg																0	0	0
E85 to CG																0	0	0
E85 to RFG																0	0	0
RFG E10 Prem	89,189	6,119	177,610	0	0	50,334	-89,189	-6,119	42,655	0	0	0	0	0	163,663	0	0	434,263
Blank Terminal Sale																0	0	0
Blank Terminal Sale																0	0	0
Jet/Kero A (450ppm)	569,899	569,055	569,407	96,916	142,463	123,496	-666,815	-711,519	-692,902	0	0	0	0	0	0	0	0	0
HSD Gr 76 (2000ppm)	154,959	293,836	236,002	43,463	45,840	44,850	-198,422	-339,676	-280,852	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	399,374	549,219	486,817	188,892	188,892	188,892	-588,266	-738,111	-675,710	0	0	0	0	0	0	0	0	0
ULSD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2,819,417	3,101,174	3,120,738	737,696	923,311	896,348	-3,557,114	-4,024,485	-3,746,486	0	0	0	0	0	163,663	0	0	434,263
Intermediates Transfers																		

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Transfers IN																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	50,000	5,000	23,740	50,000	5,000	23,740
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	33,501	8,469	18,893	110,475	192,861	158,552	0	0	0	0	0	0	0	0	0	143,976	201,330	177,446
Transfer RBOB 10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	397,627	0	165,587	0	0	0	0	0	0	0	0	0	397,627	0	165,587
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers IN	33,501	8,469	18,893	508,102	192,861	324,140	0	0	0	0	0	0	50,000	5,000	23,740	591,603	206,330	366,773
Transfers OUT																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate																		
Transfer Alkylate	0	0	0	0	0	0	50,000	5,000	23,740	0	0	0	0	0	0	50,000	5,000	23,740
Transfer Blendstock	0	0	0	0	0	0	143,976	201,330	177,446	0	0	0	0	0	0	143,976	201,330	177,446
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	397,627	0	165,587	0	0	0	0	0	0	397,627	0	165,587
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers OUT	0	0	0	0	0	0	591,603	206,330	366,773	0	0	0	0	0	0	591,603	206,330	366,773
Financials																		
Refinery Feedstocks ($000)	14,055,265	17,862,911	31,918,176	22,532,413	30,499,374	53,031,787	49,006,728	67,330,879	116,337,607	9,381,714	12,796,117	22,177,831	12,212,605	17,119,602	29,332,206	107,188,725	145,608,884	252,797,609
Terminal Imports ($000)	5,450,067	8,156,823	13,606,890	67,648	98,893	166,541	174,307	143,314	317,622	0	0	0	0	0	0	5,692,022	8,399,030	14,091,052
Transfer Costs ($000)	364,261	556,377	920,638	119,298	149,779	269,077	0	0	0	0	0	0	31,920	4,473	36,393	515,478	710,629	1,226,108
Total Costs ($000)	19,869,593	26,576,111	46,445,704	22,719,358	30,748,046	53,467,405	49,181,035	67,474,194	116,655,229	9,381,714	12,796,117	22,177,831	12,244,525	17,124,075	29,368,599	113,396,226	154,718,543	268,114,769
Total Costs ($/Day)	130,721,006	124,770,475	127,248,505	149,469,464	144,357,024	146,486,040	323,559,442	316,780,252	319,603,367	61,721,803	60,075,668	60,761,182	80,556,085	80,394,716	80,461,916	746,027,800	726,378,136	734,561,010
Refinery Revenues ($000)	1,825,623	2,430,834	4,256,457	2,593,540	3,029,006	5,622,546	11,235,573	13,634,213	24,869,785	1,354,136	1,642,433	2,996,570	1,621,948	2,696,853	4,318,801	18,630,820	23,433,339	42,064,159
Terminal Revenues ($000)	41,501,728	58,199,673	99,701,401	33,548,347	43,565,126	77,113,473	18,990,419	25,799,416	44,789,835	10,726,955	13,841,884	24,568,839	15,568,387	20,053,378	35,621,765	120,335,837	161,459,476	281,795,314
Total Sales ($000)	43,327,351	60,630,508	103,957,858	36,141,888	46,594,131	82,736,019	30,225,992	39,433,629	69,659,621	12,081,092	15,484,317	27,565,409	17,190,335	22,750,231	39,940,566	138,966,657	184,892,815	323,859,473
Total Sales ($/Day)	285,048,359	284,650,270	284,816,050	237,775,577	218,751,789	226,674,024	198,855,210	185,134,408	190,848,276	79,480,867	72,696,323	75,521,667	113,094,312	106,808,596	109,426,209	914,254,326	868,041,386	887,286,227
Gross Margin ($000)	23,457,758	34,054,396	57,512,154	13,422,529	15,846,085	29,268,614	-18,955,043	-28,040,565	-46,995,608	2,699,378	2,688,199	5,387,577	4,945,811	5,626,156	10,571,967	25,570,432	30,174,272	55,744,704
Utilities ($000)	154,830	174,157	328,986	281,149	355,224	636,373	800,196	1,069,714	1,869,911	123,954	168,625	292,579	350,004	468,360	818,364	1,710,134	2,236,079	3,946,213
Utilities ($/Day)	1,018,616	817,638	901,333	1,849,665	1,667,716	1,743,487	5,264,450	5,022,134	5,123,044	815,487	791,665	801,585	2,302,661	2,198,872	2,242,094	11,250,879	10,498,025	10,811,542
Variable Margin ($000)	23,302,928	33,880,240	57,183,168	13,141,380	15,490,861	28,632,242	-19,755,240	-29,110,279	-48,865,519	2,575,424	2,519,575	5,094,999	4,595,806	5,157,797	9,753,603	23,860,298	27,938,193	51,798,491
Variable Margin ($/Day)	153,308,737	159,062,157	156,666,212	86,456,449	72,727,049	78,444,498	-129,968,682	-136,667,978	-133,878,134	16,943,577	11,828,989	13,958,900	30,235,566	24,215,008	26,722,199	156,975,647	131,165,226	141,913,675
Variable Margin ($/Bbl Crd)	90.57	101.81	96.91	24.73	21.53	22.89	-16.29	-17.90	-17.21	11.52	8.45	9.77	16.17	13.20	14.45	9.51	8.30	8.81
Unit Operations																		
Crude Tower	1,692,692	1,562,368	1,616,640	3,496,305	3,378,118	3,427,336	7,980,291	7,634,656	7,778,591	1,470,500	1,399,901	1,429,301	1,870,419	1,835,054	1,849,781	16,510,207	15,810,096	16,101,649
Vacuum Tower	736,431	679,258	703,067	1,506,872	1,450,554	1,474,006	3,671,378	3,495,538	3,568,764	662,460	625,609	640,955	1,007,569	988,512	996,448	7,584,710	7,239,470	7,383,241
Sats Gas Plant	63,829	57,064	59,881	151,300	135,529	142,097	340,415	293,026	312,760	58,160	52,395	54,796	170,738	134,645	149,675	784,442	672,659	719,210
Unsats Gas Plant	162,871	164,599	163,880	326,347	324,253	325,125	899,005	882,497	889,372	95,775	95,623	95,686	195,926	200,294	198,475	1,679,924	1,667,266	1,672,537
FCC DeC5 Tower	1,751	1,751	1,751	11,859	100	4,997	3,502	3,502	3,502	100	100	100	139,185	1,000	58,545	156,396	6,453	68,895
FCC	589,531	591,157	590,480	1,098,250	1,089,202	1,092,970	2,950,167	2,890,430	2,915,307	332,035	332,035	332,035	642,500	642,500	642,500	5,612,483	5,545,324	5,573,292
FCC Splitter	151,504	87,398	114,094	622,750	570,398	592,200	1,640,783	1,503,918	1,560,914	174,926	176,870	176,060	361,893	362,522	362,260	2,951,856	2,701,106	2,805,528
Hydrocracker	42,333	42,333	42,333	140,583	140,583	140,583	416,750	416,750	416,750	86,900	86,900	86,900	424,503	424,503	424,503	1,111,070	1,111,070	1,111,070
H-Oil Unit	0	0	0	0	0	0	161,000	161,000	161,000	0	0	0	0	0	0	161,000	161,000	161,000
Delayed Coker	80,833	80,833	80,833	306,935	305,597	306,154	1,123,833	1,123,833	1,123,833	125,605	125,605	125,605	365,454	367,962	366,918	2,002,661	2,003,831	2,003,343
Visbreaker	0	0	0	0	0	0	48,000	100	20,047	27,467	11,645	18,234	2,978	100	1,299	78,446	11,845	39,580
Thermal Naphtha Splitter	9,741	9,741	9,741	37,191	37,029	37,096	134,989	132,366	133,458	15,849	15,043	15,379	44,210	44,344	44,288	241,980	238,523	239,963
CRU Reformer	286,080	221,765	248,548	798,635	716,988	750,989	1,313,567	1,000,414	1,130,823	0	0	0	0	0	0	2,398,282	1,939,167	2,130,360
SRU Reformer	0	0	0	0	0	0	0	0	0	278,326	278,326	278,326	374,270	393,755	385,641	652,596	672,081	663,967
BTX Reformer	50,396	50,396	50,396	43,005	43,005	43,005	225,067	209,427	215,940	0	0	0	0	0	0	318,467	302,827	309,340
C4 Isomerization	100	100	100	16,000	100	6,721	100	100	100	100	100	100	51,600	18,914	32,525	67,900	19,314	39,547
C5/C6 Isomerization	16,800	13,083	14,631	164,100	95,274	123,936	229,168	229,168	229,168	11,050	11,050	11,050	74,022	83,783	79,718	495,140	432,359	458,503
HF Alkylation	28,154	100	11,783	133,314	76,357	100,076	225,146	157,050	185,408	10,760	327	4,672	38,500	100	16,091	435,874	233,934	318,030
H2SO4 Alkylation	41,440	100	17,316	88,480	70,555	78,020	279,819	279,819	279,819	41,400	41,400	41,400	121,400	70,391	91,633	572,539	462,265	508,187
Dimersol	0	0	0	0	0	0	0	0	0	100	100	100	3,129	3,218	3,181	3,229	3,318	3,281
Cat Poly	12,006	12,006	12,006	5,307	100	2,268	0	0	0	100	100	100	100	100	100	17,512	12,306	14,474
Isooctane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT - Total	319,335	219,817	261,260	922,664	857,095	884,400	1,639,460	1,577,968	1,603,575	295,529	286,426	290,217	207,560	271,746	245,017	3,384,548	3,213,052	3,284,470
DHT - SR Diesel Fd	165,297	81,760	116,548	512,152	486,314	497,074	578,330	820,947	719,912	179,080	166,366	171,660	140,717	160,737	152,400	1,575,576	1,716,124	1,657,594
DHT - Jet/Kero Fd	0	0	0	38,849	0	16,178	306,493	0	127,635	0	0	0	6,005	48,083	30,560	351,347	48,083	174,374
DHT - LCO Fd	132,725	116,743	123,399	290,980	290,451	290,671	465,176	474,840	470,815	83,191	88,122	86,069	0	0	0	972,072	970,156	970,954
DHT - CGO Fd	21,314	21,314	21,314	80,682	80,330	80,477	289,460	282,181	285,212	33,257	31,938	32,488	60,839	62,926	62,057	485,552	478,689	481,547

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
DHT 2nd RCT - Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - SR Diesel Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - Jet/Kero Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - LCO Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - CGO Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT Arom Saturation	0	0	0	0	0	0	0	0	0	0	0	0	179,032	193,168	187,281	179,032	193,168	187,281
NHT - Total Fd	307,291	235,153	265,194	968,545	983,908	977,511	1,757,688	1,376,624	1,535,314	312,178	312,178	312,178	443,494	476,929	463,006	3,789,197	3,384,794	3,553,203
NHT - Isom/Thermal Fd	21,211	13,388	16,646	169,910	216,839	197,296	444,121	376,210	404,491	13,084	33,852	25,204	69,224	83,174	77,365	717,550	723,465	721,002
NHT - Reformer Fd	286,080	221,765	248,548	798,635	767,069	780,214	1,313,567	1,000,414	1,130,823	299,094	278,326	286,975	374,270	393,755	385,641	3,071,647	2,661,329	2,832,201
CGH - Generic	63,000	56,700	59,324	85,800	100	35,789	199,900	159,920	176,569	18,000	18,000	18,000	0	0	0	366,700	234,720	289,682
CGH - Olefin Sat'n	0	0	0	0	0	0	0	0	0	0	0	0	140,003	240,751	198,796	140,003	240,751	198,796
FCCU Fd HDT	137,640	137,640	137,640	370,419	370,419	370,419	1,343,283	1,343,283	1,343,283	56,380	56,380	56,380	493,594	399,520	438,696	2,401,316	2,307,242	2,346,418
LSR Splitter	50,000	30,454	38,594	1,000	1,000	1,000	1,000	1,000	1,000	10,000	10,000	10,000	69,336	68,025	68,571	131,336	110,480	119,165
LSR Bz Saturator	1,083	1,000	1,035	1,000	1,000	1,000	1,000	1,000	1,000	5,000	1,000	2,666	25,863	4,931	13,648	33,946	8,931	19,348
Reformate Saturator	1,000	1,000	1,000	1,000	1,000	1,000	8,000	8,000	8,000	5,000	5,000	5,000	50,000	50,000	50,000	65,000	65,000	65,000
SDA	32,600	32,600	32,600	0	0	0	263,385	261,283	262,158	100	23,619	13,825	44,000	44,000	44,000	340,085	361,502	352,583
MTBE	5,452	5,452	5,452	0	0	0	101,090	101,090	101,090	0	0	0	0	0	0	106,542	106,542	106,542
TAME	202	202	202	0	0	0	404	404	404	0	0	0	0	0	0	606	606	606
Hydrogen Plant - Total MSCF	100	100	100	60,036	90,694	77,927	1,191,383	1,486,115	1,363,377	55,332	51,019	52,815	1,295,873	1,206,501	1,243,719	2,602,723	2,834,429	2,737,938
Hydrogen Plant - Plant Fuel Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - LPG Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Naphtha Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Nat Gas Fd	100	100	100	60,036	90,694	77,927	1,191,383	1,486,115	1,363,377	55,332	51,019	52,815	1,295,873	1,206,501	1,243,719	2,602,723	2,834,429	2,737,938
Lube Unit	48,029	52,220	50,475	44,373	37,764	40,516	330,190	326,014	327,753	0	0	0	0	0	0	422,592	415,999	418,744
Sulfur Plant	2,209,638	2,080,655	2,134,368	9,505,778	9,444,262	9,469,880	26,844,348	26,137,352	26,431,772	3,142,686	3,098,090	3,116,661	6,750,052	7,031,349	6,914,206	48,452,502	47,791,707	48,066,887
Merox Jet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Merox Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BTX Reformer - Tower feed	17,448	17,448	17,448	16,094	17,448	16,884	75,769	17,448	41,735	0	0	0	0	0	0	109,311	52,344	76,067
BTX Reformer - Extract feed	31,890	31,890	31,890	34,168	31,890	32,839	153,532	31,890	82,547	0	0	0	0	0	0	219,591	95,671	147,276
Toluene Dealkyation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BLANK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - CO2 (MLb/Day)	93,473	87,480	89,975	204,321	191,217	196,674	576,274	555,714	564,276	66,753	64,008	65,151	190,325	168,367	177,511	1,131,145	1,066,786	1,093,587
Utilities - Steam (Mlbs)	103,385	87,473	94,099	231,187	203,825	215,220	677,259	668,937	672,403	68,653	68,739	68,703	224,245	179,980	198,414	1,304,729	1,208,954	1,248,838
Utilities - Steam Vent (Mlbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities - Power (kwh)	7,177,396	5,725,683	6,330,231	18,417,728	17,349,714	17,794,476	45,722,772	44,515,008	45,017,967	6,574,123	6,351,068	6,443,956	16,610,051	16,303,312	16,431,050	94,502,069	90,244,784	92,017,681
Utilities - Cooling H2O (Mgal)	1,214,583	1,008,978	1,094,600	2,802,618	2,477,102	2,612,659	7,809,119	7,413,259	7,578,110	778,794	719,180	744,005	2,425,528	2,153,163	2,266,586	15,030,642	13,771,680	14,295,960
HYD Supply (MSCFD)																		
CRU Reformer	276,437	214,157		693,231	655,905		1,110,258	810,785		0	0		0	0		2,079,926	1,680,847	1,847,038
CRU Reformer - Unrecov'd	69,116	53,545		173,232	163,938		277,592	202,595		0	0		0	0		519,941	420,078	461,665
CRU Reformer - Total	345,554	267,701		866,463	819,843		1,387,850	1,013,380		0	0		0	0		2,599,867	2,100,924	2,308,703
SRU Reformer	0	0		0	0		0	0		243,912	239,513		329,047	352,668		572,959	592,181	584,176
SRU Reformer - Unrecov'd	0	0		0	0		0	0		60,987	59,876		82,273	88,182		143,260	148,057	146,059
SRU Reformer - Total	0	0		0	0		0	0		304,898	299,388		411,320	440,850		716,218	740,238	730,235
BTX Reformer	29,769	29,769		22,930	22,930		128,635	111,520		0	0		0	0		181,334	164,219	171,347
BTX Reformer - Unrecov'd	7,530	7,530		5,840	5,840		32,605	28,404		0	0		0	0		45,975	41,774	43,523
BTX Reformer - Total	37,299	37,299		28,770	28,770		161,239	139,924		0	0		0	0		227,309	205,993	214,870
Hydrogen Plant	100	100		60,036	90,693		1,191,374	1,486,104		55,331	51,019		1,295,863	1,206,492		2,602,704	2,834,408	2,737,918
Purchased Hydrogen	0	0		0	0		0	0		0	0		0	0		0	0	0
Coker (Unrecovered)	4,322	4,322		16,096	16,025		60,439	60,439		6,838	6,838		19,863	20,000		107,559	107,625	107,597
Total Supply	387,275	309,423		971,364	955,331		2,800,903	2,699,847		367,068	357,245		1,727,046	1,667,342		6,253,657	5,989,188	6,099,323
HYD Demand (MSCFD)																		
Hydrocracker	87,420	87,420		288,356	312,624		983,571	979,891		184,131	180,743		1,072,262	1,068,531		2,615,740	2,629,209	2,623,600
H-Oil Unit	0	0		0	0		141,882	141,882		0	0		0	0		141,882	141,882	141,882
FCCU Fd HDT	83,192	83,192		242,600	242,600		867,562	868,311		38,920	35,854		307,585	250,251		1,539,859	1,480,208	1,505,049
DHT	46,930	35,046		159,939	147,709		273,015	287,531		52,594	52,783		33,455	37,470		565,932	560,540	562,785
DHT 2nd RCT	0	0		0	0		0	0		0	0		0	0		0	0	0
Naphtha HDT	13,709	10,788		51,169	49,991		88,493	67,997		15,436	14,644		22,540	23,473		191,346	166,894	177,077
DHT Arom Saturation	0	0		0	0		0	0		0	0		127,075	132,757		127,075	132,757	130,391
CGH - Generic	4,336	4,201		5,299	11		34,014	21,368		3,063	2,273		0	0		46,711	27,853	35,706
CGH - Olefin Sat'n	0	0		0	0		0	0		0	0		1,530	2,724		1,530	2,724	2,227
C4 Isomerization	1	6		928	1		6	6		6	1		2,993	1,097		3,933	1,111	2,286
C5/C6 Isomerization	2,757	2,147		26,926	15,633		37,602	37,602		1,813	1,813		12,146	13,747		81,243	70,942	75,232
Isooctane	0	0		0	0		0	0		0	0		0	0		0	0	0
Reformate Saturator	553	666		493	666		3,528	3,528		2,205	2,205		22,050	27,675		28,829	34,740	32,278
LSR Bz Saturator	315	291		487	291		592	291		1,076	215		23,273	1,435		25,742	2,523	12,192
Cyclohexane	0	0		0	0		0	0		0	0		0	0		0	0	0
TDA	0	0		0	0		0	0		0	0		0	0		0	0	0
Plant Fuel (Recovered H2)	67,094	20,270		1	1		1	1		1	1		1	1		67,098	20,274	39,773

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Plant Fuel (Unrecovered H2)	80,969	65,397		195,168	185,803		370,637	291,438		67,825	66,714		102,136	108,181		816,734	717,533	758,844
Total Demand	387,275	309,423		971,364	955,332		2,800,903	2,699,847		367,068	357,245		1,727,046	1,667,341		6,253,657	5,989,188	6,099,323
FCC Data																		
Total Feed Rate																		
BPD	589,531	591,157	590,480	1,098,250	1,089,202	1,092,970	2,950,167	2,890,430	2,915,307	387,810	332,035	355,262	642,500	642,500	642,500	5,668,258	5,545,324	5,596,518
API	24.5	24.7	24.6	22.3	23.3	22.9	24.7	24.8	24.8	48.9	22.4	32.4	22.9	23.0	23.0	25.4	24.2	24.6
Specific Gravity	0.9073	0.9061	0.9066	0.9202	0.9141	0.9166	0.9057	0.9051	0.9054	0.7846	0.9192	0.8631	0.9164	0.9156	0.9159	0.9016	0.9091	0.9062
Sulfur, Wt%	0.68	0.65	0.67	1.24	1.06	1.13	0.86	0.84	0.85	1.10	1.32	1.23	0.32	0.51	0.43	0.87	0.85	0.86
Sulfur ppm	6,810	6,545	6,656	12,362	10,567	11,315	8,630	8,387	8,488	11,014	13,171	12,273	3,152	5,111	4,295	8,689	8,529	8,595
Basic N2 ppm	478	443	458	439	361	393	319	315	317	443	559	510	814	651	719	396	383	389
% Diesel Feed	11.4	11.4	11.4	2.5	9.7	6.7	6.7	7.9	7.4	0.6	0.0	0.2	2.1	4.3	3.4	5.5	7.7	6.8
Mid TBP	787	787	787	834	813	822	790	788	789	661	786	734	839	827	832	795	797	797
W % Conradson Carbon	1.4	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	0.9	1.3	1.1	1.7	1.5	1.6	1.5	1.5	1.5
Percent HDT'd Feed	24%	24%	24%	35%	36%	35%	49%	51%	50%	14%	17%	16%	86%	71%	77%	46%	45%	46%
FCC Yields (vol%)	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%
H2S	0.2%	0.2%	0.2%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.5%	0.4%	0.1%	0.2%	0.1%	0.3%	0.3%	0.3%
Methane	1.5%	1.5%	1.5%	1.7%	1.6%	1.6%	1.4%	1.4%	1.4%	1.4%	1.7%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Ethane	1.2%	1.2%	1.2%	1.4%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.4%	1.3%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%
Ethylene	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.1%	1.3%	1.2%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%
Dry Gas	3.9%	3.9%	3.9%	4.3%	4.1%	4.2%	3.8%	3.8%	3.8%	3.7%	4.4%	4.1%	4.0%	4.0%	4.0%	3.9%	3.9%	3.9%
Propane	2.9%	2.9%	2.9%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	2.5%	2.9%	2.7%	2.6%	2.8%	2.7%	2.9%	3.0%	2.9%
Propylene	7.8%	7.7%	7.7%	7.9%	7.7%	7.8%	7.6%	7.6%	7.6%	6.5%	7.7%	7.2%	8.5%	8.2%	8.3%	7.7%	7.7%	7.7%
NC4	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.1%	1.3%	1.2%	1.2%	1.3%	1.3%	1.4%	1.4%	1.4%
Iso-butane	5.7%	5.9%	5.8%	5.8%	6.1%	6.0%	6.3%	6.3%	6.3%	4.7%	5.3%	5.1%	4.7%	5.3%	5.0%	5.9%	6.1%	6.0%
Iso C4=	2.5%	2.5%	2.5%	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.1%	2.4%	2.3%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
1/2 C4=	6.4%	6.4%	6.4%	6.9%	6.8%	6.8%	6.6%	6.6%	6.6%	5.3%	6.3%	5.9%	6.6%	6.7%	6.7%	6.6%	6.6%	6.6%
FCC Gasoline	54.4%	54.7%	54.6%	56.7%	56.2%	56.4%	55.6%	55.6%	55.6%	45.1%	53.3%	49.9%	56.3%	56.4%	56.4%	55.1%	55.6%	55.4%
Cycle Oil	19.9%	19.7%	19.8%	17.4%	18.3%	17.9%	19.2%	19.3%	19.3%	16.5%	19.4%	18.2%	20.2%	19.4%	19.7%	18.9%	19.2%	19.1%
Decant Oil	7.8%	7.6%	7.7%	8.3%	7.6%	7.9%	7.0%	6.8%	6.9%	8.7%	9.9%	9.4%	7.2%	7.3%	7.2%	7.5%	7.3%	7.4%
Coke (wt%)	4.8%	4.9%	4.8%	4.0%	4.4%	4.2%	4.8%	4.9%	4.9%	4.1%	3.8%	3.9%	4.3%	4.4%	4.3%	4.6%	4.7%	4.6%
Conversion	72.3%	72.6%	72.5%	74.3%	74.1%	74.2%	73.8%	73.8%	73.8%	74.7%	70.7%	72.4%	72.7%	73.3%	73.0%	73.7%	73.5%	73.6%
Naphtha Sulfur, ppm	544	523	532	979	835	895	658	636	645	897	1,059	992	206	374	304	673	658	664
LCO Sulfur, wt.%	0.9	1.0	1.0	1.4	1.2	1.3	1.2	1.1	1.2	1.4	1.6	1.5	0.4	0.6	0.5	1.1	1.1	1.1
HCO Sulfur, wt%	2.3	2.2	2.2	4.1	3.5	3.8	2.9	2.8	2.8	3.7	4.4	4.1	1.1	1.7	1.4	2.9	2.8	2.9
Naphtha Sul/Fd Sul	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.08	0.08	0.08
LCO Sul/Fd Sul	1.37	1.49	1.44	1.12	1.15	1.14	1.39	1.36	1.37	1.25	1.20	1.22	1.15	1.17	1.16	1.30	1.29	1.29
HCO Sul/Fd Sul	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.33	3.34
CETANE																		
HSD Gr 76 (0.2%)	46.0	40.9	43.0	40.0	40.0	40.0	48.2	41.8	44.5	40.0	42.1	41.2	0.0	0.0	0.0			0.0
LSD Gr 74 (.05%)	42.0	46.0	44.3	43.5	43.0	43.2	42.3	45.2	44.0	45.1	44.2	44.5	0.0	0.0	0.0			0.0
ULSD (15 ppm)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CARB Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.7	58.0	57.9			0.0
RFO Blending																		
API	10.5	10.5	10.5	11.2	10.5	10.8	10.5	10.5	10.5	13.1	10.5	11.6	10.5	10.5	10.5			0.0
Sulfur	1.9	2.0	2.0	3.0	2.9	3.0	2.6	2.3	2.5	2.3	2.7	2.6	1.3	1.7	1.5			0.0
Viscosity (cst)	39.6	99.6	74.6	115.5	173.4	149.3	25.8	13.4	18.6	362.0	136.1	230.2	8.7	8.3	8.5			0.0
Reformer Operations																97.5	96.3	96.7
CRU - Severity	100.0	100.0	100.0	94.6	97.4	96.2	98.4	94.2	95.9	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - Endpoint	363.9	379.9	373.2	360.8	400.0	383.7	365.0	400.0	385.4	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - PFF vol%	45.1	46.7	46.0	47.4	46.8	47.1	50.1	52.8	51.7	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - ARO vol%	14.1	13.4	13.7	13.1	13.3	13.2	16.8	13.6	14.9	0.0	0.0	0.0	0.0	0.0	0.0			0.0
SRU - Severity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.8	93.6	95.0	99.1	99.1	99.1			0.0
SRU - Endpoint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	399.7	400.0	399.9	350.0	350.0	350.0			0.0
SRU - PFF vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.3	41.8	42.0	46.5	45.9	46.1			0.0
SRU - ARO vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.8	12.2	12.4	11.6	11.7	11.6			0.0
Coker Operations																		
Feed API	7.6	7.6	7.6	6.4	6.4	6.4	3.9	3.9	3.9	4.7	4.7	4.7	6.1	6.1	6.1			0.0
Feed Sulfur Wt%	2.6	2.6	2.6	3.5	3.5	3.5	4.0	4.0	4.0	3.8	3.8	3.8	2.6	2.6	2.6			0.0
Feed Concarbon Wt%	19.0	19.0	19.0	19.1	19.1	19.1	21.5	21.5	21.5	22.5	22.5	22.5	19.5	19.5	19.5			0.0
Hydrocracker Operations																		
Feed API	18.6	18.6	18.6	21.7	17.3	19.2	15.6	16.4	16.1	18.2	17.1	17.5	23.1	21.7	22.3			0.0
Feed Sulfur Wt%	1.3	1.3	1.3	1.8	3.0	2.5	2.0	1.9	1.9	1.7	1.9	1.8	1.1	1.3	1.2			0.0

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Feed Basic N2	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.2			0.0
Feed K Factor	11.6	11.6	11.6	11.6	11.5	11.6	11.3	11.3	11.3	11.6	11.6	11.6	11.2	11.2	11.2			0.0
Cracked Feeds %	0.0	0.0	0.0	9.9	77.1	49.1	42.0	39.9	40.8	0.0	0.1	0.1	75.0	73.0	73.8			0.0
Conversion	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0	85.0			0.0
Alkylation																		
HF C3 Alkylate	9,434	2	3,930	36,789	76,355	59,878	146,078	88,076	112,230	2	2	2	823	2	344	193,126	164,437	176,384
HF C4 Alkylate	18,719	97	7,852	93,316	0	38,861	79,067	68,972	73,176	10,757	324	4,668	2	97	57	201,860	69,489	124,613
HF C5 Alkylate	2	2	2	3,209	2	1,337	2	2	2	2	2	2	37,675	2	15,690	40,888	8	17,032
Total HF Alkylate	28,157	103	11,786	136,231	76,358	101,292	225,149	157,053	185,411	10,761	329	4,673	72,751	101	30,355	473,050	233,945	333,517
H2SO4 C3 Alkylate	2	2	2	2	2	2	2	2	2	2	2	2	10,448	2	4,352	10,455	9	4,359
H2SO4 C4 Alkylate	41,437	97	17,312	88,477	70,552	78,016	279,816	279,816	279,816	41,397	41,397	41,397	110,951	70,388	87,280	562,076	462,249	503,821
H2SO4 C5 Alkylate	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	8	8	8
Total H2SO4 Alkylate	41,443	103	17,319	88,481	70,556	78,021	279,822	279,822	279,822	41,401	41,401	41,401	121,401	70,393	91,635	572,550	462,276	508,198
Crude																		
Crude API	31.7	31.7	31.7	31.7	31.7	31.7	29.8	29.8	29.8	30.2	30.2	30.2	26.3	26.3	26.3			0.0
Feed Sulfur Wt%	0.9	0.9	0.9	1.4	1.4	1.4	1.6	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3			0.0
ENERGY BALANCE																		
Process Fuel (MMBTU/D)	406,746	354,103	376,026	979,838	890,689	927,814	2,514,852	2,338,276	2,411,809	341,601	326,573	332,831	887,202	850,290	865,662	5,130,240	4,759,932	4,914,143
Fuel for Steam Gen (MMBTU/D)	154,354	130,597	140,490	345,162	304,311	321,323	1,011,148	998,724	1,003,897	102,499	102,627	102,573	334,798	268,710	296,231	1,947,960	1,804,968	1,864,515
Fuel for Power (MMBTU/D)	71,774	57,257	63,302	184,177	173,497	177,945	457,228	445,150	450,180	65,741	63,511	64,440	166,101	163,033	164,310	945,021	902,448	920,177
Total Energy (MMBTU/D)	632,874	541,957	579,818	1,509,177	1,368,497	1,427,082	3,983,228	3,782,150	3,865,887	509,841	492,711	499,844	1,388,101	1,282,033	1,326,204	8,023,221	7,467,348	7,698,835
Total Energy (MBTU/Bbl Crd)	374	347	358	432	405	416	499	495	497	347	352	350	742	699	717	486	472	478

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Refinery Input	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
PADD Crude	1,525,290	1,525,290	1,525,290	3,065,508	3,916,969	3,562,388	9,099,910	9,099,909	9,099,909	1,742,748	1,749,772	1,746,847	2,138,519	2,136,220	2,137,177	17,571,975	18,428,160	18,071,612
GTL Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GTL Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VGO HS	0	0	0	0	0	0	441,677	750,000	621,602	0	0	0	28,662	28,662	28,662	470,338	778,662	650,264
VGO LS	0	0	0	1,000	1,000	1,000	0	0	0	0	0	0	0	0	0	1,000	1,000	1,000
HS AR (A960)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LS AR (Alg)	204,959	198,799	201,364	0	0	0	308,324	0	128,398	0	0	0	0	0	0	513,283	198,799	329,762
Normal Butane	7,185	38,531	25,477	0	93,443	54,530	0	191,373	111,678	3,138	61,534	37,215	8,800	61,534	39,573	19,123	446,414	268,473
Isobutane	0	16,129	9,412	51,514	100	21,511	90,101	48,988	66,109	2,626	21,654	13,730	0	39,708	23,172	144,240	126,580	133,934
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E10	369,348	330,259	346,537	253,076	146,692	190,994	113,341	82,400	95,285	75,228	41,509	55,551	169,674	172,606	171,385	980,667	773,465	859,752
Ethanol - E20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformer Feed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (FOE)	81,772	77,197	79,102	157,292	128,332	140,392	578,324	562,981	569,370	121,482	121,889	121,719	176,848	169,387	172,494	1,115,718	1,059,786	1,083,078
Hydrogen (MSCF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentanes Plus	0	0	0	77,000	100	32,124	125,000	1	52,055	44,616	0	18,580	0	0	0	246,616	101	102,759
Import CBOB 10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import RBOB 10%	200,000	200,000	200,000	0	0	0	0	0	0	0	0	0	0	0	0	200,000	200,000	200,000
Import RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Alkylate	25,718	9,929	16,504	0	0	0	0	0	0	0	0	0	0	0	0	25,718	9,929	16,504
Import Raffinate	24,282	65,071	48,085	0	0	0	0	0	0	0	0	0	110,000	0	45,808	134,282	65,071	93,893
Import Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Lt Naphtha	0	0	0	0	0	0	71,320	0	29,700	0	0	0	0	1,000	584	71,320	1,000	30,284
Import Hvy Naph	0	0	0	0	0	0	100,000	0	41,644	0	0	0	0	0	0	100,000	0	41,644
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	40,798	23,808	0	40,798	23,808
Transfer Reformate	0	0	0	0	9,224	5,383	0	0	0	0	0	0	0	0	0	0	9,224	5,383
Transfer Alkylate	60,000	60,000	60,000	5,672	776	2,815	0	0	0	0	0	0	60,000	60,000	60,000	125,672	120,776	122,815
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	4,328	0	1,802	0	0	0	0	0	0	60,000	60,000	60,000	64,328	60,000	61,802
Transfer RBOB 10%	860,811	578,444	696,032	50,000	50,000	50,000	0	0	0	0	0	0	0	0	0	910,811	628,444	746,032
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,299,900	1,297,155	1,298,298	450,000	450,000	450,000	0	0	0	0	0	0	0	0	0	1,749,900	1,747,155	1,748,298
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isooctane	100	100	100	100	100	100	100	100	100	100	100	100	68,231	100	28,472	68,631	500	28,872
Isooctene	25,366	100	10,622	3,956	100	1,706	100	100	100	100	100	100	100	100	100	29,622	500	12,628
X-Fer C5's from Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum Total	4,684,731	4,397,003	4,516,824	4,119,446	4,796,837	4,514,745	10,928,196	10,735,851	10,815,951	1,990,037	1,996,558	1,993,842	2,820,834	2,770,114	2,791,236	24,543,245	24,696,363	24,632,599
Refinery Output	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
Propane	32,389	35,150	34,000	50,395	73,951	64,141	146,947	144,277	145,389	27,903	27,771	27,826	54,844	60,310	58,033	312,478	341,458	329,390
Propylene	18,685	18,685	18,685	42,525	42,525	42,525	245,407	245,407	245,407	2,041	2,041	2,041	11,774	11,774	11,774	320,432	320,432	320,432
Normal Butane	0	0	0	9,464	0	3,941	110,139	0	45,866	0	0	0	0	0	0	119,604	0	49,808
Isobutane	0	0	0	0	0	0	0	0	0	0	0	0	19,434	0	8,093	19,434	0	8,093
PC Naphtha	15,830	15,830	15,830	40,290	40,290	40,290	432,937	432,937	432,937	0	0	0	0	0	0	489,056	489,056	489,056
PC Gasoil	0	0	0	0	951,418	555,211	157,500	157,500	157,500	0	0	0	0	0	0	157,500	1,108,918	712,711
CG Reg	0	124,823	72,842	100	945,863	552,011	907,294	1,367,754	1,176,001	100	421,001	245,721	100	100	100	907,594	2,859,541	2,046,675
CG Prem	0	0	0	100	100	100	200	2,945	1,802	79,243	100	33,058	100	100	100	79,643	3,245	35,060
CG E10 Reg	1,554,004	1,427,013	1,479,897	1,774,598	741,621	1,171,792	339,601	100	141,481	692,210	277,932	450,453	119,520	108,222	112,927	4,479,934	2,554,888	3,356,551
CG E10 Prem	381,615	171,228	258,841	337,938	321,325	328,243	237,404	260,444	250,849	52,626	133,030	99,547	22,685	20,533	21,429	1,032,267	906,560	958,909
RFG E10 Reg	1,445,578	1,404,150	1,421,402	330,079	327,105	328,343	457,925	466,449	462,899	0	0	0	1,291,664	1,327,246	1,312,428	3,525,246	3,524,950	3,525,073
RFG E10 Prem	275,348	267,457	270,743	62,872	62,306	62,542	87,224	88,847	88,171	0	0	0	246,031	252,809	249,986	671,475	671,419	671,442
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to RFG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	910,811	628,444	746,032	0	0	0	0	0	0	910,811	628,444	746,032
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,749,900	1,747,155	1,748,298	0	0	0	0	0	0	1,749,900	1,747,155	1,748,298
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	15,521	35,289	27,057	176,293	71,211	114,971	1,381,669	1,350,395	1,363,419	377,584	381,854	380,076	300,470	299,665	300,000	2,251,537	2,138,414	2,185,523
X-Fer Diesel Rundown to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSD Gr 76 (0.2%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (.05%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	553,004	550,770	551,700	713,591	651,013	677,073	2,086,888	2,321,213	2,223,631	508,254	513,309	511,204	0	0	0	3,861,737	4,036,306	3,963,609
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	357,732	357,302	357,481	357,732	357,302	357,481
X-Fer C5's to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residual Fuel	89,250	56,882	70,361	78,750	41,355	56,928	350,885	215,724	272,010	153,476	139,868	145,535	72,447	72,211	72,309	744,807	526,040	617,143
Slurry	32,019	31,634	31,794	79,831	96,416	89,509	138,000	172,500	158,133	0	0	0	30,000	30,000	30,000	279,850	330,550	309,437
Asphalt & Wax	143,000	143,000	143,000	210,000	210,000	210,000	157,500	157,500	157,500	5,250	5,250	5,250	44,232	44,232	44,232	559,982	559,982	559,982

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Gasoil	0	0	0	10,115	7,675	8,691	0	0	0	0	0	0	9,814	9,814	9,814	19,928	17,489	18,505
Lubes	18,706	18,706	18,706	17,313	17,313	17,313	157,500	157,500	157,500	0	0	0	20,149	20,149	20,149	213,668	213,668	213,668
Benzene	11,003	11,003	11,003	11,003	11,003	11,003	51,347	51,347	51,347	0	0	0	0	0	0	73,353	73,353	73,353
Toluene	0	0	0	0	0	0	34,910	34,910	34,910	0	0	0	0	0	0	34,910	34,910	34,910
Xylenes	0	0	0	0	0	0	7,777	7,777	7,777	0	0	0	0	0	0	7,777	7,777	7,777
Transfer Raffinate	0	0	0	0	0	0	64,328	60,000	61,802	0	0	0	0	0	0	64,328	60,000	61,802
Transfer Alkylate	0	0	0	0	0	0	125,672	120,776	122,815	0	0	0	0	0	0	125,672	120,776	122,815
Transfer Reformate	0	0	0	0	0	0	0	9,224	5,383	0	0	0	0	0	0	0	9,224	5,383
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	57,171	0	23,808	57,171	0	23,808
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (STons)	1,005	1,065	1,040	3,896	4,445	4,217	16,614	17,865	17,344	2,507	2,583	2,551	4,049	4,046	4,047	28,071	30,005	29,200
Coke (STon)	1,038	2,208	1,721	8,804	16,881	13,517	67,946	69,516	68,862	7,111	7,111	7,111	19,994	19,967	19,978	104,892	115,684	111,190
Sum Total	4,596,225	4,328,051	4,439,729	4,008,987	4,719,384	4,423,547	10,763,551	10,639,098	10,690,925	1,946,931	1,950,781	1,949,178	2,778,621	2,734,769	2,753,031	24,094,314	24,372,084	24,256,410
Check = 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
C3+ Liq Product	4,585,951	4,311,619	4,425,861	3,945,257	4,612,489	4,334,628	10,339,765	10,201,125	10,258,860	1,898,687	1,902,156	1,900,711	2,658,166	2,614,466	2,632,664	23,427,825	23,641,855	23,552,725
C3+ Recovery	99.6%	99.8%	99.7%	99.6%	98.8%	99.1%	99.9%	100.3%	100.1%	101.6%	101.5%	101.5%	100.5%	100.5%	100.5%			
Clean Prod Terminal Imports	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	450,000	450,000	450,000	0	0	0	0	0	0	0	0	0	0	0	0	450,000	450,000	450,000
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	79,500	79,500	79,500	0	0	0	3,000	3,000	3,000	0	0	0	0	0	0	82,500	82,500	82,500
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	172,500	172,500	172,500	4,500	4,500	4,500	20,250	20,250	20,250	0	0	0	0	0	0	197,250	197,250	197,250
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Imports	702,000	702,000	702,000	4,500	4,500	4,500	23,250	23,250	23,250	0	0	0	0	0	0	729,750	729,750	729,750
Clean Prod Terminal Sales	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	450,000	574,823	522,842	100	945,863	552,011	907,294	1,367,754	1,176,001	100	421,001	245,721	100	100	100	1,357,594	3,309,541	2,496,675
CG Prem	100	2,845	1,702	100	100	100	100	100	100	79,243	100	33,058	100	100	100	79,643	3,245	35,060
CG E10 Reg	1,554,004	1,427,013	1,479,897	1,774,598	741,621	1,171,792	339,601	100	141,481	692,210	277,932	450,453	119,520	108,222	112,927	4,479,934	2,554,888	3,356,551
CG E10 Prem	381,615	171,228	258,841	337,938	321,325	328,243	237,404	260,444	250,849	52,626	133,030	99,547	22,685	20,533	21,429	1,032,267	906,560	958,909
RFG E10 Reg	1,445,578	1,404,150	1,421,402	330,079	327,105	328,343	457,925	466,449	462,899	0	0	0	1,291,664	1,327,246	1,312,428	3,525,246	3,524,950	3,525,073
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to RFG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	275,348	267,457	270,743	62,872	62,306	62,542	87,224	88,847	88,171	0	0	0	246,031	252,809	249,986	671,475	671,419	671,442
Jet/Kero A (450ppm)	495,021	514,789	506,557	276,293	271,211	273,327	814,669	683,395	738,063	447,584	451,854	450,076	300,470	299,665	300,000	2,334,037	2,220,914	2,268,023
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	1,395,979	1,730,184	1,591,008	992,157	974,829	982,045	1,092,597	945,234	1,006,601	578,254	583,309	581,204	0	0	0	4,058,987	4,233,556	4,160,859
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	357,732	357,302	357,481	357,732	357,302	357,481
Total Sales	5,997,645	6,092,489	6,052,992	3,774,137	3,644,360	3,698,404	3,936,813	3,812,323	3,864,165	1,850,017	1,867,226	1,860,060	2,338,301	2,365,976	2,354,451	17,896,914	17,782,373	17,830,072
Clean Prod Transfers	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blank Terminal Sale																		
CG Prem	100	2,845	1,702	0	0	0	-100	-2,845	-1,702	0	0	0	0	0	0	0	0	0
CG E10 Reg																0	0	0
CG E10 Prem																0	0	0
RFG E10 Reg																0	0	0
RFG E20 Reg																0	0	0
CG E20 Reg																0	0	0
E85 to CG																0	0	0
E85 to RFG																0	0	0
RFG E10 Prem																0	0	0
Blank Terminal Sale																0	0	0
Blank Terminal Sale																0	0	0
Jet/Kero A (450ppm)	400,000	400,000	400,000	100,000	200,000	158,356	-570,000	-670,000	-628,356	70,000	70,000	70,000	0	0	0	0	0	0
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	670,476	1,006,914	866,808	274,066	319,316	300,472	-1,014,541	-1,396,229	-1,237,280	70,000	70,000	70,000	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,070,575	1,409,759	1,268,510	374,066	519,316	458,828	-1,584,641	-2,069,074	-1,867,338	140,000	140,000	140,000	0	0	0	0	0	0
Intermediates Transfers																		

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Transfers IN																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,808	0	0	23,808
Transfer Reformate	0	0	0	0	9,224	5,383	0	0	0	0	0	0	0	0	0	0	9,224	5,383
Transfer Alkylate	60,000	60,000	60,000	5,672	776	2,815	0	0	0	0	0	0	60,000	60,000	60,000	125,672	120,776	122,815
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	4,328	0	1,802	0	0	0	0	0	0	60,000	60,000	60,000	64,328	60,000	61,802
Transfer RBOB 10%	860,811	578,444	696,032	50,000	50,000	50,000	0	0	0	0	0	0	0	0	0	910,811	628,444	746,032
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,299,900	1,297,155	1,298,298	450,000	450,000	450,000	0	0	0	0	0	0	0	0	0	1,749,900	1,747,155	1,748,298
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers IN	2,220,711	1,935,599	2,054,330	510,000	510,000	510,000	0	0	0	0	0	0	120,000	120,000	143,808	2,850,711	2,565,599	2,708,139
Transfers OUT																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,808	0	0	23,808
Transfer Reformate	0	0	0	0	0	0	0	9,224	5,383	0	0	0	0	0	0	0	9,224	5,383
Transfer Raffinate	0	0	0	0	0	0	64,328	60,000	61,802	0	0	0	0	0	0	64,328	60,000	61,802
Transfer Alkylate	0	0	0	0	0	0	125,672	120,776	122,815	0	0	0	0	0	0	125,672	120,776	122,815
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	910,811	628,444	746,032	0	0	0	0	0	0	910,811	628,444	746,032
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,749,900	1,747,155	1,748,298	0	0	0	0	0	0	1,749,900	1,747,155	1,748,298
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers OUT	0	0	0	0	0	0	2,850,711	2,565,599	2,684,330	0	0	0	0	0	23,808	2,850,711	2,565,599	2,708,139
Financials																		
Refinery Feedstocks ($000)	21,793,582	29,456,147	51,249,729	29,697,778	48,173,409	77,871,187	85,326,738	115,488,412	200,815,150	15,896,012	21,755,876	37,651,887	21,891,479	28,954,866	50,846,346	174,605,589	243,828,710	418,434,299
Terminal Imports ($000)	7,432,276	10,010,248	17,442,524	46,208	67,167	113,375	234,670	339,179	573,848	0	0	0	0	0	0	7,713,153	10,416,594	18,129,747
Transfer Costs ($000)	534,865	761,608	1,296,474	85,935	139,913	225,848	0	0	0	13,406	18,787	32,193	76,608	107,352	183,960	710,815	1,027,660	1,738,475
Total Costs ($000)	29,760,723	40,228,003	69,988,726	29,829,921	48,380,489	78,210,409	85,561,408	115,827,591	201,388,999	15,909,418	21,774,662	37,684,080	21,968,087	29,062,218	51,030,306	183,029,557	255,272,963	438,302,520
Total Costs ($/Day)	195,794,229	188,863,865	191,749,935	196,249,478	227,138,445	214,275,094	562,903,999	543,791,506	551,750,681	104,667,223	102,228,461	103,244,055	144,526,891	136,442,339	139,809,057	1,204,141,820	1,198,464,617	1,200,828,822
Refinery Revenues ($000)	2,902,573	3,504,873	6,407,446	4,380,820	18,943,460	23,324,280	17,350,282	21,233,296	38,583,578	1,278,851	1,541,586	2,820,437	2,434,376	2,407,194	4,841,570	28,346,902	47,630,409	75,977,311
Terminal Revenues ($000)	63,653,828	86,450,623	150,104,452	39,351,308	50,865,458	90,216,767	40,098,052	52,337,423	92,435,475	19,982,701	27,506,401	47,489,102	26,949,109	36,344,486	63,293,595	190,034,999	253,504,392	443,539,391
Total Sales ($000)	66,556,402	89,955,496	156,511,898	43,732,128	69,808,919	113,541,047	57,448,334	73,570,718	131,019,052	21,261,552	29,047,987	50,309,539	29,383,485	38,751,681	68,135,166	218,381,902	301,134,800	519,516,702
Total Sales ($/Day)	437,871,066	422,326,271	428,799,720	287,711,367	327,741,403	311,071,361	377,949,568	345,402,433	358,956,308	139,878,634	136,375,525	137,834,354	193,312,402	181,932,773	186,671,687	1,436,723,037	1,413,778,404	1,423,333,429
Gross Margin ($000)	36,795,679	49,727,492	86,523,172	13,902,207	21,428,430	35,330,637	-28,113,074	-42,256,873	-70,369,946	5,352,134	7,273,325	12,625,459	7,415,398	9,689,462	17,104,860	35,352,345	45,861,837	81,214,182
Utilities ($000)	250,688	330,510	581,199	398,853	588,552	987,406	1,447,912	1,990,018	3,437,930	234,822	332,279	567,101	381,899	522,829	904,727	2,714,175	3,764,188	6,478,363
Utilities ($/Day)	1,649,266	1,551,692	1,592,325	2,624,036	2,763,156	2,705,221	9,525,737	9,342,807	9,418,986	1,544,884	1,559,993	1,553,701	2,512,493	2,454,594	2,478,705	17,856,416	17,672,242	17,748,939
Variable Margin ($000)	36,544,991	49,396,982	85,941,973	13,503,354	20,839,878	34,343,231	-29,560,986	-44,246,891	-73,807,876	5,117,312	6,941,046	12,058,358	7,033,499	9,166,634	16,200,133	32,638,170	42,097,649	74,735,819
Variable Margin ($/Day)	240,427,571	231,910,714	235,457,460	88,837,854	97,839,801	94,091,045	-194,480,169	-207,731,880	-202,213,359	33,666,527	32,587,071	33,036,598	46,273,018	43,035,840	44,383,925	214,724,801	197,641,545	204,755,668
Variable Margin ($/Bbl Crd)	157.63	152.04	154.37	28.98	24.98	26.41	-21.37	-22.83	-22.22	19.32	18.62	18.91	21.64	20.15	20.77	12.22	10.72	11.33
Unit Operations																		
Crude Tower	1,525,290	1,525,290	1,525,290	3,065,508	3,916,969	3,562,388	9,099,909	9,099,909	9,099,909	1,742,748	1,749,772	1,746,847	2,138,519	2,136,220	2,137,177	17,571,974	18,428,160	18,071,611
Vacuum Tower	656,657	656,657	656,657	1,310,500	1,694,752	1,534,734	4,103,890	4,031,842	4,061,845	727,217	722,354	724,379	1,152,347	1,151,108	1,151,624	7,950,611	8,256,712	8,129,240
Sats Gas Plant	99,196	68,841	81,482	136,255	134,785	135,397	446,629	381,222	408,460	90,436	68,256	77,492	197,375	130,043	158,083	969,891	783,147	860,914
Unsats Gas Plant	171,854	169,891	170,708	283,448	327,058	308,898	1,017,851	1,020,496	1,019,395	102,333	105,845	104,382	219,337	219,000	219,140	1,794,823	1,842,290	1,822,523
FCC DeC5 Tower	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FCC	618,120	605,226	610,595	978,387	1,121,162	1,061,705	3,344,026	3,344,026	3,344,026	322,262	331,988	327,937	706,388	706,388	706,388	5,969,183	6,108,789	6,050,652
FCC Splitter	347,414	340,774	343,539	553,017	628,566	597,105	1,871,438	1,879,133	1,875,928	187,482	195,037	191,891	395,498	395,394	395,438	3,354,848	3,438,905	3,403,901
Hydrocracker	37,890	37,890	37,890	151,600	151,600	151,600	553,450	553,450	553,450	308,656	308,656	308,656	424,503	424,503	424,503	1,476,098	1,476,099	1,476,098
H-Oil Unit	0	0	0	0	0	0	161,000	161,000	161,000	0	0	0	0	0	0	161,000	161,000	161,000
Delayed Coker	21,418	45,584	35,520	178,776	342,800	274,494	1,233,822	1,262,348	1,250,469	125,605	125,605	125,605	398,450	397,915	398,138	1,958,071	2,174,252	2,084,226
Visbreaker	0	0	0	0	0	0	48,000	48,000	48,000	19,008	41,000	31,842	30,600	30,600	30,600	97,608	119,600	110,442
Thermal Naphtha Splitter	2,581	5,493	4,280	21,662	41,537	33,260	147,943	151,303	149,904	15,418	16,539	16,072	49,802	49,737	49,764	237,406	264,609	253,281
CRU Reformer	276,985	270,497	273,199	479,480	643,022	574,917	1,280,376	1,207,295	1,237,729	0	0	0	0	0	0	2,036,841	2,120,814	2,085,844
SRU Reformer	0	0	0	0	0	0	0	0	0	208,598	220,839	215,741	427,407	427,407	427,407	636,004	648,246	643,148
BTX Reformer	64,190	64,190	64,190	57,515	57,515	57,515	271,276	271,276	271,276	0	0	0	0	0	0	392,981	392,981	392,981
C4 Isomerization	27,676	100	11,584	16,000	100	6,721	58,400	100	24,378	19,170	132	8,060	69,736	100	29,099	190,981	532	79,842
C5/C6 Isomerization	32,454	14,523	21,990	164,100	51,269	98,256	229,168	100	95,493	100	100	100	8,548	100	3,618	434,371	66,092	219,457
HF Alkylation	39,690	19,845	28,109	144,922	76,357	104,910	285,117	142,559	201,925	33,675	33,675	33,675	38,500	24,889	30,557	541,904	297,324	399,177
H2SO4 Alkylation	83,490	57,129	68,107	88,480	64,288	74,363	421,093	386,576	400,950	62,789	62,789	62,789	157,468	157,468	157,468	813,320	728,250	763,677
Dimersol	0	0	0	3,240	3,240	3,240	5,700	5,700	5,700	1,000	1,000	1,000	4,900	4,900	4,900	14,840	14,840	14,840
Cat Poly	13,340	12,051	12,588	100	100	100	100	100	100	100	1,698	1,033	100	100	100	13,740	14,049	13,920
Isooctane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT - Total	556,564	562,563	560,065	822,552	606,860	696,682	3,142,370	3,291,523	3,229,410	539,043	539,043	539,043	443,450	443,450	443,450	5,503,979	5,443,438	5,468,650
DHT - SR Diesel Fd	393,243	390,640	391,724	558,975	132,349	310,013	1,071,915	1,287,121	1,197,501	192,152	196,754	194,838	121,972	121,518	121,707	2,338,257	2,128,382	2,215,782
DHT - Jet/Kero Fd	8,031	16,244	12,824	165,944	61,168	104,801	1,136,986	1,071,170	1,098,578	250,099	249,273	249,617	239,329	240,238	239,859	1,800,390	1,638,093	1,705,680
DHT - LCO Fd	153,653	155,578	154,776	97,531	301,754	216,708	623,671	616,271	619,353	60,630	58,630	59,463	677	799	748	936,163	1,133,032	1,051,048
DHT - CGO Fd	1,637	101	741	101	111,588	65,161	309,798	316,961	313,978	36,162	34,386	35,125	81,472	80,894	81,135	429,170	543,930	496,140

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
DHT 2nd RCT - Total	521,232	521,442	521,354	638,442	519,322	568,928	1,958,591	2,172,666	2,083,517	278,122	278,122	278,122	44,345	44,345	44,345	3,440,731	3,535,898	3,496,267
DHT 2nd RCT - SR Diesel Fd	386,404	383,846	384,912	541,564	109,562	289,464	1,033,412	1,264,738	1,168,405	188,811	193,333	191,449	44,145	44,145	44,145	2,194,336	1,995,625	2,078,376
DHT 2nd RCT - Jet/Kero Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - LCO Fd	133,209	137,496	135,711	96,777	299,421	215,033	618,850	594,517	604,650	53,555	50,789	51,941	100	100	100	902,491	1,082,323	1,007,434
DHT 2nd RCT - CGO Fd	1,619	100	732	100	110,339	64,431	306,328	313,411	310,461	35,757	34,001	34,732	100	100	100	343,904	457,950	410,457
DHT Arom Saturation	0	0	0	0	0	0	0	0	0	0	0	0	156,166	155,149	155,572	156,166	155,149	155,572
NHT - Total Fd	382,271	382,271	382,271	871,330	932,291	906,905	1,805,176	1,703,806	1,746,020	354,843	354,843	354,843	588,363	585,564	586,730	4,001,983	3,958,775	3,976,768
NHT - Isom/Thermal Fd	56,020	71,958	65,321	278,103	289,269	284,619	524,800	254,752	367,211	146,245	134,004	139,101	158,329	158,157	158,229	1,163,497	908,140	1,014,481
NHT - Reformer Fd	326,251	310,313	316,950	593,228	643,022	622,286	1,280,376	1,449,054	1,378,810	208,598	220,839	215,741	430,034	427,407	428,501	2,838,486	3,050,635	2,962,288
CGH - Generic	74,521	75,256	74,950	234,253	213,863	222,355	782,357	745,868	761,063	65,991	65,991	65,991	0	0	0	1,157,122	1,100,979	1,124,359
CGH - Olefin Sat'n	0	0	0	0	0	0	0	0	0	0	0	0	204,472	204,472	204,472	204,472	204,472	204,472
FCCU Fd HDT	308,794	308,794	308,794	370,419	370,419	370,419	1,343,283	1,343,283	1,343,283	106,380	140,477	126,278	499,400	499,400	499,400	2,628,276	2,662,373	2,648,174
LSR Splitter	1,000	1,000	1,000	82,800	38,014	56,664	100,000	100,000	100,000	100,000	100,000	100,000	79,275	79,190	79,225	363,075	318,203	336,889
LSR Bz Saturator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformate Saturator	26,088	10,839	17,189	10,000	10,000	10,000	17,847	1,000	8,016	1,000	1,000	1,000	100,000	50,000	70,822	154,935	72,839	107,027
SDA	32,600	32,600	32,600	40,200	40,200	40,200	263,385	263,385	263,385	27,700	27,700	27,700	44,000	44,000	44,000	407,885	407,885	407,885
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TAME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Total MSCF	469,948	469,948	469,948	784,103	736,516	756,333	3,581,520	3,732,173	3,669,435	840,004	840,004	840,004	1,302,535	1,287,877	1,293,981	6,978,110	7,066,518	7,029,702
Hydrogen Plant - Plant Fuel Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - LPG Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Naphtha Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Nat Gas Fd	469,948	469,948	469,948	784,103	736,516	756,333	3,581,520	3,732,173	3,669,435	840,004	840,004	840,004	1,302,535	1,287,877	1,293,981	6,978,110	7,066,518	7,029,702
Lube Unit	52,222	52,222	52,222	48,333	48,333	48,333	439,699	439,699	439,699	0	0	0	56,250	56,250	56,250	596,505	596,504	596,504
Sulfur Plant	2,009,865	2,130,417	2,080,214	7,791,249	8,889,866	8,432,360	33,224,642	35,727,820	34,685,401	5,014,524	5,165,052	5,102,366	8,097,931	8,091,089	8,093,938	56,138,210	60,004,243	58,394,278
Merox Jet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Merox Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BTX Reformer - Tower feed	22,224	22,224	22,224	21,524	21,524	21,524	94,349	94,349	94,349	0	0	0	0	0	0	138,097	138,097	138,097
BTX Reformer - Extract feed	40,620	40,620	40,620	45,697	45,697	45,697	197,990	197,990	197,990	0	0	0	0	0	0	284,306	284,306	284,306
Toluene Dealkyation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BLANK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - CO2 (MLb/Day)	119,657	114,931	116,899	205,562	221,788	215,031	741,566	723,141	730,814	111,421	112,489	112,044	192,077	187,495	189,403	1,370,284	1,359,843	1,364,191
Utilities - Steam (Mlbs)	135,123	124,425	128,880	233,466	221,250	226,337	844,720	811,313	825,225	124,529	124,607	124,574	207,064	200,905	203,470	1,544,902	1,482,499	1,508,486
Utilities - Steam Vent (Mlbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities - Power (kwh)	10,328,774	9,820,418	10,032,117	17,809,482	18,358,830	18,130,060	64,676,992	64,052,024	64,312,285	11,937,301	11,974,258	11,958,868	19,468,344	19,009,340	19,200,487	124,220,893	123,214,870	123,633,817
Utilities - Cooling H2O (Mgal)	1,641,873	1,490,792	1,553,708	2,847,858	2,850,804	2,849,577	10,098,264	9,527,022	9,764,909	1,408,627	1,422,068	1,416,471	2,652,881	2,525,116	2,578,322	18,649,502	17,815,802	18,162,986
HYD Supply (MSCFD)																		
CRU Reformer	264,989	260,267		456,811	608,685		1,037,308	977,220		0	0		0	0		1,759,108	1,846,172	1,809,915
CRU Reformer - Unrecov'd	66,253	65,073		114,214	152,185		259,173	244,157		0	0		0	0		439,640	461,416	452,347
CRU Reformer - Total	331,242	325,340		571,024	760,870		1,296,481	1,221,377		0	0		0	0		2,198,747	2,307,588	2,262,263
SRU Reformer	0	0		0	0		0	0		165,508	176,132		360,702	365,755		526,210	541,887	535,359
SRU Reformer - Unrecov'd	0	0		0	0		0	0		41,374	44,030		90,167	91,438		131,541	135,468	133,833
SRU Reformer - Total	0	0		0	0		0	0		206,882	220,162		450,869	457,193		657,751	677,355	669,191
BTX Reformer	37,918	37,918		30,667	30,667		150,822	150,822		0	0		0	0		219,406	219,406	219,406
BTX Reformer - Unrecov'd	9,591	9,591		7,810	7,810		38,299	38,299		0	0		0	0		55,701	55,701	55,701
BTX Reformer - Total	47,509	47,509		38,477	38,477		189,121	189,121		0	0		0	0		275,107	275,107	275,107
Hydrogen Plant	469,945	469,945		784,097	736,510		3,581,494	3,732,146		839,998	839,998		1,302,525	1,287,868		6,978,059	7,066,466	7,029,650
Purchased Hydrogen	0	0		0	0		0	0		0	0		0	0		0	0	0
Coker (Unrecovered)	1,145	2,437		9,375	17,976		66,354	67,889		6,838	6,838		21,657	21,628		105,370	116,768	112,021
Total Supply	849,842	845,232		1,402,974	1,553,834		5,133,450	5,210,532		1,053,717	1,066,997		1,775,052	1,766,688		10,215,034	10,443,284	10,348,232
HYD Demand (MSCFD)																		
Hydrocracker	81,093	81,093		400,907	288,044		1,296,814	1,296,300		648,622	642,334		1,102,927	1,102,877		3,530,364	3,410,648	3,460,502
H-Oil Unit	0	0		0	0		141,882	138,179		0	0		0	0		141,882	138,179	139,721
FCCU Fd HDT	174,882	174,882		242,600	242,600		877,503	918,727		66,202	87,542		311,711	311,709		1,672,899	1,735,460	1,709,407
DHT	66,684	67,571		111,067	107,971		418,325	447,362		58,297	57,917		45,609	45,454		699,982	726,274	715,325
DHT 2nd RCT	406,611	411,358		415,082	658,299		1,803,766	1,875,717		210,324	206,144		20,676	20,676		2,856,459	3,172,195	3,040,710
Naphtha HDT	14,673	14,610		40,033	42,223		87,539	92,500		12,233	13,213		27,225	27,091		181,703	189,637	186,333
DHT Arom Saturation	0	0		0	0		0	0		0	0		123,995	123,181		123,995	123,181	123,520
CGH - Generic	4,602	9,012		29,622	23,900		94,934	90,943		8,652	8,909		0	0		137,810	132,764	134,866
CGH - Olefin Sat'n	0	0		0	0		0	0		0	0		2,732	2,699		2,732	2,699	2,713
C4 Isomerization	1,605	1		928	1		3,387	1		1,112	8		4,045	1		11,077	12	4,620
C5/C6 Isomerization	5,325	2,383		26,926	8,412		37,602	16		16	16		1,403	16		71,272	10,844	36,009
Isooctane	0	0		0	0		0	0		0	0		0	0		0	0	0
Reformate Saturator	17,375	7,219		4,410	4,410		7,870	441		45	45		22,905	19,918		52,605	32,032	40,599
LSR Bz Saturator	0	0		0	0		0	0		0	0		0	0		0	0	0
Cyclohexane	0	0		0	0		0	0		0	0		0	0		0	0	0
TDA	0	0		0	0		0	0		0	0		0	0		0	0	0
Plant Fuel (Recovered H2)	1	1		1	1		1	1		1	1		1	1		5	5	5

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Plant Fuel (Unrecovered H2)	76,990	77,102		131,399	177,972		363,826	350,345		48,212	50,868		111,824	113,066		732,251	769,353	753,902
Total Demand	849,842	845,232		1,402,974	1,553,834		5,133,450	5,210,533		1,053,717	1,066,997		1,775,052	1,766,688		10,215,035	10,443,284	10,348,232
FCC Data																		
Total Feed Rate																		
BPD	618,120	605,226	610,596	978,387	1,121,162	1,061,705	3,344,026	3,344,026	3,344,026	322,262	331,988	327,937	706,388	706,388	706,388	5,969,183	6,108,789	6,050,652
API	24.5	24.3	24.4	22.5	22.1	22.2	24.1	23.8	23.9	24.1	24.0	24.0	22.8	22.8	22.8	23.7	23.4	23.5
Specific Gravity	0.9070	0.9085	0.9078	0.9190	0.9215	0.9205	0.9095	0.9110	0.9104	0.9091	0.9101	0.9097	0.9170	0.9169	0.9169	0.9117	0.9133	0.9126
Sulfur, Wt%	0.45	0.48	0.47	1.16	1.32	1.25	1.04	1.08	1.06	0.84	0.74	0.78	0.44	0.44	0.44	0.92	0.97	0.95
Sulfur ppm	4,495	4,802	4,674	11,598	13,202	12,534	10,446	10,779	10,640	8,413	7,358	7,797	4,444	4,445	4,444	9,199	9,718	9,496
Basic N2 ppm	393	410	403	424	458	444	350	372	363	331	340	336	630	634	633	382	408	397
% Diesel Feed	2.5	0.0	1.0	3.1	0.0	1.3	1.4	0.4	0.8	0.0	0.0	0.0	3.6	3.6	3.6	2.0	0.6	1.2
Mid TBP	816	821	819	829	826	827	804	811	808	843	853	849	820	820	820	813	818	816
W % Conradson Carbon	1.8	1.8	1.8	1.6	1.5	1.5	1.5	1.5	1.5	1.4	1.5	1.5	1.6	1.6	1.6	1.5	1.5	1.5
Percent HDT'd Feed	50%	51%	51%	39%	34%	36%	43%	43%	43%	42%	51%	48%	76%	76%	76%	47%	47%	47%
FCC Yields (vol%)	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%
H2S	0.2%	0.2%	0.2%	0.4%	0.5%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%
Methane	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Ethane	1.2%	1.3%	1.2%	1.3%	1.4%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Ethylene	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Dry Gas	3.9%	4.0%	4.0%	4.2%	4.2%	4.2%	4.0%	4.0%	4.0%	3.9%	3.9%	3.9%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Propane	3.0%	2.9%	2.9%	3.0%	2.9%	3.0%	3.0%	3.0%	3.0%	3.1%	3.1%	3.1%	2.8%	2.8%	2.8%	3.0%	3.0%	3.0%
Propylene	7.8%	7.8%	7.8%	7.8%	7.7%	7.7%	7.7%	7.8%	7.7%	7.9%	8.0%	8.0%	8.1%	8.1%	8.1%	7.8%	7.8%	7.8%
NC4	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.4%	1.5%	1.5%	1.5%	1.5%	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%
Iso-butane	6.0%	5.9%	6.0%	5.9%	5.7%	5.8%	6.2%	6.1%	6.1%	6.4%	6.3%	6.3%	5.3%	5.3%	5.3%	6.0%	5.9%	6.0%
Iso C4=	2.6%	2.6%	2.6%	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.8%	2.8%	2.8%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
1/2 C4=	6.8%	6.8%	6.8%	6.8%	6.7%	6.7%	6.7%	6.7%	6.7%	7.1%	7.2%	7.2%	6.6%	6.6%	6.6%	6.7%	6.7%	6.7%
FCC Gasoline	56.2%	56.3%	56.3%	56.5%	56.1%	56.3%	56.0%	56.2%	56.1%	58.2%	58.7%	58.5%	56.0%	56.0%	56.0%	56.2%	56.3%	56.3%
Cycle Oil	18.6%	18.4%	18.5%	17.7%	17.9%	17.9%	18.5%	18.3%	18.3%	16.3%	16.2%	16.2%	19.8%	19.9%	19.9%	18.4%	18.3%	18.3%
Decant Oil	7.1%	7.3%	7.2%	8.2%	8.9%	8.6%	7.5%	7.6%	7.5%	7.2%	6.9%	7.0%	7.4%	7.4%	7.4%	7.5%	7.7%	7.6%
Coke (wt%)	973.6%	937.0%	952.3%	1269.4%	1350.0%	1316.4%	4885.4%	4796.2%	4833.3%	490.6%	506.4%	499.8%	976.4%	976.3%	976.3%	3187.8%	3106.5%	3140.4%
Conversion	74.2%	74.3%	74.3%	74.1%	73.2%	73.6%	74.0%	74.2%	74.1%	76.5%	76.9%	76.7%	72.8%	72.8%	72.8%	74.1%	74.0%	74.0%
Naphtha Sulfur, ppm	351	376	366	915	1,048	993	809	828	820	659	567	605	315	315	315	712	750	734
LCO Sulfur, wt.%	0.5	0.6	0.5	1.6	1.5	1.5	1.3	1.4	1.3	1.1	1.0	1.1	0.7	0.7	0.7	1.2	1.2	1.2
HCO Sulfur, wt%	1.5	1.6	1.6	3.9	4.4	4.2	3.5	3.6	3.5	2.8	2.5	2.6	1.5	1.5	1.5	3.1	3.2	3.2
Naphtha Sul/Fd Sul	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.08	0.08	0.08
LCO Sul/Fd Sul	1.14	1.19	1.17	1.34	1.13	1.21	1.26	1.26	1.26	1.35	1.41	1.38	1.49	1.49	1.49	1.29	1.24	1.26
HCO Sul/Fd Sul	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.33	3.34
CETANE																		
HSD Gr 76 (0.2%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
LSD Gr 74 (.05%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
ULSD (15 ppm)	50.1	50.3	50.2	49.5	48.1	48.7	50.5	51.2	50.9	50.1	50.5	50.3	0.0	0.0	0.0			0.0
CARB Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.7	32.5			0.0
RFO Blending																		
API	10.5	10.5	10.5	10.5	12.1	11.4	9.1	8.5	8.7	9.3	8.5	8.9	10.5	10.5	10.5			0.0
Sulfur	2.0	2.2	2.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0			0.0
Viscosity (cst)	380.0	380.0	380.0	369.2	380.0	375.5	80.2	50.0	62.6	380.0	299.1	332.8	28.3	27.7	28.0			0.0
Reformer Operations																		
CRU - Severity	100.0	100.0	100.0	99.0	98.8	98.9	94.9	95.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	96.0	96.3	96.2
CRU - Endpoint	400.0	400.0	400.0	400.0	400.0	400.0	350.0	400.0	379.2	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - PFF vol%	46.9	46.1	46.5	44.8	47.2	46.2	49.8	50.1	50.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - ARO vol%	13.4	13.7	13.6	14.0	13.0	13.4	16.0	15.9	15.9	0.0	0.0	0.0	0.0	0.0	0.0			0.0
SRU - Severity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.2	93.1	93.1	94.4	95.7	95.2			0.0
SRU - Endpoint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	400.0	400.0	400.0	355.4	355.2	355.3			0.0
SRU - PFF vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.7	43.5	44.0	46.2	46.2	46.2			0.0
SRU - ARO vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.4	15.8	15.7	12.5	12.6	12.5			0.0
Coker Operations																		
Feed API	7.6	7.6	7.6	6.4	6.4	6.4	3.9	3.9	3.9	4.7	4.7	4.7	6.1	6.1	6.1			0.0
Feed Sulfur Wt%	2.6	2.6	2.6	3.5	3.5	3.5	4.0	4.0	4.0	3.8	3.8	3.8	2.6	2.6	2.6			0.0
Feed Concarbon Wt%	19.0	19.0	19.0	19.1	19.1	19.1	21.5	21.5	21.5	22.5	22.5	22.5	19.5	19.5	19.5			0.0
Hydrocracker Operations																		
Feed API	18.6	18.6	18.6	22.3	21.0	21.5	16.8	17.2	17.0	17.5	17.5	17.5	19.3	19.3	19.3			0.0
Feed Sulfur Wt%	1.3	1.3	1.3	1.8	1.7	1.8	2.0	2.0	2.0	2.0	2.0	2.0	1.4	1.4	1.4			0.0

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Feed Basic N2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.3			0.0
Feed K Factor	11.6	11.6	11.6	11.1	11.6	11.4	11.4	11.4	11.4	11.6	11.6	11.6	11.2	11.2	11.2			0.0
Cracked Feeds %	0.0	0.0	0.0	85.6	0.1	35.7	32.4	30.8	31.5	13.8	13.8	13.8	68.5	68.4	68.4			0.0
Conversion	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0			0.0
Alkylation																		
HF C3 Alkylate	21,780	17,653	19,371	68,163	27,626	44,507	137,455	141,059	139,558	33,673	33,673	33,673	38,498	24,887	30,555	299,569	244,898	267,665
HF C4 Alkylate	17,910	2,192	8,738	76,759	48,731	60,403	147,662	1,499	62,367	2	2	2	2	2	2	242,335	52,426	131,511
HF C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total HF Alkylate	39,690	19,845	28,109	144,922	76,357	104,910	285,117	142,559	201,925	33,675	33,675	33,675	38,500	24,889	30,557	541,904	297,324	399,177
H2SO4 C3 Alkylate	2	2	2	2	2	2	2	2	2	4,675	2,176	3,217	35,684	41,650	39,165	40,364	43,831	42,387
H2SO4 C4 Alkylate	83,489	57,128	68,105	88,478	64,286	74,361	421,092	386,574	400,949	58,114	60,613	59,572	121,784	115,818	118,302	772,956	684,419	721,289
H2SO4 C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total H2SO4 Alkylate	83,490	57,129	68,107	88,480	64,288	74,363	421,093	386,576	400,950	62,789	62,789	62,789	157,468	157,468	157,468	813,320	728,250	763,677
Crude																		
Crude API	31.7	31.7	31.7	31.7	31.7	31.7	29.8	29.8	29.8	30.2	30.2	30.2	26.3	26.3	26.3			0.0
Feed Sulfur Wt%	0.9	0.9	0.9	1.4	1.4	1.4	1.6	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3			0.0
ENERGY BALANCE																		
Process Fuel (MMBTU/D)	513,762	500,234	505,867	998,435	1,111,674	1,064,517	3,444,833	3,351,710	3,390,490	582,878	587,962	585,845	983,853	955,048	967,044	6,523,761	6,506,629	6,513,763
Fuel for Steam Gen (MMBTU/D)	201,738	185,766	192,418	348,565	330,326	337,921	1,261,167	1,211,290	1,232,061	185,922	186,038	185,989	309,147	299,952	303,781	2,306,539	2,213,371	2,252,170
Fuel for Power (MMBTU/D)	103,288	98,204	100,321	178,095	183,588	181,301	646,770	640,520	643,123	119,373	119,743	119,589	194,683	190,093	192,005	1,242,209	1,232,149	1,236,338
Total Energy (MMBTU/D)	818,788	784,204	798,606	1,525,095	1,625,588	1,583,739	5,352,770	5,203,520	5,265,674	888,173	893,743	891,423	1,487,683	1,445,093	1,462,830	10,072,509	9,952,149	10,002,271
Total Energy (MBTU/Bbl Crd)	537	514	524	498	415	449	588	572	579	510	511	510	696	676	684	573	540	554

