Report to
California Air Resources Board
August 1988

Cost of Reducing Aromatics and Sulfur Levels in Motor Vehicle Fuels

Volume III — Appendices

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Arthur D. Little, Inc.
Contract No.: A6-199-32

VOLUME III

APPENDIX
COST OF REDUCING AROMATICS AND SULFUR IN MOTOR VEHICLE FUELS

A. GENERALIZED DESCRIPTION OF PETROLEUM REFINING AND THE ADL LP MODEL

APPENDIX A

1. LINEAR PROGRAMMING (LP) TECHNIQUE

The simulation of refinery processing in this study has been made using the Linear Programming (LP) technique. LP is a mathematical technique which enables a large number of inter-relationships to be studied using computer technology to speed up the process of problem solving. It is a technique which is highly suitable for the study of continuous process operations such as oil refining. It is widely used by refiners to:

- Plan refinery process capacity modifications/additions; and
- Plan refinery operations over various timeframes.

In particular, LP modelling can be used to monitor changes in refining operations as various parameters, such as diesel aromatics and sulfur level, are changed. It can study changes in:

- Direct fuel used for process heat (most refining processes use heat to achieve their objectives);
- Indirect fuel for steam raising;
- Other energy requirements (e.g., electricity);
- Variable operating costs;
- Existing process capacity utilization; and
- New process capacity requirements.

The LP technique derives an "optimum" solution to each individual problem by either maximizing or minimizing any pre-determined parameter. It could therefore minimize energy, maximize revenue, minimize costs and so on. For the purposes of this study, we have used cost minimization to derive "optimum" solutions. We believe that the cost minimization approach will produce results which are consistent with the day-to-day objectives of refiners.

2. CATEGORIZATION OF INDUSTRY BY REFINERY GROUP

One major problem facing a study of this nature is the need to strike a balance between complexity and simplicity. On the one hand, simulation of each refinery would require an enormous work effort and conversely a single model simulation of the total refining industry would grossly underestimate the complexities of the refining situation.

In 1986, there were thirty operating refineries in California, each with a slightly different configuration. These variations lead to the use of different options to achieve more restrictive product qualities. To analyze these differences and the cost associated with them, we divided the thirty California refineries into six groups.

We obtained information about the operation of California refineries through a confidential refinery survey.

Based on the survey information, we selected the following refineries for modeling:

Group	Description	Refinery/Location
I	Topping	None*
II	Hydroskimming	Kern Oil-Bakersfield
III	Conversion	Unocal - Los Angeles
IV	Deep Conversion - w/o hydrocracking	Shell - Wilmington
V	Deep Conversion - LA Basin	ARCO - Carson
VI	Deep Conversion - Northern CA	Exxon - Benicia

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* Since topping refineries generally do not produce gasoline and produce only a small volume of diesel, we chose not to model this refinery type. We estimated the costs for this refinery type outside the LP model.

We cannot provide a detailed description of the individual refinery models used in this analysis since this information is confidential. We have, however, provided a generalized description of major refinery types and a generalized description of the Arthur D. Little LP model below.

3. DESCRIPTION OF MAJOR REFINERY PROCESS TYPES

A. Process Unit Functions

Oil refineries are made up of a series of different process units. Each refinery process unit can be classified as performing one or more of the following functions:

- separation,
- conversion, and
- treating.

Separation involves a physical process (not a chemical process) which divides an oil into its component parts. Distillation is the most frequent separation process used in refineries. Distillation separates components by boiling range. The first process in a refinery is generally an atmospheric distillation unit. This unit separates crude oil into such components as naphtha, kerosene, gas, oil and long residue. These components are thus available for further processing in the refinery. A simplified diagram of a crude distillation (separation) process is shown on Figure A-1. Separation processes include:

- Atmospheric distillation,
- Vacuum distillation,
- Solvent extraction,
- Mole sieve separation,
- Cyrogenic separation, and
- Gravity separation.

Conversion processes produce a chemical change in refinery components by altering the molecular structure of the components. Fluid Catalytic Cracking (FCC) and Hydrocracking (HCC) break heavy, long chain molecules found in resid into lighter components such as gasoline and distillates. A simplified flow diagram of an FCC unit is shown on Figure A-2.

Catalytic Reforming, another type of conversion process, converts low octane naphtha into high octane gasoline blendstock. Reforming rearranges low octane naphthenes (cyclic compounds) into high octane aromatic compounds such as benzene and toluene. Conversion processes include:

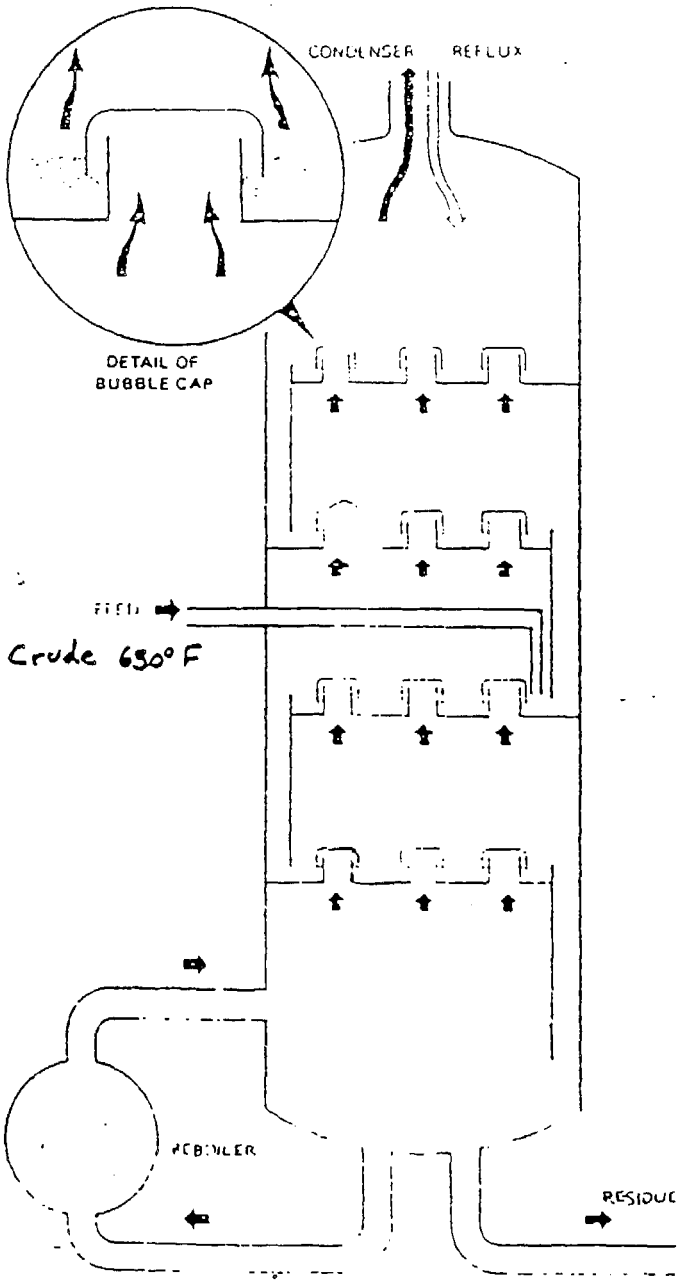
- Fluid catalytic cracking,
- Catalytic hydrocracking,
- Thermal cracking/visbreaking,
- Coking,
- Residual upgrading,
- Alkylation,
- Polymerization, and
- Isomerization.

Treating units remove impurities such as sulfur and nitrogen from refinery streams. Treating can be used to improve the quality of a component prior to blending. A component stream might also be treated before it is processed in a conversion unit. This can be done to prevent catalyst poisoning and/or to improve the quality of the products produced in the conversion process. A simplified flow diagram of a catalytic hydrodesulfurization (treating) process is shown on Figure A-3. Treating processes include:

- Hydrodesulfurization,
- Merox treating,

Figure A.1

SEPARATION PROCESSES FRACTIONATION (DISTILLATION)



Other Separation Processes

- Extraction (Solvent)
- Mole sieve
- Cyrogenic
- Gravity

SOURCE: "Our Industry Petroleum" pp. 230
The British Petroleum Co. Ltd., 1977.

Figure A.2

CONVERSION PROCESSES FLUID CATALYTIC CRACKING UNIT

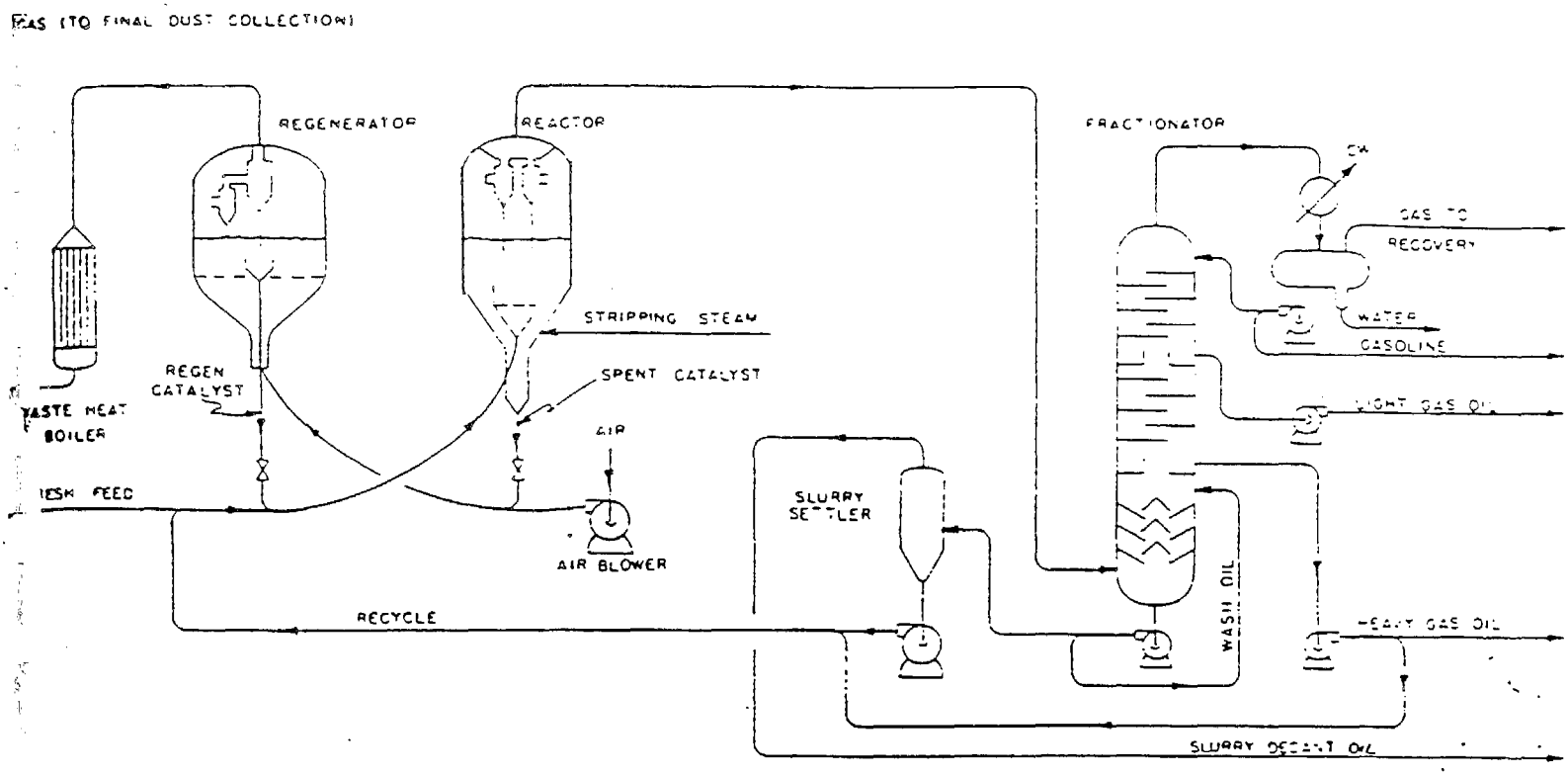


FIG. 7.4. FCC unit. Model III

SOURCE: Gary and Handwerk pp. 93
"Petroleum Refining Technology and Economics", J.H. Gary and G.E. Handwerk, Marcel Dekker, 1975.

OTHER CONVERSION PROCESSES:

- Catalytic Hydrocracking
- Thermal cracking (vis breaking)
- Coking
- Residual upgrading
- Catalytic reforming
- Alkylation
- Polymerization
- Isomerization

Figure A.3

TREATING PROCESS - CATALYTIC HYDRODESULFURIZATION

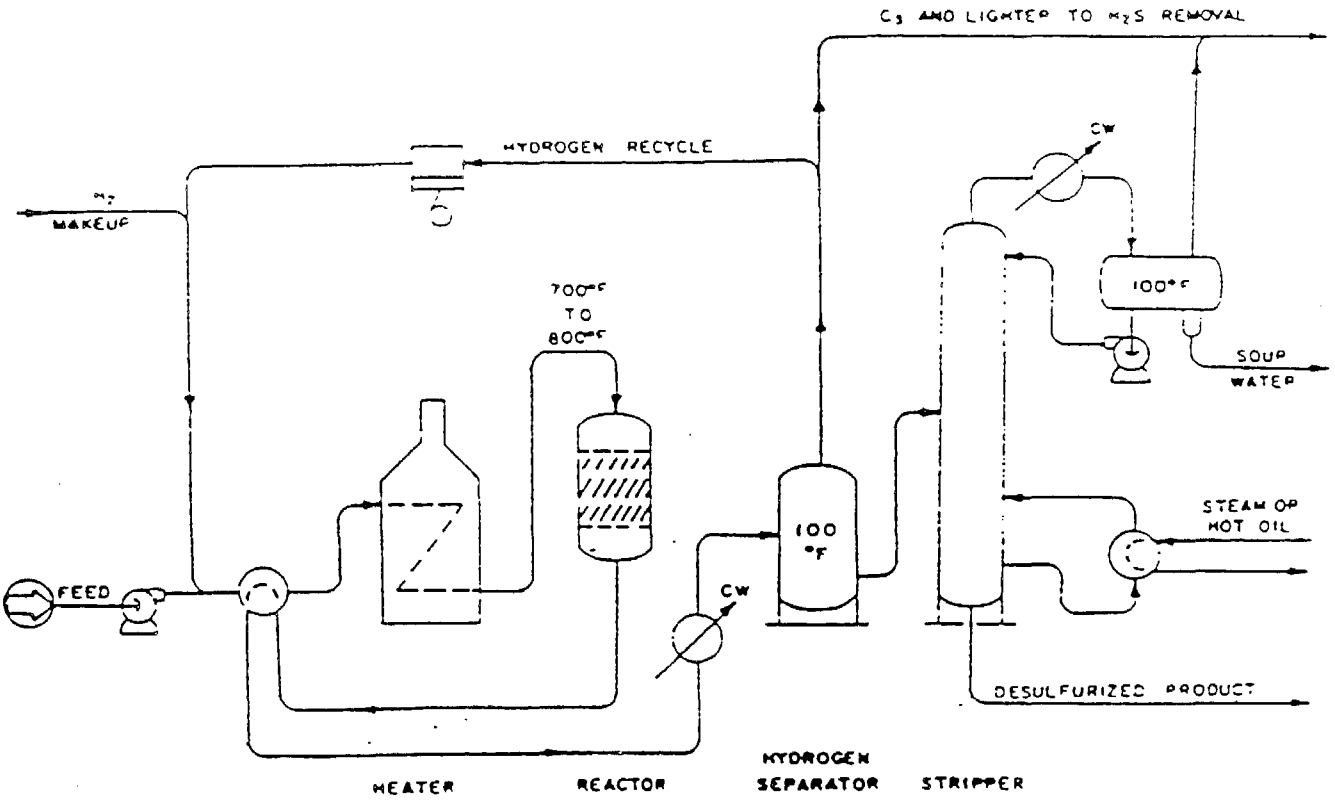


FIG. 6.1. Catalytic hydrodesulfurizer

SOURCE: Gary and Handwerk P.. 115
"Petroleum Refining Technology and Economics", J.H. Gary and G.E. Handwerk, Marcel Dekker, 1975.

Other Treating Processes

- Merox
- Caustic
- Acid
- Clay
- Amine
- Sulfur Recovery

- Caustic treating,
- Acid treating,
- Clay treating,
- Amine extraction,
- Sulfur recovery, and
- Desalting.

All refinery process units are made up of combinations of the above three process types.

B. Refinery Configuration Types

Refineries can be divided into four configuration types based on the process units present. the four configuration types are:

- Topping,
- Hydroskimming,
- Conversion, and
- Deep conversion.

These refinery types are given in order of increasing complexity. Each successive configuration type includes the same processes as the preceding type and adds one or more additional distinguishing process. Figure A-4 provides a summary of the basic characteristics and distinguishing processes for each of these configurations.

An increase in refinery complexity enables the refinery to process the same barrel of crude oil into a greater yield of light and valuable products. A complex conversion or deep conversion refinery is able to produce gasoline and diesel at the expense of low value residual fuel. However, the greater the complexity, the higher the investment cost, maintenance cost and manpower requirements.

1. Topping Refinery

The simplest refinery configuration is topping. A topping refinery uses a separation process--atmospheric distillation--to separate crude into its natural fractions: LPG and lighter, naphtha, kerosene, distillate, and long resid. A simplified process flow diagram for a typical topping refinery is shown on Figure A-5. California Group I are topping refineries.

A topping refinery consists of a crude desalter and an atmospheric distillation tower. Although not shown, a topping refinery might also have a vacuum distillation unit which further distills long resid into vacuum gas oil and short resid. Vacuum gas oil can be sold as cracker feedstock or for lube oil blending. Short resid may be sold as asphalt. Long resid (or short resid) would normally be cut (i.e., blended to meet viscosity) with distillate to produce residual fuel.

Figure A.4

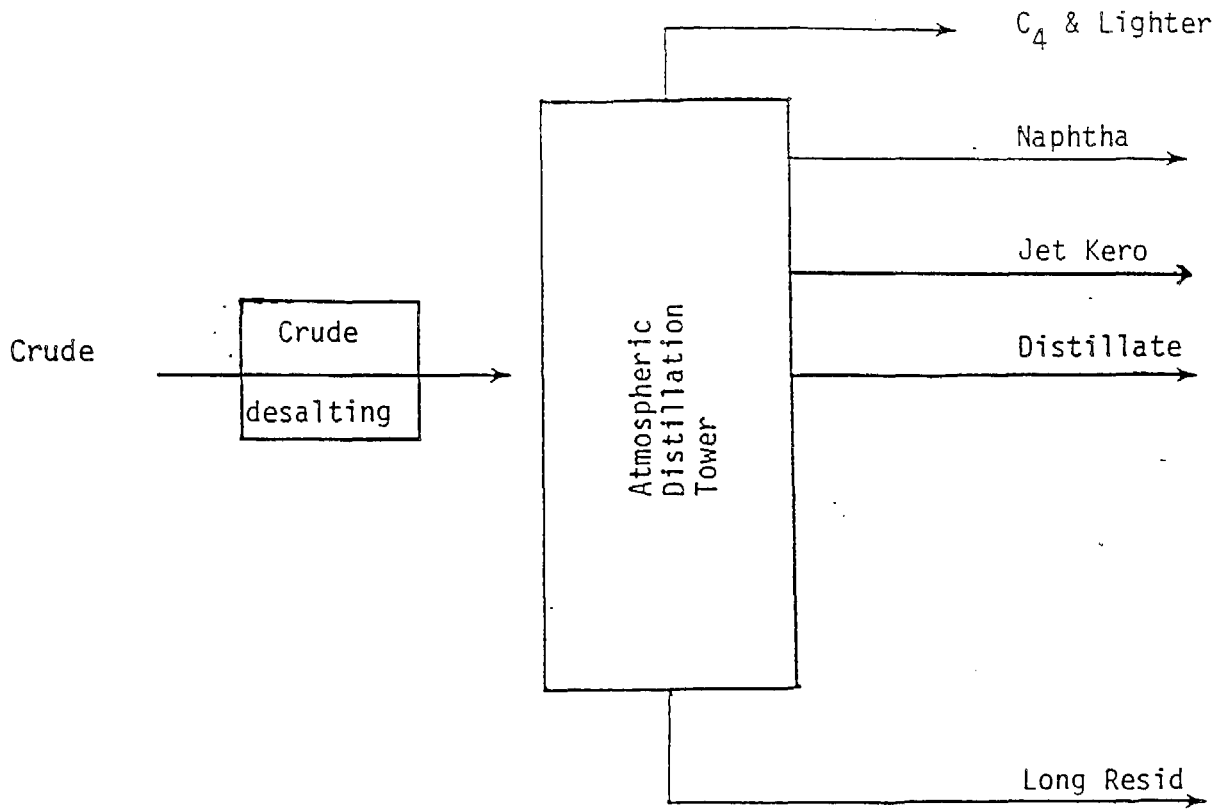
PRINCIPAL TYPES OF REFINERY CONFIGURATIONS

	Topping (Distillation)	Hydroskimming	Conversion	Coking (Deep Conversion)
Basic Process Characteristics	• Most simple configuration • Breaks crude into natural fractions • Produces naphtha instead of finished gasoline	• Adds capability to produce gasoline from naphtha • Earns naphtha/gasoline differential	• Converts lighter fuel oils to light products • Earns partial heavy/light product price differential	• Converts all fuel oil to light and middle products • Earns full heavy/light product price differential
Distinguishing Process Units	• Distillation column • Vacuum unit possibly	• Reformer	• Catalytic cracking	• Coking

Figure A.5

TYPICAL TOPPING REFINERY

Volume: 000 B/D



A topping refinery cannot directly produce gasoline since the octane quality of naphtha is quite low. In countries where significant lead (TEL) blending is allowed, a low octane gasoline product can be produced from naphtha.

2. Hydroskimming Refinery

Hydroskimming refineries are one step more complex than topping units. A simplified diagram for a typical hydroskimming refinery is shown in Figure A-6. The first two process units in this refinery--crude desalting and distillation unit--are identical to those in a topping refinery. The distinguishing process in a hydroskimming refinery is the catalytic reformer. California Group II are hysdroskimming refineries.

A reformer is a catalytic process which upgrades naphtha into gasoline quality material. The crude naphtha must be treated in a naphtha pretreater to remove sulfur and nitrogen which would otherwise poison the reformer catalyst.

Figure A.6 also shows three other process units which may, or may not, be present in a hydroskimming refinery. These units are isomerization, distillate desulfurizing and vacuum distillation.

An isomerization unit converts the lightest naphtha fraction into gasoline quality by converting straight chain hydrocarbons into isomers (i.e., branched hydrocarbons). Isomerization units are popular in countries with lead phasedown requirements. The light straight run naphtha would be blended to gasoline even if an isom unit was not available.

The need for a distillate desulfurizing unit is set by the sulfur specification of the distillate product and the crude oil being processed. The distillate produced from sweet crudes (i.e., low sulfur) may not require desulfurization to current specifications. However, sour crudes, especially when processed in locations with stringent distillate sulfur specs, would require desulfurization.

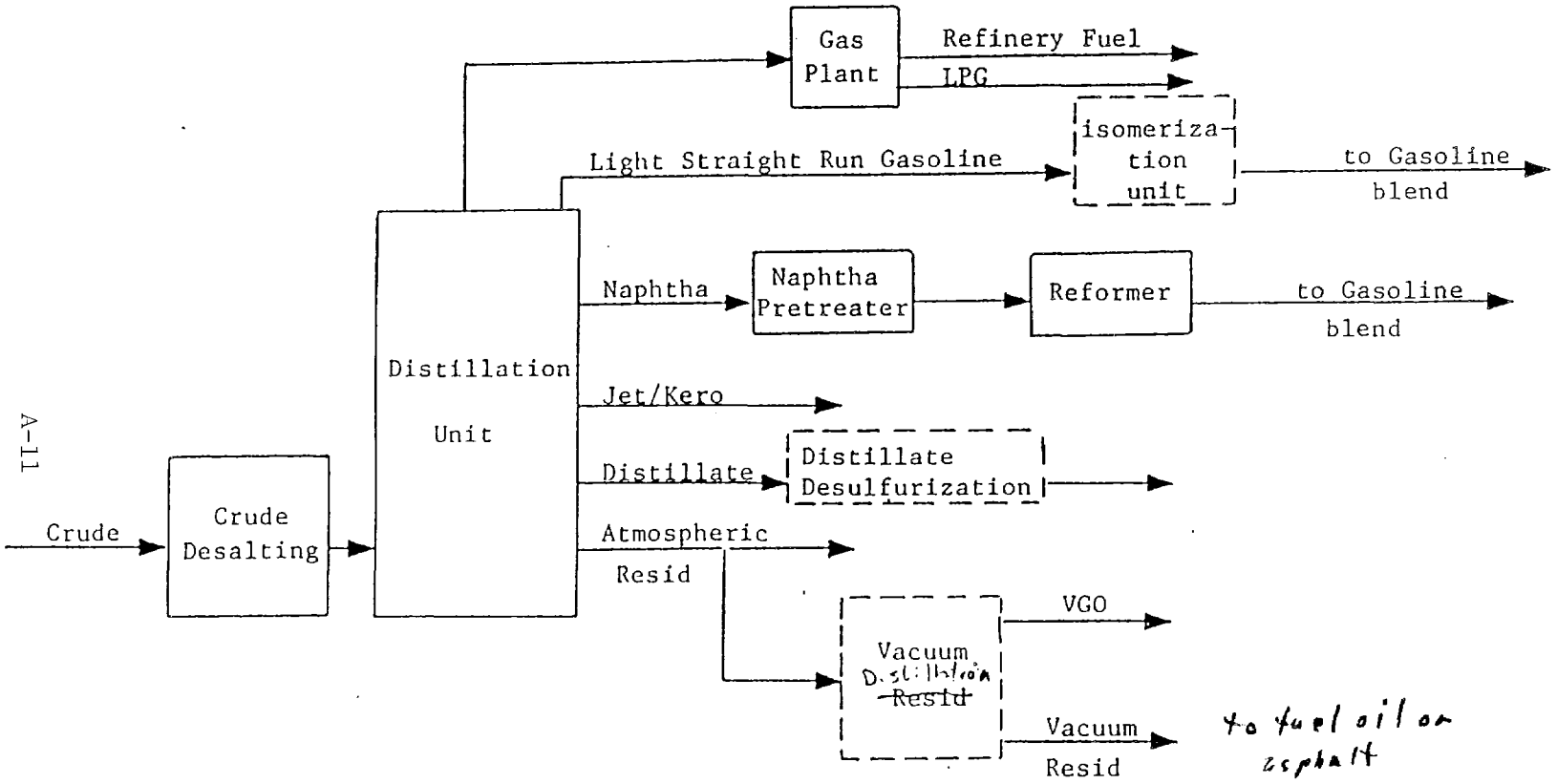
The vacuum distillation unit would be included in a refinery if the vacuum gas oil had a more profitable alternative than residual fuel blending, such as lubricating oils or feedstock to more complex (conversion) refineries. Vacuum distillation is also required to produce asphalt.

Hydroskimming refineries cannot produce more light product from a crude than is naturally available. These refineries simply have the capability of upgrading the naturally occurring naphtha in the crude to gasoline.

