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ENERGY & ENVIRONMENT DIVISION

REVIEW OF DATA ANALYSIS ON THE
DOMESTIC CRUDE OIL ENTITLEMENTS SYSTEM

Mark W. Horovitz, William L. Klein, and Carl M. York

June 1979

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REVIEW OF DATA ANALYSIS ON THE
DOMESTIC CRUDE OIL ENTITLEMENTS SYSTEM

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June 25, 1979

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Submitted to:

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SUMMARY

Findings of the Lawrence Berkeley Laboratory (LBL) validation study of the Domestic Crude Oil Entitlements (DCOE) system related to assessment of the accuracy of DCOE data, are reviewed. While LBL's exploratory investigations of data quality are inconclusive, preliminary evidence does warrant concern about data quality. Unexpected discrepancies were found between crude oil receipts and runs to refinery stills. These discrepancies appeared for parts of a three year time series of nationally aggregated data and for some individual companies. An indication was found of incorrect reporting practices for contributions to the Strategic Petroleum Reserve that could result in companies receiving double credit in entitlements for their sales to the Strategic Petroleum Reserve. Methods for carrying out certain data consistency checks were developed but individual company data sufficient to complete these checks were not available to the investigators. The accuracy of tier classification was not addressed. A thorough assessment of DCOE data will require further studies; an agenda for such studies is presented.

I. SUMMARY OF STUDY FINDINGS CONCERNING THE QUALITY OF DCOE DATA

The findings summarized in a) and b) below were discovered in the course of work between May and November 1978, and were documented in the DCOE interim validation report¹.

a) Data editing and checking

Manual and computerized data editing procedures now in use were reviewed in the interim study report³ and judged to be generally effective in checking data formats and arithmetic. It was recommended that DOE investigate monitoring long term trends in individual company data. More complex data consistency checks, such as those described in this report, are not presently in routine use.

b) Cumulative difference between receipts and runs

The cumulative difference between crude oil receipts and total refinery runs to stills for the U.S. reported in form ERA-49 is displayed in Figure 1 (reproduced from the interim study report⁴). During the period January 1975 through May 1977 receipts generally exceed runs to stills. From June 1977 through May 1978 runs generally exceeded receipts. The latter phenomenon was unexpected and was judged to warrant further study.

Investigations were planned to follow two approaches:

- (i) Detailed analysis of data series for individual companies,
and
- (ii) Field investigations intended to study reporting practices
for such items as refinery exports, contributions to the

Strategic Petroleum Reserve and other topics likely to affect data quality.

Work subsequent to the interim report led to the following additional findings:

c) Analysis of detailed company data

Thirteen companies from a sample of forty-four, generally reported runs to stills exceeding their crude oil receipts while three companies in the sample consistently reported exactly the same number for both runs and receipts.

The frequency distribution of the quantity R'' , where

$$R'' = \frac{\text{Runs to Stills} - \text{Receipts}}{1/2 (\text{Runs to Stills} + \text{Receipts})}$$
 was computed and plotted from

ERA-49 data. Data from a few companies gave R'' values which are far removed from the mean values of the distribution.

d) Preliminary field investigations

Field work indicated that at least one company appeared to follow incorrect procedures for reporting oil sent to the Strategic Petroleum Reserve.

II. PURPOSE OF THIS REPORT

The draft interim report (LBL-8436, December 1978¹) on the LBL validation study characterized the DCOE system as 'basically sound'. Later analyses of individual company data revealed structural inconsistencies which cast doubt on the soundness of the data. The inconsistencies were summarized in two memos by Phiroze Nagarvala (Appendices B and C). John Shewmaker of the Office of Energy Information Validation (OEIV), Energy