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 Control A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Refinery Input	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
PADD Crude	1,525,290	1,525,290	1,525,290	3,065,508	3,496,305	3,316,904	8,702,222	8,598,178	8,641,506	1,749,772	1,708,920	1,725,932	2,138,519	2,069,273	2,098,109	17,181,311	17,397,965	17,307,742
GTL Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GTL Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VGO HS	0	0	0	0	0	0	350,671	577,162	482,843	0	0	0	6,578	2,888	4,425	357,249	580,051	487,268
VGO LS	0	0	0	1,000	1,000	1,000	0	0	0	0	0	0	0	0	0	1,000	1,000	1,000
HS AR (A960)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LS AR (Alg)	204,708	196,678	200,022	0	0	0	399,329	172,838	267,157	0	0	0	0	0	0	604,037	369,516	467,180
Normal Butane	20,000	38,531	30,814	6,514	99,638	60,858	0	191,373	111,678	4,701	61,534	37,866	8,800	61,534	39,573	40,015	452,608	280,789
Isobutane	10,687	16,129	13,863	52,697	100	22,004	72,590	22,870	43,575	0	17,522	10,225	0	23,142	13,505	135,975	79,763	103,172
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E10	385,504	342,582	360,456	247,224	229,896	237,112	183,682	177,267	179,938	86,879	78,764	82,143	170,260	157,839	163,011	1,073,550	986,347	1,022,661
Ethanol - E20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E85	358,551	558,902	475,468	143,961	195,036	173,766	257,382	450,033	369,806	86	114,360	66,772	39,045	174,138	117,880	799,025	1,492,469	1,203,693
Reformer Feed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (FOE)	81,514	57,242	67,350	162,587	131,723	144,576	570,731	546,827	556,782	121,923	116,904	118,994	179,928	170,870	174,642	1,116,683	1,023,566	1,062,344
Hydrogen (MSCF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentanes Plus	0	0	0	77,000	100	32,124	125,000	1	52,055	44,616	0	18,580	0	0	0	246,616	101	102,759
Import CBOB 10%	277,000	277,000	277,000	0	0	0	0	0	0	0	0	0	0	0	0	277,000	277,000	277,000
Import CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import RBOB 10%	123,000	123,000	123,000	0	0	0	0	0	0	0	0	0	0	0	0	123,000	123,000	123,000
Import RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Alkylate	39,299	51,361	46,338	0	0	0	0	0	0	0	0	0	0	0	0	39,299	51,361	46,338
Import Raffinate	10,701	0	4,456	0	0	0	0	0	0	10,000	0	4,164	110,000	0	45,808	130,701	0	54,429
Import Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Lt Naphtha	0	23,639	13,795	0	0	0	54,207	0	22,574	0	0	0	0	1,000	584	54,207	24,639	36,952
Import Hvy Naph	0	0	0	0	0	0	100,000	0	41,644	0	0	0	0	0	0	100,000	0	41,644
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	19,882	11,602	0	19,882	11,602
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	60,000	60,000	60,000	0	10,000	5,836	0	0	0	0	0	0	60,000	60,000	60,000	120,000	130,000	125,836
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	10,000	0	4,164	0	0	0	0	0	0	60,000	60,000	60,000	70,000	60,000	64,164
Transfer RBOB 10%	872,771	511,091	661,709	50,000	100,000	79,178	0	0	0	0	0	0	0	0	0	922,771	611,091	740,887
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,300,000	1,300,000	1,300,000	450,000	400,000	420,822	0	0	0	2,205	0	918	0	0	0	1,752,205	1,700,000	1,721,740
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isooctane	5,301	100	2,266	100	100	100	100	100	100	100	100	100	84,412	100	35,211	90,014	500	37,777
Isooctene	1,301	100	600	100	100	100	100	100	100	100	100	100	100	100	100	1,701	500	1,000
X-Fer C5's from Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum Total	5,275,627	5,081,645	5,162,426	4,266,692	4,663,998	4,498,544	10,816,015	10,736,749	10,769,758	2,020,382	2,098,204	2,065,796	2,857,643	2,800,765	2,824,451	25,236,358	25,381,360	25,320,976
Refinery Output	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
Propane	32,190	34,402	33,481	47,337	58,537	53,873	127,097	158,298	145,305	27,669	24,467	25,801	57,872	57,946	57,915	292,165	333,651	316,375
Propylene	18,685	18,685	18,685	42,525	42,525	42,525	245,407	245,407	245,407	2,041	2,041	2,041	11,774	11,774	11,774	320,432	320,432	320,432
Normal Butane	0	0	0	0	0	0	72,067	0	30,011	0	0	0	0	0	0	72,067	0	30,011
Isobutane	0	0	0	0	0	0	0	0	0	8,672	0	3,611	33,729	0	14,046	42,401	0	17,657
PC Naphtha	15,830	15,830	15,830	40,290	40,290	40,290	432,937	432,937	432,937	0	0	0	0	0	0	489,056	489,056	489,056
PC Gasoil	0	0	0	0	849,240	495,584	157,500	157,500	157,500	0	0	0	0	0	0	157,500	1,006,740	653,084
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	2,047,808	1,821,950	1,916,006	1,852,169	1,534,164	1,666,593	1,301,295	903,540	1,069,180	722,471	633,684	670,658	118,758	113,056	115,431	6,042,502	5,006,394	5,437,869
CG E10 Prem	390,078	181,681	268,466	352,813	335,475	342,695	247,885	271,932	261,918	137,633	146,075	142,559	22,621	21,535	21,987	1,151,029	956,697	1,037,624
RFG E10 Reg	1,091,221	1,104,480	1,098,958	176,919	341,303	272,847	178,239	486,737	358,267	0	0	0	1,289,843	1,167,079	1,218,203	2,736,223	3,099,598	2,948,275
RFG E10 Prem	287,384	283,449	285,088	65,620	65,029	65,275	91,036	92,731	92,025	0	0	0	254,347	260,936	258,192	698,387	702,146	700,581
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	100	267,385	156,077	100	227,080	132,557	100	524,103	305,888	100	133,208	77,777	0	0	0	400	1,151,775	672,299
E85 to RFG	417,543	383,629	397,752	167,587	100	69,848	299,701	100	124,865	0	0	0	45,480	202,837	137,308	930,311	586,666	729,773
Transfer RBOB 10%	0	0	0	0	0	0	922,771	611,091	740,887	0	0	0	0	0	0	922,771	611,091	740,887
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,752,206	1,700,000	1,721,740	0	0	0	0	0	0	1,752,206	1,700,000	1,721,740
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	15,521	35,289	27,057	176,293	71,211	114,971	1,381,669	1,350,395	1,363,419	377,584	381,854	380,076	300,470	299,665	300,000	2,251,537	2,138,414	2,185,523
X-Fer Diesel Rundown to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSD Gr 76 (0.2%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (.05%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	564,694	564,495	564,578	761,756	567,022	648,117	1,986,334	2,334,185	2,189,326	495,247	529,672	515,336	0	0	0	3,808,031	3,995,374	3,917,357
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	353,755	353,325	353,504	353,755	353,325	353,504
X-Fer C5's to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residual Fuel	89,250	84,511	86,485	78,750	41,710	57,135	322,045	200,000	250,824	153,992	148,507	150,791	77,737	60,600	67,736	721,773	535,328	612,971
Slurry	31,105	30,328	30,651	79,744	80,623	80,257	138,000	172,500	158,133	0	0	0	30,000	30,000	30,000	278,849	313,451	299,041
Asphalt & Wax	143,000	143,000	143,000	210,000	210,000	210,000	157,500	157,500	157,500	5,250	5,250	5,250	44,232	44,232	44,232	559,982	559,982	559,982

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 Control A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Gasoil	0	0	0	10,115	7,675	8,691	0	0	0	0	0	0	9,814	9,814	9,814	19,928	17,489	18,505
Lubes	18,706	18,706	18,706	17,313	17,313	17,313	157,500	157,500	157,500	0	0	0	20,149	20,149	20,149	213,668	213,668	213,668
Benzene	11,003	11,003	11,003	11,003	11,003	11,003	51,347	51,347	51,347	0	0	0	0	0	0	73,353	73,353	73,353
Toluene	0	0	0	0	0	0	34,910	34,910	34,910	0	0	0	0	0	0	34,910	34,910	34,910
Xylenes	0	0	0	0	0	0	7,777	7,777	7,777	0	0	0	0	0	0	7,777	7,777	7,777
Transfer Raffinate	0	0	0	0	0	0	70,000	60,000	64,164	0	0	0	0	0	0	70,000	60,000	64,164
Transfer Alkylate	0	0	0	0	0	0	120,000	130,000	125,836	0	0	0	0	0	0	120,000	130,000	125,836
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	27,861	0	11,602	27,861	0	11,602
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (STons)	1,005	1,009	1,007	3,906	3,884	3,893	15,689	16,464	16,141	2,527	2,457	2,486	3,953	3,873	3,906	27,080	27,686	27,434
Coke (STon)	1,069	1,237	1,167	8,740	13,568	11,558	64,518	64,518	64,518	7,111	7,111	7,111	19,491	19,184	19,312	100,930	105,620	103,667
Sum Total	5,184,546	5,010,113	5,082,754	4,153,798	4,587,790	4,407,060	10,657,296	10,646,381	10,650,926	1,979,001	2,052,749	2,022,038	2,815,898	2,768,465	2,788,218	24,790,539	25,065,498	24,950,995
Check = 0	0	0	0	0	0	0	-1	-1	-1	0	0	0	0	0	0			
C3+ Liq Product	5,174,116	4,998,823	5,071,822	4,090,334	4,500,299	4,329,574	10,255,322	10,240,489	10,246,666	1,930,658	2,004,758	1,973,900	2,698,443	2,652,948	2,671,894	24,148,873	24,397,317	24,293,856
C3+ Recovery	99.6%	99.5%	99.5%	99.7%	99.3%	99.4%	100.1%	100.5%	100.3%	101.7%	101.2%	101.4%	100.8%	100.9%	100.8%			
Clean Prod Terminal Imports	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	79,500	79,500	79,500	0	0	0	3,000	3,000	3,000	0	0	0	0	0	0	82,500	82,500	82,500
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	172,500	172,500	172,500	4,500	4,500	4,500	20,250	20,250	20,250	0	0	0	0	0	0	197,250	197,250	197,250
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Imports	252,000	252,000	252,000	4,500	4,500	4,500	23,250	23,250	23,250	0	0	0	0	0	0	279,750	279,750	279,750
Clean Prod Terminal Sales	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	2,047,808	1,821,950	1,916,006	1,852,169	1,534,164	1,666,593	1,301,295	903,540	1,069,180	722,471	633,684	670,658	118,758	113,056	115,431	6,042,502	5,006,394	5,437,869
CG E10 Prem	390,078	181,681	268,466	352,813	335,475	342,695	247,885	271,932	261,918	137,633	146,075	142,559	22,621	21,535	21,987	1,151,029	956,697	1,037,624
RFG E10 Reg	1,091,221	1,104,480	1,098,958	176,919	341,303	272,847	178,239	486,737	358,267	0	0	0	1,289,843	1,167,079	1,218,203	2,736,223	3,099,598	2,948,275
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	100	267,385	156,077	100	227,080	132,557	100	524,103	305,888	100	133,208	77,777	0	0	0	400	1,151,775	672,299
E85 to RFG	417,543	383,629	397,752	167,587	100	69,848	299,701	100	124,865	0	0	0	45,480	202,837	137,308	930,311	586,666	729,773
RFG E10 Prem	287,384	283,449	285,088	65,620	65,029	65,275	91,036	92,731	92,025	0	0	0	254,347	260,936	258,192	698,387	702,146	700,581
Jet/Kero A (450ppm)	495,021	514,789	506,557	276,293	271,211	273,327	814,669	683,395	738,063	447,584	451,854	450,076	300,470	299,665	300,000	2,334,037	2,220,914	2,268,023
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	1,377,651	1,712,751	1,573,203	981,226	945,958	960,645	1,081,157	934,243	995,424	565,247	599,672	585,336	0	0	0	4,005,281	4,192,624	4,114,607
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	353,755	353,325	353,504	353,755	353,325	353,504
Total Sales	6,106,806	6,270,115	6,202,106	3,872,728	3,720,319	3,783,788	4,014,083	3,896,780	3,945,629	1,873,035	1,964,493	1,926,406	2,385,275	2,418,434	2,404,625	18,251,925	18,270,140	18,262,555
Clean Prod Transfers	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blank Terminal Sale																		
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg																0	0	0
CG E10 Prem																0	0	0
RFG E10 Reg																0	0	0
RFG E20 Reg																0	0	0
CG E20 Reg																0	0	0
E85 to CG																0	0	0
E85 to RFG																0	0	0
RFG E10 Prem																0	0	0
Blank Terminal Sale																0	0	0
Blank Terminal Sale																0	0	0
Jet/Kero A (450ppm)	400,000	400,000	400,000	100,000	200,000	158,356	-570,000	-670,000	-628,356	70,000	70,000	70,000	0	0	0	0	0	0
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	640,458	975,756	836,125	214,969	374,436	308,028	-925,427	-1,420,192	-1,214,153	70,000	70,000	70,000	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,040,458	1,375,756	1,236,125	314,969	574,436	466,384	-1,495,427	-2,090,192	-1,842,509	140,000	140,000	140,000	0	0	0	0	0	0
Intermediates Transfers																		

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 Control A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Transfers IN																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,602	0	0	11,602
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	60,000	60,000	60,000	0	10,000	5,836	0	0	0	0	0	0	60,000	60,000	60,000	120,000	130,000	125,836
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	10,000	0	4,164	0	0	0	0	0	0	60,000	60,000	60,000	70,000	60,000	64,164
Transfer RBOB 10%	872,771	511,091	661,709	50,000	100,000	79,178	0	0	0	0	0	0	0	0	0	922,771	611,091	740,887
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,300,000	1,300,000	1,300,000	450,000	400,000	420,822	0	0	0	2,205	0	918	0	0	0	1,752,205	1,700,000	1,721,740
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers IN	2,232,771	1,871,091	2,021,709	510,000	510,000	510,000	0	0	0	2,205	0	918	120,000	120,000	131,602	2,864,977	2,501,091	2,664,229
Transfers OUT																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11,602	0	0	11,602
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	70,000	60,000	64,164	0	0	0	0	0	0	70,000	60,000	64,164
Transfer Alkylate	0	0	0	0	0	0	120,000	130,000	125,836	0	0	0	0	0	0	120,000	130,000	125,836
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	922,771	611,091	740,887	0	0	0	0	0	0	922,771	611,091	740,887
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,752,206	1,700,000	1,721,740	0	0	0	0	0	0	1,752,206	1,700,000	1,721,740
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers OUT	0	0	0	0	0	0	2,864,977	2,501,091	2,652,627	0	0	0	0	0	11,602	2,864,977	2,501,091	2,664,229
Financials																		
Refinery Feedstocks ($000)	27,719,586	39,793,335	67,512,921	31,093,068	47,191,952	78,285,020	85,308,764	117,231,512	202,540,276	16,166,278	23,401,067	39,567,345	22,362,817	29,800,049	52,162,866	182,650,513	257,417,915	440,068,428
Terminal Imports ($000)	2,581,690	3,696,129	6,277,819	46,208	67,167	113,375	234,670	339,179	573,848	0	0	0	0	0	0	2,862,567	4,102,475	6,965,042
Transfer Costs ($000)	531,983	739,576	1,271,560	80,276	147,310	227,585	0	0	0	13,618	18,787	32,404	76,608	107,352	183,960	702,485	1,013,025	1,715,509
Total Costs ($000)	30,833,259	44,229,041	75,062,300	31,219,551	47,406,429	78,625,980	85,543,434	117,570,690	203,114,124	16,179,896	23,419,853	39,599,749	22,439,425	29,907,401	52,346,826	186,215,564	262,533,415	448,748,979
Total Costs ($/Day)	202,850,389	207,648,078	205,650,136	205,391,785	222,565,393	215,413,644	562,785,747	551,975,073	556,477,052	106,446,684	109,952,363	108,492,464	147,627,793	140,410,335	143,415,961	1,225,102,397	1,232,551,242	1,229,449,258
Refinery Revenues ($000)	2,894,993	3,749,955	6,644,948	4,302,126	17,241,246	21,543,372	16,790,605	21,175,236	37,965,841	1,335,474	1,594,931	2,930,405	2,340,603	2,281,113	4,621,716	27,663,801	46,042,480	73,706,281
Terminal Revenues ($000)	62,436,895	83,852,887	146,289,781	39,438,298	50,141,318	89,579,615	39,239,464	49,587,129	88,826,593	20,242,860	27,916,350	48,159,210	27,227,716	35,425,704	62,653,420	188,585,232	246,923,387	435,508,619
Total Sales ($000)	65,331,887	87,602,842	152,934,729	43,740,424	67,382,563	111,122,987	56,030,069	70,762,365	126,792,433	21,578,334	29,511,281	51,089,615	29,568,319	37,706,816	67,275,136	216,249,033	292,965,868	509,214,900
Total Sales ($/Day)	429,815,046	411,280,948	418,999,258	287,765,945	316,350,063	304,446,540	368,618,872	332,217,674	347,376,529	141,962,723	138,550,616	139,971,548	194,528,417	177,027,307	184,315,440	1,422,691,003	1,375,426,608	1,395,109,315
Gross Margin ($000)	34,498,628	43,373,801	77,872,429	12,520,872	19,976,135	32,497,007	-29,513,365	-46,808,326	-76,321,691	5,398,438	6,091,428	11,489,866	7,128,895	7,799,415	14,928,310	30,033,468	30,432,453	60,465,921
Utilities ($000)	246,179	299,339	545,518	410,162	508,335	918,497	1,358,110	1,854,891	3,213,001	231,689	305,660	537,350	369,256	494,899	864,155	2,615,396	3,463,125	6,078,521
Utilities ($/Day)	1,619,597	1,405,347	1,494,569	2,698,433	2,386,549	2,516,430	8,934,935	8,708,410	8,802,744	1,524,271	1,435,026	1,472,191	2,429,314	2,323,471	2,367,548	17,206,550	16,258,802	16,653,481
Variable Margin ($000)	34,252,449	43,074,463	77,326,912	12,110,711	19,467,800	31,578,510	-30,871,475	-48,663,217	-79,534,692	5,166,749	5,785,767	10,952,516	6,759,639	7,304,516	14,064,155	27,418,072	26,969,328	54,387,401
Variable Margin ($/Day)	225,345,060	202,227,524	211,854,553	79,675,727	91,398,120	86,516,466	-203,101,810	-228,465,808	-217,903,266	33,991,768	27,163,227	30,006,894	44,471,309	34,293,501	38,531,931	180,382,056	126,616,564	149,006,577
Variable Margin ($/Bbl Crd)	147.74	132.58	138.89	25.99	26.14	26.08	-23.34	-26.57	-25.22	19.43	15.89	17.39	20.80	16.57	18.37	10.50	7.28	8.61
Unit Operations																		
Crude Tower	1,525,290	1,525,290	1,525,290	3,065,508	3,496,305	3,316,904	8,702,222	8,598,179	8,641,506	1,749,772	1,708,920	1,725,932	2,138,519	2,069,272	2,098,109	17,181,311	17,397,966	17,307,742
Vacuum Tower	656,669	656,970	656,845	1,310,537	1,507,051	1,425,215	3,943,533	3,838,250	3,882,094	732,063	712,522	720,659	1,152,347	1,115,030	1,130,570	7,795,148	7,829,823	7,815,383
Sats Gas Plant	70,650	69,208	69,808	129,654	110,774	118,637	412,101	328,603	363,375	91,398	57,220	71,453	193,447	128,818	155,732	897,250	694,623	779,005
Unsats Gas Plant	171,821	166,172	168,524	283,243	284,537	283,998	966,862	967,169	967,041	100,166	100,682	100,467	206,372	199,436	202,324	1,728,465	1,717,995	1,722,355
FCC DeC5 Tower	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FCC	618,120	595,768	605,076	977,887	976,549	977,106	3,168,746	3,168,745	3,168,745	328,768	316,465	321,588	635,185	613,327	622,429	5,728,705	5,670,854	5,694,945
FCC Splitter	347,389	335,915	340,693	552,770	552,621	552,683	1,776,395	1,781,853	1,779,580	190,475	184,298	186,870	364,111	351,956	357,018	3,231,139	3,206,644	3,216,845
Hydrocracker	37,890	37,890	37,890	151,600	151,600	151,600	553,450	553,450	553,450	305,239	305,239	305,239	424,503	424,503	424,503	1,472,682	1,472,682	1,472,682
H-Oil Unit	0	0	0	0	0	0	161,000	161,000	161,000	0	0	0	0	0	0	161,000	161,000	161,000
Delayed Coker	22,071	25,535	24,093	177,490	275,536	234,706	1,171,590	1,171,590	1,171,590	125,605	125,605	125,605	388,429	382,325	384,867	1,885,185	1,980,591	1,940,860
Visbreaker	0	48,000	28,011	0	0	0	48,000	48,000	48,000	41,000	17,593	27,341	30,600	30,600	30,600	119,600	144,193	133,952
Thermal Naphtha Splitter	2,660	3,077	2,903	21,506	33,386	28,439	140,614	140,614	140,614	16,539	15,346	15,843	48,594	47,859	48,165	229,913	240,282	235,964
CRU Reformer	269,654	250,869	258,692	548,208	476,827	506,553	1,004,164	1,050,429	1,031,162	0	0	0	0	0	0	1,822,026	1,778,125	1,796,407
SRU Reformer	0	0	0	0	0	0	0	0	0	210,661	160,315	181,281	430,183	430,183	430,183	640,844	590,498	611,464
BTX Reformer	63,427	64,190	63,872	58,647	57,515	57,986	271,276	271,572	271,449	0	0	0	0	0	0	393,350	393,277	393,307
C4 Isomerization	100	100	100	16,000	100	6,721	58,400	100	24,378	19,170	100	8,041	65,744	100	27,437	159,414	500	66,678
C5/C6 Isomerization	31,046	20,530	24,909	158,759	36,433	87,374	198,772	100	82,834	100	100	100	7,652	100	3,245	396,328	57,263	198,463
HF Alkylation	39,690	19,845	28,109	144,743	76,357	104,835	285,117	142,559	201,925	33,675	33,675	33,675	38,500	19,250	27,266	541,725	291,685	395,811
H2SO4 Alkylation	61,715	20,720	37,792	88,480	44,240	62,663	370,322	274,827	314,594	47,741	47,741	47,741	131,772	122,244	126,212	700,030	509,771	589,002
Dimersol	0	0	0	3,240	3,240	3,240	5,700	5,700	5,700	1,000	1,000	1,000	4,900	4,900	4,900	14,840	14,840	14,840
Cat Poly	21,991	1,000	9,742	100	100	100	100	100	100	5,011	100	2,145	100	100	100	27,302	1,400	12,187
Isooctane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT - Total	564,762	569,207	567,356	875,307	523,692	670,118	3,006,722	3,198,413	3,118,586	533,303	541,832	538,280	443,450	443,450	443,450	5,423,543	5,276,595	5,337,790
DHT - SR Diesel Fd	404,798	409,880	407,764	559,000	110,790	297,442	1,083,903	1,156,571	1,126,309	200,376	207,976	204,811	121,424	106,526	112,730	2,369,501	1,991,742	2,149,056
DHT - Jet/Kero Fd	4,208	8,919	6,957	165,944	61,168	104,801	1,131,163	1,044,613	1,080,656	249,470	254,220	252,242	222,207	235,733	230,100	1,772,992	1,604,653	1,674,756
DHT - LCO Fd	155,655	150,308	152,534	150,262	262,042	215,492	497,484	698,815	614,973	49,071	47,203	47,981	101	1,635	996	852,572	1,160,002	1,031,976
DHT - CGO Fd	101	101	101	101	89,693	52,383	294,172	298,414	296,648	34,386	32,434	33,247	99,718	99,557	99,624	428,478	520,199	482,003

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 Control A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
DHT 2nd RCT - Total	532,625	532,625	532,625	691,926	438,656	544,127	1,829,629	2,103,309	1,989,338	274,036	274,036	274,036	59,675	59,675	59,675	3,387,891	3,408,301	3,399,802
DHT 2nd RCT - SR Diesel Fd	397,758	402,752	400,673	549,279	89,952	281,233	1,045,114	1,136,458	1,098,419	196,892	204,359	201,249	59,475	59,475	59,475	2,248,518	1,892,995	2,041,048
DHT 2nd RCT - Jet/Kero Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - LCO Fd	134,767	129,773	131,853	142,547	260,016	211,097	493,638	671,779	597,594	43,144	37,607	39,913	100	100	100	814,196	1,099,275	980,557
DHT 2nd RCT - CGO Fd	100	100	100	100	88,688	51,797	290,877	295,072	293,325	34,001	32,071	32,874	100	100	100	325,178	416,031	378,196
DHT Arom Saturation	0	0	0	0	0	0	0	0	0	0	0	0	158,339	142,358	149,013	158,339	142,358	149,013
NHT - Total Fd	366,718	361,827	363,864	856,160	819,508	834,771	1,587,652	1,583,810	1,585,410	352,971	343,936	347,699	588,363	583,344	585,434	3,751,864	3,692,425	3,717,178
NHT - Isom/Thermal Fd	57,172	71,461	65,511	234,187	291,424	267,588	583,488	217,801	370,087	142,310	147,976	145,616	158,180	153,162	155,252	1,175,337	881,823	1,004,053
NHT - Reformer Fd	309,546	290,366	298,353	621,973	528,084	567,183	1,004,164	1,366,010	1,215,323	210,661	195,960	202,082	430,183	430,183	430,183	2,576,527	2,810,602	2,713,124
CGH - Generic	77,044	77,044	77,044	186,250	181,203	183,304	807,745	587,386	679,152	73,575	42,278	55,312	0	0	0	1,144,614	887,912	994,812
CGH - Olefin Sat'n	0	0	0	0	0	0	0	0	0	0	0	0	93,007	93,007	93,007	93,007	93,007	93,007
FCCU Fd HDT	308,460	308,460	308,460	370,419	370,419	370,419	1,343,283	1,343,283	1,343,283	106,380	106,380	106,380	559,804	559,804	559,804	2,688,347	2,688,347	2,688,347
LSR Splitter	1,000	1,000	1,000	98,370	94,816	96,296	100,000	100,000	100,000	100,000	100,000	100,000	79,275	76,708	77,777	378,645	372,524	375,073
LSR Bz Saturator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformate Saturator	17,477	1,000	7,862	1,000	10,000	6,252	17,128	1,000	7,717	1,000	1,000	1,000	100,000	55,806	74,210	136,605	68,806	97,041
SDA	32,600	32,600	32,600	40,200	40,200	40,200	263,385	263,385	263,385	27,700	27,700	27,700	44,000	44,000	44,000	407,885	407,885	407,885
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TAME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Total MSCF	477,086	477,086	477,086	817,894	757,037	782,380	3,545,838	3,767,710	3,675,314	820,613	820,613	820,613	1,322,674	1,301,025	1,310,040	6,984,105	7,123,469	7,065,433
Hydrogen Plant - Plant Fuel Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - LPG Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Naphtha Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Nat Gas Fd	477,086	477,086	477,086	817,894	757,037	782,380	3,545,839	3,767,710	3,675,314	820,613	820,613	820,613	1,322,674	1,301,025	1,310,040	6,984,105	7,123,469	7,065,433
Lube Unit	52,222	52,222	52,222	48,333	48,333	48,333	439,699	439,699	439,699	0	0	0	56,250	56,250	56,250	596,505	596,504	596,504
Sulfur Plant	2,008,934	2,017,568	2,013,972	7,811,590	7,766,543	7,785,302	31,375,826	32,924,716	32,279,699	5,053,771	4,914,479	4,972,486	7,905,879	7,744,873	7,811,922	54,156,000	55,368,178	54,863,380
Merox Jet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Merox Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BTX Reformer - Tower feed	22,192	22,224	22,211	21,901	21,524	21,681	94,349	94,348	94,348	0	0	0	0	0	0	138,442	138,096	138,240
BTX Reformer - Extract feed	41,160	40,620	40,845	46,527	45,697	46,042	197,990	197,714	197,829	0	0	0	0	0	0	285,677	284,030	284,716
Toluene Dealkyation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BLANK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - CO2 (MLb/Day)	118,814	115,230	116,722	206,464	197,535	201,253	710,697	687,671	697,260	110,626	106,104	107,987	188,586	180,718	183,995	1,335,188	1,287,257	1,307,217
Utilities - Steam (Mlbs)	135,590	112,980	122,395	233,112	203,750	215,977	813,343	765,377	785,352	124,424	119,115	121,326	199,316	188,534	193,024	1,505,785	1,389,756	1,438,075
Utilities - Steam Vent (Mlbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities - Power (kwh)	9,913,052	9,282,076	9,544,839	18,293,394	16,043,836	16,980,638	61,122,172	60,102,820	60,527,317	11,682,369	11,320,630	11,471,272	19,019,644	18,250,022	18,570,522	120,030,631	114,999,384	117,094,588
Utilities - Cooling H2O (Mgal)	1,615,502	1,359,067	1,465,856	2,880,144	2,521,088	2,670,613	9,605,462	8,962,592	9,230,308	1,413,785	1,324,097	1,361,446	2,551,098	2,356,172	2,437,347	18,065,991	16,523,016	17,165,570
HYD Supply (MSCFD)																		
CRU Reformer	257,953	239,743		486,094	459,922		810,614	849,765		0	0		0	0		1,554,662	1,549,430	1,551,609
CRU Reformer - Unrecov'd	64,494	59,941		121,456	114,991		202,533	212,315		0	0		0	0		388,483	387,247	387,762
CRU Reformer - Total	322,448	299,684		607,550	574,914		1,013,147	1,062,080		0	0		0	0		1,943,144	1,936,677	1,939,371
SRU Reformer	0	0		0	0		0	0		167,507	128,101		362,041	366,566		529,548	494,667	509,193
SRU Reformer - Unrecov'd	0	0		0	0		0	0		41,873	32,023		90,502	91,638		132,376	123,661	127,290
SRU Reformer - Total	0	0		0	0		0	0		209,381	160,124		452,544	458,204		661,924	618,328	636,483
BTX Reformer	37,118	37,918		31,270	30,667		150,822	151,155		0	0		0	0		219,209	219,740	219,519
BTX Reformer - Unrecov'd	9,394	9,591		7,964	7,810		38,299	38,381		0	0		0	0		55,658	55,783	55,731
BTX Reformer - Total	46,512	47,509		39,234	38,477		189,121	189,536		0	0		0	0		274,867	275,523	275,250
Hydrogen Plant	477,082	477,082		817,888	757,031		3,545,812	3,767,682		820,607	820,607		1,322,665	1,301,015		6,984,053	7,123,417	7,065,380
Purchased Hydrogen	0	0		0	0		0	0		0	0		0	0		0	0	0
Coker (Unrecovered)	1,180	1,365		9,307	14,449		63,008	63,008		6,838	6,838		21,112	20,780		101,446	106,441	104,360
Total Supply	847,222	825,641		1,473,979	1,384,871		4,811,087	5,082,306		1,036,825	987,569		1,796,320	1,779,999		9,965,435	10,060,385	10,020,844
HYD Demand (MSCFD)																		
Hydrocracker	81,093	81,093		387,342	285,823		1,308,012	1,221,234		644,903	621,827		1,083,085	1,077,074		3,504,435	3,287,052	3,377,578
H-Oil Unit	0	0		0	0		141,882	141,129		0	0		0	0		141,882	141,129	141,443
FCCU Fd HDT	174,704	174,682		242,600	242,600		863,581	893,569		66,668	66,192		347,387	347,032		1,694,940	1,724,075	1,711,942
DHT	67,727	68,021		119,556	89,941		391,077	428,600		57,685	56,620		48,936	47,094		684,982	690,275	688,071
DHT 2nd RCT	413,153	406,974		496,457	562,891		1,582,510	1,931,343		194,794	187,109		27,766	27,766		2,714,680	3,116,083	2,948,923
Naphtha HDT	13,977	13,318		40,653	35,721		74,445	86,625		12,888	12,171		27,315	26,768		169,278	174,602	172,385
DHT Arom Saturation	0	0		0	0		0	0		0	0		127,957	116,178		127,957	116,178	121,083
CGH - Generic	4,758	6,614		21,225	20,250		102,185	65,643		10,002	4,725		0	0		138,170	97,232	114,280
CGH - Olefin Sat'n	0	0		0	0		0	0		0	0		1,114	1,041		1,114	1,041	1,071
C4 Isomerization	6	6		928	6		3,387	1		1,112	1		3,813	1		9,246	15	3,859
C5/C6 Isomerization	5,094	3,369		26,049	5,978		32,615	16		16	16		1,256	16		65,030	9,396	32,564
Isooctane	0	0		0	0		0	0		0	0		0	0		0	0	0
Reformate Saturator	11,640	666		441	4,410		7,554	441		45	45		16,076	24,610		35,755	30,172	32,497
LSR Bz Saturator	0	0		0	0		0	0		0	0		0	0		0	0	0
Cyclohexane	0	0		0	0		0	0		0	0		0	0		0	0	0
TDA	0	0		0	0		0	0		0	0		0	0		0	0	0
Plant Fuel (Recovered H2)	1	1		1	1		1	1		1	1		1	1		5	5	5

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 Control A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Plant Fuel (Unrecovered H2)	75,069	70,898		138,727	137,251		303,840	313,703		48,712	38,861		111,614	112,418		677,962	673,131	675,143
Total Demand	847,222	825,641		1,473,979	1,384,871		4,811,087	5,082,306		1,036,825	987,569		1,796,320	1,779,999		9,965,435	10,060,386	10,020,844
FCC Data																		
Total Feed Rate																		
BPD	618,120	595,768	605,076	977,887	976,549	977,106	3,168,745	3,168,745	3,168,745	328,768	316,465	321,588	635,185	613,327	622,429	5,728,705	5,670,854	5,694,945
API	24.5	24.3	24.4	22.5	22.0	22.2	24.1	24.0	24.0	23.8	24.2	24.0	22.8	22.9	22.9	23.7	23.6	23.6
Specific Gravity	0.9070	0.9080	0.9076	0.9190	0.9217	0.9206	0.9091	0.9101	0.9097	0.9112	0.9089	0.9099	0.9169	0.9162	0.9165	0.9116	0.9125	0.9121
Sulfur, Wt%	0.45	0.46	0.45	1.16	1.24	1.21	1.01	1.03	1.02	0.85	0.83	0.84	0.23	0.19	0.20	0.88	0.90	0.89
Sulfur ppm	4,504	4,571	4,543	11,588	12,428	12,078	10,071	10,292	10,200	8,542	8,333	8,420	2,264	1,862	2,029	8,776	9,041	8,929
Basic N2 ppm	393	402	398	423	459	444	344	360	354	343	331	336	466	488	479	368	387	379
% Diesel Feed	2.5	0.0	1.0	3.1	0.0	1.3	0.2	0.0	0.1	0.0	0.0	0.0	0.9	0.4	0.6	1.0	0.1	0.5
Mid TBP	816	821	819	829	835	833	805	810	808	839	844	842	828	829	828	815	819	817
W % Conradson Carbon	1.8	1.8	1.8	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.7	1.7	1.7	1.6	1.6	1.6
Percent HDT'd Feed	50%	52%	51%	39%	39%	39%	46%	46%	46%	41%	43%	42%	94%	97%	96%	50%	51%	50%
FCC Yields (vol%)	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%
H2S	0.2%	0.2%	0.2%	0.4%	0.4%	0.4%	0.3%	0.4%	0.3%	0.3%	0.3%	0.3%	0.1%	0.1%	0.1%	0.3%	0.3%	0.3%
Methane	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Ethane	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.1%	1.2%	1.2%	1.3%	1.3%	1.3%	1.2%	1.3%	1.2%
Ethylene	1.2%	1.2%	1.2%	1.3%	1.2%	1.3%	1.2%	1.2%	1.2%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Dry Gas	3.9%	4.0%	4.0%	4.2%	4.2%	4.2%	3.9%	4.0%	4.0%	3.6%	3.9%	3.8%	4.0%	3.9%	4.0%	4.0%	4.0%	4.0%
Propane	3.0%	3.0%	3.0%	3.0%	2.9%	3.0%	3.0%	3.0%	3.0%	2.9%	3.1%	3.0%	2.9%	2.9%	2.9%	3.0%	3.0%	3.0%
Propylene	7.8%	7.8%	7.8%	7.8%	7.7%	7.8%	7.7%	7.8%	7.7%	7.5%	8.0%	7.8%	8.0%	8.1%	8.0%	7.8%	7.8%	7.8%
NC4	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Iso-butane	6.0%	6.0%	6.0%	5.9%	5.7%	5.8%	6.2%	6.2%	6.2%	6.1%	6.4%	6.3%	5.9%	5.8%	5.8%	6.1%	6.0%	6.1%
Iso C4=	2.6%	2.6%	2.6%	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.8%	2.7%	2.7%	2.7%	2.7%	2.6%	2.6%	2.6%
1/2 C4=	6.8%	6.8%	6.8%	6.8%	6.7%	6.8%	6.7%	6.8%	6.7%	6.8%	7.1%	7.0%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%
FCC Gasoline	56.2%	56.4%	56.3%	56.5%	56.6%	56.6%	56.1%	56.2%	56.2%	57.9%	58.2%	58.1%	57.3%	57.4%	57.4%	56.4%	56.5%	56.5%
Cycle Oil	18.6%	18.4%	18.5%	17.7%	17.8%	17.8%	18.4%	18.3%	18.3%	17.3%	16.3%	16.7%	19.0%	19.1%	19.0%	18.3%	18.2%	18.2%
Decant Oil	7.1%	7.2%	7.2%	8.2%	8.6%	8.4%	7.4%	7.5%	7.5%	7.7%	7.2%	7.4%	6.6%	6.5%	6.5%	7.5%	7.5%	7.5%
Coke (wt%)	973.3%	929.3%	947.7%	1269.8%	1185.5%	1220.6%	4667.0%	4613.3%	4635.6%	466.3%	483.1%	476.1%	922.1%	898.0%	908.0%	3032.2%	3003.7%	3015.6%
Conversion	74.2%	74.4%	74.3%	74.1%	73.6%	73.8%	74.2%	74.3%	74.2%	75.0%	76.5%	75.9%	74.4%	74.4%	74.4%	74.2%	74.3%	74.3%
Naphtha Sulfur, ppm	352	357	355	914	980	953	777	791	785	670	652	659	128	93	108	676	695	687
LCO Sulfur, wt.%	0.5	0.5	0.5	1.3	1.4	1.4	1.4	1.2	1.3	1.3	0.9	1.1	0.3	0.3	0.3	1.2	1.0	1.1
HCO Sulfur, wt%	1.5	1.5	1.5	3.9	4.1	4.0	3.4	3.4	3.4	2.8	2.8	2.8	0.8	0.6	0.7	2.9	3.0	3.0
Naphtha Sul/Fd Sul	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.06	0.05	0.05	0.08	0.08	0.08
LCO Sul/Fd Sul	1.14	1.14	1.14	1.15	1.13	1.14	1.37	1.13	1.23	1.49	1.10	1.26	1.49	1.49	1.49	1.32	1.14	1.21
HCO Sul/Fd Sul	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.33	3.34
CETANE																		
HSD Gr 76 (0.2%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
LSD Gr 74 (.05%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
ULSD (15 ppm)	50.0	50.2	50.1	49.5	48.4	48.9	50.4	51.8	51.2	50.0	51.4	50.8	0.0	0.0	0.0			0.0
CARB Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.4	32.3			0.0
RFO Blending																		
API	10.5	10.5	10.5	10.7	11.8	11.3	9.1	9.4	9.3	8.5	8.5	8.5	10.5	10.5	10.5			0.0
Sulfur	2.0	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.2	2.2	2.2			0.0
Viscosity (cst)	380.0	380.0	380.0	380.0	380.0	380.0	86.3	50.0	65.1	223.4	209.2	215.1	188.6	149.1	165.6			0.0
Reformer Operations																		
CRU - Severity	100.0	100.0	100.0	95.0	99.2	97.4	94.9	94.9	94.9	0.0	0.0	0.0	0.0	0.0	0.0	95.3	96.2	95.9
CRU - Endpoint	400.0	400.0	400.0	359.0	400.0	382.9	350.0	400.0	379.2	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - PFF vol%	47.2	47.9	47.6	44.4	45.9	45.3	48.9	49.9	49.5	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - ARO vol%	13.3	12.9	13.1	14.3	13.0	13.6	16.5	16.0	16.2	0.0	0.0	0.0	0.0	0.0	0.0			0.0
SRU - Severity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.2	93.0	93.1	94.8	95.0	94.9			0.0
SRU - Endpoint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	361.4	400.0	383.9	358.3	354.1	355.9			0.0
SRU - PFF vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.1	43.4	43.7	46.0	46.2	46.2			0.0
SRU - ARO vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.8	15.6	15.7	13.1	12.3	12.6			0.0
Coker Operations																		
Feed API	7.6	7.6	7.6	6.4	6.4	6.4	3.9	3.9	3.9	4.7	4.7	4.7	6.1	6.1	6.1			0.0
Feed Sulfur Wt%	2.6	2.6	2.6	3.5	3.5	3.5	4.0	4.0	4.0	3.8	3.8	3.8	2.6	2.6	2.6			0.0
Feed Concarbon Wt%	19.0	19.0	19.0	19.1	19.1	19.1	21.5	21.5	21.5	22.5	22.5	22.5	19.5	19.5	19.5			0.0
Hydrocracker Operations																		
Feed API	18.6	18.6	18.6	25.1	22.7	23.7	16.2	18.3	17.4	17.5	17.5	17.5	20.0	20.3	20.2			0.0
Feed Sulfur Wt%	1.3	1.3	1.3	1.7	1.6	1.6	2.0	1.9	2.0	2.0	2.0	2.0	1.3	1.3	1.3			0.0

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 Control A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Feed Basic N2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.3			0.0
Feed K Factor	11.6	11.6	11.6	11.2	11.7	11.5	11.4	11.5	11.4	11.6	11.6	11.6	11.3	11.3	11.3			0.0
Cracked Feeds %	0.0	0.0	0.0	85.6	0.1	35.7	32.4	32.7	32.5	12.8	13.9	13.5	63.1	61.4	62.1			0.0
Conversion	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0			0.0
Alkylation																		
HF C3 Alkylate	2	2	2	68,079	27,898	44,631	115,030	59,294	82,504	24,622	33,673	29,904	38,498	19,248	27,265	246,231	140,116	184,306
HF C4 Alkylate	39,688	19,843	28,107	76,664	48,459	60,204	170,087	83,264	119,421	9,053	2	3,771	2	2	2	295,494	151,570	211,505
HF C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total HF Alkylate	39,690	19,845	28,109	144,743	76,357	104,835	285,117	142,559	201,925	33,675	33,675	33,675	38,500	19,250	27,266	541,725	291,685	395,811
H2SO4 C3 Alkylate	2	2	2	2	2	2	2	2	2	2	4,145	2,420	17,740	34,329	27,421	17,748	38,480	29,846
H2SO4 C4 Alkylate	61,713	20,718	37,790	88,478	44,238	62,661	370,320	274,825	314,593	47,739	43,596	45,321	114,032	87,914	98,790	682,282	471,291	559,156
H2SO4 C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total H2SO4 Alkylate	61,715	20,720	37,792	88,480	44,240	62,663	370,322	274,827	314,594	47,741	47,741	47,741	131,772	122,244	126,212	700,030	509,771	589,002
Crude																		
Crude API	31.7	31.7	31.7	31.7	31.7	31.7	29.8	29.8	29.8	30.2	30.2	30.2	26.3	26.3	26.3			0.0
Feed Sulfur Wt%	0.9	0.9	0.9	1.4	1.4	1.4	1.6	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3			0.0
ENERGY BALANCE																		
Process Fuel (MMBTU/D)	505,264	489,622	496,136	1,008,965	984,802	994,864	3,285,678	3,167,292	3,216,593	584,835	546,761	562,617	983,421	941,518	958,968	6,368,163	6,129,995	6,229,177
Fuel for Steam Gen (MMBTU/D)	202,436	168,678	182,736	348,035	304,198	322,454	1,214,322	1,142,708	1,172,531	185,765	177,839	181,140	297,579	281,482	288,185	2,248,137	2,074,905	2,147,046
Fuel for Power (MMBTU/D)	99,131	92,821	95,448	182,934	160,438	169,806	611,222	601,028	605,273	116,824	113,206	114,713	190,196	182,500	185,705	1,200,306	1,149,994	1,170,946
Total Energy (MMBTU/D)	806,831	751,121	774,320	1,539,934	1,449,438	1,487,124	5,111,222	4,911,028	4,994,396	887,424	837,806	858,469	1,471,196	1,405,500	1,432,859	9,816,606	9,354,894	9,547,169
Total Energy (MBTU/Bbl Crd)	529	492	508	502	415	451	587	571	578	507	490	497	688	679	683	571	538	552

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 Control B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Refinery Input	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
PADD Crude	1,525,290	1,525,290	1,525,290	3,065,508	3,494,351	3,315,765	8,632,786	8,632,786	8,632,786	1,708,401	1,698,816	1,702,808	2,137,925	2,108,987	2,121,038	17,069,910	17,460,231	17,297,686
GTL Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GTL Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VGO HS	0	0	0	0	0	0	342,639	700,448	551,442	0	0	0	17,893	0	7,451	360,533	700,448	558,894
VGO LS	0	0	0	1,000	1,000	1,000	0	0	0	0	0	0	0	0	0	1,000	1,000	1,000
HS AR (A960)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LS AR (Alg)	203,970	195,979	199,307	0	0	0	407,361	49,552	198,558	0	0	0	0	0	0	611,331	245,532	397,865
Normal Butane	13,060	38,531	27,924	0	65,325	38,121	0	191,373	111,678	15,432	61,534	42,335	8,800	61,534	39,573	37,291	418,296	259,631
Isobutane	10,659	16,129	13,851	52,803	100	22,048	71,742	54,349	61,592	9,266	16,800	13,662	0	0	0	144,469	87,378	111,153
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E10	63,936	60,025	61,653	39,624	37,927	38,634	32,095	34,532	33,517	13,033	13,833	13,500	27,573	27,171	27,338	176,262	173,487	174,643
Ethanol - E20	724,533	680,203	698,664	449,013	429,772	437,785	363,683	353,342	357,648	147,684	156,744	152,971	312,459	307,903	309,800	1,997,372	1,927,964	1,956,868
Ethanol - E85	172	172	172	172	172	172	172	161,519	94,328	86	86	86	86	86	86	687	162,034	94,843
Reformer Feed	0	0	0	0	0	0	0	0	0	0	0	0	752	0	313	752	0	313
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (FOE)	82,570	74,539	77,884	164,215	127,696	142,903	569,370	570,712	570,153	123,058	120,839	121,763	184,315	170,763	176,406	1,123,528	1,064,548	1,089,109
Hydrogen (MSCF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentanes Plus	0	0	0	0	100	58	125,000	1	52,055	19,707	0	8,207	0	0	0	144,707	101	60,321
Import CBOB 10%	277,000	277,000	277,000	0	0	0	0	0	0	0	0	0	0	0	0	277,000	277,000	277,000
Import CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import RBOB 10%	123,000	123,000	123,000	0	0	0	0	0	0	0	0	0	0	0	0	123,000	123,000	123,000
Import RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Alkylate	7,602	37,853	25,255	0	0	0	0	0	0	0	0	0	0	0	0	7,602	37,853	25,255
Import Raffinate	42,398	37,147	39,334	0	0	0	0	0	0	0	0	0	110,000	0	45,808	152,398	37,147	85,142
Import Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Lt Naphtha	0	0	0	0	0	0	37,750	0	15,721	0	0	0	0	1,000	584	37,750	1,000	16,304
Import Hvy Naph	0	0	0	0	0	0	100,000	0	41,644	0	0	0	0	0	0	100,000	0	41,644
Transfer Lt Naphtha	0	0	0	10,000	0	4,164	0	0	0	0	0	0	0	0	0	10,000	0	4,164
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	60,000	60,000	60,000	0	10,000	5,836	0	0	0	0	0	0	40,000	11,389	23,304	100,000	81,389	89,140
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	0	0	0	0	0	0	60,000	60,000	60,000	60,000	60,000	60,000
Transfer RBOB 10%	744,111	581,999	649,509	50,000	100,000	79,178	0	0	0	0	0	0	0	0	0	794,111	681,999	728,687
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,300,000	1,300,000	1,300,000	450,000	400,000	420,822	0	0	0	0	28,611	16,696	0	0	0	1,750,000	1,728,611	1,737,518
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isooctane	17,577	100	7,378	100	100	100	100	100	100	100	100	100	100,899	100	42,077	118,776	500	49,755
Isooctene	50,451	100	21,068	100	100	100	18,614	100	7,810	100	100	100	11,548	100	4,867	80,813	500	33,945
X-Fer C5's from Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	70,175	40,951	0	70,175	40,951
Sum Total	5,246,329	5,008,067	5,107,288	4,282,535	4,666,642	4,506,685	10,701,311	10,748,814	10,729,032	2,036,867	2,097,462	2,072,228	3,012,250	2,819,208	2,899,598	25,279,292	25,340,192	25,314,831
Refinery Output	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
Propane	31,598	34,190	33,111	47,013	57,203	52,959	132,391	128,951	130,383	22,452	20,848	21,516	53,001	55,853	54,665	286,455	297,044	292,634
Propylene	18,685	18,685	18,685	42,525	42,525	42,525	245,407	245,407	245,407	2,041	2,041	2,041	11,774	11,774	11,774	320,432	320,432	320,432
Normal Butane	0	0	0	13,316	0	5,545	108,564	0	45,210	0	0	0	0	0	0	121,880	0	50,756
Isobutane	0	0	0	0	0	0	0	0	0	0	0	0	35,431	6,448	18,517	35,431	6,448	18,517
PC Naphtha	15,830	15,830	15,830	40,290	40,290	40,290	432,937	432,937	432,937	0	0	0	0	0	0	489,056	489,056	489,056
PC Gasoil	0	0	0	0	848,766	495,307	157,500	157,500	157,500	0	0	0	0	0	0	157,500	1,006,266	652,807
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Prem	347,880	324,620	334,306	326,661	310,443	317,197	226,702	249,140	239,796	129,031	136,945	133,649	11,890	22,236	17,928	1,042,164	1,043,385	1,042,876
RFG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1
RFG E10 Prem	285,088	269,622	276,063	65,620	65,029	65,275	91,036	92,731	92,025	0	0	0	261,083	246,758	252,723	702,828	674,140	686,087
CG E20 Reg	2,090,006	1,951,757	2,009,329	1,878,321	1,786,175	1,824,548	1,322,478	1,450,334	1,397,090	731,073	775,922	757,245	136,739	116,738	125,067	6,158,616	6,080,925	6,113,278
RFG E20 Reg	1,496,612	1,415,418	1,449,230	344,406	341,303	342,595	477,841	298,798	373,358	0	0	0	1,410,010	1,407,458	1,408,521	3,728,869	3,462,977	3,573,705
E85 to CG	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0	400	400	400
E85 to RFG	100	100	100	100	100	100	100	188,039	109,774	0	0	0	100	100	100	400	188,339	110,074
Transfer RBOB 10%	0	0	0	0	0	0	794,111	681,999	728,687	0	0	0	0	0	0	794,111	681,999	728,687
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,750,000	1,728,611	1,737,518	0	0	0	0	0	0	1,750,000	1,728,611	1,737,518
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	15,521	35,289	27,057	176,293	71,211	114,971	1,381,669	1,350,395	1,363,419	377,584	381,854	380,076	300,470	299,665	300,000	2,251,537	2,138,414	2,185,523
X-Fer Diesel Rundown to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSD Gr 76 (0.2%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (.05%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	547,578	567,863	559,415	764,394	568,569	650,118	2,000,997	2,311,635	2,182,273	519,774	529,672	525,550	0	0	0	3,832,743	3,977,740	3,917,357
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	353,755	353,325	353,504	353,755	353,325	353,504
X-Fer C5's to Storage	0	0	0	0	0	0	0	0	0	0	0	0	98,337	0	40,951	98,337	0	40,951
Residual Fuel	89,250	77,926	82,642	78,750	41,712	57,136	306,291	200,000	244,264	144,051	147,700	146,181	77,737	37,631	54,333	696,080	504,970	584,555
Slurry	26,616	30,596	28,939	79,741	80,549	80,213	138,000	164,207	153,294	0	0	0	30,000	30,000	30,000	274,358	305,352	292,445
Asphalt & Wax	143,000	143,000	143,000	210,000	210,000	210,000	157,500	157,500	157,500	5,250	5,250	5,250	44,232	44,232	44,232	559,982	559,982	559,982

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 Control B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Gasoil	0	0	0	10,115	7,675	8,691	0	0	0	0	0	0	9,814	9,814	9,814	19,928	17,489	18,505
Lubes	18,706	18,706	18,706	17,313	17,313	17,313	157,500	157,500	157,500	0	0	0	20,149	20,149	20,149	213,668	213,668	213,668
Benzene	11,003	11,003	11,003	11,003	11,003	11,003	51,347	51,347	51,347	0	0	0	0	0	0	73,353	73,353	73,353
Toluene	0	0	0	0	0	0	34,910	34,910	34,910	0	0	0	0	0	0	34,910	34,910	34,910
Xylenes	0	0	0	0	0	0	7,777	7,777	7,777	0	0	0	0	0	0	7,777	7,777	7,777
Transfer Raffinate	0	0	0	0	0	0	60,000	60,000	60,000	0	0	0	0	0	0	60,000	60,000	60,000
Transfer Alkylate	0	0	0	0	0	0	100,000	81,390	89,140	0	0	0	0	0	0	100,000	81,390	89,140
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Lt Naphtha	0	0	0	0	0	0	10,000	0	4,164	0	0	0	0	0	0	10,000	0	4,164
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (STons)	1,016	1,022	1,020	3,909	3,880	3,892	15,618	16,931	16,384	2,484	2,439	2,458	3,975	4,038	4,012	27,002	28,310	27,766
Coke (STon)	1,162	1,465	1,339	8,739	13,553	11,548	63,872	64,518	64,249	7,111	7,111	7,111	19,677	21,107	20,512	100,561	107,754	104,759
Sum Total	5,148,526	4,927,198	5,019,368	4,169,431	4,587,361	4,413,319	10,543,536	10,639,461	10,599,514	1,979,483	2,048,231	2,019,602	2,973,017	2,788,146	2,865,134	24,813,994	24,990,397	24,916,936
Check = 0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1			
C3+ Liq Product	5,137,573	4,914,703	5,007,515	4,105,960	4,499,965	4,335,887	10,145,158	10,231,207	10,195,373	1,931,356	2,000,332	1,971,608	2,854,521	2,662,180	2,742,278	24,174,569	24,308,387	24,252,660
C3+ Recovery	99.5%	99.6%	99.6%	99.7%	99.1%	99.4%	100.1%	100.5%	100.4%	100.9%	101.2%	101.1%	100.9%	100.5%	100.7%			
Clean Prod Terminal Imports	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	79,500	79,500	79,500	0	0	0	3,000	3,000	3,000	0	0	0	0	0	0	82,500	82,500	82,500
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	172,500	172,500	172,500	4,500	4,500	4,500	20,250	20,250	20,250	0	0	0	0	0	0	197,250	197,250	197,250
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Imports	252,000	252,000	252,000	4,500	4,500	4,500	23,250	23,250	23,250	0	0	0	0	0	0	279,750	279,750	279,750
Clean Prod Terminal Sales	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Prem	347,880	324,620	334,306	326,661	310,443	317,197	226,702	249,140	239,796	129,031	136,945	133,649	11,890	22,236	17,928	1,042,164	1,043,385	1,042,876
RFG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1
RFG E20 Reg	1,496,612	1,415,418	1,449,230	344,406	341,303	342,595	477,841	298,798	373,358	0	0	0	1,410,010	1,407,458	1,408,521	3,728,869	3,462,977	3,573,705
CG E20 Reg	2,090,006	1,951,757	2,009,329	1,878,321	1,786,175	1,824,548	1,322,478	1,450,334	1,397,090	731,073	775,922	757,245	136,739	116,738	125,067	6,158,616	6,080,925	6,113,278
E85 to CG	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0	400	400	400
E85 to RFG	100	100	100	100	100	100	100	188,039	109,774	0	0	0	100	100	100	400	188,339	110,074
RFG E10 Prem	285,088	269,622	276,063	65,620	65,029	65,275	91,036	92,731	92,025	0	0	0	261,083	246,758	252,723	702,828	674,140	686,087
Jet/Kero A (450ppm)	495,021	514,789	506,557	276,293	271,211	273,327	814,669	683,395	738,063	447,584	451,854	450,076	300,470	299,665	300,000	2,334,037	2,220,914	2,268,023
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	1,377,836	1,712,751	1,573,280	981,226	928,323	950,354	1,081,157	934,243	995,424	589,774	599,672	595,550	0	0	0	4,029,993	4,174,990	4,114,607
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	353,755	353,325	353,504	353,755	353,325	353,504
Total Sales	6,092,644	6,189,157	6,148,965	3,872,728	3,702,684	3,773,497	4,014,083	3,896,780	3,945,629	1,897,562	1,964,493	1,936,620	2,474,047	2,446,280	2,457,843	18,351,063	18,199,394	18,262,554
Clean Prod Transfers	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blank Terminal Sale																		
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg																0	0	0
CG E10 Prem																0	0	0
RFG E10 Reg																0	0	0
RFG E20 Reg																0	0	0
CG E20 Reg																0	0	0
E85 to CG																0	0	0
E85 to RFG																0	0	0
RFG E10 Prem																0	0	0
Blank Terminal Sale																0	0	0
Blank Terminal Sale																0	0	0
Jet/Kero A (450ppm)	400,000	400,000	400,000	100,000	200,000	158,356	-570,000	-670,000	-628,356	70,000	70,000	70,000	0	0	0	0	0	0
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	657,758	972,388	841,364	212,332	355,254	295,736	-940,090	-1,397,642	-1,207,100	70,000	70,000	70,000	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,057,758	1,372,388	1,241,364	312,332	555,254	454,092	-1,510,090	-2,067,642	-1,835,456	140,000	140,000	140,000	0	0	0	0	0	0
Intermediates Transfers																		

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 Control B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Transfers IN																		
Transfer Lt Naphtha	0	0	0	10,000	0	4,164	0	0	0	0	0	0	0	0	0	10,000	0	4,164
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	60,000	60,000	60,000	0	10,000	5,836	0	0	0	0	0	0	40,000	11,389	23,304	100,000	81,389	89,140
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	0	0	0	0	0	0	60,000	60,000	60,000	60,000	60,000	60,000
Transfer RBOB 10%	744,111	581,999	649,509	50,000	100,000	79,178	0	0	0	0	0	0	0	0	0	794,111	681,999	728,687
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,300,000	1,300,000	1,300,000	450,000	400,000	420,822	0	0	0	0	28,611	16,696	0	0	0	1,750,000	1,728,611	1,737,518
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers IN	2,104,111	1,941,999	2,009,509	510,000	510,000	510,000	0	0	0	0	28,611	16,696	100,000	71,389	83,304	2,714,111	2,551,999	2,619,509
Transfers OUT																		
Transfer Lt Naphtha	0	0	0	0	0	0	10,000	0	4,164	0	0	0	0	0	0	10,000	0	4,164
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	60,000	60,000	60,000	0	0	0	0	0	0	60,000	60,000	60,000
Transfer Alkylate	0	0	0	0	0	0	100,000	81,390	89,140	0	0	0	0	0	0	100,000	81,390	89,140
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	794,111	681,999	728,687	0	0	0	0	0	0	794,111	681,999	728,687
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,750,000	1,728,611	1,737,518	0	0	0	0	0	0	1,750,000	1,728,611	1,737,518
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers OUT	0	0	0	0	0	0	2,714,111	2,551,999	2,619,509	0	0	0	0	0	0	2,714,111	2,551,999	2,619,509
Financials																		
Refinery Feedstocks ($000)	28,797,731	37,792,613	66,590,344	31,366,518	47,356,488	78,723,006	84,370,311	117,124,356	201,494,667	16,471,793	23,002,099	39,473,892	24,276,122	30,498,786	54,774,908	185,282,476	255,774,341	441,056,818
Terminal Imports ($000)	2,581,690	3,696,129	6,277,819	46,208	67,167	113,375	234,670	339,179	573,848	0	0	0	0	0	0	2,862,567	4,102,475	6,965,042
Transfer Costs ($000)	514,210	754,682	1,268,892	80,023	144,736	224,759	0	0	0	13,406	22,626	36,032	63,840	63,865	127,705	671,480	985,908	1,657,388
Total Costs ($000)	31,893,631	42,243,424	74,137,055	31,492,749	47,568,391	79,061,140	84,604,981	117,463,534	202,068,515	16,485,200	23,024,725	39,509,925	24,339,962	30,562,651	54,902,613	188,816,523	260,862,725	449,679,248
Total Costs ($/Day)	209,826,522	198,325,932	203,115,219	207,189,139	223,325,778	216,605,863	556,611,716	551,471,992	553,612,370	108,455,261	108,097,300	108,246,369	160,131,331	143,486,624	150,418,118	1,242,213,968	1,224,707,627	1,231,997,939
Refinery Revenues ($000)	2,859,856	3,688,020	6,547,875	4,387,183	17,223,415	21,610,598	16,931,538	20,882,766	37,814,304	1,187,003	1,562,252	2,749,255	2,855,247	2,134,356	4,989,603	28,220,826	45,490,810	73,711,636
Terminal Revenues ($000)	64,676,126	87,826,425	152,502,551	40,381,592	51,607,981	91,989,574	40,893,165	52,032,518	92,925,683	20,497,127	28,914,758	49,411,885	28,552,633	37,574,969	66,127,603	195,000,643	257,956,651	452,957,294
Total Sales ($000)	67,535,981	91,514,445	159,050,426	44,768,775	68,831,397	113,600,172	57,824,703	72,915,284	130,739,987	21,684,129	30,477,011	52,161,140	31,407,881	39,709,325	71,117,206	223,221,469	303,447,461	526,668,930
Total Sales ($/Day)	444,315,666	429,645,280	435,754,592	294,531,416	323,152,097	311,233,348	380,425,675	342,325,277	358,191,744	142,658,745	143,084,557	142,907,232	206,630,794	186,428,757	194,841,660	1,468,562,296	1,424,635,969	1,442,928,576
Gross Margin ($000)	35,642,350	49,271,021	84,913,371	13,276,026	21,263,006	34,539,032	-26,780,278	-44,548,250	-71,328,529	5,198,930	7,452,286	12,651,215	7,067,918	9,146,674	16,214,593	34,404,946	42,584,737	76,989,683
Utilities ($000)	256,071	331,957	588,028	406,695	506,408	913,103	1,370,088	1,931,748	3,301,836	222,138	303,473	525,611	362,082	502,259	864,341	2,617,074	3,575,845	6,192,919
Utilities ($/Day)	1,684,676	1,558,485	1,611,036	2,675,625	2,377,503	2,501,652	9,013,737	9,069,239	9,046,126	1,461,432	1,424,756	1,440,029	2,382,120	2,358,023	2,368,058	17,217,589	16,788,006	16,966,901
Variable Margin ($000)	35,386,279	48,939,064	84,325,343	12,869,331	20,756,598	33,625,929	-28,150,366	-46,479,998	-74,630,364	4,976,792	7,148,813	12,125,605	6,705,836	8,644,415	15,350,252	31,787,872	39,008,892	70,796,764
Variable Margin ($/Day)	232,804,469	229,760,863	231,028,337	84,666,652	97,448,817	92,125,833	-185,199,778	-218,215,954	-204,466,752	32,742,052	33,562,501	33,220,834	44,117,343	40,584,110	42,055,484	209,130,738	183,140,336	193,963,736
Variable Margin ($/Bbl Crd)	152.63	150.63	151.47	27.62	27.89	27.78	-21.45	-25.28	-23.68	19.17	19.76	19.51	20.64	19.24	19.83	12.25	10.49	11.21
Unit Operations																		
Crude Tower	1,525,290	1,525,290	1,525,290	3,065,508	3,494,351	3,315,765	8,632,786	8,632,786	8,632,786	1,708,401	1,698,816	1,702,808	2,137,925	2,108,987	2,121,038	17,069,910	17,460,230	17,297,686
Vacuum Tower	656,703	656,703	656,703	1,310,538	1,506,179	1,424,707	3,904,145	3,820,540	3,855,356	716,429	707,930	711,469	1,152,027	1,136,432	1,142,926	7,739,841	7,827,784	7,791,161
Sats Gas Plant	107,740	68,327	84,740	128,886	107,414	116,355	422,640	355,279	383,331	68,266	55,736	60,954	183,541	148,175	162,903	911,073	734,930	808,283
Unsats Gas Plant	172,001	166,719	168,918	283,238	284,340	283,881	972,267	974,063	973,315	94,946	100,014	97,904	207,588	204,256	205,644	1,730,040	1,729,392	1,729,662
FCC DeC5 Tower	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FCC	618,120	596,869	605,719	977,874	975,877	976,709	3,193,259	3,193,259	3,193,259	301,180	314,028	308,677	642,500	642,500	642,500	5,732,932	5,722,534	5,726,864
FCC Splitter	347,315	336,416	340,955	552,764	552,268	552,475	1,788,004	1,797,283	1,793,419	147,350	183,016	168,163	366,241	361,596	363,530	3,201,674	3,230,579	3,218,542
Hydrocracker	37,890	37,890	37,890	151,600	151,600	151,600	553,450	553,450	553,450	303,643	303,643	303,643	424,503	424,503	424,503	1,471,086	1,471,086	1,471,086
H-Oil Unit	0	0	0	0	0	0	161,000	161,000	161,000	0	0	0	0	0	0	161,000	161,000	161,000
Delayed Coker	23,988	30,229	27,630	177,456	275,223	234,509	1,159,842	1,171,590	1,166,698	125,605	125,605	125,605	392,149	420,636	408,773	1,879,040	2,023,282	1,963,214
Visbreaker	0	0	0	0	0	0	48,000	48,000	48,000	41,000	12,390	24,304	30,600	1,538	13,640	119,600	61,927	85,944
Thermal Naphtha Splitter	2,891	3,643	3,330	21,502	33,349	28,415	139,230	140,614	140,037	16,539	15,081	15,688	49,043	50,775	50,054	229,204	243,461	237,524
CRU Reformer	284,070	267,607	274,463	480,671	456,222	466,403	1,042,352	963,674	996,439	0	0	0	0	0	0	1,807,093	1,687,503	1,737,305
SRU Reformer	0	0	0	0	0	0	0	0	0	137,899	91,783	110,987	320,785	397,700	365,670	458,684	489,483	476,657
BTX Reformer	64,363	64,190	64,262	58,647	57,515	57,986	271,276	271,276	271,276	0	0	0	0	0	0	394,286	392,981	393,525
C4 Isomerization	37,825	100	15,810	16,000	100	6,721	58,400	100	24,378	19,170	7,894	12,590	66,960	25,543	42,790	198,355	33,736	102,290
C5/C6 Isomerization	16,800	13,120	14,652	156,305	45,913	91,884	229,168	12,597	102,786	11,050	100	4,660	8,588	100	3,635	421,911	71,830	217,617
HF Alkylation	39,690	19,845	28,109	144,738	76,357	104,834	285,117	164,647	214,815	33,675	33,675	33,675	38,500	19,250	27,266	541,720	313,774	408,699
H2SO4 Alkylation	110,854	80,230	92,983	88,480	44,240	62,663	374,942	374,942	374,942	54,997	54,997	54,997	128,232	128,232	128,232	757,505	682,641	713,817
Dimersol	0	0	0	3,240	3,240	3,240	5,700	5,700	5,700	1,000	1,000	1,000	4,900	4,900	4,900	14,840	14,840	14,840
Cat Poly	2,468	1,000	1,611	100	100	100	100	100	100	100	2,265	1,363	2,202	100	975	4,970	3,565	4,150
Isooctane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT - Total	559,084	572,658	567,005	878,149	523,306	671,076	3,038,155	3,274,497	3,176,075	508,215	538,122	525,667	443,450	443,450	443,450	5,427,053	5,352,033	5,383,274
DHT - SR Diesel Fd	385,340	410,020	399,742	559,001	110,690	297,384	1,014,465	1,150,375	1,093,777	196,412	206,746	202,443	128,501	120,561	123,868	2,283,719	1,998,393	2,117,213
DHT - Jet/Kero Fd	6,951	8,866	8,068	165,944	61,168	104,801	1,146,527	1,068,790	1,101,163	227,594	254,452	243,267	215,327	213,068	214,008	1,762,342	1,606,343	1,671,307
DHT - LCO Fd	166,691	153,672	159,094	153,103	261,857	216,568	585,941	705,315	655,603	49,823	44,924	46,964	101	101	101	955,660	1,165,868	1,078,329
DHT - CGO Fd	101	101	101	101	89,591	52,324	291,222	350,017	325,532	34,386	32,000	32,994	99,521	109,720	105,473	425,332	581,429	516,424

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 Control B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
DHT 2nd RCT - Total	525,350	536,287	531,732	694,664	438,159	544,977	1,846,730	2,156,031	2,027,226	270,036	270,036	270,036	68,737	68,737	68,737	3,405,517	3,469,250	3,442,709
DHT 2nd RCT - SR Diesel Fd	378,639	402,890	392,791	549,280	89,738	281,109	977,357	1,130,370	1,066,650	192,996	203,151	198,922	53,080	68,537	62,100	2,151,352	1,894,686	2,001,572
DHT 2nd RCT - Jet/Kero Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - LCO Fd	146,611	133,297	138,842	145,284	259,833	212,130	581,412	679,564	638,690	43,039	35,244	38,490	100	100	100	916,446	1,108,038	1,028,252
DHT 2nd RCT - CGO Fd	100	100	100	100	88,587	51,738	287,961	346,096	321,886	34,001	31,642	32,624	15,557	100	6,537	337,718	466,526	412,885
DHT Arom Saturation	0	0	0	0	0	0	0	0	0	0	0	0	156,036	158,319	157,368	156,036	158,319	157,368
NHT - Total Fd	396,320	369,465	380,648	856,488	818,982	834,601	1,598,352	1,538,945	1,563,685	365,782	341,492	351,608	565,994	559,693	562,317	3,782,936	3,628,578	3,692,859
NHT - Isom/Thermal Fd	80,958	101,858	93,154	227,225	311,536	276,426	331,507	221,394	267,249	106,177	135,708	123,410	106,990	156,347	135,793	852,858	926,843	896,033
NHT - Reformer Fd	315,362	267,607	287,494	629,263	507,446	558,175	1,266,845	1,317,552	1,296,435	259,605	205,784	228,197	459,004	403,346	426,524	2,930,079	2,701,735	2,796,826
CGH - Generic	86,029	86,029	86,029	185,188	182,239	183,467	731,702	590,383	649,234	76,180	38,886	54,417	0	0	0	1,079,100	897,537	973,147
CGH - Olefin Sat'n	0	0	0	0	0	0	0	0	0	0	0	0	153,447	153,447	153,447	153,447	153,447	153,447
FCCU Fd HDT	307,480	307,480	307,480	370,419	370,419	370,419	1,343,283	1,343,283	1,343,283	106,380	106,380	106,380	499,400	499,400	499,400	2,626,962	2,626,962	2,626,962
LSR Splitter	30,899	30,727	30,799	100,000	87,846	92,907	100,000	100,000	100,000	74,922	100,000	89,556	79,253	78,180	78,627	385,073	396,754	391,889
LSR Bz Saturator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformate Saturator	10,000	1,000	4,748	1,000	1,000	1,000	22,946	1,000	10,139	1,000	1,000	1,000	50,000	50,000	50,000	84,946	54,000	66,887
SDA	32,600	32,600	32,600	40,200	40,200	40,200	263,385	263,385	263,385	27,700	27,700	27,700	44,000	44,000	44,000	407,885	407,885	407,885
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TAME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Total MSCF	468,154	468,154	468,154	865,006	767,797	808,278	3,609,555	3,985,074	3,828,694	856,593	856,593	856,593	1,385,544	1,314,275	1,343,954	7,184,851	7,391,892	7,305,672
Hydrogen Plant - Plant Fuel Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - LPG Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Naphtha Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Nat Gas Fd	468,154	468,154	468,154	865,006	767,797	808,278	3,609,555	3,985,074	3,828,694	856,593	856,593	856,593	1,385,544	1,314,275	1,343,954	7,184,851	7,391,892	7,305,672
Lube Unit	52,222	52,222	52,222	48,333	48,333	48,333	439,699	439,699	439,699	0	0	0	56,250	56,250	56,250	596,505	596,504	596,504
Sulfur Plant	2,032,359	2,044,236	2,039,290	7,817,260	7,759,301	7,783,437	31,233,328	33,858,276	32,765,147	4,968,311	4,878,139	4,915,690	7,948,632	8,076,078	8,023,004	53,999,890	56,616,030	55,526,569
Merox Jet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Merox Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BTX Reformer - Tower feed	22,274	22,224	22,245	21,901	21,524	21,681	94,349	94,349	94,349	0	0	0	0	0	0	138,524	138,097	138,275
BTX Reformer - Extract feed	40,718	40,620	40,660	46,526	45,697	46,042	197,990	197,990	197,990	0	0	0	0	0	0	285,234	284,306	284,693
Toluene Dealkyation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BLANK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - CO2 (MLb/Day)	120,051	114,633	116,889	206,256	198,343	201,638	713,584	701,073	706,283	106,800	105,549	106,070	186,799	182,796	184,463	1,333,489	1,302,393	1,315,343
Utilities - Steam (Mlbs)	133,741	123,060	127,508	235,478	204,886	217,626	818,481	798,774	806,980	118,488	123,086	121,171	203,243	194,704	198,260	1,509,431	1,444,510	1,471,545
Utilities - Steam Vent (Mlbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities - Power (kwh)	10,769,892	10,098,647	10,378,179	18,213,472	15,989,506	16,915,651	61,593,896	62,507,060	62,126,783	11,464,404	11,287,763	11,361,323	18,793,084	18,556,674	18,655,124	120,834,748	118,439,650	119,437,061
Utilities - Cooling H2O (Mgal)	1,644,556	1,462,036	1,538,044	2,876,115	2,516,647	2,666,343	9,687,828	9,337,483	9,483,380	1,363,292	1,351,190	1,356,229	2,577,381	2,415,150	2,482,709	18,149,171	17,082,506	17,526,706
HYD Supply (MSCFD)																		
CRU Reformer	272,372	255,811		443,285	444,047		856,259	768,300		0	0		0	0		1,571,917	1,468,157	1,511,366
CRU Reformer - Unrecov'd	68,100	63,959		110,790	111,022		213,956	191,959		0	0		0	0		392,845	366,940	377,728
CRU Reformer - Total	340,472	319,770		554,075	555,069		1,070,215	960,259		0	0		0	0		1,964,762	1,835,097	1,889,095
SRU Reformer	0	0		0	0		0	0		89,359	79,495		263,463	334,492		352,822	413,987	388,515
SRU Reformer - Unrecov'd	0	0		0	0		0	0		22,340	19,873		65,859	83,614		88,199	103,487	97,121
SRU Reformer - Total	0	0		0	0		0	0		111,699	99,368		329,322	418,106		441,021	517,474	485,636
BTX Reformer	38,020	37,918		31,270	30,667		150,822	150,822		0	0		0	0		220,111	219,406	219,700
BTX Reformer - Unrecov'd	9,617	9,591		7,964	7,810		38,299	38,299		0	0		0	0		55,880	55,701	55,776
BTX Reformer - Total	47,637	47,509		39,234	38,477		189,121	189,121		0	0		0	0		275,992	275,107	275,476
Hydrogen Plant	468,150	468,150		865,000	767,791		3,609,528	3,985,045		856,586	856,586		1,385,534	1,314,265		7,184,798	7,391,838	7,305,618
Purchased Hydrogen	0	0		0	0		0	0		0	0		0	0		0	0	0
Coker (Unrecovered)	1,283	1,616		9,306	14,433		62,376	63,008		6,838	6,838		21,314	22,863		101,117	108,757	105,575
Total Supply	857,542	837,046		1,467,614	1,375,770		4,931,239	5,197,432		975,123	962,793		1,736,170	1,755,234		9,967,689	10,128,274	10,061,400
HYD Demand (MSCFD)																		
Hydrocracker	81,093	81,093		386,895	284,292		1,296,953	1,278,980		602,473	614,578		1,087,449	1,093,386		3,454,864	3,352,329	3,395,029
H-Oil Unit	0	0		0	0		141,882	139,687		0	0		0	0		141,882	139,687	140,601
FCCU Fd HDT	174,180	174,180		242,600	242,600		862,775	909,944		66,631	66,152		311,288	311,178		1,657,474	1,704,055	1,684,657
DHT	67,372	68,577		119,988	89,857		394,308	441,898		56,496	55,935		49,791	50,698		687,955	706,965	699,048
DHT 2nd RCT	424,446	413,028		501,110	562,391		1,697,780	1,987,364		192,814	182,150		38,623	31,958		2,854,774	3,176,891	3,042,749
Naphtha HDT	14,527	12,790		41,001	35,022		82,668	77,801		14,670	12,399		28,124	26,590		180,990	164,603	171,427
DHT Arom Saturation	0	0		0	0		0	0		0	0		124,217	129,249		124,217	129,249	127,153
CGH - Generic	5,313	9,614		20,942	20,366		89,134	65,978		9,890	4,346		0	0		125,279	100,304	110,704
CGH - Olefin Sat'n	0	0		0	0		0	0		0	0		1,960	1,950		1,960	1,950	1,954
C4 Isomerization	2,194	1		928	1		3,387	6		1,112	458		3,884	1,481		11,505	1,947	5,927
C5/C6 Isomerization	2,757	2,153		25,647	7,533		37,602	2,067		1,813	16		1,409	16		69,228	11,786	35,707
Isooctane	0	0		0	0		0	0		0	0		0	0		0	0	0
Reformate Saturator	6,660	441		441	441		10,119	441		45	45		2,250	2,250		19,515	3,618	10,238
LSR Bz Saturator	0	0		0	0		0	0		0	0		0	0		0	0	0
Cyclohexane	0	0		0	0		0	0		0	0		0	0		0	0	0
TDA	0	0		0	0		0	0		0	0		0	0		0	0	0
Plant Fuel (Recovered H2)	1	1		1	1		1	1		1	1		1	1		5	5	5