3. Conversion Refinery

A simplified process flow diagram for a typical conversion refinery is shown in Figure A-7. The processes shown outside the dashed lines are

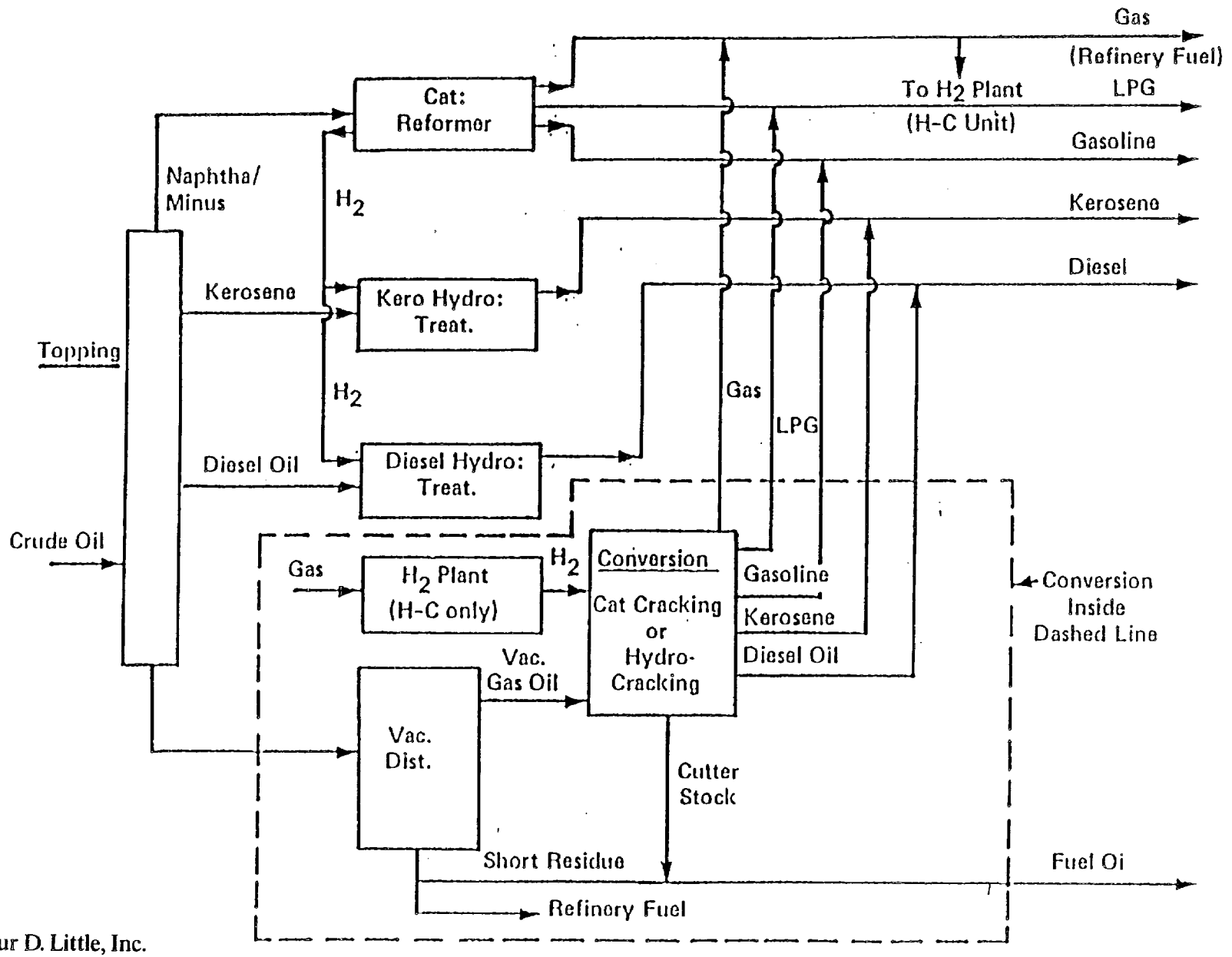
Figure A.6



HYDROSKIMMING REFINERY

Figure A.7

CONVERSION REFINERY (SIMPLIFIED)



identical to those for a hydroskimming refinery. The distinguishing process is the conversion unit shown inside the dashed line. California Group III are conversion refineries.

The conversion process can either be an FCC unit, a hydrocracking unit, or a thermal cracking unit. In each case, the vacuum gas oil (VGO) which would otherwise go to residual fuel, is cracked into lighter products.

An FCC unit uses a fluidized catalyst at high temperatures to crack the VGO into lighter products. An FCC unit does not fully convert the feed to lighter products. The residual, or uncracked portion, is shown here as cutter stock. The sulfur in the VGO feed to an FCC unit remain in the conversion products which require further treatment for sulfur removal.

A hydrocracking (HCC) unit operates under extremely high pressure in the presence of hydrogen to upgrade all the VGO into light products. In California some cracked distillates are also generally input to the HCC to produce Jet Fuel and Gasoline. The products from an HCC unit are extremely low in sulfur and require little further treatment.

A thermal cracking unit is less severe than either of the above processes, and only converts a portion of the VGO into lighter products. As in the case of the FCC unit, the products require further treatment for sulfur removal.

In a conversion refinery, the short residue or vacuum tower bottoms is blended to fuel oil or sold as asphalt. FCC cutter stock or distillate is used with the short residue to produce an acceptable viscosity fuel.

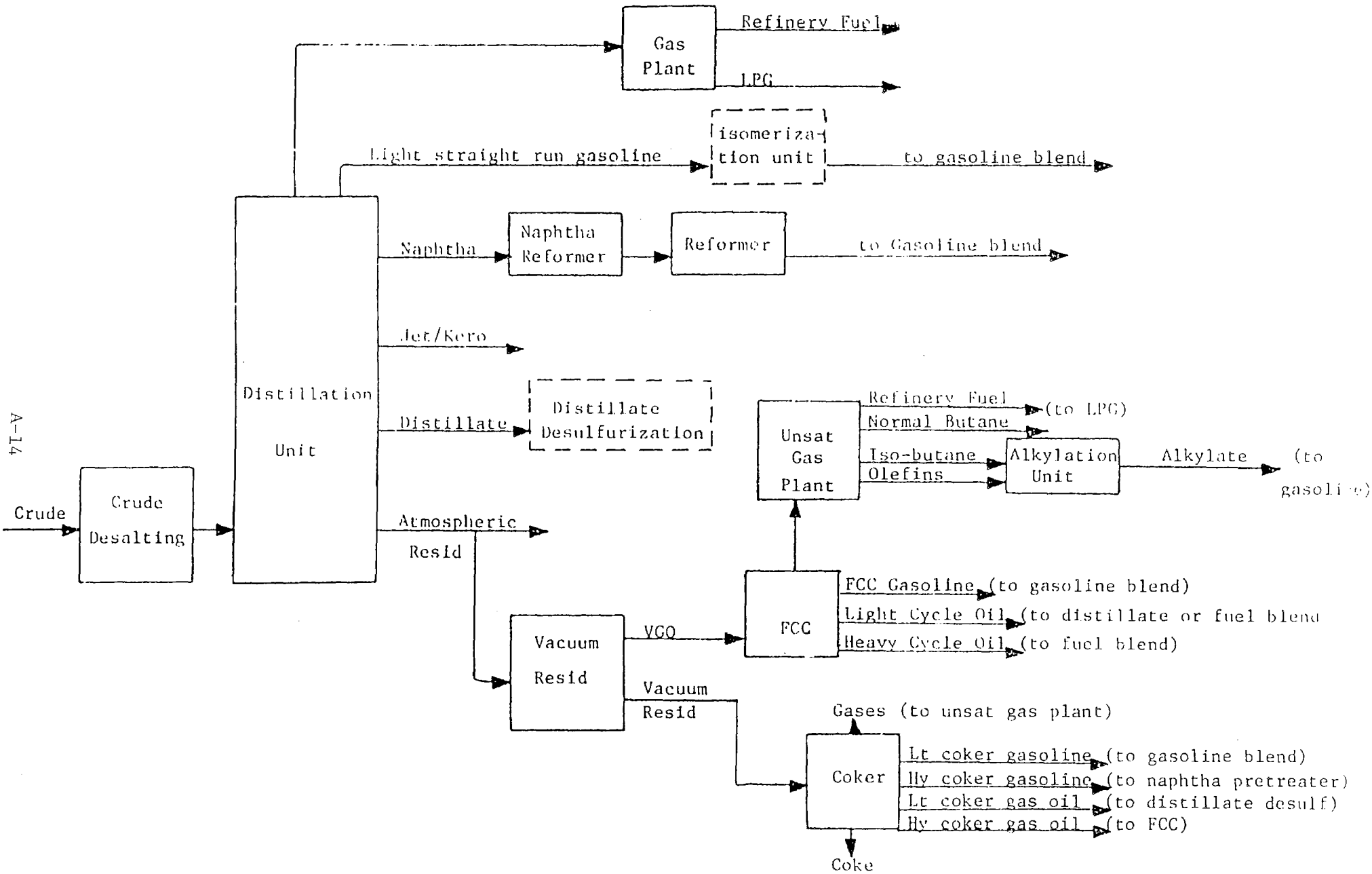
4. Deep Conversion Refinery

Deep conversion is the most complex form of refinery configuration. A deep conversion refinery converts all residual fuel components into lighter, more valuable products and coke[1]. California Groups IV, V and VI refineries are in this category.

Figure A-8 is a simplified flow diagram for a typical deep conversion refinery. The flow diagram is the same as a conversion refinery except for the addition of the coker. In this particular drawing, the VGO conversion process is shown as an FCC unit. A hydrocracking unit could be substituted as the VGO conversion process. The alkylation unit, however, would only be suitable with an FCC since it requires light olefin (unsaturated compounds) feedstock which is produced from FCC units, but not HCC units. California Group IV refineries have only a FCC unit. California Group V and VI refineries have both a FCC operation on VGO and HCC unit operating on cracked distillates.

[1] Coal-like substance produced in a delayed coking process.

Figure A.8



DEEP CONVERSION REFINERY

The coker uses the heaviest portion of the crude--vacuum resid--as its feedstock. The coker produces light coker gasoline which is blended directly to gasoline. The heavy coker gasoline is treated and reformed to improve its octane. Light coker gas oil is either a distillate blendstock or can be upgraded to gasoline on an FCC unit. The heavy coker gas oil is further upgraded in either the FCC or HCC conversion process. The coker products require treating to remove sulfur.

Coking units also produce coke which is a solid, coal-like material. Coke can be used in a blend with coal in utility boilers. Coke is also used in the production of cement and to produce electrical anodes.

Deep conversion refineries do not produce a residual fuel product. Coking refineries with FCC units may sell their cutter stock (heavy cycle oil) to others who blend residual fuel.

The isomerization and distillate desulfurizing units shown in Figure 8 are optional units in any type of refinery. An isom unit would be built at a refinery short on octane. A refiner's decision to use a distillate desulfurizer is based on crude slate and distillate product specifications.

Summary

There are three basic refinery processes functions: separation, conversion and treating. All refinery process units combine of one or more of these basic process functions.

There are four refinery configuration types which are distinguished from one another by the process units they contain. The simplest refinery types are topping and hydroskimming which yield products at the level naturally available from the crude. Hydroskimming is distinguished from topping by its reformer which allows the refinery to produce gasoline rather than naphtha.

Conversion and deep conversion refineries convert the heavier fractions of the crude oil into lighter products. Conversion refineries upgrade the vacuum gas oil portion of the crude. Deep conversion refineries convert both the vacuum gas oil and vacuum resid into lighter products and coke. Conversion refineries are able to earn part of the heavy/light product price differential. Deep conversion refineries are able to earn the full differential between light and heavy products.

4. The Arthur D. Little Refinery LP Model

Model Description

Over the past several years, Arthur D. Little has developed large-scale computer models for simulating the major world refining

centers. In such models a specified product demand pattern is met by a specified crude slate in an optimized refinery operation. An analysis of model outputs offers valuable insight into crude and refined product values with respect to the stated cost of a reference crude oil. In effect, the model continuously answers the question: "What will it cost to produce an additional barrel of Product X?" and "What would an additional barrel of crude oil Y be worth relative to the reference crude oil and the other crude oils in the crude oil slate?"

A simplified refinery flow sheet shown in Figure A.9 represents one of the models. This particular one is of a U.S. West Coast cluster model and was used in a study of the cost of lead phase-down and sulfur content reduction of gasolines for the Environmental Protection Agency (EPA-450/3-76-016 a and b). This particular model was not used in the current study which was based on confidential, refinery specific models.

The main blocks of the refinery processing scheme can be broken down into: (1) naptha, (b) gas oil, and (c) residual. The full-range (C_5 - 375°F) untreated naphtha can be sold directly. Otherwise, the naphtha is split into several fractions for blending or further processing. The light (200-340) and heavy (340-375) naphthas can each be hydrotreated. Each hydrotreated naphtha can be routed to a catalytic reformer with the option of running at three different octane severities. The model chooses the optimum severity or it can bypass some naptha into finished product blending.

The gas oil processing scheme is less complex than the naptha. The full-range 375-650° F fraction can be split into a kerosene fraction and heavy gas-oil fraction, and each stream can be subsequently hydrotreated.

The residual fraction (atmospheric bottoms) can be directly blended to residual fuel oil or desulfurized before blending if from a sour crude origin. It can also be fed to a vacuum distillation unit; the vacuum overhead stream can then be hydrotreated for fuel-oil blending or fed to a FCC or HCC for conversion into lighter products. The model is allowed the option of choosing between two catalytic cracking conversion levels or several grades of vacuum gas oil feed. the propylene-butylenes from catalytic cracking can be fed to an alkylation unit or to a polymerization unit to make gasoline blending stocks. Vacuum bottoms can be routed to a coker to reduce the production of fuel oil and to produce some lighter products and coke. The coker naphtha can be hydrotreated and the heavy fraction reformed. The coker gas oil can also be hydrotreated and the heavy fraction cracked.

Additional processes in the model not shown on this refinery flow sheet include a hydrogen plant. (If the volume of hydrogen required for treating exceeds that supplied from catalytic reforming, then

hydrogen must be manufactured either from refinery gas, naphtha and/or residual fractions.) The refinery is usually required to generate its own steam and power, although these can be variable options. A sulfur plant is provided which converts hydrogen sulfide into elemental sulfur.

ADL has accumulated industry data for each processing unit for each crude oil. This includes yields and key properties of the products from that particular process, capital costs, and operating costs divided into the following seven categories: refinery fuel consumption, steam, water, electric power, catalysts and chemicals, operating labor, and maintenance. The capital and operating costs for each refinery process unit are based on modern units of the size consistent with each selected refinery process unit capacity.

The costs of offsites for crude handling and product blending and storage is included and varies with crude distillation capacity. An internal refinery fuel balance is maintained (including fuel needed for steam generation, power generation, etc.) with a maximum sulfur content specification.

Economic Basis

The data supplied to the model for the computer runs consists of:

- Product demands and specifications;
- Crude supply; and
- Refinery processing options for each crude.

Product demands were fixed volumes which must be met in this study. However, we can allow product volumes to optimize at specified netbacks, sometimes limiting minimum or maximum levels.

The basic assumption underlying our use of fixed product demands is that the total market for petroleum products in a refining center is relatively inelastic to changes in product prices. This is most true for products such as gasoline and jet fuel which have no competitive supply source. Heating oil and residual fuel have had inter-fuel competition from natural gas and coal in the past. One result of this is that residual fuel has been sold below its investment cost value. If we expect this condition to continue, we can remove the fixed volume restriction for residual fuel oil and allow it to seek its own optimum production level at an inter-fuel competitive price structure.

In a multi-crude system, crude slate is usually specified as a fixed supply for all crudes except a marginal crude[2] in which must be allowed to vary in order to meet a fixed product slate because it is not known in advance the exact volume of crude oil that will be required due to gains/losses from refinery processes and own fuel

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[2] Alaskan North Slope crude is the marginal California crude.

consumption. The volume of the marginal crude consumed will vary somewhat from run to run. A delivered price is assigned to this reference crude, and all other crude and product values are determined relative to the reference crude oil price chosen.

For each refinery process in the model, the capital cost is supplied plus several categories of operating costs. The capital cost is converted to a daily cost basis via a capital recovery factor. The capital charge provides for depreciation, income tax, property tax and insurance, and profit. Other cost categories can be selectively included or excluded so that the model can represent operations under variable cost, cash cost or fully built up cost conditions.

The linear programming algorithm will optimize the refinery processing scheme at minimum cost to meet the required product demands and product specifications from the crude slate provided. It is assumed that complete interchange of intermediate streams from all crudes is possible.

The most useful outputs from the linear programming runs are the optimum refined process schemes chosen for each crude oil and the shadow prices for the refined products and crude oils. These shadow prices indicate the internal refinery values for each respective product and each crude oil and indicate the minimum long-term selling price that a particular product requires in order to justify capital expenditures for its manufacture or the maximum long-term purchase price for each crude oil. The product values (sometimes called investment cost values) are often used to major oil companies as transfer values when transferring products from refining to marketing divisions and also from refinery to petrochemical divisions.

The relative crude values simulate the internal crude oil values assigned by large, integrated oil companies which have the flexibility to reallocate crudes among various refineries to optimize its operations in a large geographic region.

In parametric evaluations, we systematically vary certain key uncertainties in our input data (such as product demand levels, specifications, operating costs, crude supply patterns, etc.) to test the flexibility of model outputs to these changes. A parametric evaluation consists of an alternate unique LP solution for each variation in input data. We can thus evaluate on a quantitative basis the extent to which a variation in a particular input forecast will affect the conclusions, in particular, gasoline and diesel quality in this analysis.

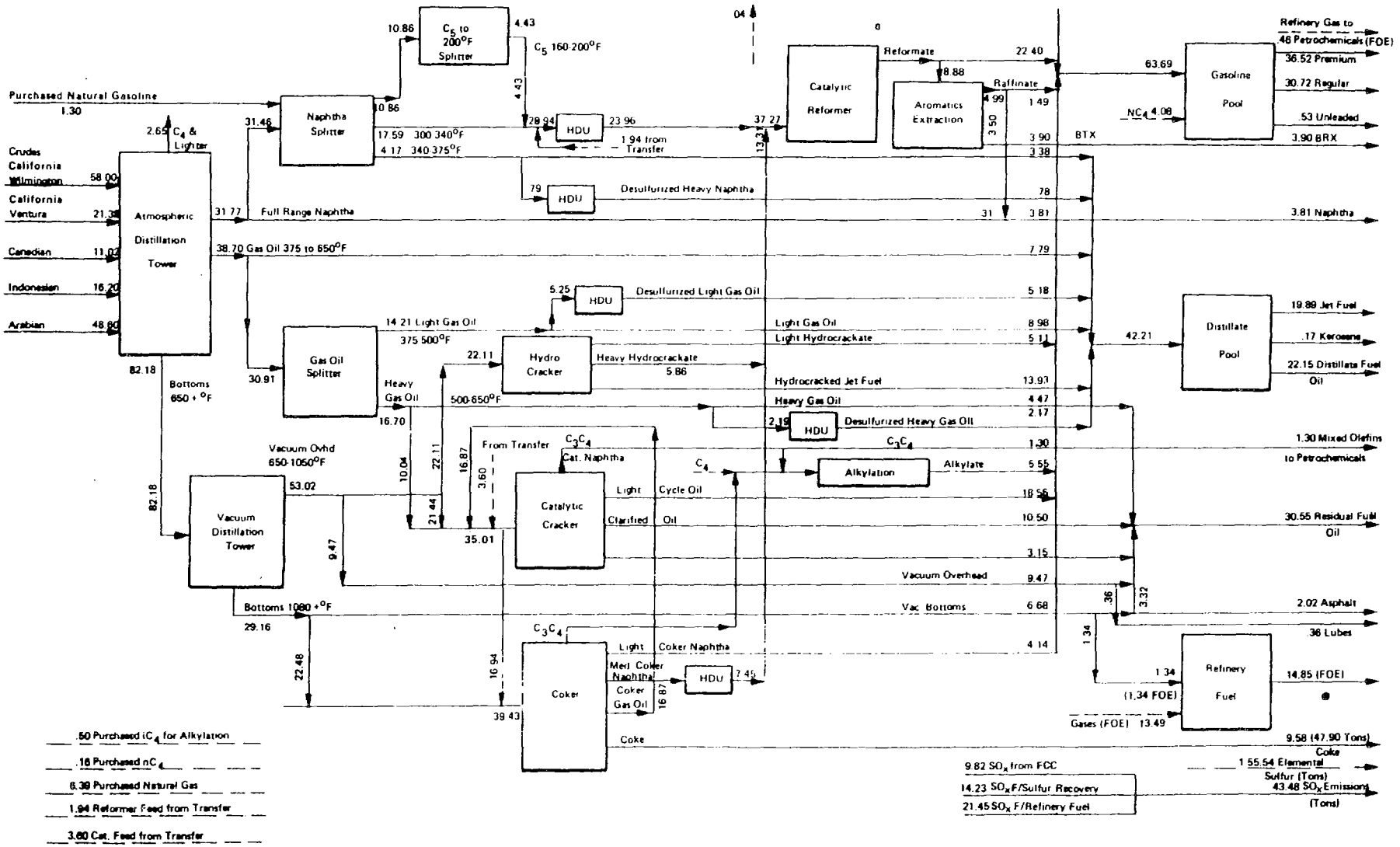
It is important to emphasize that the crude and product values generated by the refinery simulation model are costs and not prices. Market constraints can and do limit the extent to which a refinery can recover the costs allocated to each product in the model. However, the model does show when additional costs are incurred in making more

of a particular product. It indicates a lower market value for high-sulfur crude oils and a higher market value for low-sulfur crude oils as the demand for low-sulfur products increases. The crude oil values are not prices but replacement values; that is, the value at which a refiner would replace a barrel of the reference crude with the barrel of another crude oil. A high replacement value for a given crude oil means that the refinery can reduce refining costs by substituting this crude oil for a low replacement value crude oil.

Figure A-9

WEST COAST CLUSTER MODEL CALIBRATION

(MB/CD) JP110675-2



Arthur D. Little, Inc.

B. CHARACTERIZATION OF 1986 CALIFORNIA REFINERIES

1986 CA Refinery Groups

Group 1: Topping:[1]

Conoco	Santa Maria
Edgington	Long Beach
Witco Chemical (Golden Bear)	Oildale
MacMillan	Signal Hill
Oxnard	Oxnard
San Joaquin RFG	Bakersfield
Huntway RFG	Benicia
Huntway RFG	Wilmington
Gibson Oil	Bakersfield

Subtotal Operating: 9

Shutdown:

Demenno-Kerdoon	Compton
ECO	Signal Hill
Gasco	Anchor
Lunday Thagard	South Gate
Western Oil & RFG (Marlex)	Long Beach
West Coast Oil	Bakersfield
Golden Eagle	Carson

Subtotal Shutdown: 7

Total Refineries in Group: 16

Group 2: Hydroskimming:[1]

Beacon	Hanford
Kern County	Bakersfield
Newhall RFG	Newhall
Paramount (old Conoco)	Paramount
Sunland	Bakersfield

Subtotal Operating: 5

Shutdown:

Chevron	Bakersfield
USA Petrochem	Ventura

Subtotal Shutdown: 2

Total Refineries in Group: 7

1986 CA Refinery Groups (Continued)

Group 3: Complex-Without Coking:

Chevron	Richmond
Fletcher	Carson
Golden West	Santa Fe Spr.
Pacific RFG	Hercules
Texaco*	Bakersfield
Unocal(2)	Los Angeles

Total Refineries in Group: 6

* Included in complex category due to purchase of shutdown Tosco refinery during 1986.

Group 4: Complex-With Coking/FCC:(2)

Champlin	Wilmington
Shell	Wilmington

Total Refineries in Group: 2

Group 5: Complex-With Coking/FCC/HCC at 0.05%S Diesel:(2)

ARCO	Carson
Chevron	El Segundo
Mobil	Torrance
Texaco	Wilmington

Subtotal operating: 4

Shutdown:

Powerine	Santa Fe Spr.

Total Refineries in Group: 5

Group 6: Complex-With Coking/FCC/HCC at ASTM Diesel:

Exxon	Benicia
Shell	Martinez
Tosco	Martinez
Unocal	Rodeo & Santa Maria

Total Refineries in Group: 4

1986 CA Refinery Groups (Continued)

Summary

	Operating	Shutdown	Total
Current ASTM Diesel	23	9	32
Currently at 0.05%S Diesel	7	1	8
Total	30	10	40

(1) Refineries currently producing ASTM diesel (< 0.5%S)
(2) Large refineries in the SCAMD and Ventura Co. currently at maximum 0.05%S diesel.

C. REFINERY SURVEY LETTERS

AUGUST 14, 1987

DEAR MR. :

SUBJECT: SURVEY OF CALIFORNIA REFINERIES: HISTORIC OPERATING DATA AND FUTURE PLANS.

THE AIR RESOURCES BOARD HAS CONTRACTED WITH ARTHUR D. LITTLE, INC. (ADL) TO ANALYZE THE "COSTS OF REDUCING AROMATICS AND SULFUR LEVELS IN MOTOR VEHICLE FUELS". THIS STUDY WILL EXAMINE THE COST IMPACT ON THE CALIFORNIA REFINING INDUSTRY TO REDUCE AROMATICS AND SULFUR LEVELS IN DIESEL AND AROMATICS IN GASOLINE MOTOR VEHICLE FUELS.

THE APPROACH ADL WILL TAKE IN DOING THIS ASSIGNMENT IS TO SIMULATE FIVE INDIVIDUAL CALIFORNIA REFINERIES USING LP MODELLING. THE REFINERIES HAVE BEEN CHOSEN TO REPRESENT CALIFORNIA REFINERY PROCESSING CAPABILITY IN THE REFINING INDUSTRY IN FIVE CONFIGURATION CLASSIFICATIONS. THE INDIVIDUAL REFINERY MODELS WILL BE VALIDATED AGAINST ACTUAL REFINERY OPERATION IN TERMS OF CONFIGURATION, CAPACITY, PROCESSING FLEXIBILITY, INPUTS, PRODUCT OUTPUTS, AND OPERATING COSTS. THE RESULTS FROM THE INDIVIDUAL REFINERY MODELS WILL BE SCALED UP FOR EACH OF THE CONFIGURATION GROUPS TO REPRESENT OVERALL CALIFORNIA REFINERY OPERATION. IN ORDER TO ENSURE THAT THIS STUDY IS BASED ON THE BEST AVAILABLE INFORMATION AND TO CALIBRATE THE ANALYSIS, WE ARE CONDUCTING A SURVEY OF CALIFORNIA REFINERY HISTORIC OPERATING DATA AND FUTURE PLANS.

YOUR REFINERY AT HAS BEEN SELECTED AS REPRESENTATIVE OF A NUMBER OF REFINERIES IN YOUR CONFIGURATION TYPE. THE DETAILED DATA REQUESTED IN THE ATTACHED QUESTIONNAIRE WILL ENABLE ADL TO CALIBRATE THEIR MODEL FOR REFINERIES OF YOUR CONFIGURATION TYPE FOR 1986 OPERATION.

WE REQUEST THAT THE SURVEY INFORMATION BE FORWARDED TO ADL BY SEPTEMBER 18, 1987. PLEASE ADDRESS YOUR RESPONSE AS FOLLOWS:

MS. KATHLEEN M. MCCARTHY
ARTHUR D. LITTLE, INC.
ACORN PARK, MD-315
CAMBRIDGE, MA. 02140

MR. ROBERT BIMAT, JR.
VICE PRESIDENT REFINING
SUNLAND REFINING COMPANY

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THANK YOU FOR YOUR PARTICIPATION.

SINCERELY YOURS,

JOHN HOLMES, PH.D.
CHIEF, RESEARCH DIVISION

Refinery Questionnaire I

I. Refinery Material Balance and Fuel Use

Please provide the information as indicated on Table 1 attached for the year 1986.

II. Process Capability

Please provide 1986 process capability for the processes listed below. In addition, please provide additions to process capability by 1990 based on your current plans under current EPA regulations and ARB regulations.

For all process units provide capacity in MB/SD, MB/CD and 1986 utilization in MB/CD. In addition, please provide the additional process specific data shown below. Please provide separate data for multiple process units of the same type where applicable.

1. Atmospheric Distillation

   - TBP cuts on products

2. Vacuum Distillation

   - TBP cuts on products

3. Catalytic Reforming

   - typical over point and end point of feed
   - catalyst regeneration (semi-regen, cyclic, continuous)
   - average quality of feedstock (N + 2A)
   - average severity (RONC) and hydrogen production (MSCF/B)
   - maximum severity (RONC) and hydrogen production (MSCF/B)
   - operating pressure

4. Isomerization

   - once through or recycle
   - feedstock
     - - C_4
     - - plant C_5/C_6
     - - purchased natural gasoline

5. Naphtha Hydrotreating

   - feedstock (SRN, Coker Naphtha, Hydrocracker Naphtha etc., by vol %)
   - sulfur in (wt%) and sulfur out (wt%)
   - hydrogen consumption: MSCF/B

6. Kerosine Hydrotreating

   - sulfur in (wt%) and sulfur out (wt%)
   - aromatics in (wt%) and aromatics out (wt%)

- hydrogen consumption: MSCF/B
- number of stages
- maximum sulfur removal and associated H_2 consumption
- operating pressure
- operating temperature
- disposition of liquid product

7. Distillate Hydrotreating

- feedstock (S.R., Coker, FCC LCGO etc.)
- sulfur in (wt%) and sulfur out (wt%)
- aromatics in (vol%) and aromatics out (vol%)
- cetane no. in and cetane no. out
- hydrogen consumption: MSCF/B
- number of stages
- maximum sulfur removal and associated H_2 consumption
- operating pressure
- operating temperature
- disposition of liquid product

8. Heavy Gas Oil (Vacuum G.O.) Hydrotreating

- feedstocks
- sulfur in (wt%) and sulfur out (wt%)
- aromatics in (vol%) and aromatics out (vol%)
- hydrogen consumption: MSCF/B
- number of stages
- maximum sulfur removal and associated H_2 consumption
- operating pressure
- operating temperature
- disposition of liquid product

9. Residual Hydrotreating

- feedstocks
- sulfur in wt% and sulfur out wt%
- aromatics in (vol%) and aromatics out (vol%)
- hydrogen consumption: MSCF/B
- number of stages
- maximum sulfur removal and associated H_2 consumption
- operating pressure
- operating temperature
- disposition of liquid product

10. FCC

- conversion: vol%
- yield (olefins, gasoline, LCCO, HCCO) vol%
- feedstock(s) (VGO, Coker GO, Long resid, etc, vol%)
- feedstock(s) quality (Aniline point, wt% S)

11. Alkylation/Polymerization

- type (HF, H_2SO_4, Cat Poly, Dimersol)
- feedstock (C_3, C_4, C_5, vol%)

12. Catalytic Hydrocracking

- feedstock(s) (Distillate, VGO, Coker GO, LCO, etc., vol%)
- hydrogen consumptions (MSCF/B)
- operating pressure:psig
- number of stages
- yield (gasoline, kerosine, distillate vol%)
- maximum severity yield and hydrogen consumption

13. Thermal Processing

- type of unit (i.e., visbreaker, delayed coker, etc.)
- feedstocks (long resid, short resid, etc. vol%)

14. Aromatic Extraction

- B, T, X (vol%)

15. Hydrodealkylation

16. MTBE

17. Hydrogen Generation/Purification

- process type (steam reforming, partial oxidation, purification)
- capacity (MSCF/B pure H_2)
- feedstock(s) (still gas, natural gas, LPG, naphtha, plant H_2 etc.)
- production capability with alternative feedstocks
- current refinery hydrogen balance surplus (deficit) MMSCF/D

18. Solvent Deasphalting

- solvent type
- DAO yield vol%
- DAO quality (Aniline point, wt%S)

19. Sulfur Recovery

- number and capacity of units
- sulfur recovery (TN/D)
- percent sulfur recovery
- number of units which are redundant but are required by EPA

III. Product Blending

1. Gasoline Blending

Please provide the following data for all gasoline components blended to your 1986 gasoline pool. Provide breakdown by gasoline grade, if possible.