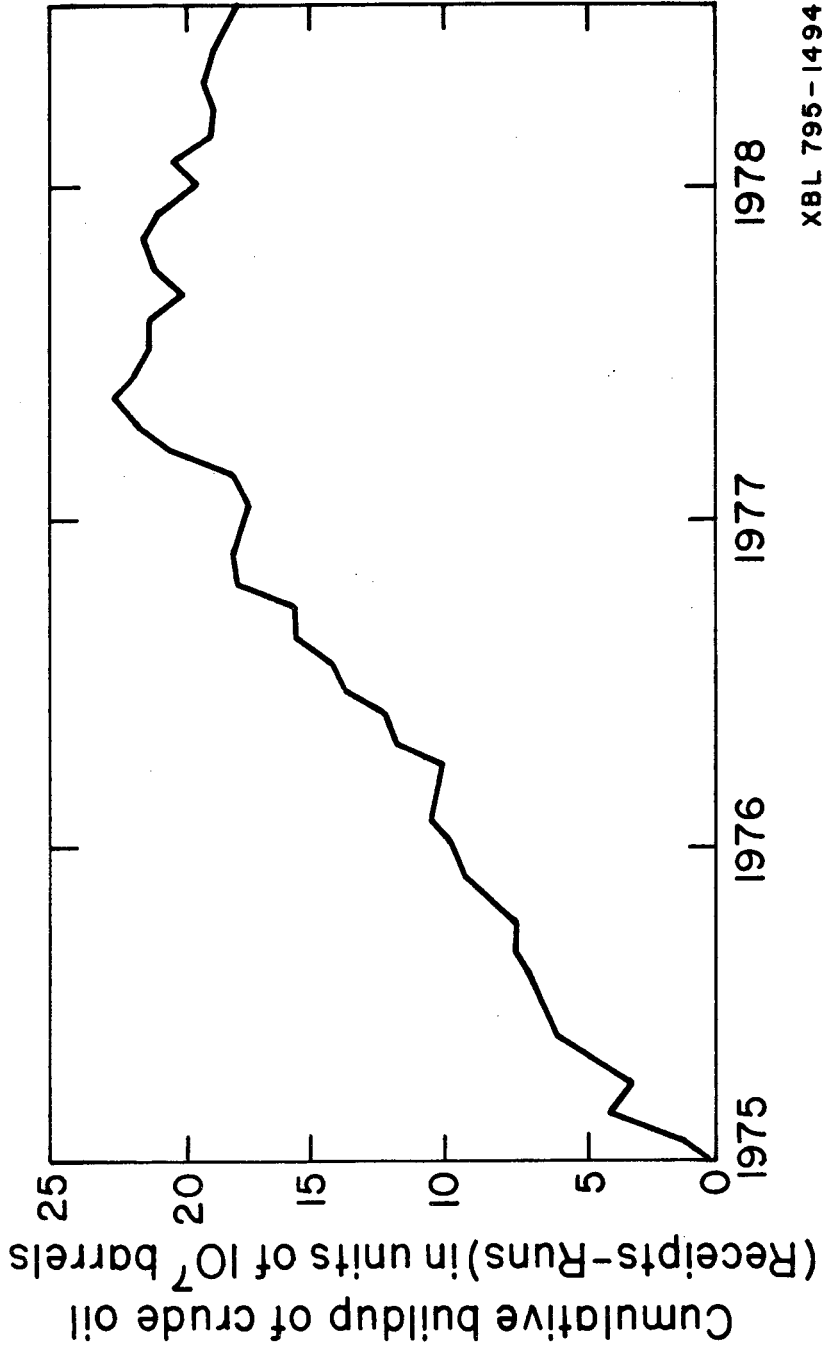


Figure 1

Information Administration, U.S. Department of Energy, requested clarification and documentation of the study findings. LBL was requested (Appendix D) to document:

- specific findings of importance to the Economic Regulatory Administration (ERA) of the U.S. Department of Energy
- detailed description of the evidence supporting such findings, and
- recommendations for further research as appropriate.

This report is in response to that request. We here assume some familiarity on the part of the reader with material covered in the LBL interim validation report and treat the subject of data quality studies in more detail than is covered in that report.

III. BRIEF DESCRIPTION OF THE ENTITLEMENTS SYSTEM

The intent of the Domestic Crude Oil Entitlements (DCOE) Program is to allocate equitably amongst domestic refiners the benefits of access to low-cost 'old' oil. The mechanism for achieving equitable allocation of low-cost old oil is the entitlement. Each entitlement represents the right to process one barrel of oil as though the cost of oil was equal to old oil prices. The crude oil covered by an entitlements is called "deemed old oil". Basically, the system requires refiners with above old oil inputs to buy entitlements from refiners that are old oil deficient. The following description of the basic concepts and procedures of the system is taken from the LBL interim validation report² and the reader is referred to that report for further details.

The Economic Regulatory Administration (ERA) within the Department of Energy (DOE) currently has responsibility for administering the DCOE Program.^a Approximately 180 refiners and 25 (non-refiner) importers of eligible products participate in the program.