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 Control B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Plant Fuel (Unrecovered H2)	78,999	75,166		128,060	133,265		314,631	293,266		29,178	26,711		87,174	106,477		638,041	634,886	636,200
Total Demand	857,542	837,046		1,467,614	1,375,770		4,931,239	5,197,432		975,123	962,793		1,736,170	1,755,234		9,967,689	10,128,274	10,061,400
FCC Data																		
Total Feed Rate																		
BPD	618,120	596,869	605,719	977,873	975,877	976,709	3,193,259	3,193,259	3,193,259	301,180	314,028	308,677	642,500	642,500	642,500	5,732,932	5,722,534	5,726,864
API	24.5	24.3	24.4	22.5	22.0	22.2	24.2	24.0	24.1	23.9	24.3	24.1	22.6	22.7	22.7	23.8	23.5	23.6
Specific Gravity	0.9071	0.9081	0.9077	0.9190	0.9217	0.9206	0.9086	0.9102	0.9095	0.9108	0.9085	0.9095	0.9181	0.9175	0.9177	0.9114	0.9127	0.9121
Sulfur, Wt%	0.45	0.46	0.46	1.16	1.24	1.21	1.00	1.04	1.02	0.81	0.83	0.82	0.35	0.35	0.35	0.89	0.93	0.91
Sulfur ppm	4,533	4,633	4,591	11,588	12,424	12,076	10,017	10,407	10,245	8,090	8,300	8,213	3,514	3,459	3,482	8,864	9,256	9,092
Basic N2 ppm	394	404	400	423	459	444	340	365	355	341	329	334	475	617	558	368	398	385
% Diesel Feed	2.5	0.0	1.1	3.1	0.0	1.3	1.6	0.4	0.9	0.0	0.0	0.0	2.5	2.5	2.5	1.9	0.5	1.1
Mid TBP	816	821	819	829	835	833	803	811	808	844	844	844	826	824	825	813	820	817
W % Conradson Carbon	1.8	1.8	1.8	1.6	1.6	1.6	1.5	1.5	1.5	1.4	1.4	1.4	1.7	1.7	1.7	1.6	1.6	1.6
Percent HDT'd Feed	50%	52%	51%	39%	39%	39%	46%	46%	46%	45%	43%	44%	83%	83%	83%	49%	49%	49%
FCC Yields (vol%)	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%
H2S	0.2%	0.2%	0.2%	0.4%	0.4%	0.4%	0.3%	0.4%	0.3%	0.3%	0.3%	0.3%	0.1%	0.1%	0.1%	0.3%	0.3%	0.3%
Methane	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Ethane	1.2%	1.3%	1.2%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.2%	1.3%	1.3%
Ethylene	1.2%	1.2%	1.2%	1.3%	1.2%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Dry Gas	3.9%	4.0%	4.0%	4.2%	4.2%	4.2%	3.9%	4.0%	3.9%	3.8%	3.9%	3.9%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Propane	3.0%	3.0%	3.0%	3.0%	2.9%	3.0%	3.0%	3.0%	3.0%	3.0%	3.1%	3.1%	2.9%	2.8%	2.8%	3.0%	3.0%	3.0%
Propylene	7.8%	7.8%	7.8%	7.8%	7.7%	7.8%	7.7%	7.8%	7.7%	7.8%	8.0%	7.9%	8.0%	8.1%	8.1%	7.8%	7.8%	7.8%
NC4	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.3%	1.3%	1.4%	1.4%	1.4%
Iso-butane	6.0%	6.0%	6.0%	5.9%	5.7%	5.8%	6.2%	6.1%	6.2%	6.2%	6.4%	6.3%	5.8%	5.3%	5.5%	6.1%	6.0%	6.0%
Iso C4=	2.6%	2.6%	2.6%	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%	2.8%	2.8%	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%
1/2 C4=	6.8%	6.8%	6.8%	6.8%	6.7%	6.8%	6.7%	6.8%	6.7%	7.0%	7.1%	7.1%	6.8%	6.7%	6.7%	6.8%	6.8%	6.8%
FCC Gasoline	56.2%	56.4%	56.3%	56.5%	56.6%	56.6%	56.0%	56.3%	56.2%	58.3%	58.3%	58.3%	57.0%	56.3%	56.6%	56.3%	56.5%	56.4%
Cycle Oil	18.6%	18.4%	18.5%	17.7%	17.8%	17.8%	18.5%	18.2%	18.4%	16.7%	16.2%	16.4%	19.0%	19.7%	19.4%	18.3%	18.2%	18.3%
Decant Oil	7.1%	7.3%	7.2%	8.2%	8.6%	8.4%	7.4%	7.4%	7.4%	7.3%	7.1%	7.2%	6.9%	7.2%	7.1%	7.4%	7.6%	7.5%
Coke (wt%)	972.5%	929.1%	947.2%	1269.8%	1184.7%	1220.2%	4728.5%	4637.4%	4675.3%	443.2%	481.7%	465.7%	906.6%	892.8%	898.6%	3080.1%	3013.4%	3041.1%
Conversion	74.2%	74.4%	74.3%	74.1%	73.6%	73.8%	74.1%	74.3%	74.2%	75.9%	76.6%	76.3%	74.1%	73.0%	73.5%	74.2%	74.2%	74.2%
Naphtha Sulfur, ppm	354	362	359	914	980	953	773	797	787	631	649	642	236	231	233	684	711	700
LCO Sulfur, wt.%	0.5	0.5	0.5	1.3	1.4	1.4	1.3	1.2	1.2	1.2	0.9	1.0	0.5	0.5	0.5	1.1	1.1	1.1
HCO Sulfur, wt%	1.5	1.5	1.5	3.9	4.1	4.0	3.3	3.5	3.4	2.7	2.8	2.7	1.2	1.2	1.2	3.0	3.1	3.0
Naphtha Sul/Fd Sul	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.08	0.08	0.08
LCO Sul/Fd Sul	1.14	1.14	1.14	1.14	1.13	1.13	1.27	1.13	1.19	1.49	1.10	1.26	1.49	1.49	1.49	1.25	1.15	1.19
HCO Sul/Fd Sul	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.33	3.33
CETANE																		
HSD Gr 76 (0.2%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
LSD Gr 74 (.05%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
ULSD (15 ppm)	50.3	50.2	50.2	49.5	48.5	48.9	50.6	51.3	51.0	52.2	51.6	51.8	0.0	0.0	0.0			0.0
CARB Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.6	32.4			0.0
RFO Blending																		
API	10.5	10.5	10.5	10.7	11.8	11.4	9.2	8.5	8.8	8.5	8.5	8.5	10.5	10.5	10.5			0.0
Sulfur	2.0	2.1	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.2	1.7	1.9			0.0
Viscosity (cst)	380.0	380.0	380.0	380.0	380.0	380.0	69.6	50.0	58.2	380.0	226.0	290.1	130.5	35.5	75.1			0.0
Reformer Operations																		
CRU - Severity	100.0	99.7	99.8	96.9	99.5	98.4	95.3	94.9	95.1	0.0	0.0	0.0	0.0	0.0	0.0	95.8	96.3	96.1
CRU - Endpoint	379.2	356.9	366.2	400.0	400.0	400.0	374.7	400.0	389.5	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - PFF vol%	45.9	46.8	46.4	43.7	45.3	44.6	49.8	50.7	50.3	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - ARO vol%	14.1	13.6	13.8	14.5	13.2	13.7	15.7	16.3	16.1	0.0	0.0	0.0	0.0	0.0	0.0			0.0
SRU - Severity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.0	91.0	90.6	94.2	95.0	94.7			0.0
SRU - Endpoint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	400.0	400.0	400.0	361.9	359.2	360.3			0.0
SRU - PFF vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.3	35.2	40.7	45.7	45.8	45.7			0.0
SRU - ARO vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.3	14.5	15.7	14.0	13.7	13.8			0.0
Coker Operations																		
Feed API	7.6	7.6	7.6	6.4	6.4	6.4	3.9	3.9	3.9	4.7	4.7	4.7	6.1	6.1	6.1			0.0
Feed Sulfur Wt%	2.6	2.6	2.6	3.5	3.5	3.5	4.0	4.0	4.0	3.8	3.8	3.8	2.6	2.6	2.6			0.0
Feed Concarbon Wt%	19.0	19.0	19.0	19.1	19.1	19.1	21.5	21.5	21.5	22.5	22.5	22.5	19.5	19.5	19.5			0.0
Hydrocracker Operations																		
Feed API	18.6	18.6	18.6	25.2	22.8	23.8	16.9	18.0	17.5	17.5	17.5	17.5	19.6	19.9	19.8			0.0
Feed Sulfur Wt%	1.3	1.3	1.3	1.7	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.0	1.4	1.4	1.4			0.0

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 Control B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Feed Basic N2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.3			0.0
Feed K Factor	11.6	11.6	11.6	11.2	11.7	11.5	11.4	11.5	11.4	11.6	11.6	11.6	11.3	11.3	11.3			0.0
Cracked Feeds %	0.0	0.0	0.0	85.6	0.1	35.7	32.4	30.8	31.5	13.0	14.0	13.6	63.7	65.4	64.7			0.0
Conversion	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0			0.0
Alkylation																		
HF C3 Alkylate	39,688	19,843	28,107	68,077	12,729	35,778	117,214	120,639	119,212	33,673	31,859	32,614	38,498	19,248	27,265	297,151	204,318	242,977
HF C4 Alkylate	2	2	2	76,661	63,628	69,056	167,903	44,008	95,603	2	1,816	1,061	2	2	2	244,570	109,456	165,723
HF C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total HF Alkylate	39,690	19,845	28,109	144,738	76,357	104,834	285,117	164,647	214,815	33,675	33,675	33,675	38,500	19,250	27,266	541,720	313,774	408,699
H2SO4 C3 Alkylate	9,446	14,912	12,636	2	2	2	2	2	2	1,250	2	521	13,589	34,532	25,810	24,288	49,449	38,971
H2SO4 C4 Alkylate	101,408	65,318	80,348	88,478	44,238	62,661	374,940	374,940	374,940	53,747	54,995	54,476	114,643	93,700	102,422	733,217	633,192	674,846
H2SO4 C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total H2SO4 Alkylate	110,854	80,230	92,983	88,480	44,240	62,663	374,942	374,942	374,942	54,997	54,997	54,997	128,232	128,232	128,232	757,505	682,641	713,817
Crude																		
Crude API	31.7	31.7	31.7	31.7	31.7	31.7	29.8	29.8	29.8	30.2	30.2	30.2	26.3	26.3	26.3			0.0
Feed Sulfur Wt%	0.9	0.9	0.9	1.4	1.4	1.4	1.6	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3			0.0
ENERGY BALANCE																		
Process Fuel (MMBTU/D)	520,424	496,572	506,505	998,431	979,105	987,153	3,283,008	3,207,431	3,238,904	561,598	532,232	544,461	957,559	945,307	950,409	6,321,019	6,160,647	6,227,432
Fuel for Steam Gen (MMBTU/D)	199,676	183,728	190,370	351,569	305,895	324,916	1,221,992	1,192,569	1,204,822	176,902	183,768	180,909	303,441	290,693	296,002	2,253,581	2,156,653	2,197,018
Fuel for Power (MMBTU/D)	107,699	100,986	103,782	182,135	159,895	169,157	615,939	625,071	621,268	114,644	112,878	113,613	187,931	185,567	186,551	1,208,347	1,184,397	1,194,371
Total Energy (MMBTU/D)	827,799	781,286	800,656	1,532,135	1,444,895	1,481,225	5,120,939	5,025,071	5,064,994	853,144	828,878	838,983	1,448,931	1,421,567	1,432,962	9,782,947	9,501,697	9,618,820
Total Energy (MBTU/Bbl Crd)	543	512	525	500	413	449	593	582	587	499	488	493	678	674	676	573	544	556

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Refinery Input	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
PADD Crude	1,525,290	1,525,290	1,525,290	3,065,508	3,714,925	3,444,483	9,031,692	9,040,608	9,036,895	1,749,772	1,749,772	1,749,772	2,138,519	2,137,451	2,137,896	17,510,781	18,168,047	17,894,336
GTL Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GTL Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VGO HS	0	0	0	0	0	0	421,373	750,000	613,147	0	0	0	28,082	28,025	28,048	449,455	778,025	641,196
VGO LS	0	0	0	1,000	1,000	1,000	0	0	0	0	0	0	0	0	0	1,000	1,000	1,000
HS AR (A960)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LS AR (Alg)	204,703	205,752	205,315	0	0	0	328,627	0	136,853	0	0	0	0	0	0	533,330	205,752	342,168
Normal Butane	5,683	38,531	24,852	0	76,611	44,707	0	191,373	111,678	951	61,534	36,305	8,800	61,534	39,573	15,434	429,582	257,115
Isobutane	0	16,129	9,412	56,123	100	23,430	88,300	43,483	62,146	2,362	20,413	12,896	0	39,708	23,172	146,785	119,833	131,057
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E10	415,772	396,059	404,268	256,218	245,235	249,809	207,530	223,289	216,726	84,275	88,832	86,934	170,302	172,423	171,540	1,134,097	1,125,837	1,129,277
Ethanol - E20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformer Feed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (FOE)	83,005	77,281	79,665	156,796	131,877	142,254	582,607	570,528	575,558	122,154	122,582	122,404	176,629	169,484	172,459	1,121,191	1,071,752	1,092,340
Hydrogen (MSCF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentanes Plus	0	0	0	77,000	100	32,124	125,000	1	52,055	44,616	0	18,580	0	0	0	246,616	101	102,759
Import CBOB 10%	421,000	421,000	421,000	0	0	0	0	0	0	0	0	0	0	0	0	421,000	421,000	421,000
Import CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import RBOB 10%	187,000	187,000	187,000	0	0	0	0	0	0	0	0	0	0	0	0	187,000	187,000	187,000
Import RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Alkylate	27,620	33,844	31,252	0	0	0	0	0	0	0	0	0	0	0	0	27,620	33,844	31,252
Import Raffinate	22,380	41,156	33,337	0	0	0	0	0	0	0	0	0	110,000	0	45,808	132,380	41,156	79,146
Import Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Lt Naphtha	0	0	0	0	0	0	50,606	0	21,074	0	0	0	0	1,000	584	50,606	1,000	21,658
Import Hvy Naph	0	0	0	0	0	0	100,000	0	41,644	0	0	0	0	0	0	100,000	0	41,644
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	37,839	22,081	0	37,839	22,081
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	60,000	60,000	60,000	10,000	10,000	10,000	0	0	0	0	0	0	60,000	60,000	60,000	130,000	130,000	130,000
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	0	0	0	0	0	0	60,000	60,000	60,000	60,000	60,000	60,000
Transfer RBOB 10%	871,925	635,286	733,832	50,000	100,000	79,178	0	0	0	0	0	0	0	0	0	921,925	735,286	813,010
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,300,000	1,300,000	1,300,000	450,000	400,000	420,822	0	0	0	0	24,437	14,261	0	0	0	1,750,000	1,724,437	1,735,083
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isooctane	100	100	100	100	100	100	100	100	100	100	100	100	70,269	100	29,321	70,669	500	29,721
Isooctene	23,453	100	9,825	4,189	100	1,803	100	100	100	100	100	100	712	100	355	28,554	500	12,183
X-Fer C5's from Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum Total	5,147,931	4,937,528	5,025,148	4,126,933	4,680,048	4,449,710	10,935,935	10,819,481	10,867,977	2,004,330	2,067,769	2,041,351	2,823,313	2,767,663	2,790,838	25,038,442	25,272,490	25,175,024
Refinery Output	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
Propane	32,254	36,433	34,693	50,711	65,282	59,214	141,806	137,594	139,348	28,241	25,321	26,537	56,913	60,447	58,976	309,925	325,077	318,767
Propylene	18,685	18,685	18,685	42,525	42,525	42,525	245,407	245,407	245,407	2,041	2,041	2,041	11,774	11,774	11,774	320,432	320,432	320,432
Normal Butane	0	0	0	7,385	0	3,075	114,045	0	47,493	0	0	0	0	0	0	121,430	0	50,568
Isobutane	0	0	0	0	0	0	0	0	0	0	0	0	22,987	0	9,573	22,987	0	9,573
PC Naphtha	15,830	15,830	15,830	40,290	40,290	40,290	432,937	432,937	432,937	0	0	0	0	0	0	489,056	489,056	489,056
PC Gasoil	0	0	0	0	902,342	526,572	157,500	157,500	157,500	0	0	0	0	0	0	157,500	1,059,842	684,072
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	1,994,174	1,893,289	1,935,302	1,796,711	1,708,416	1,745,185	1,262,360	1,384,821	1,333,823	700,898	738,798	723,015	121,103	109,665	114,429	5,875,247	5,834,989	5,851,754
CG E10 Prem	379,843	309,610	338,857	342,231	325,413	332,416	240,450	263,775	254,062	133,504	140,723	137,717	23,067	20,889	21,796	1,119,095	1,060,409	1,084,848
RFG E10 Reg	1,463,509	1,449,296	1,455,215	334,173	331,163	332,416	463,605	472,234	468,641	0	0	0	1,295,272	1,324,212	1,312,160	3,556,559	3,576,905	3,568,432
RFG E10 Prem	278,764	269,126	273,139	63,652	63,079	63,317	88,306	89,949	89,265	0	0	0	246,718	252,231	249,935	677,440	674,384	675,657
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to RFG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	921,925	735,286	813,010	0	0	0	0	0	0	921,925	735,286	813,010
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,750,000	1,724,437	1,735,083	0	0	0	0	0	0	1,750,000	1,724,437	1,735,083
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	15,521	35,289	27,057	176,293	71,211	114,971	1,381,669	1,350,395	1,363,419	377,584	381,854	380,076	300,470	299,665	300,000	2,251,537	2,138,414	2,185,523
X-Fer Diesel Rundown to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSD Gr 76 (0.2%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (.05%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	554,767	557,732	556,497	688,465	583,651	627,299	2,069,737	2,309,903	2,209,889	515,725	529,343	523,672	0	0	0	3,828,694	3,980,629	3,917,357
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	353,755	353,325	353,504	353,755	353,325	353,504
X-Fer C5's to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residual Fuel	89,250	56,819	70,324	78,750	41,370	56,936	350,885	211,325	269,443	151,115	148,076	149,341	72,677	75,311	74,214	742,676	532,900	620,259
Slurry	28,758	32,017	30,659	80,000	91,785	86,878	138,000	172,500	158,133	0	1,159	676	30,000	30,000	30,000	276,758	327,461	306,346
Asphalt & Wax	143,000	143,000	143,000	210,000	210,000	210,000	157,500	157,500	157,500	5,250	5,250	5,250	44,232	44,232	44,232	559,982	559,982	559,982

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Gasoil	0	0	0	10,115	7,675	8,691	0	0	0	0	0	0	9,814	9,814	9,814	19,928	17,489	18,505
Lubes	18,706	18,706	18,706	17,313	17,313	17,313	157,500	157,500	157,500	0	0	0	20,149	20,149	20,149	213,668	213,668	213,668
Benzene	11,003	11,003	11,003	11,003	11,003	11,003	51,347	51,347	51,347	0	0	0	0	0	0	73,353	73,353	73,353
Toluene	0	0	0	0	0	0	34,910	34,910	34,910	0	0	0	0	0	0	34,910	34,910	34,910
Xylenes	0	0	0	0	0	0	7,777	7,777	7,777	0	0	0	0	0	0	7,777	7,777	7,777
Transfer Raffinate	0	0	0	0	0	0	60,000	60,000	60,000	0	0	0	0	0	0	60,000	60,000	60,000
Transfer Alkylate	0	0	0	0	0	0	130,000	130,000	130,000	0	0	0	0	0	0	130,000	130,000	130,000
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	53,024	0	22,081	53,024	0	22,081
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (STons)	1,015	1,069	1,046	3,863	4,144	4,027	16,425	17,768	17,209	2,534	2,542	2,539	4,045	4,022	4,032	27,882	29,545	28,853
Coke (STon)	1,094	2,206	1,743	9,167	15,290	12,740	66,457	68,890	67,877	7,111	7,111	7,111	19,994	19,981	19,986	103,823	113,478	109,457
Sum Total	5,054,670	4,863,269	4,942,976	4,014,992	4,609,933	4,362,177	10,773,058	10,721,443	10,742,937	1,962,739	2,020,983	1,996,728	2,782,387	2,731,971	2,752,966	24,587,846	24,947,599	24,797,784
Check = 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
C3+ Liq Product	5,044,063	4,846,832	4,928,967	3,949,615	4,512,516	4,278,103	10,357,665	10,287,098	10,316,485	1,914,358	1,972,565	1,948,325	2,661,956	2,611,714	2,632,637	23,927,657	24,230,725	24,104,516
C3+ Recovery	99.6%	99.7%	99.7%	99.5%	99.2%	99.3%	100.0%	100.4%	100.2%	101.7%	101.4%	101.5%	100.6%	100.5%	100.5%			
Clean Prod Terminal Imports	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	79,500	79,500	79,500	0	0	0	3,000	3,000	3,000	0	0	0	0	0	0	82,500	82,500	82,500
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	172,500	172,500	172,500	4,500	4,500	4,500	20,250	20,250	20,250	0	0	0	0	0	0	197,250	197,250	197,250
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Imports	252,000	252,000	252,000	4,500	4,500	4,500	23,250	23,250	23,250	0	0	0	0	0	0	279,750	279,750	279,750
Clean Prod Terminal Sales	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	1,994,174	1,893,289	1,935,302	1,796,711	1,708,416	1,745,185	1,262,360	1,384,821	1,333,823	700,898	738,798	723,015	121,103	109,665	114,429	5,875,247	5,834,989	5,851,754
CG E10 Prem	379,843	309,610	338,857	342,231	325,413	332,416	240,450	263,775	254,062	133,504	140,723	137,717	23,067	20,889	21,796	1,119,095	1,060,409	1,084,848
RFG E10 Reg	1,463,509	1,449,296	1,455,215	334,173	331,163	332,416	463,605	472,234	468,641	0	0	0	1,295,272	1,324,212	1,312,160	3,556,559	3,576,905	3,568,432
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to RFG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	278,764	269,126	273,139	63,652	63,079	63,317	88,306	89,949	89,265	0	0	0	246,718	252,231	249,935	677,440	674,384	675,657
Jet/Kero A (450ppm)	495,021	514,789	506,557	276,293	271,211	273,327	814,669	683,395	738,063	447,584	451,854	450,076	300,470	299,665	300,000	2,334,037	2,220,914	2,268,023
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	1,377,836	1,712,751	1,573,280	981,226	931,542	952,232	1,081,157	934,243	995,424	585,726	599,343	593,672	0	0	0	4,025,944	4,177,879	4,114,607
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	353,755	353,325	353,504	353,755	353,325	353,504
Total Sales	5,989,147	6,148,860	6,082,349	3,794,286	3,630,822	3,698,895	3,950,547	3,828,418	3,879,277	1,867,712	1,930,719	1,904,480	2,340,386	2,359,987	2,351,824	17,942,077	17,898,805	17,916,825
Clean Prod Transfers	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blank Terminal Sale																		
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg																0	0	0
CG E10 Prem																0	0	0
RFG E10 Reg																0	0	0
RFG E20 Reg																0	0	0
CG E20 Reg																0	0	0
E85 to CG																0	0	0
E85 to RFG																0	0	0
RFG E10 Prem																0	0	0
Blank Terminal Sale																0	0	0
Blank Terminal Sale																0	0	0
Jet/Kero A (450ppm)	400,000	400,000	400,000	100,000	200,000	158,356	-570,000	-670,000	-628,356	70,000	70,000	70,000	0	0	0	0	0	0
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	650,569	982,519	844,283	288,261	343,391	320,433	-1,008,830	-1,395,910	-1,234,715	70,000	70,000	70,000	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,050,569	1,382,519	1,244,283	388,261	543,391	478,789	-1,578,830	-2,065,910	-1,863,071	140,000	140,000	140,000	0	0	0	0	0	0
Intermediates Transfers																		

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Transfers IN																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,081	0	0	22,081
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	60,000	60,000	60,000	10,000	10,000	10,000	0	0	0	0	0	0	60,000	60,000	60,000	130,000	130,000	130,000
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	0	0	0	0	0	0	60,000	60,000	60,000	60,000	60,000	60,000
Transfer RBOB 10%	871,925	635,286	733,832	50,000	100,000	79,178	0	0	0	0	0	0	0	0	0	921,925	735,286	813,010
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,300,000	1,300,000	1,300,000	450,000	400,000	420,822	0	0	0	0	24,437	14,261	0	0	0	1,750,000	1,724,437	1,735,083
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers IN	2,231,925	1,995,286	2,093,832	510,000	510,000	510,000	0	0	0	0	24,437	14,261	120,000	120,000	142,081	2,861,925	2,649,723	2,760,173
Transfers OUT																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,081	0	0	22,081
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	60,000	60,000	60,000	0	0	0	0	0	0	60,000	60,000	60,000
Transfer Alkylate	0	0	0	0	0	0	130,000	130,000	130,000	0	0	0	0	0	0	130,000	130,000	130,000
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	921,925	735,286	813,010	0	0	0	0	0	0	921,925	735,286	813,010
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,750,000	1,724,437	1,735,083	0	0	0	0	0	0	1,750,000	1,724,437	1,735,083
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers OUT	0	0	0	0	0	0	2,861,925	2,649,723	2,738,092	0	0	0	0	0	22,081	2,861,925	2,649,723	2,760,174
Financials																		
Refinery Feedstocks ($000)	26,665,267	36,201,569	62,866,837	29,759,301	47,077,009	76,836,310	85,625,843	116,848,984	202,474,828	16,039,037	22,432,976	38,472,012	21,926,786	28,922,137	50,848,923	180,016,234	251,482,674	431,498,908
Terminal Imports ($000)	2,581,690	3,696,129	6,277,819	46,208	67,167	113,375	234,670	339,179	573,848	0	0	0	0	0	0	2,862,567	4,102,475	6,965,042
Transfer Costs ($000)	533,462	768,865	1,302,327	87,294	143,144	230,438	0	0	0	13,406	22,066	35,472	76,608	107,352	183,960	710,771	1,041,427	1,752,197
Total Costs ($000)	29,780,419	40,666,564	70,446,983	29,892,802	47,287,320	77,180,122	85,860,513	117,188,163	203,048,676	16,052,443	22,455,041	38,507,484	22,003,394	29,029,489	51,032,883	183,589,571	256,626,576	440,216,148
Total Costs ($/Day)	195,923,809	190,922,835	193,005,432	196,663,174	222,006,195	211,452,389	564,871,796	550,179,168	556,297,742	105,608,177	105,422,729	105,499,957	144,759,170	136,288,679	139,816,116	1,207,826,127	1,204,819,607	1,206,071,637
Refinery Revenues ($000)	2,878,649	3,518,040	6,396,688	4,370,393	18,141,326	22,511,719	17,346,076	21,140,121	38,486,197	1,264,070	1,607,462	2,871,531	2,438,937	2,435,957	4,874,894	28,298,124	46,842,905	75,141,029
Terminal Revenues ($000)	63,585,127	87,289,573	150,874,701	39,570,921	50,638,787	90,209,708	40,247,742	52,543,021	92,790,762	20,175,407	28,434,270	48,609,676	26,977,687	36,250,189	63,227,877	190,556,884	255,155,840	445,712,724
Total Sales ($000)	66,463,776	90,807,613	157,271,389	43,941,313	68,780,113	112,721,426	57,593,817	73,683,142	131,276,959	21,439,476	30,041,731	51,481,208	29,416,624	38,686,147	68,102,771	218,855,007	301,998,745	520,853,752
Total Sales ($/Day)	437,261,685	426,326,821	430,880,518	289,087,589	322,911,328	308,825,826	378,906,692	345,930,242	359,662,901	141,049,187	141,040,992	141,044,404	193,530,421	181,625,102	186,582,933	1,439,835,573	1,417,834,485	1,426,996,582
Gross Margin ($000)	36,683,357	50,141,049	86,824,406	14,048,511	21,492,793	35,541,304	-28,266,696	-43,505,021	-71,771,717	5,387,033	7,586,690	12,973,723	7,413,230	9,656,658	17,069,888	35,265,436	45,372,169	80,637,605
Utilities ($000)	251,646	336,024	587,669	396,716	547,910	944,626	1,430,371	1,973,658	3,404,029	236,537	326,087	562,624	380,145	521,124	901,269	2,695,414	3,704,803	6,400,217
Utilities ($/Day)	1,655,563	1,577,577	1,610,053	2,609,972	2,572,347	2,588,016	9,410,332	9,266,001	9,326,106	1,556,164	1,530,924	1,541,435	2,500,955	2,446,591	2,469,230	17,732,986	17,393,440	17,534,840
Variable Margin ($000)	36,431,712	49,805,025	86,236,737	13,651,795	20,944,883	34,596,679	-29,697,066	-45,478,679	-75,175,746	5,150,497	7,260,603	12,411,100	7,033,085	9,135,534	16,168,619	32,570,022	41,667,366	74,237,388
Variable Margin ($/Day)	239,682,313	233,826,409	236,265,032	89,814,442	98,332,786	94,785,421	-195,375,437	-213,514,927	-205,960,947	33,884,846	34,087,338	34,003,012	46,270,296	42,889,832	44,297,587	214,276,460	195,621,438	203,390,105
Variable Margin ($/Bbl Crd)	157.14	153.30	154.90	29.30	26.47	27.52	-21.63	-23.62	-22.79	19.37	19.48	19.43	21.64	20.07	20.72	12.24	10.77	11.37
Unit Operations																		
Crude Tower	1,525,290	1,525,290	1,525,290	3,065,508	3,714,925	3,444,483	9,031,692	9,040,608	9,036,895	1,749,772	1,749,772	1,749,772	2,138,519	2,137,451	2,137,896	17,510,781	18,168,047	17,894,336
Vacuum Tower	655,933	656,408	656,210	1,322,886	1,604,600	1,487,283	4,075,080	4,003,453	4,033,281	730,948	729,895	730,334	1,152,347	1,151,771	1,152,011	7,937,193	8,146,128	8,059,119
Sats Gas Plant	99,062	71,264	82,840	135,269	126,473	130,136	436,901	367,522	396,414	92,120	66,969	77,443	197,303	129,845	157,937	960,656	762,073	844,771
Unsats Gas Plant	172,209	171,902	172,030	289,028	306,636	299,303	1,011,137	1,014,854	1,013,306	104,055	103,898	103,963	218,870	219,369	219,161	1,795,300	1,816,659	1,807,764
FCC DeC5 Tower	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FCC	618,120	612,174	614,650	996,116	1,051,705	1,028,555	3,325,689	3,325,689	3,325,689	329,294	327,424	328,203	702,606	702,606	702,606	5,971,825	6,019,597	5,999,703
FCC Splitter	348,045	344,852	346,181	563,661	592,090	580,251	1,860,959	1,869,334	1,865,846	190,968	190,424	190,650	393,896	394,436	394,211	3,357,528	3,391,136	3,377,140
Hydrocracker	37,890	37,890	37,890	151,600	151,600	151,600	553,450	553,450	553,450	311,276	311,276	311,276	424,503	424,503	424,503	1,478,719	1,478,719	1,478,719
H-Oil Unit	0	0	0	0	0	0	161,000	161,000	161,000	0	0	0	0	0	0	161,000	161,000	161,000
Delayed Coker	22,585	45,530	35,975	186,150	310,493	258,712	1,206,800	1,250,967	1,232,574	125,605	125,605	125,605	398,450	398,201	398,305	1,939,590	2,130,796	2,051,170
Visbreaker	0	0	0	0	0	0	48,000	48,000	48,000	40,110	41,000	40,629	30,600	30,600	30,600	118,710	119,600	119,229
Thermal Naphtha Splitter	2,722	5,487	4,335	22,556	37,622	31,348	144,761	149,962	147,796	16,493	16,539	16,520	49,802	49,772	49,784	236,333	259,382	249,784
CRU Reformer	273,476	278,529	276,425	474,896	538,735	512,150	1,118,685	1,073,286	1,092,192	0	0	0	0	0	0	1,867,057	1,890,551	1,880,767
SRU Reformer	0	0	0	0	0	0	0	0	0	195,669	170,355	180,897	430,034	430,034	430,034	625,703	600,389	610,931
BTX Reformer	64,190	64,190	64,190	57,515	57,515	57,515	271,276	271,276	271,276	0	0	0	0	0	0	392,981	392,981	392,981
C4 Isomerization	27,922	100	11,686	16,000	100	6,721	58,400	100	24,378	19,170	4,724	10,740	69,718	100	29,092	191,210	5,124	82,618
C5/C6 Isomerization	36,786	3,125	17,143	164,100	13,730	76,350	229,168	100	95,493	100	100	100	8,325	100	3,525	438,479	17,155	192,611
HF Alkylation	39,690	19,845	28,109	152,714	76,357	108,155	285,117	142,559	201,925	33,675	33,675	33,675	38,500	29,567	33,287	549,696	302,002	405,151
H2SO4 Alkylation	83,859	62,366	71,317	88,480	60,649	72,239	414,350	387,381	398,612	64,429	64,429	64,429	152,744	152,744	152,744	803,862	727,569	759,341
Dimersol	0	0	0	2,396	3,240	2,888	5,700	5,700	5,700	1,000	1,000	1,000	4,900	4,900	4,900	13,996	14,840	14,488
Cat Poly	13,340	11,051	12,004	100	100	100	100	100	100	100	100	100	100	100	100	13,740	11,451	12,404
Isooctane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT - Total	558,516	569,782	565,090	796,715	555,836	656,147	3,165,605	3,279,719	3,232,197	549,895	549,895	549,895	443,450	443,450	443,450	5,514,181	5,398,681	5,446,780
DHT - SR Diesel Fd	390,282	390,640	390,490	557,941	121,994	303,539	1,141,492	1,270,121	1,216,555	210,634	212,947	211,984	121,744	115,182	117,915	2,422,093	2,110,884	2,240,483
DHT - Jet/Kero Fd	8,031	16,244	12,824	165,950	61,168	104,803	1,135,512	1,070,890	1,097,801	249,930	249,483	249,669	238,120	241,932	240,345	1,797,543	1,639,717	1,705,442
DHT - LCO Fd	160,102	162,797	161,675	72,722	271,602	188,781	585,587	624,605	608,357	55,020	53,080	53,888	197	101	141	873,629	1,112,184	1,012,841
DHT - CGO Fd	101	101	101	101	101,072	59,024	303,013	314,103	309,484	34,311	34,386	34,355	83,389	86,235	85,050	420,915	535,896	488,014

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
DHT 2nd RCT - Total	522,169	527,704	525,399	612,984	470,951	530,099	1,981,981	2,161,170	2,086,548	287,612	287,612	287,612	44,345	44,345	44,345	3,449,090	3,491,781	3,474,003
DHT 2nd RCT - SR Diesel Fd	383,495	383,846	383,700	540,724	101,508	284,415	1,101,301	1,248,033	1,186,928	206,971	209,244	208,297	44,145	43,538	43,791	2,276,635	1,986,170	2,107,131
DHT 2nd RCT - Jet/Kero Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - LCO Fd	138,574	143,757	141,599	72,160	269,502	187,321	581,061	602,552	593,602	46,714	44,367	45,344	100	100	100	838,608	1,060,279	967,966
DHT 2nd RCT - CGO Fd	100	100	100	100	99,940	58,363	299,619	310,585	306,018	33,927	34,001	33,970	100	707	454	333,846	445,332	398,905
DHT Arom Saturation	0	0	0	0	0	0	0	0	0	0	0	0	157,837	153,717	155,433	157,837	153,717	155,433
NHT - Total Fd	380,248	383,252	382,001	872,760	876,812	875,125	1,739,333	1,689,320	1,710,147	353,729	353,729	353,729	588,363	588,283	588,316	3,934,433	3,891,396	3,909,318
NHT - Isom/Thermal Fd	58,710	63,919	61,750	278,831	338,077	313,405	601,648	240,600	390,954	158,060	132,425	143,100	158,329	158,249	158,283	1,255,577	933,271	1,067,492
NHT - Reformer Fd	321,538	319,332	320,251	593,930	538,735	561,720	1,137,685	1,448,720	1,319,193	195,669	221,304	210,629	430,034	430,034	430,034	2,678,855	2,958,125	2,841,827
CGH - Generic	71,058	71,058	71,058	249,945	196,242	218,606	794,488	732,135	758,101	50,554	50,554	50,554	0	0	0	1,166,044	1,049,989	1,098,319
CGH - Olefin Sat'n	0	0	0	0	0	0	0	0	0	0	0	0	203,644	203,644	203,644	203,644	203,644	203,644
FCCU Fd HDT	315,929	315,929	315,929	370,419	370,419	370,419	1,343,283	1,343,283	1,343,283	106,380	111,379	109,297	499,400	499,400	499,400	2,635,411	2,640,410	2,638,328
LSR Splitter	1,000	1,000	1,000	83,418	100,000	93,094	100,000	100,000	100,000	100,000	100,000	100,000	79,275	79,235	79,252	363,692	380,235	373,346
LSR Bz Saturator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformate Saturator	23,929	22,254	22,951	10,000	10,000	10,000	17,535	1,000	7,886	1,000	1,000	1,000	100,000	50,000	70,822	152,464	84,254	112,659
SDA	32,600	32,600	32,600	40,200	40,200	40,200	263,385	263,385	263,385	27,700	27,700	27,700	44,000	44,000	44,000	407,885	407,885	407,885
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TAME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Total MSCF	484,181	484,181	484,181	767,970	767,970	767,970	3,660,249	3,838,950	3,764,532	854,229	857,480	856,126	1,299,281	1,284,787	1,290,823	7,065,910	7,233,368	7,163,632
Hydrogen Plant - Plant Fuel Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - LPG Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Naphtha Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Nat Gas Fd	484,181	484,181	484,181	767,970	767,970	767,970	3,660,249	3,838,951	3,764,532	854,229	857,480	856,126	1,299,281	1,284,787	1,290,823	7,065,910	7,233,368	7,163,632
Lube Unit	52,222	52,222	52,222	48,333	48,333	48,333	439,699	439,699	439,699	0	0	0	56,250	56,250	56,250	596,505	596,504	596,504
Sulfur Plant	2,030,134	2,137,208	2,092,618	7,724,647	8,287,932	8,053,358	32,848,108	35,532,336	34,414,521	5,068,418	5,083,324	5,077,116	8,088,405	8,044,169	8,062,590	55,759,711	59,084,968	57,700,203
Merox Jet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Merox Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BTX Reformer - Tower feed	22,224	22,224	22,224	21,524	21,524	21,524	94,349	94,349	94,349	0	0	0	0	0	0	138,097	138,097	138,097
BTX Reformer - Extract feed	40,620	40,620	40,620	45,697	45,697	45,697	197,990	197,990	197,990	0	0	0	0	0	0	284,306	284,306	284,306
Toluene Dealkyation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BLANK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - CO2 (MLb/Day)	120,229	116,032	117,780	206,867	210,339	208,894	737,242	720,009	727,186	111,799	110,322	110,937	191,729	187,148	189,056	1,367,865	1,343,851	1,353,852
Utilities - Steam (Mlbs)	136,156	123,984	129,053	234,255	213,317	222,036	845,777	813,012	826,656	125,853	124,747	125,208	206,003	200,131	202,576	1,548,043	1,475,191	1,505,529
Utilities - Steam Vent (Mlbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities - Power (kwh)	10,380,934	10,028,350	10,175,180	17,714,380	17,245,456	17,440,734	64,106,580	63,684,748	63,860,415	12,112,923	11,960,026	12,023,698	19,401,798	18,960,652	19,144,362	123,716,615	121,879,232	122,644,389
Utilities - Cooling H2O (Mgal)	1,649,985	1,510,511	1,568,593	2,880,513	2,697,476	2,773,699	10,020,245	9,484,275	9,707,473	1,447,808	1,420,362	1,431,791	2,640,977	2,527,398	2,574,696	18,639,528	17,640,021	18,056,254
HYD Supply (MSCFD)																		
CRU Reformer	261,471	266,462		451,872	507,594		918,020	866,994		0	0		0	0		1,631,363	1,641,051	1,637,017
CRU Reformer - Unrecov'd	65,374	66,622		112,979	126,896		229,371	216,617		0	0		0	0		407,724	410,135	409,131
CRU Reformer - Total	326,845	333,084		564,851	634,490		1,147,391	1,083,612		0	0		0	0		2,039,087	2,051,186	2,046,147
SRU Reformer	0	0		0	0		0	0		154,514	138,421		363,132	367,765		517,647	506,186	510,959
SRU Reformer - Unrecov'd	0	0		0	0		0	0		38,625	34,603		90,774	91,940		129,400	126,543	127,733
SRU Reformer - Total	0	0		0	0		0	0		193,140	173,024		453,907	459,705		647,046	632,729	638,692
BTX Reformer	37,918	37,918		30,667	30,667		150,822	150,822		0	0		0	0		219,406	219,406	219,406
BTX Reformer - Unrecov'd	9,591	9,591		7,810	7,810		38,299	38,299		0	0		0	0		55,701	55,701	55,701
BTX Reformer - Total	47,509	47,509		38,477	38,477		189,121	189,121		0	0		0	0		275,107	275,107	275,107
Hydrogen Plant	484,177	484,177		767,965	767,965		3,660,222	3,838,922		854,223	857,473		1,299,272	1,284,777		7,065,858	7,233,314	7,163,579
Purchased Hydrogen	0	0		0	0		0	0		0	0		0	0		0	0	0
Coker (Unrecovered)	1,208	2,435		9,762	16,282		64,901	67,276		6,838	6,838		21,657	21,643		104,365	114,475	110,265
Total Supply	859,739	867,205		1,381,055	1,457,214		5,061,635	5,178,931		1,054,201	1,037,336		1,774,835	1,766,126		10,131,464	10,306,811	10,233,790
HYD Demand (MSCFD)																		
Hydrocracker	82,263	81,093		424,366	306,262		1,301,108	1,294,750		658,175	645,077		1,102,163	1,101,470		3,568,075	3,428,652	3,486,713
H-Oil Unit	0	0		0	0		141,882	138,396		0	0		0	0		141,882	138,396	139,847
FCCU Fd HDT	179,083	178,692		242,868	242,600		874,176	918,441		66,395	69,474		311,669	311,694		1,674,191	1,720,902	1,701,450
DHT	66,681	68,338		105,947	97,022		419,819	444,844		59,021	59,058		45,885	45,587		697,354	714,850	707,564
DHT 2nd RCT	413,028	422,003		372,844	594,419		1,764,926	1,879,124		205,458	202,586		20,676	20,938		2,776,932	3,119,069	2,976,591
Naphtha HDT	14,530	14,865		40,193	37,322		80,162	92,096		12,440	13,215		27,243	27,180		174,566	184,679	180,468
DHT Arom Saturation	0	0		0	0		0	0		0	0		125,458	122,695		125,458	122,695	123,846
CGH - Generic	4,388	8,231		32,022	21,931		98,267	88,627		6,074	6,149		0	0		140,751	124,937	131,523
CGH - Olefin Sat'n	0	0		0	0		0	0		0	0		2,712	2,680		2,712	2,680	2,693
C4 Isomerization	1,619	1		928	6		3,387	1		1,112	274		4,044	1		11,090	283	4,783
C5/C6 Isomerization	6,036	513		26,926	2,253		37,602	16		16	16		1,366	16		71,946	2,815	31,604
Isooctane	0	0		0	0		0	0		0	0		0	0		0	0	0
Reformate Saturator	15,937	14,821		4,410	4,410		7,733	441		45	45		21,187	20,280		49,312	39,996	43,876
LSR Bz Saturator	0	0		0	0		0	0		0	0		0	0		0	0	0
Cyclohexane	0	0		0	0		0	0		0	0		0	0		0	0	0
TDA	0	0		0	0		0	0		0	0		0	0		0	0	0
Plant Fuel (Recovered H2)	1	1		1	1		1	1		1	1		1	1		5	5	5

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Plant Fuel (Unrecovered H2)	76,173	78,647		130,551	150,989		332,571	322,193		45,463	41,441		112,431	113,583		697,190	706,853	702,829
Total Demand	859,739	867,205		1,381,055	1,457,214		5,061,635	5,178,931		1,054,201	1,037,336		1,774,835	1,766,126		10,131,464	10,306,812	10,233,791
FCC Data																		
Total Feed Rate																		
BPD	618,120	612,174	614,650	996,116	1,051,705	1,028,555	3,325,689	3,325,689	3,325,689	329,294	327,424	328,203	702,606	702,606	702,606	5,971,825	6,019,598	5,999,703
API	24.5	24.3	24.4	22.4	22.0	22.2	24.1	23.8	24.0	23.9	23.9	23.9	22.8	22.6	22.7	23.7	23.4	23.5
Specific Gravity	0.9069	0.9084	0.9078	0.9197	0.9216	0.9208	0.9092	0.9109	0.9102	0.9107	0.9108	0.9108	0.9170	0.9183	0.9178	0.9117	0.9134	0.9127
Sulfur, Wt%	0.43	0.48	0.46	1.17	1.29	1.24	1.04	1.07	1.06	0.85	0.83	0.84	0.44	0.44	0.44	0.91	0.96	0.94
Sulfur ppm	4,299	4,750	4,562	11,692	12,857	12,372	10,355	10,740	10,580	8,484	8,301	8,377	4,393	4,387	4,389	9,148	9,629	9,427
Basic N2 ppm	390	408	401	423	458	444	346	372	361	339	339	339	615	593	602	380	404	394
% Diesel Feed	2.4	0.0	1.0	3.1	0.0	1.3	1.7	0.4	1.0	0.7	0.0	0.3	3.6	3.6	3.6	2.2	0.6	1.3
Mid TBP	817	821	819	830	830	830	804	811	808	840	843	842	820	820	820	813	818	816
W % Conradson Carbon	1.8	1.8	1.8	1.6	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.6	1.6	1.6	1.5	1.5	1.5
Percent HDT'd Feed	51%	52%	51%	38%	36%	37%	44%	44%	44%	41%	43%	42%	76%	76%	76%	47%	47%	47%
FCC Yields (vol%)	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%
H2S	0.1%	0.2%	0.2%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%
Methane	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.5%	1.5%	1.5%	1.5%
Ethane	1.2%	1.3%	1.2%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Ethylene	1.2%	1.2%	1.2%	1.3%	1.2%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Dry Gas	3.9%	4.0%	4.0%	4.3%	4.2%	4.2%	3.9%	4.0%	4.0%	3.9%	4.0%	4.0%	4.0%	4.1%	4.0%	4.0%	4.0%	4.0%
Propane	3.0%	2.9%	3.0%	3.0%	2.9%	3.0%	3.0%	3.0%	3.0%	3.1%	3.1%	3.1%	2.8%	2.8%	2.8%	3.0%	3.0%	3.0%
Propylene	7.8%	7.8%	7.8%	7.8%	7.7%	7.7%	7.7%	7.8%	7.7%	7.9%	8.0%	7.9%	8.1%	8.1%	8.1%	7.8%	7.8%	7.8%
NC4	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.4%	1.5%	1.5%	1.5%	1.5%	1.3%	1.3%	1.3%	1.4%	1.4%	1.4%
Iso-butane	6.0%	6.0%	6.0%	5.9%	5.7%	5.8%	6.2%	6.1%	6.1%	6.3%	6.3%	6.3%	5.3%	5.4%	5.4%	6.0%	5.9%	6.0%
Iso C4=	2.6%	2.6%	2.6%	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%	2.8%	2.8%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
1/2 C4=	6.8%	6.8%	6.8%	6.8%	6.7%	6.8%	6.7%	6.8%	6.7%	7.1%	7.1%	7.1%	6.6%	6.7%	6.6%	6.7%	6.8%	6.8%
FCC Gasoline	56.3%	56.3%	56.3%	56.6%	56.3%	56.4%	56.0%	56.2%	56.1%	58.0%	58.2%	58.1%	56.1%	56.1%	56.1%	56.2%	56.3%	56.3%
Cycle Oil	18.6%	18.4%	18.5%	17.7%	17.9%	17.8%	18.5%	18.3%	18.4%	16.5%	16.4%	16.4%	19.8%	19.7%	19.7%	18.4%	18.3%	18.3%
Decant Oil	7.1%	7.3%	7.2%	8.2%	8.8%	8.5%	7.4%	7.5%	7.5%	7.3%	7.3%	7.3%	7.3%	7.4%	7.3%	7.5%	7.7%	7.6%
Coke (wt%)	977.2%	949.1%	960.8%	1282.2%	1271.0%	1275.6%	4875.8%	4776.2%	4817.7%	491.4%	490.5%	490.9%	972.7%	962.1%	966.5%	3171.8%	3096.3%	3127.7%
Conversion	74.4%	74.3%	74.3%	74.1%	73.4%	73.7%	74.1%	74.2%	74.1%	76.1%	76.4%	76.3%	72.9%	73.0%	72.9%	74.1%	74.0%	74.1%
Naphtha Sulfur, ppm	335	372	357	923	1,018	978	800	825	815	666	650	657	311	311	311	707	743	728
LCO Sulfur, wt.%	0.5	0.6	0.5	1.6	1.5	1.5	1.3	1.3	1.3	1.0	1.0	1.0	0.7	0.7	0.7	1.2	1.2	1.2
HCO Sulfur, wt%	1.4	1.6	1.5	3.9	4.3	4.1	3.5	3.6	3.5	2.8	2.8	2.8	1.5	1.5	1.5	3.1	3.2	3.1
Naphtha Sul/Fd Sul	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.08	0.08	0.08
LCO Sul/Fd Sul	1.14	1.16	1.15	1.39	1.13	1.23	1.30	1.25	1.27	1.17	1.18	1.18	1.49	1.49	1.49	1.32	1.22	1.26
HCO Sul/Fd Sul	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.33	3.33	3.34
CETANE																		
HSD Gr 76 (0.2%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
LSD Gr 74 (.05%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
ULSD (15 ppm)	50.0	50.3	50.2	49.6	47.2	48.2	50.6	51.2	51.0	50.2	50.9	50.6	0.0	0.0	0.0			0.0
CARB Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	55.9	47.6			0.0
RFO Blending																		
API	10.5	10.5	10.5	10.5	10.5	10.5	8.5	8.5	8.5	8.5	8.5	8.5	10.5	10.5	10.5			0.0
Sulfur	2.0	2.1	2.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0			0.0
Viscosity (cst)	380.0	380.0	380.0	263.2	380.0	331.3	81.4	50.0	63.1	157.5	160.6	159.3	31.4	36.6	34.4			0.0
Reformer Operations																		
CRU - Severity	100.0	100.0	100.0	99.0	98.2	98.5	94.9	95.0	95.0	0.0	0.0	0.0	0.0	0.0	0.0	96.0	96.2	96.1
CRU - Endpoint	400.0	400.0	400.0	400.0	400.0	400.0	353.7	400.0	380.7	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - PFF vol%	46.9	47.1	47.0	44.8	46.6	45.8	50.6	49.7	50.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - ARO vol%	13.4	13.4	13.4	14.0	13.0	13.5	15.0	16.2	15.7	0.0	0.0	0.0	0.0	0.0	0.0			0.0
SRU - Severity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.5	92.5	92.9	94.4	95.6	95.1			0.0
SRU - Endpoint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	358.6	400.0	382.8	355.6	354.9	355.2			0.0
SRU - PFF vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.3	41.3	42.9	46.1	46.1	46.1			0.0
SRU - ARO vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.6	15.7	15.6	12.6	12.5	12.6			0.0
Coker Operations																		
Feed API	7.6	7.6	7.6	6.4	6.4	6.4	3.9	3.9	3.9	4.7	4.7	4.7	6.1	6.1	6.1			0.0
Feed Sulfur Wt%	2.6	2.6	2.6	3.5	3.5	3.5	4.0	4.0	4.0	3.8	3.8	3.8	2.6	2.6	2.6			0.0
Feed Concarbon Wt%	19.0	19.0	19.0	19.1	19.1	19.1	21.5	21.5	21.5	22.5	22.5	22.5	19.5	19.5	19.5			0.0
Hydrocracker Operations																		
Feed API	18.6	18.6	18.6	22.5	21.8	22.1	16.6	17.2	17.0	17.5	17.5	17.5	19.4	19.7	19.6			0.0
Feed Sulfur Wt%	1.4	1.3	1.3	1.8	1.7	1.7	2.0	2.0	2.0	2.0	2.0	2.0	1.4	1.4	1.4			0.0

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Feed Basic N2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.3			0.0
Feed K Factor	11.6	11.6	11.6	11.0	11.6	11.4	11.4	11.4	11.4	11.6	11.6	11.6	11.2	11.2	11.2			0.0
Cracked Feeds %	14.0	0.0	5.8	97.7	0.1	40.8	32.4	30.8	31.5	13.6	13.7	13.6	68.3	66.8	67.4			0.0
Conversion	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0			0.0
Alkylation																		
HF C3 Alkylate	21,865	19,843	20,685	72,590	25,502	45,111	134,457	138,651	136,905	33,673	33,673	33,673	38,498	29,565	33,285	301,084	247,235	269,660
HF C4 Alkylate	17,825	2	7,424	80,123	50,855	63,043	150,660	3,907	65,021	2	2	2	2	2	2	248,612	54,767	135,492
HF C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total HF Alkylate	39,690	19,845	28,109	152,714	76,357	108,155	285,117	142,559	201,925	33,675	33,675	33,675	38,500	29,567	33,287	549,696	302,002	405,151
H2SO4 C3 Alkylate	2	1,043	610	2	2	2	2	2	2	5,437	5,602	5,533	31,295	35,836	33,945	36,737	42,485	40,092
H2SO4 C4 Alkylate	83,858	61,322	70,707	88,478	60,647	72,237	414,348	387,380	398,610	58,993	58,827	58,896	121,449	116,907	118,799	767,125	685,084	719,249
H2SO4 C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total H2SO4 Alkylate	83,859	62,366	71,317	88,480	60,649	72,239	414,350	387,381	398,612	64,429	64,429	64,429	152,744	152,744	152,744	803,862	727,569	759,341
Crude																		
Crude API	31.7	31.7	31.7	31.7	31.7	31.7	29.8	29.8	29.8	30.2	30.2	30.2	26.3	26.3	26.3			0.0
Feed Sulfur Wt%	0.9	0.9	0.9	1.4	1.4	1.4	1.6	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3			0.0
ENERGY BALANCE																		
Process Fuel (MMBTU/D)	515,219	505,991	509,834	1,005,258	1,047,518	1,029,919	3,398,256	3,317,174	3,350,939	582,001	570,852	575,495	984,438	957,205	968,546	6,485,171	6,398,740	6,434,734
Fuel for Steam Gen (MMBTU/D)	203,281	185,109	192,676	349,742	318,482	331,500	1,262,744	1,213,826	1,234,198	187,899	186,248	186,935	307,562	298,795	302,446	2,311,229	2,202,460	2,247,755
Fuel for Power (MMBTU/D)	103,809	100,284	101,752	177,144	172,455	174,407	641,066	636,847	638,604	121,129	119,600	120,237	194,018	189,607	191,444	1,237,166	1,218,792	1,226,444
Total Energy (MMBTU/D)	822,309	791,384	804,262	1,532,144	1,538,455	1,535,827	5,302,066	5,167,847	5,223,741	891,029	876,700	882,667	1,486,018	1,445,607	1,462,435	10,033,566	9,819,992	9,908,933
Total Energy (MBTU/Bbl Crd)	539	519	527	500	414	450	587	572	578	509	501	504	695	676	684	573	541	554

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 Control D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Refinery Input	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
PADD Crude	1,525,290	1,525,290	1,525,290	3,065,508	3,704,576	3,438,444	9,042,371	9,042,371	9,042,371	1,749,772	1,749,772	1,749,772	2,138,519	2,138,519	2,138,519	17,521,460	18,160,528	17,894,396
GTL Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GTL Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VGO HS	0	0	0	0	0	0	429,834	750,000	616,670	0	0	0	62,755	32,064	44,845	492,588	782,064	661,515
VGO LS	0	0	0	4,389	1,000	2,411	0	0	0	0	0	0	0	0	0	4,389	1,000	2,411
HS AR (A960)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LS AR (Alg)	204,399	205,614	205,108	0	0	0	320,166	0	133,330	0	0	0	0	0	0	524,565	205,614	338,437
Normal Butane	6,422	38,531	25,159	0	77,860	45,436	0	191,373	111,678	0	61,534	35,909	8,800	61,534	39,573	15,222	430,831	257,756
Isobutane	4,010	16,129	11,082	55,558	100	23,195	89,912	47,233	65,006	2,346	23,753	14,838	0	39,708	23,172	151,826	126,924	137,294
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E10	414,827	396,059	403,875	250,360	245,235	247,369	207,530	223,289	216,726	84,275	89,444	87,291	173,409	174,435	174,007	1,130,401	1,128,462	1,129,269
Ethanol - E20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol - E85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformer Feed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Methanol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Gas (FOE)	83,902	78,092	80,511	158,151	134,891	144,577	578,024	570,226	573,473	122,664	123,334	123,055	177,384	168,508	172,204	1,120,124	1,075,052	1,093,822
Hydrogen (MSCF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentanes Plus	0	0	0	77,000	100	32,124	125,000	1	52,055	44,616	3,023	20,344	0	0	0	246,616	3,124	104,523
Import CBOB 10%	421,000	421,000	421,000	0	0	0	0	0	0	0	0	0	0	0	0	421,000	421,000	421,000
Import CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import RBOB 10%	187,000	187,000	187,000	0	0	0	0	0	0	0	0	0	0	0	0	187,000	187,000	187,000
Import RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Alkylate	24,544	33,111	29,543	0	0	0	0	0	0	0	0	0	0	0	0	24,544	33,111	29,543
Import Raffinate	25,456	41,889	35,046	0	0	0	0	0	0	0	0	0	110,000	0	45,808	135,456	41,889	80,854
Import Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Import Lt Naphtha	0	0	0	0	0	0	51,837	0	21,587	0	0	0	0	1,000	584	51,837	1,000	22,171
Import Hvy Naph	0	0	0	0	0	0	100,000	0	41,644	0	0	0	0	0	0	100,000	0	41,644
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	40,845	23,836	0	40,845	23,836
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	60,000	60,000	60,000	10,000	10,000	10,000	0	0	0	0	0	0	50,319	60,000	55,969	120,319	130,000	125,969
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	0	0	0	0	0	0	60,000	60,000	60,000	60,000	60,000	60,000
Transfer RBOB 10%	839,702	636,278	720,992	50,000	100,000	79,178	0	0	0	0	0	0	0	0	0	889,702	736,278	800,170
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,307,571	1,300,000	1,303,153	450,000	400,000	420,822	0	0	0	0	0	0	0	0	0	1,757,571	1,700,000	1,723,975
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Isooctane	1,518	100	691	100	100	100	100	100	100	100	100	100	80,463	1,236	34,229	82,281	1,636	35,219
Isooctene	33,661	100	14,076	3,744	100	1,618	100	100	100	100	100	100	100	100	100	37,705	500	15,994
X-Fer C5's from Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum Total	5,139,301	4,939,192	5,022,526	4,124,811	4,673,963	4,445,275	10,944,875	10,824,692	10,874,741	2,003,872	2,051,060	2,031,409	2,861,748	2,777,949	2,812,846	25,074,607	25,266,857	25,186,796
Refinery Output	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD	BPD
Propane	31,164	35,394	33,633	50,952	64,164	58,662	151,211	136,759	142,777	28,228	25,243	26,486	56,020	61,105	58,987	317,575	322,665	320,545
Propylene	18,685	18,685	18,685	42,525	42,525	42,525	245,407	245,407	245,407	2,041	2,041	2,041	11,774	11,774	11,774	320,432	320,432	320,432
Normal Butane	0	0	0	43,210	0	17,994	164,103	0	68,339	13,473	0	5,611	0	0	0	220,787	0	91,944
Isobutane	0	0	0	0	0	0	0	0	0	0	0	0	21,920	0	9,128	21,920	0	9,128
PC Naphtha	15,830	15,830	15,830	40,290	40,290	40,290	432,937	432,937	432,937	0	0	0	0	0	0	489,056	489,056	489,056
PC Gasoil	0	0	0	0	899,829	525,105	157,500	157,500	157,500	0	0	0	0	0	0	157,500	1,057,329	682,605
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	1,986,483	1,893,289	1,932,099	1,747,998	1,708,416	1,724,899	1,262,360	1,384,821	1,333,823	700,898	743,889	725,986	121,103	109,665	114,429	5,818,842	5,840,080	5,831,236
CG E10 Prem	378,378	309,610	338,247	332,952	325,413	328,552	240,450	263,775	254,062	133,504	141,693	138,283	23,067	20,889	21,796	1,108,351	1,061,379	1,080,940
RFG E10 Reg	1,463,509	1,457,766	1,460,157	334,173	331,163	332,416	463,605	472,234	468,641	0	0	0	1,321,094	1,340,944	1,332,678	3,582,381	3,602,107	3,593,892
RFG E10 Prem	278,764	260,655	268,196	63,652	63,079	63,317	88,306	89,949	89,265	0	0	0	251,637	255,418	253,843	682,358	669,101	674,622
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to RFG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	889,702	736,278	800,170	0	0	0	0	0	0	889,702	736,278	800,170
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,757,571	1,700,000	1,723,975	0	0	0	0	0	0	1,757,571	1,700,000	1,723,975
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	15,521	35,289	27,057	176,293	71,211	114,971	1,381,669	1,350,395	1,363,419	377,584	381,854	380,076	300,470	299,665	300,000	2,251,537	2,138,414	2,185,523
X-Fer Diesel Rundown to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HSD Gr 76 (0.2%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (.05%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	556,012	560,276	558,500	707,554	584,079	635,499	2,049,403	2,335,508	2,216,363	502,122	510,474	506,996	0	0	0	3,815,091	3,990,336	3,917,357
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	353,755	353,325	353,504	353,755	353,325	353,504
X-Fer C5's to Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residual Fuel	89,250	56,820	70,325	78,750	41,509	57,018	350,885	211,452	269,517	150,232	146,377	147,982	77,737	63,765	69,584	746,854	519,924	614,426
Slurry	26,825	32,009	29,850	80,000	88,475	84,946	138,000	172,500	158,133	0	0	0	30,000	30,000	30,000	274,825	322,984	302,929
Asphalt & Wax	143,000	143,000	143,000	210,000	210,000	210,000	157,500	157,500	157,500	5,250	5,250	5,250	44,232	44,232	44,232	559,982	559,982	559,982

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 Control D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Gasoil	0	0	0	10,115	7,675	8,691	0	0	0	0	0	0	9,814	9,814	9,814	19,928	17,489	18,505
Lubes	18,706	18,706	18,706	17,313	17,313	17,313	157,500	157,500	157,500	0	0	0	20,149	20,149	20,149	213,668	213,668	213,668
Benzene	11,003	11,003	11,003	11,003	11,003	11,003	51,347	51,347	51,347	0	0	0	0	0	0	73,353	73,353	73,353
Toluene	0	0	0	0	0	0	34,910	34,910	34,910	0	0	0	0	0	0	34,910	34,910	34,910
Xylenes	0	0	0	0	0	0	7,777	7,777	7,777	0	0	0	0	0	0	7,777	7,777	7,777
Transfer Raffinate	0	0	0	0	0	0	60,000	60,000	60,000	0	0	0	0	0	0	60,000	60,000	60,000
Transfer Alkylate	0	0	0	0	0	0	120,319	130,000	125,969	0	0	0	0	0	0	120,319	130,000	125,969
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	57,237	0	23,836	57,237	0	23,836
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sulfur (STons)	1,020	1,069	1,049	3,867	4,157	4,036	16,526	17,771	17,252	2,542	2,556	2,550	4,112	4,098	4,104	28,066	29,651	28,991
Coke (STon)	1,133	2,206	1,759	9,173	15,208	12,695	66,314	68,908	67,828	7,111	7,111	7,111	20,110	20,460	20,314	103,842	113,894	109,708
Sum Total	5,043,957	4,864,769	4,939,390	4,012,210	4,603,217	4,357,099	10,777,648	10,723,004	10,745,760	1,961,749	2,005,311	1,987,170	2,821,363	2,743,782	2,776,090	24,616,926	24,940,083	24,805,508
Check = 0	0	0	0	0	0	0	-1	0	0	0	0	0	0	0	0			
C3+ Liq Product	5,033,129	4,848,330	4,925,288	3,946,779	4,506,142	4,273,202	10,362,462	10,288,550	10,319,329	1,913,333	1,956,822	1,938,711	2,700,010	2,620,746	2,653,754	23,955,713	24,220,589	24,110,284
C3+ Recovery	99.6%	99.7%	99.7%	99.5%	99.3%	99.4%	100.0%	100.3%	100.2%	101.7%	101.5%	101.6%	100.6%	100.4%	100.5%			
Clean Prod Terminal Imports	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jet/Kero A (450ppm)	79,500	79,500	79,500	0	0	0	3,000	3,000	3,000	0	0	0	0	0	0	82,500	82,500	82,500
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD (15 ppm)	172,500	172,500	172,500	4,500	4,500	4,500	20,250	20,250	20,250	0	0	0	0	0	0	197,250	197,250	197,250
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Imports	252,000	252,000	252,000	4,500	4,500	4,500	23,250	23,250	23,250	0	0	0	0	0	0	279,750	279,750	279,750
Clean Prod Terminal Sales	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg	1,986,483	1,893,289	1,932,099	1,747,998	1,708,416	1,724,899	1,262,360	1,384,821	1,333,823	700,898	743,889	725,986	121,103	109,665	114,429	5,818,842	5,840,080	5,831,236
CG E10 Prem	378,378	309,610	338,247	332,952	325,413	328,552	240,450	263,775	254,062	133,504	141,693	138,283	23,067	20,889	21,796	1,108,351	1,061,379	1,080,940
RFG E10 Reg	1,463,509	1,457,766	1,460,157	334,173	331,163	332,416	463,605	472,234	468,641	0	0	0	1,321,094	1,340,944	1,332,678	3,582,381	3,602,107	3,593,892
RFG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E20 Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to CG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E85 to RFG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RFG E10 Prem	278,764	260,655	268,196	63,652	63,079	63,317	88,306	89,949	89,265	0	0	0	251,637	255,418	253,843	682,358	669,101	674,622
Jet/Kero A (450ppm)	495,021	514,789	506,557	276,293	271,211	273,327	814,669	683,395	738,063	447,584	451,854	450,076	300,470	299,665	300,000	2,334,037	2,220,914	2,268,023
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	1,377,836	1,712,751	1,573,280	981,226	960,119	968,908	1,081,157	934,243	995,424	572,122	580,474	576,996	0	0	0	4,012,341	4,187,586	4,114,607
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	353,755	353,325	353,504	353,755	353,325	353,504
Total Sales	5,979,990	6,148,860	6,078,536	3,736,294	3,659,399	3,691,421	3,950,547	3,828,418	3,879,277	1,854,109	1,917,911	1,891,341	2,371,127	2,379,907	2,376,250	17,892,066	17,934,493	17,916,825
Clean Prod Transfers	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**	**BPD**
CG Reg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blank Terminal Sale																		
CG Prem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG E10 Reg																0	0	0
CG E10 Prem																0	0	0
RFG E10 Reg																0	0	0
RFG E20 Reg																0	0	0
CG E20 Reg																0	0	0
E85 to CG																0	0	0
E85 to RFG																0	0	0
RFG E10 Prem																0	0	0
Blank Terminal Sale																0	0	0
Blank Terminal Sale																0	0	0
Jet/Kero A (450ppm)	400,000	400,000	400,000	100,000	200,000	158,356	-570,000	-670,000	-628,356	70,000	70,000	70,000	0	0	0	0	0	0
HSD Gr 76 (2000ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD Gr 74 (500ppm)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ULSD	649,324	979,975	842,279	269,172	371,540	328,910	-988,496	-1,421,515	-1,241,189	70,000	70,000	70,000	0	0	0	0	0	0
CARB Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,049,324	1,379,975	1,242,279	369,172	571,540	487,266	-1,558,496	-2,091,515	-1,869,545	140,000	140,000	140,000	0	0	0	0	0	0
Intermediates Transfers																		

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 Control D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Transfers IN																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,836	0	0	23,836
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Alkylate	60,000	60,000	60,000	10,000	10,000	10,000	0	0	0	0	0	0	50,319	60,000	55,969	120,319	130,000	125,969
Transfer FCC Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	0	0	0	0	0	0	60,000	60,000	60,000	60,000	60,000	60,000
Transfer RBOB 10%	839,702	636,278	720,992	50,000	100,000	79,178	0	0	0	0	0	0	0	0	0	889,702	736,278	800,170
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	1,307,571	1,300,000	1,303,153	450,000	400,000	420,822	0	0	0	0	0	0	0	0	0	1,757,571	1,700,000	1,723,975
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers IN	2,207,273	1,996,278	2,084,144	510,000	510,000	510,000	0	0	0	0	0	0	110,319	120,000	139,804	2,827,592	2,626,278	2,733,949
Transfers OUT																		
Transfer Lt Naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23,836	0	0	23,836
Transfer Reformate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer Raffinate	0	0	0	0	0	0	60,000	60,000	60,000	0	0	0	0	0	0	60,000	60,000	60,000
Transfer Alkylate	0	0	0	0	0	0	120,319	130,000	125,969	0	0	0	0	0	0	120,319	130,000	125,969
Transfer Blendstock	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer FCC naphtha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer RBOB 10%	0	0	0	0	0	0	889,702	736,278	800,170	0	0	0	0	0	0	889,702	736,278	800,170
Transfer RBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Transfer CBOB 10%	0	0	0	0	0	0	1,757,571	1,700,000	1,723,975	0	0	0	0	0	0	1,757,571	1,700,000	1,723,975
Transfer CBOB 20%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Transfers OUT	0	0	0	0	0	0	2,827,592	2,626,278	2,710,113	0	0	0	0	0	23,836	2,827,592	2,626,278	2,733,949
Financials																		
Refinery Feedstocks ($000)	26,828,581	36,208,817	63,037,398	29,733,391	47,007,816	76,741,207	85,698,537	116,900,763	202,599,300	16,036,767	22,516,271	38,553,038	22,405,698	29,056,108	51,461,806	180,702,974	251,689,775	432,392,749
Terminal Imports ($000)	2,581,690	3,696,129	6,277,819	46,208	67,167	113,375	234,670	339,179	573,848	0	0	0	0	0	0	2,862,567	4,102,475	6,965,042
Transfer Costs ($000)	529,329	768,518	1,297,847	85,466	146,921	232,387	0	0	0	13,406	18,787	32,193	70,428	107,352	177,780	698,629	1,041,578	1,740,207
Total Costs ($000)	29,939,600	40,673,464	70,613,064	29,865,065	47,221,903	77,086,968	85,933,207	117,239,942	203,173,148	16,050,173	22,535,058	38,585,231	22,476,126	29,163,460	51,639,586	184,264,171	256,833,827	441,097,998
Total Costs ($/Day)	196,971,052	190,955,232	193,460,450	196,480,691	221,699,077	211,197,174	565,350,043	550,422,261	556,638,762	105,593,244	105,798,394	105,712,962	147,869,250	136,917,652	141,478,318	1,212,264,280	1,205,792,616	1,208,487,665
Refinery Revenues ($000)	2,858,970	3,509,684	6,368,654	4,605,231	18,068,310	22,673,542	17,709,698	21,135,068	38,844,765	1,337,521	1,581,939	2,919,460	2,498,441	2,339,416	4,837,857	29,009,861	46,634,416	75,644,277
Terminal Revenues ($000)	63,487,207	87,286,540	150,773,747	38,960,002	51,057,018	90,017,020	40,247,742	52,543,021	92,790,762	20,030,730	28,229,808	48,260,538	27,343,724	36,558,891	63,902,615	190,069,404	255,675,277	445,744,682
Total Sales ($000)	66,346,176	90,796,224	157,142,400	43,565,233	69,125,328	112,690,562	57,957,439	73,678,088	131,635,527	21,368,251	29,811,746	51,179,998	29,842,165	38,898,307	68,740,472	219,079,265	302,309,693	521,388,959
Total Sales ($/Day)	436,488,003	426,273,351	430,527,124	286,613,377	324,532,058	308,741,265	381,298,943	345,906,517	360,645,281	140,580,601	139,961,251	140,219,172	196,330,033	182,621,158	188,330,059	1,441,310,957	1,419,294,335	1,428,462,901
Gross Margin ($000)	36,406,577	50,122,759	86,529,336	13,700,168	21,903,425	35,603,593	-27,975,767	-43,561,854	-71,537,621	5,318,078	7,276,689	12,594,767	7,366,039	9,734,847	17,100,886	34,815,095	45,475,866	80,290,961
Utilities ($000)	253,825	335,421	589,245	401,188	550,473	951,660	1,452,785	1,974,010	3,426,795	236,883	326,747	563,630	386,774	529,383	916,157	2,731,455	3,716,033	6,447,488
Utilities ($/Day)	1,669,900	1,574,745	1,614,371	2,639,393	2,584,379	2,607,289	9,557,799	9,267,651	9,388,480	1,558,441	1,534,024	1,544,192	2,544,567	2,485,364	2,510,019	17,970,100	17,446,163	17,664,350
Variable Margin ($000)	36,152,752	49,787,339	85,940,091	13,298,980	21,352,952	34,651,933	-29,428,553	-45,535,863	-74,964,416	5,081,195	6,949,942	12,031,137	6,979,265	9,205,464	16,184,729	32,083,640	41,759,833	73,843,473
Variable Margin ($/Day)	237,847,052	233,743,374	235,452,303	87,493,292	100,248,602	94,936,802	-193,608,899	-213,783,395	-205,381,961	33,428,916	32,628,833	32,962,019	45,916,215	43,218,141	44,341,723	211,076,577	196,055,556	202,310,885
Variable Margin ($/Bbl Crd)	155.94	153.25	154.37	28.54	27.06	27.61	-21.41	-23.64	-22.71	19.10	18.65	18.84	21.47	20.21	20.73	12.05	10.80	11.31
Unit Operations																		
Crude Tower	1,525,290	1,525,290	1,525,290	3,065,508	3,704,576	3,438,444	9,042,371	9,042,371	9,042,371	1,749,772	1,749,772	1,749,772	2,138,519	2,138,519	2,138,519	17,521,460	18,160,528	17,894,396
Vacuum Tower	655,921	656,413	656,208	1,324,964	1,599,982	1,485,454	4,068,936	4,004,298	4,031,215	731,539	727,681	729,287	1,152,347	1,152,347	1,152,347	7,933,706	8,140,720	8,054,511
Sats Gas Plant	106,666	68,990	84,680	135,393	124,330	128,937	455,205	361,645	400,607	92,080	63,497	75,400	200,130	130,923	159,743	989,474	749,385	849,367
Unsats Gas Plant	172,282	171,862	172,037	291,074	305,590	299,545	1,025,633	1,015,022	1,019,441	103,815	103,734	103,768	228,948	222,825	225,375	1,821,752	1,819,033	1,820,165
FCC DeC5 Tower	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FCC	618,120	612,036	614,569	1,002,615	1,048,147	1,029,186	3,382,121	3,326,235	3,349,508	327,625	328,764	328,290	726,588	726,588	726,588	6,057,070	6,041,770	6,048,141
FCC Splitter	348,037	344,771	346,131	567,540	590,222	580,776	1,889,869	1,869,627	1,878,056	190,062	191,783	191,066	410,086	404,531	406,844	3,405,594	3,400,933	3,402,874
Hydrocracker	37,890	37,890	37,890	151,600	151,600	151,600	553,450	553,450	553,450	310,506	310,506	310,506	424,503	424,503	424,503	1,477,949	1,477,949	1,477,949
H-Oil Unit	0	0	0	0	0	0	161,000	161,000	161,000	0	0	0	0	0	0	161,000	161,000	161,000
Delayed Coker	23,394	45,531	36,312	186,288	308,838	257,804	1,204,197	1,251,307	1,231,688	125,605	125,605	125,605	400,764	407,746	404,838	1,940,247	2,139,027	2,056,247
Visbreaker	0	0	0	0	0	0	48,000	48,000	48,000	41,000	41,000	41,000	28,286	21,304	24,212	117,286	110,304	113,212
Thermal Naphtha Splitter	2,819	5,487	4,376	22,572	37,422	31,238	144,454	150,002	147,692	16,539	16,539	16,539	49,945	50,378	50,198	236,330	259,828	250,042
CRU Reformer	265,803	270,491	268,539	479,317	537,966	513,542	1,146,299	1,072,249	1,103,086	0	0	0	0	0	0	1,891,419	1,880,706	1,885,167
SRU Reformer	0	0	0	0	0	0	0	0	0	204,480	184,116	192,597	429,963	429,963	429,963	634,443	614,079	622,560
BTX Reformer	64,190	64,190	64,190	57,515	57,515	57,515	271,276	271,276	271,276	0	0	0	0	0	0	392,981	392,981	392,981
C4 Isomerization	37,825	100	15,810	16,000	100	6,721	58,400	100	24,378	19,170	100	8,041	72,804	100	30,377	204,199	500	85,328
C5/C6 Isomerization	36,654	9,912	21,048	164,100	22,488	81,461	229,168	100	95,493	100	100	100	6,549	100	2,786	436,571	32,700	200,887
HF Alkylation	39,690	19,845	28,109	152,714	76,357	108,155	285,117	142,559	201,925	33,675	33,675	33,675	38,500	20,315	27,888	549,696	292,750	399,752
H2SO4 Alkylation	101,696	61,681	78,345	88,480	59,764	71,722	428,111	388,294	404,875	64,248	64,248	64,248	163,663	163,663	163,663	846,198	737,649	782,853
Dimersol	0	0	0	3,240	3,240	3,240	5,700	5,700	5,700	1,000	1,000	1,000	4,900	4,900	4,900	14,840	14,840	14,840
Cat Poly	6,254	11,460	9,292	100	100	100	100	100	100	100	100	100	100	100	100	6,654	11,860	9,692
Isooctane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT - Total	559,857	572,420	567,188	818,574	564,868	670,521	3,294,945	3,282,719	3,287,810	536,606	536,606	536,606	443,450	443,450	443,450	5,653,432	5,400,063	5,505,576
DHT - SR Diesel Fd	386,902	390,640	389,083	557,764	121,464	303,156	1,037,452	1,275,045	1,176,102	191,016	199,486	195,959	119,444	122,423	121,182	2,292,578	2,109,057	2,185,482
DHT - Jet/Kero Fd	8,031	16,244	12,824	165,944	61,168	104,801	1,274,304	1,062,157	1,150,503	249,930	249,400	249,621	231,128	241,084	236,938	1,929,337	1,630,052	1,754,686
DHT - LCO Fd	164,822	165,436	165,180	94,765	281,703	203,855	680,830	631,329	651,943	61,275	53,335	56,641	101	101	101	1,001,793	1,131,904	1,077,721
DHT - CGO Fd	101	101	101	101	100,533	58,709	302,359	314,188	309,262	34,386	34,386	34,386	92,777	79,843	85,229	429,724	529,051	487,687