COMPONENT	1986 MB/D	RVP psi	(R+M)/2 Clear	TOTAL AROMATICS VOL %	BZ [1] VOL %	TOLUENE [1] VOL %	XYLENE [1] VOL %	C_9+ [1] AROMATICS VOL %
Lt.Straight Run								
Natural Gasoline								
Nathpha								
Reformate								
Lt.Hydrocrackate								
FCC Gasoline								
Alkylate								
Cat Poly/Dimate								
BTX								
Raffinate								
Normal Butane								
Iso Butane								
Other Refinery Stocks								
Purchased:								
Toluene								
MTBE								
Ethanol								
Other Purchased								
Total Gasoline								

(1) Total aromatics and benzene content most important. Provide complete aromatics breakdown and test method, if available.

2. Diesel Blending

Please provide the following data for all distillate components blended to your 1986 kerosene jet, kerosene, diesel and No.2 fuel oil pool. Show diesel and No.2 as one product if not segregated and indicate current degree of segregation possible.

COMPONENT	1986 MB/D	°API	CETANE[2] NO.	SULFUR WT %	TOTAL[1] AROMATICS VOL %	PNA[1] VOL %	NITRATED[1] PNA
Straight Run Kerosene							
Straight Run Distillate							
FCC Lt.Cycle Oil							
Coker Distillate							
Hydrocracker Jet							
Hydrocracker Distillate							
HDT Straight Run Kerosene							
HDT Straight Run Distillate							
HDT LCO							
HDT CGO							
Other Refinery stocks							
Purchased:							
Kerosene Stocks							
Distillate Stocks							
Total Distillate							

(1) Total aromatics most important. Provide levels of polynuclear aromatics (PNA), nitrated PNA and test method, if possible.

(2) Provide cetane index if cetane number is not available.

IV. Product Specifications

Our analysis will be based on current California Product Specifications shown on Table 2. Those specifications that will be controlled in our LP Modelling Analysis are indicated by an asterisk. Please indicate any differences in current product specifications (especially gasoline and diesel) for your refinery. Our study will analyze the impact of reducing gasoline aromatics levels, diesel aromatics levels and diesel sulfur content (except for large refineries in the SCAMD and Ventura County which are currently at .05 wt%S).

V. Future Operations

Our analysis will be based on CEC forecasts of crude oil supply and refined product demand for 1990 and 1995.

As a guideline for our analysis, please provide any planned changes for 1990 and 1995 in your:

- Crude slate
- Product slate
- Other feedstocks
- Process modifications or additions

VI. Refinery Operating Costs

Please provide the following refinery operating costs for 1986:

	000$	$/B Crude
Variable costs		
- Catalyst and chemicals		
- Electric power		
- "Other" variable costs		
- Purchased refinery fuel		
- Subtotal variable costs		
Fixed costs		
- Contract maintenance[1]		
- Maintenance materials[1]		
- Maintenance manpower[1]		
- Operations and administrative manpower[1]		
- Tax, insurance and other		
- Subtotal fixed costs		
Total Cash Costs		

(1) Include number of employees/contract laborers by category.

VII. Previous Survey Submissions

Under the conditions of secrecy as outlined in our cover letter, we would like access to your submissions to the following previous surveys.

1. Submission to National Petroleum Council for October 1986 U.S. Petroleum Refining Report.

2. Submission to CARB for October 1984 Diesel Fuel Modification Study.

3. Submission to CARB for May 1986 Benzene Control Plan.

4. Submission to NPRA for 1986 Diesel Fuels Survey.

5. DOE Monthly Refinery Reports for 1986 EIA-810.

VIII. Refinery Contact

Please provide the name of a day-to-day contact for questions regarding your submission.

Company: _____
Location: _____

TABLE 1*

1986 Refinery Material Balance

Refinery Input:	000B/D	°API	Sulfur wt%	Aromatics[6] vol%	Benzene vol%	Cetane no.	RVP psi	(R+M)/2 clear	N+2A vol%	TEL gm/gal	Aniline Pt. °F
Crude Oil[1]											
1.					x	x	x	x	x	x	x
2.					x	x	x	x	x	x	x
3.					x	x	x	x	x	x	x
4.					x	x	x	x	x	x	x
5.					x	x	x	x	x	x	x
6. Other domestic					x	x	x	x	x	x	x
7. Other foreign	_____				x	x	x	x	x	x	x
ST Crude Input	_____				x	x	x	x	x	x	x
LPG		x	x	x	x	x	x	x	x	x	x
N Butane		x	x	x	x	x	x	x	x	x	x
I Butane		x	x	x	x	x	x	x	x	x	x
Natural Gasoline		x	x			x			x	x	x
Naphtha		x	x			x	x	x		x	x
Gasoline Blndstks[2]		x	x			x			x	x	x
Distillate Blndstks[2]					x		x	x	x	x	x
Vacuum Gas Oil		x		x	x	x	x	x	x	x	
Long Resid		x		x	x	x	x	x	x	x	x
Short Resid		x		x	x	x	x	x	x	x	x
Other Feedstocks[3]	_____	x	x	x	x	x	x	x	x	x	x
Total Input	_____										
Fuel Use											
Crude Oil		x	x	x	x	x	x	x	x	x	x
Residual Fuel		x	x	x	x	x	x	x	x	x	x
LPG		x	x	x	x	x	x	x	x	x	x
Natural Gas (MMCF)		x	x	x	x	x	x	x	x	x	x
Still Gas		x	x	x	x	x	x	x	x	x	x
FCC Coke		x	x	x	x	x	x	x	x	x	x
Purchased Elec (GWh)		x	x	x	x	x	x	x	x	x	x
Purchased Steam (M#)	_____	x	x	x	x	x	x	x	x	x	x
Total (FOEB)	_____										

* Please fill in blanks. Data not required indicated by x.

Company: _____
Location: _____

TABLE 1* (Continued)

1986 Refinery Material Balance

Refinery Input:	000B/D	°API	Sulfur wt%	Aromatics[6] vol%	Benzene vol%	Cetane no.	RVP psi	(R+M)/2 clear	N+2A vol%	TEL gm/gal	Aniline Pt. °F
Leaded Regular		x	x			x			x		x
Leaded Premium		x	x			x			x		x
Unleaded Regular		x	x			x			x	x	x
Unleaded Premium		x	x			x			x	x	x
Gasohol	_____	x	x			x			x	x	x
Total Motor Gasoline	_____	x	x			x			x		x
Naphtha Jet		x			x	x	x	x	x	x	x
Kerosine Jet		x			x	x	x	x	x	x	x
Kerosipe		x			x	x	x	x	x	x	x
Diesel[5]					x		x	x	x	x	x
No 2 Fuel[5]				x	x		x	x	x	x	x
<1% S Residual		x		x	x	x	x	x	x	x	x
>1% S Residual		x		x	x	x	x	x	x	x	x
Lubricating Oil		x	x	x	x	x	x	x	x	x	x
Asphalt Road Oil		x	x	x	x	x	x	x	x	x	x
Wax		x	x	x	x	x	x	x	x	x	x
Petroleum Coke-Marketable		x	x	x	x	x	x	x	x	x	x
Petroleum Coke-Catalyst		x	x	x	x	x	x	x	x	x	x
Still Gas		x	x	x	x	x	x	x	x	x	x
Unfinished Oils[4]		x	x	x	x	x	x	x	x	x	x
Other Products[4]	_____	x	x	x	x	x	x	x	x	x	x
Total Output	_____										
Refinery Gain	_____										

* Please fill in blanks. Data not required indicated by x.

(1) Identify individual crudes over 10% of slate. Balance of crudes in "other domestic" and "other foreign".
(2) Finished blendstock and unfinished blendstocks by type.
(3) Identify feedstock type(s).
(4) Identify product type.
(5) Indicate if common product is produced.
(6) Indicate test method.

Arthur D. Little, Inc.

Table 2

CALIFORNIA PRODUCT SPECIFICATIONS

SPECIFICATION	UNITS	MINIMUM/ MAXIMUM	LPG	UNLEADED REGULAR	UNLEADED PREMIUM	LEADED REGULAR	LEADED PREMIUM	NAPHTHA JET	KEROSENE JET	LOW-SULFUR DIESEL	HIGH-SULFUR DIESEL	LOW-SULFUR FUEL OIL	HIGH-SULFUR FUEL OIL
Road Octane*	$(R+M)/_2$	Minimum	-	87.5	92	88.5	92	-	-	-	-	-	-
RVP*	psia	Minimum	-	-	-	-	-	2.0	-	-	-	-	-
		Maximum	225	9.8	9.8	9.8	9.8	3.0	-	-	-	-	-
TEL*	Gm/Gal	Maximum	-	0	0	0.1 (4)	0.1 (4)	-	-	-	-	-	-
Butane*	Vol %	Maximum	10	-	-	-	-	-	-	-	-	-	-
ASD Distillation % off at:													
150*	°F	Minimum	-	12	12	12	12	-	-	-	-	-	-
		Maximum	-	33	33	33	33	-	-	-	-	-	-
160	°F	Minimum	-	15	15	15	15	-	-	-	-	-	-
		Maximum	-	35	35	35	35	-	-	-	-	-	-
210*	°F	Minimum	-	39	39	39	39	-	-	-	-	-	-
		Maximum	-	57	57	57	57	-	-	-	-	-	-
230	°F	Minimum	-	49	49	49	49	-	-	-	-	-	-
330	°F	Minimum	-	84	84	84	84	-	-	-	-	-	-
		Maximum	-	95	95	95	95	-	-	-	-	-	-
400	°F	Minimum	-	-	-	-	-	60	10	-	-	-	-
Smoke pt*	mm	Minimum	-	-	-	-	-	-	20	-	-	-	-
Specific Gravity*		Minimum	-	-	-	-	-	0.751	0.775	0.816	0.816	-	-
		Maximum	-	-	-	-	-	0.802	0.840	0.876	0.876	0.997	0.997
Sulfur*	wt %	Maximum	-	0.03	0.03	0.15	0.15	0.40	0.30	0.05	0.50**	0.25 (1) (0.5) (2)	3.0
Cetane Index*		Minimum	-	-	-	-	-	-	-	40	40	-	-
Luminometer No		Minimum	-	-	-	-	-	44	40	-	-	-	-
Pour Point	°F	Maximum	-	-	-	-	-	-	-	0	0	125	-
Olefins/Bromine No. Equivalent	Vol %	Maximum	5	15	15	15	15	-	-	-	-	-	-
Aromatics *	Vol %	Maximum	-	**	**	**	**	25	20	**	**	-	-
Viscosity at 122 °F	Furol	Minimum	-	-	-	-	-	-	-	-	-	45	45
		Maximum	-	-	-	-	-	-	-	-	-	300	300
Viscosity at 122 °F	Centistokes	Minimum	-	-	-	-	-	-	-	-	-	-	-
		Maximum	-	-	-	-	-	-	-	3.5	3.5	-	-
Viscosity Index at 122 °F*	Refutas	Minimum	-	-	-	-	-	-	-	-	-	20.21	20.21
		Maximum	-	-	-	-	-	-	-	-	-	38.125	38.125
Flash Index		Maximum	-	-	-	-	-	-	705	378	378	208	208

* Specifications modelled (1) Southern, CA (2) Northern, CA (3) Also No. 2 Fuel oil (4) Zero lead beyond 1988

** Specification changes that will be analyzed in our study.

AUGUST 14, 1987

DEAR MR. :

SUBJECT: SURVEY OF CALIFORNIA REFINERIES: HISTORIC OPERATING DATA AND FUTURE PLANS.

THE AIR RESOURCES BOARD HAS CONTRACTED WITH ARTHUR D. LITTLE, INC. (ADL) TO ANALYZE THE "COSTS OF REDUCING AROMATICS AND SULFUR LEVELS IN MOTOR VEHICLE FUELS". THIS STUDY WILL EXAMINE THE COST IMPACT ON THE CALIFORNIA REFINING INDUSTRY TO REDUCE AROMATICS AND SULFUR LEVELS IN DIESEL AND AROMATICS IN GASOLINE MOTOR VEHICLE FUELS.

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THE DATA REQUESTED ON THE ATTACHED SURVEY FORM WILL ENABLE ADL TO SCALE-UP SELECTED REFINERY DATA FOR REFINERIES IN YOUR CONFIGURATION TYPE TO ASSESS THE OVERALL IMPACT ON THE CALIFORNIA REFINING INDUSTRY. IF YOU OPERATE MORE THAN ONE REFINERY IN CALIFORNIA WE REQUEST THAT YOU COMPLETE A SEPARATE SURVEY FOR EACH REFINERY.

WE REQUEST THAT THE SURVEY INFORMATION BE FORWARDED TO ADL BY SEPTEMBER 18, 1987. PLEASE ADDRESS YOUR RESPONSES AS FOLLOWS:

MS. KATHLEEN M. MCCARTHY
ARTHUR D. LITTLE, INC.
ACORN PARK, MD-315
CAMBRIDGE, MA. 02140

MR. R. P. PAVLETIC
REFINERY MANAGER
CHAMPLIN PETROLEUM COMPANY

PURSUANT TO THE PROVISIONS OF THE PUBLIC RECORDS ACT (GOVERNMENT CODE SECTIONS 6250 ET SEQ.) AND SECTION 91010, TITLE 17, CALIFORNIA ADMINISTRATIVE CODE, THE INFORMATION YOU PROVIDE WILL BE A PUBLIC RECORD AND SUBJECT TO PUBLIC DISCLOSURE, EXCEPT FOR TRADE SECRETS WHICH ARE NOT EMISSION DATA OR OTHER INFORMATION WHICH IS EXEMPT FROM DISCLOSURE OR THE DISCLOSURE OF WHICH IS PROHIBITED BY LAW. THE INFORMATION MAY ALSO BE RELEASED TO THE ENVIRONMENTAL PROTECTION AGENCY, WHICH PROTECTS TRADE SECRETS AND OTHER CONFIDENTIAL INFORMATION IN ACCORDANCE WITH FEDERAL LAW.

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THANK YOU FOR YOUR PARTICIPATION.

SINCERELY YOURS,

JOHN HOLMES, PH.D.
CHIEF, RESEARCH DIVISION

Refinery Questionnaire II

I. Please provide the information as indicated on Table 1 attached for the year 1986.

II. Process Capability

Our analysis will be based on January 1, 1987 capacities published in the Oil and Gas Journal and DOE Annual Refinery Surveys, unless you provide alternate data.

Please provide 1986 process capability for the processes listed below. In addition, please provide additions to process capability by 1990 based on your current plans under current EPA regulations and ARB regulations.

1. Catalytic Reforming

- typical over point of feed
- average quality of feedstock (N + 2A)
- average severity (RONC) and hydrogen production (MSCF/B)
- maximum severity (RONC) and hydrogen production (MSCF/B)
- operating pressure

2. Distillate Hydrotreating

- feedstock (S.R., Coker, FCC LCGO etc.)
- sulfur in (wt%) and sulfur out (wt%)
- aromatics in (wt%) and aromatics out (wt%)
- hydrogen consumption: MSCF/B
- number of stages
- maximum sulfur removal and associated H_2 consumption
- operating pressure
- operating temperature
- disposition of liquid product

3. Heavy Gas Oil (Vacuum G.O.) Hydrotreating

- feedstocks
- sulfur in (wt%) and sulfur out (wt%)
- aromatics in (wt%) and aromatics out (wt%)
- hydrogen consumption: MSCF/B
- number of stages
- maximum sulfur removal and associated H_2 consumption
- operating pressure
- operating temperature
- disposition of liquid product

4. FCC

- conversion: vol%
- yield (olefins, gasoline, LCCO, HCCO) vol%
- feedstock(s) (VGO, Coker GO, Long resid, etc, vol%)
- feedstock(s) quality (Aniline point, wt% S)

5. Catalytic Hydrocracking

- feedstock(s) (Distillate, VGO, Coker GO, LCO, etc., vol%)
- hydrogen consumptions (MSCF/B)
- operating pressure:psig
- number of stages
- yield (gasoline, kerosine, distillate vol%)
- maximum severity yield and hydrogen consumption

6. Thermal Processing

- type of unit (i.e., visbreaker, delayed coker, etc.)
- feedstocks (long resid, short resid, etc. vol%)

7. Aromatic Extraction

- B, T, X (vol%)

8. Hydrogen Generation/Purification

- process type (steam reforming, partial oxidation, purification)
- capacity (MSCF/B pure H_2)
- feedstock(s) (still gas, natural gas, LPG, naphtha, plant H_2 etc.)
- production capability with alternative feedstocks
- current refinery hydrogen balance surplus (deficit) MMSCF/D

III. Gasoline Blending

Please provide volume percent blended, (R+M)/2 clear and volume percent aromatics content of all gasoline components.

IV. Diesel Blending

Please provide volume percent blended, wt.% sulfur and volume percent aromatics content of all distillate components blended to diesel and No. 2 fuel. Show diesel and No. 2 fuel as one product if not segregated and indicate the degree of segregation possible.

V. Future Operations

Our analysis will be based on CEC forecasts of crude oil supply and refined product demand for 1990 and 1995.

As a guideline for our analysis, please provide any planned changes for 1990 and 1995 in your:

- Crude slate
- Product slate
- Other feedstocks
- Process modifications or additions

VI. Refinery Contact

Please provide the name of contact for questions regarding your submission.

Company: _____
Location: _____

TABLE 1*

1986 Refinery Material Balance

Refinery Input:	000 B/D	°API	Sulfur wt%	Aromatics vol%	Cetane no.	(R+M)/2 clear
Crude Oil						
Alaska				x	x	x
California				x	x	x
Other domestic				x	x	x
Foreign				x		x
Gasoline Blendstocks		x	x		x	
Distillate Blendstocks					x	x
Other Feedstocks	_____	x	x	x	x	x
Total Input	_____					
Refinery Output:						
Motor Gasoline		x	x		x	
Kerosine		x			x	x
Distillate Fuels						x
Residual Fuels		x		x	x	x
Other Products	_____	x		x	x	x
Total Output	_____					

* Please fill in blanks. Data not required indicated by x.

Arthur D. Little, Inc.

D. CHARACTERIZATION OF NEW PROCESS CAPACITY

STANDARD DISTILLATE HYDROTREATING

- One stage hydrotreating to reduce Sulfur level.

	ANS Light Gas Oil	ANS Heavy Gas Oil	Lt Cat Cycle Oil[2]	Coker Gas Oil[2]
Pressure: PSIG	650	700	800	800
Catalyst Type:	Co/Mo	Co/Mo	Co/Mo	Co/Mo
Feedstock				
TBP Cut: °F	375-500	500-650	375-650	350-600
°API	37.2	32.5	20.0	29.2
Wt% S	0.14	0.57	1.0	2.0
Vol% Aromatics	22.4	35.4	70.0	40.0
Cetane Index	40.8	46.9	26.3	33.4
H_2 Consumption: SCF/B	140	225	700	490
Product Quality				
°API	37.7	33.0	22.0	31.2
Wt% S	0.002	0.03	0.15	0.30
Vol% Aromatics	21.3	31.9	56.0	32.0
Cetane Index	41.8	47.9	28.7	36.7
Operating Cost Consumptions:				
Fuel: FOEB/B	0.006	0.006	0.008	0.008
Electricity: Kwh/B	1.3	1.3	1.5	1.5
Steam: M#/B	0.012	0.012	0.01	0.01
Cooling Water: MGal/B	0.32	0.32	0.48	0.48
Catalyst & Chem: $/B	0.0063	0.0063	0.0068	0.0068
Manpower: Men/Shift	2.4	2.4	2.5	2.5
Capital Related Costs:[1]				
Unit Size: MB/D	30	30	10	10
Scale Factor: e	0.7	0.7	0.7	0.7
ISBL Cost: MM$	18.2	18.2	11.0	11.0
Offsites Cost: MM$	9.1	9.1	5.5	5.5
Maintenance: % ISBL	4.0	4.0	4.0	4.0
% Offsites	2.5	2.5	2.5	2.5

[1] 1987 USGC location. California = 1.05 x USGC location.
[2] Typical data. Feedstock quality, product quality and hydrogen consumption are feed specific.

DISTILLATE HYDROREFINING

- Severe hydroprocessing to meet 0.05% Sulfur.

	ANS Heavy Gas Oil	Lt Cat Cycle Oil[2]	Coker Gas Oil[2]
Pressure: PSIG	900	1,500	1,500
Catalyst Type	Co/Mo	Co/Mo	Co/Mo
Feedstock			
TBP Cut: °F	500-650	375-650	350-600
°API	32.5	20.0	29.2
Wt% S	0.62	1.0	2.0
Vol% Aromatics	35.4	70.0	40.0
Cetane Index	46.9	26.3	33.4
H_2 Consumption: SCF/B	290	950	630
Product Quality			
°API	33.8	25.4	32.3
Wt% S	0.03	0.05	0.05
Nitrogen: ppm	<1.0	<1.0	<1.0
Vol% Aromatics	30.1	49.0	28.0
Cetane Index	48.9	33.0	38.5
Operating Cost Consumptions:			
Fuel: FOEB/B	0.007	0.009	0.009
Electricity: Kwh/B	1.3	1.5	1.5
Steam: M#/B	0.012	0.01	0.01
Cooling Water: MGal/B	0.32	0.48	0.48
Catalyst & Chem: $/B	0.0073	0.0095	0.0095
Manpower: Men/Shift	2.5	2.5	2.5
Capital Related Costs:[1]			
Unit Size: MB/D	30	10	10
Scale Factor: e	0.7	0.7	0.7
ISBL Cost: MM$	31.8	15.4	15.4
Offsites Cost: MM$	15.9	7.8	7.8
Maintenance: % Process	4.0	4.0	4.0
% Offsites	2.5	2.5	2.5

[1] 1987 USGC location. California = 1.05 x USGC location.

[2] Typical data. Feedstock quality, product quality and hydrogen consumption are feed specific.

DISTILLATE AROMATICS REMOVAL[4]

o Two stage hydroprocessing to reduce aromatics to 20 Vol%.

	ANS Heavy Gas Oil	Lt Cat Cycle Oil[2]	Coker Gas Oil[2]
First Stage: Pressure, PSIG	900	1,500	1,500
Catalyst Type	Co/Mo	Co/Mo	Co/Mo
Second Stage: Pressure, PSIG	1,000	1,000	1,000
Catalyst Type	Pt	Pt	Pt
Feedstock			
TBP Cut: °F	500-650	375-650	350-600
°API	32.5	20.0	29.2
Wt% S	0.57	1.0	2.0
Vol% Aromatics	35.4	70.0	40.0
Cetane Index	46.9	26.3	33.4
H_2 Consumption: SCF/B	1015	2,000	1280
Product Quality			
°API	36.4	33.0	34.3
Sulfur: ppm[3]	2.0	5.0	5.0
Nitrogen: ppm	<1.0	<1.0	<1.0
Vol% Aromatics	10.0	20.0	10.0
Cetane Index	53.2	44.1	42.3
Operating Cost Consumptions:			
Fuel: FOEB/B	0.025	0.025	0.025
Electricity: Kwh/B	0.4	0.4	0.4
Steam: M#/B	0.012	0.012	0.012
Cooling Water: MGal/B	0.29	0.29	0.29
Catalyst & Chem: $/B	0.029	0.029	0.029
Manpower: Men/Shift	3.0	3.0	3.0
Platinum: troy oz.	12,000	4,000	4,000
Capital Related Costs:[1]			
Unit Size: MB/D	30	10	10
Scale Factor: e	0.65	0.65	0.65
ISBL Cost: MM$	53.0	26.0	26.0
Offsites Cost: MM$	26.5	13.0	13.0
Maintenance: % Process	4.0	4.0	4.0
% Offsites	2.5	2.5	2.5

[1] 1987 USGC location. California = 1.05 x USGC location.

[2] Typical data. Feedstock quality, product quality and hydrogen consumption are feed specific.

[3] Stage 1 product: 1 ppm Nitrogen

[4] Costs are based on the UOP AH Unibon process extrapolated from commercial processing of straight run distillates. To provide definitive estimates of LCO UOP would need to conduct a pilot plant program followed by some engineering design and estimating work.

MOBIL METHANOL TO OLEFINS PROCESS

Basis: Sized on produce 11,000 B/D distillate on MOGD
1987 U.S. Gulf Coast Costs. California = 1.05 x USGC location
330 SD/yr operation

	Volume Basis		Weight Basis	
Input	B/SD	Vol.%	MT/SD	Wt%
Methanol	23,305	100.0	2,918	100.0
Output				
C_3/C_4 Olefins	19,643	84.3	1,680	57.6
Loss (H_2O + Volume Shift)	3,662	15.7	1,238	42.4
Total	23,305	100.05	2,918	100.0

Operating Costs: $/B or $/Tn Olefins		
Fuel: FOE B/B, FOE TN/TN	0.0035	0.0065
Catalyst & Chemicals: $/B, $/TN	0.37	4.29
Cooling Water: MGal/B, MGal/TN	1.00	11.61
Electricity: Kwh/B, Kwh/TN	4.20	49.2
Steam: M#/B, M#/TN (credit)	(0.043)	(0.500)
Makeup Water: MGal/B, MGal/TN	0.005	0.060
Manpower: Shift Pos.	3.0	3.0
SP/B, SP/TN	0.00015	0.0018
Maintenance[1]: $/B, $/TN	0.290	3.390
Investment[2]: 000 $	53,700	53,700
$/B/D, $/TN/D	2,734	31,964

[1] Based on 4% process, 2.5% offsites, 330 SD/yr.
[2] Includes 50% offsites.

MOBIL OLEFINS TO GASOLINE AND DISTILLATE PROCESS[1]

Basis: 11,000 B/D hydrotreated distillate
1987 U.S. Gulf Coast Costs. California = 1.05 x USGC location
330 SD/yr operation

	Volume Basis		Weight Basis	
Input	B/SD	Vol.%	MT/SD	Wt%
C_3/C_4 Olefins (46%/54%)	19,643	100.0	1,680	100.0
Hydrogen: MSCF, MT[2]	4.933		12	0.71
Output				
LPG	1,805	9.2	146	8.7
Gasoline	1,428	7.3	168	10.0
Jet Fuel	3,402	17.3	418	24.9
Diesel	7,560	38.5	960	57.1
Total	14,195	72.3	1,692	100.7

Operating Costs: $/B or $/Tn Olefins		
Fuel: FOE B/B, FOE TN/TN	0.0133	0.0246
Catalyst & Chemicals: $/B, $/TN	0.37	4.33
Cooling Water: MGal/B, MGal/TN	0.205	2.43
Electricity: Kwh/B, Kwh/TN	5.9	69.1
Steam: M#/B, M#/TN	0.118	1.375
Makeup Water: MGal/B, MGal/TN	0.015	0.165
Manpower: Shift Pos.	3.0	3.0
SP/B, SP/TN	0.000153	0.00179
Maintenance[3]: $/B, $/TN	0.265	3.10
Investment[4]: 000 $	49,050	49,050
$/B/D, $/TN/D	2,497	29,196

1 Including distillate hydrotreater.
2 Based on 450 SCF/B distillate.
3 Based on 4% process, 2.5% offsites, 330 SD/yr.
4 Includes 50% offsites.