Each month refiners are issued a number of entitlements, subject to certain adjustments^b, equal to the number of barrels of crude oil in their crude runs to stills multiplied by the National Domestic Crude Oil Supply Ratio or DOSR (in essence, the national average proportion of deemed old oil receipts to crude runs to stills). Refiners are required to possess a number of entitlements equal to the number of barrels of deemed old oil shown in their crude oil receipts for that month. To meet that requirement, refiners possessing insufficient entitlements to cover their receipts of deemed old oil must buy entitlements from refiners with excess entitlements. Refiners with excess entitlements are required to sell them at the price set each month by the ERA. The ERA determines the entitlement price by computing the differential between the weighted average cost per barrel of old oil and the weighted average cost per barrel of imported crude oil, Alaska North Slope (ANS) crude oil, stripper well crude oil, incremental tertiary crude oil, and other first sale exempt domestic crude oil, less 21 cents.

^aThe DOE's regulations for the implementation of the DCOE program are published in the Code of Federal Regulations. Relevant portions of these regulations are set out in Appendix B of LBL-8436.

^bThe Formulae used to make the calculations necessary to operate the DCOE program are discussed in Appendix F of LBL-8436.

The ERA publishes a notice in the Federal Register about six weeks after the end of a reporting month setting forth for that month (1) the DOSR, (2) the name of each refiner and other eligible firm to which entitlements have been issued, (3) the number of barrels of deemed old oil included in each refiner's adjusted crude receipts, (4) the number of entitlements issued to each such refiner or other firm, (5) the number of entitlements required to be purchased or sold by each such refiner and other firm, and (6) the price at which entitlements shall be purchased and sold. These calculations are based on monthly data submitted to the ERA by all refiners and other eligible firms.

The cost equalization effected by the DCOE Program does not take place in the month the purchase and sale of the oil occurs. There is approximately a three month time lag between the end of the reporting period and the ERA's issuance of entitlement buy/sell requirements. Thus, the cost equalization is achieved over time as the crude oil moving through the refinery is tracked by the accounting system, and the data are captured and reported to the ERA.

All U.S. domestic refiners are required to submit to DOE the Refiners Monthly Report Form ERA-49. Much of the information required for operation of the Entitlements system is collected via Form ERA-49 which contains data concerning respondents crude oil receipts, costs and runs to stills; also the volume of residual fuel oil produced and sold by the respondents

in, or into, the East Coast Market. This form is shown in Appendix H and the instructions for ERA-49 are displayed in Appendix G. Errors in these data can influence the entitlements allocation of individual refiners and thus have financial impact on those companies and on the equity of operation of the entitlements system.

IV. ANALYTICAL APPROACH

Continuity equation for crude oil

Several lines of investigation of the quality and consistency of DCOE data were planned and proposed in the interim study report¹. One of these approaches was subsequently developed in more detail and is reviewed here. This analysis considers the flow of crude oil to stills within a refinery. Figure 2 shows the simple conceptual model used for the flow of crude oil in a refinery. A conservation of mass (continuity) equation for crude oil is constructed below. This equation (1) states that, for any time period, crude oil received minus runs to stills minus total losses equals the increase in crude oil inventory. All quantities referred to here are physical amounts and not transactions.

$$C_i - R_i - L_i - \text{Del } S_i = 0 \dots\dots\dots (1)$$

where

C_i = crude oil received during time period i

R_i = runs to stills during time period i

L_i = total losses during time period i

S_i = inventory at end of time period i and

$$\text{Del } S_i \equiv S_i - S_{(i-1)}$$

Del S_i is the increase in inventory during i^{th} time period.
The quantity L , named 'total losses' is composed of the following crude oil flows:

$$L = l_1 + l_2 + l_3$$

where

l_1 = refinery losses

l_2 = crude oil used as refinery fuel, and

l_3 = crude oil for petro-chemical feed stock

Equation (1) is rigorous and deals with physical quantities. To apply it, these physical quantities must be related to data reported to DOE.