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 Control D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
DHT 2nd RCT - Total	523,534	530,011	527,313	634,517	480,144	544,430	1,974,881	2,172,404	2,090,148	276,143	276,143	276,143	50,585	50,585	50,585	3,459,659	3,509,286	3,488,620
DHT 2nd RCT - SR Diesel Fd	380,174	383,846	382,317	540,384	101,211	284,099	1,000,341	1,252,872	1,147,708	187,694	196,017	192,551	50,385	32,449	39,918	2,158,978	1,966,394	2,046,593
DHT 2nd RCT - Jet/Kero Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DHT 2nd RCT - LCO Fd	143,260	146,064	144,897	94,032	279,526	202,279	675,567	608,863	636,641	54,448	46,126	49,592	100	100	100	967,408	1,080,679	1,033,509
DHT 2nd RCT - CGO Fd	100	100	100	100	99,407	58,052	298,973	310,669	305,798	34,001	34,001	34,001	100	18,037	10,567	333,273	462,214	408,518
DHT Arom Saturation	0	0	0	0	0	0	0	0	0	0	0	0	158,620	147,988	152,415	158,620	147,988	152,415
NHT - Total Fd	383,530	383,530	383,530	885,390	875,368	879,542	1,853,905	1,690,626	1,758,622	354,028	353,730	353,854	588,310	588,363	588,341	4,065,163	3,891,617	3,963,888
NHT - Isom/Thermal Fd	76,646	71,957	73,910	294,745	337,402	319,638	399,748	240,766	306,972	149,548	113,284	128,386	158,347	158,400	158,378	1,079,034	921,809	987,284
NHT - Reformer Fd	306,883	311,572	309,620	590,645	537,966	559,904	1,454,157	1,449,861	1,451,650	204,480	240,446	225,469	429,963	429,963	429,963	2,986,129	2,969,808	2,976,605
CGH - Generic	68,338	68,338	68,338	231,274	196,064	210,727	727,076	726,183	726,555	66,279	65,162	65,627	0	0	0	1,092,967	1,055,746	1,071,246
CGH - Olefin Sat'n	0	0	0	0	0	0	0	0	0	0	0	0	221,987	222,766	222,442	221,987	222,766	222,442
FCCU Fd HDT	315,787	315,787	315,787	370,419	370,419	370,419	1,343,283	1,343,283	1,343,283	106,380	119,924	114,284	499,400	499,400	499,400	2,635,269	2,648,814	2,643,173
LSR Splitter	20,718	1,000	9,211	99,330	100,000	99,721	100,000	100,000	100,000	100,000	100,000	100,000	79,275	79,275	79,275	399,322	380,275	388,207
LSR Bz Saturator	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reformate Saturator	10,838	10,838	10,838	10,000	10,000	10,000	48,975	1,000	20,979	1,000	1,000	1,000	100,000	50,000	70,822	170,813	72,838	113,639
SDA	32,600	32,600	32,600	40,200	40,200	40,200	263,385	263,385	263,385	27,700	27,700	27,700	44,000	44,000	44,000	407,885	407,885	407,885
MTBE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TAME	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Total MSCF	487,360	487,360	487,360	793,188	793,188	793,188	3,688,950	3,842,968	3,778,829	851,189	851,189	851,189	1,305,630	1,294,495	1,299,132	7,126,318	7,269,201	7,209,699
Hydrogen Plant - Plant Fuel Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - LPG Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Naphtha Fd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydrogen Plant - Nat Gas Fd	487,360	487,360	487,360	793,188	793,188	793,188	3,688,950	3,842,968	3,778,829	851,189	851,189	851,189	1,305,630	1,294,496	1,299,132	7,126,318	7,269,201	7,209,699
Lube Unit	52,222	52,222	52,222	48,333	48,333	48,333	439,699	439,699	439,699	0	0	0	56,250	56,250	56,250	596,505	596,504	596,504
Sulfur Plant	2,039,839	2,137,969	2,097,104	7,732,528	8,313,499	8,071,560	33,049,624	35,538,616	34,502,104	5,082,679	5,111,530	5,099,515	8,223,132	8,196,112	8,207,364	56,127,801	59,297,726	57,977,648
Merox Jet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Merox Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BTX Reformer - Tower feed	22,224	22,224	22,224	21,524	21,524	21,524	94,349	94,349	94,349	0	0	0	0	0	0	138,097	138,097	138,097
BTX Reformer - Extract feed	40,620	40,620	40,620	45,697	45,697	45,697	197,990	197,990	197,990	0	0	0	0	0	0	284,306	284,306	284,306
Toluene Dealkyation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumene	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyclohexane	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BLANK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - Fuel Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel System - CO2 (MLb/Day)	120,237	115,853	117,679	207,872	210,862	209,617	744,250	719,570	729,848	112,251	110,850	111,433	194,338	188,646	191,016	1,378,947	1,345,782	1,359,593
Utilities - Steam (Mlbs)	136,778	125,143	129,988	236,564	214,522	223,701	854,691	812,691	830,181	125,365	124,177	124,671	210,029	203,170	206,027	1,563,427	1,479,702	1,514,569
Utilities - Steam Vent (Mlbs)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities - Power (kwh)	10,635,924	9,994,661	10,261,708	17,913,292	17,326,504	17,570,865	65,087,900	63,669,568	64,260,216	12,063,969	11,920,764	11,980,400	19,657,908	19,161,834	19,368,418	125,358,993	122,073,331	123,441,607
Utilities - Cooling H2O (Mgal)	1,654,214	1,509,168	1,569,570	2,903,686	2,704,224	2,787,288	10,142,914	9,479,943	9,756,030	1,445,247	1,412,437	1,426,101	2,691,305	2,537,084	2,601,308	18,837,367	17,642,856	18,140,296
HYD Supply (MSCFD)																		
CRU Reformer	256,279	260,262		459,606	501,930		1,013,644	866,138		0	0		0	0		1,729,529	1,628,329	1,670,473
CRU Reformer - Unrecov'd	64,076	65,072		114,913	125,469		253,400	216,403		0	0		0	0		432,389	406,944	417,540
CRU Reformer - Total	320,354	325,333		574,519	627,399		1,267,044	1,082,541		0	0		0	0		2,161,918	2,035,273	2,088,013
SRU Reformer	0	0		0	0		0	0		162,091	151,001		362,394	369,269		524,485	520,271	522,026
SRU Reformer - Unrecov'd	0	0		0	0		0	0		40,520	37,748		90,590	92,319		131,109	130,067	130,501
SRU Reformer - Total	0	0		0	0		0	0		202,611	188,749		452,983	461,588		655,594	650,337	652,527
BTX Reformer	37,918	37,918		30,667	30,667		150,822	150,822		0	0		0	0		219,406	219,406	219,406
BTX Reformer - Unrecov'd	9,591	9,591		7,810	7,810		38,299	38,299		0	0		0	0		55,701	55,701	55,701
BTX Reformer - Total	47,509	47,509		38,477	38,477		189,121	189,121		0	0		0	0		275,107	275,107	275,107
Hydrogen Plant	487,357	487,357		793,182	793,182		3,688,923	3,842,940		851,183	851,183		1,305,621	1,294,486		7,126,265	7,269,147	7,209,646
Purchased Hydrogen	0	0		0	0		0	0		0	0		0	0		0	0	0
Coker (Unrecovered)	1,251	2,435		9,769	16,195		64,761	67,295		6,838	6,838		21,783	22,162		104,402	114,925	110,543
Total Supply	856,471	862,634		1,415,947	1,475,254		5,209,849	5,181,896		1,060,632	1,046,770		1,780,387	1,778,236		10,323,287	10,344,790	10,335,835
HYD Demand (MSCFD)																		
Hydrocracker	82,303	81,093		419,774	306,170		1,292,182	1,284,584		656,363	647,663		1,103,874	1,110,174		3,554,497	3,429,683	3,481,660
H-Oil Unit	0	0		0	0		141,882	138,389		0	0		0	0		141,882	138,389	139,844
FCCU Fd HDT	179,021	178,617		242,918	242,600		875,800	918,450		66,488	74,780		311,441	311,948		1,675,669	1,726,395	1,705,271
DHT	66,984	68,625		109,809	98,864		424,402	446,120		58,030	57,704		47,370	45,285		706,596	716,598	712,432
DHT 2nd RCT	419,459	425,924		409,869	610,844		1,878,315	1,892,167		209,757	199,458		23,562	31,297		2,940,963	3,159,692	3,068,604
Naphtha HDT	14,139	14,660		40,225	37,283		91,897	92,152		12,714	13,790		27,364	27,281		186,339	185,166	185,655
DHT Arom Saturation	0	0		0	0		0	0		0	0		127,253	115,373		127,253	115,373	120,321
CGH - Generic	4,220	7,770		28,595	21,911		86,322	87,578		8,748	8,721		0	0		127,885	125,981	126,774
CGH - Olefin Sat'n	0	0		0	0		0	0		0	0		3,037	2,954		3,037	2,954	2,989
C4 Isomerization	2,194	1		928	6		3,387	1		1,112	6		4,223	1		11,843	15	4,941
C5/C6 Isomerization	6,014	1,626		26,926	3,690		37,602	16		16	16		1,075	16		71,633	5,365	32,962
Isooctane	0	0		0	0		0	0		0	0		0	0		0	0	0
Reformate Saturator	7,218	7,218		4,410	4,410		21,598	441		45	45		18,814	19,424		52,085	31,538	40,094
LSR Bz Saturator	0	0		0	0		0	0		0	0		0	0		0	0	0
Cyclohexane	0	0		0	0		0	0		0	0		0	0		0	0	0
TDA	0	0		0	0		0	0		0	0		0	0		0	0	0
Plant Fuel (Recovered H2)	1	1		1	1		1	1		1	1		1	1		5	5	5

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 Control D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Plant Fuel (Unrecovered H2)	74,918	77,097		132,492	149,475		356,461	321,997		47,358	44,586		112,372	114,481		723,600	707,636	714,284
Total Demand	856,471	862,634		1,415,948	1,475,254		5,209,850	5,181,897		1,060,632	1,046,770		1,780,386	1,778,236		10,323,287	10,344,791	10,335,835
FCC Data																		
Total Feed Rate																		
BPD	618,120	612,036	614,569	1,002,615	1,048,147	1,029,186	3,382,121	3,326,234	3,349,508	327,625	328,764	328,290	726,588	726,588	726,588	6,057,070	6,041,770	6,048,141
API	24.5	24.3	24.4	22.3	22.0	22.2	24.2	23.8	24.0	23.8	23.9	23.9	22.7	22.7	22.7	23.7	23.4	23.6
Specific Gravity	0.9069	0.9084	0.9078	0.9198	0.9216	0.9208	0.9088	0.9109	0.9100	0.9110	0.9106	0.9108	0.9174	0.9174	0.9174	0.9116	0.9133	0.9126
Sulfur, Wt%	0.43	0.48	0.46	1.17	1.28	1.24	1.04	1.07	1.06	0.85	0.80	0.82	0.50	0.47	0.48	0.92	0.96	0.95
Sulfur ppm	4,304	4,752	4,565	11,706	12,838	12,366	10,372	10,741	10,587	8,493	8,022	8,218	4,975	4,706	4,818	9,225	9,628	9,459
Basic N2 ppm	391	408	401	423	458	443	343	372	360	341	340	340	521	689	619	374	411	396
% Diesel Feed	2.4	0.0	1.0	3.1	0.0	1.3	3.1	0.4	1.6	0.0	0.0	0.0	3.9	3.9	3.9	3.0	0.7	1.7
Mid TBP	817	821	819	830	831	830	801	811	807	841	846	844	819	819	819	812	818	816
W % Conradson Carbon	1.8	1.8	1.8	1.6	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.6	1.6	1.6	1.5	1.5	1.5
Percent HDT'd Feed	51%	52%	51%	38%	36%	37%	43%	44%	44%	42%	46%	44%	74%	74%	74%	47%	47%	47%
FCC Yields (vol%)	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%	VOL%
H2S	0.1%	0.2%	0.2%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%
Methane	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Ethane	1.2%	1.3%	1.2%	1.3%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%	1.3%	1.2%	1.3%	1.3%
Ethylene	1.2%	1.2%	1.2%	1.3%	1.2%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Dry Gas	3.9%	4.0%	4.0%	4.3%	4.2%	4.2%	3.9%	4.0%	4.0%	4.0%	3.9%	3.9%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Propane	3.0%	2.9%	3.0%	3.0%	2.9%	3.0%	3.0%	3.0%	3.0%	3.1%	3.1%	3.1%	2.9%	2.7%	2.8%	3.0%	3.0%	3.0%
Propylene	7.8%	7.8%	7.8%	7.8%	7.7%	7.8%	7.7%	7.8%	7.7%	7.9%	7.9%	7.9%	8.0%	8.2%	8.1%	7.8%	7.8%	7.8%
NC4	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.4%	1.5%	1.5%	1.5%	1.5%	1.4%	1.3%	1.3%	1.4%	1.4%	1.4%
Iso-butane	6.0%	6.0%	6.0%	5.9%	5.7%	5.8%	6.2%	6.1%	6.1%	6.3%	6.3%	6.3%	5.6%	5.1%	5.3%	6.1%	5.9%	6.0%
Iso C4=	2.6%	2.6%	2.6%	2.7%	2.6%	2.6%	2.6%	2.6%	2.6%	2.8%	2.8%	2.8%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%
1/2 C4=	6.8%	6.8%	6.8%	6.8%	6.7%	6.8%	6.7%	6.8%	6.7%	7.1%	7.1%	7.1%	6.7%	6.6%	6.6%	6.7%	6.7%	6.7%
FCC Gasoline	56.3%	56.3%	56.3%	56.6%	56.3%	56.4%	55.9%	56.2%	56.1%	58.0%	58.3%	58.2%	56.4%	55.7%	56.0%	56.2%	56.3%	56.3%
Cycle Oil	18.6%	18.4%	18.5%	17.6%	17.9%	17.8%	18.6%	18.3%	18.4%	16.4%	16.5%	16.5%	19.3%	20.1%	19.8%	18.4%	18.3%	18.4%
Decant Oil	7.1%	7.3%	7.2%	8.2%	8.8%	8.5%	7.4%	7.6%	7.5%	7.4%	7.2%	7.3%	7.2%	7.5%	7.4%	7.5%	7.7%	7.6%
Coke (wt%)	977.0%	948.9%	960.6%	1290.3%	1266.9%	1276.6%	4977.5%	4776.8%	4860.4%	488.5%	491.0%	490.0%	1009.7%	988.8%	997.5%	3240.1%	3091.4%	3153.3%
Conversion	74.4%	74.3%	74.3%	74.2%	73.4%	73.7%	74.0%	74.2%	74.1%	76.2%	76.3%	76.3%	73.5%	72.3%	72.8%	74.1%	74.0%	74.0%
Naphtha Sulfur, ppm	335	372	357	925	1,016	978	802	825	815	666	625	642	361	337	347	714	743	731
LCO Sulfur, wt.%	0.5	0.5	0.5	1.5	1.5	1.5	1.3	1.3	1.3	1.2	1.1	1.1	0.7	0.7	0.7	1.2	1.2	1.2
HCO Sulfur, wt%	1.4	1.6	1.5	3.9	4.3	4.1	3.5	3.6	3.5	2.8	2.7	2.7	1.7	1.6	1.6	3.1	3.2	3.2
Naphtha Sul/Fd Sul	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.08	0.08	0.08
LCO Sul/Fd Sul	1.14	1.15	1.14	1.28	1.13	1.19	1.22	1.24	1.23	1.37	1.39	1.38	1.49	1.49	1.49	1.25	1.23	1.24
HCO Sul/Fd Sul	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.33	3.33	3.33
CETANE																		
HSD Gr 76 (0.2%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
LSD Gr 74 (.05%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0
ULSD (15 ppm)	50.1	50.3	50.2	49.6	47.3	48.3	50.6	51.4	51.1	50.0	50.5	50.3	0.0	0.0	0.0			0.0
CARB Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.0	32.7			0.0
RFO Blending																		
API	10.5	10.5	10.5	10.5	12.0	11.4	8.8	8.5	8.6	9.1	8.5	8.7	10.5	10.5	10.5			0.0
Sulfur	2.0	2.1	2.1	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.1	1.9	2.0			0.0
Viscosity (cst)	380.0	380.0	380.0	281.5	380.0	339.0	104.3	50.0	72.6	246.5	230.3	237.1	46.0	15.9	28.4			0.0
Reformer Operations																		
CRU - Severity	100.0	100.0	100.0	99.1	97.6	98.2	98.3	95.0	96.4	0.0	0.0	0.0	0.0	0.0	0.0	97.6	96.1	96.7
CRU - Endpoint	400.0	400.0	400.0	400.0	400.0	400.0	373.2	400.0	388.8	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - PFF vol%	46.0	46.1	46.1	44.2	46.4	45.5	49.0	49.7	49.4	0.0	0.0	0.0	0.0	0.0	0.0			0.0
CRU - ARO vol%	13.7	13.7	13.7	14.0	13.1	13.5	15.3	16.2	15.8	0.0	0.0	0.0	0.0	0.0	0.0			0.0
SRU - Severity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.3	92.2	92.7	94.5	96.0	95.4			0.0
SRU - Endpoint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	360.3	400.0	383.4	356.8	355.0	355.8			0.0
SRU - PFF vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.6	39.7	41.8	46.1	46.1	46.1			0.0
SRU - ARO vol%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.7	15.9	15.8	12.9	12.6	12.7			0.0
Coker Operations																		
Feed API	7.6	7.6	7.6	6.4	6.4	6.4	3.9	3.9	3.9	4.7	4.7	4.7	6.1	6.1	6.1			0.0
Feed Sulfur Wt%	2.6	2.6	2.6	3.5	3.5	3.5	4.0	4.0	4.0	3.8	3.8	3.8	2.6	2.6	2.6			0.0
Feed Concarbon Wt%	19.0	19.0	19.0	19.1	19.1	19.1	21.5	21.5	21.5	22.5	22.5	22.5	19.5	19.5	19.5			0.0
Hydrocracker Operations																		
Feed API	18.6	18.6	18.6	24.4	21.9	22.9	17.1	17.3	17.2	17.5	17.5	17.5	19.3	19.5	19.4			0.0
Feed Sulfur Wt%	1.4	1.3	1.3	1.7	1.7	1.7	2.0	2.0	2.0	2.0	2.0	2.0	1.4	1.4	1.4			0.0

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 Control D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
Feed Basic N2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.3			0.0
Feed K Factor	11.6	11.6	11.6	11.0	11.6	11.4	11.4	11.4	11.4	11.6	11.6	11.6	11.2	11.2	11.2			0.0
Cracked Feeds %	14.5	0.0	6.1	100.0	0.1	41.7	32.4	30.8	31.5	13.3	13.7	13.5	68.6	69.3	69.0			0.0
Conversion	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0			0.0
Alkylation																		
HF C3 Alkylate	39,688	19,843	28,107	71,426	25,375	44,553	140,666	138,723	139,532	33,673	33,673	33,673	38,498	20,313	27,886	323,952	237,928	273,751
HF C4 Alkylate	2	2	2	81,288	50,982	63,602	144,451	3,835	62,393	2	2	2	2	2	2	225,744	54,822	126,001
HF C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total HF Alkylate	39,690	19,845	28,109	152,714	76,357	108,155	285,117	142,559	201,925	33,675	33,675	33,675	38,500	20,315	27,888	549,696	292,750	399,752
H2SO4 C3 Alkylate	2	95	56	2	2	2	2	2	2	5,377	5,155	5,247	36,879	49,623	44,316	42,261	54,876	49,623
H2SO4 C4 Alkylate	101,694	61,586	78,289	88,478	59,762	71,721	428,109	388,292	404,874	58,871	59,093	59,000	126,784	114,039	119,347	803,937	682,773	733,230
H2SO4 C5 Alkylate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total H2SO4 Alkylate	101,696	61,681	78,345	88,480	59,764	71,722	428,111	388,294	404,875	64,248	64,248	64,248	163,663	163,663	163,663	846,198	737,649	782,853
Crude																		
Crude API	31.7	31.7	31.7	31.7	31.7	31.7	29.8	29.8	29.8	30.2	30.2	30.2	26.3	26.3	26.3			0.0
Feed Sulfur Wt%	0.9	0.9	0.9	1.4	1.4	1.4	1.6	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3			0.0
ENERGY BALANCE																		
Process Fuel (MMBTU/D)	514,191	502,561	507,404	1,006,810	1,050,719	1,032,434	3,416,946	3,313,652	3,356,668	588,231	577,604	582,030	988,426	956,667	969,893	6,514,603	6,401,204	6,448,428
Fuel for Steam Gen (MMBTU/D)	204,209	186,839	194,072	353,190	320,281	333,986	1,276,054	1,213,348	1,239,461	187,169	185,396	186,134	313,574	303,333	307,598	2,334,197	2,209,196	2,261,251
Fuel for Power (MMBTU/D)	106,359	99,947	102,617	179,133	173,265	175,709	650,879	636,696	642,602	120,640	119,208	119,804	196,579	191,618	193,684	1,253,590	1,220,733	1,234,416
Total Energy (MMBTU/D)	824,759	789,347	804,094	1,539,133	1,544,265	1,542,128	5,343,879	5,163,696	5,238,731	896,040	882,208	887,968	1,498,579	1,451,618	1,471,175	10,102,390	9,831,133	9,944,095
Total Energy (MBTU/Bbl Crd)	541	518	527	502	417	452	591	571	579	512	504	507	701	679	688	577	541	556

Appendix 2.

Prices

Appendix 2: Regional Prices

	PD 1 Reference 2022 US Model		PD 2 Reference 2022 US Model		PD 3 Reference 2022 US Model		PD 4/5 ex-CA Reference 2022 US Model		PD CA Reference 2022 US Model	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Refinery Input Prices	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL
PADD Crude	54.18	53.18	53.58	52.58	51.22	50.22	52.35	51.35	50.80	49.80
VGO HS	56.66	54.98	55.82	54.14	54.56	52.88	55.40	53.72	58.76	57.08
VGO LS	60.02	58.34	59.18	57.50	57.92	56.24	58.76	57.08	62.12	60.44
HS AR (A960)	48.50	47.50	49.30	48.30	48.50	47.50	48.50	47.50	48.50	47.50
LS AR (Alg)	52.50	51.50	53.30	52.30	52.50	51.50	52.50	51.50	52.50	51.50
Normal Butane	43.76	45.44	43.13	44.81	41.66	43.34	39.14	40.82	39.14	40.82
Isobutane	45.86	47.54	45.23	46.91	43.76	45.44	41.24	42.92	51.32	53.00
MTBE	89.71	81.31	88.03	79.63	85.51	77.11	88.87	80.47	93.91	85.51
Ethanol - E10	67.16	64.05	64.38	61.28	68.54	65.43	70.68	67.58	70.77	67.66
Ethanol - E20	67.16	64.05	64.38	61.28	68.54	65.43	70.68	67.58	70.77	67.66
Ethanol - E85	67.16	64.05	64.38	61.28	68.54	65.43	70.68	67.58	70.77	67.66
Reformer Feed	61.15	59.47	64.30	62.62	62.83	61.15	65.35	63.67	65.35	63.67
Methanol	35.28	38.22	33.18	36.12	32.13	35.07	30.03	32.97	33.18	36.12
Natural Gas (FOE)	52.92	57.33	49.77	54.18	48.20	52.61	45.05	49.46	49.77	54.18
Hydrogen (MSCF)	5.45	5.90	5.13	5.58	4.96	5.42	4.64	5.09	5.13	5.58
Pentanes Plus	56.36	60.56	55.73	59.93	54.26	58.46	51.74	55.94	61.82	66.02
Import CBOB 10%	71.33	66.08								
Import CBOB 20%	71.85	66.33								
Import RBOB 10%	74.60	69.34								
Import RBOB 20%	75.53	70.01								
Import Alkylate	81.31	72.43	80.04	71.30	77.94	69.07	82.14	73.27	85.73	74.53
Import Raffinate	59.23	65.16	58.15	64.01	56.68	62.54	60.80	68.90	58.78	70.45
Import Reformate	80.89	72.11	79.82	70.97	78.35	69.50	86.76	77.17	91.36	80.89
Import FCC Naphtha	68.99	67.39	67.94	66.28	66.47	64.81	72.41	71.31	73.76	73.83
Import Lt Naphtha	54.64	62.33	53.60	61.23	52.13	59.76	55.15	65.17	52.33	66.25
Import Hvy Naph	51.33	62.09	0.00	0.00	48.79	59.49	0.00	0.00	0.00	0.00
Isooctane	86.93	75.14	85.67	73.98	83.57	83.57	87.77	75.98	89.03	77.24
Isooctene	81.78	72.28	80.52	71.11	78.42	78.42	82.62	73.12	83.88	74.38
Refinery Output Prices	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL
Propane	35.82	37.50	35.19	36.87	33.72	35.40	31.20	32.88	37.92	39.60
Propylene	60.57	53.51	59.80	52.74	58.19	51.14	54.58	47.53	62.39	55.34
Normal Butane	43.51	45.19	42.88	44.56	41.41	43.09	38.89	40.57	38.89	40.57
Isobutane	45.61	47.29	44.98	46.66	43.51	45.19	40.99	42.67	51.07	52.75
PC Naphtha	61.15	59.47	64.30	62.62	62.83	61.15	65.35	63.67	65.35	63.67
PC Gasoil	62.20	65.14	62.83	65.77	61.36	64.30	66.40	69.34	65.56	68.50
Residual Fuel	49.00	45.00	49.00	45.00	48.00	44.00	46.00	42.00	46.00	42.00
Slurry	47.00	43.00	47.00	43.00	46.00	42.00	44.00	40.00	44.00	40.00
Asphalt & Wax	50.00	46.00	50.00	46.00	49.00	45.00	47.00	43.00	47.00	43.00
Gasoil	56.66	54.98	55.82	54.14	54.56	52.88	55.40	53.72	58.76	57.08
Lubes	69.18	68.18	68.58	67.58	66.22	65.22	67.35	66.35	65.80	64.80
Benzene	134.19	124.95	133.35	124.11	132.09	122.85	0.00	0.00	0.00	0.00
Toluene	104.78	95.54	103.94	94.70	102.68	93.44	0.00	0.00	0.00	0.00
Xylenes	105.65	97.25	104.81	96.41	103.55	95.15	0.00	0.00	0.00	0.00
Sulfur (STons)	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Coke (STon)	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
Clean Prod Terminal Imports										
CG Reg	70.92	65.88	69.87	64.83	68.40	63.36	0.00	0.00	0.00	0.00
Jet/Kero A (450ppm)	67.98	67.14	67.98	67.14	67.14	66.30	0.00	0.00	0.00	0.00
HSD Gr 76 (2000ppm)	63.57	66.51	64.20	67.14	62.73	65.67	0.00	0.00	0.00	0.00
LSD Gr 74 (500ppm)	65.88	68.40	66.09	68.61	65.04	67.56	0.00	0.00	0.00	0.00
ULSD (15 ppm)	67.14	69.66	67.56	70.08	66.30	68.82	0.00	0.00	0.00	0.00
Clean Prod Terminal Sales	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL	$/BBL
CG Reg	69.55	64.51	68.50	63.46	67.03	61.99	72.07	67.03	74.59	69.55
CG Prem	74.59	66.19	73.54	65.14	72.07	63.67	77.11	68.71	79.63	71.23
CG E10 Reg	69.55	64.51	68.50	63.46	67.03	61.99	72.07	67.03	74.59	69.55
CG E10 Prem	74.59	66.19	73.54	65.14	72.07	63.67	77.11	68.71	79.63	71.23
RFG E10 Reg	72.49	67.45	71.44	66.40	69.97	64.93	0.00	0.00	77.53	72.49
RFG E20 Reg	72.49	67.45	71.44	66.40	69.97	64.93	0.00	0.00	77.53	72.49
CG E20 Reg	69.55	64.51	68.50	63.46	67.03	61.99	72.07	67.03	74.59	69.55
E85 to CG	32.00	28.20	31.30	27.60	31.00	27.30	35.50	31.70	0.00	0.00
E85 to RFG	34.20	30.40	33.60	29.80	33.30	29.50	0.00	0.00	36.20	32.50
RFG E10 Prem	77.53	69.13	76.48	68.08	75.01	66.61	0.00	0.00	82.57	74.17
Jet/Kero A (450ppm)	66.61	65.77	66.61	65.77	65.77	64.93	69.13	68.29	69.13	68.29
HSD Gr 76 (2000ppm)	62.20	65.14	62.83	65.77	61.36	64.30	66.40	69.34	65.56	68.50
LSD Gr 74 (500ppm)	64.51	67.03	64.72	67.24	63.67	66.19	68.71	71.23	67.87	70.39
ULSD	65.77	68.29	66.19	68.71	64.93	67.45	69.97	72.49	69.13	71.65
CARB Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.81	73.33

Appendix 3.

Capital

Appendix 3: Capital Investment Summary

	REFERENCE CASE CAPEX VS 2004 CALIBRATION						CONTROL CASE A CAPEX VS 2004 CALIBRATION					
	PD1	PD2	PD3	PD4	PD5	TOTAL	PD1	PD2	PD3	PD4	PD5	TOTAL
New Capacity (MBPD)	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD
Crude Tower	0.00	420.66	1119.62	41.37	202.46	1,784	0.00	0.00	721.93	41.37	202.46	966
Vacuum Tower	0.00	187.88	429.57	64.76	29.54	712	0.00	0.18	269.21	69.60	29.54	369
Sats Gas Plant	35.37	0.00	106.21	22.87	20.64	185	6.82	0.00	71.69	23.83	16.72	119
Unsats Gas Plant	7.25	0.71	121.49	0.00	12.01	141	7.22	0.00	68.16	0.00	0.00	75
FCC DeC5 Tower	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
FCC	0.00	0.00	393.86	0.00	62.89	457	0.00	0.00	218.58	0.00	0.00	219
FCC Splitter	195.91	5.82	238.35	0.00	20.25	460	195.88	0.00	141.07	0.00	0.00	337
Hydrocracker	0.00	0.00	0.00	221.76	0.00	222	0.00	0.00	0.00	218.34	0.00	218
Delayed Coker	0.00	0.00	90.76	0.00	0.00	91	0.00	0.00	0.00	0.00	0.00	0
Visbreaker	0.00	0.00	0.00	0.00	0.00	0	48.00	0.00	0.00	0.00	0.00	48
Thermal Naphtha Splitter	0.00	4.35	16.31	0.00	3.90	25	0.00	0.00	5.62	0.00	2.69	8
CRU Reformer	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
SRU Reformer	0.00	0.00	0.00	0.00	29.71	30	0.00	0.00	0.00	0.00	32.48	32
BTX Reformer	13.79	14.51	46.21	0.00	0.00	75	13.79	15.64	46.50	0.00	0.00	76
C4 Isomerization	0.00	0.00	0.00	0.00	18.14	18	0.00	0.00	0.00	0.00	14.14	14
C5/C6 Isomerization	15.65	0.00	0.00	0.00	0.00	16	14.25	0.00	0.00	0.00	0.00	14
HF Alkylation	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
H2SO4 Alkylation	42.05	0.00	141.27	21.39	36.07	241	20.28	0.00	90.50	6.34	10.37	127
Dimersol	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Cat Poly	0.00	0.00	0.00	0.00	0.00	0	8.65	0.00	0.00	0.00	0.00	9
DHT - Total	166.05	0.00	932.29	243.51	31.85	1,374	172.70	0.00	839.18	246.30	31.85	1,290
DHT 2nd RCT - Total	521.44	638.44	2172.67	278.12	44.35	3,655	532.63	691.93	2103.31	274.04	59.67	3,662
DHT Arom Saturation	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
NHT - Total Fd	20.84	0.00	0.00	42.66	0.00	64	5.29	0.00	0.00	40.79	0.00	46
CGH - Generic	12.26	148.45	582.46	47.99	0.00	791	14.04	100.45	607.85	55.58	0.00	778
CGH - Olefin Sat'n	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
FCCU Fd HDT	171.15	0.00	0.00	84.10	0.00	255	170.82	0.00	0.00	50.00	60.40	281
LSR Splitter	0.00	81.80	99.00	88.38	7.51	277	0.00	97.37	99.00	88.38	7.51	292
LSR Bz Saturator	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Reformate Saturator	25.09	9.00	9.85	0.00	50.00	94	16.48	9.00	9.13	0.00	50.00	85
Reformate Splitter	75.27	27.00	29.54	0.00	150.00	282	49.43	27.00	27.39	0.00	150.00	254
SDA	0.00	40.20	0.00	4.08	0.00	44	0.00	40.20	0.00	4.08	0.00	44
MTBE	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
TAME	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Hydrogen Plant - Total MSCF	469.85	693.41	2246.06	784.67	6.66	4,201	476.99	727.20	2281.59	765.28	26.80	4,278
Lube Unit	0.00	3.96	109.51	0.00	56.25	170	0.00	3.96	109.51	0.00	56.25	170
Sulfur Plant	0.00	0.00	4441.74	1011.18	533.29	5,986	0.00	0.00	3040.18	955.54	437.27	4,433
Merox Jet	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Merox Diesel	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
BTX Reformer - Tower feed	4.78	4.08	18.58	0.00	0.00	27	4.78	4.45	18.58	0.00	0.00	28
BTX Reformer - Extract feed	8.73	11.53	44.46	0.00	0.00	65	9.27	12.36	44.46	0.00	0.00	66

Appendix 3: Capital Investment Summary

	REFERENCE CASE CAPEX VS 2004 CALIBRATION						CONTROL CASE A CAPEX VS 2004 CALIBRATION					
	PD1	PD2	PD3	PD4	PD5	TOTAL	PD1	PD2	PD3	PD4	PD5	TOTAL
New Capacity ($MM)	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM
Crude Tower	0.0	994.8	1919.1	154.2	557.8	3625.9	0.0	0.0	1254.1	154.2	557.8	1966.0
Vacuum Tower	0.0	527.1	943.2	194.1	135.4	1799.8	0.0	0.0	628.6	279.3	135.4	1043.3
Sats Gas Plant	156.4	0.0	313.1	112.4	111.8	693.7	44.2	0.0	210.3	115.2	74.6	444.3
Unsats Gas Plant	76.0	0.0	598.5	0.0	101.5	775.9	75.8	0.0	338.3	0.0	0.0	414.0
FCC DeC5 Tower	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FCC	0.0	0.0	2719.9	0.0	786.4	3506.4	0.0	0.0	1440.3	0.0	0.0	1440.3
FCC Splitter	141.9	6.4	116.3	0.0	15.6	280.2	141.8	0.0	69.2	0.0	0.0	211.1
Hydrocracker	0.0	0.0	0.0	5864.0	0.0	5864.0	0.0	0.0	0.0	5799.5	0.0	5799.5
Delayed Coker	0.0	0.0	1261.2	0.0	0.0	1261.2	0.0	0.0	0.0	0.0	0.0	0.0
Visbreaker	0.0	0.0	0.0	0.0	0.0	0.0	170.0	0.0	0.0	0.0	0.0	170.0
Thermal Naphtha Splitter	0.0	5.4	9.3	0.0	5.8	20.5	0.0	0.0	4.9	0.0	4.7	9.5
CRU Reformer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SRU Reformer	0.0	0.0	0.0	0.0	180.1	180.1	0.0	0.0	0.0	0.0	252.2	252.2
BTX Reformer	277.0	245.4	500.6	0.0	0.0	1023.0	277.0	256.5	502.5	0.0	0.0	1036.0
C4 Isomerization	0.0	0.0	0.0	0.0	189.5	189.5	0.0	0.0	0.0	0.0	166.9	166.9
C5/C6 Isomerization	197.9	0.0	0.0	0.0	0.0	197.9	134.3	0.0	0.0	0.0	0.0	134.3
HF Alkylation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H2SO4 Alkylation	724.8	0.0	1578.2	342.6	637.4	3283.1	352.7	0.0	1021.1	115.8	177.0	1666.6
Dimersol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cat Poly	0.0	0.0	0.0	0.0	0.0	0.0	71.8	0.0	0.0	0.0	0.0	71.8
DHT - Total	1713.8	0.0	6289.0	2366.2	401.2	10770.1	1755.6	0.0	5599.5	2382.8	401.2	10139.2
DHT 2nd RCT - Total	3777.0	3974.4	10383.0	1910.0	351.3	20395.7	3826.6	4318.2	10069.7	1892.7	421.7	20528.8
DHT Arom Saturation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NHT - Total Fd	122.2	0.0	0.0	231.4	0.0	353.5	52.6	0.0	0.0	225.1	0.0	277.6
CGH - Generic	96.9	717.7	2199.3	273.3	0.0	3287.2	105.3	518.0	2300.5	299.1	0.0	3223.0
CGH - Olefin Sat'n	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FCCU Fd HDT	1995.4	0.0	0.0	921.2	0.0	2916.6	1993.0	0.0	0.0	572.4	794.6	3360.0
LSR Splitter	0.0	59.9	52.0	68.0	8.6	188.5	0.0	66.5	52.0	68.0	8.6	195.1
LSR Bz Saturator	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reformate Saturator	161.3	55.9	45.9	0.0	317.5	580.6	122.7	55.9	43.7	0.0	317.5	539.9
Reformate Splitter	94.6	33.3	27.3	0.0	166.1	321.3	55.7	33.3	26.1	0.0	166.1	281.2
SDA	0.0	260.3	0.0	46.1	0.0	306.5	0.0	260.3	0.0	46.1	0.0	306.5
MTBE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen Plant - Total MSCF	1724.1	2158.4	5408.8	2657.5	40.1	11988.8	1743.4	2276.2	5503.3	2608.8	112.3	12244.0
Lube Unit	0.0	181.3	2946.7	0.0	2280.9	5408.9	0.0	181.3	2946.7	0.0	2280.9	5408.9
Sulfur Plant	0.0	0.0	16.1	9.3	6.7	32.0	0.0	0.0	12.8	9.0	5.9	27.7
Merox Jet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Merox Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BTX Reformer - Tower feed	15.2	11.8	31.1	0.0	0.0	58.1	15.2	12.5	31.1	0.0	0.0	58.8
BTX Reformer - Extract feed	64.9	66.9	183.1	0.0	0.0	315.0	67.5	70.0	183.1	0.0	0.0	320.6
Total Capital ($MM)	**11,339.3**	**9,299.0**	**37,541.8**	**15,150.5**	**6,293.5**	**79,624**	**11,005.2**	**8,048.6**	**32,237.9**	**14,568.0**	**5,877.2**	**71,737**
Total Fixed Costs Ex-Depreciation ($	**330.0**	**275.0**	**1,143.4**	**437.7**	**197.8**	**2,384**	**321.1**	**238.7**	**979.7**	**421.6**	**182.2**	**2,143**

Appendix 3: Capital Investment Summary

New Capacity (MBPD)	CONTROL CASE B CAPEX VS 2004 CALIBRATION						CONTROL CASE C CAPEX VS 2004 CALIBRATION					
	PD1 MBPD	PD2 MBPD	PD3 MBPD	PD4 MBPD	PD5 MBPD	TOTAL MBPD	PD1 MBPD	PD2 MBPD	PD3 MBPD	PD4 MBPD	PD5 MBPD	TOTAL MBPD
Crude Tower	0.00	0.00	652.50	0.00	201.87	854	0.00	218.62	1060.32	41.37	202.46	1,523
Vacuum Tower	0.00	0.00	229.82	53.97	29.22	313	0.00	97.73	400.76	68.49	29.54	597
Sats Gas Plant	43.91	0.00	82.22	0.70	6.81	134	35.23	0.00	96.49	24.55	20.57	177
Unsats Gas Plant	7.40	0.00	75.06	0.00	0.27	83	7.61	0.00	115.85	0.00	12.05	136
FCC DeC5 Tower	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
FCC	0.00	0.00	243.09	0.00	0.00	243	0.00	0.00	375.52	0.00	59.11	435
FCC Splitter	195.81	0.00	156.50	0.00	0.00	352	196.54	0.00	228.55	0.00	19.19	444
Hydrocracker	0.00	0.00	0.00	216.74	0.00	217	0.00	0.00	0.00	224.38	0.00	224
Delayed Coker	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	79.38	0.00	0.00	79
Visbreaker	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Thermal Naphtha Splitter	0.00	0.00	5.62	0.00	4.87	10	0.00	0.43	14.97	0.00	3.90	19
CRU Reformer	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
SRU Reformer	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	32.33	32
BTX Reformer	13.97	15.64	46.21	0.00	0.00	76	13.79	14.51	46.21	0.00	0.00	75
C4 Isomerization	0.00	0.00	0.00	0.00	15.36	15	0.00	0.00	0.00	0.00	18.12	18
C5/C6 Isomerization	0.00	0.00	0.00	0.00	0.00	0	19.99	0.00	0.00	0.00	0.00	20
HF Alkylation	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
H2SO4 Alkylation	69.41	0.00	95.12	13.60	6.83	185	42.42	0.00	134.53	23.03	31.34	231
Dimersol	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Cat Poly	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
DHT - Total	176.15	0.00	915.26	242.59	31.85	1,366	173.27	0.00	920.48	254.37	31.85	1,380
DHT 2nd RCT - Total	536.29	694.66	2156.03	270.04	68.74	3,726	527.70	612.98	2161.17	287.61	44.35	3,634
DHT Arom Saturation	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
NHT - Total Fd	34.89	0.00	0.00	53.60	0.00	88	21.82	0.00	0.00	41.55	0.00	63
CGH - Generic	23.03	99.39	531.80	58.18	0.00	712	8.06	164.14	594.59	32.55	0.00	799
CGH - Olefin Sat'n	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
FCCU Fd HDT	169.84	0.00	0.00	50.00	0.00	220	178.29	0.00	0.00	55.00	0.00	233
LSR Splitter	0.00	99.00	99.00	88.38	7.48	294	0.00	99.00	99.00	88.38	7.51	294
LSR Bz Saturator	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Reformate Saturator	9.00	0.00	14.95	0.00	0.00	24	22.93	9.00	9.53	0.00	50.00	91
Reformate Splitter	27.00	0.00	44.84	0.00	0.00	72	68.79	27.00	28.60	0.00	150.00	274
SDA	0.00	40.20	0.00	4.08	0.00	44	0.00	40.20	0.00	4.08	0.00	44
MTBE	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
TAME	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Hydrogen Plant - Total MSCF	468.05	774.31	2498.96	801.26	89.67	4,632	484.08	677.28	2352.84	802.15	3.41	4,320
Lube Unit	0.00	3.96	109.51	0.00	56.25	170	0.00	3.96	109.51	0.00	56.25	170
Sulfur Plant	0.00	0.00	3506.96	912.81	522.36	4,942	0.00	0.00	4343.99	970.32	528.53	5,843
Merox Jet	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
Merox Diesel	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0
BTX Reformer - Tower feed	4.83	4.45	18.58	0.00	0.00	28	4.78	4.08	18.58	0.00	0.00	27
BTX Reformer - Extract feed	8.83	12.36	44.46	0.00	0.00	66	8.73	11.53	44.46	0.00	0.00	65

Appendix 3: Capital Investment Summary

	CONTROL CASE B CAPEX VS 2004 CALIBRATION						CONTROL CASE C CAPEX VS 2004 CALIBRATION					
	PD1	PD2	PD3	PD4	PD5	TOTAL	PD1	PD2	PD3	PD4	PD5	TOTAL
New Capacity ($MM)	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM	$MM
Crude Tower	0.0	0.0	1180.2	0.0	556.8	1737.0	0.0	509.1	1857.5	154.2	557.8	3078.5
Vacuum Tower	0.0	0.0	520.5	176.2	134.6	831.3	0.0	308.1	909.1	276.9	135.4	1629.5
Sats Gas Plant	209.5	0.0	249.6	10.5	43.5	513.2	156.1	0.0	274.8	117.3	111.5	659.7
Unsats Gas Plant	76.9	0.0	358.4	0.0	0.0	435.3	78.2	0.0	546.9	0.0	101.6	726.7
FCC DeC5 Tower	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FCC	0.0	0.0	1688.3	0.0	0.0	1688.3	0.0	0.0	2495.0	0.0	760.1	3255.1
FCC Splitter	141.8	0.0	78.3	0.0	0.0	220.2	142.1	0.0	113.4	0.0	15.1	270.7
Hydrocracker	0.0	0.0	0.0	5769.2	0.0	5769.2	0.0	0.0	0.0	5913.4	0.0	5913.4
Delayed Coker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1140.6	0.0	0.0	1140.6
Visbreaker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Thermal Naphtha Splitter	0.0	0.0	4.9	0.0	6.6	11.5	0.0	1.4	8.8	0.0	5.8	16.0
CRU Reformer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SRU Reformer	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	251.5	251.5
BTX Reformer	279.0	256.5	500.6	0.0	0.0	1036.2	277.0	245.4	500.6	0.0	0.0	1023.0
C4 Isomerization	0.0	0.0	0.0	0.0	174.1	174.1	0.0	0.0	0.0	0.0	189.4	189.4
C5/C6 Isomerization	0.0	0.0	0.0	0.0	0.0	0.0	224.2	0.0	0.0	0.0	0.0	224.2
HF Alkylation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
H2SO4 Alkylation	1168.2	0.0	1060.0	243.9	129.4	2601.6	729.6	0.0	1521.3	362.2	533.9	3147.0
Dimersol	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cat Poly	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DHT - Total	1777.1	0.0	6142.5	2360.7	401.2	10681.5	1759.2	0.0	6164.1	2430.5	401.2	10755.0
DHT 2nd RCT - Total	3842.8	4328.7	10279.4	1875.6	537.7	20864.1	3804.8	3807.3	10349.2	1949.8	351.3	20262.5
DHT Arom Saturation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NHT - Total Fd	219.0	0.0	0.0	266.2	0.0	485.3	125.7	0.0	0.0	227.6	0.0	353.3
CGH - Generic	142.8	514.6	1996.9	307.7	0.0	2962.0	74.8	819.0	2227.3	215.3	0.0	3336.5
CGH - Olefin Sat'n	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FCCU Fd HDT	1986.0	0.0	0.0	572.4	0.0	2558.4	2046.1	0.0	0.0	607.0	0.0	2653.1
LSR Splitter	0.0	67.1	52.0	68.0	8.6	195.8	0.0	67.1	52.0	68.0	8.6	195.8
LSR Bz Saturator	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reformate Saturator	65.0	0.0	60.2	0.0	0.0	125.2	152.1	55.9	45.0	0.0	317.5	570.5
Reformate Splitter	38.8	0.0	35.0	0.0	0.0	73.8	79.9	33.3	26.8	0.0	166.1	306.1
SDA	0.0	260.3	0.0	46.1	0.0	306.5	0.0	260.3	0.0	46.1	0.0	306.5
MTBE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen Plant - Total MSCF	1719.2	2424.8	6015.7	2741.9	328.6	13230.2	1762.6	2121.1	5692.6	2744.1	0.0	12320.4
Lube Unit	0.0	181.3	2946.7	0.0	2280.9	5408.9	0.0	181.3	2946.7	0.0	2280.9	5408.9
Sulfur Plant	0.0	0.0	14.0	8.7	6.6	29.3	0.0	0.0	15.9	9.0	6.6	31.5
Merox Jet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Merox Diesel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BTX Reformer - Tower feed	15.3	12.5	31.1	0.0	0.0	58.9	15.2	11.8	31.1	0.0	0.0	58.1
BTX Reformer - Extract feed	65.4	70.0	183.1	0.0	0.0	318.5	64.9	66.9	183.1	0.0	0.0	315.0
Total Capital ($MM)	**11,746.7**	**8,115.8**	**33,397.7**	**14,447.3**	**4,608.6**	**72,316**	**11,492.6**	**8,488.0**	**37,101.9**	**15,121.5**	**6,194.3**	**78,398**
Total Fixed Costs Ex-Depreciation (	**341.2**	**240.3**	**1,015.1**	**418.4**	**144.0**	**2,159**	**333.7**	**251.6**	**1,131.0**	**437.5**	**194.4**	**2,348**

Appendix 3: Capital Investment Summary

	CONTROL CASE D CAPEX VS 2004 CALIBRATION					
	PD1	PD2	PD3	PD4	PD5	TOTAL
New Capacity (MBPD)	MBPD	MBPD	MBPD	MBPD	MBPD	MBPD
Crude Tower	0.00	208.27	1062.08	41.37	202.46	1,514
Vacuum Tower	0.00	93.11	394.61	69.08	29.54	586
Sats Gas Plant	42.84	0.00	114.79	24.51	23.40	206
Unsats Gas Plant	7.68	0.00	126.63	0.00	21.63	156
FCC DeC5 Tower	0.00	0.00	0.00	0.00	0.00	0
FCC	0.00	0.00	431.95	0.00	83.09	515
FCC Splitter	196.53	0.00	249.09	0.00	34.84	480
Hydrocracker	0.00	0.00	0.00	223.61	0.00	224
Delayed Coker	0.00	0.00	79.72	0.00	0.00	80
Visbreaker	0.00	0.00	0.00	0.00	0.00	0
Thermal Naphtha Splitter	0.00	0.23	15.01	0.00	4.48	20
CRU Reformer	0.00	0.00	0.00	0.00	0.00	0
SRU Reformer	0.00	0.00	0.00	0.00	32.26	32
BTX Reformer	13.79	14.51	46.21	0.00	0.00	75
C4 Isomerization	0.00	0.00	0.00	0.00	21.20	21
C5/C6 Isomerization	19.85	0.00	0.00	0.00	0.00	20
HF Alkylation	0.00	0.00	0.00	0.00	0.00	0
H2SO4 Alkylation	60.26	0.00	148.29	22.85	42.26	274
Dimersol	0.00	0.00	0.00	0.00	0.00	0
Cat Poly	0.00	0.00	0.00	0.00	0.00	0
DHT - Total	175.91	0.00	935.71	241.08	31.85	1,385
DHT 2nd RCT - Total	530.01	634.52	2172.40	276.14	50.59	3,664
DHT Arom Saturation	0.00	0.00	0.00	0.00	0.00	0
NHT - Total Fd	22.10	0.00	0.00	41.85	0.00	64
CGH - Generic	5.34	145.47	527.18	48.28	0.00	726
CGH - Olefin Sat'n	0.00	0.00	0.00	0.00	0.00	0
FCCU Fd HDT	178.15	0.00	0.00	63.54	0.00	242
LSR Splitter	0.00	99.00	99.00	88.38	7.51	294
LSR Bz Saturator	0.00	0.00	0.00	0.00	0.00	0
Reformate Saturator	9.84	9.00	40.97	0.00	50.00	110
Reformate Splitter	29.51	27.00	122.92	0.00	150.00	329
SDA	0.00	40.20	0.00	4.08	0.00	44
MTBE	0.00	0.00	0.00	0.00	0.00	0
TAME	0.00	0.00	0.00	0.00	0.00	0
Hydrogen Plant - Total MSCF	487.26	702.49	2356.85	795.86	9.76	4,352
Lube Unit	0.00	3.96	109.51	0.00	56.25	170
Sulfur Plant	0.00	0.00	4347.13	984.42	595.89	5,927
Merox Jet	0.00	0.00	0.00	0.00	0.00	0
Merox Diesel	0.00	0.00	0.00	0.00	0.00	0
BTX Reformer - Tower feed	4.78	4.08	18.58	0.00	0.00	27
BTX Reformer - Extract feed	8.73	11.53	44.46	0.00	0.00	65

Appendix 3: Capital Investment Summary

	CONTROL CASE D CAPEX VS 2004 CALIBRATION					
	PD1	PD2	PD3	PD4	PD5	TOTAL
New Capacity ($MM)	$MM	$MM	$MM	$MM	$MM	$MM
Crude Tower	0.0	494.5	1859.3	154.2	557.8	3065.8
Vacuum Tower	0.0	300.3	901.7	278.2	135.4	1615.6
Sats Gas Plant	206.4	0.0	328.0	117.2	120.5	772.1
Unsats Gas Plant	78.6	0.0	613.5	0.0	190.5	882.7
FCC DeC5 Tower	0.0	0.0	0.0	0.0	0.0	0.0
FCC	0.0	0.0	2861.6	0.0	916.6	3778.2
FCC Splitter	142.1	0.0	119.4	0.0	28.5	290.1
Hydrocracker	0.0	0.0	0.0	5898.9	0.0	5898.9
Delayed Coker	0.0	0.0	1144.3	0.0	0.0	1144.3
Visbreaker	0.0	0.0	0.0	0.0	0.0	0.0
Thermal Naphtha Splitter	0.0	0.9	8.8	0.0	6.3	16.1
CRU Reformer	0.0	0.0	0.0	0.0	0.0	0.0
SRU Reformer	0.0	0.0	0.0	0.0	251.2	251.2
BTX Reformer	277.0	245.4	500.6	0.0	0.0	1023.0
C4 Isomerization	0.0	0.0	0.0	0.0	250.3	250.3
C5/C6 Isomerization	223.4	0.0	0.0	0.0	0.0	223.4
HF Alkylation	0.0	0.0	0.0	0.0	0.0	0.0
H2SO4 Alkylation	1050.6	0.0	1669.7	360.0	717.9	3798.2
Dimersol	0.0	0.0	0.0	0.0	0.0	0.0
Cat Poly	0.0	0.0	0.0	0.0	0.0	0.0
DHT - Total	1775.6	0.0	6303.1	2351.6	401.2	10831.6
DHT 2nd RCT - Total	3815.1	3959.3	10382.3	1901.6	380.9	20439.2
DHT Arom Saturation	0.0	0.0	0.0	0.0	0.0	0.0
NHT - Total Fd	126.7	0.0	0.0	228.6	0.0	355.3
CGH - Generic	58.1	708.8	1986.2	274.3	0.0	3027.5
CGH - Olefin Sat'n	0.0	0.0	0.0	0.0	0.0	0.0
FCCU Fd HDT	2045.1	0.0	0.0	775.4	0.0	2820.5
LSR Splitter	0.0	67.1	52.0	68.0	8.6	195.8
LSR Bz Saturator	0.0	0.0	0.0	0.0	0.0	0.0
Reformate Saturator	68.9	55.9	170.5	0.0	317.5	612.7
Reformate Splitter	40.9	33.3	92.6	0.0	166.1	332.9
SDA	0.0	260.3	0.0	46.1	0.0	306.5
MTBE	0.0	0.0	0.0	0.0	0.0	0.0
TAME	0.0	0.0	0.0	0.0	0.0	0.0
Hydrogen Plant - Total MSCF	1771.1	2218.7	5699.8	2685.5	53.2	12428.3
Lube Unit	0.0	181.3	2946.7	0.0	2280.9	5408.9
Sulfur Plant	0.0	0.0	15.9	9.1	7.1	32.1
Merox Jet	0.0	0.0	0.0	0.0	0.0	0.0
Merox Diesel	0.0	0.0	0.0	0.0	0.0	0.0
BTX Reformer - Tower feed	15.2	11.8	31.1	0.0	0.0	58.1
BTX Reformer - Extract feed	64.9	66.9	183.1	0.0	0.0	315.0
Total Capital ($MM)	**11,759.7**	**8,604.6**	**37,870.5**	**15,148.9**	**6,790.5**	**80,174**
Total Fixed Costs Ex-Depreciation (	**342.0**	**255.3**	**1,155.3**	**438.2**	**212.2**	**2,403**

Appendix 4.

Gasoline Quality by Regional Production

Appendix 4: Mogas Quality Produced by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	662,688	581,093	615,072	324,324	321,304	322,562	608,683	697,810	660,694	0	0	0	822,461	806,469	813,129	2,418,156	2,406,676	2,411,457
Ethanol BPD	28,512	34,841	32,205	24,265	27,617	26,221	101	1,283	791	0	0	0	47,545	45,946	46,612	100,424	109,687	105,830
RVP	6.8	13.4	10.4	6.5	12.8	10.2	6.9	11.2	9.5	0.0	0.0	0.0	6.8	11.5	9.5	6.8	12.0	9.8
Sulfur ppm	91	118	106	100	100	100	115	115	115	0	0	0	45	45	45	82	90	87
Density	259.9	252.6	255.9	264.5	251.5	257.1	257.2	251.2	253.5	0.0	0.0	0.0	263.9	259.5	261.4	261.2	254.4	257.3
R+M/2	87.0	87.0	87.0	91.6	87.0	88.9	89.3	87.0	87.9	0.0	0.0	0.0	87.0	87.0	87.0	88.2	87.0	87.5
Aromatics	21.9	18.5	20.0	20.9	18.2	19.3	19.1	17.7	18.2	0.0	0.0	0.0	23.7	25.0	24.4	21.6	20.4	20.9
Benzene	0.65	0.75	0.71	0.84	0.73	0.77	0.64	0.61	0.62	0.00	0.00	0.00	1.18	1.18	1.18	0.85	0.85	0.85
Olefins	9.8	11.6	10.8	12.2	11.4	11.7	12.4	11.2	11.6	0.0	0.0	0.0	6.0	6.0	6.0	9.5	9.6	9.5
Oxygen (wt%)	2.571	2.653	2.616	2.700	3.262	3.020	2.100	2.100	2.100	0.000	0.000	0.000	3.576	3.576	3.576	2.817	2.891	2.859
E200	54	60	57	49	67	60	58	64	62	0	0	0	51	51	51	53	59	57
E300	76	76	76	94	94	94	83	83	83	0	0	0	92	92	92	86	86	86
T10	138	97	115	140	100	117	138	111	121	0	0	0	138	108	121	138	105	119
T50	191	180	185	202	164	180	184	172	176	0	0	0	197	197	197	193	181	186
T90	360	360	360	280	280	280	329	329	329	0	0	0	290	290	290	318	317	317
DVI	1,141	1,045	1,088	1,097	924	996	1,087	1,010	1,039	0	0	0	1,089	1,043	1,062	1,104	1,018	1,054
V/L	147	110	126	150	110	127	145	120	130	0	0	0	148	122	133	147	117	130
Energy (MMBtu/Bbl)	5.082	4.935	5.001	5.049	4.850	4.933	5.142	5.070	5.097	0.000	0.000	0.000	5.147	5.033	5.081	5.115	4.995	5.045
MTBE (wt%)	0.989	0.385	0.660	0.000	0.000	0.000	2.091	2.028	2.052	0.000	0.000	0.000	0.000	0.000	0.000	0.788	0.673	0.722
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.003	0.003	0.003	0.000	0.000	0.000	0.003	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Ethanol (wt%)	1.580	2.266	1.953	2.700	3.262	3.020	0.006	0.070	0.045	0.000	0.000	0.000	3.576	3.576	3.576	2.028	2.216	2.136
VOC Reduction	28.9			30.1			30.9			0.0						29.9 (voc,nox,tox ex-CA)		
NOX Reduction	10.1	9.4	9.7	9.4	9.9	9.7	8.4	9.8	9.2	0.0	0.0	0.0				9.3	9.7	9.5
Toxics Reduction	33.7	26.2	29.6	29.1	27.2	28.0	36.1	30.9	32.9	0.0	0.0	0.0				33.7	28.5	30.6
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0					0.0 (voc,nox,tox ex-CA)		
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
RFG Prem E10																		
Total BPD	88,251	171,613	136,898	50,600	50,144	50,334	131,386	49,101	83,368	0	0	0	160,122	166,191	163,663	430,359	437,048	434,263
Ethanol BPD	6,247	0	2,601	3,716	4,725	4,305	1,270	101	588	0	0	0	8,100	9,699	9,033	19,333	14,525	16,528
RVP	6.4	13.5	11.6	6.4	13.7	10.6	6.9	11.4	8.4	0.0	0.0	0.0	6.8	11.5	9.6	6.7	12.5	10.1
Sulfur ppm	91	90	91	76	64	69	37	83	53	0	0	0	45	45	45	56	69	64
Density	254.0	258.1	257.0	259.6	256.9	258.1	253.0	248.2	251.4	0.0	0.0	0.0	258.0	253.2	255.2	255.9	255.0	255.4
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.2	92.2
Aromatics	7.2	22.4	18.4	13.4	19.3	16.9	11.1	6.9	9.6	0.0	0.0	0.0	10.5	12.7	11.8	10.3	16.6	14.0
Benzene	0.23	0.53	0.45	0.50	0.80	0.68	0.36	0.22	0.31	0.00	0.00	0.00	1.18	1.18	1.18	0.65	0.77	0.72
Olefins	10.2	17.5	15.5	8.0	8.6	8.4	8.4	8.2	8.4	0.0	0.0	0.0	6.0	5.9	5.9	7.8	11.0	9.7
Oxygen (wt%)	2.700	3.500	3.288	2.700	3.500	3.163	2.340	2.340	2.340	0.000	0.000	0.000	3.576	3.576	3.576	2.920	3.402	3.202
E200	50	58	56	50	53	52	57	61	58	0	0	0	51	51	51	53	55	54
E300	76	76	76	94	94	94	83	83	83	0	0	0	92	92	92	86	85	85
T10	141	96	108	141	94	114	138	109	128	0	0	0	138	108	121	139	102	117
T50	199	183	187	200	194	197	186	178	183	0	0	0	197	197	197	194	189	191
T90	360	360	360	280	280	280	329	329	329	0	0	0	290	290	290	315	321	319
DVI	1,168	1,053	1,084	1,093	1,004	1,041	1,094	1,028	1,071	0	0	0	1,089	1,043	1,062	1,107	1,041	1,068
V/L	150	110	121	151	110	127	146	120	137	0	0	0	148	123	133	148	116	129
Energy (MMBtu/Bbl)	4.942	5.053	5.023	4.998	4.887	4.934	4.996	4.949	4.980	0.000	0.000	0.000	4.980	4.865	4.912	4.979	4.951	4.963
MTBE (wt%)	0.021	3.490	2.570	0.000	0.000	0.000	1.963	2.226	2.052	0.000	0.000	0.000	0.000	0.000	0.000	0.597	1.631	1.203
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.019	0.010	0.012	0.000	0.000	0.000	0.013	0.035	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.008	0.008
Ethanol (wt%)	2.660	0.000	0.706	2.700	3.500	3.163	0.365	0.079	0.268	0.000	0.000	0.000	3.576	3.576	3.576	2.315	1.763	1.992
VOC Reduction	33.2	0.0		32.2	0.0		32.3	0.0		0.0	0.0					32.6 (voc,nox,tox ex-CA)		
NOX Reduction	14.6	5.0	7.5	14.8	13.1	13.8	16.6	15.4	16.2	0.0	0.0	0.0				15.6	8.4	11.4
Toxics Reduction	39.5	28.9	31.7	36.5	22.9	28.6	43.3	37.7	41.4	0.0	0.0	0.0				40.8	29.4	34.1

Appendix 4: Mogas Quality Produced by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	750,939	752,706	751,970	374,924	371,449	372,896	740,070	746,910	744,062	0	0	0	982,583	972,660	976,792	2,848,515	2,843,725	2,845,719
Ethanol BPD	34,759	34,841	34,807	27,981	32,342	30,526	1,371	1,384	1,379	0	0	0	55,645	55,645	55,645	119,757	124,213	122,357
RVP	6.8	13.4	10.6	6.5	12.9	10.2	6.9	11.2	9.4	0.0	0.0	0.0	6.8	11.5	9.5	6.8	12.1	9.9
Sulfur ppm	91	112	103	97	95	96	101	113	108	0	0	0	45	45	45	78	87	83
Density	259.2	253.8	256.1	263.8	252.3	257.2	256.4	251.0	253.3	0.0	0.0	0.0	262.9	258.5	260.4	260.4	254.5	257.0
R+M/2	87.7	88.4	88.1	91.8	87.8	89.5	90.0	87.4	88.5	0.0	0.0	0.0	87.7	87.7	87.7	88.8	87.8	88.2
Aromatics	20.2	19.4	19.7	19.9	18.3	19.0	17.7	17.0	17.2	0.0	0.0	0.0	21.5	22.9	22.3	19.9	19.8	19.9
Benzene	0.60	0.70	0.66	0.79	0.74	0.76	0.59	0.59	0.59	0.00	0.00	0.00	1.18	1.18	1.18	0.82	0.84	0.83
Olefins	9.9	13.0	11.7	11.6	11.0	11.3	11.7	11.0	11.3	0.0	0.0	0.0	6.0	6.0	6.0	9.2	9.8	9.6
Oxygen (wt%)	2.586	2.849	2.738	2.700	3.295	3.039	2.142	2.116	2.127	0.000	0.000	0.000	3.576	3.576	3.576	2.832	2.969	2.911
E200	54	59	57	49	65	59	58	64	61	0	0	0	51	51	51	53	59	56
E300	76	76	76	94	94	94	83	83	83	0	0	0	92	92	92	86	86	86
T10	138	96	114	140	100	117	138	110	122	0	0	0	138	108	121	139	105	119
T50	192	181	185	202	168	182	184	172	177	0	0	0	197	197	197	193	182	187
T90	360	360	360	280	280	280	329	329	329	0	0	0	290	290	290	317	318	318
DVI	1,144	1,047	1,088	1,097	935	1,003	1,088	1,011	1,043	0	0	0	1,089	1,043	1,062	1,104	1,022	1,056
V/L	147	110	125	150	110	127	145	120	130	0	0	0	148	122	133	147	117	130
Energy (MMBtu/Bbl)	5.065	4.962	5.005	5.042	4.855	4.933	5.116	5.062	5.084	0.000	0.000	0.000	5.120	5.004	5.053	5.094	4.988	5.033
MTBE (wt%)	0.877	1.105	1.009	0.000	0.000	0.000	2.069	2.041	2.052	0.000	0.000	0.000	0.000	0.000	0.000	0.759	0.820	0.795
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.004	0.004	0.004	0.000	0.000	0.000	0.004	0.005	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.002
Ethanol (wt%)	1.704	1.740	1.725	2.700	3.295	3.039	0.069	0.070	0.070	0.000	0.000	0.000	3.576	3.576	3.576	2.071	2.147	2.114
VOC Reduction	29.4			30.4			31.2			0.0						30.3 (voc,nox,tox ex-CA)		
NOX Reduction	10.6	8.4	9.3	10.1	10.4	10.3	9.9	10.1	10.0	0.0	0.0	0.0				10.2	9.5	9.8
Toxics Reduction	34.4	26.8	30.0	30.1	26.6	28.1	37.4	31.4	33.9	0.0	0.0	0.0				34.7	28.6	31.1
CG Reg																		
Total BPD	475,388	345,001	399,299	1,088,074	1,052,849	1,067,518	2,490,063	2,749,431	2,641,420	485,548	526,890	509,674	91,183	86,805	88,628	4,630,256	4,760,977	4,706,540
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	8.4	14.0	11.2	8.5	13.8	11.5	8.2	12.1	10.6	8.0	13.0	11.0	8.0	12.4	10.5	8.2	12.7	10.9
Sulfur ppm	125	137	131	140	140	140	115	115	115	100	100	100	0	15	9	118	119	118
Density	259.2	252.9	256.1	262.0	255.9	258.5	260.5	254.1	256.7	264.7	257.7	260.5	264.7	266.0	265.5	261.2	255.1	257.6
R+M/2	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	86.0	86.0	86.0	90.9	87.9	89.2	87.0	86.9	86.9
Aromatics	25.6	22.2	23.9	30.4	26.8	28.3	29.3	26.1	27.3	30.3	25.5	27.4	37.9	40.5	39.4	29.4	26.1	27.5
Benzene	1.05	1.02	1.04	1.40	1.28	1.33	0.94	0.93	0.94	1.54	1.53	1.54	0.33	1.00	0.71	1.11	1.08	1.10
Olefins	12.5	14.8	13.7	12.2	14.1	13.3	12.5	11.4	11.8	7.4	8.0	7.8	0.3	5.8	3.5	11.7	11.8	11.7
Oxygen (wt%)	0.356	0.132	0.245	0.000	0.000	0.000	0.206	0.124	0.157	0.000	0.000	0.000	0.000	0.000	0.000	0.147	0.081	0.108
E200	45	50	48	48	52	50	50	50	50	46	52	50	44	41	42	48	50	49
E300	76	76	76	94	94	94	83	83	83	89	89	89	92	92	92	86	86	86
T10	128	93	110	128	94	108	129	105	114	131	99	112	130	103	115	129	101	112
T50	209	200	205	204	196	200	201	200	200	208	195	200	212	219	216	203	199	201
T90	360	360	360	280	280	280	329	329	329	302	302	302	290	290	290	317	317	317
DVI	1,181	1,099	1,140	1,084	1,010	1,041	1,126	1,087	1,102	1,123	1,035	1,070	1,121	1,101	1,109	1,121	1,065	1,088
V/L	142	110	125	140	110	123	141	120	128	143	114	126	144	122	131	141	117	127
Energy (MMBtu/Bbl)	5.100	5.009	5.054	5.096	5.034	5.060	5.135	5.018	5.064	5.207	5.054	5.115	5.063	5.194	5.138	5.128	5.028	5.069
MTBE (wt%)	0.356	0.132	0.245	0.000	0.000	0.000	0.205	0.123	0.156	0.000	0.000	0.000	0.000	0.000	0.000	0.146	0.080	0.108
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	65.1	101.0	83.2	71.8	108.4	92.9	65.7	101.5	87.4	71.6	107.6	93.3	63.0	115.6	93.1	67.6	103.9	89.1
NOX	1,256	1,451	1,355	1,276	1,466	1,386	1,264	1,420	1,359	1,224	1,389	1,324	1,161	1,332	1,259	1,260	1,427	1,359
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	24,035	0	10,009	0	0	0	0	0	0	0	0	0	24,035	0	10,009
RVP	0.0	0.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	117	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	257.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	87.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	22.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	12.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	2.131	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	84	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	5.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	2.131	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	60.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0.0	0.0	0.0	1,255.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	24,254	673	10,493	0	0	0	327,688	316,523	321,172	0	0	0	13,729	13,070	13,344	365,671	330,266	345,010
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	8.4	13.8	8.6	0.0	0.0	0.0	8.2	11.3	10.0	0.0	0.0	0.0	8.0	12.4	10.5	8.2	11.3	9.9
Sulfur ppm	125	10	121	0	0	0	80	99	90	0	0	0	0	0	0	80	94	88
Density	265.1	257.8	264.8	0.0	0.0	0.0	259.9	249.1	253.8	0.0	0.0	0.0	268.5	263.9	265.9	260.6	249.7	254.6
R+M/2	93.0	93.0	93.0	0.0	0.0	0.0	93.0	93.0	93.0	0.0	0.0	0.0	93.0	93.0	93.0	93.0	93.0	93.0
Aromatics	30.1	25.8	30.0	0.0	0.0	0.0	21.3	8.3	13.8	0.0	0.0	0.0	42.2	38.5	40.1	22.7	9.5	15.3
Benzene	0.52	0.75	0.53	0.00	0.00	0.00	0.69	0.26	0.44	0.00	0.00	0.00	0.33	0.31	0.32	0.66	0.27	0.44
Olefins	14.3	4.1	13.9	0.0	0.0	0.0	8.9	11.4	10.4	0.0	0.0	0.0	22.4	28.3	25.8	9.8	12.1	11.1
Oxygen (wt%)	2.700	2.700	2.700	0.000	0.000	0.000	2.700	2.700	2.700	0.000	0.000	0.000	0.000	0.000	0.000	2.596	2.587	2.591
E200	47	52	47	0	0	0	53	63	59	0	0	0	36	40	38	52	62	58
E300	76	76	76	0	0	0	83	83	83	0	0	0	92	92	92	83	83	83
T10	128	94	127	0	0	0	129	110	118	0	0	0	130	103	115	129	110	118
T50	207	195	206	0	0	0	193	174	182	0	0	0	229	221	224	195	176	184
T90	360	360	360	0	0	0	329	329	329	0	0	0	290	290	290	330	328	329
DVI	1,173	1,085	1,170	0	0	0	1,102	1,017	1,053	0	0	0	1,171	1,107	1,134	1,109	1,021	1,060
V/L	141	110	140	0	0	0	140	120	128	0	0	0	147	122	132	140	120	129
Energy (MMBtu/Bbl)	5.196	5.093	5.193	0.000	0.000	0.000	5.134	4.967	5.038	0.000	0.000	0.000	5.233	5.151	5.186	5.142	4.974	5.048
MTBE (wt%)	2.700	2.700	2.700	0.000	0.000	0.000	2.695	2.695	2.695	0.000	0.000	0.000	0.000	0.000	0.000	2.591	2.582	2.586
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.005	0.005
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	59.8	88.7	60.9	0.0	0.0	0.0	54.1	75.0	66.1	0.0	0.0	0.0	72.4	115.5	97.1	55.1	76.6	67.1
NOX	1,284	1,317	1,286	0	0	0	1,196	1,334	1,276	0	0	0	1,305	1,585	1,465	1,206	1,344	1,283
Oxy Reg E10																		
Total BPD	0	13,705	7,997	627,307	420,400	506,564	37,378	0	15,566	73,300	66,236	69,178	0	0	0	737,985	500,341	599,305
Ethanol BPD	0	1,384	808	21,192	42,460	33,603	3,775	0	1,572	7,403	6,690	6,987	0	0	0	32,370	50,534	42,970
RVP	0.0	10.3	10.3	9.5	13.0	11.2	9.2	0.0	9.2	9.0	13.0	11.2	0.0	0.0	0.0	9.4	12.9	11.1
Sulfur ppm	0	137	137	131	140	136	115	0	115	100	100	100	0	0	0	128	135	131
Density	0.0	252.7	252.7	261.9	257.0	259.6	260.3	0.0	260.3	256.3	258.8	257.7	0.0	0.0	0.0	261.3	257.1	259.3
R+M/2	0.0	87.0	87.0	87.0	87.0	87.0	87.0	0.0	87.0	86.0	86.0	86.0	0.0	0.0	0.0	86.9	86.9	86.9
Aromatics	0.0	11.9	11.9	31.1	22.0	26.7	22.8	0.0	22.8	11.8	20.9	16.9	0.0	0.0	0.0	28.8	21.6	25.3
Benzene	0.00	1.29	1.29	1.58	1.27	1.43	1.81	0.00	1.81	0.83	1.46	1.18	0.00	0.00	0.00	1.52	1.29	1.41
Olefins	0.0	13.2	13.2	0.5	13.0	6.6	0.4	0.0	0.4	5.9	7.0	6.5	0.0	0.0	0.0	1.1	12.2	6.5
Oxygen (wt%)	0.000	5.000	5.000	3.680	3.751	3.714	5.000	0.000	5.000	3.761	3.725	3.741	0.000	0.000	0.000	3.755	3.781	3.767
E200	0	68	68	54	64	59	64	0	64	65	64	64	0	0	0	56	64	60
E300	0	76	76	94	94	94	83	0	83	89	89	89	0	0	0	93	93	93
T10	0	116	116	121	99	111	123	0	123	124	99	110	0	0	0	122	99	111
T50	0	163	163	191	172	181	172	0	172	170	171	171	0	0	0	188	171	180
T90	0	360	360	280	280	280	329	0	329	302	302	302	0	0	0	285	285	285
DVI	0	1,024	1,024	1,034	944	990	1,030	0	1,030	999	964	979	0	0	0	1,031	949	991
V/L	0	124	124	133	110	122	131	0	131	132	110	120	0	0	0	132	111	122
Energy (MMBtu/Bbl)	0.000	4.847	4.847	5.028	4.900	4.966	4.937	0.000	4.937	4.947	4.925	4.935	0.000	0.000	0.000	5.015	4.902	4.960
MTBE (wt%)	0.000	1.186	1.186	0.000	0.000	0.000	1.297	0.000	1.297	0.000	0.000	0.000	0.000	0.000	0.000	0.065	0.032	0.049
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	3.814	3.814	3.680	3.751	3.714	3.703	0.000	3.703	3.761	3.725	3.741	0.000	0.000	0.000	3.689	3.749	3.718
Exhaust Toxics	0.0	88.5	88.5	70.2	98.7	84.0	61.1	0.0	61.1	54.0	97.8	78.5	0.0	0.0	0.0	68.1	98.3	82.8
NOX	0	1,388	1,388	1,248	1,444	1,343	1,150	0	1,150	1,163	1,373	1,280	0	0	0	1,235	1,433	1,331
Oxy Prem E10																		
Total BPD	82,186	67,672	73,716	318,939	303,150	309,725	0	37,253	21,739	115,163	122,227	119,285	0	0	0	516,288	530,301	524,466
Ethanol BPD	8,301	6,835	7,445	32,216	30,621	31,285	0	3,763	2,196	11,631	12,345	12,048	0	0	0	52,148	53,564	52,974
RVP	9.4	13.7	11.7	9.5	13.9	12.0	0.0	11.3	11.3	9.0	13.0	11.4	0.0	0.0	0.0	9.3	13.5	11.8
Sulfur ppm	42	137	92	19	83	55	0	115	115	100	100	100	0	0	0	41	96	73
Density	269.6	261.8	265.5	268.0	261.8	264.5	0.0	256.2	256.2	268.8	266.0	267.1	0.0	0.0	0.0	268.5	262.4	264.9
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	0.0	93.0	93.0	91.5	91.5	91.5	0.0	0.0	0.0	92.7	92.7	92.7
Aromatics	35.1	27.9	31.2	33.6	27.5	30.1	0.0	16.4	16.4	31.3	35.9	34.0	0.0	0.0	0.0	33.3	28.7	30.6
Benzene	0.86	0.66	0.75	1.36	1.14	1.24	0.00	0.53	0.53	1.70	1.28	1.45	0.00	0.00	0.00	1.36	1.07	1.19
Olefins	4.1	15.2	10.1	3.9	11.2	8.1	0.0	11.5	11.5	9.5	8.9	9.1	0.0	0.0	0.0	5.1	11.2	8.7
Oxygen (wt%)	4.413	5.000	4.723	3.597	3.683	3.645	0.000	5.000	5.000	3.587	3.623	3.608	0.000	0.000	0.000	3.725	3.927	3.843
E200	46	55	51	42	50	47	0	61	61	52	53	53	0	0	0	45	52	49
E300	76	76	76	94	94	94	0	83	83	89	89	89	0	0	0	90	90	90
T10	122	95	107	121	93	105	0	110	110	124	99	109	0	0	0	122	96	107
T50	208	190	199	216	199	206	0	177	177	196	193	194	0	0	0	210	195	201
T90	360	360	360	280	280	280	0	329	329	302	302	302	0	0	0	298	299	299
DVI	1,169	1,073	1,118	1,109	1,018	1,057	0	1,023	1,023	1,076	1,031	1,049	0	0	0	1,111	1,028	1,062
V/L	136	110	122	137	110	122	0	120	120	136	114	123	0	0	0	136	112	122
Energy (MMBtu/Bbl)	5.063	4.950	5.002	5.053	4.938	4.987	0.000	4.887	4.887	5.001	4.993	4.996	0.000	0.000	0.000	5.043	4.949	4.987
MTBE (wt%)	0.838	1.318	1.092	0.000	0.000	0.000	0.000	1.238	1.238	0.000	0.000	0.000	0.000	0.000	0.000	0.134	0.253	0.203
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.576	3.682	3.632	3.597	3.683	3.645	0.000	3.762	3.762	3.587	3.623	3.608	0.000	0.000	0.000	3.591	3.674	3.640
Exhaust Toxics	65.5	98.5	83.2	69.9	104.6	89.7	0.0	86.0	86.0	71.3	112.2	95.8	0.0	0.0	0.0	69.5	104.3	90.0
NOX	1,191	1,480	1,346	1,173	1,399	1,302	0	1,380	1,380	1,241	1,411	1,343	0	0	0	1,191	1,411	1,321