MOBIL OLEFINS TO GASOLINE AND DISTILLATE PRODUCT QUALITIES

	MOGD			MTG
	Gasoline	HDT Jet	HDT Diesel	Gasoline
Specific Gravity	0.74	0.774	0.80	0.74
°API	59.7	38.4	45.4	59.7
RON: C1	92	--	--	93
RON: +3	99			100
MON: C1	79	--	--	83
MON: +3	86			91
FON: C1	90	--	--	87
FON: +3	97			95
RVP: Psig	11	--	--	
% @ 70 °C	28	--	--	
% @ 100 °C	51	--	--	
Parafins: Wt%	4	--	--	60
Olefins: Wt%	94	--	--	8
Naphthenes: Wt%	0	--	--	0
Aromatics: Wt%	2	4	2.9	32
- Benzene: Wt%	0	--	--	--
- PNA: Wt%	--	0	0	--
Durene: Wt%	0	--	--	1.8
Sulfur: Wt%	0	0.002	0.002	0
50%: °C	--	230	266	--
Cetane No.:[1]	--	54	52	--
Cetane Index:	--	68	65.9	--
Cloud: °C	--	--	-55	--
Freeze: °C	--	-60	--	--
Viscosity: CS @ 40 °C	--	2.0	2.5	--
CS @ 50 °C	--	1.3	1.7	--
RI @ 50 °C	--	6.64	9.7	--

[1] Use Cetane No.

ASSUMPTIONS FOR 1991 LP MODEL ANALYSIS

PROCESS INVESTMENT COSTS

PROCESS UNIT:	BASE CAPACITY MB/D (FEED)	EXPONENT	TOTAL INVESTMENT (1) MILLION $
GASOLINE:			
ALKYLATION *	10	0.70	47.4
CATALYTIC POLYMERIZATION *	10	0.66	21.7
DIMERSOL *	10	0.66	35.9
ONCE THROUGH ISOMERIZATION *	5	0.56	7.7
RECYCLE ISOMERIZATION *	5	0.56	13.7
MTBE *	1.75	0.60	7.2
ETHEROL	11	0.60	11.3
C4 ISOMERIZATION	5	0.56	8.7
REFORMATE EXTRACTION	13.5	0.65	52.9
LIGHT FCC GASOLINE EXTRAC.	10	0.65	21.5
FCC GASOLINE FRACTIONATION	20	0.66	17.1
FCC HEART CUT REFORMING	10	0.70	15.9
REFORMER	20	0.70	52.9
FCC GASOLINE HYDROTREATER	20	0.63	16.5
COMMON PROCESS:			
NAPHTHA HYDROTREATER	20	0.63	16.5
HYDROGEN PLANT (MMSCF/D) *	50	0.70	48.2
DIESEL:			
DISTILLATE HYDROTREATER	30	0.70	27.2
DISTILLATE HYDROREFINER	10	0.70	23.2
DEAROMITIZATION (2)	10	0.65	16.4
METHANOL TO OLEFINS **	19.6	0.65	56.3
MOBIL OLEFINS TO DISTILLATE **	19.6	0.65	51.4

* PER BARREL OF PRODUCT
** PER BARREL OF OLEFIN
(1) 1987 USGC basis including 50% offsites.
(2) Second Stage only.

Arthur D. Little, Inc.

E. 1991 DIESEL RESULTS

1991 Diesel Aromatics & Sulfur Results - Summary Diesel without Investment

		DIESEL					REFINERY COST CHANGES							
DESCRIPTION	% AROMATICS REDUCTION [1]	PROD 000 B/D [2]	SULFUR WT% [2]	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
Base Case without Investment	0.0	291.7	0.27	43.7	8.1	30.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
.25 Sulfur	-	291.7	0.17	44.6	7.3	29.9	65.6	10.7	22.8	0.0	99.1	0.8	0.0	2.76
.20 Sulfur	-	291.7	0.15	44.7	7.0	29.2	441.6	13.4	33.7	0.0	488.7	4.0	0.0	16.77
Max Sulfur Reduction	-	291.7	0.14	44.4	6.9	29.2	552.7	17.5	41.5	0.0	611.7	5.0	0.0	19.91
5% Aromatics Reduction	6.0	291.7	0.22	44.4	6.5	28.7	611.1	35.2	69.7	0.0	716.1	5.8	0.0	20.80
10% Aromatics Reduction	12.0	121.4	0.28	44.0	5.0	25.3	601.8	48.2	73.6	0.0	723.7	14.2	0.0	25.76
Max Aromatics Reduction	8.7	291.7	0.20	44.4	6.0	27.9	1,563.5	64.0	123.6	0.0	1,751.1	14.3	0.0	60.30

	PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
DESCRIPTION	NAPHT HDT	DIST HDT	DIST HR	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
Base Case without Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.25 Sulfur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
.20 Sulfur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Sulfur Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5% Aromatics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10% Aromatics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Aromatics Reduction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Level.
2) Includes Refineries Currently at .05 Sulfur.

1991 Diesel Aromatics & Sulfur Results - Summary Diesel with Investment

DESCRIPTION	% AROMATICS REDUCTION [1]	DIESEL PROD 000 B/D [2]	DIESEL SULFUR WT% [2]	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
Base Case with Investment	0.0	291.7	0.27	43.7	8.1	30.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
.15 Sulfur	-	291.7	0.11	42.5	7.2	29.6	112.7	14.4	31.6	68.7	227.3	1.9	96.2	4.62
.05 Sulfur	-	291.7	0.05	44.9	6.8	29.4	493.6	23.9	58.7	189.8	766.0	6.3	265.7	19.8
20% Aromatics	25.4	291.7	0.14	49.1	3.8	20.0	84.8	29.1	59.8	293.0	466.6	3.8	410.2	2.29
15% Aromatics	51.6	291.7	0.07	49.9	1.6	14.0	195.1	76.0	131.2	617.2	1,019.4	8.3	864.0	5.20
10% Aromatics	65.1	291.7	0.03	50.9	0.3	10.0	1,885.4	176.7	297.9	1,022.2	3,382.2	27.6	1,431.1	71.79
10% Aromatics at .05 Sulfur	65.1	291.7	0.03	50.9	0.3	10.0	1,876.1	194.8	314.2	1,037.9	3,423.1	27.9	1,453.1	102.53
10% Aromatics with Purch Feedstock	65.1	291.7	0.03	51.4	0.7	10.0	810.4	90.9	113.1	786.3	1,800.7	14.7	1,100.8	35.40

DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHT HDT	DIST HDT	DIST HR	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
Base Case with Investment	1.8	0.0	0.0	0.7	0.0	0.0	0.0	0.0
.15 Sulfur	0.0	7.1	27.2	0.0	0.0	0.0	0.0	0.0
.05 Sulfur	0.0	33.9	78.5	0.0	0.0	0.0	0.0	0.0
20% Aromatics	3.5	0.0	51.5	105.7	0.0	1.8	1.8	0.0
15% Aromatics	5.2	0.0	109.7	179.0	36.3	16.5	16.5	0.0
10% Aromatics	8.5	0.0	153.5	217.6	105.0	55.1	55.1	0.0
10% Aromatics at .05 Sulfur	8.5	0.0	150.7	214.8	105.0	59.3	59.3	0.0
10% Aromatics with Purch Feedstock	4.0	0.0	129.6	207.9	49.6	29.7	29.7	48.1

1) % Reduction from Base Case Aromatics Level.
2) Includes Refineries Currently at .05 Sulfur.

1991 Diesel Aromatics & Sulfur Results - Summary Diesel Segregation

DESCRIPTION	% AROMATICS REDUCTION [1]	DIESEL PROD 000 B/D [2]	DIESEL SULFUR WT% [2]	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
NPRA Segregation: .05 Sulfur	-	291.7	0.12	43.3	8.1	30.5	471.0	13.2	44.1	124.6	652.8	5.3	174.4	18.03
NPRA Segregation: 10% Aromatics	30.7	291.7	0.132	49.2	4.0	21.1	1,636.5	90.6	227.4	722.5	2,676.9	21.8	1,011.5	61.72
50% Segregation: .05 Sulfur	-	291.7	0.17	43.4	8.1	30.5	13.0	12.5	28.7	92.5	146.7	1.2	129.5	(0.06)
50% Segregation: 10% Aromatics	35.2	291.7	0.183	48.7	4.2	20.3	127.8	51.4	94.8	535.8	809.9	6.6	750.2	2.92

DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHT HDT	DIST HDT	DIST HR	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
NPRA Segregation: .05 Sulfur	0.0	27.2	42.9	0.0	0.0	0.0	0.0	0.0
NPRA Segregation: 10% Aromatics	15.4	0.0	89.3	122.1	105.0	33.4	33.4	0.0
50% Segregation: .05 Sulfur	0.0	0.0	39.2	0.0	0.0	0.0	0.0	0.0
50% Segregation: 10% Aromatics	10.0	0.0	85.8	112.5	36.3	15.9	15.9	0.0

1) % Reduction from Base Case Aromatics Level.
2) Includes Refineries Currently at .05 Sulfur.

TABLE 1A

1991 Costs of Reducing Diesel Sulfur and Aromatics Levels for Groups I & II

	SULFUR	AROMATICS	CETANE	TOTAL COST	TOTAL COST	INVESTMENT [1]	PROCESS CAPACITY [2]	ENERGY
	wt%	vol%		MM$/yr	cents/gal	MM$	000 B/D	000 B/D
Base Case w/Investment	0.67	25.6	41.2	-	-	-	-	-
.15% Sulfur	0.15	23.9	20.3	46	7.8	13	7	4
.05% Sulfur	0.05	23.3	38.2	206	34.7	62	34	19
20% Aromatics	0.29	21.0	53.1	31	5.2	106	18	(0.3)
15% Aromatics	0.002	13.7	48.7	98	16.4	309	87	(2)
10% Aromatics	0.002	10.0	51.2	750	126.4	514	193	57
10% Aromatics at .05% S	0.002	10.0	51.2	750	126.4	514	193	57
10% Aromatics at .05% S with Purchased Feedstock	0.02	10.0	52.9	228	38.4	362	109	5

1) Based on Groups I & II Diesel Production of 38,700 B/D.

2) Includes Hydrogen Plant Capacity in Millions SCF/D.

TABLE 1B

1991 Costs of Reducing Diesel Sulfur and Aromatics Levels for Groups III thru VI

	SULFUR	AROMATICS	CETANE	TOTAL COST	TOTAL COST	INVESTMENT [1]	PROCESS CAPACITY [2]	ENERGY
	wt%	vol%		MM$/yr	cents/gal	MM$	000 B/D	000 B/D
Base Case w/Investment	0.21	31.5	44.1	-	-	-	-	-
.15% Sulfur	0.15	29.6	47.6	37	1.0	83	27	1
.05% Sulfur	0.05	29.0	47.8	74	1.9	204	78	1
20% Aromatics	0.12	19.9	48.5	139	3.6	304	144	3
15% Aromatics	0.08	14.0	50.0	274	7.1	555	260	7
10% Aromatics	0.036	10.0	50.9	485	12.5	917	347	15
10% Aromatics at .05% S	0.035	10.0	50.8	500	12.9	939	405	46
10% Aromatics at .05% S with Purchased Feedstock	0.12	10.0	51.1	429	11.1	738	312	30

1) Based on Groups III thru IV Diesel Production of 253,000 B/D.

2) Includes Hydrogen Plant Capacity in Millions SCF/D.

21-Jul-88

TABLE 1C

1991 Costs of Reducing Diesel Sulfur and Aromatics Levels for Total California

	SULFUR	AROMATICS	CETANE	TOTAL COST	TOTAL COST	INVESTMENT [1]	PROCESS CAPACITY [2]	ENERGY
	wt%	vol%		MM$/yr	cents/gal	MM$	000 B/D	000 B/D
Base Case w/Investment	0.27	30.7	43.7	-	-	-	-	-
.15% Sulfur	0.11	29.6	42.5	83	1.9	96	34	5
.05% Sulfur	0.05	29.4	44.9	280	6.3	266	112	20
20% Aromatics	0.14	20.0	49.1	170	3.8	410	162	2
15% Aromatics	0.07	14.0	49.9	372	8.3	864	347	5
10% Aromatics	0.032	10.0	50.9	1,235	27.6	1,431	540	72
10% Aromatics at .05% S	0.031	10.0	50.9	1,249	27.9	1,453	598	103
10% Aromatics at .05% S with Purchased Feedstock	0.034	10.0	51.4	657	14.7	1,101	421	35

1) Based on Groups I thru IV Diesel Production of 291,700 B/D.

2) Includes Hydrogen Plant Capacity in Millions SCF/D.

21-Jul-88

TABLE 2A

1991 Costs of Reducing Diesel Sulfur and Aromatics Levels for Groups I & II: Hydrogen Plant Sensitivity [3]

	SULFUR	AROMATICS	CETANE	TOTAL COST	TOTAL COST	INVESTMENT [1]	PROCESS CAPACITY [2]	ENERGY
	wt%	vol%		MM$/yr	cents/gal	MM$	000 B/D	000 B/D
Base Case w/Investment	0.67	25.6	41.2	-	-	-	-	-
.15% Sulfur	0.15	23.9	20.3	46	7.8	18	9	4
.05% Sulfur	0.05	23.3	38.2	211	35.6	77	41	19
20% Aromatics	0.29	21.0	53.1	36	6.1	125	27	(0.3)
15% Aromatics	0.002	13.7	48.7	98	16.5	309	87	(2)
10% Aromatics	0.002	10.0	51.2	749	126.2	514	193	57
10% Aromatics at .05% S	0.002	10.0	51.2	752	126.8	514	193	57
10% Aromatics at .05% S with Purchased Feedstock	0.02	10.0	52.9	228	38.4	362	109	5

1) Based on Groups I & II Diesel Production of 38,700 B/D.

2) Includes Hydrogen Plant Capacity in Millions SCF/D.

3) New Hydrogen Plant Capacity Provided to Support all new Hydroprocessing Investment.

TABLE 2B

1991 Costs of Reducing Diesel Sulfur and Aromatics Levels for Groups III thru VI: Hydrogen Plant Sensitivity [3]

	SULFUR	AROMATICS	CETANE	TOTAL COST	TOTAL COST	INVESTMENT [1]	PROCESS CAPACITY [2]	ENERGY
	wt%	vol%		MM$/yr	cents/gal	MM$	000 B/D	000 B/D
Base Case w/Investment	0.21	31.5	44.1	-	-	-	-	-
.15% Sulfur	0.15	29.6	47.6	47	1.2	113	43	1
.05% Sulfur	0.05	29.0	47.8	92	2.4	267	126	1
20% Aromatics	0.12	19.9	48.5	183	4.7	422	245	3
15% Aromatics	0.08	14.0	50.0	328	8.5	730	438	7
10% Aromatics	0.036	10.0	50.9	550	14.2	1,126	576	15
10% Aromatics at .05% S	0.035	10.0	50.8	564	14.5	1,146	630	46
10% Aromatics at .05% S with Purchased Feedstock	0.12	10.0	51.1	491	12.7	937	525	30

1) Based on Groups III thru IV Diesel Production of 253,000 B/D.

2) Includes Hydrogen Plant Capacity in Millions SCF/D.

3) New Hydrogen Plant Capacity Provided to Support all new Hydroprocessing Investment.

TABLE 2C

1991 Costs of Reducing Diesel Sulfur and Aromatics Levels for Total California: Hydrogen Plant Sensitivity[3]

	SULFUR	AROMATICS	CETANE	TOTAL COST	TOTAL COST[1]	INVESTMENT	PROCESS CAPACITY[2]	ENERGY
	wt%	vol%		MM$/yr	cents/gal	MM$	000 B/D	000 B/D
Base Case w/Investment	0.27	30.7	43.7	-	-	-	-	-
.15% Sulfur	0.11	29.6	42.5	93	2.1	131	52	5
.05% Sulfur	0.05	29.4	44.9	303	6.8	344	167	20
20% Aromatics	0.14	20.0	49.1	219	4.9	547	272	2
15% Aromatics	0.07	14.0	49.9	426	9.5	1,039	525	5
10% Aromatics	0.032	10.0	50.9	1,299	29.1	1,640	769	72
10% Aromatics at .05% S	0.031	10.0	50.9	1,316	28.4	1,660	823	103
10% Aromatics at .05% S with Purchased Feedstock	0.034	10.0	51.4	719	16.1	1,299	634	35

1) Based on Groups I thru IV Diesel Production of 291,700 B/D.

2) Includes Hydrogen Plant Capacity in Millions SCF/D.

3) New Hydrogen Plant Capacity Provided to Support all new Hydroprocessing Investment.

1991 Diesel Aromatics & Sulfur Results - Base Case without Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.0	20.8	0.98	39.6	6.7	22.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
II	Hydroskimming	0.0	17.9	0.32	43.1	8.7	29.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
III + IV	Conv + D. Conv	0.0	123.7	0.19	41.4	7.4	32.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
V	D. Conversion - LA	0.0	71.6	0.27	48.3	10.3	34.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
VI	D. Conversion - N. Cal	0.0	57.7	0.18	44.6	7.1	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
TOTAL CALIFORNIA		0.0	291.7	0.27	43.7	8.1	30.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS SO LA
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1991 Diesel Aromatics & Sulfur Results - .25 Sulfur without Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% SULFUR	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.25	20.8	0.25	40.6	6.1	21.3	50.1	1.6	9.3	0.0	61.0	7.0	0.0	2.05
II	Hydroskimming	0.25	17.9	0.23	44.1	7.9	27.8	0.6	0.3	0.9	0.0	1.8	0.2	0.0	0.03
III + IV	Conv + D. Conv	0.25	82.7	0.21	44.3	7.8	28.5	4.0	1.5	1.4	0.0	7.0	0.2	0.0	0.19
V	D. Conversion - LA	0.25	41.0	0.25	49.8	9.5	33.8	9.8	7.0	10.6	0.0	27.4	1.6	0.0	0.44
VI	D. Conversion - N. Cal	0.25	15.6	0.25	46.7	7.4	27.9	1.0	0.4	0.5	0.0	1.9	0.3	0.0	0.05
TOTAL HIGH SULFUR		0.23	178.0	0.23	45.3	8.0	28.8	65.6	10.7	22.8	0.0	99.1	1.3	0.0	2.76
TOTAL CALIFORNIA		0.19	291.7	0.00	44.6	7.3	29.9	65.6	10.7	22.8	0.0	99.1	0.8	0.0	2.76

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS SO LA
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Volume & Cents/Gallon are based on High Sulfur Diesel volume only for Groups III, V, and VI.

1991 Diesel Aromatics & Sulfur Results - .20 Sulfur without Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% SULFUR	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.20	20.8	0.20	40.6	5.8	21.1	60.8	1.9	7.9	0.0	70.6	8.1	0.0	2.48
II	Hydroskimming	0.19	17.9	0.19	44.1	7.6	27.5	6.1	0.6	1.9	0.0	8.6	1.1	0.0	0.26
III + IV	Conv + D. Conv	0.21	73.5	0.21	44.3	7.7	28.3	259.2	2.8	12.6	0.0	274.5	8.9	0.0	9.62
V	D. Conversion - LA	0.20	41.0	0.20	49.8	8.0	31.1	42.8	7.4	6.9	0.0	57.0	3.3	0.0	1.61
VI	D. Conversion - N. Cal	0.21	36.7	0.21	45.9	7.0	28.3	72.8	0.8	4.3	0.0	77.9	5.1	0.0	2.80
TOTAL HIGH SULFUR		0.21	189.9	0.21	45.4	7.4	28.1	441.6	13.4	33.7	0.0	488.7	6.1	0.0	16.77
TOTAL CALIFORNIA		0.15	291.7	0.15	44.7	7.0	29.2	441.6	13.4	33.7	0.0	488.7	4.0	0.0	16.77

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Volume & Cents/Gallon are based on High Sulfur Diesel volume only for Groups II, V, and VI.

1991 Diesel Aromatics & Sulfur Results - Max Sulfur Reduction without Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% SULFUR	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.10	20.8	0.10	38.6	5.1	20.7	142.3	5.2	13.1	0.0	160.6	18.4	0.0	5.85
II	Hydroskimming	0.10	17.9	0.10	42.0	6.7	27.0	35.6	1.3	4.6	0.0	41.6	5.5	0.0	0.07
III + IV	Conv + D. Conv	0.21	73.5	0.21	44.3	7.7	28.3	259.2	2.8	12.6	0.0	274.5	8.9	0.0	9.62
V	D. Conversion - LA	0.20	41.0	0.20	49.8	8.0	31.1	42.8	7.4	6.9	0.0	57.0	3.3	0.0	1.61
VI	D. Conversion - N. Cal	0.21	36.7	0.21	45.9	7.0	28.3	72.8	0.8	4.3	0.0	77.9	5.1	0.0	2.76
TOTAL HIGH SULFUR		0.19	189.9	0.19	45.0	7.3	28.0	552.7	17.5	41.5	0.0	611.7	7.7	0.0	19.91
TOTAL CALIFORNIA		0.14	291.7	0.14	44.4	6.9	29.2	552.7	17.5	41.5	0.0	611.7	5.0	0.0	19.91

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS SO LA
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Note: Volume & Cents/Gallon are based on High Sulfur Diesel volume only for Groups II, V, and VI.

1991 Diesel Aromatics & Sulfur Results - 5% Aromatics Reduction without Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION	DIESEL PROD 000 B/D	DIESEL SULFUR WT%	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	10.0	20.8	0.46	40.5	5.2	20.2	158.9	1.5	10.3	0.0	170.7	19.5	0.0	6.41
II	Hydroskimming	10.0	17.9	0.15	44.0	6.8	26.4	136.8	1.3	8.5	0.0	146.5	19.5	0.0	5.51
III + IV	Conv + D. Conv	6.3	123.7	0.19	42.4	5.3	30.6	75.1	21.7	29.5	0.0	126.4	2.4	0.0	(0.26)
V	D. Conversion - LA	4.0	71.6	0.29	49.1	9.3	31.5	4.3	8.2	9.2	0.0	21.6	0.7	0.0	0.27
VI	D. Conversion - N. Cal	5.0	57.7	0.15	44.7	6.1	24.8	236.0	2.6	12.3	0.0	250.8	10.4	0.0	8.88
TOTAL CALIFORNIA		6.0	291.7	0.22	44.4	6.5	28.7	611.1	35.2	69.7	0.0	716.1	5.8	0.0	20.80

GROUP	DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1991 Diesel Aromatics & Sulfur Results - 10% Aromatics Reduction without Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	10.0	20.8	0.46	40.5	5.2	20.2	158.9	1.5	10.3	0.0	170.7	19.5	0.0	6.41
II	Hydroskimming	10.0	17.9	0.15	44.0	6.8	26.4	136.8	1.3	8.5	0.0	146.5	19.5	0.0	5.51
III + IV	Conv + D. Conv	13.0	82.7	0.26	45.0	4.6	26.3	306.2	45.4	54.9	0.0	406.5	11.7	0.0	13.84
V	D. Conversion - LA	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VI	D. Conversion - N. Cal	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL CALIFORNIA		12.0	121.4	0.28	44.0	5.0	25.3	601.8	48.2	73.6	0.0	723.7	14.2	0.0	25.76

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS SO LA
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	-	-	-	-	-	-	-	-
VI	D. Conversion - N. Cal	-	-	-	-	-	-	-	-
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1991 Diesel Aromatics & Sulfur Results - Max Aromatics Reduction without Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	14.0	20.8	0.49	40.6	4.9	19.3	499.5	2.2	25.0	0.0	526.8	60.3	0.0	20.13
II	Hydroskimming	14.0	17.9	0.16	44.1	6.4	25.2	429.9	1.9	20.7	0.0	452.5	60.2	0.0	17.33
III + IV	Conv + D. Conv	10.3	123.7	0.19	42.2	5.2	30.4	336.4	46.7	58.3	0.0	441.4	8.5	0.0	11.42
V	D. Conversion - LA	6.0	71.6	0.20	49.3	7.5	29.5	61.7	10.5	7.3	0.0	79.6	2.6	0.0	2.55
VI	D. Conversion - N. Cal	5.0	57.7	0.15	44.7	6.1	24.8	236.0	2.6	12.3	0.0	250.8	10.4	0.0	8.88
TOTAL CALIFORNIA		8.7	291.7	0.20	44.4	6.0	27.9	1,563.5	64.0	123.6	0.0	1,751.1	14.3	0.0	60.30

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1991 Diesel Aromatics & Sulfur Results - Base Case with Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION	DIESEL PROD 000 B/D	DIESEL SULFUR WT%	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D	MEMO: BASE CASE INNVESTMENT MILLION $
I	Topping	0.0	20.8	0.98	39.6	6.7	22.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0
II	Hydroskimming	0.0	17.9	0.32	43.1	8.7	29.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0
III + IV	Conv + D. Conv	0.0	123.7	0.18	41.4	7.4	32.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	5.6
V	D. Conversion - LA	0.0	71.6	0.27	48.3	10.3	34.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0
VI	D. Conversion - N. Cal	0.0	57.7	0.18	44.7	7.1	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	6.0
TOTAL CALIFORNIA		0.0	291.7	0.27	43.7	8.1	30.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	11.6

GROUP	DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0
V	D. Conversion - LA	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		1.8	0.0	0.0	0.7	0.0	0.0	0.0	0.0

1991 Diesel Aromatics & Sulfur Results - .15 Sulfur with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% SULFUR	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.15	20.8	0.15	0.0	5.6	20.9	99.1	2.5	10.9	9.5	121.9	14.0	13.3	4.02
II	Hydroskimming	0.14	17.9	0.14	43.8	7.3	27.3	1.3	0.7	1.7	0.0	3.7	0.5	0.0	0.07
III + IV	Conv + D. Conv	0.15	73.5	0.15	47.3	7.7	28.3	3.3	1.2	1.5	24.0	29.9	1.0	33.6	0.16
V	D. Conversion - LA	0.15	41.0	0.15	49.8	8.6	32.5	6.2	8.6	14.7	24.7	54.2	3.1	34.5	0.21
VI	D. Conversion - N. Cal	0.15	36.7	0.15	45.7	7.0	28.7	2.8	1.5	2.8	10.6	17.6	1.1	14.8	0.16
TOTAL HIGH SULFUR		0.15	189.9	0.15	42.0	7.5	28.4	112.7	14.4	31.6	68.7	227.3	2.9	96.2	4.62
TOTAL CALIFORNIA		0.11	291.7	0.11	42.5	7.2	29.6	112.7	14.4	31.6	68.7	227.3	1.9	96.2	4.62

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	10.6	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	11.2	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	7.1	27.2	0.0	0.0	0.0	0.0	0.0

Note: Volume & Cents/Gallon are based on High Sulfur Diesel volume only for Groups III, V, and VI.

1991 Diesel Aromatics & Sulfur Results - .05 Sulfur with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% SULFUR	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.05	20.8	0.05	36.7	4.9	20.4	380.0	9.2	25.5	26.4	441.1	50.5	36.9	15.40
II	Hydroskimming	0.05	17.9	0.05	39.9	6.4	26.7	93.8	2.3	9.2	17.8	123.1	16.4	24.9	3.58
III + IV	Conv + D. Conv	0.05	73.5	0.05	47.5	7.6	27.9	4.7	1.7	2.1	78.6	87.0	2.8	110.0	0.22
V	D. Conversion - LA	0.05	41.0	0.05	49.8	7.7	31.6	10.3	9.8	18.0	33.4	71.4	4.1	46.7	0.39
VI	D. Conversion - N. Cal	0.05	36.7	0.05	45.9	6.3	28.3	4.8	1.0	3.9	33.6	43.3	2.8	47.0	0.16
TOTAL HIGH SULFUR		0.05	189.9	0.05	45.8	7.0	27.8	493.6	23.9	58.7	189.8	766.0	9.6	265.7	19.76
TOTAL CALIFORNIA		0.05	291.7	0.05	44.9	6.8	29.4	493.6	23.9	58.7	189.8	766.0	6.3	265.7	19.76

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	27.2	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	38.6	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	17.3	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	22.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	33.9	78.5	0.0	0.0	0.0	0.0	0.0

Note: Volume & Cents/Gallon are based on High Sulfur Diesel volume only for Groups III, V, and VI.

1991 Diesel Aromatics & Sulfur Results - 20% Aromatics with Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION	DIESEL PROD 000 B/D	DIESEL SULFUR WT%	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	26.0	20.8	0.42	53.1	4.9	21.0	(4.8)	3.0	7.2	40.2	45.5	5.2	56.3	(0.17)
II	Hydroskimming	26.0	17.9	0.14	53.1	4.9	21.0	(4.2)	2.6	5.9	35.8	40.1	5.3	50.1	(0.14)
III + IV	Conv + D. Conv	25.0	123.7	0.11	48.9	3.1	20.1	49.2	7.2	9.1	106.3	171.7	3.3	148.8	1.85
V	D. Conversion - LA	25.2	71.6	0.14	48.6	4.0	18.9	18.3	15.2	32.4	53.4	119.3	4.0	74.7	0.04
VI	D. Conversion - N. Cal	26.0	57.7	0.10	47.6	4.4	20.6	26.3	1.1	5.2	57.3	89.9	3.7	80.2	0.70
TOTAL CALIFORNIA		25.4	291.7	0.14	49.1	3.8	20.0	84.8	29.1	59.8	293.0	466.6	3.8	410.2	2.29

GROUP	DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	3.3	3.3	0.0	0.9	0.9	0.0
II	Hydroskimming	0.0	0.0	3.8	3.8	0.0	1.0	1.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	25.4	49.5	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	4.4	34.5	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	3.5	0.0	14.6	14.6	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		3.5	0.0	51.5	105.7	0.0	1.8	1.8	0.0

1991 Diesel Aromatics & Sulfur Results - 15% Aromatics with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	52.0	20.8	0.002	48.7	1.4	13.7	(22.0)	15.2	32.7	116.8	142.8	16.3	163.6	(0.83)
II	Hydroskimming	52.0	17.9	0.001	48.7	1.4	13.7	(18.9)	13.1	27.1	103.9	125.2	16.6	145.5	(0.72)
III + IV	Conv + D. Conv	50.1	123.7	0.085	50.8	1.2	13.3	102.7	11.0	17.2	168.5	299.4	5.8	235.9	3.67
V	D. Conversion - LA	54.5	71.6	0.069	49.1	2.4	15.5	27.8	17.8	40.5	74.1	160.3	5.3	103.8	0.27
VI	D. Conversion - N. Cal	51.0	57.7	0.081	49.5	1.7	13.5	105.4	18.9	13.7	153.8	291.8	12.0	215.3	2.81
TOTAL CALIFORNIA		51.6	291.7	0.069	49.9	1.6	14.0	195.1	76.0	131.2	617.2	1,019.4	8.3	864.0	5.20

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	8.0	7.4	17.0	4.3	4.3	0.0
II	Hydroskimming	0.0	0.0	9.0	8.3	19.2	4.9	4.9	0.0
III + IV	Conv + D. Conv	0.0	0.0	51.7	91.9	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	12.5	43.3	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	5.2	0.0	28.4	28.1	0.0	7.3	7.3	0.0
TOTAL CALIFORNIA		5.2	0.0	109.7	179.0	36.3	16.5	16.5	0.0

1991 Diesel Aromatics & Sulfur Results - 10% Aromatics with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	65.0	20.8	0.003	51.2	0.7	10.0	765.3	39.2	104.0	194.7	1,103.2	126.3	272.6	30.37
II	Hydroskimming	65.0	17.9	0.001	51.2	0.7	10.0	658.6	33.7	86.1	172.4	950.8	126.5	241.3	26.13
III + IV	Conv + D. Conv	62.5	123.7	0.049	51.9	0.2	10.0	180.3	31.2	29.6	273.4	514.4	9.9	382.7	6.83
V	D. Conversion - LA	70.7	71.6	0.000	49.6	0.2	10.0	119.3	50.8	62.9	209.0	442.0	14.7	292.6	4.14
VI	D. Conversion - N. Cal	64.0	57.7	0.053	50.3	0.4	10.0	162.0	21.8	15.2	172.8	371.8	15.3	241.9	4.33
TOTAL CALIFORNIA		65.1	291.7	0.032	50.9	0.3	10.0	1,885.4	176.7	297.9	1,022.2	3,382.2	27.6	1,431.1	71.79

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	9.4	8.9	49.3	11.4	11.4	0.0
II	Hydroskimming	0.0	0.0	10.6	10.2	55.8	13.1	13.1	0.0
III + IV	Conv + D. Conv	0.0	0.0	59.3	108.2	0.0	10.5	10.5	0.0
V	D. Conversion - LA	4.3	0.0	37.7	54.2	0.0	12.1	12.1	0.0
VI	D. Conversion - N. Cal	4.2	0.0	36.5	36.1	0.0	8.0	8.0	0.0
TOTAL CALIFORNIA		8.5	0.0	153.5	217.6	105.0	55.1	55.1	0.0

1991 Diesel Aromatics & Sulfur Results - 10% Aromatics at .05 Sulfur with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	65.0	20.8	0.003	51.2	0.7	10.0	765.3	39.2	104.0	194.7	1,103.2	126.3	272.6	30.37
II	Hydroskimming	65.0	17.9	0.001	51.2	0.7	10.0	658.6	33.7	86.1	172.4	950.8	126.5	241.3	26.13
III + IV	Conv + D. Conv	62.5	123.7	0.049	51.9	0.2	10.0	180.3	31.2	29.6	273.4	514.4	9.9	382.7	6.83
V	D. Conversion - LA	70.7	71.6	0.000	49.6	0.2	10.0	119.3	50.8	62.9	209.0	442.0	14.7	292.6	4.14
VI	D. Conversion - N. Cal	64.0	57.7	0.047	50.0	0.3	10.0	152.8	39.9	31.6	188.5	412.8	17.0	263.9	35.06
TOTAL CALIFORNIA		65.1	291.7	0.031	50.9	0.3	10.0	1,876.1	194.8	314.2	1,037.9	3,423.1	27.9	1,453.1	102.53

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	9.4	8.9	49.3	11.4	11.4	0.0
II	Hydroskimming	0.0	0.0	10.6	10.2	55.8	13.1	13.1	0.0
III + IV	Conv + D. Conv	0.0	0.0	59.3	108.2	0.0	10.5	10.5	0.0
V	D. Conversion - LA	4.3	0.0	37.7	54.2	0.0	12.1	12.1	0.0
VI	D. Conversion - N. Cal	4.2	0.0	33.7	33.3	0.0	12.2	12.2	0.0
TOTAL CALIFORNIA		8.5	0.0	150.7	214.8	105.0	59.3	59.3	0.0

1991 Diesel Aromatics & Sulfur Results - 10% Aromatics with Investment & Purchased Feedstock

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	65.0	20.8	0.001	52.9	1.2	10.0	138.5	21.4	37.2	137.6	334.8	38.3	192.7	2.83
II	Hydroskimming	65.0	17.9	0.032	52.9	1.2	10.0	119.2	18.4	30.8	121.2	289.6	38.5	169.7	2.43
III + IV	Conv + D. Conv	62.5	123.7	0.050	51.9	0.4	10.0	213.7	18.6	23.5	252.1	507.9	9.8	353.0	(2.34)
V	D. Conversion - LA	70.7	71.6	0.008	49.7	0.7	10.0	147.4	29.2	27.2	161.5	365.2	12.1	226.1	1.78
VI	D. Conversion - N. Cal	64.0	57.7	0.047	51.1	1.0	10.0	191.6	3.3	(5.6)	113.8	303.2	12.5	159.4	30.70
TOTAL CALIFORNIA		65.1	291.7	0.034	51.4	0.7	10.0	810.4	90.9	113.1	786.3	1,800.7	14.7	1,100.8	35.40

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	7.7	7.0	23.3	6.5	6.5	6.5
II	Hydroskimming	0.0	0.0	8.8	8.0	26.3	7.4	7.4	7.4
III + IV	Conv + D. Conv	0.0	0.0	59.3	108.1	0.0	6.8	6.8	8.3
V	D. Conversion - LA	4.0	0.0	20.5	51.8	0.0	7.5	7.5	11.3
VI	D. Conversion - N. Cal	0.0	0.0	33.3	33.0	0.0	1.4	1.4	14.6
TOTAL CALIFORNIA		4.0	0.0	129.6	207.9	49.6	29.7	29.7	48.1

1991 Diesel Aromatics & Sulfur Results - NPRA Segregation: .05 Sulfur with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% SULFUR	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.05	20.8	0.05	36.7	4.9	20.4	380.0	9.2	25.5	26.4	441.1	50.5	36.9	15.40
II	Hydroskimming	0.05	17.9	0.05	39.9	6.4	26.7	93.8	2.3	9.2	17.8	123.1	16.4	24.9	3.58
III + IV	Conv + D. Conv	0.05	62.1	0.05	42.3	8.0	29.4	(2.2)	1.3	7.0	60.4	66.4	2.5	84.5	(0.74)
V	D. Conversion - LA	0.05	30.6	0.05	46.3	10.0	29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
VI	D. Conversion - N. Cal	0.05	18.4	0.05	46.9	5.9	28.8	(0.6)	0.4	2.4	20.0	22.1	2.9	28.0	(0.21)
TOTAL CALIFORNIA		0.05	149.8	0.05	42.6	7.5	27.9	471.0	13.2	44.1	124.6	652.8	10.4	174.4	18.03
		0.12	291.7	0.12	43.3	8.1	30.5	471.0	13.2	44.1	124.6	652.8	5.3	174.4	18.03

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS SO LA
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	GAS OIL 000 B/D
I	Topping	0.0	27.2	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	6.7	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	26.5	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	9.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	27.2	42.9	0.0	0.0	0.0	0.0	0.0

1991 Diesel Aromatics & Sulfur Results - NPRA Segregation: 10% Aromatics with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	67.4	20.8	0.003	51.2	0.7	10.0	765.3	39.2	104.0	194.7	1,103.2	126.3	272.6	30.37
II	Hydroskimming	67.4	17.9	0.001	51.2	0.7	10.0	658.6	33.7	86.1	172.4	950.8	126.5	241.3	26.13
III + IV	Conv + D. Conv	67.4	72.3	0.049	53.7	0.1	10.0	91.9	12.2	15.2	193.0	312.1	10.3	270.1	3.66
V	D. Conversion - LA	67.4	30.6	0.050	51.1	0.2	10.0	77.7	3.6	17.3	91.4	190.1	14.8	127.9	0.99
VI	D. Conversion - N. Cal	67.4	28.9	0.047	49.3	0.3	10.0	43.0	1.9	4.7	71.1	120.8	9.9	99.6	0.56
TOTAL CALIFORNIA		67.4	170.5	0.038	51.9	0.3	10.0	1,636.5	90.6	227.4	722.5	2,676.9	37.4	1,011.5	61.72
		31.4	291.7	0.132	49.2	4.0	21.1	1,636.5	90.6	227.4	722.5	2,676.9	21.8	1,011.5	61.72

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	9.4	8.9	49.3	11.4	11.4	0.0
II	Hydroskimming	0.0	0.0	10.6	10.2	55.8	13.1	13.1	0.0
III + IV	Conv + D. Conv	0.0	0.0	49.5	66.6	0.0	4.2	4.2	0.0
V	D. Conversion - LA	10.2	0.0	0.0	21.4	0.0	4.8	4.8	0.0
VI	D. Conversion - N. Cal	5.2	0.0	19.7	14.9	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		15.4	0.0	89.3	122.1	105.0	33.4	33.4	0.0

1991 Diesel Aromatics & Sulfur Results - 50% Segregation: .05 Sulfur With Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% SULFUR	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.05	10.4	0.05	35.9	5.0	20.9	6.5	3.7	6.7	0.0	16.9	3.9	0.0	0.31
II	Hydroskimming	0.05	9.0	0.05	39.9	6.4	26.7	1.6	0.9	2.4	0.0	4.9	1.3	0.0	0.07
III + IV	Conv + D. Conv	0.05	41.4	0.05	42.3	8.0	29.4	(1.5)	0.9	5.4	45.4	50.1	2.9	63.5	(0.49)
V	D. Conversion - LA	0.05	35.8	0.05	49.9	12.3	37.0	7.0	6.7	11.8	27.1	52.6	3.5	38.0	0.27
VI	D. Conversion - N. Cal	0.05	18.4	0.05	46.9	5.9	28.8	(0.6)	0.4	2.4	20.0	22.1	2.9	28.0	(0.21)
TOTAL CALIFORNIA		0.05	114.9	0.05	44.6	8.6	30.7	13.0	12.5	28.7	92.5	146.7	3.0	129.5	(0.06)
		0.17	291.7	0.17	43.4	8.1	30.5	13.0	12.5	28.7	92.5	146.7	1.2	129.5	(0.06)

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	17.6	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	11.9	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	9.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	39.2	0.0	0.0	0.0	0.0	0.0

1991 Diesel Aromatics & Sulfur Results - 50% Segregation: 10% Aromatics with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	67.4	10.4	0.003	52.9	1.2	10.0	(26.5)	14.7	27.3	110.6	126.1	28.9	154.9	(1.08)
II	Hydroskimming	67.4	9.0	0.001	51.1	0.5	10.0	(22.8)	12.7	22.6	96.8	109.2	29.1	135.5	(0.93)
III + IV	Conv + D. Conv	67.4	61.9	0.049	53.7	0.1	10.0	68.8	4.2	12.3	130.6	215.8	8.3	182.8	2.68
V	D. Conversion - LA	67.4	35.8	0.050	51.1	0.2	10.0	65.4	18.0	27.9	126.7	238.0	15.8	177.4	1.70
VI	D. Conversion - N. Cal	67.4	28.9	0.047	49.3	0.3	10.0	43.0	1.9	4.7	71.1	120.8	9.9	99.6	0.56
TOTAL CALIFORNIA		67.4	145.9	0.043	52.0	0.3	10.0	127.8	51.4	94.8	535.8	809.9	13.2	750.2	2.92
		33.9	291.7	0.183	48.7	4.2	20.3	127.8	51.4	94.8	535.8	809.9	13.2	750.2	2.92

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	5.0	4.9	17.1	4.9	4.9	0.0
II	Hydroskimming	0.0	0.0	5.7	5.5	19.2	5.5	5.5	0.0
III + IV	Conv + D. Conv	0.0	0.0	37.5	62.5	0.0	0.0	0.0	0.0
V	D. Conversion - LA	4.8	0.0	17.8	24.6	0.0	5.5	5.5	0.0
VI	D. Conversion - N. Cal	5.2	0.0	19.7	14.9	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		10.0	0.0	85.8	112.5	36.3	15.9	15.9	0.0

F. 1991 DIESEL AND GASOLINE COST EQUATIONS

GROUP I COST EQUATION COMPONENTS FOR 1991 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC Without Investment	0.00	0.00	0.00	0.00	0.00
.25 wt% Sulfur w/o Inv	2.41	0.08	0.45	0.00	2.94
.20 wt% Sulfur w/o Inv	2.92	0.09	0.38	0.00	3.39
Max Sulfur Red w/o Inv	6.84	0.25	0.63	0.00	7.72
5% Aromatics Red w/o Inv	7.64	0.07	0.50	0.00	8.21
10% Aromatics Red w/o Inv	7.64	0.07	0.50	0.00	8.21
Max Aromatics Red w/o Inv	24.01	0.11	1.20	0.00	25.32
BC with Investment	0.00	0.00	0.00	0.00	0.00
.15 wt% Sulfur w/Inv	4.76	0.12	0.52	0.46	5.86
.05 wt% Sulfur w/Inv	18.27	0.44	1.23	1.27	21.21
20% Aromatics w/Inv	(0.23)	0.14	0.35	1.93	2.19
15% Aromatics w/Inv	(1.06)	0.73	1.57	5.62	6.86
10% Aromatics w/Inv	36.79	1.88	5.00	9.36	53.03
10% Aromatics w/Inv at .05 Sulf	36.79	1.88	5.00	9.36	53.03
10% Aromatics w/Inv & Purch Feed	6.66	1.03	1.79	6.62	16.10
DIESEL SEGREGATION RUNS					
NPRA Segregation: .05 Sulfur w/Inv	18.27	0.44	1.23	1.27	21.21
NPRA Segregation: 10% Aromatics w/Inv	36.79	1.88	5.00	9.36	53.03
50% Segregation: .05 Sulfur w/Inv	0.63	0.36	0.64	0.00	1.63
50% Segregation: 10% Aromatics w/Inv	(2.55)	1.41	2.63	10.63	12.12
GASOLINE RUNS					
BC Without Investment	-	-	-	-	-
Max Aromatics Red w/o Inv	-	-	-	-	-
BC with Investment	-	-	-	-	-
5% Aromatics Red w/Inv	-	-	-	-	-
10% Aromatics Red w/Inv	-	-	-	-	-
15% Aromatics Red w/Inv	-	-	-	-	-
20% Aromatics Red w/Inv	-	-	-	-	-
Max Aromatics Red w/Inv	-	-	-	-	-
Max Aromatics Red w/Inv & Purch Feed	-	-	-	-	-

GROUP II COST EQUATION COMPONENTS FOR 1991 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC without Investment	0.00	0.00	0.00	0.00	0.00
.25 wt% Sulfur w/o Inv	0.03	0.02	0.05	0.00	0.10
.20 wt% Sulfur w/o Inv	0.34	0.03	0.11	0.00	0.48
Max Sulfur Red w/o Inv	1.99	0.07	0.26	0.00	2.32
5% Aromatics Red w/o Inv	7.64	0.07	0.47	0.00	8.18
10% Aromatics Red w/o Inv	7.64	0.07	0.47	0.00	8.18
Max Aromatics Red w/o Inv	24.02	0.11	1.16	0.00	25.29
BC with Investment	0.00	0.00	0.00	0.00	0.00
.15 wt% Sulfur w/Inv	0.07	0.04	0.09	0.00	0.20
.05 wt% Sulfur w/Inv	5.24	0.13	0.51	0.99	6.87
20% Aromatics w/Inv	(0.23)	0.15	0.33	2.00	2.25
15% Aromatics w/Inv	(1.06)	0.73	1.51	5.80	6.98
10% Aromatics w/Inv	36.79	1.88	4.81	9.63	53.11
10% Aromatics w/Inv at .05 Sulf	36.79	1.88	4.81	9.63	53.11
10% Aromatics w/Inv & Purch Feed	6.66	1.03	1.72	6.77	16.18
DIESEL SEGREGATION RUNS					
NPRA Segregation: .05 Sulfur w/Inv	5.24	0.13	0.51	0.99	6.87
NPRA Segregation: 10% Aromatics w/Inv	36.79	1.88	4.81	9.63	53.11
50% Segregation: .05 Sulfur w/Inv	0.18	0.10	0.27	0.00	0.55
50% Segregation: 10% Aromatics w/Inv	(2.53)	1.41	2.51	10.76	12.15
GASOLINE RUNS					
BC without Investment	0.00	0.00	0.00	0.00	0.00
Max Aromatics Red w/o Inv	24.64	0.08	1.30	0.00	26.02
BC with Investment	0.00	0.00	0.00	0.00	0.00
5% Aromatics Red w/Inv	3.47	0.20	0.72	2.17	6.56
10% Aromatics Red w/Inv	-	-	-	-	-
15% Aromatics Red w/Inv	-	-	-	-	-
20% Aromatics Red w/Inv	-	-	-	-	-
Max Aromatics Red w/Inv	3.47	0.20	0.72	2.17	6.56
Max Aromatics Red w/Inv & Purch Feed	0.10	(0.08)	(0.42)	0.01	(0.39)

GROUPS III & IV COST EQUATION COMPONENTS FOR 1991 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC Without Investment	0.00	0.00	0.00	0.00	0.00
.25 wt% Sulfur w/o Inv	0.05	0.02	0.02	0.00	0.09
.20 wt% Sulfur w/o Inv	3.53	0.04	0.17	0.00	3.74
Max Sulfur Red w/o Inv	3.53	0.04	0.17	0.00	3.74
5% Aromatics Red w/o Inv	0.61	0.18	0.24	0.00	1.03
10% Aromatics Red w/o Inv	3.70	0.55	0.66	0.00	4.91
Max Aromatics Red w/o Inv	2.72	0.38	0.47	0.00	3.57
BC with Investment	0.00	0.00	0.00	0.00	0.00
.15 wt% Sulfur w/Inv	0.04	0.01	0.02	0.33	0.40
.05 wt% Sulfur w/Inv	0.06	0.02	0.03	1.07	1.18
20% Aromatics w/Inv	0.40	0.06	0.07	0.86	1.39
15% Aromatics w/Inv	0.83	0.09	0.14	1.36	2.42
10% Aromatics w/Inv	1.46	0.25	0.24	2.21	4.16
10% Aromatics w/Inv at .05 Sulf	1.46	0.25	0.24	2.21	4.16
10% Aromatics w/Inv & Purch Feed	1.73	0.15	0.19	2.04	4.11
DIESEL SEGREGATION RUNS					
NPRA Segregation: .05 Sulfur w/Inv	(0.04)	0.02	0.11	0.97	1.06
NPRA Segregation: 10% Aromatics w/Inv	1.27	0.17	0.21	2.67	4.32
50% Segregation: .05 Sulfur w/Inv	(0.04)	0.02	0.13	1.10	1.21
50% Segregation: 10% Aromatics w/Inv	1.11	0.07	0.20	2.11	3.49
GASOLINE RUNS					
BC Without Investment	0.00	0.00	0.00	0.00	0.00
Max Aromatics Red w/o Inv	0.49	0.06	0.07	0.00	0.62
BC with Investment	0.00	0.00	0.00	0.00	0.00
5% Aromatics Red w/Inv	(0.01)	(0.01)	(0.00)	0.06	0.04
10% Aromatics Red w/Inv	0.01	0.03	0.05	0.11	0.20
15% Aromatics Red w/Inv	0.92	0.22	0.56	1.36	3.06
20% Aromatics Red w/Inv	-	-	-	-	-
Max Aromatics Red w/Inv	0.92	0.22	0.56	1.36	3.06
Max Aromatics Red w/Inv & Purch Feed	0.41	(0.01)	(0.01)	0.21	0.60

GROUP V COST EQUATION COMPONENTS FOR 1991 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC without Investment	0.00	0.00	0.00	0.00	0.00
.25 wt% Sulfur w/o Inv	0.24	0.17	0.26	0.00	0.67
.20 wt% Sulfur w/o Inv	1.04	0.18	0.17	0.00	1.39
Max Sulfur Red w/o Inv	1.04	0.18	0.17	0.00	1.39
5% Aromatics Red w/o Inv	0.06	0.11	0.13	0.00	0.30
10% Aromatics Red w/o Inv	-	-	-	-	-
Max Aromatics Red w/o Inv	0.06	0.11	0.13	0.00	0.30
BC with Investment	0.00	0.00	0.00	0.00	0.00
.15 wt% Sulfur w/Inv	0.15	0.21	0.36	0.60	1.32
.05 wt% Sulfur w/Inv	0.25	0.24	0.44	0.81	1.74
20% Aromatics w/Inv	0.26	0.21	0.45	0.75	1.67
15% Aromatics w/Inv	0.39	0.25	0.57	1.03	2.24
10% Aromatics w/Inv	1.67	0.71	0.88	2.92	6.18
10% Aromatics w/Inv at .05 Sulf	1.67	0.71	0.88	2.92	6.18
10% Aromatics w/Inv & Purch Feed	2.06	0.41	0.38	2.26	5.11
DIESEL SEGREGATION RUNS					
NPRA Segregation: .05 Sulfur w/Inv	0.00	0.00	0.00	0.00	0.00
NPRA Segregation: 10% Aromatics w/Inv	2.54	0.12	0.57	2.99	6.22
50% Segregation: .05 Sulfur w/Inv	0.20	0.19	0.33	0.76	1.48
50% Segregation: 10% Aromatics w/Inv	1.83	0.50	0.78	3.54	6.65
GASOLINE RUNS					
BC without Investment	0.00	0.00	0.00	0.00	0.00
Max Aromatics Red w/o Inv	0.75	0.03	0.03	0.00	0.81
BC with Investment	0.00	0.00	0.00	0.00	0.00
5% Aromatics Red w/Inv	0.34	0.00	(0.09)	0.05	0.30
10% Aromatics Red w/Inv	1.04	0.03	0.02	0.21	1.30
15% Aromatics Red w/Inv	0.85	0.02	0.16	0.34	1.37
20% Aromatics Red w/Inv	0.60	0.15	0.57	0.84	2.16
Max Aromatics Red w/Inv	0.60	0.15	0.57	0.84	2.16
Max Aromatics Red w/Inv & Purch Feed	0.57	(0.12)	(0.24)	0.06	0.27

GROUP VI COST EQUATION COMPONENTS FOR 1991 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC without Investment	0.00	0.00	0.00	0.00	0.00
.25 wt% Sulfur w/o Inv	0.03	0.01	0.01	0.00	0.05
.20 wt% Sulfur w/o Inv	1.98	0.02	0.12	0.00	2.12
Max Sulfur Red w/o Inv	1.98	0.02	0.12	0.00	2.12
5% Aromatics Red w/o Inv	4.09	0.05	0.21	0.00	4.35
10% Aromatics Red w/o Inv	-	-	-	-	-
Max Aromatics Red w/o Inv	4.09	0.05	0.21	0.00	4.35
BC with Investment	0.00	0.00	0.00	0.00	0.00
.15 wt% Sulfur w/Inv	0.08	0.04	0.08	0.29	0.49
.05 wt% Sulfur w/Inv	0.13	0.03	0.11	0.92	1.19
20% Aromatics w/Inv	0.46	0.02	0.09	0.99	1.56
15% Aromatics w/Inv	1.83	0.33	0.24	2.67	5.07
10% Aromatics w/Inv	2.81	0.38	0.26	2.99	6.44
10% Aromatics w/Inv at .05 Sulf	2.65	0.69	0.55	3.27	7.16
10% Aromatics w/Inv & Purch Feed	3.32	0.06	(0.10)	1.97	5.25
DIESEL SEGREGATION RUNS					
NPRA Segregation: .05 Sulfur w/Inv	(0.03)	0.02	0.13	1.09	1.21
NPRA Segregation: 10% Aromatics w/Inv	1.49	0.07	0.16	2.46	4.18
50% Segregation: .05 Sulfur w/Inv	(0.03)	0.02	0.13	1.09	1.21
50% Segregation: 10% Aromatics w/Inv	1.49	0.07	0.16	2.46	4.18
GASOLINE RUNS					
BC without Investment	0.00	0.00	0.00	0.00	0.00
Max Aromatics Red w/o Inv	0.36	0.07	0.15	0.00	0.58
BC with Investment	0.00	0.00	0.00	0.00	0.00
5% Aromatics Red w/Inv	(0.02)	0.01	0.02	0.07	0.08
10% Aromatics Red w/Inv	0.14	0.04	0.08	0.22	0.48
15% Aromatics Red w/Inv	0.07	0.07	0.16	0.46	0.76
20% Aromatics Red w/Inv	0.48	0.25	0.82	1.27	2.82
Max Aromatics Red w/Inv	0.48	0.25	0.82	1.27	2.82
Max Aromatics Red w/Inv & Purch Feed	1.06	0.04	0.08	0.37	1.55

G. 1991 GASOLINE RESULTS

1991 Gasoline Aromatics & Benzene Results - Summary Gasoline without Investment

DESCRIPTION	% AROMATICS REDUCTION [1]	MOTOR GASOLINE PROD 000 B/D	AROM VOL%	BENZ VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
Base Case without Investment	0.0	824.8	33.2	1.97	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Max Aromatics Reduction	3.4	824.8	32.1	1.89	927.6	44.5	88.5	0.0	1,060.6	3.1	0.0	31.10

DESCRIPTION	PROCESS ADDITITIONS: 000 B/D NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	PURCHASED FEEDSTOCKS: 000 B/D MTBE	ETOH	ISOM	ALKYL	TOTAL
Base Case without Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Aromatics 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	0.0	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - Summary Gasoline with Investment

DESCRIPTION	% AROMATICS REDUCTION [1]	MOTOR GASOLINE PROD 000 B/D	AROM VOL%	BENZ VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
Base Case with Investment	0.0	824.8	31.5	1.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
5% Aromatics Reduction	5.1	824.8	29.8	1.75	164.0	4.5	(10.7)	91.9	249.7	0.7	128.6	3.40
10% Aromatics Reduction	10.0	804.5	28.2	1.87	364.7	28.7	39.9	169.7	603.1	1.8	237.6	7.70
15% Aromatics Reduction	14.9	804.5	26.7	1.62	573.0	94.0	261.5	640.5	1,569.0	4.6	896.8	24.60
20% Aromatics Reduction	20.4	489.2	25.5	1.66	299.3	107.6	371.0	557.7	1,335.5	6.5	780.8	19.00
Max Aromatics Reduction	18.1	824.8	25.8	1.54	652.9	182.1	560.8	1,025.1	2,420.9	7.0	1,435.1	37.20
Max Arom Red with Purch Feedstock	18.7	824.8	25.6	1.52	557.7	(32.9)	(66.5)	169.0	627.3	1.8	236.7	(14.00)

PROCESS ADDITITIONS: 000 B/D

DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D
Base Case with Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5% Aromatics Reduction	4.9	0.0	9.9	0.0	0.0	0.0	9.6	36.2	15.0	6.2	20.3	1.2	0.0	0.0	0.0	0.1
10% Aromatics Reduction	4.0	0.0	0.0	0.0	0.0	0.3	0.0	47.8	14.6	6.2	33.1	4.0	3.7	40.1	0.0	1.1
15% Aromatics Reduction	4.3	0.0	98.9	0.0	0.0	0.6	0.0	51.9	18.1	13.0	92.5	14.9	77.8	76.7	39.3	14.4
20% Aromatics Reduction	5.9	0.0	0.0	3.2	0.0	0.0	0.0	34.0	16.5	7.0	47.3	33.9	98.5	136.4	21.3	17.8
Max Aromatics Reduction	5.9	0.0	108.7	3.2	0.0	0.6	0.0	58.4	22.2	13.5	111.3	43.6	150.9	178.0	60.1	28.0
Max Arom Red with Purch Feedstock	2.7	0.0	0.0	0.0	0.0	0.3	0.0	49.0	17.1	13.4	8.2	14.5	1.9	13.0	0.0	6.1