Appendix 4: Mogas Quality Produced by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	581,829	427,050	491,506	2,034,321	1,776,400	1,883,808	2,855,128	3,103,207	2,999,897	674,011	715,353	698,136	104,912	99,875	101,973	6,250,200	6,121,885	6,175,321
Ethanol BPD	8,301	8,219	8,253	77,443	73,082	74,898	3,775	3,763	3,768	19,035	19,035	19,035	0	0	0	108,553	104,098	105,953
RVP	8.5	13.8	11.2	8.9	13.6	11.5	8.2	12.0	10.5	8.3	13.0	11.1	8.0	12.4	10.5	8.5	12.7	10.9
Sulfur ppm	113	137	125	115	130	123	111	113	112	100	100	100	0	13	7	109	117	114
Density	261.0	254.4	257.7	262.1	257.2	259.4	260.4	253.6	256.4	264.5	259.3	261.4	265.2	265.8	265.5	261.6	255.6	258.1
R+M/2	88.1	88.0	88.0	87.9	88.0	88.0	87.7	87.7	87.7	86.9	86.9	86.9	91.2	88.6	89.7	87.8	87.7	87.8
Aromatics	27.1	22.8	24.9	29.4	25.8	27.4	28.3	24.1	25.8	28.4	26.9	27.5	38.4	40.3	39.5	28.7	25.1	26.6
Benzene	1.00	0.97	0.99	1.32	1.25	1.28	0.93	0.86	0.89	1.49	1.48	1.49	0.33	0.91	0.66	1.11	1.06	1.08
Olefins	11.4	14.8	13.1	9.8	13.4	11.8	11.9	11.4	11.6	7.6	8.1	7.9	3.2	8.7	6.4	10.6	11.8	11.3
Oxygen (wt%)	1.047	1.086	1.067	1.386	1.527	1.463	0.554	0.441	0.487	1.019	0.980	0.996	0.000	0.000	0.000	0.913	0.859	0.882
E200	45	51	48	50	54	52	50	51	51	49	54	52	43	41	42	49	52	51
E300	76	76	76	92	94	93	83	83	83	89	89	89	92	92	92	86	87	86
T10	127	94	110	125	95	108	129	105	115	129	99	111	130	103	115	128	101	112
T50	209	197	203	201	191	195	199	197	198	202	192	196	214	219	217	201	195	198
T90	360	360	360	290	280	284	329	329	329	302	302	302	290	290	290	316	313	314
DVI	1,179	1,093	1,135	1,079	995	1,033	1,122	1,079	1,096	1,101	1,028	1,057	1,127	1,101	1,112	1,111	1,050	1,076
V/L	141	110	125	137	110	122	141	120	128	141	114	125	144	122	131	140	116	126
Energy (MMBtu/Bbl)	5.099	4.994	5.046	5.064	4.986	5.021	5.132	5.011	5.059	5.144	5.032	5.077	5.085	5.188	5.144	5.107	5.008	5.050
MTBE (wt%)	0.526	0.364	0.444	0.000	0.000	0.000	0.505	0.394	0.439	0.000	0.000	0.000	0.000	0.000	0.000	0.278	0.224	0.247
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Ethanol (wt%)	0.522	0.722	0.622	1.386	1.527	1.463	0.048	0.046	0.047	1.019	0.980	0.996	0.000	0.000	0.000	0.634	0.635	0.635
Exhaust Toxics	64.9	100.2	82.8	69.0	105.4	89.0	64.3	98.6	85.0	69.7	107.5	92.3	64.2	115.6	93.6	66.4	102.0	87.0
NOX	1,248	1,454	1,352	1,253	1,449	1,361	1,255	1,411	1,349	1,220	1,391	1,323	1,180	1,365	1,286	1,248	1,422	1,349
E85 to CG																		
Total BPD																		
Ethanol BPD																		
RVP																		
Sulfur ppm																		
Density																		
R+M/2																		
Aromatics																		
Benzene																		
Olefins																		
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200																		
E300																		
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)																		
MTBE (wt%)																		
ETBE (wt%)																		
TAME (wt%)																		
Ethanol (wt%)																		
E85 to RFG																		
Total BPD																		
Ethanol BPD																		
RVP																		
Sulfur ppm																		
Density																		
R+M/2																		
Aromatics																		
Benzene																		
Olefins																		
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200																		
E300																		
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)																		
MTBE (wt%)																		
ETBE (wt%)																		
TAME (wt%)																		
Ethanol (wt%)																		

Appendix 4: Mogas Quality Produced by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD																		
Ethanol BPD																		
RVP																		
Sulfur ppm																		
Density																		
R+M/2																		
Aromatics																		
Benzene																		
Olefins																		
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200																		
E300																		
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)																		
MTBE (wt%)																		
ETBE (wt%)																		
TAME (wt%)																		
Ethanol (wt%)																		
ALL MOGAS																		
Total BPD	1,332,768	1,179,756	1,243,476	2,409,244	2,147,848	2,256,704	3,595,198	3,850,117	3,743,959	674,011	715,353	698,136	1,087,495	1,072,535	1,078,765	9,098,715	8,965,610	9,021,040
Ethanol BPD	43,060	43,060	43,060	105,424	105,424	105,424	5,147	5,147	5,147	19,035	19,035	19,035	55,645	55,645	55,645	228,311	228,311	228,311
RVP	7.5	13.5	10.9	8.5	13.5	11.3	7.9	11.8	10.3	8.3	13.0	11.1	6.9	11.6	9.6	7.9	12.5	10.6
Sulfur ppm	101	121	112	112	124	119	109	113	112	100	100	100	40	42	41	100	107	104
Density	260.0	254.0	256.7	262.4	256.4	259.1	259.6	253.1	255.8	264.5	259.3	261.4	263.2	259.2	260.9	261.2	255.3	257.8
R+M/2	87.9	88.2	88.1	88.5	88.0	88.2	88.2	87.6	87.8	86.9	86.9	86.9	88.0	87.8	87.9	88.1	87.8	87.9
Aromatics	23.2	20.6	21.8	27.9	24.5	26.0	26.1	22.7	24.1	28.4	26.9	27.5	23.1	24.5	23.9	26.0	23.4	24.5
Benzene	0.78	0.80	0.79	1.24	1.16	1.20	0.86	0.81	0.83	1.49	1.48	1.49	1.09	1.15	1.13	1.02	0.99	1.00
Olefins	10.5	13.6	12.2	10.1	13.0	11.7	11.9	11.3	11.5	7.6	8.1	7.9	5.7	6.2	6.0	10.2	11.1	10.7
Oxygen (wt%)	1.912	2.210	2.075	1.592	1.828	1.721	0.877	0.763	0.809	1.019	0.980	0.996	3.228	3.234	3.232	1.512	1.526	1.520
E200	50	56	54	49	56	53	52	54	53	49	54	52	51	50	50	51	54	53
E300	76	76	76	92	94	93	83	83	83	89	89	89	92	92	92	86	86	86
T10	134	95	113	127	96	110	131	106	116	129	99	111	138	108	120	131	102	114
T50	200	187	192	201	187	193	196	192	194	202	192	196	199	199	199	199	191	194
T90	360	360	360	288	280	284	329	329	329	302	302	302	290	290	290	316	315	315
DVI	1,160	1,064	1,106	1,082	985	1,028	1,115	1,066	1,086	1,101	1,028	1,057	1,092	1,049	1,067	1,109	1,041	1,070
V/L	144	110	125	139	110	123	142	120	129	141	114	125	148	122	133	142	116	127
Energy (MMBtu/Bbl)	5.080	4.973	5.021	5.061	4.963	5.007	5.129	5.021	5.064	5.144	5.032	5.077	5.117	5.021	5.061	5.103	5.002	5.044
MTBE (wt%)	0.723	0.836	0.785	0.000	0.000	0.000	0.823	0.711	0.756	0.000	0.000	0.000	0.000	0.000	0.000	0.429	0.412	0.419
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.002	0.003	0.003	0.000	0.000	0.000	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Ethanol (wt%)	1.186	1.371	1.288	1.592	1.828	1.721	0.053	0.050	0.051	1.019	0.980	0.996	3.228	3.234	3.232	1.082	1.113	1.100

Appendix 4: Mogas Quality Produced by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,445,578	1,404,150	1,421,402	330,079	327,105	328,343	457,925	466,449	462,899	0	0	0	1,291,664	1,327,246	1,312,428	3,525,246	3,524,950	3,525,073
Ethanol BPD	146,018	141,819	143,568	33,338	33,038	33,163	46,250	47,111	46,753	0	0	0	130,458	134,065	132,563	356,064	356,033	356,046
RVP	7.0	13.4	10.7	7.0	12.8	10.4	7.0	11.6	9.7	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.4	10.1
Sulfur ppm	21	24	23	23	25	24	18	25	22	0	0	0	8	10	9	16	19	18
Density	259.9	256.5	258.0	261.5	255.2	257.9	259.6	257.9	258.6	0.0	0.0	0.0	261.1	257.4	258.9	260.4	256.9	258.4
R+M/2	87.1	87.1	87.1	87.0	87.0	87.0	87.0	87.0	87.0	0.0	0.0	0.0	87.0	87.0	87.0	87.1	87.1	87.1
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	22.6	22.9	22.8	20.9	21.0	21.0
Benzene	0.59	0.56	0.57	0.60	0.59	0.59	0.60	0.52	0.55	0.00	0.00	0.00	0.62	0.50	0.55	0.60	0.53	0.56
Olefins	7.8	13.2	10.9	7.2	11.7	9.8	3.9	12.4	8.9	0.0	0.0	0.0	5.7	5.7	5.7	6.5	10.2	8.6
Oxygen (wt%)	3.710	3.758	3.737	3.687	3.777	3.739	3.714	3.737	3.728	0.000	0.000	0.000	3.691	3.746	3.723	3.701	3.753	3.731
E200	51	58	55	53	67	61	52	57	55	0	0	0	55	60	58	53	60	57
E300	94	94	94	84	84	84	87	87	87	0	0	0	86	86	86	89	89	89
T10	137	96	113	137	100	116	137	108	120	0	0	0	138	109	121	138	103	117
T50	197	183	189	193	166	177	195	186	189	0	0	0	190	179	184	194	180	186
T90	280	280	280	324	324	324	309	309	309	0	0	0	315	315	315	301	301	301
DVI	1,076	972	1,016	1,110	972	1,030	1,100	1,028	1,058	0	0	0	1,094	1,016	1,048	1,089	996	1,035
V/L	147	110	125	146	110	125	146	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.021	4.913	4.959	5.015	4.854	4.921	5.035	4.968	4.996	0.000	0.000	0.000	5.046	4.982	5.008	5.031	4.941	4.978
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.710	3.758	3.737	3.687	3.777	3.739	3.714	3.737	3.728	0.000	0.000	0.000	3.691	3.746	3.723	3.701	3.753	3.731
VOC Reduction	27.9			27.9			28.8			0.0						28.1	(voc,nox,tox ex-CA)	
NOX Reduction	14.8	12.4	13.4	14.6	12.7	13.5	15.3	12.9	13.9	0.0	0.0	0.0				14.9	12.5	13.5
Toxics Reduction	33.0	26.0	28.9	33.1	28.2	30.3	33.7	26.0	29.2	0.0	0.0	0.0				33.2	26.3	29.2
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0					0.0	(voc,nox,tox ex-CA)	
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
RFG Prem E10																		
Total BPD	275,348	267,457	270,743	62,872	62,306	62,542	87,224	88,847	88,171	0	0	0	246,031	252,809	249,986	671,475	671,419	671,442
Ethanol BPD	27,813	27,016	27,348	6,351	6,294	6,317	8,810	8,974	8,906	0	0	0	24,852	25,536	25,251	67,826	67,819	67,822
RVP	7.0	13.7	10.8	7.0	13.5	10.8	7.0	12.0	9.9	0.0	0.0	0.0	6.8	11.5	9.6	6.9	12.6	10.2
Sulfur ppm	24	25	24	20	20	20	11	11	11	0	0	0	7	9	8	16	17	16
Density	263.0	258.0	260.1	262.6	257.9	259.9	259.1	256.1	257.3	0.0	0.0	0.0	257.6	253.5	255.2	260.5	256.1	257.9
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.2	92.3
Aromatics	20.0	20.0	20.0	20.0	20.0	20.0	15.7	17.5	16.8	0.0	0.0	0.0	13.8	13.0	13.4	17.2	17.1	17.1
Benzene	0.45	0.38	0.41	0.46	0.58	0.53	0.29	0.26	0.27	0.00	0.00	0.00	0.37	0.25	0.30	0.40	0.33	0.36
Olefins	16.2	15.1	15.6	13.9	12.0	12.8	7.4	7.5	7.4	0.0	0.0	0.0	5.7	5.7	5.7	11.0	10.3	10.6
Oxygen (wt%)	3.666	3.737	3.706	3.671	3.738	3.710	3.721	3.764	3.746	0.000	0.000	0.000	3.743	3.803	3.778	3.701	3.765	3.738
E200	50	55	53	50	56	53	50	51	51	0	0	0	54	58	57	51	56	54
E300	94	94	94	84	84	84	87	87	87	0	0	0	86	86	86	89	89	89
T10	137	95	113	137	96	113	137	105	118	0	0	0	138	108	121	138	101	116
T50	201	189	194	200	188	193	200	197	199	0	0	0	191	183	186	197	188	192
T90	280	280	280	324	324	324	309	309	309	0	0	0	315	315	315	301	301	301
DVI	1,088	990	1,031	1,130	1,030	1,072	1,116	1,059	1,083	0	0	0	1,096	1,025	1,054	1,099	1,016	1,050
V/L	147	110	126	147	110	126	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.003	4.880	4.932	4.961	4.878	4.912	4.960	4.882	4.914	0.000	0.000	0.000	4.941	4.873	4.901	4.971	4.877	4.916
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.666	3.737	3.706	3.671	3.738	3.710	3.721	3.764	3.746	0.000	0.000	0.000	3.743	3.803	3.778	3.701	3.765	3.738
VOC Reduction	28.7	0.0		28.5	0.0		29.8	0.0		0.0	0.0					28.9	(voc,nox,tox ex-CA)	
NOX Reduction	10.3	11.2	10.8	12.1	13.4	12.9	16.9	16.6	16.7	0.0	0.0	0.0				11.9	12.7	12.4
Toxics Reduction	32.6	25.7	28.6	33.1	25.5	28.7	37.3	27.3	31.4	0.0	0.0	0.0				33.6	26.0	29.2

Appendix 4: Mogas Quality Produced by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,720,926	1,671,607	1,692,146	392,951	389,411	390,885	545,149	555,296	551,070	0	0	0	1,537,696	1,580,055	1,562,415	4,196,721	4,196,369	4,196,515
Ethanol BPD	173,831	168,835	170,916	39,689	39,331	39,480	55,061	56,085	55,658	0	0	0	155,310	159,601	157,814	423,890	423,853	423,868
RVP	7.0	13.5	10.7	7.0	12.9	10.4	7.0	11.7	9.7	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.4	10.1
Sulfur ppm	22	24	23	22	24	23	17	23	20	0	0	0	8	10	9	16	19	17
Density	260.4	256.8	258.3	261.7	255.6	258.2	259.5	257.6	258.4	0.0	0.0	0.0	260.6	256.7	258.3	260.5	256.8	258.3
R+M/2	88.1	88.1	88.1	88.0	88.0	88.0	88.0	88.0	88.0	0.0	0.0	0.0	87.6	87.6	87.6	87.9	87.9	87.9
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	19.3	19.6	19.5	0.0	0.0	0.0	21.2	21.3	21.3	20.3	20.4	20.4
Benzene	0.57	0.53	0.55	0.58	0.59	0.58	0.55	0.48	0.51	0.00	0.00	0.00	0.58	0.46	0.51	0.57	0.50	0.53
Olefins	9.1	13.5	11.7	8.3	11.7	10.3	4.4	11.7	8.7	0.0	0.0	0.0	5.7	5.7	5.7	7.2	10.2	8.9
Oxygen (wt%)	3.703	3.754	3.732	3.684	3.771	3.734	3.715	3.742	3.731	0.000	0.000	0.000	3.699	3.755	3.732	3.701	3.754	3.732
E200	51	58	55	53	65	60	52	56	54	0	0	0	55	60	58	53	59	56
E300	94	94	94	84	84	84	87	87	87	0	0	0	86	86	86	89	89	89
T10	137	96	113	137	99	115	137	107	120	0	0	0	138	109	121	138	103	117
T50	198	184	189	195	169	180	196	187	191	0	0	0	191	180	184	194	181	187
T90	280	280	280	324	324	324	309	309	309	0	0	0	315	315	315	301	301	301
DVI	1,078	975	1,018	1,113	981	1,036	1,103	1,033	1,062	0	0	0	1,094	1,018	1,049	1,091	999	1,037
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.018	4.908	4.954	5.006	4.857	4.920	5.023	4.955	4.983	0.000	0.000	0.000	5.029	4.965	4.991	5.022	4.931	4.969
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.703	3.754	3.732	3.684	3.771	3.734	3.715	3.742	3.731	0.000	0.000	0.000	3.699	3.755	3.732	3.701	3.754	3.732
VOC Reduction	28.1			28.0			29.0			0.0						28.2 (voc,nox,tox ex-CA)		
NOX Reduction	14.1	12.2	13.0	14.2	12.8	13.4	15.6	13.4	14.3	0.0	0.0	0.0				14.4	12.6	13.3
Toxics Reduction	32.9	25.9	28.9	33.1	27.8	30.0	34.3	26.2	29.5	0.0	0.0	0.0				33.2	26.3	29.2
CG Reg																		
Total BPD	0	124,823	72,842	100	945,863	552,011	907,294	1,367,754	1,176,001	100	421,001	245,721	100	100	100	907,594	2,859,541	2,046,675
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	14.0	14.0	8.3	13.8	13.8	7.9	12.4	11.0	8.1	13.0	13.0	8.0	12.2	10.5	7.9	13.0	12.1
Sulfur ppm	0	28	28	28	28	28	28	28	28	28	28	28	26	25	25	28	28	28
Density	0.0	258.3	258.3	263.5	258.1	258.1	262.4	258.0	259.5	249.4	253.8	253.8	258.8	260.2	259.6	262.4	257.5	258.4
R+M/2	0.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	86.0	86.0	86.0	87.0	87.0	87.0	87.0	86.9	86.9
Aromatics	0.0	30.0	30.0	30.0	30.0	30.0	30.0	28.7	29.1	8.0	21.0	21.0	21.4	30.0	26.4	30.0	28.1	28.4
Benzene	0.00	0.99	0.99	0.67	0.92	0.92	0.74	0.62	0.66	0.25	1.30	1.30	0.59	0.58	0.58	0.74	0.84	0.82
Olefins	0.0	15.2	15.2	10.3	15.3	15.3	19.9	15.6	17.0	7.5	7.3	7.3	20.5	15.4	17.5	19.9	14.3	15.3
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	49	49	41	51	51	44	44	44	56	54	54	51	48	49	44	48	48
E300	0	94	94	84	84	84	87	87	87	83	83	83	86	86	86	87	86	86
T10	0	93	93	129	94	94	132	103	112	130	99	99	130	104	115	132	99	105
T50	0	202	202	219	197	197	211	211	211	187	191	191	199	204	202	211	203	205
T90	0	280	280	324	324	324	309	309	309	327	327	327	315	315	315	309	315	314
DVI	0	1,024	1,024	1,175	1,055	1,055	1,141	1,097	1,111	1,084	1,050	1,050	1,107	1,084	1,094	1,141	1,073	1,086
V/L	0	110	110	144	110	110	145	120	128	139	114	114	142	120	129	145	115	121
Energy (MMBtu/Bbl)	0.000	5.046	5.046	5.181	5.052	5.052	5.160	5.089	5.112	5.061	5.066	5.066	5.079	5.068	5.073	5.160	5.072	5.088
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	104.9	104.9	63.8	103.4	103.4	66.1	101.1	89.8	49.8	97.6	97.6	59.9	100.1	83.4	66.1	101.5	95.0
NOX	0	1,405	1,405	1,191	1,409	1,409	1,289	1,405	1,367	1,107	1,319	1,318	1,275	1,404	1,350	1,289	1,393	1,374
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	100	100	100	200	2,945	1,802	79,243	100	33,058	100	100	100	79,643	3,245	35,060
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	8.3	14.0	11.6	7.9	12.0	11.8	8.1	13.0	8.1	8.0	12.4	10.6	8.1	12.1	8.3
Sulfur ppm	0	0	0	0	10	6	28	28	28	12	28	12	7	1	3	12	27	12
Density	0.0	0.0	0.0	259.3	258.6	258.9	246.6	243.1	243.2	247.2	252.6	247.2	249.2	257.9	254.3	247.2	244.3	247.1
R+M/2	0.0	0.0	0.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	91.5	92.9	91.6
Aromatics	0.0	0.0	0.0	23.0	30.0	27.1	1.2	0.0	0.1	2.6	17.7	2.6	5.7	27.3	18.3	2.6	2.3	2.6
Benzene	0.00	0.00	0.00	0.42	0.74	0.61	0.01	0.00	0.00	0.08	1.10	0.08	0.16	0.25	0.21	0.08	0.06	0.08
Olefins	0.0	0.0	0.0	9.0	21.7	16.4	1.2	7.2	6.9	4.3	25.8	4.4	7.2	2.2	4.3	4.3	8.0	4.5
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	34	39	37	47	51	51	48	48	48	48	39	43	48	51	48
E300	0	0	0	84	84	84	87	87	87	83	83	83	86	86	86	83	87	84
T10	0	0	0	129	93	108	132	105	107	130	99	130	130	103	114	130	105	129
T50	0	0	0	232	222	226	207	197	197	204	205	204	203	223	215	204	199	204
T90	0	0	0	324	324	324	309	309	309	327	327	327	315	315	315	327	311	326
DVI	0	0	0	1,212	1,129	1,163	1,127	1,058	1,061	1,135	1,089	1,135	1,120	1,138	1,131	1,135	1,064	1,131
V/L	0	0	0	146	113	127	144	120	121	142	116	142	142	122	131	142	120	141
Energy (MMBtu/Bbl)	0.000	0.000	0.000	5.123	5.074	5.094	4.960	4.878	4.882	4.964	4.971	4.964	4.982	5.069	5.033	4.964	4.893	4.960
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	58.8	106.9	86.8	49.1	77.1	75.8	49.6	101.5	49.7	50.2	92.8	75.1	49.6	79.2	51.2
NOX	0	0	0	1,140	1,471	1,333	1,077	1,234	1,227	1,086	1,502	1,087	1,089	1,304	1,214	1,086	1,252	1,095
Oxy Reg E10																		
Total BPD	1,554,004	1,427,013	1,479,897	1,774,598	741,621	1,171,792	339,601	100	141,481	692,210	277,932	450,453	119,520	108,222	112,927	4,479,934	2,554,888	3,356,551
Ethanol BPD	156,970	144,128	149,476	179,252	74,904	118,359	34,300	10	14,290	69,913	28,071	45,496	12,073	10,930	11,406	452,508	258,044	339,026
RVP	9.3	13.5	11.7	9.3	13.3	10.7	8.9	11.7	8.9	9.1	12.8	10.4	9.0	11.7	10.5	9.2	13.3	11.0
Sulfur ppm	20	25	23	24	22	23	20	25	20	28	28	28	28	28	28	23	25	24
Density	258.9	257.8	258.3	260.6	256.7	259.2	259.2	259.1	259.2	260.5	255.2	258.6	265.4	264.3	264.8	260.0	257.5	258.9
R+M/2	87.1	87.0	87.0	87.0	87.0	87.0	87.2	87.0	87.2	86.0	86.0	86.0	88.5	89.0	88.8	86.9	87.0	86.9
Aromatics	22.5	22.5	22.5	22.5	21.8	22.3	22.5	22.5	22.5	21.8	17.5	20.2	27.6	29.3	28.5	22.5	22.1	22.3
Benzene	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	1.30	0.97	1.18	0.67	0.61	0.64	0.66	0.59	0.63
Olefins	12.3	13.1	12.8	9.4	11.5	10.2	13.1	12.4	13.1	6.9	6.5	6.8	21.5	16.3	18.6	10.6	12.0	11.3
Oxygen (wt%)	3.723	3.740	3.732	3.699	3.756	3.720	3.719	3.720	3.719	3.701	3.777	3.728	3.633	3.648	3.641	3.707	3.744	3.724
E200	61	57	59	59	60	59	61	55	61	62	67	64	58	56	57	60	59	60
E300	94	94	94	84	84	84	87	87	87	83	83	83	86	86	86	88	90	89
T10	123	96	107	123	97	113	125	107	125	124	100	115	124	107	115	123	97	112
T50	178	185	182	182	180	181	178	189	178	175	165	171	184	187	186	179	181	180
T90	280	280	280	324	324	324	309	309	309	327	327	327	315	315	315	308	299	304
DVI	997	978	987	1,055	1,009	1,038	1,030	1,037	1,030	1,038	972	1,014	1,054	1,037	1,045	1,030	989	1,012
V/L	131	110	119	132	110	124	134	120	134	132	110	124	134	120	126	132	110	122
Energy (MMBtu/Bbl)	4.952	4.949	4.950	4.939	4.928	4.934	4.958	4.984	4.958	5.038	4.978	5.017	4.987	4.950	4.967	4.961	4.946	4.954
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.723	3.740	3.732	3.699	3.756	3.720	3.719	3.720	3.719	3.701	3.777	3.728	3.633	3.648	3.641	3.707	3.744	3.724
Exhaust Toxics	55.8	91.3	75.8	56.2	89.5	68.5	55.7	91.6	55.8	59.4	87.3	69.5	61.7	97.3	81.6	56.7	90.6	71.7
NOX	1,193	1,360	1,287	1,175	1,344	1,238	1,197	1,352	1,197	1,167	1,306	1,217	1,321	1,421	1,377	1,186	1,352	1,260
Oxy Prem E10																		
Total BPD	381,615	171,228	258,841	337,938	321,325	328,243	237,404	260,444	250,849	52,626	133,030	99,547	22,685	20,533	21,429	1,032,267	906,560	958,909
Ethanol BPD	38,547	17,296	26,146	34,135	32,457	33,156	23,980	26,305	25,337	5,315	13,437	10,055	2,291	2,074	2,165	104,269	91,569	96,858
RVP	9.3	13.7	11.0	9.3	13.7	11.8	8.9	12.1	10.8	9.1	13.0	12.1	9.0	12.1	10.7	9.2	13.1	11.3
Sulfur ppm	25	25	25	22	7	13	7	10	9	28	28	28	11	14	13	20	14	17
Density	262.2	259.4	261.2	262.5	257.2	259.5	261.0	257.1	258.6	252.3	257.8	256.6	263.0	263.9	263.5	261.6	257.8	259.5
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.9	92.7	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	19.7	20.8	6.6	20.1	17.1	24.9	30.0	27.8	21.7	21.5	21.6
Benzene	0.41	0.41	0.41	0.50	0.54	0.52	0.30	0.27	0.28	0.20	1.30	1.06	0.38	0.44	0.41	0.41	0.55	0.48
Olefins	13.8	14.9	14.2	8.5	6.0	7.1	4.9	7.0	6.2	7.5	7.7	7.7	8.8	8.8	8.8	9.6	8.3	8.9
Oxygen (wt%)	3.676	3.716	3.692	3.672	3.749	3.715	3.694	3.750	3.728	3.821	3.740	3.758	3.666	3.653	3.659	3.686	3.739	3.715
E200	52	54	53	49	53	51	46	49	48	59	57	57	51	50	50	50	53	51
E300	94	94	94	84	84	84	87	87	87	83	83	83	86	86	86	89	87	88
T10	123	94	112	123	95	107	125	105	113	124	99	104	124	105	113	123	98	110
T50	196	192	194	201	193	197	208	201	204	180	186	185	199	199	199	200	194	197
T90	280	280	280	324	324	324	309	309	309	327	327	327	315	315	315	304	312	308
DVI	1,052	996	1,031	1,111	1,046	1,074	1,122	1,069	1,090	1,054	1,035	1,039	1,097	1,070	1,082	1,089	1,042	1,063
V/L	134	110	125	135	110	121	139	120	127	133	113	117	136	120	127	136	114	123
Energy (MMBtu/Bbl)	4.957	4.898	4.934	4.968	4.895	4.926	4.975	4.897	4.927	4.865	4.871	4.869	5.000	4.962	4.979	4.961	4.894	4.924
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.676	3.716	3.692	3.672	3.749	3.715	3.694	3.750	3.728	3.821	3.740	3.758	3.666	3.653	3.659	3.686	3.739	3.715
Exhaust Toxics	57.4	91.5	70.6	58.1	91.5	77.2	56.8	89.5	76.6	50.5	96.1	86.1	57.6	96.0	79.1	57.1	91.7	76.2
NOX	1,201	1,376	1,268	1,164	1,304	1,243	1,140	1,293	1,232	1,112	1,316	1,271	1,166	1,340	1,263	1,169	1,317	1,250

Appendix 4: Mogas Quality Produced by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	1,935,619	1,723,064	1,811,580	2,112,736	2,008,909	2,052,147	1,484,498	1,631,243	1,570,133	824,179	832,063	828,780	142,404	128,954	134,556	6,499,437	6,324,233	6,397,195
Ethanol BPD	195,517	161,424	175,622	213,387	107,361	151,514	58,280	26,315	39,626	75,228	41,509	55,551	14,364	13,004	13,571	556,777	349,613	435,884
RVP	9.3	13.6	11.7	9.3	13.6	11.7	8.2	12.4	10.7	9.0	12.9	11.3	9.0	11.7	10.5	9.0	13.1	11.4
Sulfur ppm	21	25	23	23	22	23	23	25	24	27	28	27	25	25	25	23	25	24
Density	259.6	258.0	258.7	260.9	257.4	258.9	261.5	257.8	259.3	258.7	254.9	256.5	265.0	264.2	264.5	260.5	257.5	258.8
R+M/2	88.2	87.6	87.9	88.0	88.0	88.0	88.0	88.0	88.0	86.9	86.9	86.9	88.9	89.3	89.1	87.9	87.7	87.8
Aromatics	22.5	23.0	22.8	22.5	25.8	24.4	27.1	27.2	27.2	19.0	19.7	19.4	27.1	29.4	28.4	23.2	24.7	24.1
Benzene	0.52	0.56	0.54	0.53	0.72	0.64	0.62	0.56	0.59	1.11	1.19	1.16	0.63	0.58	0.60	0.62	0.69	0.66
Olefins	12.6	13.4	13.1	9.3	12.4	11.1	16.0	14.2	14.9	6.7	7.1	6.9	19.5	15.1	17.1	11.7	12.5	12.2
Oxygen (wt%)	3.714	3.466	3.577	3.695	1.981	2.721	1.433	0.597	0.929	3.368	1.868	2.494	3.633	3.643	3.639	3.139	2.049	2.513
E200	59	56	58	57	55	56	48	45	46	61	59	60	56	55	56	56	53	54
E300	94	94	94	84	84	84	87	87	87	83	83	83	86	86	86	88	88	88
T10	123	95	107	123	95	107	129	103	113	124	99	110	124	107	115	124	98	109
T50	181	187	184	185	190	188	203	210	207	178	182	180	187	189	188	187	193	191
T90	280	280	280	324	324	324	309	309	309	327	327	327	315	315	315	308	308	308
DVI	1,008	984	995	1,064	1,037	1,048	1,112	1,092	1,100	1,048	1,022	1,033	1,061	1,043	1,051	1,056	1,035	1,044
V/L	132	110	120	133	110	120	141	120	128	133	112	121	134	120	126	134	113	122
Energy (MMBtu/Bbl)	4.953	4.951	4.952	4.943	4.981	4.965	5.084	5.058	5.068	5.020	5.005	5.011	4.989	4.952	4.969	4.989	4.995	4.993
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.714	3.466	3.577	3.695	1.981	2.721	1.433	0.597	0.929	3.368	1.868	2.494	3.633	3.643	3.639	3.139	2.049	2.513
Exhaust Toxics	56.1	92.3	76.2	56.5	96.3	79.3	62.2	99.2	84.6	57.9	94.0	79.0	61.0	97.1	81.2	58.0	95.7	79.7
NOX	1,194	1,365	1,289	1,173	1,368	1,285	1,244	1,386	1,330	1,156	1,314	1,248	1,296	1,408	1,359	1,196	1,366	1,294
E85 to CG																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E85 to RFG																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALL MOGAS																		
Total BPD	3,656,545	3,394,671	3,503,726	2,505,687	2,398,320	2,443,032	2,029,647	2,186,539	2,121,203	824,179	832,063	828,780	1,680,100	1,709,009	1,696,970	10,696,158	10,520,602	10,593,710
Ethanol BPD	369,348	330,259	346,537	253,076	146,692	190,994	113,341	82,400	95,285	75,228	41,509	55,551	169,674	172,606	171,385	980,667	773,465	859,752
RVP	8.2	13.5	11.2	8.9	13.5	11.5	7.9	12.2	10.5	9.0	12.9	11.3	7.0	11.5	9.6	8.2	12.9	10.9
Sulfur ppm	21	25	23	23	23	23	21	25	23	27	28	27	9	11	10	20	22	21
Density	260.0	257.4	258.5	261.0	257.2	258.8	260.9	257.8	259.1	258.7	254.9	256.5	261.0	257.3	258.8	260.5	257.2	258.6
R+M/2	88.2	87.8	88.0	88.0	88.0	88.0	88.0	88.0	88.0	86.9	86.9	86.9	87.7	87.8	87.8	87.9	87.8	87.9
Aromatics	21.3	21.5	21.4	22.1	24.8	23.7	25.0	25.3	25.2	19.0	19.7	19.4	21.7	21.9	21.8	22.1	23.0	22.6
Benzene	0.54	0.54	0.54	0.54	0.70	0.63	0.60	0.54	0.57	1.11	1.19	1.16	0.58	0.47	0.52	0.60	0.62	0.61
Olefins	11.0	13.5	12.4	9.1	12.3	10.9	12.9	13.6	13.3	6.7	7.1	6.9	6.9	6.4	6.6	9.9	11.6	10.9
Oxygen (wt%)	3.708	3.608	3.652	3.693	2.270	2.883	2.043	1.395	1.655	3.368	1.868	2.494	3.694	3.746	3.724	3.360	2.728	2.996
E200	55	57	56	56	56	56	49	48	49	61	59	60	55	59	58	55	56	55
E300	94	94	94	84	84	84	87	87	87	83	83	83	86	86	86	88	88	88
T10	129	96	110	125	96	108	131	104	115	124	99	110	137	109	121	130	100	112
T50	189	185	187	187	187	187	201	204	203	178	182	180	190	180	184	190	188	189
T90	280	280	280	324	324	324	309	309	309	327	327	327	315	315	315	305	305	305
DVI	1,041	979	1,006	1,072	1,028	1,047	1,110	1,077	1,090	1,048	1,022	1,033	1,092	1,019	1,049	1,070	1,021	1,041
V/L	139	110	122	135	110	121	143	120	129	133	112	121	146	120	131	139	114	125
Energy (MMBtu/Bbl)	4.983	4.929	4.953	4.953	4.961	4.958	5.068	5.032	5.046	5.020	5.005	5.011	5.026	4.964	4.989	5.002	4.969	4.983
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.708	3.608	3.652	3.693	2.270	2.883	2.043	1.395	1.655	3.368	1.868	2.494	3.694	3.746	3.724	3.360	2.728	2.996

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,091,221	1,104,480	1,098,958	176,919	341,303	272,847	178,239	486,737	358,267	0	0	0	1,289,843	1,167,079	1,218,203	2,736,223	3,099,598	2,948,275
Ethanol BPD	110,224	111,564	111,006	17,871	34,475	27,560	18,004	49,165	36,189	0	0	0	130,287	117,887	123,051	276,386	313,091	297,806
RVP	7.0	13.1	10.6	7.0	13.1	11.4	7.0	11.7	10.7	0.0	0.0	0.0	6.8	11.4	9.4	6.9	12.2	10.2
Sulfur ppm	23	24	24	20	25	23	24	25	25	0	0	0	10	10	10	17	19	18
Density	259.6	257.5	258.3	260.9	256.5	257.7	260.1	258.9	259.1	0.0	0.0	0.0	261.3	257.5	259.2	260.5	257.6	258.7
R+M/2	87.1	87.1	87.1	87.0	87.0	87.0	87.0	87.0	87.0	0.0	0.0	0.0	87.0	87.0	87.0	87.0	87.0	87.0
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	22.9	23.7	23.4	21.3	21.4	21.4
Benzene	0.59	0.59	0.59	0.60	0.60	0.60	0.60	0.50	0.52	0.00	0.00	0.00	0.62	0.53	0.57	0.61	0.55	0.57
Olefins	6.3	14.0	10.8	6.7	11.8	10.5	4.5	13.8	11.9	0.0	0.0	0.0	5.7	5.7	5.7	5.9	10.6	8.8
Oxygen (wt%)	3.714	3.745	3.732	3.695	3.758	3.741	3.707	3.724	3.720	0.000	0.000	0.000	3.689	3.744	3.719	3.700	3.743	3.726
E200	52	59	56	53	63	60	52	56	55	0	0	0	54	60	58	53	59	57
E300	95	95	95	95	95	95	95	95	95	0	0	0	86	86	86	91	92	91
T10	137	98	114	137	99	109	137	107	113	0	0	0	138	109	122	138	104	117
T50	195	182	188	193	174	179	196	188	190	0	0	0	192	179	184	194	181	186
T90	275	275	275	274	274	274	274	274	274	0	0	0	315	315	315	294	290	291
DVI	1,067	969	1,009	1,058	943	974	1,067	1,000	1,014	0	0	0	1,098	1,015	1,051	1,081	988	1,024
V/L	147	112	126	146	110	120	147	120	126	0	0	0	147	120	132	147	116	128
Energy (MMBtu/Bbl)	5.014	4.908	4.952	5.016	4.861	4.903	5.031	4.957	4.972	0.000	0.000	0.000	5.066	4.982	5.019	5.040	4.938	4.978
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.714	3.745	3.732	3.695	3.758	3.741	3.707	3.724	3.720	0.000	0.000	0.000	3.689	3.744	3.719	3.700	3.743	3.726
VOC Reduction	27.8			28.4			28.7			0.0						28.0 (voc,nox,tox ex-CA)		
NOX Reduction	14.9	11.9	13.1	15.0	12.9	13.4	15.0	12.2	12.7	0.0	0.0	0.0				14.9	12.1	13.1
Toxics Reduction	33.1	25.8	28.8	33.8	27.3	29.0	33.5	25.7	27.3	0.0	0.0	0.0				33.2	26.0	28.5
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0					0.0 (voc,nox,tox ex-CA)		
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
RFG Prem E10																		
Total BPD	287,384	283,449	285,088	65,620	65,029	65,275	91,036	92,731	92,025	0	0	0	254,347	260,936	258,192	698,387	702,146	700,581
Ethanol BPD	29,029	28,631	28,797	6,628	6,569	6,593	9,196	9,367	9,295	0	0	0	25,692	26,357	26,080	70,544	70,924	70,766
RVP	7.0	13.6	10.8	7.0	13.5	10.8	7.0	12.0	9.9	0.0	0.0	0.0	6.8	11.5	9.6	6.9	12.6	10.2
Sulfur ppm	25	25	25	15	23	20	13	12	12	0	0	0	9	8	8	17	17	17
Density	262.8	257.7	259.9	260.0	257.9	258.8	258.8	257.1	257.8	0.0	0.0	0.0	257.5	253.7	255.3	260.1	256.2	257.8
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.3	92.3
Aromatics	20.0	20.0	20.0	15.6	20.0	18.2	15.2	19.0	17.4	0.0	0.0	0.0	14.3	13.8	14.0	16.9	17.6	17.3
Benzene	0.53	0.50	0.51	0.27	0.49	0.40	0.28	0.34	0.32	0.00	0.00	0.00	0.36	0.25	0.30	0.41	0.39	0.40
Olefins	14.7	14.2	14.4	7.0	12.3	10.1	7.6	8.7	8.2	0.0	0.0	0.0	5.7	5.7	5.7	9.8	10.1	10.0
Oxygen (wt%)	3.668	3.741	3.710	3.708	3.738	3.725	3.726	3.750	3.740	0.000	0.000	0.000	3.744	3.800	3.777	3.707	3.764	3.740
E200	50	56	53	49	56	53	50	51	51	0	0	0	54	58	57	51	56	54
E300	95	95	95	95	95	95	95	95	95	0	0	0	86	86	86	92	92	92
T10	137	95	113	137	96	113	137	105	118	0	0	0	138	108	121	138	101	116
T50	199	188	193	202	188	194	199	198	198	0	0	0	192	182	186	197	187	191
T90	275	275	275	274	274	274	274	274	274	0	0	0	315	315	315	289	289	289
DVI	1,079	981	1,022	1,086	982	1,025	1,077	1,025	1,047	0	0	0	1,098	1,025	1,055	1,086	1,003	1,038
V/L	147	110	125	148	110	126	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.002	4.880	4.932	4.962	4.877	4.913	4.953	4.895	4.919	0.000	0.000	0.000	4.958	4.881	4.913	4.976	4.882	4.921
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.668	3.741	3.710	3.708	3.738	3.725	3.726	3.750	3.740	0.000	0.000	0.000	3.744	3.800	3.777	3.707	3.764	3.740
VOC Reduction	28.6	0.0		28.3	0.0		30.0	0.0		0.0	0.0					28.8 (voc,nox,tox ex-CA)		
NOX Reduction	11.3	11.9	11.6	16.9	13.1	14.7	16.9	15.7	16.2	0.0	0.0	0.0				13.3	12.9	13.0
Toxics Reduction	32.3	25.6	28.4	36.9	26.0	30.5	37.5	26.2	30.9	0.0	0.0	0.0				34.0	25.8	29.2

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,378,604	1,387,929	1,384,046	242,540	406,332	338,122	269,276	579,468	450,292	0	0	0	1,544,190	1,428,015	1,476,395	3,434,610	3,801,744	3,648,855
Ethanol BPD	139,253	140,195	139,803	24,499	41,044	34,154	27,200	58,532	45,484	0	0	0	155,979	144,244	149,131	346,930	384,015	368,571
RVP	7.0	13.2	10.6	7.0	13.1	11.3	7.0	11.8	10.6	0.0	0.0	0.0	6.8	11.4	9.4	6.9	12.3	10.2
Sulfur ppm	23	24	24	18	25	23	20	23	22	0	0	0	10	10	10	17	19	18
Density	260.3	257.5	258.7	260.7	256.7	257.9	259.6	258.6	258.9	0.0	0.0	0.0	260.7	256.8	258.5	260.5	257.3	258.6
R+M/2	88.3	88.3	88.3	88.6	88.0	88.2	89.0	88.0	88.2	0.0	0.0	0.0	87.7	87.7	87.7	88.1	88.0	88.0
Aromatics	19.9	19.9	19.9	18.8	20.0	19.6	18.4	19.8	19.5	0.0	0.0	0.0	21.5	21.9	21.7	20.4	20.7	20.6
Benzene	0.58	0.57	0.58	0.51	0.58	0.56	0.49	0.48	0.48	0.00	0.00	0.00	0.58	0.48	0.52	0.57	0.52	0.54
Olefins	8.1	14.1	11.6	6.8	11.9	10.4	5.6	13.0	11.1	0.0	0.0	0.0	5.7	5.7	5.7	6.7	10.5	9.0
Oxygen (wt%)	3.704	3.744	3.727	3.698	3.755	3.738	3.713	3.728	3.724	0.000	0.000	0.000	3.698	3.754	3.729	3.702	3.746	3.729
E200	52	58	55	52	62	59	51	55	54	0	0	0	54	60	57	53	59	56
E300	95	95	95	95	95	95	95	95	95	0	0	0	86	86	86	91	92	91
T10	137	98	114	137	98	110	137	107	114	0	0	0	138	109	122	138	103	117
T50	196	183	189	195	176	182	197	190	192	0	0	0	192	179	185	194	182	187
T90	275	275	275	274	274	274	274	274	274	0	0	0	315	315	315	293	290	291
DVI	1,069	971	1,012	1,066	949	984	1,070	1,004	1,020	0	0	0	1,098	1,017	1,052	1,082	991	1,027
V/L	147	111	126	147	110	121	147	120	127	0	0	0	147	120	132	147	116	128
Energy (MMBtu/Bbl)	5.011	4.902	4.948	5.002	4.864	4.905	5.004	4.947	4.961	0.000	0.000	0.000	5.049	4.964	5.001	5.027	4.928	4.967
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.704	3.744	3.727	3.698	3.755	3.738	3.713	3.728	3.724	0.000	0.000	0.000	3.698	3.754	3.729	3.702	3.746	3.729
VOC Reduction	28.0			28.3			29.2			0.0						28.2 (voc,nox,tox ex-CA)		
NOX Reduction	14.2	11.9	12.8	15.5	12.9	13.7	15.6	12.7	13.5	0.0	0.0	0.0				14.6	12.3	13.1
Toxics Reduction	32.9	25.7	28.7	34.6	27.1	29.3	34.8	25.8	28.0	0.0	0.0	0.0				33.4	26.0	28.7
CG Reg																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxy Reg E10																		
Total BPD	2,047,808	1,821,950	1,916,006	1,852,169	1,534,164	1,666,593	1,301,295	903,540	1,069,180	722,471	633,684	670,658	118,758	113,056	115,431	6,042,502	5,006,394	5,437,869
Ethanol BPD	206,849	184,035	193,536	187,088	154,966	168,343	131,444	91,267	107,998	72,977	64,008	67,743	11,996	11,420	11,660	610,354	505,696	549,280
RVP	9.3	13.7	11.7	9.3	13.3	11.4	8.9	11.8	10.3	9.1	12.9	11.2	9.0	11.7	10.6	9.1	13.1	11.3
Sulfur ppm	24	24	24	25	25	25	25	25	25	28	28	28	28	27	27	25	25	25
Density	259.0	258.4	258.7	260.1	258.0	259.0	258.9	260.1	259.5	258.7	257.5	258.1	264.4	264.4	264.4	259.4	258.6	259.0
R+M/2	87.1	87.2	87.1	87.0	87.0	87.0	87.1	87.0	87.1	86.0	86.0	86.0	87.9	89.4	88.8	87.0	87.0	87.0
Aromatics	22.4	22.3	22.4	22.5	22.5	22.5	22.5	22.5	22.5	18.9	18.2	18.6	28.5	30.0	29.3	22.1	22.1	22.1
Benzene	0.53	0.52	0.53	0.54	0.54	0.54	0.54	0.53	0.54	1.06	1.17	1.12	0.58	0.59	0.59	0.60	0.61	0.61
Olefins	14.2	15.0	14.6	10.7	12.0	11.4	12.4	13.9	13.1	6.8	7.5	7.2	16.3	15.2	15.7	11.9	12.9	12.4
Oxygen (wt%)	3.723	3.730	3.727	3.706	3.737	3.723	3.723	3.707	3.715	3.726	3.744	3.736	3.647	3.647	3.647	3.717	3.728	3.723
E200	58	55	56	59	60	59	61	54	58	63	65	64	56	55	56	59	57	58
E300	95	95	95	95	95	95	95	95	95	96	96	96	86	86	86	95	95	95
T10	123	95	107	123	97	109	125	107	116	124	99	110	124	107	114	123	98	110
T50	184	190	187	181	180	181	178	191	184	173	170	171	188	189	188	181	185	183
T90	273	273	273	273	273	273	273	273	273	271	271	271	315	315	315	274	274	274
DVI	1,009	985	996	1,001	960	979	994	1,007	1,000	976	929	950	1,064	1,042	1,051	1,000	976	987
V/L	132	110	120	132	110	120	134	120	127	132	110	120	134	120	126	132	112	122
Energy (MMBtu/Bbl)	4.966	4.931	4.947	4.949	4.916	4.931	4.940	4.972	4.956	5.025	4.953	4.985	5.040	4.956	4.992	4.964	4.937	4.950
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.723	3.730	3.727	3.706	3.737	3.723	3.723	3.707	3.715	3.726	3.744	3.736	3.647	3.647	3.647	3.717	3.728	3.723
Exhaust Toxics	56.8	92.0	76.4	55.8	89.7	74.0	55.9	92.0	73.7	56.6	90.3	75.1	60.2	97.5	81.5	56.4	91.2	75.1
NOX	1,208	1,376	1,301	1,182	1,352	1,273	1,194	1,364	1,278	1,155	1,310	1,241	1,250	1,407	1,340	1,192	1,359	1,281
Oxy Prem E10																		
Total BPD	390,078	181,681	268,466	352,813	335,475	342,695	247,885	271,932	261,918	137,633	146,075	142,559	22,621	21,535	21,987	1,151,029	956,697	1,037,624
Ethanol BPD	39,402	18,352	27,118	35,638	33,886	34,616	25,039	27,468	26,456	13,902	14,755	14,400	2,285	2,175	2,221	116,266	96,636	104,811
RVP	9.3	13.7	11.0	9.3	13.6	11.7	8.9	12.1	10.8	9.1	13.0	11.4	9.0	12.0	10.8	9.2	13.1	11.3
Sulfur ppm	25	25	25	10	23	17	8	11	10	28	28	28	27	15	20	17	20	19
Density	262.8	259.1	261.3	261.7	259.2	260.3	261.2	258.0	259.3	261.6	248.8	254.1	258.3	263.9	261.5	261.9	257.4	259.5
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.8	92.7	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	20.9	21.5	21.4	4.5	11.3	15.7	30.0	23.9	22.2	19.5	20.7
Benzene	0.50	0.53	0.51	0.29	0.53	0.43	0.29	0.35	0.33	1.30	0.20	0.64	0.43	0.44	0.44	0.48	0.43	0.45
Olefins	15.3	14.2	14.9	4.7	12.2	9.0	4.9	8.0	6.8	8.8	8.3	8.5	16.2	9.0	12.1	9.1	10.7	9.9
Oxygen (wt%)	3.669	3.721	3.689	3.683	3.720	3.704	3.691	3.737	3.719	3.685	3.874	3.796	3.732	3.653	3.687	3.681	3.746	3.716
E200	50	55	52	46	54	51	46	49	48	53	64	59	58	50	54	48	54	52
E300	95	95	95	95	95	95	95	95	95	96	96	96	86	86	86	95	95	95
T10	123	94	112	123	95	107	125	105	113	124	99	109	124	105	113	123	99	110
T50	199	191	196	209	191	198	208	201	204	195	172	181	183	199	192	203	191	197
T90	273	273	273	273	273	273	273	273	273	271	271	271	315	315	315	274	274	274
DVI	1,053	986	1,027	1,083	988	1,029	1,084	1,033	1,054	1,041	936	978	1,049	1,070	1,061	1,068	994	1,028
V/L	135	110	125	137	110	122	139	120	127	135	110	120	133	120	126	136	113	124
Energy (MMBtu/Bbl)	4.982	4.899	4.949	4.969	4.896	4.927	4.973	4.907	4.933	4.964	4.779	4.853	4.902	4.961	4.936	4.972	4.883	4.924
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.669	3.721	3.689	3.683	3.720	3.704	3.691	3.737	3.719	3.685	3.874	3.796	3.732	3.653	3.687	3.681	3.746	3.716
Exhaust Toxics	58.5	91.9	71.7	56.9	91.5	76.7	56.8	90.8	77.4	61.4	78.9	71.9	54.6	96.0	78.2	57.9	89.6	75.0
NOX	1,214	1,368	1,275	1,143	1,348	1,260	1,141	1,302	1,239	1,165	1,267	1,226	1,199	1,341	1,280	1,170	1,326	1,254

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,437,886	2,003,632	2,184,472	2,204,982	1,869,638	2,009,288	1,549,180	1,175,471	1,331,098	860,104	779,759	813,217	141,379	134,591	137,418	7,193,530	5,963,091	6,475,493
Ethanol BPD	246,251	202,387	220,654	222,725	188,852	202,958	156,483	118,734	134,454	86,879	78,763	82,143	14,281	13,595	13,881	726,619	602,332	654,090
RVP	9.3	13.7	11.6	9.3	13.3	11.5	8.9	11.9	10.4	9.1	12.9	11.2	9.0	11.8	10.6	9.1	13.1	11.3
Sulfur ppm	24	24	24	23	25	24	22	22	22	28	28	28	28	25	26	24	24	24
Density	259.6	258.5	259.0	260.4	258.2	259.2	259.3	259.6	259.5	259.2	255.9	257.4	263.4	264.3	263.9	259.8	258.4	259.1
R+M/2	88.1	87.7	87.9	88.0	88.1	88.0	88.1	88.4	88.2	86.9	87.0	87.0	88.4	89.7	89.1	87.9	87.9	87.9
Aromatics	22.4	22.4	22.4	22.5	22.5	22.5	22.5	22.1	22.3	19.3	15.7	17.3	26.4	30.0	28.5	22.2	21.7	21.9
Benzene	0.53	0.52	0.53	0.50	0.54	0.52	0.50	0.49	0.50	1.10	0.99	1.04	0.55	0.57	0.56	0.58	0.58	0.58
Olefins	14.4	14.9	14.7	9.7	12.0	11.0	11.2	12.5	11.9	7.1	7.6	7.4	16.3	14.2	15.1	11.4	12.6	12.0
Oxygen (wt%)	3.714	3.729	3.722	3.703	3.734	3.719	3.718	3.714	3.716	3.720	3.767	3.746	3.660	3.648	3.653	3.711	3.731	3.721
E200	57	55	56	57	59	58	58	53	56	61	65	63	56	55	55	58	57	57
E300	95	95	95	95	95	95	95	95	95	96	96	96	86	86	86	95	95	95
T10	123	95	108	123	97	109	125	106	115	124	99	110	124	107	114	123	98	110
T50	186	190	188	186	182	184	182	194	188	176	170	173	187	190	189	184	186	185
T90	273	273	273	273	273	273	273	273	273	271	271	271	315	315	315	274	274	274
DVI	1,016	985	1,000	1,014	965	987	1,008	1,013	1,011	986	930	955	1,061	1,047	1,053	1,011	979	994
V/L	133	110	120	133	110	121	134	120	127	132	110	120	134	120	126	133	112	122
Energy (MMBtu/Bbl)	4.968	4.928	4.947	4.952	4.913	4.931	4.945	4.957	4.951	5.015	4.921	4.962	5.018	4.957	4.983	4.965	4.929	4.946
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.714	3.729	3.722	3.703	3.734	3.719	3.718	3.714	3.716	3.720	3.767	3.746	3.660	3.648	3.653	3.711	3.731	3.721
Exhaust Toxics	57.1	92.0	75.8	56.0	90.0	74.5	56.0	91.7	74.4	57.3	88.1	74.6	59.3	97.3	81.0	56.6	90.9	75.1
NOX	1,209	1,375	1,298	1,176	1,351	1,271	1,186	1,350	1,270	1,157	1,302	1,238	1,242	1,396	1,330	1,188	1,354	1,277
E85 to CG																		
Total BPD	100.0	267,385.4	156,077.5	100.0	227,079.6	132,556.6	100.0	524,102.6	305,887.8	100.0	133,207.8	77,776.6	0.0	0.0	0.0	400.0	1,151,775.4	672,298.5
Ethanol BPD	85.9	229,553.0	133,994.1	85.9	194,950.1	113,801.2	85.9	449,947.3	262,607.8	85.9	114,360.3	66,772.0	0.0	0.0	0.0	343.4	988,810.8	577,175.0
RVP	8.0	11.0	11.0	8.0	12.2	12.2	8.0	12.4	12.4	8.0	12.0	12.0	0.0	0.0	0.0	8.0	12.0	12.0
Sulfur ppm	10.7	9.8	9.8	10.7	8.8	8.8	10.6	8.8	8.8	10.9	8.8	8.8	0.0	0.0	0.0	10.7	9.1	9.1
Density	270.2	268.0	268.0	270.2	266.3	266.3	270.1	266.2	266.2	270.1	266.2	266.2	0.0	0.0	0.0	270.1	266.6	266.6
R+M/2	107.4	107.8	107.8	107.4	108.0	108.0	107.4	108.0	108.0	107.3	107.9	107.9	0.0	0.0	0.0	107.4	108.0	108.0
Aromatics	1.9	1.0	1.0	1.9	0.0	0.0	1.9	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	1.8	0.2	0.2
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Olefins	1.2	2.8	2.8	1.2	3.0	3.0	1.1	3.0	3.0	0.6	1.1	1.1	0.0	0.0	0.0	1.0	2.8	2.7
Oxygen (wt%)	30.330	30.573	30.573	30.330	30.772	30.772	30.334	30.781	30.781	30.334	30.785	30.784	0.000	0.000	0.000	30.332	30.731	30.731
E200	125.7	127.8	127.8	125.7	130.1	130.1	125.7	130.1	130.1	125.9	129.6	129.6	0.0	0.0	0.0	125.7	129.5	129.5
E300	95.4	95.8	95.8	95.4	96.6	96.6	95.4	96.6	96.6	95.8	96.6	96.6	0.0	0.0	0.0	95.5	96.4	96.4
T10	131	112	112	131	104	104	131	103	103	131	105	105	0	0	0	131	105	105
T50	45	41	41	45	36	36	45	36	36	45	37	37	0	0	0	45	38	38
T90	273	271	271	273	268	268	273	268	268	271	268	268	0	0	0	273	268	268
DVI	605	561	561	605	532	532	605	530	530	602	537	537	0	0	0	604	539	539
V/L	116	99	99	116	91	91	116	90	90	116	93	93	0	0	0	116	93	93
Energy (MMBtu/Bbl)	3.688	3.635	3.635	3.688	3.599	3.599	3.684	3.597	3.597	3.692	3.596	3.596	0.000	0.000	0.000	3.688	3.606	3.606
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	30.3	30.6	30.6	30.3	30.8	30.8	30.3	30.8	30.8	30.3	30.8	30.8	0.0	0.0	0.0	30.3	30.7	30.7
E85 to RFG																		
Total BPD	417,542.8	383,628.8	397,751.9	167,586.9	100.0	69,848.0	299,701.3	100.0	124,865.5	0.0	0.0	0.0	45,480.5	202,837.0	137,307.7	930,311.5	586,665.8	729,773.0
Ethanol BPD	358,464.7	329,349.3	341,474.0	143,875.1	85.9	59,965.2	257,296.6	85.9	107,198.3	0.0	0.0	0.0	39,045.5	174,137.6	117,880.0	798,681.8	503,658.5	626,517.5
RVP	8.0	11.0	9.7	8.0	12.2	8.0	8.0	12.4	8.0	0.0	0.0	0.0	8.0	12.3	11.7	8.0	11.4	9.6
Sulfur ppm	10.2	9.8	9.9	10.4	8.8	10.4	10.5	8.8	10.5	0.0	0.0	0.0	9.4	8.8	8.9	10.3	9.5	9.9
Density	270.2	267.9	268.9	270.0	266.3	270.0	270.1	266.2	270.1	0.0	0.0	0.0	270.1	266.1	266.7	270.1	267.3	268.8
R+M/2	107.4	107.8	107.6	107.4	108.0	107.4	107.4	108.0	107.4	0.0	0.0	0.0	107.4	108.0	107.9	107.4	107.9	107.6
Aromatics	1.6	0.9	1.2	1.6	0.0	1.6	1.6	0.0	1.6	0.0	0.0	0.0	1.9	0.0	0.3	1.6	0.6	1.1
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Olefins	0.8	2.8	2.0	0.4	3.0	0.4	0.4	3.0	0.4	0.0	0.0	0.0	0.5	1.3	1.2	0.6	2.3	1.4
Oxygen (wt%)	30.322	30.581	30.467	30.342	30.772	30.342	30.341	30.781	30.341	0.000	0.000	0.000	30.331	30.794	30.729	30.332	30.654	30.482
E200	125.1	128.0	126.7	125.2	130.1	125.2	125.1	130.1	125.1	0.0	0.0	0.0	125.3	129.7	129.1	125.1	128.6	126.7
E300	95.1	95.9	95.5	95.2	96.6	95.2	95.2	96.6	95.2	0.0	0.0	0.0	95.5	96.6	96.5	95.2	96.2	95.6
T10	131	112	120	131	104	131	131	103	131	0	0	0	131	104	107	131	109	120
T50	47	41	43	46	36	46	46	36	46	0	0	0	46	37	38	46	39	43
T90	275	271	272	274	268	274	274	268	274	0	0	0	272	268	268	274	270	272
DVI	610	560	582	609	532	609	609	530	609	0	0	0	607	534	544	610	551	582
V/L	116	99	106	116	91	116	116	90	116	0	0	0	116	91	95	116	96	107
Energy (MMBtu/Bbl)	3.689	3.634	3.658	3.688	3.599	3.688	3.688	3.597	3.688	0.000	0.000	0.000	3.691	3.593	3.607	3.689	3.620	3.656
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	30.3	30.6	30.5	30.3	30.8	30.3	30.3	30.8	30.3	0.0	0.0	0.0	30.3	30.8	30.7	30.3	30.7	30.5

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	417,642.8	651,014.2	553,829.4	167,686.9	227,179.6	202,404.6	299,801.3	524,202.6	430,753.3	100.0	133,207.8	77,776.6	45,480.5	202,837.0	137,307.7	930,711.5	1,738,441.2	1,402,071.5
Ethanol BPD	358,550.5	558,902.3	475,468.1	143,960.9	195,036.0	173,766.3	257,382.4	450,033.2	369,806.0	85.9	114,360.3	66,772.0	39,045.5	174,137.6	117,880.0	799,025.2	1,492,469.3	1,203,692.6
RVP	8.0	11.0	10.1	8.0	12.2	10.8	8.0	12.4	11.1	8.0	12.0	12.0	8.0	12.3	11.7	8.0	11.8	10.8
Sulfur ppm	10.2	9.8	9.9	10.4	8.8	9.4	10.5	8.8	9.3	10.9	8.8	8.8	9.4	8.8	8.9	10.3	9.2	9.5
Density	270.2	268.0	268.7	270.0	266.3	267.6	270.1	266.2	267.3	270.1	266.2	266.2	270.1	266.1	266.7	270.1	266.9	267.8
R+M/2	107.4	107.8	107.7	107.4	108.0	107.8	107.4	108.0	107.9	107.3	107.9	107.9	107.4	108.0	107.9	107.4	107.9	107.8
Aromatics	1.6	0.9	1.1	1.6	0.0	0.6	1.6	0.0	0.5	1.6	0.0	0.0	1.9	0.0	0.3	1.6	0.3	0.7
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Olefins	0.8	2.8	2.2	0.4	3.0	2.1	0.4	3.0	2.2	0.6	1.1	1.1	0.5	1.3	1.2	0.6	2.6	2.0
Oxygen (wt%)	30.322	30.577	30.497	30.342	30.772	30.622	30.341	30.781	30.652	30.334	30.785	30.784	30.331	30.794	30.729	30.332	30.705	30.601
E200	125.1	127.9	127.0	125.2	130.1	128.4	125.1	130.1	128.7	125.9	129.6	129.6	125.3	129.7	129.1	125.1	129.2	128.1
E300	95.1	95.9	95.6	95.2	96.6	96.1	95.2	96.6	96.2	95.8	96.6	96.6	95.5	96.6	96.5	95.2	96.3	96.0
T10	131	112	118	131	104	113	131	103	111	131	105	105	131	104	107	131	106	113
T50	47	41	43	46	36	40	46	36	39	45	37	37	46	37	38	46	38	40
T90	275	271	272	274	268	270	274	268	269	271	268	268	272	268	268	274	269	270
DVI	610	561	576	609	532	559	609	530	553	602	537	537	607	534	544	610	543	561
V/L	116	99	104	116	91	100	116	90	98	116	93	93	116	91	95	116	94	100
Energy (MMBtu/Bbl)	3.689	3.634	3.652	3.688	3.599	3.630	3.688	3.597	3.623	3.692	3.596	3.596	3.691	3.593	3.607	3.689	3.611	3.632
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	30.3	30.6	30.5	30.3	30.8	30.6	30.3	30.8	30.7	30.3	30.8	30.8	30.3	30.8	30.7	30.3	30.7	30.6
ALL MOGAS																		
Total BPD	4,234,133	4,042,575	4,122,347	2,615,209	2,503,150	2,549,815	2,118,257	2,279,142	2,212,143	860,204	912,966	890,994	1,731,050	1,765,443	1,751,120	11,558,852	11,503,276	11,526,420
Ethanol BPD	744,055	901,484	835,924	391,185	424,932	410,879	441,065	627,300	549,744	86,965	193,124	148,915	209,305	331,977	280,891	1,872,575	2,478,816	2,226,354
RVP	8.4	13.1	11.1	9.0	13.2	11.4	8.5	12.0	10.6	9.1	12.8	11.3	7.0	11.5	9.7	8.4	12.6	10.9
Sulfur ppm	22	22	22	21	23	22	20	19	19	28	25	26	11	11	11	21	20	20
Density	260.9	259.7	260.2	261.0	258.7	259.7	260.9	260.9	260.9	259.2	257.5	258.2	261.2	258.5	259.6	260.9	259.4	260.0
R+M/2	90.1	91.1	90.7	89.3	89.9	89.6	90.9	92.8	92.1	86.9	90.1	88.8	88.2	90.2	89.4	89.5	91.0	90.4
Aromatics	19.5	18.1	18.7	20.8	20.1	20.4	19.0	16.5	17.5	19.3	13.4	15.8	21.4	20.0	20.6	20.0	18.1	18.9
Benzene	0.50	0.46	0.48	0.47	0.49	0.48	0.44	0.37	0.40	1.10	0.85	0.95	0.56	0.43	0.48	0.53	0.48	0.50
Olefins	11.0	12.7	12.0	8.9	11.2	10.2	8.9	10.4	9.8	7.1	6.7	6.9	6.4	5.8	6.1	9.2	10.4	9.9
Oxygen (wt%)	6.430	8.196	7.438	5.469	6.263	5.922	7.618	10.070	9.092	3.723	7.843	6.180	4.419	6.944	5.898	5.928	7.930	7.092
E200	62	68	65	61	66	64	67	71	70	61	74	69	56	68	63	62	68	66
E300	95	95	95	95	95	95	95	96	96	96	96	96	86	87	87	94	94	94
T10	128	98	111	124	98	109	128	105	114	124	100	110	137	108	120	128	101	113
T50	176	164	169	178	168	172	165	157	160	176	151	161	188	164	174	176	162	168
T90	274	273	273	273	273	273	273	272	272	271	271	271	314	310	311	279	278	279
DVI	993	912	947	993	923	953	960	900	924	986	873	918	1,082	963	1,012	1,000	917	952
V/L	136	108	120	133	109	119	133	113	121	132	108	118	145	117	128	136	111	121
Energy (MMBtu/Bbl)	4.856	4.711	4.773	4.876	4.786	4.824	4.775	4.642	4.695	5.015	4.727	4.843	5.010	4.806	4.890	4.881	4.729	4.792
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	6.430	8.196	7.438	5.469	6.263	5.922	7.618	10.070	9.092	3.723	7.843	6.180	4.419	6.944	5.898	5.928	7.930	7.092

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0			0.0			0.0			0.0						0.0 (voc,nox,tox ex-CA)		
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
RFG Reg E20																		
Total BPD	1,496,612	1,415,418	1,449,230	344,406	341,303	342,595	477,841	298,798	373,358	0	0	0	1,410,010	1,407,458	1,408,521	3,728,869	3,462,977	3,573,705
Ethanol BPD	302,331	285,929	292,759	69,574	68,947	69,208	96,529	60,360	75,422	0	0	0	284,836	284,321	284,535	753,269	699,556	721,924
RVP	7.0	12.6	10.2	7.0	12.4	10.1	7.0	11.1	8.9	0.0	0.0	0.0	6.8	11.0	9.2	6.9	11.8	9.7
Sulfur ppm	18	23	20	16	23	20	23	23	23	0	0	0	10	10	10	15	18	17
Density	262.9	256.8	259.5	264.2	257.5	260.3	262.5	260.6	261.6	0.0	0.0	0.0	264.7	260.9	262.5	263.6	258.9	261.0
R+M/2	89.7	89.7	89.7	89.6	89.6	89.6	89.6	89.6	89.6	0.0	0.0	0.0	87.6	88.0	87.8	88.9	89.0	88.9
Aromatics	17.7	12.5	14.7	17.8	14.1	15.6	16.1	16.7	16.4	0.0	0.0	0.0	18.1	22.7	20.8	17.7	17.2	17.4
Benzene	0.53	0.42	0.47	0.52	0.39	0.44	0.53	0.41	0.48	0.00	0.00	0.00	0.62	0.46	0.53	0.56	0.43	0.49
Olefins	9.3	12.9	11.4	5.5	10.0	8.1	4.9	11.3	7.9	0.0	0.0	0.0	5.7	5.7	5.7	7.0	9.6	8.4
Oxygen (wt%)	7.335	7.508	7.432	7.298	7.489	7.407	7.346	7.400	7.371	0.000	0.000	0.000	7.285	7.390	7.345	7.314	7.448	7.389
E200	59	72	66	59	73	67	58	64	61	0	0	0	59	66	63	59	69	65
E300	84	91	88	82	90	87	82	85	83	0	0	0	86	86	86	85	89	87
T10	137	102	117	137	103	117	137	111	125	0	0	0	138	112	123	138	107	120
T50	182	155	166	182	153	165	184	171	178	0	0	0	182	166	173	182	161	170
T90	323	291	305	332	297	312	334	322	328	0	0	0	315	315	315	322	304	312
DVI	1,073	908	979	1,085	911	984	1,092	1,000	1,049	0	0	0	1,068	982	1,017	1,075	946	1,002
V/L	144	110	125	144	110	125	145	120	133	0	0	0	145	120	131	145	115	128
Energy (MMBtu/Bbl)	4.862	4.724	4.783	4.881	4.697	4.774	4.875	4.810	4.844	0.000	0.000	0.000	4.956	4.868	4.905	4.901	4.787	4.837
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	7.335	7.508	7.432	7.298	7.489	7.407	7.346	7.400	7.371	0.000	0.000	0.000	7.285	7.390	7.345	7.314	7.448	7.389
VOC Reduction	30.4	0.0		29.5	0.0		30.9	0.0		0.0	0.0					30.3 (voc,nox,tox ex-CA)		
NOX Reduction	15.1	14.8	14.9	15.9	15.5	15.7	16.2	14.5	15.4	0.0	0.0	0.0				15.4	14.9	15.1
Toxics Reduction	22.7	17.9	19.9	22.1	17.5	19.4	21.9	13.7	18.1	0.0	0.0	0.0				22.4	17.2	19.5
RFG Prem E10																		
Total BPD	285,088	269,622	276,063	65,620	65,029	65,275	91,036	92,731	92,025	0	0	0	261,083	246,758	252,723	702,828	674,140	686,087
Ethanol BPD	28,797	27,235	27,885	6,628	6,569	6,593	9,196	9,367	9,295	0	0	0	26,372	24,925	25,528	70,993	68,095	69,302
RVP	7.0	13.7	10.8	7.0	13.3	10.7	7.0	11.3	9.5	0.0	0.0	0.0	6.8	11.6	9.5	6.9	12.6	10.2
Sulfur ppm	24	1	11	16	1	7	13	19	17	0	0	0	7	6	6	16	5	10
Density	263.0	256.3	259.2	259.4	254.4	256.5	258.5	250.7	254.0	0.0	0.0	0.0	254.7	252.7	253.5	259.0	254.0	256.2
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.3	92.3
Aromatics	20.0	20.0	20.0	14.5	18.7	16.9	14.6	5.2	9.1	0.0	0.0	0.0	6.3	11.7	9.4	13.7	14.8	14.3
Benzene	0.43	0.45	0.44	0.28	0.30	0.29	0.29	0.25	0.27	0.00	0.00	0.00	0.16	0.19	0.17	0.30	0.31	0.30
Olefins	14.4	3.5	8.2	7.5	2.9	4.8	8.2	10.8	9.7	0.0	0.0	0.0	5.7	5.7	5.7	9.7	5.2	7.1
Oxygen (wt%)	3.666	3.761	3.720	3.716	3.789	3.758	3.730	3.845	3.797	0.000	0.000	0.000	3.785	3.816	3.802	3.722	3.795	3.764
E200	50	54	52	51	59	55	51	62	57	0	0	0	54	58	56	51	57	55
E300	95	95	95	95	95	95	95	95	95	0	0	0	86	86	86	92	92	92
T10	137	94	113	137	97	114	137	110	121	0	0	0	138	108	121	138	102	117
T50	200	192	195	199	182	189	199	176	185	0	0	0	192	184	188	197	186	191
T90	275	275	275	275	275	275	275	275	275	0	0	0	315	315	315	290	290	290
DVI	1,080	992	1,030	1,076	966	1,012	1,076	967	1,012	0	0	0	1,100	1,029	1,060	1,087	1,000	1,037
V/L	147	110	126	147	110	126	147	120	131	0	0	0	147	120	132	147	115	129
Energy (MMBtu/Bbl)	5.001	4.866	4.924	4.938	4.758	4.833	4.951	4.802	4.863	0.000	0.000	0.000	4.943	4.874	4.904	4.967	4.850	4.900
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.666	3.761	3.720	3.716	3.789	3.758	3.730	3.845	3.797	0.000	0.000	0.000	3.785	3.816	3.802	3.722	3.795	3.764
VOC Reduction	28.6	0.0		28.9	0.0		30.3	0.0		0.0	0.0					29.0 (voc,nox,tox ex-CA)		
NOX Reduction	11.7	16.6	14.5	17.0	16.6	16.8	16.9	17.4	17.2	0.0	0.0	0.0				13.5	16.8	15.4
Toxics Reduction	33.4	27.1	29.8	37.2	29.1	32.5	37.5	33.7	35.3	0.0	0.0	0.0				34.8	28.8	31.4