PURCHASED FEEDSTOCKS: 000 B/D

DESCRIPTION	MTBE	ETOH	ISOM	ALKYL	TOTAL
Base Case with Investment	0.0	0.0	0.0	0.0	0.0
5% Aromatics Reduction	0.0	0.0	0.0	0.0	0.0
10% Aromatics Reduction	0.0	0.0	0.0	0.0	0.0
15% Aromatics Reduction	0.0	0.0	0.0	0.0	0.0
20% Aromatics Reduction	0.0	0.0	0.0	0.0	0.0
Max Aromatics Reduction	0.0	0.0	0.0	0.0	0.0
Max Arom Red with Purch Feedstock	30.6	0.0	0.0	2.1	32.7

1) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - Base Case without Investment

			MOTOR GASOLINE			REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	PROD 000 B/D	AROM VOL%	BENZ VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.0	1.8	37.4	2.66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	18.5	45.8	3.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D Conv	0.0	315.3	31.8	1.81	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D Conversion - LA	0.0	258.5	32.0	1.96	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	0.0	230.7	35.6	2.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	824.8	33.2	1.97	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

		PROCESS ADDITIONS: 000 B/D															PURCHASED FEEDSTOCKS: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - Max Aromatics Reduction without Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	MOTOR GASOLINE PROD 000 B/D	AROM VOL%	BENZ VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.0	1.8	37.4	2.66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	1.0	18.5	45.5	2.51	455.8	1.5	24.0	0.0	481.4	62.0	0.0	18.3
III + IV	Conv + D Conv	4.6	315.3	30.2	1.72	153.3	18.0	21.5	0.0	193.0	1.5	0.0	3.4
V	D Conversion - LA	4.2	258.5	30.6	2.00	235.1	8.2	8.9	0.0	252.3	2.3	0.0	7.8
VI	D Conversion - N. Cal	1.1	230.7	35.2	1.96	83.4	16.7	34.0	0.0	134.1	1.4	0.0	1.6
TOTAL CALIFORNIA		3.4	824.8	32.1	1.89	927.6	44.5	88.5	0.0	1,060.6	3.1	0.0	31.1

		PROCESS ADDITIONS: 000 B/D																PURCHASED FEEDSTOCKS: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - Base Case with Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	MOTOR GASOLINE PROD 000 B/D	MOTOR GASOLINE AROM VOL%	MOTOR GASOLINE BENZ VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D	MEMO: BASE CASE INVEST. MILLION $
I	Topping	0.0	1.8	37.4	2.66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	18.5	36.1	2.61	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.2
III + IV	Conv + D Conv	0.0	315.3	30.2	1.78	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.3
V	D Conversion - LA	0.0	258.5	29.5	1.69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.2
VI	D Conversion - N. Cal	0.0	230.7	34.9	1.89	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.1
TOTAL CALIFORNIA		0.0	824.8	31.5	1.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	199.8

		PROCESS ADDITIONS: 000 B/D																PURCHASED FEEDSTOCKS: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	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
III + IV	Conv + D Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	3.3	6.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.4	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		4.9	0.0	0.0	0.0	0.0	0.0	0.0	30.0	12.5	10.8	1.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - 5% Aromatics Reduction with Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	MOTOR GASOLINE PROD 000 B/D	MOTOR GASOLINE AROM VOL%	MOTOR GASOLINE BENZ VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.0	1.8	37.4	2.66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	5.0	18.5	34.3	3.30	64.2	3.7	13.8	40.1	121.8	15.7	56.1	2.0
III + IV	Conv + D Conv	5.4	315.3	28.6	1.58	(3.5)	(2.6)	(0.5)	19.5	12.9	0.1	27.3	(0.2)
V	D Conversion - LA	5.0	258.5	28.0	1.84	106.7	1.0	(28.3)	16.9	96.3	0.9	23.6	3.0
VI	D Conversion - N. Cal	5.0	230.7	33.1	1.75	(3.5)	2.4	4.3	15.5	18.7	0.2	21.7	(0.1)
TOTAL CALIFORNIA		5.1	824.8	29.8	1.75	164.0	4.5	(10.7)	91.9	249.7	0.7	128.6	3.4

GROUP	DESCRIPTION	PROCESS ADDITIONS: 000 B/D NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORMATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	PURCHASED FEEDSTOCKS: 000 B/D MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	9.9	0.0	0.0	0.0	0.0	3.9	0.0	0.0	5.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D Conv	0.0	0.0	0.0	0.0	0.0	0.0	4.2	7.2	5.8	6.2	0.2	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.1	0.0	0.0	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	4.9	0.0	0.0	0.0	0.0	0.0	5.4	3.0	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		4.9	0.0	9.9	0.0	0.0	0.0	9.6	36.2	15.0	6.2	20.3	1.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - 10% Aromatics Reduction with Investment

			MOTOR GASOLINE			REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	PROD 000 B/D	AROM VOL%	BENZ VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	-	-	-	-	-	-	-	-	-	-	-	-
III + IV	Conv + D Conv	9.9	315.3	27.2	1.52	2.6	9.6	14.3	35.1	81.5	0.6	77.0	(0.1)
V	D Conversion - LA	10.0	258.5	26.6	2.19	328.9	9.5	6.6	64.8	409.8	3.8	90.7	6.3
VI	D Conversion - N. Cal	10.0	230.7	31.4	1.97	33.2	9.7	19.0	49.9	111.8	1.2	69.9	1.5
TOTAL CALIFORNIA		10.0	804.5	28.2	1.87	364.7	28.7	39.9	169.7	603.1	1.8	237.6	7.7

		PROCESS ADDITIONS: 000 B/D															PURCHASED FEEDSTOCKS: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
III + IV	Conv + D Conv	0.0	0.0	0.0	0.0	0.0	0.3	0.0	16.5	5.4	6.2	3.5	4.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.1	0.0	0.0	19.7	0.0	3.7	23.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	4.0	0.0	0.0	0.0	0.0	0.0	0.0	9.2	9.2	0.0	10.0	0.0	0.0	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		4.0	0.0	0.0	0.0	0.0	0.3	0.0	47.8	14.6	6.2	33.1	4.0	3.7	40.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - 15% Aromatics Reduction with Investment

			MOTOR GASOLINE			REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	PROD 000 B/D	AROM VOL%	BENZ VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	-	-	-	-	-	-	-	-	-	-	-	-
III + IV	Conv + D Conv	14.8	315.3	25.8	1.24	289.4	70.9	176.0	427.4	963.6	7.3	598.3	16.2
V	D Conversion - LA	15.0	258.5	25.1	2.04	268.5	6.7	49.4	107.7	432.2	4.0	150.8	5.5
VI	D Conversion - N. Cal	15.0	230.7	29.6	1.66	15.1	16.5	36.1	105.5	173.1	1.8	147.7	2.9
TOTAL CALIFORNIA		14.9	804.5	26.7	1.62	573.0	94.0	261.5	640.5	1,569.0	4.6	896.8	24.6

		PROCESS ADDITIONS: 000 B/D																PURCHASED FEEDSTOCKS: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
III + IV	Conv + D Conv	0.0	0.0	98.9	0.0	0.0	0.6	0.0	20.6	5.7	6.5	58.8	8.7	52.4	41.6	38.8	10.1	0.0	0.0	0.0	0.0	0.0
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.9	3.0	6.5	19.9	0.0	24.1	13.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	4.3	0.0	0.0	0.0	0.0	0.0	0.0	9.4	9.4	0.0	13.8	6.2	1.3	21.9	0.5	4.2	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		4.3	0.0	98.9	0.0	0.0	0.6	0.0	51.9	18.1	13.0	92.5	14.9	77.8	76.7	39.3	14.4	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - 20% Aromatics Reduction with Investment

			MOTOR GASOLINE			REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	PROD 000 B/D	AROM VOL%	BENZ VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	-	-	-	-	-	-	-	-	-	-	-	-
III + IV	Conv + D Conv	-	-	-	-	-	-	-	-	-	-	-	-
V	D Conversion - LA	20.0	258.5	23.6	1.82	187.8	48.8	181.0	265.4	683.0	6.3	371.6	10.0
VI	D Conversion - N. Cal	20.8	230.7	27.6	1.49	111.4	58.8	190.0	292.3	652.5	6.7	409.2	9.0
TOTAL CALIFORNIA		20.4	489.2	25.5	1.66	299.3	107.6	371.0	557.7	1,335.5	6.5	780.8	19.0

		PROCESS ADDITIONS: 000 B/D															PURCHASED FEEDSTOCKS: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
III + IV	Conv + D Conv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.6	6.5	7.0	20.9	27.1	50.5	46.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	5.9	0.0	0.0	3.2	0.0	0.0	0.0	11.3	10.0	0.0	26.4	6.7	48.0	90.1	21.3	17.8	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		5.9	0.0	0.0	3.2	0.0	0.0	0.0	34.0	16.5	7.0	47.3	33.9	98.5	136.4	21.3	17.8	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - Max Aromatics Reduction with Investment

			MOTOR GASOLINE			REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	PROD 000 B/D	AROM VOL%	BENZ VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.0	1.8	37.4	2.66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	5.0	18.5	34.3	3.30	64.2	3.7	13.8	40.1	121.8	15.7	56.1	2.0
III + IV	Conv + D Conv	14.8	315.3	25.8	1.24	289.4	70.9	176.0	427.4	963.6	7.3	598.3	16.2
V	D Conversion - LA	20.0	258.5	23.6	1.82	187.8	48.8	181.0	265.4	683.0	6.3	371.6	10.0
VI	D Conversion - N. Cal	20.8	230.7	27.6	1.49	111.4	58.8	190.0	292.3	652.5	6.7	409.2	9.0
TOTAL CALIFORNIA		18.1	824.8	25.8	1.54	652.9	182.1	560.8	1,025.1	2,420.9	7.0	1,435.1	37.2

		PROCESS ADDITIONS: 000 B/D																PURCHASED FEEDSTOCKS: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	9.9	0.0	0.0	0.0	0.0	3.9	0.0	0.0	5.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D Conv	0.0	0.0	98.8	0.0	0.0	0.6	0.0	20.6	5.7	6.5	58.8	8.7	52.4	41.6	38.8	10.1	0.0	0.0	0.0	0.0	0.0
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.6	6.5	7.0	20.9	27.1	50.5	46.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D Conversion - N. Cal	5.9	0.0	0.0	3.2	0.0	0.0	0.0	11.3	10.0	0.0	26.4	6.7	48.0	90.1	21.3	17.8	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		5.9	0.0	108.7	3.2	0.0	0.6	0.0	58.4	22.2	13.5	111.3	43.6	150.9	178.0	60.1	28.0	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Level

1991 Gasoline Aromatics & Benzene Results - Max Aromatics Reduction with Investment & Purchased Feedstock

			MOTOR GASOLINE			REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION [1]	PROD 000 B/D	AROM VOL%	BENZ VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.0	1.8	37.4	2.66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	29.0	18.5	25.6	2.21	1.8	(1.4)	(7.8)	0.2	(7.2)	(0.9)	0.3	(1.6)
III + IV	Conv + D Conv	14.8	315.3	25.8	1.43	130.1	(3.9)	(2.1)	66.1	190.2	3.2	92.5	(3.1)
V	D Conversion - LA	20.0	258.5	23.6	1.51	181.1	(37.1)	(75.9)	17.4	85.6	0.8	24.4	(8.5)
VI	D Conversion - N. Cal	20.8	230.7	27.6	1.57	244.7	9.4	19.3	85.3	358.8	3.7	119.5	(0.8)
TOTAL CALIFORNIA		18.7	824.8	25.6	1.52	557.7	(32.9)	(66.5)	169.0	627.3	1.8	236.7	(14.0)

		PROCESS ADDITIONS: 000 B/D																PURCHASED FEEDSTOCKS: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.1
III + IV	Conv + D Conv	0.0	0.0	0.0	0.0	0.0	0.3	0.0	16.1	5.7	6.2	2.3	0.8	0.0	0.0	0.0	1.8	6.4	0.0	0.0	0.0	6.4
V	D Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.7	3.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0	12.7	0.0	0.0	0.0	12.7
VI	D Conversion - N. Cal	2.7	0.0	0.0	0.0	0.0	0.0	0.0	8.6	8.4	0.0	5.9	6.5	1.9	13.0	0.0	4.3	11.6	0.0	0.0	0.0	11.6
TOTAL CALIFORNIA		2.7	0.0	0.0	0.0	0.0	0.3	0.0	49.0	17.1	13.4	8.2	14.5	1.9	13.0	0.0	6.1	30.6	0.0	0.0	2.1	32.7

1) % Reduction from Base Case Aromatics Level

H. 1995 DIESEL RESULTS

1995 Diesel Aromatics & Sulfur Results - Summary Diesel with Investment

DESCRIPTION	% AROMATICS REDUCTION [1]	DIESEL PROD 000 B/D [2]	DIESEL SULFUR WT% [2]	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
Base Case with Investment	0.0	309.1	0.23	44.3	7.6	31.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
.05 Sulfur	-	309.1	0.05	44.5	6.4	29.6	693.5	30.6	61.1	208.2	993.4	7.7	291.4	21.95
20% Aromatics	34.1	309.1	0.14	48.7	3.7	20.0	113.6	46.7	63.9	296.2	520.4	4.0	414.7	3.87
15% Aromatics	52.5	309.1	0.07	49.5	1.7	15.0	259.4	105.4	139.3	606.6	1,110.8	8.6	849.2	7.42
10% Aromatics	67.2	309.1	0.030	50.8	0.3	10.0	2,596.9	243.7	370.7	1,142.9	4,354.3	33.5	1,600.1	87.21

DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHT HDT	DIST HDT	DIST HR	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
Base Case with Investment	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0
.05 Sulfur	1.5	30.9	97.4	0.0	0.0	0.0	0.0	0.0
20% Aromatics	3.1	0.0	61.1	110.8	0.0	0.8	0.8	0.0
15% Aromatics	9.7	0.0	106.6	173.6	35.3	15.6	15.6	0.0
10% Aromatics	5.3	0.0	163.3	225.5	137.0	72.4	72.4	0.0

1) % Aromatics Reduction from Base Case Aromatics Level

1995 Diesel Aromatics & Sulfur Results - Base Case with Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION	DIESEL PROD 000 B/D	DIESEL SULFUR WT%	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D	MEMO: BASE CASE INNVESTMENT MILLION $
I	Topping	0.0	22.1	0.32	41.1	8.5	28.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0
II	Hydroskimming	0.0	19.0	0.32	41.1	8.5	28.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0
III + IV	Conv + D. Conv	0.0	131.1	0.19	43.9	6.1	32.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0
V	D. Conversion - LA	0.0	43.2	0.48	48.9	12.0	36.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0
VI	D. Conversion - N. Cal	0.0	61.6	0.18	43.8	7.9	27.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	11.9
TOTAL HIGH SULFUR		0.0	277.0	0.25	44.2	7.8	31.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	11.9
TOTAL CALIFORNIA		0.0	309.1	0.23	44.3	7.6	31.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	

GROUP	DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0

1995 Diesel Aromatics & Sulfur Results - .05 wt% Sulfur with Investment

GROUP	DESCRIPTION	% SULFUR	DIESEL PROD 000 B/D	DIESEL SULFUR WT%	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	0.05	22.1	0.05	36.7	4.6	20.5	510.2	10.5	28.9	29.2	578.8	62.4	40.8	15.40
II	Hydroskimming	0.05	19.0	0.05	39.9	6.0	26.7	123.7	2.5	10.3	19.3	155.8	19.5	27.0	4.36
III + IV	Conv + D. Conv	0.05	79.0	0.05	47.5	5.6	27.9	10.3	4.5	12.2	90.2	117.3	3.5	126.3	0.29
V	D. Conversion - LA	0.05	43.2	0.05	48.9	7.5	30.9	6.8	10.1	18.5	38.6	74.1	4.1	54.1	0.00
VI	D. Conversion - N. Cal	0.05	39.1	0.05	45.1	7.2	30.2	4.1	1.8	5.2	29.5	40.6	2.5	41.3	0.14
TOTAL HIGH SULFUR		0.05	202.4	0.05	45.5	6.2	28.0	655.1	29.5	75.1	206.8	966.5	11.4	289.5	20.34
TOTAL CALIFORNIA		0.05	309.1	0.05	44.5	6.4	29.6	693.5	30.6	61.1	208.2	993.4	7.7	291.4	21.95

GROUP	DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
I	Topping	0.0	30.9	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	0.0	7.5	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	47.2	14.7	0.0	0.0	0.0	0.0
V	D. Conversion - LA	1.5	0.0	18.4	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	24.3	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		1.5	30.9	97.4	14.7	0.0	0.0	0.0	0.0

1995 Diesel Aromatics & Sulfur Results - 20% Aromatics with Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION	DIESEL PROD 000 B/D	DIESEL SULFUR WT%	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	-10.7	22.1	0.39	53.1	4.9	20.0	(1.0)	2.4	8.5	39.7	49.7	5.4	55.6	(0.08)
II	Hydroskimming	30.6	19.0	0.13	52.0	4.3	20.0	(0.8)	2.0	6.9	36.8	44.9	5.6	51.5	(0.07)
III + IV	Conv + D. Conv	36.3	131.1	0.11	48.6	3.0	20.0	60.9	6.9	1.5	110.5	179.8	3.3	154.7	2.27
V	D. Conversion - LA	44.8	75.3	0.14	47.4	4.1	20.0	17.2	29.0	34.6	46.5	127.3	4.0	65.1	0.00
VI	D. Conversion - N. Cal	27.5	61.6	0.10	47.7	4.0	20.0	37.3	6.3	12.4	62.7	118.8	4.6	87.8	1.16
TOTAL CALIFORNIA		34.4	309.1	0.14	48.7	3.7	20.0	113.6	46.7	63.9	296.2	520.4	4.0	414.7	3.87

GROUP	DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	5.0	4.9	0.0	0.4	0.4	0.0
II	Hydroskimming	0.0	0.0	5.6	5.5	0.0	0.4	0.4	0.0
III + IV	Conv + D. Conv	0.0	0.0	28.9	47.1	0.0	0.0	0.0	0.0
V	D. Conversion - LA	3.1	0.0	0.4	32.1	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	21.3	21.2	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		3.1	0.0	61.1	110.8	0.0	0.8	0.8	0.0

1995 Diesel Aromatics & Sulfur Results - 15% Aromatics with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	33.0	22.1	0.07	48.7	1.4	15.0	(8.4)	14.2	29.9	112.5	148.1	16.0	157.5	(0.92)
II	Hydroskimming	47.9	19.0	0.02	49.9	2.0	15.0	(7.1)	12.0	24.3	98.3	127.5	16.0	137.6	(0.77)
III + IV	Conv + D. Conv	52.3	131.1	0.09	50.4	1.5	15.0	105.1	13.5	11.2	159.2	289.1	5.2	222.9	4.00
V	D. Conversion - LA	58.6	75.3	0.04	48.3	1.7	15.0	48.7	39.8	50.2	83.8	222.5	7.0	117.3	0.00
VI	D. Conversion - N. Cal	45.7	61.6	0.08	49.1	2.2	15.0	121.1	25.9	23.7	152.8	323.6	12.5	213.9	3.32
TOTAL CALIFORNIA		50.8	309.1	0.07	49.5	1.7	15.0	259.4	105.4	139.3	606.6	1,110.8	8.6	849.2	7.42

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	SO LA GAS OIL 000 B/D
I	Topping	0.0	0.0	7.7	7.2	16.8	3.9	3.9	0.0
II	Hydroskimming	0.0	0.0	8.4	7.9	18.5	4.3	4.3	0.0
III + IV	Conv + D. Conv	0.0	0.0	47.8	84.6	0.0	0.0	0.0	0.0
V	D. Conversion - LA	3.0	0.0	14.0	45.6	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	6.7	0.0	28.7	28.4	0.0	7.5	7.5	0.0
TOTAL CALIFORNIA		9.7	0.0	106.6	173.6	35.3	15.6	15.6	0.0

1995 Diesel Aromatics & Sulfur Results - 10% Aromatics with Investment

			DIESEL					REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	SULFUR WT%	CETANE NO	POLY AROM VOL%	TOTAL AROM VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	55.4	22.1	0.003	51.2	0.7	10.0	959.6	43.5	113.2	208.0	1,324.3	142.7	291.2	33.28
II	Hydroskimming	65.3	19.0	0.001	51.2	0.7	10.0	809.7	36.7	92.2	180.3	1,118.9	140.2	252.4	28.08
III + IV	Conv + D. Conv	68.2	131.1	0.049	51.7	0.2	10.0	290.0	39.7	50.9	288.8	669.4	12.2	404.3	10.58
V	D. Conversion - LA	72.4	75.3	0.000	48.9	0.2	10.0	244.6	61.5	69.0	245.9	621.0	19.6	344.2	0.00
VI	D. Conversion - N. Cal	63.8	61.6	0.043	50.9	0.5	10.0	293.0	62.3	45.5	220.0	620.7	24.0	308.0	7.95
TOTAL CALIFORNIA		67.2	309.1	0.030	50.8	0.3	10.0	2,596.9	243.7	370.7	1,142.9	4,354.3	33.5	1,600.1	87.21

		PROCESS ADDITIONS : 000 B/D							PURCHASED STOCKS SO LA
GROUP	DESCRIPTION	NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	GAS OIL 000 B/D
I	Topping	0.0	0.0	10.1	9.5	57.0	12.2	12.2	0.0
II	Hydroskimming	0.0	0.0	11.1	10.6	62.7	13.6	13.6	0.0
III + IV	Conv + D. Conv	0.0	0.0	63.0	113.6	0.0	12.1	12.1	0.0
V	D. Conversion - LA	5.3	0.0	44.4	57.4	17.3	12.8	12.8	0.0
VI	D. Conversion - N. Cal	0.0	0.0	34.8	34.4	0.0	21.7	21.7	0.0
TOTAL CALIFORNIA		5.3	0.0	163.3	225.5	137.0	72.4	72.4	0.0

Arthur D. Little, Inc.

I. 1995 GASOLINE RESULTS

1995 Gasoline Aromatics & Benzene Results - Summary Gasoline with Investment

DESCRIPTION	% AROMATICS REDUCTION [1]	MOTOR GASOLINE PROD 000 B/D	AROM VOL%	BENZ VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
Base Case with Investment	0.0	831.8	32.3	1.88	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Max Aromatics Reduction	14.7	831.8	27.5	1.61	1,028.1	222.7	688.0	1,324.9	3,263.7	9.3	1,854.9	47.39
Max Aromatics Reduction w/Purch Fee	50.3	831.8	16.1	0.81	4,663.4	1.8	190.2	905.0	5,760.4	16.5	1,266.1	5.71

	PROCESS ADDITIONS : 000 B/D																PURCHASED FEEDSTOCK: 000 B/D				
DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
Base Case with Investment	0.0	0.0	0.0	0.0	0.0	0.0	6.2	32.2	13.7	16.7	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max Aromatics Reduction	7.1	2.6	483.3	3.3	0.0	0.4	0.0	62.1	23.4	11.8	124.2	66.9	130.7	181.6	67.6	29.6	0.0	0.0	0.0	0.0	0.0
Max Aromatics Reduction w/Purch Fee	2.9	11.9	217.5	0.0	0.0	0.0	0.0	49.1	2.7	0.0	13.9	130.1	127.8	146.9	0.0	46.3	61.6	7.5	0.0	108.6	158.1

1) % Reduction from Base Case Aromatics Level

1995 Gasoline Aromatics & Benzene Results - Base Case with Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION	MOTOR GASOLINE PROD 000 B/D	MOTOR GASOLINE AROM VOL%	MOTOR GASOLINE BENZ VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D	MEMO: BASE CASE INVESTMENT MILLION $
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	0.0	18.6	39.3	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.2
III + IV	Conv + D Conv	0.0	320.2	30.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.7
V	D. Conversion - LA	0.0	260.6	31.4	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	79.8
VI	D. Conversion - N. Cal	0.0	232.4	35.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.0
TOTAL CALIFORNIA		0.0	831.8	32.3	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	235.7

PROCESS ADDITIONS : 000 B/D

GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORMATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D Conv	0.0	0.0	0.0	0.0	0.0	0.0	6.2	6.9	4.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.8	0.0	5.6	2.4	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.7	4.6	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0	0.0	6.2	32.2	13.7	16.7	2.4	0.0	0.0	0.0	0.0	0.0

PURCHASED FEEDSTOCK: 000 B/D

GROUP	DESCRIPTION	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	-	-	-	-	-
II	Hydroskimming	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D Conv	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	0.0	0.0	0.0	0.0

1995 Gasoline Aromatics & Benzene Results - Max Aromatics Reduction with Investment

GROUP	DESCRIPTION	% AROMATICS REDUCTION	MOTOR GASOLINE PROD 000 B/D	MOTOR GASOLINE AROM VOL%	MOTOR GASOLINE BENZ VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	4.9	18.6	37.4	3.8	37.0	2.8	11.8	33.4	85.0	10.9	46.7	1.2
III + IV	Conv + D Conv	12.0	320.2	26.9	1.4	300.4	30.6	172.9	408.2	912.1	6.8	571.5	13.9
V	D. Conversion - LA	16.9	260.6	26.1	1.8	537.3	113.9	302.9	498.2	1,452.3	13.3	697.4	21.7
VI	D. Conversion - N. Cal	16.8	232.4	29.1	1.5	153.4	75.3	200.4	385.2	814.3	8.3	539.3	10.6
TOTAL CALIFORNIA		14.7	831.8	27.5	1.6	1,028.1	222.7	688.0	1,324.9	3,263.7	9.3	1,854.9	47.4

GROUP	DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	PURCHASED FEEDSTOCK: 000 B/D MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	0.0	0.0	3.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	3.8	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D Conv	0.0	2.6	88.7	0.0	0.0	0.4	0.0	22.6	5.7	6.2	60.3	5.3	52.7	40.8	42.8	9.1	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	353.1	0.0	0.0	0.0	0.0	24.2	7.6	5.5	33.5	52.7	29.6	50.3	0.0	11.7	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	7.1	0.0	38.5	3.3	0.0	0.0	0.0	11.5	10.1	0.0	26.5	7.1	48.4	90.5	24.8	8.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		7.1	2.6	483.3	3.3	0.0	0.4	0.0	62.1	23.4	11.8	124.2	66.9	130.7	181.6	67.6	29.6	0.0	0.0	0.0	0.0	0.0

1) % Reduction from Base Case Aromatics Reduction Level

1995 Gasoline Aromatics & Benzene Results - Max Aromatics Reduction with Investment & Purchased Feedstock

			MOTOR GASOLINE			REFINERY COST CHANGES							
GROUP	DESCRIPTION	% AROMATICS REDUCTION	PROD 000 B/D	AROM VOL%	BENZ VOL%	NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INVEST MILLION $	ENERGY 000 B/D
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	67.2	18.6	12.9	1.5	142.9	(3.2)	(12.4)	9.2	136.4	17.5	15.2	0.8
III + IV	Conv + D Conv	48.0	320.2	15.8	0.8	1,634.7	(34.5)	21.8	321.6	1,943.6	14.5	441.4	(3.5)
V	D. Conversion - LA	62.8	260.6	11.7	0.5	1,747.7	(2.1)	57.9	299.8	2,103.2	19.2	419.7	3.6
VI	D. Conversion - N. Cal	37.9	232.4	21.7	1.1	1,138.1	41.7	123.0	274.4	1,577.2	16.2	389.9	4.9
TOTAL CALIFORNIA		50.3	831.8	16.1	0.8	4,663.4	1.8	190.2	905.0	5,760.4	16.5	1,266.1	5.7

		PROCESS ADDITIONS : 000 B/D																PURCHASED FEEDSTOCK: 000 B/D				
GROUP	DESCRIPTION	NAPHTHA HDT	FCC GASO HDT	H2 PLANT	ALKYL	CAT POLY	DIMERSOL	ONCE THRU ISOM	RECYCLE ISOM	MTBE	ETHEROL	C4 ISOM	REFORM-ATE EXTRACT	FCC GASO EXTRACT	FCC GASO FRAC	REFORM	BTX SALES 000 B/D	MTBE	ETOH	ISOM	ALKYL	TOTAL
I	Topping	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II	Hydroskimming	0.0	0.0	0.4	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.3	0.0	0.0	0.0	6.0	6.0
III + IV	Conv + D Conv	0.0	11.9	128.2	0.0	0.0	0.0	0.0	16.8	2.7	0.0	10.1	31.4	42.2	35.0	0.0	13.5	20.0	2.2	0.0	19.4	22.0
V	D. Conversion - LA	0.0	0.0	26.4	0.0	0.0	0.0	0.0	19.8	0.0	0.0	0.0	70.2	46.3	38.2	0.0	19.6	16.1	0.0	0.0	73.1	89.2
VI	D. Conversion - N. Cal	2.9	0.0	62.6	0.0	0.0	0.0	0.0	9.0	0.0	0.0	3.8	27.8	39.4	73.6	0.0	12.8	25.6	5.3	0.0	10.1	41.0
TOTAL CALIFORNIA		2.9	11.9	217.5	0.0	0.0	0.0	0.0	49.1	2.7	0.0	13.9	130.1	127.8	146.9	0.0	46.3	61.6	7.5	0.0	108.6	158.1

1) % Reduction from Base Case Aromatics Reduction Level

J. 1995 DIESEL AND GASOLINE COST EQUATIONS

GROUP I COST EQUATION COMPONENTS FOR 1995 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
.05 wt% Sulfur w/Inv	23.09	0.48	1.31	1.32	26.20
20% Aromatics w/Inv	(0.05)	0.11	0.38	1.80	2.24
15% Aromatics w/Inv	(0.38)	0.64	1.35	5.09	6.70
10% Aromatics w/Inv	43.42	1.97	5.12	9.41	59.92
GASOLINE RUNS					
BC with Investment	-	-	-	-	-
Max Aromatics Red w/Inv	-	-	-	-	-
Max Aromatics Red w/Inv & Purch Feed	-	-	-	-	-

GROUP II COST EQUATION COMPONENTS FOR 1995 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
.05 wt% Sulfur w/Inv	6.51	0.13	0.54	1.02	8.20
20% Aromatics w/Inv	(0.04)	0.11	0.36	1.94	2.37
15% Aromatics w/Inv	(0.37)	0.63	1.28	5.17	6.71
10% Aromatics w/Inv	42.62	1.93	4.85	9.49	58.89
GASOLINE RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
Max Aromatics Red w/Inv	1.99	0.15	0.63	1.80	4.57
Max Aromatics Red w/Inv & Purch Feed	7.68	(0.17)	(0.67)	0.49	7.33

GROUPS III & IV COST EQUATION COMPONENTS FOR 1995 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
.05 wt% Sulfur w/Inv	0.13	0.06	0.15	1.14	1.48
20% Aromatics w/Inv	0.46	0.05	0.01	0.84	1.36
15% Aromatics w/Inv	0.80	0.10	0.09	1.21	2.20
10% Aromatics w/Inv	2.21	0.30	0.39	2.20	5.10
GASOLINE RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
Max Aromatics Red w/Inv	0.94	0.10	0.54	1.27	2.85
Max Aromatics Red w/Inv & Purch Feed	5.11	(0.11)	0.70	1.00	6.70

GROUP V COST EQUATION COMPONENTS FOR 1995 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
.05 wt% Sulfur w/Inv	0.16	0.23	0.43	0.89	1.71
20% Aromatics w/Inv	0.23	0.39	0.46	0.62	1.70
15% Aromatics w/Inv	0.65	0.53	0.67	1.11	2.96
10% Aromatics w/Inv	3.25	0.82	0.92	3.27	8.26
GASOLINE RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
Max Aromatics Red w/Inv	2.06	0.44	1.16	1.91	5.57
Max Aromatics Red w/Inv & Purch Feed	6.71	(0.01)	0.22	1.15	8.07

GROUP VI COST EQUATION COMPONENTS FOR 1995 $/ B

	Feedstock	Variable	Fixed	Capital	Total
DIESEL RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
.05 wt% Sulfur w/Inv	0.10	0.05	0.13	0.75	1.03
20% Aromatics w/Inv	0.61	0.10	0.20	1.02	1.93
15% Aromatics w/Inv	1.97	0.42	0.38	2.48	5.25
10% Aromatics w/Inv	4.76	1.01	0.74	3.57	10.08
GASOLINE RUNS					
BC with Investment	0.00	0.00	0.00	0.00	0.00
Max Aromatics Red w/Inv	0.66	0.32	0.86	1.66	3.50
Max Aromatics Red w/Inv & Purch Feed	4.90	0.18	0.53	1.18	6.79

K. 1991 REFINERY EMISSION RESULTS

1991 Diesel and Aromatics Refinery Emissions Analysis - Summary Diesel without Investment

Increase (Decrease) vs Base case

DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case without Investment	291.7	0.0	0.0	0.0	0.0	0.0
.25 wt% Sulfur	291.7	(19,377.7)	(35,046.5)	(1,983.3)	(84.2)	(2,849.2)
.20 wt% Sulfur	291.7	(16,900.8)	(22,698.1)	(1,727.6)	(73.4)	(2,007.7)
Max Sulfur Reduction	291.7	(16,833.3)	(20,036.4)	(1,708.4)	(72.6)	(2,006.3)
5% Aromatics Reduction	291.7	6,431.9	36,925.2	1,166.2	49.6	628.7
Max Aromatics Reduction	291.7	6,630.2	37,538.6	1,222.9	52.0	632.9

CASE EMISSIONS DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case without Investment	291.7	246,974.3	383,920.5	34,691.6	1,474.4	38,783.2
.25 wt% Sulfur	291.7	220,271.9	373,491.3	29,024.2	1,233.6	33,104.9
.20 wt% Sulfur	291.7	222,748.8	385,839.7	29,279.9	1,244.4	33,946.4
Max Sulfur Reduction	291.7	222,816.3	388,501.4	29,299.1	1,245.3	33,947.9
5% Aromatics Reduction	291.7	253,406.2	420,845.7	35,857.8	1,524.0	39,411.9
Max Aromatics Reduction	291.7	253,905.2	422,389.6	36,000.4	1,530.0	39,422.6

1991 Diesel and Aromatics Refinery Emissions Analysis - Summary Diesel with Investment

Increase (Decrease) vs Base case

DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case with Investment	291.7	0.0	0.0	0.0	0.0	0.0
.15 wt% Sulfur	291.7	(17,886.6)	(29,661.2)	(1,787.9)	(76.0)	(2,409.5)
.05 wt% Sulfur	291.7	(18,638.9)	(10,712.3)	(1,722.0)	(73.2)	(2,872.0)
20% Aromatics	291.7	3,319.3	33,607.6	789.2	33.5	57.7
15% Aromatics	291.7	7,489.8	39,531.4	1,916.2	81.4	(421.4)
10% Aromatics	291.7	13,833.8	5,371.7	3,488.8	148.2	(621.9)
10% Aromatics at .05 Sulfur	291.7	12,813.9	24,490.4	3,358.4	142.6	(654.6)
10% Aromatics Purch Feedstock	291.7	3,964.7	29,992.2	1,585.1	67.3	(1,217.2)

CASE EMISSIONS DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case with Investment	291.7	247,169.2	356,689.3	34,735.8	1,476.4	38,657.5
.15 wt% Sulfur	291.7	218,782.9	357,397.7	28,362.8	1,205.4	33,424.3
.05 wt% Sulfur	291.7	221,223.2	367,357.9	29,332.5	1,246.7	32,942.9
20% Aromatics	291.7	250,488.5	390,296.9	35,525.0	1,509.9	38,715.2
15% Aromatics	291.7	254,659.0	396,220.7	36,652.0	1,557.7	38,236.1
10% Aromatics	291.7	261,003.0	362,060.9	38,224.6	1,624.5	38,035.7
10% Aromaticsc at .05 Sulfur	291.7	259,983.1	381,179.6	38,094.2	1,619.0	38,003.0
10% Aromatics with Purch Feedstock	291.7	251,133.9	386,681.5	36,320.9	1,543.7	37,440.3

1991 Diesel and Aromatics Refinery Emissions Analysis - Diesel Segregation Cases

Increase (Decrease) vs Base case		REFINERY EMISSIONS: #/D				
DESCRIPTION	Diesel Prod 000 B/D	NOx	SOx	CO	VOC	Particulates
NPRA Diesel Segregation: .05% Sulfur w/Investment	291.7	(20,077.9)	(8,165.8)	(2,080.3)	(88.4)	(2,961.9)
NPRA Diesel Segregation: 10% Aromatics w/Investment	291.7	7,077.1	41,342.3	1,959.1	83.2	56.5
50% Diesel Segregation: .05% Sulfur w/Investment	291.7	2,222.4	38,070.9	689.7	29.2	50.1
50% Diesel Segregation: 10% Aromatics w/Investment	291.7	5,874.1	37,108.1	1,658.4	70.4	(56.6)

		REFINERY EMISSIONS: #/D				
CASE EMISSIONS	Diesel Prod 000 B/D	NOx	SOx	CO	VOC	Particulates
DESCRIPTION						
NPRA Diesel Segregation: .05% Sulfur w/Investment	291.7	219,808.5	381,769.7	28,969.2	1,231.3	32,939.2
NPRA Diesel Segregation: 10% Aromatics w/Investment	291.7	251,718.0	295,100.5	45,981.2	1,954.2	42,493.5
50% Diesel Segregation: .05% Sulfur w/Investment	291.7	221,438.9	381,549.5	29,514.3	1,254.3	32,926.0
50% Diesel Segregation: 10% Aromatics w/Investment	291.7	250,515.0	290,866.3	45,680.6	1,941.4	42,380.5

1991 Diesel and Aromatics Refinery Emissions Analysis - Base Case without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	17.9	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	123.7	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	71.6	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	57.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		291.7	0.0	0.0	0.0	0.0	0.0

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2019.6	6264.9	577.0	24.5	43.3
II	Hydroskimming	17.9	3063.6	9503.5	875.3	37.2	65.7
III + IV	Conv + D. Conv	123.7	125,114.0	191,445.9	16,392.3	696.7	19,699.5
V	D. Conversion - LA	71.6	40,498.4	36,786.6	8,617.3	366.2	8,049.7
VI	D. Conversion - N. Cal	57.7	76,278.8	139,919.7	8,229.6	349.8	10,925.1
TOTAL CALIFORNIA		291.7	246,974.3	383,920.5	34,691.6	1,474.4	38,783.2

1991 Diesel and Aromatics Refinery Emissions Analysis - .25 wt% Sulfur without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	17.9	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	123.7	(20,433.0)	(37,473.0)	(2,201.4)	(93.5)	(2,977.4)
V	D. Conversion - LA	71.6	906.1	2,146.8	199.7	8.5	146.8
VI	D. Conversion - N. Cal	57.7	149.2	279.7	18.5	0.8	(18.6)
TOTAL CALIFORNIA		291.7	(19,377.7)	(35,046.5)	(1,983.3)	(84.2)	(2,849.2)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2019.6	6264.9	577.0	24.5	43.3
II	Hydroskimming	17.9	3063.6	9503.5	875.3	37.2	65.7
III + IV	Conv + D. Conv	123.7	97,356.3	178,590.2	10,506.7	446.6	13,893.0
V	D. Conversion - LA	71.6	41,404.5	38,933.4	8,817.0	374.7	8,196.5
VI	D. Conversion - N. Cal	57.7	76,428.0	140,199.4	8,248.1	350.6	10,906.5
TOTAL CALIFORNIA		291.7	220,271.9	373,491.3	29,024.2	1,233.6	33,104.9

1991 Diesel and Aromatics Refinery Emissions Analysis - .20 wt% Sulfur without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	51.6	4379.2	14.8	0.6	1.1
II	Hydroskimming	17.9	78.3	6643.0	22.4	0.9	1.7
III + IV	Conv + D. Conv	123.7	(19,114.8)	(34,184.4)	(2,142.5)	(91.0)	(2,370.6)
V	D. Conversion - LA	71.6	900.0	(2,397.3)	313.0	13.3	(97.8)
VI	D. Conversion - N. Cal	57.7	1,184.0	2,861.3	64.7	2.8	457.8
TOTAL CALIFORNIA		291.7	(16,900.8)	(22,698.1)	(1,727.6)	(73.4)	(2,007.7)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2071.2	10644.1	591.8	25.2	44.4
II	Hydroskimming	17.9	3142.0	16146.5	897.7	38.2	67.4
III + IV	Conv + D. Conv	123.7	98,674.4	181,878.8	10,565.6	449.1	14,499.9
V	D. Conversion - LA	71.6	41,398.4	34,389.3	8,930.3	379.5	7,951.9
VI	D. Conversion - N. Cal	57.7	77,462.8	142,781.0	8,294.4	352.5	11,382.9
TOTAL CALIFORNIA		291.7	222,748.8	385,839.7	29,279.9	1,244.4	33,946.4

1991 Diesel and Aromatics Refinery Emissions Analysis - Max Sulfur Reduction without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	78.4	5436.7	22.4	0.9	1.7
II	Hydroskimming	17.9	119.0	8247.2	34.0	1.4	2.6
III + IV	Conv + D. Conv	123.7	(19,114.8)	(34,184.4)	(2,142.5)	(91.0)	(2,370.6)
V	D. Conversion - LA	71.6	900.0	(2,397.3)	313.0	13.3	(97.8)
VI	D. Conversion - N. Cal	57.7	1,184.0	2,861.3	64.7	2.8	457.8
TOTAL CALIFORNIA		291.7	(16,833.3)	(20,036.4)	(1,708.4)	(72.6)	(2,006.3)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2098.0	11701.6	599.4	25.5	45.0
II	Hydroskimming	17.9	3182.6	17750.7	909.3	38.7	68.2
III + IV	Conv + D. Conv	123.7	98,674.4	181,878.8	10,565.6	449.1	14,499.9
V	D. Conversion - LA	71.6	41,398.4	34,389.3	8,930.3	379.5	7,951.9
VI	D. Conversion - N. Cal	57.7	77,462.8	142,781.0	8,294.4	352.5	11,382.9
TOTAL CALIFORNIA		291.7	222,816.3	388,501.4	29,299.1	1,245.3	33,947.9

1991 Diesel and Aromatics Refinery Emissions Analysis - 5% Aromatics Reduction without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	111.5	4610.7	31.9	1.3	2.4
II	Hydroskimming	17.9	169.1	6994.2	48.3	2.0	3.7
III + IV	Conv + D. Conv	123.7	4,035.8	23,762.5	691.8	29.4	277.4
V	D. Conversion - LA	71.6	931.5	(1,351.5)	329.5	14.0	(112.8)
VI	D. Conversion - N. Cal	57.7	1,184.0	2,909.3	64.7	2.8	457.9
TOTAL CALIFORNIA		291.7	6,431.9	36,925.2	1,166.2	49.6	628.7

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2131.1	10875.5	608.9	25.9	45.7
II	Hydroskimming	17.9	3232.7	16497.6	923.6	39.2	69.3
III + IV	Conv + D. Conv	123.7	129,149.7	215,208.4	17,084.0	726.1	19,976.9
V	D. Conversion - LA	71.6	41,429.9	35,435.1	8,946.9	380.2	7,936.9
VI	D. Conversion - N. Cal	57.7	77,462.8	142,829.0	8,294.4	352.5	11,383.0
TOTAL CALIFORNIA		291.7	253,406.2	420,845.7	35,857.8	1,524.0	39,411.9

1991 Diesel and Aromatics Refinery Emissions Analysis - 10% Aromatics Reduction without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	111.5	4610.7	31.9	1.3	2.4
II	Hydroskimming	17.9	169.1	6994.2	48.3	2.0	3.7
III + IV	Conv + D. Conv	123.7	4,359.0	23,736.2	566.0	24.1	634.4
V	D. Conversion - LA	71.6	-	-	-	-	-
VI	D. Conversion - N. Cal	57.7	-	-	-	-	-
TOTAL CALIFORNIA		291.7	4,639.6	35,341.1	646.2	27.4	640.5

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2131.1	10875.5	608.9	25.9	45.7
II	Hydroskimming	17.9	3232.7	16497.6	923.6	39.2	69.3
III + IV	Conv + D. Conv	123.7	113,393.1	209,487.8	13,529.1	575.0	16,757.6
V	D. Conversion - LA	71.6	-	-	-	-	-
VI	D. Conversion - N. Cal	57.7	-	-	-	-	-
TOTAL CALIFORNIA		291.7	118,756.9	236,861.0	15,061.7	640.1	16,872.6

1991 Diesel and Aromatics Refinery Emissions Analysis - Max Aromatics Reduction without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	309.7	5224.1	88.5	3.7	6.7
II	Hydroskimming	17.9	169.1	6994.2	48.3	2.0	3.7
III + IV	Conv + D. Conv	123.7	4,035.8	23,762.5	691.8	29.4	277.4
V	D. Conversion - LA	71.6	931.5	(1,351.5)	329.5	14.0	(112.8)
VI	D. Conversion - N. Cal	57.7	1,184.0	2,909.3	64.7	2.8	457.9
TOTAL CALIFORNIA		291.7	6,630.2	37,538.6	1,222.9	52.0	632.9

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2329.3	11489.0	665.5	28.3	49.9
II	Hydroskimming	17.9	3533.5	17428.2	1009.6	42.9	75.8
III + IV	Conv + D. Conv	123.7	129,149.7	215,208.4	17,084.0	726.1	19,976.9
V	D. Conversion - LA	71.6	41,429.9	35,435.1	8,946.9	380.2	7,936.9
VI	D. Conversion - N. Cal	57.7	77,462.8	142,829.0	8,294.4	352.5	11,383.0
TOTAL CALIFORNIA		291.7	253,905.2	422,389.6	36,000.4	1,530.0	39,422.6

1991 Diesel and Aromatics Refinery Emissions Analysis - Base Case with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	17.9	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	123.7	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	71.6	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	57.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		291.7	0.0	0.0	0.0	0.0	0.0

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2019.6	6264.9	577.0	24.5	43.3
II	Hydroskimming	17.9	3063.6	9503.5	875.3	37.2	65.7
III + IV	Conv + D. Conv	123.7	125,225.3	176,190.0	16,418.0	697.8	19,628.5
V	D. Conversion - LA	71.6	40,498.4	36,786.6	8,617.3	366.2	8,049.7
VI	D. Conversion - N. Cal	57.7	76,362.3	127,944.3	8,248.1	350.6	10,870.3
TOTAL CALIFORNIA		291.7	247,169.2	356,689.3	34,735.8	1,476.4	38,657.5

1991 Diesel and Aromatics Refinery Emissions Analysis - .15 wt% Sulfur with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	66.1	3351.1	18.9	0.8	1.4
II	Hydroskimming	17.9	100.2	5083.5	28.6	1.2	2.1
III + IV	Conv + D. Conv	123.7	(19,114.8)	(34,184.4)	(2,142.5)	(91.0)	(2,370.6)
V	D. Conversion - LA	71.6	825.0	(3,093.9)	279.4	11.9	(64.7)
VI	D. Conversion - N. Cal	57.7	236.9	(817.5)	27.7	1.1	22.3
TOTAL CALIFORNIA		291.7	(17,886.6)	(29,661.2)	(1,787.9)	(76.0)	(2,409.5)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2085.7	9616.0	595.9	25.3	44.7
II	Hydroskimming	17.9	100.2	5083.5	28.6	1.2	2.1
III + IV	Conv + D. Conv	123.7	98,674.4	181,878.8	10,565.6	449.1	14,499.9
V	D. Conversion - LA	71.6	41,323.3	33,692.7	8,896.7	378.1	7,985.0
VI	D. Conversion - N. Cal	57.7	76,599.3	127,126.9	8,275.9	351.7	10,892.6
TOTAL CALIFORNIA		291.7	218,782.9	357,397.7	28,362.8	1,205.4	33,424.3

1991 Diesel Aromatics & Sulfur Results - .05 Sulfur with Investment

GROUP	DESCRIPTION	% SULFUR	DIESEL PROD 000 B/D	DIESEL SULFUR WT%	DIESEL CETANE NO	DIESEL POLY AROM VOL%	DIESEL TOTAL AROM VOL%	REFINERY COST CHANGES NET FEEDST 000 $/D	VAR COST 000 $/D	FIXED COST 000 $/D	CAPITAL COST 000 $/D	TOTAL COST 000 $/D	TOTAL COST CPG **	INV MILLIO
I	Topping	0.05	20.8	0.05	36.7	4.9	20.4	380.0	9.2	25.5	26.4	441.1	50.5	3
II	Hydroskimming	0.05	17.9	0.05	39.9	6.4	26.7	93.8	2.3	9.2	17.8	123.1	16.4	2
III + IV	Conv + D. Conv	0.05	73.5	0.05	47.5	7.6	27.9	4.7	1.7	2.1	78.6	87.0	2.8	11
V	D. Conversion - LA	0.05	41.0	0.05	49.8	7.7	31.6	10.3	9.8	18.0	33.4	71.4	4.1	4
VI	D. Conversion - N. Cal	0.05	36.7	0.05	45.9	6.3	28.3	4.8	1.0	3.9	33.6	43.3	2.8	4
TOTAL HIGH SULFUR		0.05	189.9	0.05	45.8	7.0	27.8	493.6	23.9	58.7	189.8	766.0	9.6	26
TOTAL CALIFORNIA		0.05	291.7	0.05	44.9	6.8	29.4	493.6	23.9	58.7	189.8	766.0	6.3	26

GROUP	DESCRIPTION	PROCESS ADDITIONS : 000 B/D NAPHTHA HDT	DIST HDT	DIST HR7	AROM HDA	H2 PLANT	MOBIL OLEFINS	MOBIL MOGD	PURCHASED STOCKS SO LA GAS OIL 000 B/D
I	Topping	0.0	27.2	0.0	0.0	0.0	0.0	0.0	0.0
II	Hydroskimming	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	0.0	0.0	38.6	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	0.0	0.0	17.3	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	0.0	0.0	22.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		0.0	33.9	78.5	0.0	0.0	0.0	0.0	0.0

Note: Volume & Cents/Gallon are based on High Sulfur Diesel volume only for Groups III, V, and VI.

1991 Diesel and Aromatics Refinery Emissions Analysis - 20% Aromatics with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	144.5	3595.9	41.3	1.7	3.1
II	Hydroskimming	17.9	219.2	5454.8	62.6	2.6	4.7
III + IV	Conv + D. Conv	123.7	1,421.6	15,448.4	270.8	11.5	108.3
V	D. Conversion - LA	71.6	874.1	(3,016.5)	340.4	14.5	(147.7)
VI	D. Conversion - N. Cal	57.7	659.9	12,125.0	74.0	3.1	89.3
TOTAL CALIFORNIA		291.7	3,319.3	33,607.6	789.2	33.5	57.7

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2164.1	9860.7	618.3	26.3	46.4
II	Hydroskimming	17.9	3282.9	14958.2	938.0	39.9	70.4
III + IV	Conv + D. Conv	123.7	126,646.9	191,638.4	16,688.8	709.3	19,736.8
V	D. Conversion - LA	71.6	41,372.4	33,770.1	8,957.8	380.7	7,901.9
VI	D. Conversion - N. Cal	57.7	77,022.2	140,069.4	8,322.1	353.7	10,959.6
TOTAL CALIFORNIA		291.7	250,488.5	390,296.9	35,525.0	1,509.9	38,715.2

1991 Diesel and Aromatics Refinery Emissions Analysis - 15% Aromatics with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	627.8	8094.0	179.4	7.6	13.5
II	Hydroskimming	17.9	952.3	12278.3	272.1	11.5	20.4
III + IV	Conv + D. Conv	123.7	2,701.1	12,746.1	587.7	25.0	(167.9)
V	D. Conversion - LA	71.6	1,936.1	(3,638.0)	682.9	29.0	(182.6)
VI	D. Conversion - N. Cal	57.7	1,272.5	10,051.0	194.2	8.2	(104.7)
TOTAL CALIFORNIA		291.7	7,489.8	39,531.4	1,916.2	81.4	(421.4)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2647.4	14358.9	756.4	32.1	56.7
II	Hydroskimming	17.9	4015.9	21781.7	1147.4	48.8	86.1
III + IV	Conv + D. Conv	123.7	127,926.4	188,936.1	17,005.7	722.8	19,460.6
V	D. Conversion - LA	71.6	42,434.5	33,148.6	9,300.2	395.3	7,867.1
VI	D. Conversion - N. Cal	57.7	77,634.9	137,995.4	8,442.3	358.8	10,765.6
TOTAL CALIFORNIA		291.7	254,659.0	396,220.7	36,652.0	1,557.7	38,236.1

1991 Diesel and Aromatics Refinery Emissions Analysis - 10% Aromatics with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	1879.1	10968.9	536.9	22.8	40.3
II	Hydroskimming	17.9	2850.5	16639.3	814.5	34.6	61.1
III + IV	Conv + D. Conv	123.7	4,382.0	(16,235.0)	875.6	37.2	(198.4)
V	D. Conversion - LA	71.6	2,565.2	6,830.6	928.1	39.4	(314.7)
VI	D. Conversion - N. Cal	57.7	2,156.9	(12,832.2)	333.8	14.2	(210.0)
TOTAL CALIFORNIA		291.7	13,833.8	5,371.7	3,488.8	148.2	(621.9)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	3898.7	17233.8	1113.9	47.3	83.5
II	Hydroskimming	17.9	5914.2	26142.7	1689.8	71.8	126.7
III + IV	Conv + D. Conv	123.7	129,607.3	159,955.0	17,293.5	735.0	19,430.1
V	D. Conversion - LA	71.6	43,063.6	43,617.2	9,545.5	405.7	7,735.0
VI	D. Conversion - N. Cal	57.7	78,519.3	115,112.2	8,582.0	364.7	10,660.3
TOTAL CALIFORNIA		291.7	261,003.0	362,060.9	38,224.6	1,624.5	38,035.7

1991 Diesel and Aromatics Refinery Emissions Analysis - 10% Aromatics at .05 wt% Sulfur with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	1879.1	10968.9	536.9	22.8	40.3
II	Hydroskimming	17.9	2850.5	16639.3	814.5	34.6	61.1
III + IV	Conv + D. Conv	123.7	4,382.0	(16,235.0)	875.6	37.2	(198.4)
V	D. Conversion - LA	71.6	2,565.2	6,830.6	928.1	39.4	(314.7)
VI	D. Conversion - N. Cal	57.7	1,137.1	6,286.5	203.4	8.6	(242.7)
TOTAL CALIFORNIA		291.7	12,813.9	24,490.4	3,358.4	142.6	(654.6)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	3898.7	17233.8	1113.9	47.3	83.5
II	Hydroskimming	17.9	5914.2	26142.7	1689.8	71.8	126.7
III + IV	Conv + D. Conv	123.7	129,607.3	159,955.0	17,293.5	735.0	19,430.1
V	D. Conversion - LA	71.6	43,063.6	43,617.2	9,545.5	405.7	7,735.0
VI	D. Conversion - N. Cal	57.7	77,499.4	134,230.9	8,451.6	359.2	10,627.6
TOTAL CALIFORNIA		291.7	259,983.1	381,179.6	38,094.2	1,619.0	38,003.0

1991 Diesel and Aromatics Refinery Emissions Analysis - 10% Aromatics with Investment & Purchased Feedstock

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	879.7	6574.5	251.3	10.7	18.8
II	Hydroskimming	17.9	1334.4	9973.2	381.3	16.2	28.6
III + IV	Conv + D. Conv	123.7	1,159.8	4,545.3	489.2	20.8	(508.2)
V	D. Conversion - LA	71.6	908.5	5,405.5	417.0	17.7	(304.4)
VI	D. Conversion - N. Cal	57.7	(317.6)	3,493.7	46.2	2.0	(452.0)
TOTAL CALIFORNIA		291.7	3,964.7	29,992.2	1,585.1	67.3	(1,217.2)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2899.3	12839.4	828.4	35.2	62.1
II	Hydroskimming	17.9	4398.0	19476.7	1256.6	53.4	94.2
III + IV	Conv + D. Conv	123.7	126,385.1	180,735.3	16,907.2	718.6	19,120.3
V	D. Conversion - LA	71.6	41,406.8	42,192.1	9,034.3	383.9	7,745.3
VI	D. Conversion - N. Cal	57.7	76,044.7	131,438.0	8,294.4	352.5	10,418.3
TOTAL CALIFORNIA		291.7	251,133.9	386,681.5	36,320.9	1,543.7	37,440.3

1991 Diesel and Aromatics Refinery Emissions Analysis - NPRA Segregation: .05% Sulfur with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	194.1	7879.2	55.5	2.4	4.2
II	Hydroskimming	17.9	294.4	11952.3	84.1	3.6	6.3
III + IV	Conv + D. Conv	123.7	(20,433.0)	(37,473.0)	(2,201.4)	(93.5)	(2,977.4)
V	D. Conversion - LA	71.6	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	57.7	(133.4)	9,475.6	(18.5)	(0.8)	5.1
TOTAL CALIFORNIA		291.7	(20,077.9)	(8,165.8)	(2,080.3)	(88.4)	(2,961.9)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	2213.7	14144.0	632.5	26.9	47.4
II	Hydroskimming	17.9	3358.0	21455.8	959.4	40.8	72.0
III + IV	Conv + D. Conv	123.7	97,509.5	171,963.2	10,530.3	447.5	13,894.7
V	D. Conversion - LA	71.6	40,498.4	36,786.6	8,617.3	366.2	8,049.7
VI	D. Conversion - N. Cal	57.7	76,228.9	137,420.0	8,229.6	349.8	10,875.5
TOTAL CALIFORNIA		291.7	219,808.5	381,769.7	28,969.2	1,231.3	32,939.2