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,781,700	1,685,040	1,725,293	410,026	406,332	407,870	568,877	391,529	465,383	0	0	0	1,671,093	1,654,216	1,661,244	4,431,697	4,137,117	4,259,791
Ethanol BPD	331,128	313,163	320,644	76,202	75,515	75,801	105,724	69,727	84,718	0	0	0	311,208	309,246	310,063	824,262	767,651	791,226
RVP	7.0	12.8	10.3	7.0	12.6	10.2	7.0	11.2	9.1	0.0	0.0	0.0	6.8	11.1	9.3	6.9	11.9	9.8
Sulfur ppm	19	19	19	16	20	18	22	22	22	0	0	0	9	9	9	15	16	15
Density	262.9	256.7	259.4	263.5	257.0	259.7	261.8	258.3	260.1	0.0	0.0	0.0	263.2	259.7	261.2	262.9	258.1	260.2
R+M/2	90.2	90.2	90.2	90.2	90.2	90.2	90.2	90.4	90.3	0.0	0.0	0.0	88.1	88.5	88.3	89.4	89.5	89.5
Aromatics	18.0	13.7	15.6	17.2	14.8	15.8	15.9	14.0	15.0	0.0	0.0	0.0	16.3	21.1	19.1	17.0	16.8	16.9
Benzene	0.51	0.43	0.46	0.48	0.37	0.42	0.49	0.37	0.44	0.00	0.00	0.00	0.55	0.42	0.47	0.52	0.41	0.46
Olefins	10.1	11.4	10.8	5.8	8.9	7.6	5.4	11.1	8.2	0.0	0.0	0.0	5.7	5.7	5.7	7.4	8.9	8.2
Oxygen (wt%)	6.747	6.909	6.839	6.733	6.902	6.830	6.774	6.582	6.681	0.000	0.000	0.000	6.755	6.871	6.822	6.752	6.862	6.814
E200	58	69	64	57	71	65	57	64	60	0	0	0	58	65	62	58	67	63
E300	86	92	89	84	91	88	84	87	86	0	0	0	86	86	86	86	89	88
T10	137	100	116	137	102	117	137	110	124	0	0	0	138	111	123	138	106	120
T50	184	161	171	185	158	169	186	172	179	0	0	0	183	169	175	184	165	173
T90	315	289	300	323	294	306	324	311	318	0	0	0	315	315	315	317	302	308
DVI	1,074	921	987	1,083	920	988	1,089	992	1,042	0	0	0	1,073	989	1,024	1,076	955	1,008
V/L	145	110	125	145	110	125	145	120	133	0	0	0	146	120	131	145	115	128
Energy (MMBtu/Bbl)	4.884	4.747	4.806	4.890	4.707	4.784	4.887	4.808	4.848	0.000	0.000	0.000	4.954	4.869	4.905	4.911	4.798	4.847
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	6.747	6.909	6.839	6.733	6.902	6.830	6.774	6.582	6.681	0.000	0.000	0.000	6.755	6.871	6.822	6.752	6.862	6.814
VOC Reduction	30.1			29.4			30.8			0.0						30.1 (voc,nox,tox ex-CA)		
NOX Reduction	14.5	15.1	14.8	16.1	15.7	15.8	16.3	15.2	15.8	0.0	0.0	0.0				15.1	15.2	15.2
Toxics Reduction	24.4	19.3	21.5	24.5	19.3	21.5	24.4	18.5	21.5	0.0	0.0	0.0				24.4	19.2	21.5
CG Reg																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Reg E20																		
Total BPD	2,090,006	1,951,757	2,009,329	1,878,321	1,786,175	1,824,548	1,322,478	1,450,334	1,397,090	731,073	775,922	757,245	136,739	116,738	125,067	6,158,616	6,080,925	6,113,278
Ethanol BPD	422,202	394,275	405,905	379,440	360,825	368,577	267,154	292,982	282,226	147,684	156,744	152,971	27,623	23,582	25,265	1,244,103	1,228,408	1,234,944
RVP	9.3	13.2	11.5	9.3	12.8	11.3	8.9	11.3	10.3	9.1	12.4	11.1	9.0	10.8	10.0	9.2	12.4	11.1
Sulfur ppm	22	22	22	23	23	23	23	23	23	28	28	28	28	28	28	24	24	24
Density	262.0	260.5	261.2	263.5	260.3	261.7	262.9	262.1	262.4	263.5	258.0	260.2	267.5	263.4	265.3	263.0	260.6	261.6
R+M/2	89.7	89.8	89.7	89.6	89.6	89.6	89.6	89.6	89.6	86.6	86.3	86.4	90.6	89.8	90.2	89.3	89.2	89.3
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	18.8	11.4	14.4	25.4	22.1	23.6	19.9	18.9	19.3
Benzene	0.47	0.45	0.46	0.46	0.47	0.47	0.48	0.48	0.48	1.30	0.86	1.04	0.60	0.55	0.57	0.57	0.52	0.54
Olefins	12.9	12.6	12.7	9.8	10.5	10.2	12.5	11.4	11.8	5.9	6.2	6.1	18.7	17.7	18.2	11.2	11.0	11.0
Oxygen (wt%)	7.359	7.401	7.383	7.317	7.407	7.368	7.333	7.357	7.347	7.316	7.473	7.409	7.207	7.320	7.268	7.332	7.400	7.371
E200	65	63	64	65	68	66	65	63	63	65	73	70	65	69	67	65	66	65
E300	84	82	83	85	85	85	85	82	83	85	94	90	81	85	83	84	84	84
T10	123	98	109	123	101	110	125	110	116	124	103	111	124	113	118	123	102	111
T50	170	174	172	170	164	166	170	174	173	170	153	160	170	160	165	170	168	169
T90	323	334	329	322	321	321	323	333	329	322	280	297	338	319	327	323	323	323
DVI	1,017	1,002	1,008	1,016	964	986	1,021	1,020	1,020	1,018	893	943	1,034	969	998	1,018	980	996
V/L	130	110	119	130	110	119	132	120	125	131	110	119	131	120	125	131	113	120
Energy (MMBtu/Bbl)	4.801	4.788	4.793	4.811	4.771	4.788	4.839	4.825	4.831	4.871	4.772	4.812	4.843	4.801	4.820	4.821	4.790	4.803
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	7.359	7.401	7.383	7.317	7.407	7.368	7.333	7.357	7.347	7.316	7.473	7.409	7.207	7.320	7.268	7.332	7.400	7.371
Exhaust Toxics	66.2	107.1	89.4	65.6	104.6	87.9	65.8	106.7	90.6	69.4	99.7	87.5	69.0	105.6	88.9	66.4	105.3	89.0
NOX	1,188.4	1,342.7	1,275.9	1,169.0	1,332.6	1,262.5	1,184.4	1,334.3	1,275.2	1,152.6	1,273.3	1,224.8	1,276.9	1,424.1	1,357.1	1,179.3	1,330.4	1,267.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxy Reg E10																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxy Prem E10																		
Total BPD	347,880	324,620	334,306	326,661	310,443	317,197	226,702	249,140	239,796	129,031	136,945	133,649	11,890	22,236	17,928	1,042,164	1,043,385	1,042,876
Ethanol BPD	35,139	32,790	33,768	32,996	31,358	32,040	22,899	25,166	24,222	13,033	13,833	13,500	1,201	2,246	1,811	105,269	105,392	105,341
RVP	9.3	13.6	11.7	9.3	13.6	11.7	8.9	12.1	10.8	9.1	13.0	11.4	9.0	12.1	11.3	9.2	13.1	11.5
Sulfur ppm	25	19	22	16	24	21	9	10	10	28	28	28	1	12	9	19	20	19
Density	262.7	259.0	260.6	262.5	259.4	260.7	261.0	257.5	258.9	252.9	253.5	253.2	261.9	263.3	262.9	261.1	258.1	259.4
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.8	92.8	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	20.2	21.1	6.5	9.1	8.0	30.0	30.0	30.0	20.6	20.4	20.5
Benzene	0.43	0.41	0.42	0.34	0.52	0.45	0.31	0.29	0.30	0.32	1.30	0.90	0.31	0.43	0.39	0.36	0.53	0.46
Olefins	13.8	14.7	14.3	7.2	13.0	10.5	5.6	6.9	6.4	6.8	7.8	7.4	0.6	9.3	6.9	8.9	11.3	10.3
Oxygen (wt%)	3.670	3.722	3.699	3.673	3.717	3.698	3.694	3.744	3.724	3.813	3.803	3.807	3.681	3.662	3.667	3.693	3.735	3.718
E200	51	55	54	47	55	51	46	49	48	60	64	62	48	49	49	50	55	53
E300	96	96	96	95	95	95	95	95	95	95	95	95	86	86	86	95	95	95
T10	123	95	107	123	95	107	125	105	113	124	99	109	124	105	110	123	98	109
T50	198	189	193	207	190	197	208	202	204	179	172	175	204	201	202	201	190	195
T90	272	272	272	274	274	274	274	274	274	274	274	274	315	315	315	274	274	274
DVI	1,050	980	1,010	1,078	986	1,026	1,087	1,035	1,056	998	938	962	1,112	1,075	1,085	1,061	992	1,021
V/L	135	110	121	136	110	121	139	120	127	133	110	119	137	120	125	136	113	122
Energy (MMBtu/Bbl)	4.976	4.896	4.930	4.971	4.896	4.928	4.975	4.900	4.930	4.815	4.802	4.807	4.973	4.987	4.983	4.954	4.886	4.915
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.670	3.722	3.699	3.673	3.717	3.698	3.694	3.744	3.724	3.813	3.803	3.807	3.681	3.662	3.667	3.693	3.735	3.718
Exhaust Toxics	57.5	89.8	75.8	57.7	91.6	77.0	57.3	89.9	77.1	51.0	87.4	72.8	59.5	96.7	86.4	56.7	90.2	76.3
NOX	1,199	1,369	1,295	1,153	1,357	1,269	1,143	1,295	1,235	1,110	1,266	1,203	1,160	1,341	1,291	1,161	1,333	1,261

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,437,886	2,276,377	2,343,636	2,204,982	2,096,618	2,141,745	1,549,180	1,699,474	1,636,886	860,104	912,866	890,894	148,629	138,974	142,994	7,200,780	7,124,309	7,156,155
Ethanol BPD	457,342	427,065	439,673	412,436	392,183	400,617	290,053	318,148	306,448	160,717	170,577	166,471	28,824	25,828	27,076	1,349,372	1,333,801	1,340,285
RVP	9.3	13.2	11.5	9.3	12.9	11.3	8.9	11.4	10.4	9.1	12.5	11.1	9.0	11.0	10.2	9.2	12.5	11.1
Sulfur ppm	23	22	22	22	23	23	21	21	21	28	28	28	26	26	26	23	23	23
Density	262.1	260.3	261.1	263.3	260.2	261.5	262.7	261.4	261.9	262.0	257.3	259.2	267.1	263.4	265.0	262.7	260.2	261.3
R+M/2	90.2	90.2	90.2	90.1	90.1	90.1	90.1	90.1	90.1	87.3	87.1	87.2	90.7	90.0	90.3	89.8	89.8	89.8
Aromatics	20.2	20.2	20.2	20.4	20.4	20.4	20.4	20.0	20.2	16.9	11.0	13.4	25.8	23.4	24.4	20.0	19.1	19.5
Benzene	0.47	0.45	0.45	0.44	0.48	0.46	0.46	0.45	0.45	1.15	0.93	1.02	0.57	0.53	0.55	0.54	0.52	0.53
Olefins	13.0	12.9	12.9	9.4	10.9	10.2	11.5	10.8	11.0	6.0	6.5	6.3	17.2	16.4	16.8	10.8	11.0	10.9
Oxygen (wt%)	6.831	6.879	6.858	6.779	6.862	6.826	6.804	6.835	6.823	6.809	6.931	6.881	6.930	6.735	6.820	6.809	6.867	6.843
E200	63	62	62	62	66	64	62	61	61	64	72	68	63	66	65	62	64	63
E300	86	84	85	86	86	86	86	84	85	86	94	91	82	85	84	86	86	86
T10	123	97	108	123	100	110	125	109	116	124	102	111	124	112	117	123	102	111
T50	174	176	175	175	168	171	176	178	177	171	156	162	173	167	169	174	171	173
T90	316	325	321	315	314	314	315	324	321	315	279	294	336	318	326	316	316	316
DVI	1,021	999	1,008	1,025	967	992	1,030	1,023	1,026	1,015	900	946	1,040	986	1,009	1,024	982	1,000
V/L	131	110	119	131	110	119	133	120	125	131	110	119	132	120	125	131	113	120
Energy (MMBtu/Bbl)	4.826	4.803	4.813	4.834	4.790	4.809	4.859	4.836	4.845	4.863	4.776	4.811	4.854	4.831	4.841	4.841	4.804	4.819
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	6.831	6.879	6.858	6.779	6.862	6.826	6.804	6.835	6.823	6.809	6.931	6.881	6.930	6.735	6.820	6.809	6.867	6.843
Exhaust Toxics	65.0	104.6	87.5	64.5	102.7	86.3	64.6	104.2	88.6	66.6	97.8	85.3	68.3	104.2	88.6	65.0	103.1	87.1
NOX	1,190	1,346	1,279	1,167	1,336	1,263	1,178	1,328	1,269	1,146	1,272	1,222	1,268	1,411	1,349	1,177	1,331	1,266
E85 to CG																		
Total BPD	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0	400.0	400.0	400.0
Ethanol BPD	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9	0.0	0.0	0.0	343.4	343.4	343.4
RVP	8.0	12.3	10.5	8.0	12.2	10.5	8.0	12.2	10.4	8.0	11.9	10.3	0.0	0.0	0.0	8.0	12.2	10.4
Sulfur ppm	10.7	8.8	9.6	10.7	8.8	9.6	10.7	8.8	9.6	11.1	8.8	9.8	0.0	0.0	0.0	10.8	8.8	9.7
Density	270.3	266.3	268.0	270.3	266.3	268.0	270.3	266.2	267.9	270.4	266.1	267.9	0.0	0.0	0.0	270.3	266.2	267.9
R+M/2	107.4	108.0	107.8	107.4	108.0	107.7	107.4	108.0	107.7	107.1	107.9	107.6	0.0	0.0	0.0	107.3	108.0	107.7
Aromatics	1.9	0.0	0.8	1.9	0.0	0.8	1.9	0.0	0.8	1.8	0.0	0.7	0.0	0.0	0.0	1.9	0.0	0.8
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Olefins	1.1	3.0	2.2	1.2	3.0	2.2	1.2	2.4	1.9	0.6	0.0	0.2	0.0	0.0	0.0	1.0	2.1	1.6
Oxygen (wt%)	30.314	30.774	30.581	30.316	30.773	30.581	30.315	30.777	30.583	30.307	30.792	30.588	0.000	0.000	0.000	30.313	30.779	30.583
E200	125.6	130.1	128.2	125.4	130.1	128.1	125.3	129.9	128.0	125.3	129.3	127.7	0.0	0.0	0.0	125.4	129.9	128.0
E300	95.6	96.6	96.2	95.3	96.6	96.1	95.2	96.6	96.0	95.2	96.6	96.0	0.0	0.0	0.0	95.3	96.6	96.1
T10	131	103	115	131	104	115	131	104	115	131	106	116	0	0	0	131	104	115
T50	45	36	40	46	36	40	46	37	41	46	38	41	0	0	0	46	37	41
T90	272	268	270	274	268	270	274	268	270	274	268	270	0	0	0	273	268	270
DVI	605	532	562	607	532	564	608	534	565	608	540	568	0	0	0	607	535	565
V/L	116	91	101	116	91	101	116	92	102	116	93	103	0	0	0	116	92	102
Energy (MMBtu/Bbl)	3.683	3.599	3.634	3.687	3.599	3.636	3.689	3.598	3.636	3.692	3.594	3.635	0.000	0.000	0.000	3.688	3.597	3.635
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	30.3	30.8	30.6	30.3	30.8	30.6	30.3	30.8	30.6	30.3	30.8	30.6	0.0	0.0	0.0	30.3	30.8	30.6
E85 to RFG																		
Total BPD	100.0	100.0	100.0	100.0	100.0	100.0	100.0	188,038.6	109,773.8	0.0	0.0	0.0	100.0	100.0	100.0	400.0	188,338.6	110,073.8
Ethanol BPD	85.9	85.9	85.9	85.9	85.9	85.9	85.9	161,433.0	94,241.9	0.0	0.0	0.0	85.9	85.9	85.9	343.4	161,690.6	94,499.4
RVP	8.0	12.3	10.5	8.0	12.2	10.5	8.0	12.2	12.2	0.0	0.0	0.0	8.0	12.1	10.4	8.0	12.2	12.2
Sulfur ppm	10.4	8.8	9.5	10.4	8.8	9.5	10.6	8.8	8.8	0.0	0.0	0.0	9.4	8.8	9.1	10.2	8.8	8.8
Density	270.1	266.3	267.9	270.1	266.3	267.9	270.1	266.2	266.2	0.0	0.0	0.0	270.2	266.2	267.9	270.1	266.2	266.2
R+M/2	107.4	108.0	107.8	107.4	108.0	107.8	107.4	108.0	108.0	0.0	0.0	0.0	107.2	107.9	107.7	107.4	108.0	108.0
Aromatics	1.6	0.0	0.7	1.6	0.0	0.7	1.5	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.7	1.6	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
Olefins	0.5	3.0	2.0	0.5	3.0	2.0	0.4	2.4	2.3	0.0	0.0	0.0	0.5	1.5	1.1	0.5	2.4	2.3
Oxygen (wt%)	30.333	30.774	30.589	30.333	30.773	30.588	30.340	30.777	30.776	0.000	0.000	0.000	30.320	30.782	30.588	30.332	30.777	30.776
E200	124.9	130.1	127.9	124.9	130.1	127.9	124.9	129.9	129.9	0.0	0.0	0.0	125.0	129.7	127.8	124.9	129.9	129.9
E300	95.0	96.6	95.9	95.0	96.6	95.9	95.1	96.6	96.6	0.0	0.0	0.0	95.4	96.6	96.1	95.1	96.6	96.6
T10	131	103	115	131	104	115	131	104	104	0	0	0	131	105	116	131	104	104
T50	47	36	41	47	36	41	47	37	37	0	0	0	47	37	41	47	37	37
T90	275	268	271	275	268	271	275	268	268	0	0	0	273	268	270	274	268	268
DVI	612	532	565	612	532	565	612	534	534	0	0	0	609	536	566	611	534	534
V/L	116	91	101	116	91	102	116	92	92	0	0	0	116	92	102	116	92	92
Energy (MMBtu/Bbl)	3.689	3.599	3.636	3.689	3.599	3.636	3.688	3.598	3.598	0.000	0.000	0.000	3.695	3.597	3.637	3.690	3.598	3.598
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	30.3	30.8	30.6	30.3	30.8	30.6	30.3	30.8	30.8	0.0	0.0	0.0	30.3	30.8	30.6	30.3	30.8	30.8

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	200.0	200.0	200.0	200.0	200.0	200.0	200.0	188,138.6	109,873.8	100.0	100.0	100.0	100.0	100.0	100.0	800.0	188,738.6	110,473.8
Ethanol BPD	171.7	171.7	171.7	171.7	171.7	171.7	171.7	161,518.9	94,327.7	85.9	85.9	85.9	85.9	85.9	85.9	686.8	162,034.0	94,842.8
RVP	8.0	12.3	10.5	8.0	12.2	10.5	8.0	12.2	12.2	8.0	11.9	10.3	8.0	12.1	10.4	8.0	12.2	12.2
Sulfur ppm	10.5	8.8	9.5	10.5	8.8	9.5	10.6	8.8	8.8	11.1	8.8	9.8	9.4	8.8	9.1	10.5	8.8	8.8
Density	270.2	266.3	267.9	270.2	266.3	267.9	270.2	266.2	266.2	270.4	266.1	267.9	270.2	266.2	267.9	270.2	266.2	266.2
R+M/2	107.4	108.0	107.8	107.4	108.0	107.8	107.4	108.0	108.0	107.1	107.9	107.6	107.2	107.9	107.7	107.4	108.0	108.0
Aromatics	1.8	0.0	0.7	1.8	0.0	0.7	1.7	0.0	0.0	1.8	0.0	0.7	1.6	0.0	0.7	1.7	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0
Olefins	0.8	3.0	2.1	0.8	3.0	2.1	0.8	2.4	2.3	0.6	0.0	0.2	0.5	1.5	1.1	0.7	2.3	2.3
Oxygen (wt%)	30.324	30.774	30.585	30.324	30.773	30.584	30.328	30.777	30.776	30.307	30.792	30.588	30.320	30.782	30.588	30.322	30.777	30.775
E200	125.2	130.1	128.1	125.1	130.1	128.0	125.1	129.9	129.9	125.3	129.3	127.7	125.0	129.7	127.8	125.2	129.9	129.9
E300	95.3	96.6	96.1	95.1	96.6	96.0	95.1	96.6	96.6	95.2	96.6	96.0	95.4	96.6	96.1	95.2	96.6	96.6
T10	131	103	115	131	104	115	131	104	104	131	106	116	131	105	116	131	104	104
T50	46	36	40	46	36	41	47	37	37	46	38	41	47	37	41	46	37	37
T90	274	268	270	274	268	270	274	268	268	274	268	270	273	268	270	274	268	268
DVI	608	532	564	610	532	564	610	534	534	608	540	568	609	536	566	609	534	534
V/L	116	91	101	116	91	102	116	92	92	116	93	103	116	92	102	116	92	92
Energy (MMBtu/Bbl)	3.686	3.599	3.635	3.688	3.599	3.636	3.688	3.598	3.598	3.692	3.594	3.635	3.695	3.597	3.637	3.689	3.598	3.598
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	30.3	30.8	30.6	30.3	30.8	30.6	30.3	30.8	30.8	30.3	30.8	30.6	30.3	30.8	30.6	30.3	30.8	30.8
ALL MOGAS																		
Total BPD	4,219,786	3,961,617	4,069,129	2,615,208	2,503,150	2,549,815	2,118,257	2,279,142	2,212,143	860,204	912,966	890,994	1,819,822	1,793,290	1,804,339	11,633,277	11,450,165	11,526,420
Ethanol BPD	788,641	740,399	760,489	488,809	467,870	476,590	395,949	549,394	485,493	160,803	170,663	166,557	340,118	335,160	337,225	2,174,321	2,263,486	2,226,354
RVP	8.3	13.0	11.0	8.9	12.8	11.2	8.4	11.4	10.2	9.1	12.5	11.1	7.0	11.1	9.4	8.3	12.3	10.6
Sulfur ppm	21	21	21	21	23	22	21	20	21	28	28	28	11	11	11	20	20	20
Density	262.4	258.8	260.4	263.4	259.7	261.3	262.4	261.3	261.7	262.0	257.3	259.2	263.5	260.0	261.5	262.8	259.6	260.9
R+M/2	90.2	90.2	90.2	90.1	90.1	90.1	90.1	91.6	91.0	87.3	87.1	87.2	88.3	88.6	88.5	89.7	90.0	89.8
Aromatics	19.3	17.5	18.3	19.9	19.5	19.6	19.2	17.3	18.1	16.9	11.0	13.4	17.1	21.2	19.5	18.9	17.9	18.3
Benzene	0.49	0.44	0.46	0.45	0.46	0.46	0.47	0.40	0.43	1.15	0.93	1.02	0.55	0.43	0.48	0.53	0.47	0.50
Olefins	11.8	12.2	12.0	8.8	10.5	9.8	9.8	10.1	10.0	6.0	6.5	6.3	6.6	6.5	6.6	9.5	10.1	9.9
Oxygen (wt%)	6.797	6.893	6.851	6.774	6.871	6.829	6.798	8.806	8.003	6.812	6.934	6.884	6.771	6.862	6.823	6.789	7.270	7.066
E200	60	65	63	61	67	64	60	67	64	64	72	68	59	65	62	61	66	64
E300	86	87	87	86	87	87	86	86	86	86	94	91	86	86	86	86	87	87
T10	129	99	112	125	100	111	128	109	117	124	102	111	137	111	122	129	103	114
T50	178	169	173	177	166	171	178	165	171	171	156	162	182	169	175	178	167	172
T90	315	310	312	316	311	313	318	317	317	315	279	294	317	315	316	316	310	312
DVI	1,044	966	999	1,034	959	991	1,046	977	1,005	1,015	900	946	1,070	988	1,023	1,044	965	998
V/L	137	110	121	133	110	120	136	118	125	131	110	119	145	120	130	137	113	123
Energy (MMBtu/Bbl)	4.850	4.779	4.810	4.843	4.776	4.805	4.867	4.729	4.784	4.862	4.776	4.811	4.946	4.866	4.900	4.867	4.782	4.818
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	6.797	6.893	6.851	6.774	6.871	6.829	6.798	8.806	8.003	6.812	6.934	6.884	6.771	6.862	6.823	6.789	7.270	7.066

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 CONTROL C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,463,509	1,449,296	1,455,215	334,173	331,163	332,416	463,605	472,234	468,641	0	0	0	1,295,272	1,324,212	1,312,160	3,556,559	3,576,905	3,568,432
Ethanol BPD	147,814	146,379	146,977	33,751	33,447	33,574	46,824	47,696	47,333	0	0	0	130,822	133,759	132,536	359,212	361,281	360,419
RVP	7.0	13.4	10.7	7.0	13.1	10.5	7.0	11.7	9.7	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.4	10.1
Sulfur ppm	23	24	24	24	25	24	24	25	24	0	0	0	8	10	9	18	19	19
Density	259.8	256.7	258.0	261.5	256.1	258.4	259.5	258.4	258.8	0.0	0.0	0.0	261.2	257.4	259.0	260.5	257.1	258.5
R+M/2	87.1	87.1	87.1	87.0	87.0	87.0	87.0	87.0	87.0	0.0	0.0	0.0	87.0	87.0	87.0	87.1	87.1	87.1
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	22.7	22.9	22.8	20.9	21.0	21.0
Benzene	0.59	0.59	0.59	0.60	0.60	0.60	0.60	0.52	0.55	0.00	0.00	0.00	0.62	0.50	0.55	0.60	0.55	0.57
Olefins	9.0	13.4	11.6	7.8	11.9	10.2	5.1	12.9	9.7	0.0	0.0	0.0	5.7	5.7	5.7	7.2	10.3	9.0
Oxygen (wt%)	3.710	3.756	3.736	3.686	3.764	3.731	3.714	3.731	3.724	0.000	0.000	0.000	3.691	3.745	3.723	3.701	3.749	3.729
E200	52	59	56	53	62	59	52	56	54	0	0	0	54	60	58	53	59	57
E300	94	94	94	83	83	83	86	86	86	0	0	0	86	86	86	89	89	89
T10	137	96	113	137	98	115	137	107	120	0	0	0	138	109	121	138	103	117
T50	196	182	188	193	174	182	196	187	191	0	0	0	191	179	184	194	181	186
T90	280	280	280	330	330	330	317	317	317	0	0	0	315	315	315	302	302	302
DVI	1,074	971	1,014	1,114	1,001	1,048	1,109	1,039	1,068	0	0	0	1,095	1,016	1,049	1,090	1,000	1,037
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.015	4.908	4.953	5.010	4.897	4.944	5.029	4.960	4.988	0.000	0.000	0.000	5.049	4.980	5.009	5.029	4.941	4.977
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.710	3.756	3.736	3.686	3.764	3.731	3.714	3.731	3.724	0.000	0.000	0.000	3.691	3.745	3.723	3.701	3.749	3.729
VOC Reduction	28.1			28.1			28.8			0.0						28.3 (voc,nox,tox ex-CA)		
NOX Reduction	14.3	12.3	13.1	14.4	12.9	13.5	15.0	12.7	13.6	0.0	0.0	0.0				14.5	12.4	13.3
Toxics Reduction	32.9	25.8	28.7	33.1	27.2	29.7	33.4	25.7	28.9	0.0	0.0	0.0				33.0	26.0	28.9
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0					0.0 (voc,nox,tox ex-CA)		
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
RFG Prem E10																		
Total BPD	278,764	269,126	273,139	63,652	63,079	63,317	88,306	89,949	89,265	0	0	0	246,718	252,231	249,935	677,440	674,384	675,657
Ethanol BPD	28,158	27,184	27,590	6,429	6,371	6,395	8,920	9,085	9,016	0	0	0	24,919	25,478	25,245	68,426	68,118	68,246
RVP	7.0	13.6	10.8	7.0	13.6	10.8	7.0	12.0	9.9	0.0	0.0	0.0	6.8	11.5	9.6	6.9	12.6	10.2
Sulfur ppm	24	25	24	19	21	20	13	11	12	0	0	0	7	9	8	16	17	16
Density	263.0	258.0	260.2	262.6	257.7	259.8	258.5	256.3	257.2	0.0	0.0	0.0	257.5	253.6	255.2	260.4	256.1	257.9
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.3	92.3
Aromatics	20.0	20.0	20.0	20.0	20.0	20.0	15.2	17.7	16.7	0.0	0.0	0.0	13.8	13.0	13.3	17.1	17.1	17.1
Benzene	0.45	0.39	0.41	0.46	0.47	0.47	0.28	0.27	0.27	0.00	0.00	0.00	0.36	0.25	0.29	0.39	0.33	0.35
Olefins	16.3	14.9	15.5	13.8	11.8	12.6	7.5	7.6	7.6	0.0	0.0	0.0	5.7	5.7	5.7	11.0	10.2	10.6
Oxygen (wt%)	3.666	3.736	3.706	3.671	3.741	3.711	3.730	3.761	3.748	0.000	0.000	0.000	3.743	3.802	3.778	3.703	3.764	3.738
E200	50	56	53	50	55	53	50	51	51	0	0	0	54	58	57	51	56	54
E300	94	94	94	83	83	83	86	86	86	0	0	0	86	86	86	89	89	89
T10	137	95	113	137	95	113	137	105	118	0	0	0	138	108	121	138	101	117
T50	201	188	194	200	189	194	200	197	198	0	0	0	191	183	186	197	187	191
T90	280	280	280	330	330	330	317	317	317	0	0	0	315	315	315	302	303	302
DVI	1,088	987	1,030	1,136	1,041	1,081	1,121	1,067	1,089	0	0	0	1,097	1,025	1,055	1,100	1,017	1,052
V/L	147	110	126	147	110	126	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.003	4.882	4.933	4.958	4.876	4.910	4.955	4.883	4.913	0.000	0.000	0.000	4.945	4.872	4.902	4.971	4.878	4.917
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.666	3.736	3.706	3.671	3.741	3.711	3.730	3.761	3.748	0.000	0.000	0.000	3.743	3.802	3.778	3.703	3.764	3.738
VOC Reduction	28.7	0.0		28.4	0.0		30.0	0.0		0.0	0.0					28.9 (voc,nox,tox ex-CA)		
NOX Reduction	10.3	11.4	10.9	12.3	13.5	13.0	16.9	16.5	16.7	0.0	0.0	0.0				11.9	12.8	12.4
Toxics Reduction	32.6	26.0	28.8	33.2	26.0	29.0	37.5	27.2	31.4	0.0	0.0	0.0				33.7	26.3	29.4

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 CONTROL C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,742,273	1,718,421	1,728,354	397,825	394,241	395,734	551,911	562,184	557,906	0	0	0	1,541,990	1,576,443	1,562,095	4,233,999	4,251,289	4,244,089
Ethanol BPD	175,972	173,563	174,567	40,181	39,818	39,969	55,744	56,781	56,349	0	0	0	155,741	159,237	157,781	427,638	429,399	428,666
RVP	7.0	13.5	10.8	7.0	13.2	10.6	7.0	11.7	9.8	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.5	10.2
Sulfur ppm	23	24	24	23	24	24	22	23	22	0	0	0	8	10	9	17	19	18
Density	260.3	256.9	258.4	261.7	256.3	258.6	259.4	258.0	258.6	0.0	0.0	0.0	260.6	256.8	258.4	260.4	257.0	258.4
R+M/2	88.1	88.0	88.1	88.0	88.0	88.0	88.0	88.0	88.0	0.0	0.0	0.0	87.6	87.6	87.6	87.9	87.9	87.9
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	19.2	19.6	19.5	0.0	0.0	0.0	21.3	21.3	21.3	20.3	20.4	20.4
Benzene	0.57	0.56	0.56	0.58	0.58	0.58	0.55	0.48	0.51	0.00	0.00	0.00	0.58	0.46	0.51	0.57	0.51	0.54
Olefins	10.2	13.6	12.2	8.8	11.9	10.6	5.5	12.0	9.3	0.0	0.0	0.0	5.7	5.7	5.7	7.8	10.3	9.3
Oxygen (wt%)	3.703	3.752	3.731	3.683	3.761	3.728	3.717	3.736	3.728	0.000	0.000	0.000	3.699	3.754	3.731	3.701	3.752	3.731
E200	51	58	55	53	61	58	52	55	54	0	0	0	54	60	58	53	59	56
E300	94	94	94	83	83	83	86	86	86	0	0	0	86	86	86	89	89	89
T10	137	96	113	137	98	114	137	107	119	0	0	0	138	109	121	138	102	117
T50	197	183	189	194	177	184	196	189	192	0	0	0	191	180	184	194	182	187
T90	280	280	280	330	330	330	317	317	317	0	0	0	315	315	315	302	302	302
DVI	1,076	974	1,017	1,118	1,007	1,053	1,111	1,044	1,071	0	0	0	1,095	1,018	1,049	1,092	1,002	1,039
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.013	4.904	4.950	5.002	4.893	4.939	5.017	4.947	4.976	0.000	0.000	0.000	5.033	4.963	4.992	5.020	4.931	4.968
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.703	3.752	3.731	3.683	3.761	3.728	3.717	3.736	3.728	0.000	0.000	0.000	3.699	3.754	3.731	3.701	3.752	3.731
VOC Reduction	28.2			28.1			29.0			0.0						28.4 (voc,nox,tox ex-CA)		
NOX Reduction	13.6	12.1	12.8	14.1	13.0	13.4	15.3	13.3	14.1	0.0	0.0	0.0				14.0	12.5	13.1
Toxics Reduction	32.8	25.8	28.8	33.1	27.0	29.6	34.1	26.0	29.3	0.0	0.0	0.0				33.1	26.0	29.0
CG Reg																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 CONTROL C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxy Reg E10																		
Total BPD	1,994,174	1,893,289	1,935,302	1,796,711	1,708,416	1,745,185	1,262,360	1,384,821	1,333,823	700,898	738,798	723,015	121,103	109,665	114,429	5,875,247	5,834,989	5,851,754
Ethanol BPD	201,432	191,222	195,474	181,468	172,550	176,264	127,498	139,867	134,716	70,791	74,619	73,024	12,231	11,076	11,557	593,420	589,334	591,036
RVP	9.2	13.7	11.8	9.3	13.1	11.5	8.9	11.8	10.6	9.1	13.0	11.4	9.0	11.7	10.5	9.1	13.0	11.4
Sulfur ppm	24	24	24	25	25	25	25	25	25	28	28	28	28	26	27	25	25	25
Density	258.3	257.9	258.1	260.6	257.3	258.7	259.2	259.6	259.4	258.2	256.9	257.4	265.2	264.8	265.0	259.3	258.1	258.6
R+M/2	87.4	87.2	87.3	87.1	87.0	87.0	87.3	87.0	87.1	86.0	86.0	86.0	88.4	89.1	88.8	87.1	87.0	87.0
Aromatics	22.3	22.3	22.3	22.5	22.5	22.5	22.5	22.5	22.5	17.0	17.4	17.2	27.3	30.0	28.8	21.9	21.9	21.9
Benzene	0.53	0.53	0.53	0.54	0.54	0.54	0.54	0.54	0.54	0.88	1.30	1.13	0.67	0.60	0.63	0.58	0.63	0.61
Olefins	14.6	14.7	14.6	9.8	11.5	10.8	13.7	12.9	13.3	6.6	6.7	6.6	21.6	15.6	18.3	12.1	12.3	12.3
Oxygen (wt%)	3.733	3.738	3.736	3.699	3.746	3.726	3.719	3.714	3.716	3.734	3.752	3.745	3.634	3.640	3.638	3.718	3.734	3.727
E200	58	54	56	59	61	60	59	55	56	65	64	64	58	55	56	59	58	58
E300	94	94	94	83	83	83	86	86	86	90	90	90	86	86	86	88	88	88
T10	123	94	107	123	98	109	125	107	114	124	99	109	124	107	115	123	99	109
T50	184	191	188	182	176	179	181	190	187	170	171	171	184	189	187	181	184	183
T90	280	280	280	330	330	330	317	317	317	297	297	297	315	315	315	306	306	306
DVI	1,016	995	1,004	1,061	1,006	1,030	1,048	1,048	1,048	993	959	973	1,052	1,042	1,047	1,034	1,007	1,019
V/L	132	110	119	132	110	120	134	120	126	131	110	119	134	120	126	133	113	121
Energy (MMBtu/Bbl)	4.933	4.933	4.933	4.933	4.916	4.923	4.987	4.975	4.979	5.021	4.948	4.977	4.983	4.955	4.967	4.956	4.940	4.947
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.733	3.738	3.736	3.699	3.746	3.726	3.719	3.714	3.716	3.734	3.752	3.745	3.634	3.640	3.638	3.718	3.734	3.727
Exhaust Toxics	56.8	92.3	77.0	56.3	88.9	74.9	56.3	91.9	77.9	54.4	91.3	76.4	61.5	97.7	81.7	56.4	91.2	76.6
NOX	1,211	1,371	1,302	1,178	1,350	1,276	1,204	1,356	1,296	1,146	1,303	1,239	1,322	1,412	1,372	1,194	1,354	1,287
Oxy Prem E10																		
Total BPD	379,843	309,610	338,857	342,231	325,413	332,416	240,450	263,775	254,062	133,504	140,723	137,717	23,067	20,889	21,796	1,119,095	1,060,409	1,084,848
Ethanol BPD	38,368	31,274	34,228	34,569	32,867	33,575	24,288	26,641	25,661	13,484	14,213	13,909	2,330	2,110	2,202	113,039	107,105	109,576
RVP	9.3	13.7	11.6	9.3	13.6	11.8	8.9	12.1	10.8	9.1	13.0	11.4	9.0	12.1	10.7	9.2	13.2	11.4
Sulfur ppm	25	25	25	21	21	21	8	10	9	28	28	28	9	14	12	20	20	20
Density	262.1	259.4	260.7	262.5	258.9	260.5	260.4	257.2	258.5	260.6	248.8	253.7	265.5	264.0	264.7	261.8	257.5	259.3
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.8	92.8	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	19.7	20.8	20.4	5.1	11.3	30.0	30.0	30.0	22.4	19.6	20.8
Benzene	0.40	0.41	0.41	0.51	0.50	0.51	0.30	0.27	0.28	1.18	0.19	0.59	0.39	0.43	0.41	0.50	0.38	0.43
Olefins	13.3	14.7	14.0	8.1	11.5	10.1	4.8	7.0	6.2	7.3	7.0	7.1	6.7	8.6	7.7	9.0	10.7	10.0
Oxygen (wt%)	3.679	3.716	3.699	3.672	3.723	3.701	3.702	3.747	3.729	3.698	3.874	3.801	3.631	3.651	3.642	3.683	3.745	3.718
E200	52	55	53	49	54	52	46	49	48	53	63	59	47	50	49	50	54	52
E300	94	94	94	83	83	83	86	86	86	90	90	90	86	86	86	88	88	88
T10	123	94	108	123	95	107	125	105	113	124	99	109	124	105	113	123	98	109
T50	195	191	193	201	192	196	208	201	204	194	174	182	206	200	202	200	191	195
T90	280	280	280	330	330	330	317	317	317	297	297	297	315	315	315	306	307	307
DVI	1,050	993	1,020	1,118	1,048	1,078	1,130	1,076	1,097	1,065	966	1,006	1,119	1,071	1,092	1,091	1,029	1,056
V/L	134	110	121	135	110	121	139	120	127	135	111	121	137	120	128	136	113	123
Energy (MMBtu/Bbl)	4.949	4.899	4.922	4.967	4.894	4.925	4.974	4.897	4.927	4.960	4.782	4.854	5.052	4.961	5.001	4.963	4.883	4.917
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.679	3.716	3.699	3.672	3.723	3.701	3.702	3.747	3.729	3.698	3.874	3.801	3.631	3.651	3.642	3.683	3.745	3.718
Exhaust Toxics	57.2	91.2	75.3	58.1	91.5	77.2	56.9	89.5	76.7	59.8	79.2	71.4	60.2	96.0	80.2	57.8	89.4	75.8
NOX	1,196	1,374	1,291	1,162	1,341	1,264	1,141	1,293	1,233	1,155	1,262	1,219	1,167	1,338	1,263	1,168	1,328	1,259

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 CONTROL C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,374,017	2,202,899	2,274,159	2,138,942	2,033,828	2,077,601	1,502,810	1,648,596	1,587,885	834,402	879,521	860,732	144,171	130,554	136,225	6,994,341	6,895,398	6,936,602
Ethanol BPD	239,800	222,496	229,702	216,037	205,417	209,839	151,786	166,508	160,377	84,275	88,832	86,934	14,561	13,186	13,759	706,459	696,439	700,611
RVP	9.3	13.7	11.8	9.3	13.2	11.5	8.9	11.8	10.7	9.1	13.0	11.4	9.0	11.8	10.6	9.1	13.0	11.4
Sulfur ppm	24	24	24	24	24	24	22	22	22	28	28	28	25	24	24	24	24	24
Density	258.9	258.1	258.5	260.9	257.6	259.0	259.4	259.2	259.3	258.6	255.7	256.8	265.3	264.7	264.9	259.7	258.0	258.7
R+M/2	88.3	88.0	88.1	88.0	88.0	88.0	88.2	88.0	88.0	86.9	86.9	86.9	88.9	89.4	89.2	88.0	87.9	87.9
Aromatics	22.3	22.3	22.3	22.5	22.5	22.5	22.5	22.1	22.2	17.5	15.4	16.3	27.7	30.0	29.0	22.0	21.6	21.7
Benzene	0.51	0.51	0.51	0.54	0.53	0.53	0.50	0.50	0.50	0.93	1.12	1.04	0.63	0.57	0.60	0.57	0.59	0.58
Olefins	14.4	14.7	14.5	9.5	11.5	10.7	12.3	12.0	12.1	6.7	6.7	6.7	19.2	14.5	16.6	11.6	12.1	11.9
Oxygen (wt%)	3.724	3.735	3.730	3.695	3.743	3.722	3.716	3.719	3.718	3.728	3.771	3.754	3.634	3.642	3.638	3.712	3.736	3.726
E200	57	54	55	57	60	59	57	54	55	63	64	63	56	55	55	58	57	57
E300	94	94	94	83	83	83	86	86	86	90	90	90	86	86	86	88	88	88
T10	123	94	107	123	98	108	125	106	114	124	99	109	124	107	114	123	99	109
T50	186	191	189	185	179	182	186	192	190	174	172	173	187	191	189	184	185	185
T90	280	280	280	330	330	330	317	317	317	297	297	297	315	315	315	306	306	306
DVI	1,021	995	1,006	1,070	1,013	1,037	1,061	1,053	1,056	1,004	960	978	1,063	1,047	1,054	1,044	1,011	1,024
V/L	133	110	120	133	110	120	135	120	126	132	110	119	134	120	126	133	113	121
Energy (MMBtu/Bbl)	4.935	4.928	4.931	4.938	4.912	4.923	4.985	4.962	4.971	5.011	4.921	4.957	4.994	4.956	4.973	4.957	4.931	4.942
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.724	3.735	3.730	3.695	3.743	3.722	3.716	3.719	3.718	3.728	3.771	3.754	3.634	3.642	3.638	3.712	3.736	3.726
Exhaust Toxics	56.8	92.1	76.8	56.6	89.4	75.3	56.4	91.5	77.7	55.3	89.4	75.6	61.3	97.4	81.5	56.6	90.9	76.5
NOX	1,208	1,372	1,301	1,175	1,349	1,274	1,194	1,346	1,286	1,147	1,296	1,236	1,297	1,400	1,354	1,190	1,350	1,282
E85 to CG																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E85 to RFG																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 CONTROL C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALL MOGAS																		
Total BPD	4,116,290	3,921,320	4,002,513	2,536,767	2,428,069	2,473,335	2,054,721	2,210,780	2,145,791	834,402	879,521	860,732	1,686,161	1,706,997	1,698,320	11,228,340	11,146,687	11,180,690
Ethanol BPD	415,772	396,059	404,268	256,218	245,235	249,809	207,530	223,289	216,726	84,275	88,832	86,934	170,302	172,423	171,540	1,134,097	1,125,837	1,129,277
RVP	8.3	13.6	11.3	8.9	13.2	11.4	8.4	11.8	10.4	9.1	13.0	11.4	7.0	11.5	9.6	8.3	12.8	10.9
Sulfur ppm	24	24	24	24	24	24	22	23	22	28	28	28	9	11	10	22	22	22
Density	259.5	257.6	258.4	261.0	257.4	258.9	259.4	258.9	259.1	258.6	255.7	256.8	261.0	257.4	258.9	260.0	257.6	258.6
R+M/2	88.2	88.0	88.1	88.0	88.0	88.0	88.1	88.0	88.0	86.9	86.9	86.9	87.7	87.8	87.8	88.0	87.9	87.9
Aromatics	21.3	21.3	21.3	22.1	22.1	22.1	21.6	21.4	21.5	17.5	15.4	16.3	21.9	22.0	21.9	21.3	21.1	21.2
Benzene	0.53	0.53	0.53	0.54	0.54	0.54	0.51	0.49	0.50	0.93	1.12	1.04	0.58	0.47	0.52	0.57	0.56	0.57
Olefins	12.6	14.2	13.5	9.4	11.6	10.6	10.5	12.0	11.4	6.7	6.7	6.7	6.9	6.4	6.6	10.2	11.4	10.9
Oxygen (wt%)	3.715	3.742	3.731	3.693	3.745	3.723	3.716	3.723	3.721	3.728	3.771	3.754	3.693	3.745	3.724	3.708	3.742	3.728
E200	55	56	55	56	60	59	56	54	55	63	64	63	55	59	57	56	58	57
E300	94	94	94	83	83	83	86	86	86	90	90	90	86	86	86	88	88	88
T10	129	95	110	125	98	109	128	107	115	124	99	109	137	109	121	129	100	112
T50	190	188	189	187	179	182	188	191	190	174	172	173	191	181	185	188	184	186
T90	280	280	280	330	330	330	317	317	317	297	297	297	315	315	315	304	305	305
DVI	1,045	986	1,011	1,077	1,012	1,040	1,075	1,050	1,060	1,004	960	978	1,092	1,020	1,050	1,062	1,007	1,030
V/L	139	110	122	135	110	121	138	120	127	132	110	119	146	120	131	138	114	124
Energy (MMBtu/Bbl)	4.968	4.918	4.939	4.948	4.909	4.926	4.993	4.958	4.972	5.011	4.921	4.957	5.029	4.963	4.990	4.981	4.931	4.952
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.715	3.742	3.731	3.693	3.745	3.723	3.716	3.723	3.721	3.728	3.771	3.754	3.693	3.745	3.724	3.708	3.742	3.728

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,463,509	1,457,766	1,460,157	334,173	331,163	332,416	463,605	472,234	468,641	0	0	0	1,321,094	1,340,944	1,332,678	3,582,381	3,602,107	3,593,892
Ethanol BPD	147,814	147,234	147,476	33,751	33,447	33,574	46,824	47,696	47,333	0	0	0	133,431	135,449	134,608	361,821	363,826	362,991
RVP	7.0	13.4	10.7	7.0	13.1	10.5	7.0	11.7	9.7	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.4	10.1
Sulfur ppm	24	24	24	21	25	23	22	25	24	0	0	0	9	10	10	18	19	19
Density	261.2	256.7	258.6	261.8	256.1	258.5	261.5	258.4	259.7	0.0	0.0	0.0	261.3	257.5	259.1	261.3	257.1	258.9
R+M/2	87.1	87.1	87.1	87.0	87.0	87.0	87.0	87.0	87.0	0.0	0.0	0.0	87.0	87.0	87.0	87.1	87.1	87.1
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	22.7	22.9	22.8	20.9	21.0	21.0
Benzene	0.59	0.59	0.59	0.60	0.60	0.60	0.60	0.52	0.55	0.00	0.00	0.00	0.62	0.50	0.55	0.60	0.55	0.57
Olefins	11.2	13.4	12.5	7.7	12.0	10.2	8.4	12.9	11.0	0.0	0.0	0.0	5.7	5.7	5.7	8.5	10.3	9.6
Oxygen (wt%)	3.691	3.756	3.728	3.682	3.764	3.729	3.686	3.731	3.712	0.000	0.000	0.000	3.689	3.745	3.721	3.689	3.749	3.724
E200	51	59	56	53	62	58	52	56	54	0	0	0	54	60	58	53	59	56
E300	94	94	94	86	86	86	89	89	89	0	0	0	86	86	86	90	90	90
T10	137	96	113	137	98	115	137	107	120	0	0	0	138	109	121	138	103	117
T50	197	182	189	193	175	182	196	187	191	0	0	0	191	179	184	194	181	187
T90	280	280	280	315	315	315	300	300	300	0	0	0	315	315	315	299	299	299
DVI	1,077	971	1,015	1,100	987	1,034	1,093	1,023	1,052	0	0	0	1,096	1,016	1,049	1,088	996	1,034
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.025	4.905	4.955	5.011	4.896	4.944	5.041	4.958	4.992	0.000	0.000	0.000	5.051	4.983	5.011	5.035	4.940	4.980
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.691	3.756	3.728	3.682	3.764	3.729	3.686	3.731	3.712	0.000	0.000	0.000	3.689	3.745	3.721	3.689	3.749	3.724
VOC Reduction	28.4			28.1			29.3			0.0						28.5 (voc,nox,tox ex-CA)		
NOX Reduction	13.4	12.3	12.7	14.6	12.8	13.6	14.5	12.6	13.4	0.0	0.0	0.0				13.8	12.4	13.0
Toxics Reduction	32.5	25.8	28.6	33.2	27.1	29.7	33.3	25.7	28.8	0.0	0.0	0.0				32.8	26.0	28.8
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0					0.0 (voc,nox,tox ex-CA)		
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
RFG Prem E10																		
Total BPD	278,764	260,655	268,196	63,652	63,079	63,317	88,306	89,949	89,265	0	0	0	251,637	255,418	253,843	682,358	669,101	674,622
Ethanol BPD	28,158	26,329	27,091	6,429	6,371	6,395	8,920	9,085	9,016	0	0	0	25,415	25,800	25,640	68,923	67,584	68,142
RVP	7.0	13.6	10.8	7.0	13.6	10.8	7.0	12.0	9.9	0.0	0.0	0.0	6.8	11.5	9.6	6.9	12.6	10.2
Sulfur ppm	25	25	25	19	20	19	15	11	13	0	0	0	8	9	8	17	16	17
Density	262.8	258.1	260.2	263.0	257.5	259.8	260.2	256.3	257.9	0.0	0.0	0.0	257.5	253.8	255.3	260.5	256.2	258.0
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.2	92.2
Aromatics	20.0	20.0	20.0	20.0	20.0	20.0	17.2	17.6	17.4	0.0	0.0	0.0	13.5	13.4	13.4	17.2	17.1	17.2
Benzene	0.44	0.39	0.42	0.46	0.45	0.46	0.33	0.27	0.29	0.00	0.00	0.00	0.35	0.25	0.29	0.40	0.33	0.36
Olefins	15.9	15.0	15.4	13.9	11.2	12.3	8.7	7.5	8.0	0.0	0.0	0.0	5.7	5.7	5.7	11.0	10.1	10.5
Oxygen (wt%)	3.668	3.735	3.706	3.666	3.743	3.711	3.705	3.762	3.738	0.000	0.000	0.000	3.744	3.799	3.776	3.700	3.764	3.737
E200	49	55	53	50	55	53	51	51	51	0	0	0	54	58	57	51	56	54
E300	94	94	94	86	86	86	89	89	89	0	0	0	86	86	86	90	90	90
T10	137	95	113	137	95	113	137	105	118	0	0	0	138	108	121	138	101	117
T50	202	189	194	200	190	194	198	197	198	0	0	0	192	183	186	197	188	192
T90	280	280	280	315	315	315	300	300	300	0	0	0	315	315	315	299	299	299
DVI	1,090	989	1,033	1,122	1,028	1,067	1,100	1,050	1,071	0	0	0	1,097	1,026	1,055	1,097	1,015	1,050
V/L	148	110	126	147	110	126	147	120	131	0	0	0	147	120	131	147	115	129
Energy (MMBtu/Bbl)	5.000	4.881	4.933	4.966	4.875	4.913	4.961	4.883	4.915	0.000	0.000	0.000	4.947	4.876	4.905	4.972	4.879	4.918
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.668	3.735	3.706	3.666	3.743	3.711	3.705	3.762	3.738	0.000	0.000	0.000	3.744	3.799	3.776	3.700	3.764	3.737
VOC Reduction	28.6	0.0		28.4	0.0		29.8	0.0		0.0	0.0					28.8 (voc,nox,tox ex-CA)		
NOX Reduction	10.6	11.3	11.0	12.2	13.9	13.2	15.7	16.5	16.2	0.0	0.0	0.0				11.9	12.8	12.4
Toxics Reduction	32.6	25.8	28.8	33.1	26.0	29.0	36.5	27.3	31.1	0.0	0.0	0.0				33.5	26.1	29.3

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,742,273	1,718,421	1,728,354	397,825	394,241	395,734	551,911	562,184	557,906	0	0	0	1,572,731	1,596,362	1,586,521	4,264,740	4,271,208	4,268,514
Ethanol BPD	175,972	173,563	174,566	40,181	39,818	39,969	55,744	56,781	56,349	0	0	0	158,846	161,249	160,248	430,743	431,411	431,133
RVP	7.0	13.5	10.8	7.0	13.2	10.6	7.0	11.7	9.8	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.5	10.1
Sulfur ppm	24	24	24	21	24	23	21	23	22	0	0	0	9	10	9	18	19	18
Density	261.4	256.9	258.8	262.0	256.3	258.8	261.3	258.1	259.4	0.0	0.0	0.0	260.7	256.9	258.5	261.2	257.0	258.8
R+M/2	88.1	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	0.0	0.0	0.0	87.6	87.6	87.6	87.9	87.9	87.9
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	19.5	19.6	19.6	0.0	0.0	0.0	21.2	21.4	21.3	20.3	20.4	20.4
Benzene	0.57	0.56	0.56	0.58	0.57	0.57	0.56	0.48	0.51	0.00	0.00	0.00	0.58	0.46	0.51	0.57	0.51	0.54
Olefins	12.0	13.7	12.9	8.7	11.9	10.5	8.4	12.1	10.6	0.0	0.0	0.0	5.7	5.7	5.7	8.9	10.3	9.7
Oxygen (wt%)	3.687	3.752	3.725	3.679	3.760	3.726	3.689	3.735	3.716	0.000	0.000	0.000	3.697	3.753	3.730	3.690	3.751	3.726
E200	51	58	55	53	61	58	52	55	54	0	0	0	54	60	58	52	59	56
E300	94	94	94	86	86	86	89	89	89	0	0	0	86	86	86	90	90	90
T10	137	96	113	137	98	114	137	107	119	0	0	0	138	109	121	138	102	117
T50	198	183	189	194	177	184	196	189	192	0	0	0	191	180	184	195	182	187
T90	280	280	280	315	315	315	300	300	300	0	0	0	315	315	315	299	299	299
DVI	1,079	974	1,018	1,104	993	1,039	1,094	1,028	1,055	0	0	0	1,096	1,018	1,050	1,090	999	1,037
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.021	4.901	4.951	5.003	4.892	4.939	5.028	4.946	4.980	0.000	0.000	0.000	5.034	4.966	4.994	5.025	4.931	4.970
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.687	3.752	3.725	3.679	3.760	3.726	3.689	3.735	3.716	0.000	0.000	0.000	3.697	3.753	3.730	3.690	3.751	3.726
VOC Reduction	28.4			28.1			29.4			0.0						28.6 (voc,nox,tox ex-CA)		
NOX Reduction	12.9	12.1	12.5	14.2	13.0	13.5	14.7	13.3	13.8	0.0	0.0	0.0				13.5	12.5	12.9
Toxics Reduction	32.5	25.8	28.6	33.2	27.0	29.6	33.8	26.0	29.2	0.0	0.0	0.0				32.9	26.0	28.9
CG Reg																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxy Reg E10																		
Total BPD	1,986,483	1,893,289	1,932,099	1,747,998	1,708,416	1,724,899	1,262,360	1,384,821	1,333,823	700,898	743,889	725,986	121,103	109,665	114,429	5,818,842	5,840,080	5,831,236
Ethanol BPD	200,635	191,222	195,142	176,548	172,550	174,215	127,498	139,867	134,716	70,791	75,133	73,325	12,233	11,076	11,558	587,704	589,848	588,955
RVP	8.2	13.7	11.4	8.3	13.2	11.1	7.9	11.8	10.2	8.1	13.0	11.0	8.0	11.7	10.1	8.1	13.0	11.0
Sulfur ppm	24	24	24	25	25	25	25	25	25	28	28	28	28	26	27	25	25	25
Density	260.7	257.9	259.1	262.3	257.3	259.4	262.3	259.6	260.7	259.5	255.7	257.3	267.3	264.7	265.8	261.5	258.0	259.5
R+M/2	87.2	87.2	87.2	87.0	87.0	87.0	87.0	87.0	87.0	86.0	86.0	86.0	88.4	89.0	88.8	87.0	87.0	87.0
Aromatics	22.3	22.3	22.3	22.5	22.5	22.5	22.5	22.5	22.5	18.5	16.4	17.2	29.6	30.0	29.8	22.1	21.8	21.9
Benzene	0.53	0.53	0.53	0.54	0.54	0.54	0.54	0.54	0.54	0.97	1.30	1.17	0.66	0.60	0.63	0.59	0.63	0.62
Olefins	13.8	14.7	14.3	10.1	11.7	11.0	12.3	13.0	12.7	6.6	6.3	6.4	19.1	15.1	16.9	11.6	12.4	12.0
Oxygen (wt%)	3.697	3.737	3.720	3.676	3.746	3.716	3.674	3.713	3.698	3.715	3.769	3.747	3.607	3.642	3.626	3.686	3.736	3.715
E200	54	54	54	57	61	59	54	55	54	63	64	63	55	56	55	56	58	57
E300	94	94	94	86	86	86	89	89	89	83	83	83	86	86	86	89	89	89
T10	129	94	109	129	98	111	132	107	117	130	99	112	130	107	117	130	99	112
T50	192	191	192	186	177	181	191	191	191	174	172	173	190	188	189	188	184	186
T90	280	280	280	315	315	315	300	300	300	329	329	329	315	315	315	301	302	302
DVI	1,049	996	1,018	1,067	992	1,023	1,071	1,032	1,047	1,046	993	1,014	1,081	1,041	1,059	1,059	1,004	1,027
V/L	139	110	122	138	110	122	141	120	128	137	110	121	140	120	129	139	113	124
Energy (MMBtu/Bbl)	4.979	4.932	4.952	4.966	4.912	4.935	5.032	4.973	4.996	5.049	4.942	4.985	5.031	4.957	4.990	4.996	4.938	4.962
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.697	3.737	3.720	3.676	3.746	3.716	3.674	3.713	3.698	3.715	3.769	3.747	3.607	3.642	3.626	3.686	3.736	3.715
Exhaust Toxics	57.1	92.3	77.2	56.3	89.0	75.2	56.8	91.9	78.0	55.5	90.9	76.7	62.1	97.5	81.9	56.7	91.2	76.8
NOX	1,197	1,372	1,297	1,174	1,351	1,276	1,185	1,357	1,289	1,148	1,296	1,237	1,284	1,406	1,352	1,184	1,353	1,283
Oxy Prem E10																		
Total BPD	378,378	309,610	338,247	332,952	325,413	328,552	240,450	263,775	254,062	133,504	141,693	138,283	23,067	20,889	21,796	1,108,351	1,061,379	1,080,940
Ethanol BPD	38,220	31,274	34,166	33,632	32,867	33,185	24,288	26,641	25,661	13,484	14,311	13,967	2,330	2,110	2,202	111,953	107,203	109,181
RVP	8.3	13.7	11.2	8.3	13.7	11.4	7.9	12.1	10.4	8.1	13.0	11.0	8.0	12.0	10.3	8.2	13.2	11.0
Sulfur ppm	25	25	25	18	19	18	11	10	10	28	28	28	9	14	12	20	20	20
Density	263.1	259.5	261.2	263.3	258.7	260.7	262.0	257.3	259.2	262.5	255.5	258.3	266.3	264.0	265.0	262.9	258.3	260.3
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.8	92.8	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	19.8	20.8	22.1	14.5	17.5	30.0	30.0	30.0	22.6	20.9	21.6
Benzene	0.40	0.42	0.41	0.49	0.49	0.49	0.34	0.27	0.30	1.30	1.30	1.30	0.39	0.44	0.42	0.52	0.52	0.52
Olefins	12.1	14.8	13.6	7.4	10.9	9.4	6.5	7.1	6.8	7.3	6.9	7.0	6.3	8.6	7.6	8.8	10.5	9.8
Oxygen (wt%)	3.664	3.715	3.691	3.661	3.726	3.698	3.679	3.747	3.720	3.673	3.773	3.732	3.620	3.651	3.637	3.666	3.733	3.704
E200	51	54	52	49	53	52	49	49	49	51	60	57	46	50	48	50	53	52
E300	94	94	94	86	86	86	89	89	89	83	83	83	86	86	86	89	89	89
T10	129	94	110	129	95	109	132	105	115	130	99	112	130	105	116	130	98	111
T50	199	191	195	201	193	197	201	201	201	198	179	186	208	199	203	200	193	196
T90	280	280	280	315	315	315	300	300	300	329	329	329	315	315	315	301	303	302
DVI	1,069	995	1,030	1,111	1,037	1,068	1,101	1,060	1,076	1,117	1,013	1,055	1,135	1,070	1,099	1,096	1,028	1,057
V/L	140	110	124	141	110	123	143	120	129	141	111	123	143	120	130	141	113	125
Energy (MMBtu/Bbl)	4.966	4.898	4.930	4.961	4.893	4.921	4.955	4.897	4.920	4.986	4.833	4.894	5.075	4.964	5.013	4.967	4.889	4.922
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.664	3.715	3.691	3.661	3.726	3.698	3.679	3.747	3.720	3.673	3.773	3.732	3.620	3.651	3.637	3.666	3.733	3.704
Exhaust Toxics	57.0	91.5	75.4	57.4	91.5	77.1	56.1	89.6	76.4	61.4	91.2	79.2	60.1	95.9	80.1	57.5	91.1	76.8
NOX	1,182	1,375	1,285	1,154	1,334	1,258	1,145	1,293	1,235	1,158	1,285	1,234	1,162	1,339	1,261	1,162	1,329	1,258

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,364,860	2,202,899	2,270,346	2,080,950	2,033,828	2,053,451	1,502,810	1,648,596	1,587,885	834,402	885,583	864,269	144,171	130,554	136,225	6,927,193	6,901,460	6,912,176
Ethanol BPD	238,855	222,496	229,308	210,179	205,417	207,400	151,786	166,508	160,377	84,275	89,444	87,291	14,563	13,186	13,759	699,658	697,051	698,136
RVP	8.3	13.7	11.4	8.3	13.2	11.1	7.9	11.8	10.3	8.1	13.0	11.0	8.0	11.8	10.1	8.1	13.0	11.0
Sulfur ppm	24	24	24	24	24	24	23	22	23	28	28	28	25	24	24	24	24	24
Density	261.1	258.2	259.5	262.4	257.5	259.6	262.3	259.2	260.5	260.0	255.7	257.4	267.1	264.6	265.7	261.8	258.1	259.6
R+M/2	88.1	88.0	88.1	88.0	88.0	88.0	88.0	88.0	88.0	86.9	86.9	86.9	88.8	89.4	89.1	87.9	87.9	87.9
Aromatics	22.3	22.3	22.3	22.5	22.5	22.5	22.5	22.1	22.2	19.1	16.1	17.3	29.6	30.0	29.8	22.2	21.7	21.9
Benzene	0.51	0.51	0.51	0.53	0.53	0.53	0.51	0.50	0.50	1.02	1.30	1.19	0.62	0.57	0.59	0.58	0.62	0.60
Olefins	13.6	14.7	14.2	9.6	11.5	10.7	11.4	12.1	11.8	6.7	6.4	6.5	17.1	14.1	15.4	11.2	12.1	11.7
Oxygen (wt%)	3.692	3.734	3.716	3.673	3.743	3.713	3.675	3.718	3.701	3.708	3.770	3.745	3.609	3.643	3.628	3.683	3.736	3.713
E200	53	54	54	56	60	58	53	54	54	61	63	62	53	55	54	55	57	56
E300	94	94	94	86	86	86	89	89	89	83	83	83	86	86	86	89	89	89
T10	129	94	109	129	97	111	132	106	116	130	99	112	130	107	117	130	99	112
T50	193	191	192	188	179	183	193	192	192	178	173	175	193	190	191	190	186	187
T90	280	280	280	315	315	315	300	300	300	329	329	329	315	315	315	301	302	302
DVI	1,052	996	1,020	1,074	999	1,031	1,076	1,036	1,052	1,057	996	1,021	1,090	1,046	1,065	1,065	1,007	1,031
V/L	139	110	123	139	110	122	142	120	129	138	110	121	141	120	129	139	113	124
Energy (MMBtu/Bbl)	4.977	4.927	4.949	4.965	4.909	4.933	5.020	4.961	4.984	5.039	4.924	4.971	5.038	4.958	4.993	4.992	4.930	4.956
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.692	3.734	3.716	3.673	3.743	3.713	3.675	3.718	3.701	3.708	3.770	3.745	3.609	3.643	3.628	3.683	3.736	3.713
Exhaust Toxics	57.1	92.2	77.0	56.5	89.4	75.5	56.7	91.5	77.8	56.5	90.9	77.1	61.8	97.2	81.6	56.8	91.1	76.8
NOX	1,195	1,372	1,295	1,171	1,348	1,274	1,179	1,347	1,280	1,150	1,294	1,236	1,265	1,395	1,338	1,180	1,350	1,279
E85 to CG																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E85 to RFG																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 4: Mogas Quality Produced by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol BPD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ETBE (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TAME (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethanol (wt%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ALL MOGAS																		
Total BPD	4,107,133	3,921,320	3,998,700	2,478,775	2,428,069	2,449,185	2,054,721	2,210,780	2,145,791	834,402	885,583	864,269	1,716,902	1,726,916	1,722,746	11,191,933	11,172,668	11,180,690
Ethanol BPD	414,827	396,059	403,875	250,360	245,235	247,369	207,530	223,289	216,726	84,275	89,444	87,291	173,409	174,435	174,007	1,130,401	1,128,462	1,129,269
RVP	7.7	13.6	11.1	8.1	13.2	11.1	7.6	11.8	10.1	8.1	13.0	11.0	6.9	11.5	9.6	7.7	12.8	10.7
Sulfur ppm	24	24	24	23	24	24	22	23	22	28	28	28	10	11	11	22	22	22
Density	261.3	257.6	259.2	262.4	257.4	259.5	262.0	258.9	260.2	260.0	255.7	257.4	261.3	257.5	259.1	261.6	257.6	259.3
R+M/2	88.1	88.0	88.1	88.0	88.0	88.0	88.0	88.0	88.0	86.9	86.9	86.9	87.7	87.8	87.8	87.9	87.9	87.9
Aromatics	21.3	21.3	21.3	22.1	22.1	22.1	21.7	21.4	21.5	19.1	16.1	17.3	21.9	22.0	22.0	21.5	21.2	21.3
Benzene	0.54	0.53	0.53	0.54	0.54	0.54	0.52	0.49	0.50	1.02	1.30	1.19	0.58	0.47	0.51	0.58	0.58	0.58
Olefins	12.9	14.3	13.7	9.5	11.6	10.7	10.6	12.1	11.5	6.7	6.4	6.5	6.7	6.3	6.5	10.3	11.4	10.9
Oxygen (wt%)	3.690	3.742	3.719	3.674	3.746	3.715	3.679	3.723	3.705	3.708	3.770	3.745	3.690	3.745	3.722	3.686	3.742	3.718
E200	52	56	54	55	60	58	53	54	54	61	63	62	54	59	57	54	58	56
E300	94	94	94	86	86	86	89	89	89	83	83	83	86	86	86	89	89	89
T10	132	95	111	130	97	111	133	107	117	130	99	112	138	109	121	133	100	114
T50	195	188	191	189	179	183	194	191	192	178	173	175	191	181	185	192	184	187
T90	280	280	280	315	315	315	300	300	300	329	329	329	315	315	315	300	301	301
DVI	1,064	986	1,019	1,079	998	1,032	1,081	1,034	1,053	1,057	996	1,021	1,096	1,020	1,051	1,074	1,004	1,034
V/L	143	110	124	140	110	123	143	120	129	138	110	121	146	120	131	142	114	126
Energy (MMBtu/Bbl)	4.995	4.916	4.950	4.971	4.906	4.934	5.022	4.957	4.983	5.039	4.924	4.971	5.035	4.965	4.994	5.004	4.930	4.961
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.690	3.742	3.719	3.674	3.746	3.715	3.679	3.723	3.705	3.708	3.770	3.745	3.690	3.745	3.722	3.686	3.742	3.718

Appendix 5A.

Gasoline Quality by Demand Center for Calibration, Reference & Control A

Appendix 5A: Mogas Quality by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,109,104	1,093,921	1,100,243	335,173	332,154	333,411	325,320	331,376	328,854	0	0	0	822,461	806,469	813,129	2,592,058	2,563,919	2,575,638
Ethanol BPD	28,512	34,841	32,205	24,265	27,617	26,221	101	1,283	791	0	0	0	47,545	45,946	46,612	100,424	109,687	105,830
RVP	6.8	12.7	10.2	6.5	12.7	10.1	6.9	11.2	9.4	0.0	0.0	0.0	6.8	11.5	9.5	6.8	12.1	9.9
Sulfur ppm	97	117	108	100	100	100	115	115	115	0	0	0	45	45	45	83	91	88
Density	259.2	252.1	255.2	264.2	251.5	257.0	257.2	251.2	253.7	0.0	0.0	0.0	263.9	259.5	261.4	261.1	254.3	257.2
R+M/2	87.6	87.0	87.2	91.5	87.0	88.9	89.3	87.0	87.9	0.0	0.0	0.0	87.0	87.0	87.0	88.1	87.0	87.5
Aromatics	21.2	18.3	19.5	20.8	18.2	19.3	19.1	17.7	18.2	0.0	0.0	0.0	23.7	25.0	24.4	21.7	20.3	20.9
Benzene	0.7	0.7	0.68	0.8	0.7	0.77	0.6	0.6	0.63	0.00	0.00	0.00	1.18	1.18	1.18	0.84	0.84	0.84
Olefins	10.5	11.5	11.0	12.2	11.4	11.7	12.4	11.2	11.7	0.0	0.0	0.0	6.0	6.0	6.0	9.5	9.7	9.6
Oxygen (wt%)	2.456	2.474	2.466	2.681	3.224	2.990	2.100	2.100	2.100	0.000	0.000	0.000	3.576	3.576	3.576	2.801	2.876	2.859
E200	55	61	59	49	67	60	58	64	61	0	0	0	51	51	51	54	59	57
E300	78	78	78	93	93	93	83	83	83	0	0	0	92	92	92	85	85	85
T10	138	101	117	140	101	117	138	111	122	0	0	0	138	108	121	138	105	119
T50	189	177	182	202	165	180	184	172	177	0	0	0	197	197	197	193	181	186
T90	353	350	351	282	282	282	329	329	329	0	0	0	290	290	290	321	320	320
DVI	1,128	1,034	1,073	1,097	927	998	1,087	1,010	1,041	0	0	0	1,089	1,043	1,062	1,106	1,020	1,056
V/L	146	113	127	150	111	127	145	120	130	0	0	0	148	122	133	147	117	129
Energy (MMBtu/Bbl)	5.097	4.979	5.028	5.052	4.857	4.939	5.142	5.070	5.099	0.000	0.000	0.000	5.147	5.033	5.081	5.113	4.992	5.042
MTBE (wt%)	1.257	0.917	1.062	0.066	0.066	0.066	2.091	2.028	2.054	0.000	0.000	0.000	0.000	0.000	0.000	0.801	0.655	0.722
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.003	0.003	0.003	0.000	0.000	0.000	0.003	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Ethanol (wt%)	1.196	1.555	1.402	2.615	3.158	2.924	0.006	0.070	0.043	0.000	0.000	0.000	3.576	3.576	3.576	1.998	2.219	2.136
VOC Reduction	29.4			30.1			30.9			0.0								
NOX Reduction	9.7	9.5	9.6	9.3	9.9	9.7	8.4	9.8	9.2	0.0	0.0	0.0						
Toxics Reduction	34.3	27.8	30.5	29.3	27.3	28.1	36.1	30.9	33.1	0.0	0.0	0.0						
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0			0.0			0.0			0.0	0.0							
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
RFG Prem E10																		
Total BPD	210,565	207,682	208,883	50,600	50,144	50,334	42,197	42,982	42,655	0	0	0	160,122	166,191	163,663	463,484	467,000	465,535
Ethanol BPD	6,247	0	2,601	3,716	4,725	4,305	1,270	101	588	0	0	0	8,100	9,699	9,033	19,333	14,525	16,528
RVP	6.6	13.4	10.5	6.4	13.7	10.6	6.9	11.4	9.5	0.0	0.0	0.0	6.8	11.5	9.6	6.7	12.6	10.1
Sulfur ppm	68	90	81	76	64	69	37	83	64	0	0	0	45	45	45	58	71	65
Density	253.6	257.8	256.0	259.6	256.9	258.1	253.0	248.2	250.2	0.0	0.0	0.0	258.0	253.2	255.2	255.7	255.2	255.4
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.3	92.3
Aromatics	8.9	22.0	16.5	13.4	19.3	16.9	11.1	6.9	8.6	0.0	0.0	0.0	10.5	12.7	11.8	10.1	17.0	14.2
Benzene	0.3	0.5	0.42	0.5	0.8	0.68	0.4	0.2	0.28	0.00	0.00	0.00	1.18	1.18	1.18	0.62	0.76	0.70
Olefins	9.4	17.2	14.0	8.0	8.6	8.4	8.4	8.2	8.3	0.0	0.0	0.0	6.0	5.9	5.9	8.0	11.4	10.0
Oxygen (wt%)	2.548	3.467	3.085	2.700	3.500	3.163	2.340	2.340	2.340	0.000	0.000	0.000	3.576	3.576	3.576	2.904	3.408	3.202
E200	53	58	56	50	53	52	57	61	59	0	0	0	51	51	51	53	55	54
E300	79	76	78	94	94	94	83	83	83	0	0	0	92	92	92	85	84	85
T10	140	96	115	141	94	114	138	109	121	0	0	0	138	108	121	139	102	117
T50	193	183	187	200	194	197	186	178	181	0	0	0	197	197	197	195	189	186
T90	347	359	354	280	280	280	329	329	329	0	0	0	290	290	290	319	323	321
DVI	1,137	1,053	1,088	1,093	1,004	1,041	1,094	1,028	1,055	0	0	0	1,089	1,043	1,062	1,111	1,042	1,071
V/L	148	110	126	151	110	127	146	120	131	0	0	0	148	123	133	148	115	129
Energy (MMBtu/Bbl)	4.965	5.050	5.014	4.998	4.887	4.934	4.996	4.949	4.968	0.000	0.000	0.000	4.980	4.865	4.912	4.977	4.957	4.965
MTBE (wt%)	0.842	3.455	2.368	0.000	0.000	0.000	1.963	2.226	2.116	0.000	0.000	0.000	0.000	0.000	0.000	0.556	1.751	1.203
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.016	0.010	0.013	0.000	0.000	0.000	0.013	0.035	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.008	0.008
Ethanol (wt%)	1.690	0.002	0.704	2.700	3.500	3.163	0.365	0.079	0.198	0.000	0.000	0.000	3.576	3.576	3.576	2.340	1.649	1.992
VOC Reduction	32.8			32.2			32.3			0.0	0.0							
NOX Reduction	15.4	5.3	9.5	14.8	13.1	13.8	16.6	15.4	15.9	0.0	0.0	0.0						
Toxics Reduction	41.1	29.1	34.2	36.5	22.9	28.6	43.3	37.7	40.0	0.0	0.0	0.0						

Appendix 5A: Mogas Quality by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,319,669	1,301,603	1,309,126	385,773	382,298	383,745	367,517	374,358	371,509	0	0	0	982,583	972,660	976,792	3,055,542	3,030,919	3,041,173
Ethanol BPD	34,759	34,841	34,807	27,981	32,342	30,526	1,371	1,384	1,379	0	0	0	55,645	55,645	55,645	119,757	124,213	122,357
RVP	6.8	12.8	10.3	6.5	12.8	10.2	6.9	11.2	9.4	0.0	0.0	0.0	6.8	11.5	9.5	6.8	12.2	9.9
Sulfur ppm	92	113	104	97	96	96	106	111	109	0	0	0	45	45	45	79	88	84
Density	258.4	253.0	255.3	263.6	252.2	257.1	256.7	250.8	253.3	0.0	0.0	0.0	262.9	258.5	260.4	260.3	254.4	256.9
R+M/2	88.4	88.0	88.2	91.7	87.8	89.4	89.7	87.7	88.5	0.0	0.0	0.0	87.7	87.7	87.7	88.8	87.8	88.2
Aromatics	19.2	18.9	19.0	19.8	18.3	19.0	18.2	16.4	17.1	0.0	0.0	0.0	21.5	22.9	22.3	19.9	19.8	19.8
Benzene	0.59	0.68	0.64	0.79	0.73	0.76	0.61	0.57	0.59	0.00	0.00	0.00	1.18	1.18	1.18	0.81	0.83	0.82
Olefins	10.3	12.4	11.5	11.6	11.0	11.3	11.9	10.8	11.3	0.0	0.0	0.0	6.0	6.0	6.0	9.3	10.0	9.7
Oxygen (wt%)	2.470	2.635	2.565	2.684	3.261	3.013	2.127	2.127	2.127	0.000	0.000	0.000	3.576	3.576	3.576	2.816	2.958	2.898
E200	55	61	58	49	65	59	58	63	61	0	0	0	51	51	51	53	59	56
E300	78	78	78	94	94	94	83	83	83	0	0	0	92	92	92	85	85	85
T10	138	100	116	140	100	117	138	110	122	0	0	0	138	108	121	139	104	119
T50	190	178	183	201	168	182	184	172	177	0	0	0	197	197	197	193	182	187
T90	352	352	352	282	282	282	329	329	329	0	0	0	290	290	290	320	320	320
DVI	1,129	1,037	1,076	1,096	937	1,004	1,087	1,012	1,043	0	0	0	1,089	1,043	1,062	1,107	1,023	1,058
V/L	147	113	127	150	111	127	145	120	130	0	0	0	148	122	133	147	116	129
Energy (MMBtu/Bbl)	5.076	4.990	5.026	5.045	4.861	4.938	5.125	5.056	5.084	0.000	0.000	0.000	5.120	5.004	5.053	5.092	4.986	5.030
MTBE (wt%)	1.192	1.329	1.271	0.057	0.057	0.057	2.077	2.050	2.061	0.000	0.000	0.000	0.000	0.000	0.000	0.765	0.825	0.799
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.005	0.004	0.004	0.000	0.000	0.000	0.004	0.006	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.002	0.002
Ethanol (wt%)	1.274	1.302	1.290	2.626	3.203	2.955	0.047	0.071	0.061	0.000	0.000	0.000	3.576	3.576	3.576	2.049	2.131	2.096
VOC Reduction	30.0			30.4			31.1			0.0								
NOX Reduction	10.6	8.8	9.6	10.1	10.4	10.2	9.3	10.4	10.0	0.0	0.0	0.0						
Toxics Reduction	35.4	28.0	31.1	30.2	26.8	28.2	36.9	31.7	33.9	0.0	0.0	0.0						
CG Reg																		
Total BPD	1,803,440	1,666,224	1,723,366	1,486,831	1,589,842	1,546,944	966,192	1,100,924	1,044,816	485,548	526,890	509,674	91,183	86,805	88,628	4,833,193	4,970,687	4,913,429
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	8.3	12.7	10.8	8.4	13.2	11.3	8.2	12.1	10.6	8.0	13.0	11.0	8.0	12.4	10.5	8.3	12.8	10.9
Sulfur ppm	119	122	121	133	132	132	115	115	115	100	100	100	0	15	9	118	119	119
Density	260.0	253.7	256.5	261.6	255.3	257.9	260.5	254.1	256.6	264.7	257.7	260.5	264.7	266.0	265.5	261.2	255.0	257.5
R+M/2	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	86.0	86.0	86.0	90.9	87.9	89.2	87.0	86.9	86.9
Aromatics	27.9	24.8	26.2	30.1	26.5	28.0	29.3	26.1	27.3	30.3	25.5	27.4	37.9	40.5	39.4	29.3	26.0	27.3
Benzene	1.0	1.0	0.97	1.3	1.2	1.21	0.9	0.9	0.94	1.54	1.53	1.54	0.33	1.00	0.71	1.11	1.08	1.09
Olefins	12.5	12.5	12.5	12.3	13.2	12.9	12.5	11.4	11.8	7.4	8.0	7.8	0.3	5.8	3.5	11.7	11.9	11.8
Oxygen (wt%)	0.261	0.127	0.186	0.055	0.042	0.047	0.206	0.124	0.156	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.083	0.108
E200	48	50	49	48	51	50	50	50	50	46	52	50	44	41	42	48	50	49
E300	81	81	81	91	90	90	83	83	83	89	89	89	92	92	92	85	85	85
T10	129	101	113	128	98	110	129	105	114	131	99	112	130	103	115	129	101	112
T50	204	200	202	203	197	200	201	200	200	208	195	200	212	219	216	204	199	186
T90	341	340	340	293	297	295	329	329	329	302	302	302	290	290	290	319	319	319
DVI	1,146	1,091	1,115	1,096	1,036	1,060	1,126	1,087	1,102	1,123	1,035	1,070	1,121	1,101	1,109	1,124	1,067	1,090
V/L	141	117	127	140	114	124	141	120	128	143	114	126	144	122	131	141	116	126
Energy (MMBtu/Bbl)	5.122	5.015	5.062	5.106	5.028	5.060	5.135	5.018	5.063	5.207	5.054	5.115	5.063	5.194	5.138	5.127	5.027	5.068
MTBE (wt%)	0.261	0.126	0.186	0.055	0.041	0.047	0.205	0.123	0.155	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.083	0.108
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	65.4	101.4	85.7	70.2	106.1	91.7	65.7	101.5	87.7	71.6	107.6	93.3	63.0	115.6	93.1			
NOX	1,261.1	1,430.4	1,356.6	1,273.0	1,450.7	1,379.6	1,263.8	1,420.0	1,359.8	1,224	1,389	1,324	1,161	1,332	1,259			
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	24,035	0	10,009	0	0	0	0	0	0	0	0	0	24,035	0	10,009
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Appendix 5A: Mogas Quality by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	260,200	251,265	254,986	225	329	286	130,172	105,547	115,802	0	0	0	13,729	13,070	13,344	404,325	370,211	384,417
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	8.2	11.7	10.2	8.2	11.3	10.3	8.2	11.3	9.8	0.0	0.0	0.0	8.0	12.4	10.5	8.2	11.6	10.1
Sulfur ppm	91	84	87	80	99	92	80	99	90	0	0	0	0	0	0	84	85	85
Density	261.2	250.5	255.1	259.9	249.1	252.7	259.9	249.1	254.3	0.0	0.0	0.0	268.5	263.9	265.9	261.0	250.6	255.3
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	93.0	93.0	93.0	93.0	93.0	93.0
Aromatics	23.4	11.1	16.3	21.3	8.3	12.6	21.3	8.3	14.4	0.0	0.0	0.0	42.2	38.5	40.1	23.4	11.2	16.6
Benzene	0.6	0.3	0.47	0.7	0.3	0.40	0.7	0.3	0.46	0.00	0.00	0.00	0.33	0.31	0.32	0.65	0.32	0.46
Olefins	10.2	10.3	10.2	8.9	11.4	10.6	8.9	11.4	10.3	0.0	0.0	0.0	22.4	28.3	25.8	10.2	11.2	10.8
Oxygen (wt%)	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700	0.000	0.000	0.000	0.000	0.000	0.000	2.606	2.600	2.591
E200	52	61	57	53	63	60	53	63	58	0	0	0	36	40	38	52	61	57
E300	81	82	82	83	83	83	83	83	83	0	0	0	92	92	92	82	83	82
T10	129	107	117	129	110	116	129	110	119	0	0	0	130	103	115	129	108	117
T50	196	177	185	193	174	180	193	174	183	0	0	0	229	221	224	196	178	186
T90	337	334	335	329	329	329	329	329	329	0	0	0	290	290	290	333	331	332
DVI	1,119	1,028	1,066	1,102	1,017	1,045	1,102	1,017	1,057	0	0	0	1,171	1,107	1,134	1,115	1,027	1,066
V/L	140	118	128	140	120	127	140	120	129	0	0	0	147	122	132	140	119	128
Energy (MMBtu/Bbl)	5.148	4.987	5.055	5.134	4.967	5.021	5.134	4.967	5.045	0.000	0.000	0.000	5.233	5.151	5.186	5.147	4.987	5.057
MTBE (wt%)	2.696	2.695	2.696	2.695	2.695	2.695	2.695	2.695	2.695	0.000	0.000	0.000	0.000	0.000	0.000	2.602	2.595	2.586
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.004	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.005	0.005
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	55.4	77.2	67.9	54.1	75.0	68.1	54.1	75.0	65.2	0.0	0.0	0.0	72.4	115.5	97.1			
NOX	1,217.1	1,331.5	1,282.9	1,196.4	1,334.3	1,289.1	1,196.4	1,334.3	1,269.7	0	0	0	1,305	1,585	1,465			
Oxy Reg E10																		
Total BPD	0	13,705	7,997	627,307	420,400	506,564	37,378	0	15,566	73,300	66,236	69,178	0	0	0	737,985	500,341	599,305
Ethanol BPD	0	1,384	808	21,192	42,460	33,603	3,775	0	1,572	7,403	6,690	6,987	0	0	0	32,370	50,534	42,970
RVP	0.0	10.3	10.3	9.5	13.0	11.2	9.2	0.0	9.2	9.0	13.0	11.2	0.0	0.0	0.0	9.4	12.9	11.1
Sulfur ppm	0	137	137	131	140	136	115	0	115	100	100	100	0	0	0	128	135	131
Density	0.0	252.7	252.7	261.9	257.0	259.6	260.3	0.0	260.3	256.3	258.8	257.7	0.0	0.0	0.0	261.3	257.1	259.3
R+M/2	0.0	87.0	87.0	87.0	87.0	87.0	87.0	0.0	87.0	86.0	86.0	86.0	0.0	0.0	0.0	86.9	86.9	86.9
Aromatics	0.0	11.9	11.9	31.1	22.0	26.7	22.8	0.0	22.8	11.8	20.9	16.9	0.0	0.0	0.0	28.8	21.6	25.3
Benzene	0.0	1.3	1.29	1.6	1.3	1.43	1.8	0.0	1.81	0.83	1.46	1.18	0.00	0.00	0.00	1.52	1.29	1.41
Olefins	0.0	13.2	13.2	0.5	13.0	6.6	0.4	0.0	0.4	5.9	7.0	6.5	0.0	0.0	0.0	1.1	12.2	6.5
Oxygen (wt%)	0.000	5.000	5.000	3.680	3.751	3.714	5.000	0.000	5.000	3.761	3.725	3.741	0.000	0.000	0.000	3.755	3.781	3.767
E200	0	68	68	54	64	59	64	0	64	65	64	64	0	0	0	56	64	60
E300	0	76	76	94	94	94	83	0	83	89	89	89	0	0	0	93	93	93
T10	0	116	116	121	99	111	123	0	123	124	99	110	0	0	0	122	99	111
T50	0	163	163	191	172	181	172	0	172	170	171	171	0	0	0	188	171	186
T90	0	360	360	280	280	280	329	0	329	302	302	302	0	0	0	285	285	285
DVI	0	1,024	1,024	1,034	944	990	1,030	0	1,030	999	964	979	0	0	0	1,031	949	991
V/L	0	124	124	133	110	122	131	0	131	132	110	120	0	0	0	132	111	122
Energy (MMBtu/Bbl)	0.000	4.847	4.847	5.028	4.900	4.966	4.937	0.000	4.937	4.947	4.925	4.935	0.000	0.000	0.000	5.015	4.902	4.960
MTBE (wt%)	0.000	1.186	1.186	0.000	0.000	0.000	1.297	0.000	1.297	0.000	0.000	0.000	0.000	0.000	0.000	0.065	0.032	0.049
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	3.814	3.814	3.680	3.751	3.714	3.703	0.000	3.703	3.761	3.725	3.741	0.000	0.000	0.000	3.689	3.749	3.718
Exhaust Toxics	0.0	88.5	88.5	70.2	98.7	84.0	61.1	0.0	61.1	54.0	97.8	78.5	0.0	0.0	0.0			
NOX	0.0	1,388.2	1,388.2	1,248.0	1,443.5	1,342.7	1,149.9	0.0	1,149.9	1,163	1,373	1,280	0	0	0			
Oxy Prem E10																		
Total BPD	82,186	67,672	73,716	318,939	303,150	309,725	0	37,253	21,739	115,163	122,227	119,285	0	0	0	516,288	530,301	524,466
Ethanol BPD	8,301	6,835	7,445	32,216	30,621	31,285	0	3,763	2,196	11,631	12,345	12,048	0	0	0	52,148	53,564	52,974
RVP	9.4	13.7	11.7	9.5	13.9	12.0	0.0	11.3	11.3	9.0	13.0	11.4	0.0	0.0	0.0	9.3	13.5	11.8
Sulfur ppm	42	137	92	19	83	55	0	115	115	100	100	100	0	0	0	41	96	73
Density	269.6	261.8	265.5	268.0	261.8	264.5	0.0	256.2	256.2	268.8	266.0	267.1	0.0	0.0	0.0	268.5	262.4	264.9
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	0.0	93.0	93.0	91.5	91.5	91.5	0.0	0.0	0.0	92.7	92.7	92.7
Aromatics	35.1	27.9	31.2	33.6	27.5	30.1	0.0	16.4	16.4	31.3	35.9	34.0	0.0	0.0	0.0	33.3	28.7	30.6
Benzene	0.9	0.7	0.75	1.4	1.1	1.24	0.0	0.5	0.53	1.70	1.28	1.45	0.00	0.00	0.00	1.36	1.07	1.19
Olefins	4.1	15.2	10.1	3.9	11.2	8.1	0.0	11.5	11.5	9.5	8.9	9.1	0.0	0.0	0.0	5.1	11.2	8.7
Oxygen (wt%)	4.413	5.000	4.723	3.597	3.683	3.645	0.000	5.000	5.000	3.587	3.623	3.608	0.000	0.000	0.000	3.725	3.927	3.843
E200	46	55	51	42	50	47	0	61	61	52	53	53	0	0	0	45	52	49
E300	76	76	76	94	94	94	0	83	83	89	89	89	0	0	0	90	90	90
T10	122	95	107	121	93	105	0	110	110	124	99	109	0	0	0	122	96	107
T50	208	190	199	216	199	206	0	177	177	196	193	194	0	0	0	210	195	186
T90	360	360	360	280	280	280	0	329	329	302	302	302	0	0	0	298	299	299
DVI	1,169	1,073	1,118	1,109	1,018	1,057	0	1,023	1,023	1,076	1,031	1,049	0	0	0	1,111	1,028	1,062
V/L	136	110	122	137	110	122	0	120	120	136	114	123	0	0	0	136	112	122
Energy (MMBtu/Bbl)	5.063	4.950	5.002	5.053	4.938	4.987	0.000	4.887	4.887	5.001	4.993	4.996	0.000	0.000	0.000	5.043	4.949	4.987
MTBE (wt%)	0.838	1.318	1.092	0.000	0.000	0.000	0.000	1.238	1.238	0.000	0.000	0.000	0.000	0.000	0.000	0.134	0.253	0.203
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.576	3.682	3.632	3.597	3.683	3.645	0.000	3.762	3.762	3.587	3.623	3.608	0.000	0.000	0.000	3.591	3.674	3.640
Exhaust Toxics	65.5	98.5	83.2	69.9	104.6	89.7	0.0	86.0	86.0	71.3	112.2	95.8	0.0	0.0	0.0			
NOX	1,190.6	1,480.2	1,345.7	1,172.5	1,399.1	1,301.9	0.0	1,380.1	1,380.1	1,241	1,411	1,343	0	0	0			

Appendix 5A: Mogas Quality by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,145,826	1,998,866	2,060,066	2,433,302	2,313,722	2,363,520	1,133,741	1,243,724	1,197,923	674,011	715,353	698,136	104,912	99,875	101,973	6,491,792	6,371,540	6,421,617
Ethanol BPD	8,301	8,219	8,253	77,443	73,082	74,898	3,775	3,763	3,768	19,035	19,035	19,035	0	0	0	108,553	104,098	105,953
RVP	8.3	12.6	10.7	8.8	13.3	11.3	8.2	12.0	10.5	8.3	13.0	11.1	8.0	12.4	10.5	8.5	12.8	11.0
Sulfur ppm	112	118	116	118	127	123	111	114	113	100	100	100	0	13	7	111	117	114
Density	260.5	253.6	256.7	262.5	256.5	259.1	260.4	253.8	256.4	264.5	259.3	261.4	265.2	265.8	265.5	261.8	255.5	258.2
R+M/2	88.0	88.0	88.0	87.8	87.8	87.8	87.7	87.7	87.7	86.9	86.9	86.9	91.2	88.6	89.7	87.8	87.7	87.8
Aromatics	27.7	23.1	25.1	30.8	25.8	28.0	28.2	24.3	25.8	28.4	26.9	27.5	38.4	40.3	39.5	29.2	25.0	26.8
Benzene	0.94	0.88	0.90	1.37	1.18	1.26	0.94	0.87	0.90	1.49	1.48	1.49	0.33	0.91	0.66	1.15	1.05	1.09
Olefins	11.9	12.3	12.1	8.2	12.9	10.9	11.7	11.4	11.5	7.6	8.1	7.9	3.2	8.7	6.4	9.9	11.8	11.0
Oxygen (wt%)	0.722	0.650	0.682	1.462	1.204	1.316	0.650	0.486	0.552	1.019	0.980	0.996	0.000	0.000	0.000	1.007	0.847	0.915
E200	48	52	50	49	53	52	50	51	51	49	54	52	43	41	42	49	52	51
E300	80	81	81	92	91	92	83	83	83	89	89	89	92	92	92	86	86	86
T10	129	101	113	126	97	109	129	105	115	129	99	111	130	103	115	128	100	112
T50	203	197	200	202	193	197	199	197	198	202	192	196	214	219	217	202	195	198
T90	341	340	340	288	292	290	329	329	329	302	302	302	290	290	290	314	315	315
DVI	1,144	1,082	1,109	1,082	1,017	1,044	1,120	1,079	1,095	1,101	1,028	1,057	1,127	1,101	1,112	1,112	1,052	1,077
V/L	141	117	127	138	113	123	141	120	128	141	114	125	144	122	131	140	116	126
Energy (MMBtu/Bbl)	5.123	5.008	5.058	5.079	4.993	5.030	5.128	5.010	5.056	5.144	5.032	5.077	5.085	5.188	5.144	5.109	5.008	5.051
MTBE (wt%)	0.580	0.494	0.532	0.034	0.029	0.031	0.527	0.371	0.433	0.000	0.000	0.000	0.000	0.000	0.000	0.295	0.236	0.261
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.001	0.001	0.001	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Ethanol (wt%)	0.142	0.155	0.149	1.428	1.175	1.285	0.122	0.114	0.117	1.019	0.980	0.996	0.000	0.000	0.000	0.712	0.610	0.654
Exhaust Toxics	64.2	98.1	83.4	70.1	104.5	89.8	64.2	98.8	85.2	69.7	107.5	92.3	64.2	115.6	93.6	0.0	0.0	0.0
NOX	1,253	1,419	1,347	1,253	1,443	1,361	1,252	1,412	1,349	1,220	1,391	1,323	1,180	1,365	1,286	0	0	0
E85 to CG																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E85 to RFG																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix 5A: Mogas Quality by Region

	PD 1 2004 US Model			PD 2 2004 US Model			PD 3 2004 US Model			PD 4/5 ex-CA 2004 US Model			PD CA 2004 US Model			USA - 2004 Calibration		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0.0	0.0	0
E300	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0.0	0.0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ALL MOGAS																		
Total BPD	3,465,495	3,300,469	3,369,192	2,819,075	2,696,020	2,747,265	1,501,259	1,618,082	1,569,432	674,011	715,353	698,136	1,087,495	1,072,535	1,078,765	9,547,334	9,402,459	9,462,790
Ethanol BPD	43,060	43,060	43,060	105,424	105,424	105,424	5,147	5,147	5,147	19,035	19,035	19,035	55,645	55,645	55,645	228,311	228,311	228,311
RVP	7.7	12.7	10.6	8.5	13.2	11.2	7.9	11.8	10.2	8.3	13.0	11.1	6.9	11.6	9.6	7.9	12.6	10.6
Sulfur ppm	105	116	111	115	122	119	110	113	112	100	100	100	40	42	41	101	107	105
Density	259.7	253.4	256.1	262.7	255.9	258.8	259.5	253.1	255.7	264.5	259.3	261.4	263.2	259.2	260.9	261.3	255.2	257.8
R+M/2	88.1	88.0	88.0	88.3	87.8	88.0	88.2	87.7	87.9	86.9	86.9	86.9	88.0	87.8	87.9	88.1	87.8	87.9
Aromatics	24.4	21.4	22.7	29.3	24.8	26.7	25.7	22.5	23.8	28.4	26.9	27.5	23.1	24.5	23.9	26.2	23.3	24.5
Benzene	0.81	0.80	0.80	1.29	1.12	1.19	0.86	0.80	0.82	1.49	1.48	1.49	1.09	1.15	1.13	1.04	0.98	1.01
Olefins	11.3	12.4	11.9	8.6	12.6	10.9	11.8	11.3	11.5	7.6	8.1	7.9	5.7	6.2	6.0	9.7	11.2	10.6
Oxygen (wt%)	1.385	1.432	1.411	1.629	1.492	1.551	1.008	0.862	0.921	1.019	0.980	0.996	3.228	3.234	3.232	1.584	1.526	1.550
E200	51	55	53	49	55	53	52	54	53	49	54	52	51	50	50	50	54	53
E300	80	80	80	92	92	92	83	83	83	89	89	89	92	92	92	86	86	86
T10	132	101	114	128	98	110	131	107	116	129	99	111	138	108	120	131	102	114
T50	198	189	193	202	190	195	195	192	193	202	192	196	199	199	199	199	191	194
T90	345	344	345	287	290	289	329	329	329	302	302	302	290	290	290	316	317	317
DVI	1,138	1,064	1,096	1,084	1,005	1,039	1,112	1,064	1,083	1,101	1,028	1,057	1,092	1,049	1,067	1,110	1,043	1,071
V/L	143	115	127	140	112	124	142	120	129	141	114	125	148	122	133	142	116	127
Energy (MMBtu/Bbl)	5.105	5.001	5.045	5.074	4.974	5.017	5.127	5.020	5.063	5.144	5.032	5.077	5.117	5.021	5.061	5.103	5.001	5.044
MTBE (wt%)	0.812	0.823	0.818	0.037	0.033	0.034	0.902	0.756	0.815	0.000	0.000	0.000	0.000	0.000	0.000	0.445	0.425	0.434
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.002	0.002	0.002	0.000	0.000	0.000	0.002	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001
Ethanol (wt%)	0.571	0.607	0.591	1.593	1.459	1.517	0.104	0.104	0.104	1.019	0.980	0.996	3.228	3.234	3.232	1.138	1.099	1.116

Appendix 5A: Mogas Quality by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,445,578	1,404,150	1,421,402	330,079	327,105	328,343	457,925	466,449	462,899	0	0	0	1,291,664	1,327,246	1,312,428	3,525,246	3,524,950	3,525,073
Ethanol BPD	146,018	141,819	143,568	33,338	33,038	33,163	46,250	47,111	46,753	0	0	0	130,458	134,065	132,563	356,064	356,033	356,046
RVP	7.0	13.4	10.7	7.0	12.8	10.4	7.0	11.6	9.7	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.4	10.1
Sulfur ppm	21	24	23	23	25	24	18	25	22	0	0	0	8	10	9	16	19	18
Density	259.9	256.5	258.0	261.5	255.2	257.9	259.6	257.9	258.6	0.0	0.0	0.0	261.1	257.4	258.9	260.4	256.9	258.4
R+M/2	87.1	87.1	87.1	87.0	87.0	87.0	87.0	87.0	87.0	0.0	0.0	0.0	87.0	87.0	87.0	87.1	87.1	87.1
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	22.6	22.9	22.8	20.9	21.0	21.0
Benzene	0.6	0.6	0.57	0.6	0.6	0.59	0.6	0.5	0.55	0.00	0.00	0.00	0.62	0.50	0.55	0.60	0.53	0.56
Olefins	7.8	13.2	10.9	7.2	11.7	9.8	3.9	12.4	8.9	0.0	0.0	0.0	5.7	5.7	5.7	6.5	10.2	8.6
Oxygen (wt%)	3.710	3.758	3.737	3.687	3.777	3.739	3.714	3.737	3.728	0.000	0.000	0.000	3.691	3.746	3.723	3.701	3.753	3.731
E200	51	58	55	53	67	61	52	57	55	0	0	0	55	60	58	53	60	57
E300	94	94	94	84	84	84	87	87	87	0	0	0	86	86	86	89	89	89
T10	137	96	113	137	100	116	137	108	120	0	0	0	138	109	121	138	103	117
T50	197	183	189	193	166	177	195	186	189	0	0	0	190	179	184	194	180	186
T90	280	280	280	324	324	324	309	309	309	0	0	0	315	315	315	301	301	301
DVI	1,076	972	1,016	1,110	972	1,030	1,100	1,028	1,058	0	0	0	1,094	1,016	1,048	1,089	996	1,035
V/L	147	110	125	146	110	125	146	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.021	4.913	4.959	5.015	4.854	4.921	5.035	4.968	4.996	0.000	0.000	0.000	5.046	4.982	5.008	5.031	4.941	4.978
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.710	3.758	3.737	3.687	3.777	3.739	3.714	3.737	3.728	0.000	0.000	0.000	3.691	3.746	3.723	3.701	3.753	3.731
VOC Reduction	27.9			27.9			28.8			0.0								
NOX Reduction	14.8	12.4	13.4	14.6	12.7	13.5	15.3	12.9	13.9	0.0	0.0	0.0						
Toxics Reduction	33.0	26.0	28.9	33.1	28.2	30.3	33.7	26.0	29.2	0.0	0.0	0.0						
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0			0.0			0.0			0.0	0.0							
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
RFG Prem E10																		
Total BPD	275,348	267,457	270,743	62,872	62,306	62,542	87,224	88,847	88,171	0	0	0	246,031	252,809	249,986	671,475	671,419	671,442
Ethanol BPD	27,813	27,016	27,348	6,351	6,294	6,317	8,810	8,974	8,906	0	0	0	24,852	25,536	25,251	67,826	67,819	67,822
RVP	7.0	13.7	10.8	7.0	13.5	10.8	7.0	12.0	9.9	0.0	0.0	0.0	6.8	11.5	9.6	6.9	12.6	10.2
Sulfur ppm	24	25	24	20	20	20	11	11	11	0	0	0	7	9	8	16	17	16
Density	263.0	258.0	260.1	262.6	257.9	259.9	259.1	256.1	257.3	0.0	0.0	0.0	257.6	253.5	255.2	260.5	256.1	257.9
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.2	92.3
Aromatics	20.0	20.0	20.0	20.0	20.0	20.0	15.7	17.5	16.8	0.0	0.0	0.0	13.8	13.0	13.4	17.2	17.1	17.1
Benzene	0.4	0.4	0.41	0.5	0.6	0.53	0.3	0.3	0.27	0.00	0.00	0.00	0.37	0.25	0.30	0.40	0.33	0.36
Olefins	16.2	15.1	15.6	13.9	12.0	12.8	7.4	7.5	7.4	0.0	0.0	0.0	5.7	5.7	5.7	11.0	10.3	10.6
Oxygen (wt%)	3.666	3.737	3.706	3.671	3.738	3.710	3.721	3.764	3.746	0.000	0.000	0.000	3.743	3.803	3.778	3.701	3.765	3.738
E200	50	55	53	50	56	53	50	51	51	0	0	0	54	58	57	51	56	54
E300	94	94	94	84	84	84	87	87	87	0	0	0	86	86	86	89	89	89
T10	137	95	113	137	96	113	137	105	118	0	0	0	138	108	121	138	101	116
T50	201	189	194	200	188	193	200	197	199	0	0	0	191	183	186	197	188	186
T90	280	280	280	324	324	324	309	309	309	0	0	0	315	315	315	301	301	301
DVI	1,088	990	1,031	1,130	1,030	1,072	1,116	1,059	1,083	0	0	0	1,096	1,025	1,054	1,099	1,016	1,050
V/L	147	110	126	147	110	126	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.003	4.880	4.932	4.961	4.878	4.912	4.960	4.882	4.914	0.000	0.000	0.000	4.941	4.873	4.901	4.971	4.877	4.916
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.666	3.737	3.706	3.671	3.738	3.710	3.721	3.764	3.746	0.000	0.000	0.000	3.743	3.803	3.778	3.701	3.765	3.738
VOC Reduction	28.7			28.5			29.8			0.0	0.0							
NOX Reduction	10.3	11.2	10.8	12.1	13.4	12.9	16.9	16.6	16.7	0.0	0.0	0.0						
Toxics Reduction	32.6	25.7	28.6	33.1	25.5	28.7	37.3	27.3	31.4	0.0	0.0	0.0						

Appendix 5A: Mogas Quality by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,720,926	1,671,607	1,692,146	392,951	389,411	390,885	545,149	555,296	551,070	0	0	0	1,537,696	1,580,055	1,562,415	4,196,721	4,196,369	4,196,515
Ethanol BPD	173,831	168,835	170,916	39,689	39,331	39,480	55,061	56,085	55,658	0	0	0	155,310	159,601	157,814	423,890	423,853	423,868
RVP	7.0	13.5	10.7	7.0	12.9	10.4	7.0	11.7	9.7	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.4	10.1
Sulfur ppm	22	24	23	22	24	23	17	23	20	0	0	0	8	10	9	16	19	17
Density	260.4	256.8	258.3	261.7	255.6	258.2	259.5	257.6	258.4	0.0	0.0	0.0	260.6	256.7	258.3	260.5	256.8	258.3
R+M/2	88.1	88.1	88.1	88.0	88.0	88.0	88.0	88.0	88.0	0.0	0.0	0.0	87.6	87.6	87.6	87.9	87.9	87.9
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	19.3	19.6	19.5	0.0	0.0	0.0	21.2	21.3	21.3	20.3	20.4	20.4
Benzene	0.57	0.53	0.55	0.58	0.59	0.58	0.55	0.48	0.51	0.00	0.00	0.00	0.58	0.46	0.51	0.57	0.50	0.53
Olefins	9.1	13.5	11.7	8.3	11.7	10.3	4.4	11.7	8.7	0.0	0.0	0.0	5.7	5.7	5.7	7.2	10.2	8.9
Oxygen (wt%)	3.703	3.754	3.732	3.684	3.771	3.734	3.715	3.742	3.731	0.000	0.000	0.000	3.699	3.755	3.732	3.701	3.754	3.732
E200	51	58	55	53	65	60	52	56	54	0	0	0	55	60	58	53	59	56
E300	94	94	94	84	84	84	87	87	87	0	0	0	86	86	86	89	89	89
T10	137	96	113	137	99	115	137	107	120	0	0	0	138	109	121	138	103	117
T50	198	184	189	195	169	180	196	187	191	0	0	0	191	180	184	194	181	187
T90	280	280	280	324	324	324	309	309	309	0	0	0	315	315	315	301	301	301
DVI	1,078	975	1,018	1,113	981	1,036	1,103	1,033	1,062	0	0	0	1,094	1,018	1,049	1,091	999	1,037
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.018	4.908	4.954	5.006	4.857	4.920	5.023	4.955	4.983	0.000	0.000	0.000	5.029	4.965	4.991	5.022	4.931	4.969
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.703	3.754	3.732	3.684	3.771	3.734	3.715	3.742	3.731	0.000	0.000	0.000	3.699	3.755	3.732	3.701	3.754	3.732
VOC Reduction	28.1			28.0			29.0			0.0								
NOX Reduction	14.1	12.2	13.0	14.2	12.8	13.4	15.6	13.4	14.3	0.0	0.0	0.0						
Toxics Reduction	32.9	25.9	28.9	33.1	27.8	30.0	34.3	26.2	29.5	0.0	0.0	0.0						
CG Reg																		
Total BPD	450,000	574,823	522,842	100	945,863	552,011	907,294	1,367,754	1,176,001	100	421,001	245,721	100	100	100	1,357,594	3,309,541	2,496,675
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	7.9	14.0	11.8	8.3	13.8	13.8	7.9	12.4	11.0	8.1	13.0	13.0	8.0	12.2	10.5	7.9	13.2	12.0
Sulfur ppm	28	28	28	28	28	28	28	28	28	28	28	28	26	25	25	28	28	28
Density	262.4	258.3	259.8	263.5	258.1	258.1	262.4	258.0	259.5	249.4	253.8	253.8	258.8	260.2	259.6	262.4	257.6	258.7
R+M/2	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	87.0	86.0	86.0	86.0	87.0	87.0	87.0	87.0	86.9	86.9
Aromatics	30.0	30.0	30.0	30.0	30.0	30.0	30.0	28.7	29.1	8.0	21.0	21.0	21.4	30.0	26.4	30.0	28.3	28.7
Benzene	0.7	1.0	0.90	0.7	0.9	0.92	0.7	0.6	0.66	0.25	1.30	1.30	0.59	0.58	0.58	0.74	0.86	0.83
Olefins	19.9	15.2	16.9	10.3	15.3	15.3	19.9	15.6	17.0	7.5	7.3	7.3	20.5	15.4	17.5	19.9	14.4	15.7
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	44	49	47	41	51	51	44	44	44	56	54	54	51	48	49	44	48	48
E300	87	94	92	84	84	84	87	87	87	83	83	83	86	86	86	87	87	87
T10	132	93	107	129	94	94	132	103	112	130	99	99	130	104	115	132	98	106
T50	211	202	205	219	197	197	211	211	211	187	191	191	199	204	202	211	203	186
T90	309	280	290	324	324	324	309	309	309	327	327	327	315	315	315	309	311	310
DVI	1,141	1,024	1,066	1,175	1,055	1,055	1,141	1,097	1,111	1,084	1,050	1,050	1,107	1,084	1,094	1,141	1,067	1,083
V/L	145	110	122	144	110	110	145	120	128	139	114	114	142	120	129	145	115	121
Energy (MMBtu/Bbl)	5.160	5.046	5.087	5.181	5.052	5.052	5.160	5.089	5.112	5.061	5.066	5.066	5.079	5.068	5.073	5.160	5.068	5.089
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	66.1	104.9	91.0	63.8	103.4	103.4	66.1	101.1	89.8	49.8	97.6	97.6	59.9	100.1	83.4			
NOX	1,289.1	1,405.0	1,363.5	1,190.6	1,409.2	1,409.2	1,289.1	1,404.6	1,367.5	1,107	1,319	1,318	1,275	1,404	1,350			
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Appendix 5A: Mogas Quality by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	100	2,845	1,702	100	100	100	100	100	100	79,243	100	33,058	100	100	100	79,643	3,245	35,060
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	7.9	12.0	11.9	8.3	14.0	11.6	7.9	12.0	10.3	8.1	13.0	8.1	8.0	12.4	10.6	8.1	12.1	8.3
Sulfur ppm	28	28	28	0	10	6	28	28	28	12	28	12	7	1	3	12	27	12
Density	246.6	243.1	243.1	259.3	258.6	258.9	246.6	243.1	244.5	247.2	252.6	247.2	249.2	257.9	254.3	247.2	244.3	247.1
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	91.5	92.9	91.6
Aromatics	1.2	0.0	0.0	23.0	30.0	27.1	1.2	0.0	0.5	2.6	17.7	2.6	5.7	27.3	18.3	2.6	2.3	2.6
Benzene	0.0	0.0	0.00	0.4	0.7	0.61	0.0	0.0	0.00	0.08	1.10	0.08	0.16	0.25	0.21	0.08	0.06	0.08
Olefins	1.2	7.2	7.0	9.0	21.7	16.4	1.2	7.2	4.7	4.3	25.8	4.4	7.2	2.2	4.3	4.3	8.0	4.5
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	47	51	51	34	39	37	47	51	49	48	48	48	48	39	43	48	51	48
E300	87	87	87	84	84	84	87	87	87	83	83	83	86	86	86	83	87	84
T10	132	105	106	129	93	108	132	105	116	130	99	130	130	103	114	130	105	129
T50	207	197	197	232	222	226	207	197	201	204	205	204	203	223	215	204	199	186
T90	309	309	309	324	324	324	309	309	309	327	327	327	315	315	315	327	311	326
DVI	1,127	1,058	1,060	1,212	1,129	1,163	1,127	1,058	1,087	1,135	1,089	1,135	1,120	1,138	1,131	1,135	1,064	1,131
V/L	144	120	121	146	113	127	144	120	130	142	116	142	142	122	131	142	120	141
Energy (MMBtu/Bbl)	4.960	4.878	4.880	5.123	5.074	5.094	4.960	4.878	4.912	4.964	4.971	4.964	4.982	5.069	5.033	4.964	4.893	4.960
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	49.1	77.1	76.4	58.8	106.9	86.8	49.1	77.1	65.4	49.6	101.5	49.7	50.2	92.8	75.1			
NOX	1,076.9	1,234.1	1,230.3	1,139.8	1,471.2	1,333.2	1,076.9	1,234.1	1,168.6	1,086	1,502	1,087	1,089	1,304	1,214			
Oxy Reg E10																		
Total BPD	1,554,004	1,427,013	1,479,897	1,774,598	741,621	1,171,792	339,601	100	141,481	692,210	277,932	450,453	119,520	108,222	112,927	4,479,934	2,554,888	3,356,551
Ethanol BPD	156,970	144,128	149,476	179,252	74,904	118,359	34,300	10	14,290	69,913	28,071	45,496	12,073	10,930	11,406	452,508	258,044	339,026
RVP	9.3	13.5	11.7	9.3	13.3	10.7	8.9	11.7	8.9	9.1	12.8	10.4	9.0	11.7	10.5	9.2	13.3	11.0
Sulfur ppm	20	25	23	24	22	23	20	25	20	28	28	28	28	28	28	23	25	24
Density	258.9	257.8	258.3	260.6	256.7	259.2	259.2	259.1	259.2	260.5	255.2	258.6	265.4	264.3	264.8	260.0	257.5	258.9
R+M/2	87.1	87.0	87.0	87.0	87.0	87.0	87.2	87.0	87.2	86.0	86.0	86.0	88.5	89.0	88.8	86.9	87.0	86.9
Aromatics	22.5	22.5	22.5	22.5	21.8	22.3	22.5	22.5	22.5	21.8	17.5	20.2	27.6	29.3	28.5	22.5	22.1	22.3
Benzene	0.5	0.5	0.54	0.5	0.5	0.54	0.5	0.5	0.54	1.30	0.97	1.18	0.67	0.61	0.64	0.66	0.59	0.63
Olefins	12.3	13.1	12.8	9.4	11.5	10.2	13.1	12.4	13.1	6.9	6.5	6.8	21.5	16.3	18.6	10.6	12.0	11.3
Oxygen (wt%)	3.723	3.740	3.732	3.699	3.756	3.720	3.719	3.720	3.719	3.701	3.777	3.728	3.633	3.648	3.641	3.707	3.744	3.724
E200	61	57	59	59	60	59	61	55	61	62	67	64	58	56	57	60	59	60
E300	94	94	94	84	84	84	87	87	87	83	83	83	86	86	86	88	90	89
T10	123	96	107	123	97	113	125	107	125	124	100	115	124	107	115	123	97	112
T50	178	185	182	182	180	181	178	189	178	175	165	171	184	187	186	179	181	186
T90	280	280	280	324	324	324	309	309	309	327	327	327	315	315	315	308	299	304
DVI	997	978	987	1,055	1,009	1,038	1,030	1,037	1,030	1,038	972	1,014	1,054	1,037	1,045	1,030	989	1,012
V/L	131	110	119	132	110	124	134	120	134	132	110	124	134	120	126	132	110	122
Energy (MMBtu/Bbl)	4.952	4.949	4.950	4.939	4.928	4.934	4.958	4.984	4.958	5.038	4.978	5.017	4.987	4.950	4.967	4.961	4.946	4.954
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.723	3.740	3.732	3.699	3.756	3.720	3.719	3.720	3.719	3.701	3.777	3.728	3.633	3.648	3.641	3.707	3.744	3.724
Exhaust Toxics	55.8	91.3	75.8	56.2	89.5	68.5	55.7	91.6	55.8	59.4	87.3	69.5	61.7	97.3	81.6			
NOX	1,192.5	1,360.4	1,287.0	1,175.3	1,344.0	1,237.6	1,196.7	1,352.1	1,196.8	1,167	1,306	1,217	1,321	1,421	1,377			
Oxy Prem E10																		
Total BPD	381,615	171,228	258,841	337,938	321,325	328,243	237,404	260,444	250,849	52,626	133,030	99,547	22,685	20,533	21,429	1,032,267	906,560	958,909
Ethanol BPD	38,547	17,296	26,146	34,135	32,457	33,156	23,980	26,305	25,337	5,315	13,437	10,055	2,291	2,074	2,165	104,269	91,569	96,858
RVP	9.3	13.7	11.0	9.3	13.7	11.8	8.9	12.1	10.8	9.1	13.0	12.1	9.0	12.1	10.7	9.2	13.1	11.3
Sulfur ppm	25	25	25	22	7	13	7	10	9	28	28	28	11	14	13	20	14	17
Density	262.2	259.4	261.2	262.5	257.2	259.5	261.0	257.1	258.6	252.3	257.8	256.6	263.0	263.9	263.5	261.6	257.8	259.5
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.9	92.7	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	19.7	20.8	6.6	20.1	17.1	24.9	30.0	27.8	21.7	21.5	21.6
Benzene	0.4	0.4	0.41	0.5	0.5	0.52	0.3	0.3	0.28	0.20	1.30	1.06	0.38	0.44	0.41	0.41	0.55	0.48
Olefins	13.8	14.9	14.2	8.5	6.0	7.1	4.9	7.0	6.2	7.5	7.7	7.7	8.8	8.8	8.8	9.6	8.3	8.9
Oxygen (wt%)	3.676	3.716	3.692	3.672	3.749	3.715	3.694	3.750	3.728	3.821	3.740	3.758	3.666	3.653	3.659	3.686	3.739	3.715
E200	52	54	53	49	53	51	46	49	48	59	57	57	51	50	50	50	53	51
E300	94	94	94	84	84	84	87	87	87	83	83	83	86	86	86	89	87	88
T10	123	94	112	123	95	107	125	105	113	124	99	104	124	105	113	123	98	110
T50	196	192	194	201	193	197	208	201	204	180	186	185	199	199	199	200	194	186
T90	280	280	280	324	324	324	309	309	309	327	327	327	315	315	315	304	312	308
DVI	1,052	996	1,031	1,111	1,046	1,074	1,122	1,069	1,090	1,054	1,035	1,039	1,097	1,070	1,082	1,089	1,042	1,063
V/L	134	110	125	135	110	121	139	120	127	133	113	117	136	120	127	136	114	123
Energy (MMBtu/Bbl)	4.957	4.898	4.934	4.968	4.895	4.926	4.975	4.897	4.927	4.865	4.871	4.869	5.000	4.962	4.979	4.961	4.894	4.924
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.676	3.716	3.692	3.672	3.749	3.715	3.694	3.750	3.728	3.821	3.740	3.758	3.666	3.653	3.659	3.686	3.739	3.715
Exhaust Toxics	57.4	91.5	70.6	58.1	91.5	77.2	56.8	89.5	76.6	50.5	96.1	86.1	57.6	96.0	79.1			
NOX	1,200.5	1,375.5	1,268.1	1,163.5	1,303.5	1,243.5	1,139.8	1,292.6	1,232.4	1,112	1,316	1,271	1,166	1,340	1,263			

Appendix 5A: Mogas Quality by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,385,719	2,175,909	2,263,282	2,112,736	2,008,909	2,052,147	1,484,398	1,628,398	1,568,431	824,179	832,063	828,780	142,404	128,954	134,556	6,949,437	6,774,233	6,847,195
Ethanol BPD	195,517	161,424	175,622	213,387	107,361	151,514	58,280	26,315	39,626	75,228	41,509	55,551	14,364	13,004	13,571	556,777	349,613	435,884
RVP	9.0	13.7	11.6	9.3	13.6	11.7	8.2	12.4	10.7	9.0	12.9	11.3	9.0	11.7	10.5	8.9	13.2	11.4
Sulfur ppm	23	26	24	23	22	23	23	25	24	27	28	27	25	25	25	23	25	24
Density	260.1	258.0	258.9	260.9	257.4	258.9	261.5	257.9	259.3	258.7	254.9	256.5	265.0	264.2	264.5	260.6	257.6	258.8
R+M/2	88.0	87.5	87.7	88.0	88.0	88.0	88.0	88.0	88.0	86.9	86.9	86.9	88.9	89.3	89.1	87.9	87.7	87.8
Aromatics	23.9	24.5	24.2	22.5	25.8	24.4	27.1	27.3	27.2	19.0	19.7	19.4	27.1	29.4	28.4	23.6	25.0	24.4
Benzene	0.56	0.65	0.61	0.53	0.72	0.64	0.62	0.57	0.59	1.11	1.19	1.16	0.63	0.58	0.60	0.63	0.71	0.68
Olefins	14.0	13.8	13.9	9.3	12.4	11.1	16.0	14.2	14.9	6.7	7.1	6.9	19.5	15.1	17.1	12.2	12.7	12.5
Oxygen (wt%)	3.007	2.744	2.860	3.695	1.981	2.721	1.433	0.598	0.930	3.368	1.868	2.494	3.633	3.643	3.639	2.934	1.913	2.347
E200	56	55	55	57	55	56	48	45	46	61	59	60	56	55	56	55	53	54
E300	93	94	93	84	84	84	87	87	87	83	83	83	86	86	86	88	88	88
T10	124	95	108	123	95	107	129	103	113	124	99	110	124	107	115	125	98	109
T50	187	190	189	185	190	188	203	210	207	178	182	180	187	189	188	189	194	192
T90	285	280	282	324	324	324	309	309	309	327	327	327	315	315	315	308	307	307
DVI	1,033	992	1,010	1,064	1,037	1,048	1,112	1,093	1,100	1,048	1,022	1,033	1,061	1,043	1,051	1,062	1,034	1,046
V/L	134	110	121	133	110	120	141	120	128	133	112	121	134	120	126	135	113	122
Energy (MMBtu/Bbl)	4.992	4.970	4.980	4.943	4.981	4.965	5.084	5.059	5.069	5.020	5.005	5.011	4.989	4.952	4.969	5.000	4.999	4.999
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.007	2.744	2.860	3.695	1.981	2.721	1.433	0.598	0.930	3.368	1.868	2.494	3.633	3.643	3.639	2.934	1.913	2.347
Exhaust Toxics	58.0	94.9	78.7	56.5	96.3	79.3	62.2	99.2	84.6	57.9	94.0	79.0	61.0	97.1	81.2	0.0	0.0	0.0
NOX	1,212	1,373	1,302	1,173	1,368	1,285	1,244	1,387	1,330	1,156	1,314	1,248	1,296	1,408	1,359	0	0	0
E85 to CG																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E85 to RFG																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix 5A: Mogas Quality by Region

	PD 1 Reference 2022 US Model			PD 2 Reference 2022 US Model			PD 3 Reference 2022 US Model			PD 4/5 ex-CA Reference 2022 US Model			PD CA Reference 2022 US Model			USA - 2022 Reference		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0.0	0.0	0
E300	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0.0	0.0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ALL MOGAS																		
Total BPD	4,106,645	3,847,516	3,955,428	2,505,687	2,398,320	2,443,032	2,029,547	2,183,694	2,119,501	824,179	832,063	828,780	1,680,100	1,709,009	1,696,970	11,146,158	10,970,602	11,043,710
Ethanol BPD	369,348	330,259	346,537	253,076	146,692	190,994	113,341	82,400	95,285	75,228	41,509	55,551	169,674	172,606	171,385	980,667	773,465	859,752
RVP	8.2	13.6	11.2	8.9	13.5	11.5	7.9	12.2	10.5	9.0	12.9	11.3	7.0	11.5	9.6	8.2	12.9	10.9
Sulfur ppm	22	25	24	23	23	23	21	25	23	27	28	27	9	11	10	21	22	22
Density	260.2	257.5	258.7	261.0	257.2	258.8	260.9	257.8	259.1	258.7	254.9	256.5	261.0	257.3	258.8	260.5	257.3	258.6
R+M/2	88.0	87.7	87.9	88.0	88.0	88.0	88.0	88.0	88.0	86.9	86.9	86.9	87.7	87.8	87.8	87.9	87.8	87.8
Aromatics	22.2	22.5	22.4	22.1	24.8	23.7	25.0	25.3	25.2	19.0	19.7	19.4	21.7	21.9	21.8	22.4	23.3	22.9
Benzene	0.56	0.60	0.58	0.54	0.70	0.63	0.60	0.54	0.57	1.11	1.19	1.16	0.58	0.47	0.52	0.61	0.63	0.62
Olefins	12.0	13.7	12.9	9.1	12.3	10.9	12.9	13.6	13.3	6.7	7.1	6.9	6.9	6.4	6.6	10.3	11.7	11.1
Oxygen (wt%)	3.299	3.182	3.233	3.693	2.270	2.883	2.043	1.397	1.656	3.368	1.868	2.494	3.694	3.746	3.724	3.223	2.616	2.873
E200	54	56	55	56	56	56	49	48	49	61	59	60	55	59	58	54	55	55
E300	93	94	94	84	84	84	87	87	87	83	83	83	86	86	86	88	89	88
T10	130	95	110	125	96	108	131	104	115	124	99	110	137	109	121	130	100	112
T50	191	187	189	187	187	187	201	204	203	178	182	180	190	180	184	191	189	190
T90	283	280	281	324	324	324	309	309	309	327	327	327	315	315	315	305	304	305
DVI	1,052	984	1,014	1,072	1,028	1,047	1,110	1,077	1,090	1,048	1,022	1,033	1,092	1,019	1,049	1,073	1,021	1,043
V/L	140	110	123	135	110	121	143	120	129	133	112	121	146	120	131	140	114	125
Energy (MMBtu/Bbl)	5.003	4.943	4.969	4.953	4.961	4.958	5.068	5.032	5.046	5.020	5.005	5.011	5.026	4.964	4.989	5.008	4.973	4.988
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.299	3.182	3.233	3.693	2.270	2.883	2.043	1.397	1.656	3.368	1.868	2.494	3.694	3.746	3.724	3.223	2.616	2.873

Appendix 5A: Mogas Quality by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,091,221	1,104,480	1,098,958	176,919	341,303	272,847	178,239	486,737	358,267	0	0	0	1,289,843	1,167,079	1,218,203	2,736,223	3,099,598	2,948,275
Ethanol BPD	110,224	111,564	111,006	17,871	34,475	27,560	18,004	49,165	36,189	0	0	0	130,287	117,887	123,051	276,386	313,091	297,806
RVP	7.0	13.1	10.6	7.0	13.1	11.4	7.0	11.7	10.7	0.0	0.0	0.0	6.8	11.4	9.4	6.9	12.2	10.2
Sulfur ppm	23	24	24	20	25	23	24	25	25	0	0	0	10	10	10	17	19	18
Density	259.6	257.5	258.3	260.9	256.5	257.7	260.1	258.9	259.1	0.0	0.0	0.0	261.3	257.5	259.2	260.5	257.6	258.7
R+M/2	87.1	87.1	87.1	87.0	87.0	87.0	87.0	87.0	87.0	0.0	0.0	0.0	87.0	87.0	87.0	87.0	87.0	87.0
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	22.9	23.7	23.4	21.3	21.4	21.4
Benzene	0.6	0.6	0.59	0.6	0.6	0.60	0.6	0.5	0.52	0.00	0.00	0.00	0.62	0.53	0.57	0.61	0.55	0.57
Olefins	6.3	14.0	10.8	6.7	11.8	10.5	4.5	13.8	11.9	0.0	0.0	0.0	5.7	5.7	5.7	5.9	10.6	8.8
Oxygen (wt%)	3.714	3.745	3.732	3.695	3.758	3.741	3.707	3.724	3.720	0.000	0.000	0.000	3.689	3.744	3.719	3.700	3.743	3.726
E200	52	59	56	53	63	60	52	56	55	0	0	0	54	60	58	53	59	57
E300	95	95	95	95	95	95	95	95	95	0	0	0	86	86	86	91	92	91
T10	137	98	114	137	99	109	137	107	113	0	0	0	138	109	122	138	104	117
T50	195	182	188	193	174	179	196	188	190	0	0	0	192	179	184	194	181	186
T90	275	275	275	274	274	274	274	274	274	0	0	0	315	315	315	294	290	291
DVI	1,067	969	1,009	1,058	943	974	1,067	1,000	1,014	0	0	0	1,098	1,015	1,051	1,081	988	1,024
V/L	147	112	126	146	110	120	147	120	126	0	0	0	147	120	132	147	116	128
Energy (MMBtu/Bbl)	5.014	4.908	4.952	5.016	4.861	4.903	5.031	4.957	4.972	0.000	0.000	0.000	5.066	4.982	5.019	5.040	4.938	4.978
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.714	3.745	3.732	3.695	3.758	3.741	3.707	3.724	3.720	0.000	0.000	0.000	3.689	3.744	3.719	3.700	3.743	3.726
VOC Reduction	27.8			28.4			28.7			0.0								
NOX Reduction	14.9	11.9	13.1	15.0	12.9	13.4	15.0	12.2	12.7	0.0	0.0	0.0						
Toxics Reduction	33.1	25.8	28.8	33.8	27.3	29.0	33.5	25.7	27.3	0.0	0.0	0.0						
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0			0.0			0.0			0.0	0.0							
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
RFG Prem E10																		
Total BPD	287,384	283,449	285,088	65,620	65,029	65,275	91,036	92,731	92,025	0	0	0	254,347	260,936	258,192	698,387	702,146	700,581
Ethanol BPD	29,029	28,631	28,797	6,628	6,569	6,593	9,196	9,367	9,295	0	0	0	25,692	26,357	26,080	70,544	70,924	70,766
RVP	7.0	13.6	10.8	7.0	13.5	10.8	7.0	12.0	9.9	0.0	0.0	0.0	6.8	11.5	9.6	6.9	12.6	10.2
Sulfur ppm	25	25	25	15	23	20	13	12	12	0	0	0	9	8	8	17	17	17
Density	262.8	257.7	259.9	260.0	257.9	258.8	258.8	257.1	257.8	0.0	0.0	0.0	257.5	253.7	255.3	260.1	256.2	257.8
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.3	92.3
Aromatics	20.0	20.0	20.0	15.6	20.0	18.2	15.2	19.0	17.4	0.0	0.0	0.0	14.3	13.8	14.0	16.9	17.6	17.3
Benzene	0.5	0.5	0.51	0.3	0.5	0.40	0.3	0.3	0.32	0.00	0.00	0.00	0.36	0.25	0.30	0.41	0.39	0.40
Olefins	14.7	14.2	14.4	7.0	12.3	10.1	7.6	8.7	8.2	0.0	0.0	0.0	5.7	5.7	5.7	9.8	10.1	10.0
Oxygen (wt%)	3.668	3.741	3.710	3.708	3.738	3.725	3.726	3.750	3.740	0.000	0.000	0.000	3.744	3.800	3.777	3.707	3.764	3.740
E200	50	56	53	49	56	53	50	51	51	0	0	0	54	58	57	51	56	54
E300	95	95	95	95	95	95	95	95	95	0	0	0	86	86	86	92	92	92
T10	137	95	113	137	96	113	137	105	118	0	0	0	138	108	121	138	101	116
T50	199	188	193	202	188	194	199	198	198	0	0	0	192	182	186	197	187	186
T90	275	275	275	274	274	274	274	274	274	0	0	0	315	315	315	289	289	289
DVI	1,079	981	1,022	1,086	982	1,025	1,077	1,025	1,047	0	0	0	1,098	1,025	1,055	1,086	1,003	1,038
V/L	147	110	125	148	110	126	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.002	4.880	4.932	4.962	4.877	4.913	4.953	4.895	4.919	0.000	0.000	0.000	4.958	4.881	4.913	4.976	4.882	4.921
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.668	3.741	3.710	3.708	3.738	3.725	3.726	3.750	3.740	0.000	0.000	0.000	3.744	3.800	3.777	3.707	3.764	3.740
VOC Reduction	28.6			28.3			30.0			0.0	0.0							
NOX Reduction	11.3	11.9	11.6	16.9	13.1	14.7	16.9	15.7	16.2	0.0	0.0	0.0						
Toxics Reduction	32.3	25.6	28.4	36.9	26.0	30.5	37.5	26.2	30.9	0.0	0.0	0.0						

Appendix 5A: Mogas Quality by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,378,604	1,387,929	1,384,046	242,540	406,332	338,122	269,276	579,468	450,292	0	0	0	1,544,190	1,428,015	1,476,395	3,434,610	3,801,744	3,648,855
Ethanol BPD	139,253	140,195	139,803	24,499	41,044	34,154	27,200	58,532	45,484	0	0	0	155,979	144,244	149,131	346,930	384,015	368,571
RVP	7.0	13.2	10.6	7.0	13.1	11.3	7.0	11.8	10.6	0.0	0.0	0.0	6.8	11.4	9.4	6.9	12.3	10.2
Sulfur ppm	23	24	24	18	25	23	20	23	22	0	0	0	10	10	10	17	19	18
Density	260.3	257.5	258.7	260.7	256.7	257.9	259.6	258.6	258.9	0.0	0.0	0.0	260.7	256.8	258.5	260.5	257.3	258.6
R+M/2	88.3	88.3	88.3	88.6	88.0	88.2	89.0	88.0	88.2	0.0	0.0	0.0	87.7	87.7	87.7	88.1	88.0	88.0
Aromatics	19.9	19.9	19.9	18.8	20.0	19.6	18.4	19.8	19.5	0.0	0.0	0.0	21.5	21.9	21.7	20.4	20.7	20.6
Benzene	0.58	0.57	0.58	0.51	0.58	0.56	0.49	0.48	0.48	0.00	0.00	0.00	0.58	0.48	0.52	0.57	0.52	0.54
Olefins	8.1	14.1	11.6	6.8	11.9	10.4	5.6	13.0	11.1	0.0	0.0	0.0	5.7	5.7	5.7	6.7	10.5	9.0
Oxygen (wt%)	3.704	3.744	3.727	3.698	3.755	3.738	3.713	3.728	3.724	0.000	0.000	0.000	3.698	3.754	3.729	3.702	3.746	3.729
E200	52	58	55	52	62	59	51	55	54	0	0	0	54	60	57	53	59	56
E300	95	95	95	95	95	95	95	95	95	0	0	0	86	86	86	91	92	91
T10	137	98	114	137	98	110	137	107	114	0	0	0	138	109	122	138	103	117
T50	196	183	189	195	176	182	197	190	192	0	0	0	192	179	185	194	182	187
T90	275	275	275	274	274	274	274	274	274	0	0	0	315	315	315	293	290	291
DVI	1,069	971	1,012	1,066	949	984	1,070	1,004	1,020	0	0	0	1,098	1,017	1,052	1,082	991	1,027
V/L	147	111	126	147	110	121	147	120	127	0	0	0	147	120	132	147	116	128
Energy (MMBtu/Bbl)	5.011	4.902	4.948	5.002	4.864	4.905	5.004	4.947	4.961	0.000	0.000	0.000	5.049	4.964	5.001	5.027	4.928	4.967
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.704	3.744	3.727	3.698	3.755	3.738	3.713	3.728	3.724	0.000	0.000	0.000	3.698	3.754	3.729	3.702	3.746	3.729
VOC Reduction	28.0			28.3			29.2			0.0								
NOX Reduction	14.2	11.9	12.8	15.5	12.9	13.7	15.6	12.7	13.5	0.0	0.0	0.0						
Toxics Reduction	32.9	25.7	28.7	34.6	27.1	29.3	34.8	25.8	28.0	0.0	0.0	0.0						
CG Reg																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Appendix 5A: Mogas Quality by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
Oxy Reg E10																		
Total BPD	2,047,808	1,821,950	1,916,006	1,852,169	1,534,164	1,666,593	1,301,295	903,540	1,069,180	722,471	633,684	670,658	118,758	113,056	115,431	6,042,502	5,006,394	5,437,869
Ethanol BPD	206,849	184,035	193,536	187,088	154,966	168,343	131,444	91,267	107,998	72,977	64,008	67,743	11,996	11,420	11,660	610,354	505,696	549,280
RVP	9.3	13.7	11.7	9.3	13.3	11.4	8.9	11.8	10.3	9.1	12.9	11.2	9.0	11.7	10.6	9.1	13.1	11.3
Sulfur ppm	24	24	24	25	25	25	25	25	25	28	28	28	28	27	27	25	25	25
Density	259.0	258.4	258.7	260.1	258.0	259.0	258.9	260.1	259.5	258.7	257.5	258.1	264.4	264.4	264.4	259.4	258.6	259.0
R+M/2	87.1	87.2	87.1	87.0	87.0	87.0	87.1	87.0	87.1	86.0	86.0	86.0	87.9	89.4	88.8	87.0	87.0	87.0
Aromatics	22.4	22.3	22.4	22.5	22.5	22.5	22.5	22.5	22.5	18.9	18.2	18.6	28.5	30.0	29.3	22.1	22.1	22.1
Benzene	0.5	0.5	0.53	0.5	0.5	0.54	0.5	0.5	0.54	1.06	1.17	1.12	0.58	0.59	0.59	0.60	0.61	0.61
Olefins	14.2	15.0	14.6	10.7	12.0	11.4	12.4	13.9	13.1	6.8	7.5	7.2	16.3	15.2	15.7	11.9	12.9	12.4
Oxygen (wt%)	3.723	3.730	3.727	3.706	3.737	3.723	3.723	3.707	3.715	3.726	3.744	3.736	3.647	3.647	3.647	3.717	3.728	3.723
E200	58	55	56	59	60	59	61	54	58	63	65	64	56	55	56	59	57	58
E300	95	95	95	95	95	95	95	95	95	96	96	96	86	86	86	95	95	95
T10	123	95	107	123	97	109	125	107	116	124	99	110	124	107	114	123	98	110
T50	184	190	187	181	180	181	178	191	184	173	170	171	188	189	188	181	185	186
T90	273	273	273	273	273	273	273	273	273	271	271	271	315	315	315	274	274	274
DVI	1,009	985	996	1,001	960	979	994	1,007	1,000	976	929	950	1,064	1,042	1,051	1,000	976	987
V/L	132	110	120	132	110	120	134	120	127	132	110	120	134	120	126	132	112	122
Energy (MMBtu/Bbl)	4.966	4.931	4.947	4.949	4.916	4.931	4.940	4.972	4.956	5.025	4.953	4.985	5.040	4.956	4.992	4.964	4.937	4.950
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.723	3.730	3.727	3.706	3.737	3.723	3.723	3.707	3.715	3.726	3.744	3.736	3.647	3.647	3.647	3.717	3.728	3.723
Exhaust Toxics	56.8	92.0	76.4	55.8	89.7	74.0	55.9	92.0	73.7	56.6	90.3	75.1	60.2	97.5	81.5			
NOX	1,208.0	1,375.6	1,301.0	1,182.3	1,352.0	1,273.5	1,194.4	1,364.4	1,278.2	1,155	1,310	1,241	1,250	1,407	1,340			
Oxy Prem E10																		
Total BPD	390,078	181,681	268,466	352,813	335,475	342,695	247,885	271,932	261,918	137,633	146,075	142,559	22,621	21,535	21,987	1,151,029	956,697	1,037,624
Ethanol BPD	39,402	18,352	27,118	35,638	33,886	34,616	25,039	27,468	26,456	13,902	14,755	14,400	2,285	2,175	2,221	116,266	96,636	104,811
RVP	9.3	13.7	11.0	9.3	13.6	11.7	8.9	12.1	10.8	9.1	13.0	11.4	9.0	12.0	10.8	9.2	13.1	11.3
Sulfur ppm	25	25	25	10	23	17	8	11	10	28	28	28	27	15	20	17	20	19
Density	262.8	259.1	261.3	261.7	259.2	260.3	261.2	258.0	259.3	261.6	248.8	254.1	258.3	263.9	261.5	261.9	257.4	259.5
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.8	92.7	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	20.9	21.5	21.4	4.5	11.3	15.7	30.0	23.9	22.2	19.5	20.7
Benzene	0.5	0.5	0.51	0.3	0.5	0.43	0.3	0.4	0.33	1.30	0.20	0.64	0.43	0.44	0.44	0.48	0.43	0.45
Olefins	15.3	14.2	14.9	4.7	12.2	9.0	4.9	8.0	6.8	8.8	8.3	8.5	16.2	9.0	12.1	9.1	10.7	9.9
Oxygen (wt%)	3.669	3.721	3.689	3.683	3.720	3.704	3.691	3.737	3.719	3.685	3.874	3.796	3.732	3.653	3.687	3.681	3.746	3.716
E200	50	55	52	46	54	51	46	49	48	53	64	59	58	50	54	48	54	52
E300	95	95	95	95	95	95	95	95	95	96	96	96	86	86	86	95	95	95
T10	123	94	112	123	95	107	125	105	113	124	99	109	124	105	113	123	99	110
T50	199	191	196	209	191	198	208	201	204	195	172	181	183	199	192	203	191	186
T90	273	273	273	273	273	273	273	273	273	271	271	271	315	315	315	274	274	274
DVI	1,053	986	1,027	1,083	988	1,029	1,084	1,033	1,054	1,041	936	978	1,049	1,070	1,061	1,068	994	1,028
V/L	135	110	125	137	110	122	139	120	127	135	110	120	133	120	126	136	113	124
Energy (MMBtu/Bbl)	4.982	4.899	4.949	4.969	4.896	4.927	4.973	4.907	4.933	4.964	4.779	4.853	4.902	4.961	4.936	4.972	4.883	4.924
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.669	3.721	3.689	3.683	3.720	3.704	3.691	3.737	3.719	3.685	3.874	3.796	3.732	3.653	3.687	3.681	3.746	3.716
Exhaust Toxics	58.5	91.9	71.7	56.9	91.5	76.7	56.8	90.8	77.4	61.4	78.9	71.9	54.6	96.0	78.2			
NOX	1,214.1	1,368.0	1,274.9	1,142.7	1,347.9	1,259.9	1,140.8	1,302.4	1,238.7	1,165	1,267	1,226	1,199	1,341	1,280			

Appendix 5A: Mogas Quality by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,437,886	2,003,632	2,184,472	2,204,982	1,869,638	2,009,288	1,549,180	1,175,471	1,331,098	860,104	779,759	813,217	141,379	134,591	137,418	7,193,530	5,963,091	6,475,493
Ethanol BPD	246,251	202,387	220,654	222,725	188,852	202,958	156,483	118,734	134,454	86,879	78,763	82,143	14,281	13,595	13,881	726,619	602,332	654,090
RVP	9.3	13.7	11.6	9.3	13.3	11.5	8.9	11.9	10.4	9.1	12.9	11.2	9.0	11.8	10.6	9.1	13.1	11.3
Sulfur ppm	24	24	24	23	25	24	22	22	22	28	28	28	28	25	26	24	24	24
Density	259.6	258.5	259.0	260.4	258.2	259.2	259.3	259.6	259.5	259.2	255.9	257.4	263.4	264.3	263.9	259.8	258.4	259.1
R+M/2	88.1	87.7	87.9	88.0	88.1	88.0	88.1	88.4	88.2	86.9	87.0	87.0	88.4	89.7	89.1	87.9	87.9	87.9
Aromatics	22.4	22.4	22.4	22.5	22.5	22.5	22.5	22.1	22.3	19.3	15.7	17.3	26.4	30.0	28.5	22.2	21.7	21.9
Benzene	0.53	0.52	0.53	0.50	0.54	0.52	0.50	0.49	0.50	1.10	0.99	1.04	0.55	0.57	0.56	0.58	0.58	0.58
Olefins	14.4	14.9	14.7	9.7	12.0	11.0	11.2	12.5	11.9	7.1	7.6	7.4	16.3	14.2	15.1	11.4	12.6	12.0
Oxygen (wt%)	3.714	3.729	3.722	3.703	3.734	3.719	3.718	3.714	3.716	3.720	3.767	3.746	3.660	3.648	3.653	3.711	3.731	3.721
E200	57	55	56	57	59	58	58	53	56	61	65	63	56	55	55	58	57	57
E300	95	95	95	95	95	95	95	95	95	96	96	96	86	86	86	95	95	95
T10	123	95	108	123	97	109	125	106	115	124	99	110	124	107	114	123	98	110
T50	186	190	188	186	182	184	182	194	188	176	170	173	187	190	189	184	186	185
T90	273	273	273	273	273	273	273	273	273	271	271	271	315	315	315	274	274	274
DVI	1,016	985	1,000	1,014	965	987	1,008	1,013	1,011	986	930	955	1,061	1,047	1,053	1,011	979	994
V/L	133	110	120	133	110	121	134	120	127	132	110	120	134	120	126	133	112	122
Energy (MMBtu/Bbl)	4.968	4.928	4.947	4.952	4.913	4.931	4.945	4.957	4.951	5.015	4.921	4.962	5.018	4.957	4.983	4.965	4.929	4.946
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.714	3.729	3.722	3.703	3.734	3.719	3.718	3.714	3.716	3.720	3.767	3.746	3.660	3.648	3.653	3.711	3.731	3.721
Exhaust Toxics	57.1	92.0	75.8	56.0	90.0	74.5	56.0	91.7	74.4	57.3	88.1	74.6	59.3	97.3	81.0	0.0	0.0	0.0
NOX	1,209	1,375	1,298	1,176	1,351	1,271	1,186	1,350	1,270	1,157	1,302	1,238	1,242	1,396	1,330	0	0	0
E85 to CG																		
Total BPD	100	267,385	156,077	100	227,080	132,557	100	524,103	305,888	100	133,208	77,777	0	0	0	400	1,151,775	672,299
Ethanol BPD	86	229,553	133,994	86	194,950	113,801	86	449,947	262,608	86	114,360	66,772	0	0	0	343	988,811	577,175
RVP	8.0	11.0	11.0	8.0	12.2	12.2	8.0	12.4	12.4	8.0	12.0	12.0	0.0	0.0	0.0	8.0	12.0	12.0
Sulfur ppm	11	10	10	11	9	9	11	9	9	11	9	9	0	0	0	11	9	9
Density	270.2	268.0	268.0	270.2	266.3	266.3	270.1	266.2	266.2	270.1	266.2	266.2	0.0	0.0	0.0	270.1	266.6	266.6
R+M/2	107.4	107.8	107.8	107.4	108.0	108.0	107.4	108.0	108.0	107.3	107.9	107.9	0.0	0.0	0.0	107.4	108.0	108.0
Aromatics	1.9	1.0	1.0	1.9	0.0	0.0	1.9	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	1.8	0.2	0.2
Benzene	0.0	0.0	0.02	0.0	0.0	0.00	0.0	0.0	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.01
Olefins	1.2	2.8	2.8	1.2	3.0	3.0	1.1	3.0	3.0	0.6	1.1	1.1	0.0	0.0	0.0	1.0	2.8	2.7
Oxygen (wt%)	30.330	30.573	30.573	30.330	30.772	30.772	30.334	30.781	30.781	30.334	30.785	30.784	0.000	0.000	0.000	30.332	30.731	30.731
E200	126	128	128	126	130	130	126	130	130	126	130	130	0	0	0	126	130	130
E300	95	96	96	95	97	97	95	97	97	96	97	97	0	0	0	96	96	96
T10	131	112	112	131	104	104	131	103	103	131	105	105	0	0	0	131	105	105
T50	45	41	41	45	36	36	45	36	36	45	37	37	0	0	0	45	38	186
T90	273	271	271	273	268	268	273	268	268	271	268	268	0	0	0	273	268	268
DVI	605	561	561	605	532	532	605	530	530	602	537	537	0	0	0	604	539	539
V/L	116	99	99	116	91	91	116	90	90	116	93	93	0	0	0	116	93	93
Energy (MMBtu/Bbl)	3.688	3.635	3.635	3.688	3.599	3.599	3.684	3.597	3.597	3.692	3.596	3.596	0.000	0.000	0.000	3.688	3.606	3.606
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	30.330	30.573	30.573	30.330	30.772	30.772	30.334	30.781	30.781	30.334	30.785	30.784	0.000	0.000	0.000	30.332	30.731	30.731
E85 to RFG																		
Total BPD	417,543	383,629	397,752	167,587	100	69,848	299,701	100	124,865	0	0	0	45,480	202,837	137,308	930,311	586,666	729,773
Ethanol BPD	358,465	329,349	341,474	143,875	86	59,965	257,297	86	107,198	0	0	0	39,045	174,138	117,880	798,682	503,659	626,518
RVP	8.0	11.0	9.7	8.0	12.2	8.0	8.0	12.4	8.0	0.0	0.0	0.0	8.0	12.3	11.7	8.0	11.4	9.6
Sulfur ppm	10	10	10	10	9	10	11	9	11	0	0	0	9	9	9	10	9	10
Density	270.2	267.9	268.9	270.0	266.3	270.0	270.1	266.2	270.1	0.0	0.0	0.0	270.1	266.1	266.7	270.1	267.3	268.8
R+M/2	107.4	107.8	107.6	107.4	108.0	107.4	107.4	108.0	107.4	0.0	0.0	0.0	107.4	108.0	107.9	107.4	107.9	107.6
Aromatics	1.6	0.9	1.2	1.6	0.0	1.6	1.6	0.0	1.6	0.0	0.0	0.0	1.9	0.0	0.3	1.6	0.6	1.1
Benzene	0.0	0.0	0.04	0.0	0.0	0.05	0.0	0.0	0.05	0.00	0.00	0.00	0.05	0.00	0.01	0.05	0.02	0.03
Olefins	0.8	2.8	2.0	0.4	3.0	0.4	0.4	3.0	0.4	0.0	0.0	0.0	0.5	1.3	1.2	0.6	2.3	1.4
Oxygen (wt%)	30.322	30.581	30.467	30.342	30.772	30.342	30.341	30.781	30.341	0.000	0.000	0.000	30.331	30.794	30.729	30.332	30.654	30.482
E200	125	128	127	125	130	125	125	130	125	0	0	0	125	130	129	125	129	127
E300	95	96	96	95	97	95	95	97	95	0	0	0	96	97	96	95	96	96
T10	131	112	120	131	104	131	131	103	131	0	0	0	131	104	107	131	109	120
T50	47	41	43	46	36	46	46	36	46	0	0	0	46	37	38	46	39	186
T90	275	271	272	274	268	274	274	268	274	0	0	0	272	268	268	274	270	272
DVI	610	560	582	609	532	609	609	530	609	0	0	0	607	534	544	610	551	582
V/L	116	99	106	116	91	116	116	90	116	0	0	0	116	91	95	116	96	107
Energy (MMBtu/Bbl)	3.689	3.634	3.658	3.688	3.599	3.688	3.688	3.597	3.688	0.000	0.000	0.000	3.691	3.593	3.607	3.689	3.620	3.656
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	30.322	30.581	30.467	30.342	30.772	30.342	30.341	30.781	30.341	0.000	0.000	0.000	30.331	30.794	30.729	30.332	30.654	30.482

Appendix 5A: Mogas Quality by Region

	PD 1 Control A 2022 US Model			PD 2 Control A 2022 US Model			PD 3 Control A 2022 US Model			PD 4/5 Control A 2022 US Model			PD CA Control A 2022 US Model			USA - 2022 CONTROL A		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	417,643	651,014	553,829	167,687	227,180	202,405	299,801	524,203	430,753	100	133,208	77,777	45,480	202,837	137,308	930,711	1,738,441	1,402,072
Ethanol BPD	358,551	558,902	475,468	143,961	195,036	173,766	257,382	450,033	369,806	86	114,360	66,772	39,045	174,138	117,880	799,025	1,492,469	1,203,693
RVP	8.0	11.0	10.1	8.0	12.2	10.8	8.0	12.4	11.1	8.0	12.0	12.0	8.0	12.3	11.7	8.0	11.8	10.8
Sulfur ppm	10	10	10	10	9	9	11	9	9	11	9	9	9	9	9	10	9	10
Density	270.2	268.0	268.7	270.0	266.3	267.6	270.1	266.2	267.3	270.1	266.2	266.2	270.1	266.1	266.7	270.1	266.9	267.8
R+M/2	107.4	107.8	107.7	107.4	108.0	107.8	107.4	108.0	107.9	107.3	107.9	107.9	107.4	108.0	107.9	107.4	107.9	107.8
Aromatics	1.6	0.9	1.1	1.6	0.0	0.6	1.6	0.0	0.5	1.6	0.0	0.0	1.9	0.0	0.3	1.6	0.3	0.7
Benzene	0.0	0.0	0.03	0.0	0.0	0.02	0.0	0.0	0.01	0.09	0.00	0.00	0.05	0.00	0.01	0.0	0.0	0.02
Olefins	0.8	2.8	2.2	0.4	3.0	2.1	0.4	3.0	2.2	0.6	1.1	1.1	0.5	1.3	1.2	0.6	2.6	2.0
Oxygen (wt%)	30.322	30.577	30.497	30.342	30.772	30.622	30.341	30.781	30.652	30.334	30.785	30.784	30.331	30.794	30.729	30.332	30.705	30.601
E200	125.1	127.9	127	125.2	130.1	128	125.1	130.1	129	126	130	130	125	130	129	125.1	129.2	128
E300	95.1	95.9	96	95.2	96.6	96	95.2	96.6	96	96	97	97	96	97	96	95.2	96.3	96
T10	131	112	118	131	104	113	131	103	111	131	105	105	131	104	107	131	106	113
T50	47	41	43	46	36	40	46	36	39	45	37	37	46	37	38	46	38	40
T90	275	271	272	274	268	270	274	268	269	271	268	268	272	268	268	274	269	270
DVI	610	561	576	609	532	559	609	530	553	602	537	537	607	534	544	610	543	561
V/L	116	99	104	116	91	100	116	90	98	116	93	93	116	91	95	116	94	100
Energy (MMBtu/Bbl)	3.689	3.634	3.652	3.688	3.599	3.630	3.688	3.597	3.623	3.692	3.596	3.596	3.691	3.593	3.607	3.689	3.611	3.632
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	30.322	30.577	30.497	30.342	30.772	30.622	30.341	30.781	30.652	30.334	30.785	30.784	30.331	30.794	30.729	30.332	30.705	30.601
ALL MOGAS																		
Total BPD	4,234,133	4,042,575	4,122,347	2,615,209	2,503,150	2,549,815	2,118,257	2,279,142	2,212,143	860,204	912,966	890,994	1,731,050	1,765,443	1,751,120	11,558,852	11,503,276	11,526,420
Ethanol BPD	744,055	901,484	835,924	391,185	424,932	410,879	441,065	627,300	549,744	86,965	193,124	148,915	209,305	331,977	280,891	1,872,575	2,478,816	2,226,354
RVP	8.4	13.1	11.1	9.0	13.2	11.4	8.5	12.0	10.6	9.1	12.8	11.3	7.0	11.5	9.7	8.4	12.6	10.9
Sulfur ppm	22	22	22	21	23	22	20	19	19	28	25	26	11	11	11	21	20	20
Density	260.9	259.7	260.2	261.0	258.7	259.7	260.9	260.9	260.9	259.2	257.5	258.2	261.2	258.5	259.6	260.9	259.4	260.0
R+M/2	90.1	91.1	90.7	89.3	89.9	89.6	90.9	92.8	92.1	86.9	90.1	88.8	88.2	90.2	89.4	89.5	91.0	90.4
Aromatics	19.5	18.1	18.7	20.8	20.1	20.4	19.0	16.5	17.5	19.3	13.4	15.8	21.4	20.0	20.6	20.0	18.1	18.9
Benzene	0.50	0.46	0.48	0.47	0.49	0.48	0.44	0.37	0.40	1.10	0.85	0.95	0.56	0.43	0.48	0.53	0.48	0.50
Olefins	11.0	12.7	12.0	8.9	11.2	10.2	8.9	10.4	9.8	7.1	6.7	6.9	6.4	5.8	6.1	9.2	10.4	9.9
Oxygen (wt%)	6.430	8.196	7.438	5.469	6.263	5.922	7.618	10.070	9.092	3.723	7.843	6.180	4.419	6.944	5.898	5.928	7.930	7.092
E200	62	68	65	61	66	64	67	71	70	61	74	69	56	68	63	62	68	66
E300	95	95	95	95	95	95	95	96	96	96	96	96	86	87	87	94	94	94
T10	128	98	111	124	98	109	128	105	114	124	100	110	137	108	120	128	101	113
T50	176	164	169	178	168	172	165	157	160	176	151	161	188	164	174	176	162	168
T90	274	273	273	273	273	273	273	272	272	271	271	271	314	310	311	279	278	279
DVI	993	912	947	993	923	953	960	900	924	986	873	918	1,082	963	1,012	1,000	917	952
V/L	136	108	120	133	109	119	133	113	121	132	108	118	145	117	128	136	111	121
Energy (MMBtu/Bbl)	4.856	4.711	4.773	4.876	4.786	4.824	4.775	4.642	4.695	5.015	4.727	4.843	5.010	4.806	4.890	4.881	4.729	4.792
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	6.430	8.196	7.438	5.469	6.263	5.922	7.618	10.070	9.092	3.723	7.843	6.180	4.419	6.944	5.898	5.928	7.930	7.092

Appendix 5A.