1991 Diesel and Aromatics Refinery Emissions Analysis - NPRA Segregation: 10% Aromatics

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	1879.1	10968.9	536.9	22.8	40.3
II	Hydroskimming	17.9	2850.5	16639.3	814.5	34.6	61.1
III + IV	Conv + D. Conv	123.7	1,478.0	406.8	412.5	17.5	46.5
V	D. Conversion - LA	71.6	92.4	(5,018.6)	84.3	3.6	(74.2)
VI	D. Conversion - N. Cal	57.7	777.1	18,346.0	111.0	4.7	(17.2)
TOTAL CALIFORNIA		291.7	7,077.1	41,342.3	1,959.1	83.2	56.5

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	3898.7	17233.8	1113.9	47.3	83.5
II	Hydroskimming	17.9	5914.2	26142.7	1689.8	71.8	126.7
III + IV	Conv + D. Conv	123.7	124,175.0	73,665.7	26,116.8	1,110.0	23,454.5
V	D. Conversion - LA	71.6	40,590.7	31,768.0	8,701.7	369.8	7,975.5
VI	D. Conversion - N. Cal	57.7	77,139.4	146,290.3	8,359.1	355.3	10,853.2
TOTAL CALIFORNIA		291.7	251,718.0	295,100.5	45,981.2	1,954.2	42,493.5

1991 Diesel and Aromatics Refinery Emissions Analysis - 50% Segregation: .05% Sulfur with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	1879.1	10968.9	536.9	22.8	40.3
II	Hydroskimming	17.9	131.5	6537.8	37.6	1.6	2.8
III + IV	Conv + D. Conv	123.7	(170.0)	12,070.3	(23.6)	(1.0)	6.5
V	D. Conversion - LA	71.6	515.2	(981.8)	157.3	6.7	(4.7)
VI	D. Conversion - N. Cal	57.7	(133.4)	9,475.6	(18.5)	(0.8)	5.1
TOTAL CALIFORNIA		291.7	2,222.4	38,070.9	689.7	29.2	50.1

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	3898.7	17233.8	1113.9	47.3	83.5
II	Hydroskimming	17.9	3195.2	16041.3	912.9	38.8	68.4
III + IV	Conv + D. Conv	123.7	97,102.6	175,049.7	10,483.2	445.5	13,853.5
V	D. Conversion - LA	71.6	41,013.6	35,804.8	8,774.6	372.9	8,045.0
VI	D. Conversion - N. Cal	57.7	76,228.9	137,420.0	8,229.6	349.8	10,875.5
TOTAL CALIFORNIA		291.7	221,438.9	381,549.5	29,514.3	1,254.3	32,926.0

1991 Diesel and Aromatics Refinery Emissions Analysis - 50% Segregation: 10% Aromatics

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	1879.1	10968.9	536.9	22.8	40.3
II	Hydroskimming	17.9	783.1	8434.5	223.8	9.5	16.8
III + IV	Conv + D. Conv	123.7	1,526.4	467.1	424.0	18.1	57.1
V	D. Conversion - LA	71.6	908.4	(1,108.3)	362.8	15.4	(153.6)
VI	D. Conversion - N. Cal	57.7	777.1	18,346.0	111.0	4.7	(17.2)
TOTAL CALIFORNIA		291.7	5,874.1	37,108.1	1,658.4	70.4	(56.6)

CASE EMISSIONS		Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	20.8	3898.7	17233.8	1113.9	47.3	83.5
II	Hydroskimming	17.9	3846.7	17937.9	1099.1	46.7	82.4
III + IV	Conv + D. Conv	123.7	124,223.4	73,726.0	26,128.4	1,110.5	23,465.2
V	D. Conversion - LA	71.6	41,406.8	35,678.3	8,980.1	381.7	7,896.1
VI	D. Conversion - N. Cal	57.7	77,139.4	146,290.3	8,359.1	355.3	10,853.2
TOTAL CALIFORNIA		291.7	250,515.0	290,866.3	45,680.6	1,941.4	42,380.5

1991 Gasoline Aromatics Refinery Emissions Analysis - Summary Gasoline without Investment

Increase (Decrease) vs Base case

DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case without Investment	823.0	0.0	0.0	0.0	0.0	0.0
Max Aromatics Reduction	823.0	5,889.5	(43,100.3)	1,096.5	46.6	867.2

CASE EMISSIONS DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case without Investment	823.0	152,216.7	183,310.3	26,387.2	1,121.4	27,101.2
Max Aromatics Reduction	823.0	158,106.1	140,210.0	27,483.7	1,168.0	27,968.4

1991 Gasoline Aromatics Refinery Emissions Analysis - Summary Gasoline with Investment

Increase (Decrease) vs Base case		REFINERY EMISSIONS: #/D				
DESCRIPTION	Gasoline Prod 000 B/D	NOx	SOx	CO	VOC	Particulates
Base Case with Investment	823.0	0.0	0.0	0.0	0.0	0.0
5% Aromatics Reduction	823.0	(633.2)	13,708.9	(79.5)	(3.4)	0.0
Max Aromatics Reduction	823.0	22,063.2	(25,049.5)	4,285.2	182.1	0.0
Max Aromatics Reduction with Purch Feedstock	823.0	(5,302.2)	(19,950.5)	(1,297.0)	(55.1)	0.0

		REFINERY EMISSIONS: #/D				
CASE EMISSIONS	Diesel Prod 000 B/D	NOx	SOx	CO	VOC	Particulates
DESCRIPTION						
Base Case with Investment	823.0	149,542.2	181,370.5	25,634.9	1,089.5	26,872.7
5% Aromatics Reduction	823.0	148,909.0	195,079.3	25,555.3	1,086.1	26,669.9
Max Aromatics Reduction	823.0	171,605.4	156,321.0	29,920.1	1,271.6	28,414.0
Max Aromatics Reduction with Purch Feedstock	823.0	144,240.0	161,420.0	24,337.9	1,034.4	26,078.5

1991 Gasoline Refinery Emissions Analysis - Base Case without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	315.3	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	258.5	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	230.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		823.0	0.0	0.0	0.0	0.0	0.0

CASE EMISSIONS		Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	2021.4	6290.2	577.5	24.5	43.3
III + IV	Conv + D. Conv	315.3	45,808.1	25,458.7	9,677.6	411.3	8,873.1
V	D. Conversion - LA	258.5	48,915.5	45,750.2	10,128.5	430.5	10,354.1
VI	D. Conversion - N. Cal	230.7	55,471.7	105,811.1	6,003.6	255.1	7,830.7
TOTAL CALIFORNIA		823.0	152,216.7	183,310.3	26,387.2	1,121.4	27,101.2

1991 Gasoline Refinery Emissions Analysis - Max Aromatics Reduction without Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	444.1	3637.2	126.9	5.4	9.5
III + IV	Conv + D. Conv	315.3	1,480.3	1,159.6	316.7	13.5	305.3
V	D. Conversion - LA	258.5	1,663.3	(10,651.4)	456.5	19.4	(0.0)
VI	D. Conversion - N. Cal	230.7	2,301.8	(37,245.8)	196.3	8.3	552.3
TOTAL CALIFORNIA		823.0	5,889.5	(43,100.3)	1,096.5	46.6	867.2

CASE EMISSIONS		Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	2465.5	9927.5	704.4	29.9	52.8
III + IV	Conv + D. Conv	315.3	47,288.4	26,618.3	9,994.3	424.7	9,178.4
V	D. Conversion - LA	258.5	50,578.8	35,098.9	10,585.1	449.9	10,354.1
VI	D. Conversion - N. Cal	230.7	57,773.4	68,565.4	6,199.9	263.5	8,383.0
TOTAL CALIFORNIA		823.0	158,106.1	140,210.0	27,483.7	1,168.0	27,968.4

1991 Gasoline Refinery Emissions Analysis - Base Case with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	0.0	0.0	0.0	0.0	0.0
III + IV	Conv + D. Conv	315.3	0.0	0.0	0.0	0.0	0.0
V	D. Conversion - LA	258.5	0.0	0.0	0.0	0.0	0.0
VI	D. Conversion - N. Cal	230.7	0.0	0.0	0.0	0.0	0.0
TOTAL CALIFORNIA		823.0	0.0	0.0	0.0	0.0	0.0

CASE EMISSIONS		Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	1867.8	6180.7	533.7	22.7	40.0
III + IV	Conv + D. Conv	315.3	43,742.8	25,921.8	9,193.4	390.7	8,644.9
V	D. Conversion - LA	258.5	47,936.0	44,696.7	9,830.0	417.8	10,362.4
VI	D. Conversion - N. Cal	230.7	55,995.6	104,571.2	6,077.8	258.3	7,825.3
TOTAL CALIFORNIA		823.0	149,542.2	181,370.5	25,634.9	1,089.5	26,872.7

1991 Gasoline Refinery Emissions Analysis - 5% Aromatics Reduction with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	568.7	3536.3	162.5	6.9	12.2
III + IV	Conv + D. Conv	315.3	(270.3)	(2,909.5)	(34.6)	(1.5)	(66.5)
V	D. Conversion - LA	258.5	(655.3)	14,369.8	(187.2)	(8.0)	(66.0)
VI	D. Conversion - N. Cal	230.7	(276.3)	(1,287.7)	(20.2)	(0.9)	(82.5)
TOTAL CALIFORNIA		823.0	(633.2)	13,708.9	(79.5)	(3.4)	0.0

CASE EMISSIONS		Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	2436.5	9717.0	696.1	29.6	52.2
III + IV	Conv + D. Conv	315.3	43,472.6	23,012.3	9,158.9	389.3	8,578.4
V	D. Conversion - LA	258.5	47,280.7	59,066.5	9,642.7	409.8	10,296.4
VI	D. Conversion - N. Cal	230.7	55,719.3	103,283.5	6,057.6	257.4	7,742.8
TOTAL CALIFORNIA		823.0	148,909.0	195,079.3	25,555.3	1,086.1	26,669.9

1991 Gasoline Refinery Emissions Analysis - Max Aromatics Reduction with Investment

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	568.7	3536.3	162.5	6.9	12.2
III + IV	Conv + D. Conv	315.3	6,279.3	3,283.1	1,480.6	62.9	762.7
V	D. Conversion - LA	258.5	4,865.5	8,808.8	1,390.2	59.1	42.3
VI	D. Conversion - N. Cal	230.7	10,349.7	(40,677.6)	1,252.0	53.2	724.2
TOTAL CALIFORNIA		823.0	22,063.2	(25,049.5)	4,285.2	182.1	0.0

CASE EMISSIONS		Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	2436.5	9717.0	696.1	29.6	52.2
III + IV	Conv + D. Conv	315.3	50,022.1	29,204.9	10,674.1	453.7	9,407.6
V	D. Conversion - LA	258.5	52,801.5	53,505.4	11,220.1	476.8	10,404.8
VI	D. Conversion - N. Cal	230.7	66,345.3	63,893.6	7,329.8	311.5	8,549.4
TOTAL CALIFORNIA		823.0	171,605.4	156,321.0	29,920.1	1,271.6	28,414.0

1991 Gasoline Refinery Emissions Analysis - Max Aromatics Reduction with Investment & Purchased Feedstock

Arthur D. Little, Inc.

Increase (Decrease) vs Base case

GROUP	DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	-182.6	-225.1	-52.2	-2.2	-3.9
III + IV	Conv + D. Conv	315.3	(718.0)	(446.2)	(224.3)	(9.5)	58.0
V	D. Conversion - LA	258.5	(4,691.7)	(3,562.5)	(1,094.7)	(46.5)	(674.4)
VI	D. Conversion - N. Cal	230.7	290.2	(15,716.7)	74.2	3.2	(173.8)
TOTAL CALIFORNIA		823.0	(5,302.2)	(19,950.5)	(1,297.0)	(55.1)	0.0

CASE EMISSIONS		Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
I	Topping	-	-	-	-	-	-
II	Hydroskimming	18.5	1685.2	5955.6	481.5	20.4	36.1
III + IV	Conv + D. Conv	315.3	43,024.8	25,475.7	8,969.1	381.2	8,702.9
V	D. Conversion - LA	258.5	43,244.2	41,134.1	8,735.3	371.3	9,688.1
VI	D. Conversion - N. Cal	230.7	56,285.8	88,854.6	6,152.0	261.5	7,651.4
TOTAL CALIFORNIA		823.0	144,240.0	161,420.0	24,337.9	1,034.4	26,078.5

Arthur D. Little, Inc.

L. 1995 REFINERY EMISSION RESULTS

1995 Diesel and Aromatics Analysis - Summary Diesel with Investment

Increase (Decrease) vs Base case

DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case with Investment	75.3	0.0	0.0	0.0	0.0	0.0
.05 wt% Sulfur	75.3	847.3	(1,493.1)	356.4	15.1	(210.9)
20% Aromatics	75.3	916.7	3,146.1	443.9	18.9	(348.2)
15% Aromatics	75.3	1,736.3	4,816.9	778.2	33.1	(539.0)
10% Aromatics	75.3	3,460.8	9,088.2	1,184.5	50.3	(319.4)

DESCRIPTION	Diesel Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case with Investment	75.3	39,532.8	35,620.4	8,236.7	350.1	8,307.2
.05 wt% Sulfur	75.3	40,380.1	34,127.3	8,593.1	365.2	8,096.4
20% Aromatics	75.3	40,449.5	38,766.5	8,680.6	368.9	7,959.0
15% Aromatics	75.3	41,269.0	40,437.3	9,014.9	383.1	7,768.2
10% Aromatics	75.3	42,993.6	44,708.6	9,421.2	400.4	7,987.8

Note: Results are for Group V Only.

1995 Gasoline Refinery Emissions Analysis - Summary Gasoline with Investment

Increase (Decrease) vs Base case

DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case with Investment	260.6	0.0	(0.0)	(0.0)	(0.0)	(0.0)
Max Aromatics Reduction	260.6	16,851.2	3,108.7	4,647.0	197.5	630.2

DESCRIPTION	Gasoline Prod 000 B/D	REFINERY EMISSIONS: #/D NOx	SOx	CO	VOC	Particulates
Base Case with Investment	260.6	47,826.8	43,093.6	9,964.8	423.5	10,050.1
Max Aromatics Reduction	260.6	64,678.0	46,202.3	14,611.8	621.0	10,680.3

Note: Results are for Group V Only.

Arthur D. Little, Inc.

M. 1991 TYPICAL DIESEL AND GASOLINE BLENDS

Typical High Sulfur Diesel Blends - Diesel Sulfur Reduction

	Base Case w/o Investment		Max Sulfur Reduction w/o Investment		Base Case with Investment		.15% Sulfur with Investment		.05% Sulfur with Investment	
	act	%	act	%	act	%	act	%	act	%
Heavy Naptha	0.00	-	0.01	0.04%	0.00	-	0.00	-	0.00	0.03%
Atmospheric Light Gas Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Light Gas Oil, Hydrotreated	0.00	-	0.43	2.75%	0.00	-	0.53	3.42%	0.59	3.76%
Atmospheric Heavy Gas Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Heavy Gas Oil, Hydrotreated	9.18	58.83%	11.92	76.41%	9.31	59.68%	9.59	61.45%	1.86	11.90%
Atmospheric Heavy Gas Oil, Hydrorefined	0.00	-	0.00	-	0.00	-	2.88	18.47%	10.25	65.73%
Atmospheric Heavy Gas Oil, Dearomitized	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Full Range Gas Oil	5.69	36.47%	1.10	7.03%	5.50	35.23%	0.00	-	0.00	-
Light Cat Cycle Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Light Cat Cycle Oil, Hydrotreated	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Light Cat Cycle Oil, Hydrorefined	0.00	-	0.00	-	0.00	-	0.44	2.82%	0.73	4.71%
Light Cat Cycle Oil, Dearomitized	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Hydrocracker Jet	0.73	4.70%	2.15	13.78%	0.79	5.08%	2.16	13.84%	2.16	13.87%
Mobil Diesel	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
PurchasedLow Aromatics Blendstocks	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Coker Light Gas Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Coker Light Gas Oil, Hydrotreated	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Coker Light Gas Oil, Hydrorefined	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Coker Light Gas Oil, Dearomitized	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Total Activity	15.60	100.00%	15.60	100.00%	15.60	100.00%	15.60	100.00%	15.60	100.00%
Diesel Qualities										
Specific Gravity		0.859		0.845		0.859		0.856		0.855
Sulfur: wt%		0.30		0.21		0.30		0.15		0.05
Cetane No.		45.8		47.2		45.9		47.0		47.2
Mono Aromatics: %		20.1		20.4		20.1		20.8		21.1
Poly Aromatics: %		7.6		6.8		7.6		6.8		6.1
Total Aromatics: %		27.7		27.2		27.7		27.6		27.2

Typical High Sulfur Diesel Blends - Diesel Aromatics Reduction

	Base Case w/o Investment		Max Aromatics Reduction w/o Investment		Base Case with Investment		25% Aromatics Reduction with Investment		50% Aromatics Reduction with Investment		Max Aromatics Reduction with Investment		Max Aromatics Reduction with Investment and Purch Feedstock		.05% Sulfur + Max Aromatics Reduction with Investment	
	act	%	act	%	act	%	act	%	act	%	act	%	act	%	act	%
Heavy Naptha	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.10	0.66%	0.00	-	0.10	0.66%
Atmospheric Light Gas Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Light Gas Oil, Hydrotreated	0.00	-	0.30	1.91%	0.00	-	0.00	-	0.00	-	0.37	2.37%	0.42	2.72%	0.32	2.03%
Atmospheric Heavy Gas Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Heavy Gas Oil, Hydrotreated	9.18	58.83%	11.26	72.16%	9.31	59.68%	6.95	44.55%	1.58	10.11%	0.00	-	0.98	6.30%	0.50	3.23%
Atmospheric Heavy Gas Oil, Hydrorefined	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Heavy Gas Oil, Dearomitized	0.00	-	0.00	-	0.00	-	3.35	21.49%	7.87	50.43%	9.68	62.06%	9.58	61.38%	9.56	61.30%
Full Range Gas Oil	5.69	36.47%	1.89	12.14%	5.50	35.23%	2.27	14.54%	2.74	17.57%	1.77	11.35%	0.26	1.67%	0.96	6.14%
Light Cat Cycle Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Light Cat Cycle Oil, Hydrotreated	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Light Cat Cycle Oil, Hydrorefined	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Light Cat Cycle Oil, Dearomitized	0.00	-	0.00	-	0.00	-	0.00	-	0.30	1.90%	0.00	-	0.00	-	0.12	0.75%
Hydrocracker Jet	0.73	4.70%	2.15	13.79%	0.79	5.08%	2.17	13.93%	2.30	14.74%	2.32	14.87%	0.00	-	2.40	15.36%
Mobil Diesel	0.00	-	0.00	-	0.00	-	0.00	-	0.82	5.27%	1.35	8.68%	0.15	0.97%	0.88	5.63%
PurchasedLow Aromatics Blendstocks	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	4.20	26.95%	0.00	-
Coker Light Gas Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Coker Light Gas Oil, Hydrotreated	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Coker Light Gas Oil, Hydrorefined	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Coker Light Gas Oil, Dearomitized	0.00	-	0.00	-	0.00	-	0.86	5.50%	0.00	-	0.00	-	0.00	-	0.77	4.91%
Total Activity	15.60	100.00%	15.60	100.00%	15.60	100.00%	15.60	100.00%	15.60	100.00%	15.60	100.00%	15.60	100.00%	15.60	100.00%
Diesel Qualities																
Specific Gravity		0.859		0.856		0.859		0.854		0.844		0.839		0.846		0.842
Sulfur: wt%		0.30		0.24		0.30		0.16		0.12		0.07		0.05		0.05
Cetane No.		45.8		45.9		45.9		47.6		49.5		50.3		51.1		50.0
Mono Aromatics: %		20.1		19.9		20.1		16.6		16.8		9.6		9.0		9.7
Poly Aromatics: %		7.6		6.5		7.6		4.4		1.7		0.4		1.0		0.3
Total Aromatics: %		27.7		26.4		27.7		20.6		13.5		10.0		10.0		10.0

Arthur D. Little, Inc.

Typical Low Sulfur Diesel Blends - Diesel Aromatics Reduction

	Base Case w/o Investment		Max Aromatics Reduction w/o Investment		Base Case with Investment		25% Aromatics Reduction with Investment		50% Aromatics Reduction with Investment		Max Aromatics Reduction with Investment		Max Aromatics Reduction with Investment and Purch Feedstock	
	act	%	act	%	act	%	act	%	act	%	act	%	act	%
Heavy Naptha	0.00	-	0.76	8.31%	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Light Gas Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Light Gas Oil, Hydrotreated	0.00	-	0.93	10.15%	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Heavy Gas Oil, Hydrotreated	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Atmospheric Heavy Gas Oil, Hydrorefined	8.03	87.31%	5.55	60.31%	8.05	87.47%	4.70	51.06%	1.03	11.22%	0.00	-	0.00	-
Atmospheric Heavy Gas Oil, Dearomitized	0.00	-	0.00	-	0.05	0.50%	3.04	33.00%	6.37	69.21%	7.31	79.43%	7.29	79.21%
Full Range Gas Oil	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Light Cat Cycle Oil, Hydrorefined	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
Light Cat Cycle Oil, Dearomitized	0.00	-	0.00	-	0.00	-	0.04	0.48%	0.38	4.09%	0.00	-	0.00	-
Hydrocracker Jet	0.49	5.29%	0.92	10.02%	0.42	4.61%	0.77	8.39%	0.77	8.40%	0.68	7.42%	0.00	-
Mobil Diesel	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.48	5.23%	0.31	3.39%
Purchased Low Aromatics Feedstocks	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.89	9.62%
Visbreaker Gas Oil, Hydrorefined	0.68	7.39%	1.03	11.20%	0.68	7.41%	0.65	7.06%	0.65	7.09%	0.00	-	0.00	-
Visbreaker Gas Oil, Dearomitized	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-	0.73	7.92%	0.72	7.78%
Total Activity	9.20	100.00%	9.20	100.00%	9.20	100.00%	9.20	100.00%	9.20	100.00%	9.20	100.00%	9.20	100.00%
Diesel Qualities														
Specific Gravity		0.851		0.842		0.852		0.846		0.840		0.836		0.839
Sulfur: wt%		0.050		0.005		0.006		0.004		0.002		0.000		0.006
Cetane No.		49.9		48.1		49.9		51.4		53.0		53.9		54.0
Mono Aromatics: %		22.2		21.0		22.2		17.5		12.8		9.9		9.6
Poly Aromatics: %		5.6		4.5		5.6		3.2		0.8		0.1		0.4
Total Aromatics: %		27.8		25.5		27.8		20.7		13.6		10.0		10.0

Arthur D. Little, Inc.

Typical Gasoline Blends - Gasoline Aromatics Reduction

	Base Case		10% Aromatics Reduction		20% Aromatics Reduction		Max Aromatics Reduction with Investment & PF	
	with Investment act	%	with Investment act	%	with Investment act	%	act	%
Cat Gasoline	27.86	32.58%	28.61	33.46%	19.97	23.36%	25.74	30.10%
Reformate	22.49	26.31%	26.85	31.40%	31.13	36.41%	26.78	31.32%
Alkylate	10.70	12.51%	10.84	12.68%	13.67	15.98%	8.72	10.20%
Dimate/ Cat Poly	0.00	-	0.00	-	0.00	-	0.00	-
Isomerate	0.00	-	3.43	4.02%	4.21	4.92%	3.16	3.69%
Naptha	5.23	6.12%	0.01	0.01%	0.00	-	0.00	-
Lt. Hydrocrackate	5.68	6.64%	5.46	6.38%	4.64	5.43%	6.27	7.33%
Coker Naptha	2.80	3.27%	2.62	3.07%	2.76	3.23%	2.62	3.06%
MTBE	3.37	3.94%	3.45	4.03%	3.73	4.36%	7.40	8.66%
Ethanol	0.00	-	0.00	-	0.00	-	0.00	-
Toluene	0.00	-	0.00	-	0.00	-	0.00	-
Raffinate	0.00	-	0.00	-	1.31	1.53%	0.85	0.99%
BTX	0.00	-	0.00	-	0.00	-	0.00	-
Mobil Gasoline	0.00	-	0.00	-	0.00	-	0.00	-
Etherol	1.83	2.14%	0.00	-	0.00	-	0.00	-
Butane	5.55	6.49%	4.23	4.95%	4.09	4.79%	3.96	4.63%
Total Activity	85.50	100.00%	85.50	100.00%	85.50	100.00%	85.50	100.00%

Gasoline Qualities

Aromatics Vol %	34.9	31.4	27.6	27.6
Benzene Vol %	1.89	1.97	1.49	1.57

N. NPRA SURVEY RESULTS

NPRA STUDY - CALIFORNIA COSTS

Case: Reduction of Diesel to 0.05% S and 20% Aromatics

	Group I Topping	Group II Hydroskimming	Group III Conversion	Group IV[3] Deep Conv. (FCC only)	Group V Deep Conv. LA	Group VI Deep Conv. N. Calif.	Total Calif.
Diesel Production (000 B/D)							
Diesel Base	.4	13.0	52.8	11.8	20.7	25.9	124.6
Common Diesel/Distillate	.1	0	14.7	31.5	88.3	24.3	158.9
Total Diesel	.5	13.0	67.5	43.3	109.0	50.2	283.5
Additional Capacity							
Hydrodesulfurization: 000 B/D	18.4[2]	16.7	50.9	12.0	106.0	50.0	254.0
Sulfur Recovery: LT/D	12	4	2	0	20	0	38
H_2 Generation: MSCF/D	19.0	10.0	10.0	15.0	35.0	20.0	109.0
Costs (000 $/D)							
Operating	28.2	11.4	75.9	7.3	153.1	61.1	337.0
Capital Charge[1]	86.3	34.2	115.1	58.2	234.2	98.6	626.6
Total Cost	114.5	45.6	191.0	65.5	387.3	159.7	963.6
Total Cost: ¢/gal.	545.2	8.36	6.74	3.60	8.46	7.58	8.09
Investment: Million $	**126**	**50**	**168**	**85**	**342**	**144**	**915**

[1] (Investment x .25)/.365

[2] Including 8,000 B/D hydrocracker

[3] Group IV includes one Group VI refinery to maintain confidentiality of data on a minimum 3 refinery basis.

NPRA STUDY - CALIFORNIA COSTS

Case: Reduction of Diesel Sulfur to 0.05%

	Group I Topping	Group II Hydroskim-ming	Group III Conversion	Group IV[3] Deep Conv. (FCC only)	Group V Deep Conv. LA	Group VI Deep Conv. N. Calif.	Total Calif.
Diesel Production (000 B/D)							
Diesel Base	3.7	13.0	53.7	11.8	38.7	25.4	146.3
Common Diesel/Distillate	0	0	14.8	31.5	70.4	24.3	141.0
Total Diesel	3.7	13.0	68.5	43.3	109.1	49.7	287.3
Additional Capacity							
Hydrodesulfurization: 000 B/D	11.1[2]	15.7	12.1	8.0	40.0	19.5	106.4[2]
Sulfur Recovery: LT/D	15.0	4.0	10	0	10.0	0	39.0
H_2 Generation: MSCF/D	21.0	2.0	1.0	0	5.0	0	9.0
Costs (000 $/D)							
Operating	42.0	7.2	34.3	5.9	50.9	23.4	163.7
Capital Charge[1]	69.9	26.7	30.0	17.9	83.6	10.3	238.4
Total Cost	111.9	33.9	64.3	23.8	134.5	33.7	402.1
Total Cost: ¢/gal.	72.0	6.21	2.23	1.31	2.94	1.61	3.33
Investment: Million $	102	39	42	25	122	15	345

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1 (Investment x .25)/.365

2 Including 8,000 B/D hydrocracker

3 Group IV includes one Group VI refinery to maintain confidentiality of data on a minimum 3 refinery basis.

NPRA STUDY - CALIFORNIA COSTS

Case: Reduction of Diesel Sulfur to 0.15%

	Group I Topping	Group II Hydroskim-ming	Group III Conversion	Group IV[3] Deep Conv. (FCC only)	Group V Deep Conv. LA	Group VI Deep Conv. N. Calif.	Total Calif.
Diesel Production (000 B/D)							
Diesel Base	3.9	13.2	53.9	11.8	52.6	25.4	160.8
Common Diesel/Distillate	0	0	15.0	31.5	56.4	24.3	127.2
Total Diesel	3.9	13.0	68.9	43.3	109.0	49.7	288.0
Additional Capacity							
Hydrodesulfurization: 000 B/D	11.1[2]	14.3	12.1	0	35.0	3.1	75.6
Sulfur Recovery: LT/D	14.0	4.0	8.0	0	10.0	0	36.0
H_2 Generation: MSCF/D	19.0	2.0	1.0	0	4.0	0	26.0
Costs (000 $/D)							
Operating	24.0	5.0	29.4	0	46.9	12.1	117.4
Capital Charge[1]	62.3	26.7	27.4	0	76.7	0	193.1
Total Cost	86.3	31.7	56.8	0	123.6	12.1	310.5
Total Cost: ¢/gal.	52.7	5.72	1.96	0	2.70	0.58	2.57
Investment: Million $	91	39	40	0	112	0	282

1 (Investment x .25)/.365

2 Including 8,000 B/D hydrocracker

3 Group IV includes one Group VI refinery to maintain confidentiality of data on a minimum 3 refinery basis.