Gasoline Quality by Demand Center for Control B, Control C & Control D

Appendix 5B: Mogas Quality by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	302
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0			0.0			0.0			0.0								
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
RFG Reg E20																		
Total BPD	1,496,612	1,415,418	1,449,230	344,406	341,303	342,595	477,841	298,798	373,358	0	0	0	1,410,010	1,407,458	1,408,521	3,728,869	3,462,977	3,573,705
Ethanol BPD	302,331	285,929	292,759	69,574	68,947	69,208	96,529	60,360	75,422	0	0	0	284,836	284,321	284,535	753,269	699,556	721,924
RVP	7.0	12.6	10.2	7.0	12.4	10.1	7.0	11.1	8.9	0.0	0.0	0.0	6.8	11.0	9.2	6.9	11.8	9.7
Sulfur ppm	18	23	20	16	23	20	23	23	23	0	0	0	10	10	10	15	18	17
Density	262.9	256.8	259.5	264.2	257.5	260.3	262.5	260.6	261.6	0.0	0.0	0.0	264.7	260.9	262.5	263.6	258.9	261.0
R+M/2	89.7	89.7	89.7	89.6	89.6	89.6	89.6	89.6	89.6	0.0	0.0	0.0	87.6	88.0	87.8	88.9	89.0	88.9
Aromatics	17.7	12.5	14.7	17.8	14.1	15.6	16.1	16.7	16.4	0.0	0.0	0.0	18.1	22.7	20.8	17.7	17.2	17.4
Benzene	0.5	0.4	0.47	0.5	0.4	0.44	0.5	0.4	0.48	0.00	0.00	0.00	0.62	0.46	0.53	0.56	0.43	0.49
Olefins	9.3	12.9	11.4	5.5	10.0	8.1	4.9	11.3	7.9	0.0	0.0	0.0	5.7	5.7	5.7	7.0	9.6	8.4
Oxygen (wt%)	7.335	7.508	7.432	7.298	7.489	7.407	7.346	7.400	7.371	0.000	0.000	0.000	7.285	7.390	7.345	7.314	7.448	7.389
E200	59	72	66	59	73	67	58	64	61	0	0	0	59	66	63	59	69	65
E300	84	91	88	82	90	87	82	85	83	0	0	0	86	86	86	85	89	87
T10	137	102	117	137	103	117	137	111	125	0	0	0	138	112	123	138	107	120
T50	182	155	166	182	153	165	184	171	178	0	0	0	302	302	302	182	161	302
T90	323	291	305	332	297	312	334	322	328	0	0	0	315	315	315	322	304	312
DVI	1,073	908	979	1,085	911	984	1,092	1,000	1,049	0	0	0	1,428	1,388	1,405	1,075	946	1,002
V/L	144	110	125	144	110	125	145	120	133	0	0	0	166	143	153	145	115	128
Energy (MMBtu/Bbl)	4.862	4.724	4.783	4.881	4.697	4.774	4.875	4.810	4.844	0.000	0.000	0.000	4.956	4.868	4.905	4.901	4.787	4.837
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	7.335	7.508	7.432	7.298	7.489	7.407	7.346	7.400	7.371	0.000	0.000	0.000	7.285	7.390	7.345	7.314	7.448	7.389
VOC Reduction	30.4			29.5			30.9			0.0	0.0							
NOX Reduction	15.1	14.8	14.9	15.9	15.5	15.7	16.2	14.5	15.4	0.0	0.0	0.0						
Toxics Reduction	22.7	17.9	19.9	22.1	17.5	19.4	21.9	13.7	18.1	0.0	0.0	0.0						
RFG Prem E10																		
Total BPD	285,088	269,622	276,063	65,620	65,029	65,275	91,036	92,731	92,025	0	0	0	261,083	246,758	252,723	702,828	674,140	686,087
Ethanol BPD	28,797	27,235	27,885	6,628	6,569	6,593	9,196	9,367	9,295	0	0	0	26,372	24,925	25,528	70,993	68,095	69,302
RVP	7.0	13.7	10.8	7.0	13.3	10.7	7.0	11.3	9.5	0.0	0.0	0.0	6.8	11.6	9.5	6.9	12.6	10.2
Sulfur ppm	24	1	11	16	1	7	13	19	17	0	0	0	7	6	6	16	5	10
Density	263.0	256.3	259.2	259.4	254.4	256.5	258.5	250.7	254.0	0.0	0.0	0.0	254.7	252.7	253.5	259.0	254.0	256.2
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.3	92.3
Aromatics	20.0	20.0	20.0	14.5	18.7	16.9	14.6	5.2	9.1	0.0	0.0	0.0	6.3	11.7	9.4	13.7	14.8	14.3
Benzene	0.4	0.4	0.44	0.3	0.3	0.29	0.3	0.3	0.27	0.00	0.00	0.00	0.16	0.19	0.17	0.30	0.31	0.30
Olefins	14.4	3.5	8.2	7.5	2.9	4.8	8.2	10.8	9.7	0.0	0.0	0.0	5.7	5.7	5.7	9.7	5.2	7.1
Oxygen (wt%)	3.666	3.761	3.720	3.716	3.789	3.758	3.730	3.845	3.797	0.000	0.000	0.000	3.785	3.816	3.802	3.722	3.795	3.764
E200	50	54	52	51	59	55	51	62	57	0	0	0	54	58	56	51	57	55
E300	95	95	95	95	95	95	95	95	95	0	0	0	86	86	86	92	92	92
T10	137	94	113	137	97	114	137	110	121	0	0	0	138	108	121	138	102	117
T50	200	192	195	199	182	189	199	176	185	0	0	0	192	184	188	197	186	302
T90	275	275	275	275	275	275	275	275	275	0	0	0	315	315	315	290	290	290
DVI	1,080	992	1,030	1,076	966	1,012	1,076	967	1,012	0	0	0	1,100	1,029	1,060	1,087	1,000	1,037
V/L	147	110	126	147	110	126	147	120	131	0	0	0	147	120	132	147	115	129
Energy (MMBtu/Bbl)	5.001	4.866	4.924	4.938	4.758	4.833	4.951	4.802	4.863	0.000	0.000	0.000	4.943	4.874	4.904	4.967	4.850	4.900
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.666	3.761	3.720	3.716	3.789	3.758	3.730	3.845	3.797	0.000	0.000	0.000	3.785	3.816	3.802	3.722	3.795	3.764
VOC Reduction	28.6			28.9			30.3			0.0	0.0							
NOX Reduction	11.7	16.6	14.5	17.0	16.6	16.8	16.9	17.4	17.2	0.0	0.0	0.0						
Toxics Reduction	33.4	27.1	29.8	37.2	29.1	32.5	37.5	33.7	35.3	0.0	0.0	0.0						

Appendix 5B: Mogas Quality by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,781,700	1,685,040	1,725,293	410,026	406,332	407,870	568,877	391,529	465,383	0	0	0	1,671,093	1,654,216	1,661,244	4,431,697	4,137,117	4,259,791
Ethanol BPD	331,128	313,163	320,644	76,202	75,515	75,801	105,724	69,727	84,718	0	0	0	311,208	309,246	310,063	824,262	767,651	791,226
RVP	7.0	12.8	10.3	7.0	12.6	10.2	7.0	11.2	9.1	0.0	0.0	0.0	6.8	11.1	9.3	6.9	11.9	9.8
Sulfur ppm	19	19	19	16	20	18	22	22	22	0	0	0	9	9	9	15	16	15
Density	262.9	256.7	259.4	263.5	257.0	259.7	261.8	258.3	260.1	0.0	0.0	0.0	263.2	259.7	261.2	262.9	258.1	260.2
R+M/2	90.2	90.2	90.2	90.2	90.2	90.2	90.2	90.4	90.3	0.0	0.0	0.0	88.1	88.5	88.3	89.4	89.5	89.5
Aromatics	18.0	13.7	15.6	17.2	14.8	15.8	15.9	14.0	15.0	0.0	0.0	0.0	16.3	21.1	19.1	17.0	16.8	16.9
Benzene	0.51	0.43	0.46	0.48	0.37	0.42	0.49	0.37	0.44	0.00	0.00	0.00	0.55	0.42	0.47	0.52	0.41	0.46
Olefins	10.1	11.4	10.8	5.8	8.9	7.6	5.4	11.1	8.2	0.0	0.0	0.0	5.7	5.7	5.7	7.4	8.9	8.2
Oxygen (wt%)	6.747	6.909	6.839	6.733	6.902	6.830	6.774	6.582	6.681	0.000	0.000	0.000	6.755	6.871	6.822	6.752	6.862	6.814
E200	58	69	64	57	71	65	57	64	60	0	0	0	58	65	62	58	67	63
E300	86	92	89	84	91	88	84	87	86	0	0	0	86	86	86	86	89	88
T10	137	100	116	137	102	117	137	110	124	0	0	0	138	111	123	138	106	120
T50	184	161	171	185	158	169	186	172	179	0	0	0	183	169	175	184	165	173
T90	315	289	300	323	294	306	324	311	318	0	0	0	315	315	315	317	302	308
DVI	1,074	921	987	1,083	920	988	1,089	992	1,042	0	0	0	1,073	989	1,024	1,076	955	1,008
V/L	145	110	125	145	110	125	145	120	133	0	0	0	146	120	131	145	115	128
Energy (MMBtu/Bbl)	4.884	4.747	4.806	4.890	4.707	4.784	4.887	4.808	4.848	0.000	0.000	0.000	4.954	4.869	4.905	4.911	4.798	4.847
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	6.747	6.909	6.839	6.733	6.902	6.830	6.774	6.582	6.681	0.000	0.000	0.000	6.755	6.871	6.822	6.752	6.862	6.814
VOC Reduction	30.1			29.4			30.8			0.0								
NOX Reduction	14.5	15.1	14.8	16.1	15.7	15.8	16.3	15.2	15.8	0.0	0.0	0.0						
Toxics Reduction	24.4	19.3	21.5	24.5	19.3	21.5	24.4	18.5	21.5	0.0	0.0	0.0						
CG Reg																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	302
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
CG Reg E20																		
Total BPD	2,090,006	1,951,757	2,009,329	1,878,321	1,786,175	1,824,548	1,322,478	1,450,334	1,397,090	731,073	775,922	757,245	136,739	116,738	125,067	6,158,616	6,080,925	6,113,278
Ethanol BPD	422,202	394,275	405,905	379,440	360,825	368,577	267,154	292,982	282,226	147,684	156,744	152,971	27,623	23,582	25,265	1,244,103	1,228,408	1,234,944
RVP	9.3	13.2	11.5	9.3	12.8	11.3	8.9	11.3	10.3	9.1	12.4	11.1	9.0	10.8	10.0	9.2	12.4	11.1
Sulfur ppm	22	22	22	23	23	23	23	23	23	28	28	28	28	28	28	24	24	24
Density	262.0	260.5	261.2	263.5	260.3	261.7	262.9	262.1	262.4	263.5	258.0	260.2	267.5	263.4	265.3	263.0	260.6	261.6
R+M/2	89.7	89.8	89.7	89.6	89.6	89.6	89.6	89.6	89.6	86.6	86.3	86.4	90.6	89.8	90.2	89.3	89.2	89.3
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	18.8	11.4	14.4	25.4	22.1	23.6	19.9	18.9	19.3
Benzene	0.5	0.5	0.46	0.5	0.5	0.47	0.5	0.5	0.48	1.30	0.86	1.04	0.60	0.55	0.57	0.57	0.52	0.54
Olefins	12.9	12.6	12.7	9.8	10.5	10.2	12.5	11.4	11.8	5.9	6.2	6.1	18.7	17.7	18.2	11.2	11.0	11.0
Oxygen (wt%)	7.359	7.401	7.383	7.317	7.407	7.368	7.333	7.357	7.347	7.316	7.473	7.409	7.207	7.320	7.268	7.332	7.400	7.371
E200	65	63	64	65	68	66	65	63	63	65	73	70	65	69	67	65	66	65
E300	84	82	83	85	85	85	85	82	83	85	94	90	81	85	83	84	84	84
T10	123	98	109	123	101	110	125	110	116	124	103	111	124	113	118	123	102	111
T50	170	174	172	170	164	166	170	174	173	302	302	302	302	302	302	170	168	302
T90	323	334	329	322	321	321	323	333	329	274	274	274	315	315	315	323	323	323
DVI	1,017	1,002	1,008	1,016	964	986	1,021	1,020	1,020	1,365	1,334	1,346	1,407	1,390	1,398	1,018	980	996
V/L	130	110	119	130	110	119	132	120	125	153	136	143	154	144	148	131	113	120
Energy (MMBtu/Bbl)	4.801	4.788	4.793	4.811	4.771	4.788	4.839	4.825	4.831	4.871	4.772	4.812	4.843	4.801	4.820	4.821	4.790	4.803
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	7.359	7.401	7.383	7.317	7.407	7.368	7.333	7.357	7.347	7.316	7.473	7.409	7.207	7.320	7.268	7.332	7.400	7.371
Exhaust Toxics	66.2	107.1	89.4	65.6	104.6	87.9	65.8	106.7	90.6	69.4	99.7	87.5	69.0	105.6	88.9			
NOX	1,188.4	1,342.7	1,275.9	1,169.0	1,332.6	1,262.5	1,184.4	1,334.3	1,275.2	1,152.6	1,273.3	1,224.8	1,276.9	1,424.1	1,357.1			

Appendix 5B: Mogas Quality by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	302
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
Oxy Reg E10																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	302
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
Oxy Prem E10																		
Total BPD	347,880	324,620	334,306	326,661	310,443	317,197	226,702	249,140	239,796	129,031	136,945	133,649	11,890	22,236	17,928	1,042,164	1,043,385	1,042,876
Ethanol BPD	35,139	32,790	33,768	32,996	31,358	32,040	22,899	25,166	24,222	13,033	13,833	13,500	1,201	2,246	1,811	105,269	105,392	105,341
RVP	9.3	13.6	11.7	9.3	13.6	11.7	8.9	12.1	10.8	9.1	13.0	11.4	9.0	12.1	11.3	9.2	13.1	11.5
Sulfur ppm	25	19	22	16	24	21	9	10	10	28	28	28	1	12	9	19	20	19
Density	262.7	259.0	260.6	262.5	259.4	260.7	261.0	257.5	258.9	252.9	253.5	253.2	261.9	263.3	262.9	261.1	258.1	259.4
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.8	92.8	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	20.2	21.1	6.5	9.1	8.0	30.0	30.0	30.0	20.6	20.4	20.5
Benzene	0.4	0.4	0.42	0.3	0.5	0.45	0.3	0.3	0.30	0.32	1.30	0.90	0.31	0.43	0.39	0.36	0.53	0.46
Olefins	13.8	14.7	14.3	7.2	13.0	10.5	5.6	6.9	6.4	6.8	7.8	7.4	0.6	9.3	6.9	8.9	11.3	10.3
Oxygen (wt%)	3.670	3.722	3.699	3.673	3.717	3.698	3.694	3.744	3.724	3.813	3.803	3.807	3.681	3.662	3.667	3.693	3.735	3.718
E200	51	55	54	47	55	51	46	49	48	60	64	62	48	49	49	50	55	53
E300	96	96	96	95	95	95	95	95	95	95	95	95	86	86	86	95	95	95
T10	123	95	107	123	95	107	125	105	113	124	99	109	124	105	110	123	98	109
T50	198	189	193	207	190	197	208	202	204	179	172	175	204	201	202	201	190	302
T90	272	272	272	274	274	274	274	274	274	274	274	274	315	315	315	274	274	274
DVI	1,050	980	1,010	1,078	986	1,026	1,087	1,035	1,056	998	938	962	1,112	1,075	1,085	1,061	992	1,021
V/L	135	110	121	136	110	121	139	120	127	133	110	119	137	120	125	136	113	122
Energy (MMBtu/Bbl)	4.976	4.896	4.930	4.971	4.896	4.928	4.975	4.900	4.930	4.815	4.802	4.807	4.973	4.987	4.983	4.954	4.886	4.915
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.670	3.722	3.699	3.673	3.717	3.698	3.694	3.744	3.724	3.813	3.803	3.807	3.681	3.662	3.667	3.693	3.735	3.718
Exhaust Toxics	57.5	89.8	75.8	57.7	91.6	77.0	57.3	89.9	77.1	51.0	87.4	72.8	59.5	96.7	86.4			
NOX	1,198.9	1,368.6	1,295.1	1,152.8	1,356.6	1,269.2	1,142.7	1,294.6	1,234.8	1,110	1,266	1,203	1,160	1,341	1,291			

Appendix 5B: Mogas Quality by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,437,886	2,276,377	2,343,636	2,204,982	2,096,618	2,141,745	1,549,180	1,699,474	1,636,886	860,104	912,866	890,894	148,629	138,974	142,994	7,200,780	7,124,309	7,156,155
Ethanol BPD	457,342	427,065	439,673	412,436	392,183	400,617	290,053	318,148	306,448	160,717	170,577	166,471	28,824	25,828	27,076	1,349,372	1,333,801	1,340,285
RVP	9.3	13.2	11.5	9.3	12.9	11.3	8.9	11.4	10.4	9.1	12.5	11.1	9.0	11.0	10.2	9.2	12.5	11.1
Sulfur ppm	23	22	22	22	23	23	21	21	21	28	28	28	26	26	26	23	23	23
Density	262.1	260.3	261.1	263.3	260.2	261.5	262.7	261.4	261.9	262.0	257.3	259.2	267.1	263.4	265.0	262.7	260.2	261.3
R+M/2	90.2	90.2	90.2	90.1	90.1	90.1	90.1	90.1	90.1	87.3	87.1	87.2	90.7	90.0	90.3	89.8	89.8	89.8
Aromatics	20.2	20.2	20.2	20.4	20.4	20.4	20.4	20.0	20.2	16.9	11.0	13.4	25.8	23.4	24.4	20.0	19.1	19.5
Benzene	0.47	0.45	0.45	0.44	0.48	0.46	0.46	0.45	0.45	1.15	0.93	1.02	0.57	0.53	0.55	0.54	0.52	0.53
Olefins	13.0	12.9	12.9	9.4	10.9	10.2	11.5	10.8	11.0	6.0	6.5	6.3	17.2	16.4	16.8	10.8	11.0	10.9
Oxygen (wt%)	6.831	6.879	6.858	6.779	6.862	6.826	6.804	6.835	6.823	6.809	6.931	6.881	6.930	6.735	6.820	6.809	6.867	6.843
E200	63	62	62	62	66	64	62	61	61	64	72	68	63	66	65	62	64	63
E300	86	84	85	86	86	86	86	84	85	86	94	91	82	85	84	86	86	86
T10	123	97	108	123	100	110	125	109	116	124	102	111	124	112	117	123	102	111
T50	174	176	175	175	168	171	176	178	177	171	156	162	173	167	169	174	171	173
T90	316	325	321	315	314	314	315	324	321	315	279	294	336	318	326	316	316	316
DVI	1,021	999	1,008	1,025	967	992	1,030	1,023	1,026	1,015	900	946	1,040	986	1,009	1,024	982	1,000
V/L	131	110	119	131	110	119	133	120	125	131	110	119	132	120	125	131	113	120
Energy (MMBtu/Bbl)	4.826	4.803	4.813	4.834	4.790	4.809	4.859	4.836	4.845	4.863	4.776	4.811	4.854	4.831	4.841	4.841	4.804	4.819
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	6.831	6.879	6.858	6.779	6.862	6.826	6.804	6.835	6.823	6.809	6.931	6.881	6.930	6.735	6.820	6.809	6.867	6.843
Exhaust Toxics	65.0	104.6	87.5	64.5	102.7	86.3	64.6	104.2	88.6	66.6	97.8	85.3	68.3	104.2	88.6	0.0	0.0	0.0
NOX	1,190	1,346	1,279	1,167	1,336	1,263	1,178	1,328	1,269	1,146	1,272	1,222	1,268	1,411	1,349	0	0	0
E85 to CG																		
Total BPD	100	100	100	100	100	100	100	100	100	100	100	100	0	0	0	400	400	400
Ethanol BPD	86	86	86	86	86	86	86	86	86	86	86	86	0	0	0	343	343	343
RVP	8.0	12.3	10.5	8.0	12.2	10.5	8.0	12.2	10.4	8.0	11.9	10.3	0.0	0.0	0.0	8.0	12.2	10.4
Sulfur ppm	11	9	10	11	9	10	11	9	10	11	9	10	0	0	0	11	9	10
Density	270.3	266.3	268.0	270.3	266.3	268.0	270.3	266.2	267.9	270.4	266.1	267.9	0.0	0.0	0.0	270.3	266.2	267.9
R+M/2	107.4	108.0	107.8	107.4	108.0	107.7	107.4	108.0	107.7	107.1	107.9	107.6	0.0	0.0	0.0	107.3	108.0	107.7
Aromatics	1.9	0.0	0.8	1.9	0.0	0.8	1.9	0.0	0.8	1.8	0.0	0.7	0.0	0.0	0.0	1.9	0.0	0.8
Benzene	0.0	0.0	0.02	0.0	0.0	0.02	0.0	0.0	0.02	0.12	0.00	0.05	0.00	0.00	0.00	0.07	0.00	0.03
Olefins	1.1	3.0	2.2	1.2	3.0	2.2	1.2	2.4	1.9	0.6	0.0	0.2	0.0	0.0	0.0	1.0	2.1	1.6
Oxygen (wt%)	30.314	30.774	30.581	30.316	30.773	30.581	30.315	30.777	30.583	30.307	30.792	30.588	0.000	0.000	0.000	30.313	30.779	30.583
E200	126	130	128	125	130	128	125	130	128	125	129	128	0	0	0	125	130	128
E300	96	97	96	95	97	96	95	97	96	95	97	96	0	0	0	95	97	96
T10	131	103	115	131	104	115	131	104	115	131	106	116	0	0	0	131	104	115
T50	45	36	40	46	36	40	46	37	41	46	38	41	0	0	0	46	37	302
T90	272	268	270	274	268	270	274	268	270	274	268	270	0	0	0	273	268	270
DVI	605	532	562	607	532	564	608	534	565	608	540	568	0	0	0	607	535	565
V/L	116	91	101	116	91	101	116	92	102	116	93	103	0	0	0	116	92	102
Energy (MMBtu/Bbl)	3.683	3.599	3.634	3.687	3.599	3.636	3.689	3.598	3.636	3.692	3.594	3.635	0.000	0.000	0.000	3.688	3.597	3.635
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	30.314	30.774	30.581	30.316	30.773	30.581	30.315	30.777	30.583	30.307	30.792	30.588	0.000	0.000	0.000	30.313	30.779	30.583
E85 to RFG																		
Total BPD	100	100	100	100	100	100	100	188,039	109,774	0	0	0	100	100	100	400	188,339	110,074
Ethanol BPD	86	86	86	86	86	86	86	161,433	94,242	0	0	0	86	86	86	343	161,691	94,499
RVP	8.0	12.3	10.5	8.0	12.2	10.5	8.0	12.2	12.2	0.0	0.0	0.0	8.0	12.1	10.4	8.0	12.2	12.2
Sulfur ppm	10	9	9	10	9	9	11	9	9	0	0	0	9	9	9	10	9	9
Density	270.1	266.3	267.9	270.1	266.3	267.9	270.1	266.2	266.2	0.0	0.0	0.0	270.2	266.2	267.9	270.1	266.2	266.2
R+M/2	107.4	108.0	107.8	107.4	108.0	107.8	107.4	108.0	108.0	0.0	0.0	0.0	107.2	107.9	107.7	107.4	108.0	108.0
Aromatics	1.6	0.0	0.7	1.6	0.0	0.7	1.5	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.7	1.6	0.0	0.0
Benzene	0.0	0.0	0.02	0.0	0.0	0.02	0.0	0.0	0.00	0.00	0.00	0.00	0.06	0.00	0.02	0.05	0.00	0.00
Olefins	0.5	3.0	2.0	0.5	3.0	2.0	0.4	2.4	2.3	0.0	0.0	0.0	0.5	1.5	1.1	0.5	2.4	2.3
Oxygen (wt%)	30.333	30.774	30.589	30.333	30.773	30.588	30.340	30.777	30.776	0.000	0.000	0.000	30.320	30.782	30.588	30.332	30.777	30.776
E200	125	130	128	125	130	128	125	130	130	0	0	0	125	130	128	125	130	130
E300	95	97	96	95	97	96	95	97	97	0	0	0	95	97	96	95	97	97
T10	131	103	115	131	104	115	131	104	104	0	0	0	131	105	116	131	104	104
T50	47	36	41	47	36	41	47	37	37	0	0	0	47	37	41	47	37	302
T90	275	268	271	275	268	271	275	268	268	0	0	0	273	268	270	274	268	268
DVI	612	532	565	612	532	565	612	534	534	0	0	0	609	536	566	611	534	534
V/L	116	91	101	116	91	102	116	92	92	0	0	0	116	92	102	116	92	92
Energy (MMBtu/Bbl)	3.689	3.599	3.636	3.689	3.599	3.636	3.688	3.598	3.598	0.000	0.000	0.000	3.695	3.597	3.637	3.690	3.598	3.598
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	30.333	30.774	30.589	30.333	30.773	30.588	30.340	30.777	30.776	0.000	0.000	0.000	30.320	30.782	30.588	30.332	30.777	30.776

Appendix 5B: Mogas Quality by Region

	PD 1 Control B 2022 US Model			PD 2 Control B 2022 US Model			PD 3 Control B 2022 US Model			PD 4/5 Control B 2022 US Model			PD CA Control B 2022 US Model			USA - 2022 CONTROL B		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	200	200	200	200	200	200	200	188,139	109,874	100	100	100	100	100	100	800	188,739	110,474
Ethanol BPD	172	172	172	172	172	172	172	161,519	94,328	86	86	86	86	86	86	687	162,034	94,843
RVP	8.0	12.3	10.5	8.0	12.2	10.5	8.0	12.2	12.2	8.0	11.9	10.3	8.0	12.1	10.4	8.0	12.2	12.2
Sulfur ppm	11	9	10	11	9	10	11	9	9	11	9	10	9	9	9	10	9	9
Density	270.2	266.3	267.9	270.2	266.3	267.9	270.2	266.2	266.2	270.4	266.1	267.9	270.2	266.2	267.9	270.2	266.2	266.2
R+M/2	107.4	108.0	107.8	107.4	108.0	107.8	107.4	108.0	108.0	107.1	107.9	107.6	107.2	107.9	107.7	107.4	108.0	108.0
Aromatics	1.8	0.0	0.7	1.8	0.0	0.7	1.7	0.0	0.0	1.8	0.0	0.7	1.6	0.0	0.7	1.7	0.0	0.0
Benzene	0.0	0.0	0.02	0.0	0.0	0.02	0.0	0.0	0.00	0.12	0.00	0.05	0.06	0.00	0.02	0.1	0.0	0.00
Olefins	0.8	3.0	2.1	0.8	3.0	2.1	0.8	2.4	2.3	0.6	0.0	0.2	0.5	1.5	1.1	0.7	2.3	2.3
Oxygen (wt%)	30.324	30.774	30.585	30.324	30.773	30.584	30.328	30.777	30.776	30.307	30.792	30.588	30.320	30.782	30.588	30.322	30.777	30.775
E200	125.2	130.1	128	125.1	130.1	128	125.1	129.9	130	125	129	128	125	130	128	125.2	129.9	130
E300	95.3	96.6	96	95.1	96.6	96	95.1	96.6	97	95	97	96	95	97	96	95.2	96.6	97
T10	131	103	115	131	104	115	131	104	104	131	106	116	131	105	116	131	104	104
T50	46	36	40	46	36	41	47	37	37	46	38	41	47	37	41	46	37	37
T90	274	268	270	274	268	270	274	268	268	274	268	270	273	268	270	274	268	268
DVI	608	532	564	610	532	564	610	534	534	608	540	568	609	536	566	609	534	534
V/L	116	91	101	116	91	102	116	92	92	116	93	103	116	92	102	116	92	92
Energy (MMBtu/Bbl)	3.686	3.599	3.635	3.688	3.599	3.636	3.688	3.598	3.598	3.692	3.594	3.635	3.695	3.597	3.637	3.689	3.598	3.598
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	30.324	30.774	30.585	30.324	30.773	30.584	30.328	30.777	30.776	30.307	30.792	30.588	30.320	30.782	30.588	30.322	30.777	30.775
ALL MOGAS																		
Total BPD	4,219,786	3,961,617	4,069,129	2,615,208	2,503,150	2,549,815	2,118,257	2,279,142	2,212,143	860,204	912,966	890,994	1,819,822	1,793,290	1,804,339	11,633,277	11,450,165	11,526,420
Ethanol BPD	788,641	740,399	760,489	488,809	467,870	476,590	395,949	549,394	485,493	160,803	170,663	166,557	340,118	335,160	337,225	2,174,321	2,263,486	2,226,354
RVP	8.3	13.0	11.0	8.9	12.8	11.2	8.4	11.4	10.2	9.1	12.5	11.1	7.0	11.1	9.4	8.3	12.3	10.6
Sulfur ppm	21	21	21	21	23	22	21	20	21	28	28	28	11	11	11	20	20	20
Density	262.4	258.8	260.4	263.4	259.7	261.3	262.4	261.3	261.7	262.0	257.3	259.2	263.5	260.0	261.5	262.8	259.6	260.9
R+M/2	90.2	90.2	90.2	90.1	90.1	90.1	90.1	91.6	91.0	87.3	87.1	87.2	88.3	88.6	88.5	89.7	90.0	89.8
Aromatics	19.3	17.5	18.3	19.9	19.5	19.6	19.2	17.3	18.1	16.9	11.0	13.4	17.1	21.2	19.5	18.9	17.9	18.3
Benzene	0.49	0.44	0.46	0.45	0.46	0.46	0.47	0.40	0.43	1.15	0.93	1.02	0.55	0.43	0.48	0.53	0.47	0.50
Olefins	11.8	12.2	12.0	8.8	10.5	9.8	9.8	10.1	10.0	6.0	6.5	6.3	6.6	6.5	6.6	9.5	10.1	9.9
Oxygen (wt%)	6.797	6.893	6.851	6.774	6.871	6.829	6.798	8.806	8.003	6.812	6.934	6.884	6.771	6.862	6.823	6.789	7.270	7.066
E200	60	65	63	61	67	64	60	67	64	64	72	68	59	65	62	61	66	64
E300	86	87	87	86	87	87	86	86	86	86	94	91	86	86	86	86	87	87
T10	129	99	112	125	100	111	128	109	117	124	102	111	137	111	122	129	103	114
T50	178	169	173	177	166	171	178	165	171	171	156	162	182	169	175	178	167	172
T90	315	310	312	316	311	313	318	317	317	315	279	294	317	315	316	316	310	312
DVI	1,044	966	999	1,034	959	991	1,046	977	1,005	1,015	900	946	1,070	988	1,023	1,044	965	998
V/L	137	110	121	133	110	120	136	118	125	131	110	119	145	120	130	137	113	123
Energy (MMBtu/Bbl)	4.850	4.779	4.810	4.843	4.776	4.805	4.867	4.729	4.784	4.862	4.776	4.811	4.946	4.866	4.900	4.867	4.782	4.818
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	6.797	6.893	6.851	6.774	6.871	6.829	6.798	8.806	8.003	6.812	6.934	6.884	6.771	6.862	6.823	6.789	7.270	7.066

Appendix 5B: Mogas Quality by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,463,509	1,449,296	1,455,215	334,173	331,163	332,416	463,605	472,234	468,641	0	0	0	1,295,272	1,324,212	1,312,160	3,556,559	3,576,905	3,568,432
Ethanol BPD	147,814	146,379	146,977	33,751	33,447	33,574	46,824	47,696	47,333	0	0	0	130,822	133,759	132,536	359,212	361,281	360,419
RVP	7.0	13.4	10.7	7.0	13.1	10.5	7.0	11.7	9.7	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.4	10.1
Sulfur ppm	23	24	24	24	25	24	24	25	24	0	0	0	8	10	9	18	19	19
Density	259.8	256.7	258.0	261.5	256.1	258.4	259.5	258.4	258.8	0.0	0.0	0.0	261.2	257.4	259.0	260.5	257.1	258.5
R+M/2	87.1	87.1	87.1	87.0	87.0	87.0	87.0	87.0	87.0	0.0	0.0	0.0	87.0	87.0	87.0	87.1	87.1	87.1
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	22.7	22.9	22.8	20.9	21.0	21.0
Benzene	0.6	0.6	0.59	0.6	0.6	0.60	0.6	0.5	0.55	0.00	0.00	0.00	0.62	0.50	0.55	0.60	0.55	0.57
Olefins	9.0	13.4	11.6	7.8	11.9	10.2	5.1	12.9	9.7	0.0	0.0	0.0	5.7	5.7	5.7	7.2	10.3	9.0
Oxygen (wt%)	3.710	3.756	3.736	3.686	3.764	3.731	3.714	3.731	3.724	0.000	0.000	0.000	3.691	3.745	3.723	3.701	3.749	3.729
E200	52	59	56	53	62	59	52	56	54	0	0	0	54	60	58	53	59	57
E300	94	94	94	83	83	83	86	86	86	0	0	0	86	86	86	89	89	89
T10	137	96	113	137	98	115	137	107	120	0	0	0	138	109	121	138	103	117
T50	196	182	188	193	174	182	196	187	191	0	0	0	191	179	184	194	181	186
T90	280	280	280	330	330	330	317	317	317	0	0	0	315	315	315	302	302	302
DVI	1,074	971	1,014	1,114	1,001	1,048	1,109	1,039	1,068	0	0	0	1,095	1,016	1,049	1,090	1,000	1,037
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.015	4.908	4.953	5.010	4.897	4.944	5.029	4.960	4.988	0.000	0.000	0.000	5.049	4.980	5.009	5.029	4.941	4.977
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.710	3.756	3.736	3.686	3.764	3.731	3.714	3.731	3.724	0.000	0.000	0.000	3.691	3.745	3.723	3.701	3.749	3.729
VOC Reduction	28.1			28.1			28.8			0.0								
NOX Reduction	14.3	12.3	13.1	14.4	12.9	13.5	15.0	12.7	13.6	0.0	0.0	0.0						
Toxics Reduction	32.9	25.8	28.7	33.1	27.2	29.7	33.4	25.7	28.9	0.0	0.0	0.0						
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0			0.0			0.0			0.0	0.0							
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
RFG Prem E10																		
Total BPD	278,764	269,126	273,139	63,652	63,079	63,317	88,306	89,949	89,265	0	0	0	246,718	252,231	249,935	677,440	674,384	675,657
Ethanol BPD	28,158	27,184	27,590	6,429	6,371	6,395	8,920	9,085	9,016	0	0	0	24,919	25,478	25,245	68,426	68,118	68,246
RVP	7.0	13.6	10.8	7.0	13.6	10.8	7.0	12.0	9.9	0.0	0.0	0.0	6.8	11.5	9.6	6.9	12.6	10.2
Sulfur ppm	24	25	24	19	21	20	13	11	12	0	0	0	7	9	8	16	17	16
Density	263.0	258.0	260.2	262.6	257.7	259.8	258.5	256.3	257.2	0.0	0.0	0.0	257.5	253.6	255.2	260.4	256.1	257.9
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.3	92.3
Aromatics	20.0	20.0	20.0	20.0	20.0	20.0	15.2	17.7	16.7	0.0	0.0	0.0	13.8	13.0	13.3	17.1	17.1	17.1
Benzene	0.4	0.4	0.41	0.5	0.5	0.47	0.3	0.3	0.27	0.00	0.00	0.00	0.36	0.25	0.29	0.39	0.33	0.35
Olefins	16.3	14.9	15.5	13.8	11.8	12.6	7.5	7.6	7.6	0.0	0.0	0.0	5.7	5.7	5.7	11.0	10.2	10.6
Oxygen (wt%)	3.666	3.736	3.706	3.671	3.741	3.711	3.730	3.761	3.748	0.000	0.000	0.000	3.743	3.802	3.778	3.703	3.764	3.738
E200	50	56	53	50	55	53	50	51	51	0	0	0	54	58	57	51	56	54
E300	94	94	94	83	83	83	86	86	86	0	0	0	86	86	86	89	89	89
T10	137	95	113	137	95	113	137	105	118	0	0	0	138	108	121	138	101	117
T50	201	188	194	200	189	194	200	197	198	0	0	0	191	183	186	197	187	186
T90	280	280	280	330	330	330	317	317	317	0	0	0	315	315	315	302	303	302
DVI	1,088	987	1,030	1,136	1,041	1,081	1,121	1,067	1,089	0	0	0	1,097	1,025	1,055	1,100	1,017	1,052
V/L	147	110	126	147	110	126	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.003	4.882	4.933	4.958	4.876	4.910	4.955	4.883	4.913	0.000	0.000	0.000	4.945	4.872	4.902	4.971	4.878	4.917
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.666	3.736	3.706	3.671	3.741	3.711	3.730	3.761	3.748	0.000	0.000	0.000	3.743	3.802	3.778	3.703	3.764	3.738
VOC Reduction	28.7			28.4			30.0			0.0	0.0							
NOX Reduction	10.3	11.4	10.9	12.3	13.5	13.0	16.9	16.5	16.7	0.0	0.0	0.0						
Toxics Reduction	32.6	26.0	28.8	33.2	26.0	29.0	37.5	27.2	31.4	0.0	0.0	0.0						

Appendix 5B: Mogas Quality by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,742,273	1,718,421	1,728,354	397,825	394,241	395,734	551,911	562,184	557,906	0	0	0	1,541,990	1,576,443	1,562,095	4,233,999	4,251,289	4,244,089
Ethanol BPD	175,972	173,563	174,567	40,181	39,818	39,969	55,744	56,781	56,349	0	0	0	155,741	159,237	157,781	427,638	429,399	428,666
RVP	7.0	13.5	10.8	7.0	13.2	10.6	7.0	11.7	9.8	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.5	10.2
Sulfur ppm	23	24	24	23	24	24	22	23	22	0	0	0	8	10	9	17	19	18
Density	260.3	256.9	258.4	261.7	256.3	258.6	259.4	258.0	258.6	0.0	0.0	0.0	260.6	256.8	258.4	260.4	257.0	258.4
R+M/2	88.1	88.0	88.1	88.0	88.0	88.0	88.0	88.0	88.0	0.0	0.0	0.0	87.6	87.6	87.6	87.9	87.9	87.9
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	19.2	19.6	19.5	0.0	0.0	0.0	21.3	21.3	21.3	20.3	20.4	20.4
Benzene	0.57	0.56	0.56	0.58	0.58	0.58	0.55	0.48	0.51	0.00	0.00	0.00	0.58	0.46	0.51	0.57	0.51	0.54
Olefins	10.2	13.6	12.2	8.8	11.9	10.6	5.5	12.0	9.3	0.0	0.0	0.0	5.7	5.7	5.7	7.8	10.3	9.3
Oxygen (wt%)	3.703	3.752	3.731	3.683	3.761	3.728	3.717	3.736	3.728	0.000	0.000	0.000	3.699	3.754	3.731	3.701	3.752	3.731
E200	51	58	55	53	61	58	52	55	54	0	0	0	54	60	58	53	59	56
E300	94	94	94	83	83	83	86	86	86	0	0	0	86	86	86	89	89	89
T10	137	96	113	137	98	114	137	107	119	0	0	0	138	109	121	138	102	117
T50	197	183	189	194	177	184	196	189	192	0	0	0	191	180	184	194	182	187
T90	280	280	280	330	330	330	317	317	317	0	0	0	315	315	315	302	302	302
DVI	1,076	974	1,017	1,118	1,007	1,053	1,111	1,044	1,071	0	0	0	1,095	1,018	1,049	1,092	1,002	1,039
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.013	4.904	4.950	5.002	4.893	4.939	5.017	4.947	4.976	0.000	0.000	0.000	5.033	4.963	4.992	5.020	4.931	4.968
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.703	3.752	3.731	3.683	3.761	3.728	3.717	3.736	3.728	0.000	0.000	0.000	3.699	3.754	3.731	3.701	3.752	3.731
VOC Reduction	28.2			28.1			29.0			0.0								
NOX Reduction	13.6	12.1	12.8	14.1	13.0	13.4	15.3	13.3	14.1	0.0	0.0	0.0						
Toxics Reduction	32.8	25.8	28.8	33.1	27.0	29.6	34.1	26.0	29.3	0.0	0.0	0.0						
CG Reg																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Appendix 5B: Mogas Quality by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
Oxy Reg E10																		
Total BPD	1,994,174	1,893,289	1,935,302	1,796,711	1,708,416	1,745,185	1,262,360	1,384,821	1,333,823	700,898	738,798	723,015	121,103	109,665	114,429	5,875,247	5,834,989	5,851,754
Ethanol BPD	201,432	191,222	195,474	181,468	172,550	176,264	127,498	139,867	134,716	70,791	74,619	73,024	12,231	11,076	11,557	593,420	589,334	591,036
RVP	9.2	13.7	11.8	9.3	13.1	11.5	8.9	11.8	10.6	9.1	13.0	11.4	9.0	11.7	10.5	9.1	13.0	11.4
Sulfur ppm	24	24	24	25	25	25	25	25	25	28	28	28	28	26	27	25	25	25
Density	258.3	257.9	258.1	260.6	257.3	258.7	259.2	259.6	259.4	258.2	256.9	257.4	265.2	264.8	265.0	259.3	258.1	258.6
R+M/2	87.4	87.2	87.3	87.1	87.0	87.0	87.3	87.0	87.1	86.0	86.0	86.0	88.4	89.1	88.8	87.1	87.0	87.0
Aromatics	22.3	22.3	22.3	22.5	22.5	22.5	22.5	22.5	22.5	17.0	17.4	17.2	27.3	30.0	28.8	21.9	21.9	21.9
Benzene	0.5	0.5	0.53	0.5	0.5	0.54	0.5	0.5	0.54	0.88	1.30	1.13	0.67	0.60	0.63	0.58	0.63	0.61
Olefins	14.6	14.7	14.6	9.8	11.5	10.8	13.7	12.9	13.3	6.6	6.7	6.6	21.6	15.6	18.3	12.1	12.3	12.3
Oxygen (wt%)	3.733	3.738	3.736	3.699	3.746	3.726	3.719	3.714	3.716	3.734	3.752	3.745	3.634	3.640	3.638	3.718	3.734	3.727
E200	58	54	56	59	61	60	59	55	56	65	64	64	58	55	56	59	58	58
E300	94	94	94	83	83	83	86	86	86	90	90	90	86	86	86	88	88	88
T10	123	94	107	123	98	109	125	107	114	124	99	109	124	107	115	123	99	109
T50	184	191	188	182	176	179	181	190	187	170	171	171	184	189	187	181	184	186
T90	280	280	280	330	330	330	317	317	317	297	297	297	315	315	315	306	306	306
DVI	1,016	995	1,004	1,061	1,006	1,030	1,048	1,048	1,048	993	959	973	1,052	1,042	1,047	1,034	1,007	1,019
V/L	132	110	119	132	110	120	134	120	126	131	110	119	134	120	126	133	113	121
Energy (MMBtu/Bbl)	4.933	4.933	4.933	4.933	4.916	4.923	4.987	4.975	4.979	5.021	4.948	4.977	4.983	4.955	4.967	4.956	4.940	4.947
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.733	3.738	3.736	3.699	3.746	3.726	3.719	3.714	3.716	3.734	3.752	3.745	3.634	3.640	3.638	3.718	3.734	3.727
Exhaust Toxics	56.8	92.3	77.0	56.3	88.9	74.9	56.3	91.9	77.9	54.4	91.3	76.4	61.5	97.7	81.7			
NOX	1,210.7	1,371.2	1,302.3	1,178.1	1,350.3	1,276.5	1,203.9	1,356.3	1,296.2	1,146	1,303	1,239	1,322	1,412	1,372			
Oxy Prem E10																		
Total BPD	379,843	309,610	338,857	342,231	325,413	332,416	240,450	263,775	254,062	133,504	140,723	137,717	23,067	20,889	21,796	1,119,095	1,060,409	1,084,848
Ethanol BPD	38,368	31,274	34,228	34,569	32,867	33,575	24,288	26,641	25,661	13,484	14,213	13,909	2,330	2,110	2,202	113,039	107,105	109,576
RVP	9.3	13.7	11.6	9.3	13.6	11.8	8.9	12.1	10.8	9.1	13.0	11.4	9.0	12.1	10.7	9.2	13.2	11.4
Sulfur ppm	25	25	25	21	21	21	8	10	9	28	28	28	9	14	12	20	20	20
Density	262.1	259.4	260.7	262.5	258.9	260.5	260.4	257.2	258.5	260.6	248.8	253.7	265.5	264.0	264.7	261.8	257.5	259.3
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.8	92.8	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	19.7	20.8	20.4	5.1	11.3	30.0	30.0	30.0	22.4	19.6	20.8
Benzene	0.4	0.4	0.41	0.5	0.5	0.51	0.3	0.3	0.28	1.18	0.19	0.59	0.39	0.43	0.41	0.50	0.38	0.43
Olefins	13.3	14.7	14.0	8.1	11.5	10.1	4.8	7.0	6.2	7.3	7.0	7.1	6.7	8.6	7.7	9.0	10.7	10.0
Oxygen (wt%)	3.679	3.716	3.699	3.672	3.723	3.701	3.702	3.747	3.729	3.698	3.874	3.801	3.631	3.651	3.642	3.683	3.745	3.718
E200	52	55	53	49	54	52	46	49	48	53	63	59	47	50	49	50	54	52
E300	94	94	94	83	83	83	86	86	86	90	90	90	86	86	86	88	88	88
T10	123	94	108	123	95	107	125	105	113	124	99	109	124	105	113	123	98	109
T50	195	191	193	201	192	196	208	201	204	194	174	182	206	200	202	200	191	186
T90	280	280	280	330	330	330	317	317	317	297	297	297	315	315	315	306	307	307
DVI	1,050	993	1,020	1,118	1,048	1,078	1,130	1,076	1,097	1,065	966	1,006	1,119	1,071	1,092	1,091	1,029	1,056
V/L	134	110	121	135	110	121	139	120	127	135	111	121	137	120	128	136	113	123
Energy (MMBtu/Bbl)	4.949	4.899	4.922	4.967	4.894	4.925	4.974	4.897	4.927	4.960	4.782	4.854	5.052	4.961	5.001	4.963	4.883	4.917
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.679	3.716	3.699	3.672	3.723	3.701	3.702	3.747	3.729	3.698	3.874	3.801	3.631	3.651	3.642	3.683	3.745	3.718
Exhaust Toxics	57.2	91.2	75.3	58.1	91.5	77.2	56.9	89.5	76.7	59.8	79.2	71.4	60.2	96.0	80.2			
NOX	1,196.2	1,373.6	1,290.8	1,161.5	1,340.7	1,263.9	1,140.6	1,292.8	1,232.8	1,155	1,262	1,219	1,167	1,338	1,263			

Appendix 5B: Mogas Quality by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,374,017	2,202,899	2,274,159	2,138,942	2,033,828	2,077,601	1,502,810	1,648,596	1,587,885	834,402	879,521	860,732	144,171	130,554	136,225	6,994,341	6,895,398	6,936,602
Ethanol BPD	239,800	222,496	229,702	216,037	205,417	209,839	151,786	166,508	160,377	84,275	88,832	86,934	14,561	13,186	13,759	706,459	696,439	700,611
RVP	9.3	13.7	11.8	9.3	13.2	11.5	8.9	11.8	10.7	9.1	13.0	11.4	9.0	11.8	10.6	9.1	13.0	11.4
Sulfur ppm	24	24	24	24	24	24	22	22	22	28	28	28	25	24	24	24	24	24
Density	258.9	258.1	258.5	260.9	257.6	259.0	259.4	259.2	259.3	258.6	255.7	256.8	265.3	264.7	264.9	259.7	258.0	258.7
R+M/2	88.3	88.0	88.1	88.0	88.0	88.0	88.2	88.0	88.0	86.9	86.9	86.9	88.9	89.4	89.2	88.0	87.9	87.9
Aromatics	22.3	22.3	22.3	22.5	22.5	22.5	22.5	22.1	22.2	17.5	15.4	16.3	27.7	30.0	29.0	22.0	21.6	21.7
Benzene	0.51	0.51	0.51	0.54	0.53	0.53	0.50	0.50	0.50	0.93	1.12	1.04	0.63	0.57	0.60	0.57	0.59	0.58
Olefins	14.4	14.7	14.5	9.5	11.5	10.7	12.3	12.0	12.1	6.7	6.7	6.7	19.2	14.5	16.6	11.6	12.1	11.9
Oxygen (wt%)	3.724	3.735	3.730	3.695	3.743	3.722	3.716	3.719	3.718	3.728	3.771	3.754	3.634	3.642	3.638	3.712	3.736	3.726
E200	57	54	55	57	60	59	57	54	55	63	64	63	56	55	55	58	57	57
E300	94	94	94	83	83	83	86	86	86	90	90	90	86	86	86	88	88	88
T10	123	94	107	123	98	108	125	106	114	124	99	109	124	107	114	123	99	109
T50	186	191	189	185	179	182	186	192	190	174	172	173	187	191	189	184	185	185
T90	280	280	280	330	330	330	317	317	317	297	297	297	315	315	315	306	306	306
DVI	1,021	995	1,006	1,070	1,013	1,037	1,061	1,053	1,056	1,004	960	978	1,063	1,047	1,054	1,044	1,011	1,024
V/L	133	110	120	133	110	120	135	120	126	132	110	119	134	120	126	133	113	121
Energy (MMBtu/Bbl)	4.935	4.928	4.931	4.938	4.912	4.923	4.985	4.962	4.971	5.011	4.921	4.957	4.994	4.956	4.973	4.957	4.931	4.942
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.724	3.735	3.730	3.695	3.743	3.722	3.716	3.719	3.718	3.728	3.771	3.754	3.634	3.642	3.638	3.712	3.736	3.726
Exhaust Toxics	56.8	92.1	76.8	56.6	89.4	75.3	56.4	91.5	77.7	55.3	89.4	75.6	61.3	97.4	81.5	0.0	0.0	0.0
NOX	1,208	1,372	1,301	1,175	1,349	1,274	1,194	1,346	1,286	1,147	1,296	1,236	1,297	1,400	1,354	0	0	0
E85 to CG																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E85 to RFG																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	186
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix 5B: Mogas Quality by Region

	PD 1 Control C 2022 US Model			PD 2 Control C 2022 US Model			PD 3 Control C 2022 US Model			PD 4/5 Control C 2022 US Model			PD CA Control C 2022 US Model			USA - 2022 Control C		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0.0	0.0	0
E300	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0.0	0.0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ALL MOGAS																		
Total BPD	4,116,290	3,921,320	4,002,513	2,536,767	2,428,069	2,473,335	2,054,721	2,210,780	2,145,791	834,402	879,521	860,732	1,686,161	1,706,997	1,698,320	11,228,340	11,146,687	11,180,690
Ethanol BPD	415,772	396,059	404,268	256,218	245,235	249,809	207,530	223,289	216,726	84,275	88,832	86,934	170,302	172,423	171,540	1,134,097	1,125,837	1,129,277
RVP	8.3	13.6	11.3	8.9	13.2	11.4	8.4	11.8	10.4	9.1	13.0	11.4	7.0	11.5	9.6	8.3	12.8	10.9
Sulfur ppm	24	24	24	24	24	24	22	23	22	28	28	28	9	11	10	22	22	22
Density	259.5	257.6	258.4	261.0	257.4	258.9	259.4	258.9	259.1	258.6	255.7	256.8	261.0	257.4	258.9	260.0	257.6	258.6
R+M/2	88.2	88.0	88.1	88.0	88.0	88.0	88.1	88.0	88.0	86.9	86.9	86.9	87.7	87.8	87.8	88.0	87.9	87.9
Aromatics	21.3	21.3	21.3	22.1	22.1	22.1	21.6	21.4	21.5	17.5	15.4	16.3	21.9	22.0	21.9	21.3	21.1	21.2
Benzene	0.53	0.53	0.53	0.54	0.54	0.54	0.51	0.49	0.50	0.93	1.12	1.04	0.58	0.47	0.52	0.57	0.56	0.57
Olefins	12.6	14.2	13.5	9.4	11.6	10.6	10.5	12.0	11.4	6.7	6.7	6.7	6.9	6.4	6.6	10.2	11.4	10.9
Oxygen (wt%)	3.715	3.742	3.731	3.693	3.745	3.723	3.716	3.723	3.721	3.728	3.771	3.754	3.693	3.745	3.724	3.708	3.742	3.728
E200	55	56	55	56	60	59	56	54	55	63	64	63	55	59	57	56	58	57
E300	94	94	94	83	83	83	86	86	86	90	90	90	86	86	86	88	88	88
T10	129	95	110	125	98	109	128	107	115	124	99	109	137	109	121	129	100	112
T50	190	188	189	187	179	182	188	191	190	174	172	173	191	181	185	188	184	186
T90	280	280	280	330	330	330	317	317	317	297	297	297	315	315	315	304	305	305
DVI	1,045	986	1,011	1,077	1,012	1,040	1,075	1,050	1,060	1,004	960	978	1,092	1,020	1,050	1,062	1,007	1,030
V/L	139	110	122	135	110	121	138	120	127	132	110	119	146	120	131	138	114	124
Energy (MMBtu/Bbl)	4.968	4.918	4.939	4.948	4.909	4.926	4.993	4.958	4.972	5.011	4.921	4.957	5.029	4.963	4.990	4.981	4.931	4.952
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.715	3.742	3.731	3.693	3.745	3.723	3.716	3.723	3.721	3.728	3.771	3.754	3.693	3.745	3.724	3.708	3.742	3.728

Appendix 5B: Mogas Quality by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
RFG Reg E10																		
Total BPD	1,463,509	1,457,766	1,460,157	334,173	331,163	332,416	463,605	472,234	468,641	0	0	0	1,321,094	1,340,944	1,332,678	3,582,381	3,602,107	3,593,892
Ethanol BPD	147,814	147,234	147,476	33,751	33,447	33,574	46,824	47,696	47,333	0	0	0	133,431	135,449	134,608	361,821	363,826	362,991
RVP	7.0	13.4	10.7	7.0	13.1	10.5	7.0	11.7	9.7	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.4	10.1
Sulfur ppm	24	24	24	21	25	23	22	25	24	0	0	0	9	10	10	18	19	19
Density	261.2	256.7	258.6	261.8	256.1	258.5	261.5	258.4	259.7	0.0	0.0	0.0	261.3	257.5	259.1	261.3	257.1	258.9
R+M/2	87.1	87.1	87.1	87.0	87.0	87.0	87.0	87.0	87.0	0.0	0.0	0.0	87.0	87.0	87.0	87.1	87.1	87.1
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	22.7	22.9	22.8	20.9	21.0	21.0
Benzene	0.6	0.6	0.59	0.6	0.6	0.60	0.6	0.5	0.55	0.00	0.00	0.00	0.62	0.50	0.55	0.60	0.55	0.57
Olefins	11.2	13.4	12.5	7.7	12.0	10.2	8.4	12.9	11.0	0.0	0.0	0.0	5.7	5.7	5.7	8.5	10.3	9.6
Oxygen (wt%)	3.691	3.756	3.728	3.682	3.764	3.729	3.686	3.731	3.712	0.000	0.000	0.000	3.689	3.745	3.721	3.689	3.749	3.724
E200	51	59	56	53	62	58	52	56	54	0	0	0	54	60	58	53	59	56
E300	94	94	94	86	86	86	89	89	89	0	0	0	86	86	86	90	90	90
T10	137	96	113	137	98	115	137	107	120	0	0	0	138	109	121	138	103	117
T50	197	182	189	193	175	182	196	187	191	0	0	0	191	179	184	194	181	187
T90	280	280	280	315	315	315	300	300	300	0	0	0	315	315	315	299	299	299
DVI	1,077	971	1,015	1,100	987	1,034	1,093	1,023	1,052	0	0	0	1,096	1,016	1,049	1,088	996	1,034
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.025	4.905	4.955	5.011	4.896	4.944	5.041	4.958	4.992	0.000	0.000	0.000	5.051	4.983	5.011	5.035	4.940	4.980
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.691	3.756	3.728	3.682	3.764	3.729	3.686	3.731	3.712	0.000	0.000	0.000	3.689	3.745	3.721	3.689	3.749	3.724
VOC Reduction	28.4			28.1			29.3			0.0								
NOX Reduction	13.4	12.3	12.7	14.6	12.8	13.6	14.5	12.6	13.4	0.0	0.0	0.0						
Toxics Reduction	32.5	25.8	28.6	33.2	27.1	29.7	33.3	25.7	28.8	0.0	0.0	0.0						
RFG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
VOC Reduction	0.0			0.0			0.0			0.0	0.0							
NOX Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
Toxics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
RFG Prem E10																		
Total BPD	278,764	260,655	268,196	63,652	63,079	63,317	88,306	89,949	89,265	0	0	0	251,637	255,418	253,843	682,358	669,101	674,622
Ethanol BPD	28,158	26,329	27,091	6,429	6,371	6,395	8,920	9,085	9,016	0	0	0	25,415	25,800	25,640	68,923	67,584	68,142
RVP	7.0	13.6	10.8	7.0	13.6	10.8	7.0	12.0	9.9	0.0	0.0	0.0	6.8	11.5	9.6	6.9	12.6	10.2
Sulfur ppm	25	25	25	19	20	19	15	11	13	0	0	0	8	9	8	17	16	17
Density	262.8	258.1	260.2	263.0	257.5	259.8	260.2	256.3	257.9	0.0	0.0	0.0	257.5	253.8	255.3	260.5	256.2	258.0
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	0.0	0.0	0.0	91.0	91.0	91.0	92.3	92.2	92.2
Aromatics	20.0	20.0	20.0	20.0	20.0	20.0	17.2	17.6	17.4	0.0	0.0	0.0	13.5	13.4	13.4	17.2	17.1	17.2
Benzene	0.4	0.4	0.42	0.5	0.5	0.46	0.3	0.3	0.29	0.00	0.00	0.00	0.35	0.25	0.29	0.40	0.33	0.36
Olefins	15.9	15.0	15.4	13.9	11.2	12.3	8.7	7.5	8.0	0.0	0.0	0.0	5.7	5.7	5.7	11.0	10.1	10.5
Oxygen (wt%)	3.668	3.735	3.706	3.666	3.743	3.711	3.705	3.762	3.738	0.000	0.000	0.000	3.744	3.799	3.776	3.700	3.764	3.737
E200	49	55	53	50	55	53	51	51	51	0	0	0	54	58	57	51	56	54
E300	94	94	94	86	86	86	89	89	89	0	0	0	86	86	86	90	90	90
T10	137	95	113	137	95	113	137	105	118	0	0	0	138	108	121	138	101	117
T50	202	189	194	200	190	194	198	197	198	0	0	0	192	183	186	197	188	187
T90	280	280	280	315	315	315	300	300	300	0	0	0	315	315	315	299	299	299
DVI	1,090	989	1,033	1,122	1,028	1,067	1,100	1,050	1,071	0	0	0	1,097	1,026	1,055	1,097	1,015	1,050
V/L	148	110	126	147	110	126	147	120	131	0	0	0	147	120	131	147	115	129
Energy (MMBtu/Bbl)	5.000	4.881	4.933	4.966	4.875	4.913	4.961	4.883	4.915	0.000	0.000	0.000	4.947	4.876	4.905	4.972	4.879	4.918
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.668	3.735	3.706	3.666	3.743	3.711	3.705	3.762	3.738	0.000	0.000	0.000	3.744	3.799	3.776	3.700	3.764	3.737
VOC Reduction	28.6			28.4			29.8			0.0	0.0							
NOX Reduction	10.6	11.3	11.0	12.2	13.9	13.2	15.7	16.5	16.2	0.0	0.0	0.0						
Toxics Reduction	32.6	25.8	28.8	33.1	26.0	29.0	36.5	27.3	31.1	0.0	0.0	0.0						

Appendix 5B: Mogas Quality by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL RFG																		
Total BPD	1,742,273	1,718,421	1,728,354	397,825	394,241	395,734	551,911	562,184	557,906	0	0	0	1,572,731	1,596,362	1,586,521	4,264,740	4,271,208	4,268,514
Ethanol BPD	175,972	173,563	174,566	40,181	39,818	39,969	55,744	56,781	56,349	0	0	0	158,846	161,249	160,248	430,743	431,411	431,133
RVP	7.0	13.5	10.8	7.0	13.2	10.6	7.0	11.7	9.8	0.0	0.0	0.0	6.8	11.4	9.5	6.9	12.5	10.1
Sulfur ppm	24	24	24	21	24	23	21	23	22	0	0	0	9	10	9	18	19	18
Density	261.4	256.9	258.8	262.0	256.3	258.8	261.3	258.1	259.4	0.0	0.0	0.0	260.7	256.9	258.5	261.2	257.0	258.8
R+M/2	88.1	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	0.0	0.0	0.0	87.6	87.6	87.6	87.9	87.9	87.9
Aromatics	19.9	19.9	19.9	20.0	20.0	20.0	19.5	19.6	19.6	0.0	0.0	0.0	21.2	21.4	21.3	20.3	20.4	20.4
Benzene	0.57	0.56	0.56	0.58	0.57	0.57	0.56	0.48	0.51	0.00	0.00	0.00	0.58	0.46	0.51	0.57	0.51	0.54
Olefins	12.0	13.7	12.9	8.7	11.9	10.5	8.4	12.1	10.6	0.0	0.0	0.0	5.7	5.7	5.7	8.9	10.3	9.7
Oxygen (wt%)	3.687	3.752	3.725	3.679	3.760	3.726	3.689	3.735	3.716	0.000	0.000	0.000	3.697	3.753	3.730	3.690	3.751	3.726
E200	51	58	55	53	61	58	52	55	54	0	0	0	54	60	58	52	59	56
E300	94	94	94	86	86	86	89	89	89	0	0	0	86	86	86	90	90	90
T10	137	96	113	137	98	114	137	107	119	0	0	0	138	109	121	138	102	117
T50	198	183	189	194	177	184	196	189	192	0	0	0	191	180	184	195	182	187
T90	280	280	280	315	315	315	300	300	300	0	0	0	315	315	315	299	299	299
DVI	1,079	974	1,018	1,104	993	1,039	1,094	1,028	1,055	0	0	0	1,096	1,018	1,050	1,090	999	1,037
V/L	147	110	125	146	110	125	147	120	131	0	0	0	147	120	131	147	115	128
Energy (MMBtu/Bbl)	5.021	4.901	4.951	5.003	4.892	4.939	5.028	4.946	4.980	0.000	0.000	0.000	5.034	4.966	4.994	5.025	4.931	4.970
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.687	3.752	3.725	3.679	3.760	3.726	3.689	3.735	3.716	0.000	0.000	0.000	3.697	3.753	3.730	3.690	3.751	3.726
VOC Reduction	28.4			28.1			29.4			0.0								
NOX Reduction	12.9	12.1	12.5	14.2	13.0	13.5	14.7	13.3	13.8	0.0	0.0	0.0						
Toxics Reduction	32.5	25.8	28.6	33.2	27.0	29.6	33.8	26.0	29.2	0.0	0.0	0.0						
CG Reg																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
CG Reg E20																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			

Appendix 5B: Mogas Quality by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
CG Prem																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Exhaust Toxics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
NOX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0	0	0			
Oxy Reg E10																		
Total BPD	1,986,483	1,893,289	1,932,099	1,747,998	1,708,416	1,724,899	1,262,360	1,384,821	1,333,823	700,898	743,889	725,986	121,103	109,665	114,429	5,818,842	5,840,080	5,831,236
Ethanol BPD	200,635	191,222	195,142	176,548	172,550	174,215	127,498	139,867	134,716	70,791	75,133	73,325	12,233	11,076	11,558	587,704	589,848	588,955
RVP	8.2	13.7	11.4	8.3	13.2	11.1	7.9	11.8	10.2	8.1	13.0	11.0	8.0	11.7	10.1	8.1	13.0	11.0
Sulfur ppm	24	24	24	25	25	25	25	25	25	28	28	28	28	26	27	25	25	25
Density	260.7	257.9	259.1	262.3	257.3	259.4	262.3	259.6	260.7	259.5	255.7	257.3	267.3	264.7	265.8	261.5	258.0	259.5
R+M/2	87.2	87.2	87.2	87.0	87.0	87.0	87.0	87.0	87.0	86.0	86.0	86.0	88.4	89.0	88.8	87.0	87.0	87.0
Aromatics	22.3	22.3	22.3	22.5	22.5	22.5	22.5	22.5	22.5	18.5	16.4	17.2	29.6	30.0	29.8	22.1	21.8	21.9
Benzene	0.5	0.5	0.53	0.5	0.5	0.54	0.5	0.5	0.54	0.97	1.30	1.17	0.66	0.60	0.63	0.59	0.63	0.62
Olefins	13.8	14.7	14.3	10.1	11.7	11.0	12.3	13.0	12.7	6.6	6.3	6.4	19.1	15.1	16.9	11.6	12.4	12.0
Oxygen (wt%)	3.697	3.737	3.720	3.676	3.746	3.716	3.674	3.713	3.698	3.715	3.769	3.747	3.607	3.642	3.626	3.686	3.736	3.715
E200	54	54	54	57	61	59	54	55	54	63	64	63	55	56	55	56	58	57
E300	94	94	94	86	86	86	89	89	89	83	83	83	86	86	86	89	89	89
T10	129	94	109	129	98	111	132	107	117	130	99	112	130	107	117	130	99	112
T50	192	191	192	186	177	181	191	191	191	174	172	173	190	188	189	188	184	187
T90	280	280	280	315	315	315	300	300	300	329	329	329	315	315	315	301	302	302
DVI	1,049	996	1,018	1,067	992	1,023	1,071	1,032	1,047	1,046	993	1,014	1,081	1,041	1,059	1,059	1,004	1,027
V/L	139	110	122	138	110	122	141	120	128	137	110	121	140	120	129	139	113	124
Energy (MMBtu/Bbl)	4.979	4.932	4.952	4.966	4.912	4.935	5.032	4.973	4.996	5.049	4.942	4.985	5.031	4.957	4.990	4.996	4.938	4.962
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.697	3.737	3.720	3.676	3.746	3.716	3.674	3.713	3.698	3.715	3.769	3.747	3.607	3.642	3.626	3.686	3.736	3.715
Exhaust Toxics	57.1	92.3	77.2	56.3	89.0	75.2	56.8	91.9	78.0	55.5	90.9	76.7	62.1	97.5	81.9			
NOX	1,197.2	1,371.7	1,297.0	1,174.3	1,351.1	1,276.5	1,185.0	1,356.8	1,289.1	1,148	1,296	1,237	1,284	1,406	1,352			
Oxy Prem E10																		
Total BPD	378,378	309,610	338,247	332,952	325,413	328,552	240,450	263,775	254,062	133,504	141,693	138,283	23,067	20,889	21,796	1,108,351	1,061,379	1,080,940
Ethanol BPD	38,220	31,274	34,166	33,632	32,867	33,185	24,288	26,641	25,661	13,484	14,311	13,967	2,330	2,110	2,202	111,953	107,203	109,181
RVP	8.3	13.7	11.2	8.3	13.7	11.4	7.9	12.1	10.4	8.1	13.0	11.0	8.0	12.0	10.3	8.2	13.2	11.0
Sulfur ppm	25	25	25	18	19	18	11	10	10	28	28	28	9	14	12	20	20	20
Density	263.1	259.5	261.2	263.3	258.7	260.7	262.0	257.3	259.2	262.5	255.5	258.3	266.3	264.0	265.0	262.9	258.3	260.3
R+M/2	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	93.0	91.5	91.5	91.5	91.0	91.0	91.0	92.8	92.8	92.8
Aromatics	22.5	22.5	22.5	22.5	22.5	22.5	22.5	19.8	20.8	22.1	14.5	17.5	30.0	30.0	30.0	22.6	20.9	21.6
Benzene	0.4	0.4	0.41	0.5	0.5	0.49	0.3	0.3	0.30	1.30	1.30	1.30	0.39	0.44	0.42	0.52	0.52	0.52
Olefins	12.1	14.8	13.6	7.4	10.9	9.4	6.5	7.1	6.8	7.3	6.9	7.0	6.3	8.6	7.6	8.8	10.5	9.8
Oxygen (wt%)	3.664	3.715	3.691	3.661	3.726	3.698	3.679	3.747	3.720	3.673	3.773	3.732	3.620	3.651	3.637	3.666	3.733	3.704
E200	51	54	52	49	53	52	49	49	49	51	60	57	46	50	48	50	53	52
E300	94	94	94	86	86	86	89	89	89	83	83	83	86	86	86	89	89	89
T10	129	94	110	129	95	109	132	105	115	130	99	112	130	105	116	130	98	111
T50	199	191	195	201	193	197	201	201	201	198	179	186	208	199	203	200	193	187
T90	280	280	280	315	315	315	300	300	300	329	329	329	315	315	315	301	303	302
DVI	1,069	995	1,030	1,111	1,037	1,068	1,101	1,060	1,076	1,117	1,013	1,055	1,135	1,070	1,099	1,096	1,028	1,057
V/L	140	110	124	141	110	123	143	120	129	141	111	123	143	120	130	141	113	125
Energy (MMBtu/Bbl)	4.966	4.898	4.930	4.961	4.893	4.921	4.955	4.897	4.920	4.986	4.833	4.894	5.075	4.964	5.013	4.967	4.889	4.922
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.664	3.715	3.691	3.661	3.726	3.698	3.679	3.747	3.720	3.673	3.773	3.732	3.620	3.651	3.637	3.666	3.733	3.704
Exhaust Toxics	57.0	91.5	75.4	57.4	91.5	77.1	56.1	89.6	76.4	61.4	91.2	79.2	60.1	95.9	80.1			
NOX	1,182.3	1,374.6	1,285.0	1,153.5	1,334.2	1,257.9	1,144.6	1,293.2	1,234.6	1,158	1,285	1,234	1,162	1,339	1,261			

Appendix 5B: Mogas Quality by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL CG																		
Total BPD	2,364,860	2,202,899	2,270,346	2,080,950	2,033,828	2,053,451	1,502,810	1,648,596	1,587,885	834,402	885,583	864,269	144,171	130,554	136,225	6,927,193	6,901,460	6,912,176
Ethanol BPD	238,855	222,496	229,308	210,179	205,417	207,400	151,786	166,508	160,377	84,275	89,444	87,291	14,563	13,186	13,759	699,658	697,051	698,136
RVP	8.3	13.7	11.4	8.3	13.2	11.1	7.9	11.8	10.3	8.1	13.0	11.0	8.0	11.8	10.1	8.1	13.0	11.0
Sulfur ppm	24	24	24	24	24	24	23	22	23	28	28	28	25	24	24	24	24	24
Density	261.1	258.2	259.5	262.4	257.5	259.6	262.3	259.2	260.5	260.0	255.7	257.4	267.1	264.6	265.7	261.8	258.1	259.6
R+M/2	88.1	88.0	88.1	88.0	88.0	88.0	88.0	88.0	88.0	86.9	86.9	86.9	88.8	89.4	89.1	87.9	87.9	87.9
Aromatics	22.3	22.3	22.3	22.5	22.5	22.5	22.5	22.1	22.2	19.1	16.1	17.3	29.6	30.0	29.8	22.2	21.7	21.9
Benzene	0.51	0.51	0.51	0.53	0.53	0.53	0.51	0.50	0.50	1.02	1.30	1.19	0.62	0.57	0.59	0.58	0.62	0.60
Olefins	13.6	14.7	14.2	9.6	11.5	10.7	11.4	12.1	11.8	6.7	6.4	6.5	17.1	14.1	15.4	11.2	12.1	11.7
Oxygen (wt%)	3.692	3.734	3.716	3.673	3.743	3.713	3.675	3.718	3.701	3.708	3.770	3.745	3.609	3.643	3.628	3.683	3.736	3.713
E200	53	54	54	56	60	58	53	54	54	61	63	62	53	55	54	55	57	56
E300	94	94	94	86	86	86	89	89	89	83	83	83	86	86	86	89	89	89
T10	129	94	109	129	97	111	132	106	116	130	99	112	130	107	117	130	99	112
T50	193	191	192	188	179	183	193	192	192	178	173	175	193	190	191	190	186	187
T90	280	280	280	315	315	315	300	300	300	329	329	329	315	315	315	301	302	302
DVI	1,052	996	1,020	1,074	999	1,031	1,076	1,036	1,052	1,057	996	1,021	1,090	1,046	1,065	1,065	1,007	1,031
V/L	139	110	123	139	110	122	142	120	129	138	110	121	141	120	129	139	113	124
Energy (MMBtu/Bbl)	4.977	4.927	4.949	4.965	4.909	4.933	5.020	4.961	4.984	5.039	4.924	4.971	5.038	4.958	4.993	4.992	4.930	4.956
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.692	3.734	3.716	3.673	3.743	3.713	3.675	3.718	3.701	3.708	3.770	3.745	3.609	3.643	3.628	3.683	3.736	3.713
Exhaust Toxics	57.1	92.2	77.0	56.5	89.4	75.5	56.7	91.5	77.8	56.5	90.9	77.1	61.8	97.2	81.6	0.0	0.0	0.0
NOX	1,195	1,372	1,295	1,171	1,348	1,274	1,179	1,347	1,280	1,150	1,294	1,236	1,265	1,395	1,338	0	0	0
E85 to CG																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E85 to RFG																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	187
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Appendix 5B: Mogas Quality by Region

	PD 1 Control D 2022 US Model			PD 2 Control D 2022 US Model			PD 3 Control D 2022 US Model			PD 4/5 Control D 2022 US Model			PD CA Control D 2022 US Model			USA - 2022 CONTROL D		
	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average	Summer	Winter	Average
ALL E85																		
Total BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethanol BPD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RVP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sulfur ppm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Density	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R+M/2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aromatics	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzene	0.0	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.00
Olefins	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oxygen (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E200	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0.0	0.0	0
E300	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0	0	0	0	0	0	0.0	0.0	0
T10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
T90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DVI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Energy (MMBtu/Bbl)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ALL MOGAS																		
Total BPD	4,107,133	3,921,320	3,998,700	2,478,775	2,428,069	2,449,185	2,054,721	2,210,780	2,145,791	834,402	885,583	864,269	1,716,902	1,726,916	1,722,746	11,191,933	11,172,668	11,180,690
Ethanol BPD	414,827	396,059	403,875	250,360	245,235	247,369	207,530	223,289	216,726	84,275	89,444	87,291	173,409	174,435	174,007	1,130,401	1,128,462	1,129,269
RVP	7.7	13.6	11.1	8.1	13.2	11.1	7.6	11.8	10.1	8.1	13.0	11.0	6.9	11.5	9.6	7.7	12.8	10.7
Sulfur ppm	24	24	24	23	24	24	22	23	22	28	28	28	10	11	11	22	22	22
Density	261.3	257.6	259.2	262.4	257.4	259.5	262.0	258.9	260.2	260.0	255.7	257.4	261.3	257.5	259.1	261.6	257.6	259.3
R+M/2	88.1	88.0	88.1	88.0	88.0	88.0	88.0	88.0	88.0	86.9	86.9	86.9	87.7	87.8	87.8	87.9	87.9	87.9
Aromatics	21.3	21.3	21.3	22.1	22.1	22.1	21.7	21.4	21.5	19.1	16.1	17.3	21.9	22.0	22.0	21.5	21.2	21.3
Benzene	0.54	0.53	0.53	0.54	0.54	0.54	0.52	0.49	0.50	1.02	1.30	1.19	0.58	0.47	0.51	0.58	0.58	0.58
Olefins	12.9	14.3	13.7	9.5	11.6	10.7	10.6	12.1	11.5	6.7	6.4	6.5	6.7	6.3	6.5	10.3	11.4	10.9
Oxygen (wt%)	3.690	3.742	3.719	3.674	3.746	3.715	3.679	3.723	3.705	3.708	3.770	3.745	3.690	3.745	3.722	3.686	3.742	3.718
E200	52	56	54	55	60	58	53	54	54	61	63	62	54	59	57	54	58	56
E300	94	94	94	86	86	86	89	89	89	83	83	83	86	86	86	89	89	89
T10	132	95	111	130	97	111	133	107	117	130	99	112	138	109	121	133	100	114
T50	195	188	191	189	179	183	194	191	192	178	173	175	191	181	185	192	184	187
T90	280	280	280	315	315	315	300	300	300	329	329	329	315	315	315	300	301	301
DVI	1,064	986	1,019	1,079	998	1,032	1,081	1,034	1,053	1,057	996	1,021	1,096	1,020	1,051	1,074	1,004	1,034
V/L	143	110	124	140	110	123	143	120	129	138	110	121	146	120	131	142	114	126
Energy (MMBtu/Bbl)	4.995	4.916	4.950	4.971	4.906	4.934	5.022	4.957	4.983	5.039	4.924	4.971	5.035	4.965	4.994	5.004	4.930	4.961
MTBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ETBE (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TAME (wt%)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethanol (wt%)	3.690	3.742	3.719	3.674	3.746	3.715	3.679	3.723	3.705	3.708	3.770	3.745	3.690	3.745	3.722	3.686	3.742	3.718

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