Application of continuity equation to data from DOE form P320

The DOE Monthly Refinery Report Form FEA-P320-M-0 contains monthly data on the physical quantities (custody basis) of various categories of oil located at the reporting refinery. Correspondence between reported data and the terms in the continuity equation (1) is more direct for P320 than for information from ERA-49. In P320 the corresponding items of data are named as follows:

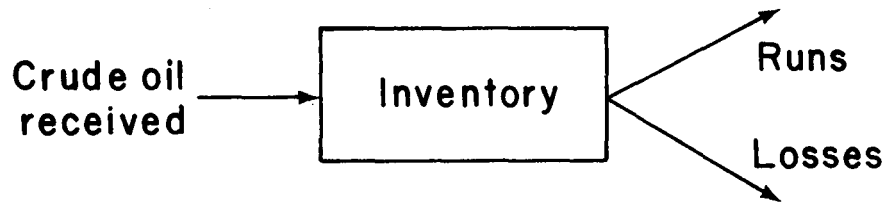
C = Receipts during month

R = Inputs during month

S_i = Stocks at end of month

S_{i-1} = Stocks at beginning of month

$L = l_1 + l_2 + l_3$ = Shipments, losses and refinery fuel use during month



Continuity equation for crude oil flow
within a refinery

$$\text{Crude oil received} - \text{Runs to stills} - \text{Total losses} = \text{Increase in inventory}$$

XBL 795-1493

Figure 2

Hence, a conservation of oil mass check can be carried out using data solely from Report FEA-P320. The quantity (C-R-L-De1 S), computed for each month, should be close to zero.

Application of continuity equation to data from DOE form ERA-49

On form ERA-49, quantities of oil are classified by refiner ownership and not by physical location at a refinery (custody). Hence, application of equation (1) to entitlements data is somewhat indirect and will be detailed below.

Examination of national totals. An approximate consistency check, using national totals for entitlements crude oil receipts and runs, is discussed in the interim study report⁶. For this approximation, the refiners participating in the entitlements program are viewed as if they constituted a closed system. In effect, the whole entitlements program is treated as if it were a single refiner: exchange and processing agreements appear as matched pairs of internal transactions which cancel. In order to apply equation (1) to data on national totals, we consider a sufficiently long period of time and assume exchanges and processing agreements occur only amongst participants in the entitlements program.

Checks on data submitted by individual refiners. Two estimates for the monthly physical runs to stills (R), can be compared. Such data are available for refineries directly from form FEA-P-320 and can also be computed for refiners from ERA-49 by summing the following three items:

- runs for own account at own refineries (line 40119)
- + runs for non-refiners at own refineries (line 40129)
- + runs for others at own refineries (line 40149)

Crude oil receipts for other refiners at own refineries (X) are computed by summing receipts for "own account at refiner X" over all other refiners that list X in lines 20131-20138 or lines 30131-30138 of ERA-49.

This procedure cannot be applied to ERA-49 data on categories of crude oil which are not under price control, as the ownership-refiner breakdown is not specified on ERA-49 for these categories.

V. Results Concerning Differences between Receipts and Runs

The detailed consistency checks described in the previous section on "Analytical Approach" were not carried out as the LBL staff was unable to access some of the data required to complete these checks. Findings obtained on three aspects of this problem are described below and support the conclusion that further detailed investigations are required before a judgement on the soundness of DCOE system can be made.

a) National totals

The cumulative difference between U.S. national totals for crude oil receipts and refinery runs to stills reported via form ERA-49, were discussed in section I. b) of this report and in the draft interim validation report.

b) Inspection of individual company data

Individual company data on runs to stills and crude oil receipts reported on form ERA-49 are displayed in Tables 1 through 7. The column labelled "difference" contains the quantity (runs-receipts). These companies are members of a randomly chosen sample of fifteen small refiners. Table 1 illustrates the "normal"

appearance of data in the "difference" column. Tables 2, 3 and 4 contain mostly zeroes in the "difference" column. Tables 5, 6 and 7 contain some zeroes in the "difference" column. Zeroes occur in any month when runs and receipts have been reported to be exactly equal. These entities represent 4, 5, 6 or 7 digit numbers of barrels of oil per month. Such exactly equal numbers indicate that the runs and receipts entries probably did not originate from independent measurements since unrealistic measurement accuracy would be required to produce such results. In this random sample of 15 small refiners, 3 data sets showed exactly equal runs and receipts and 3 other had a few entries exactly equal. This suggests that perhaps 20-40% of data from small refiners may show this phenomenon. It is not known to us which of these refiners operate intermittently, so as to clear out their stocks to empty level at the end of the month.

c) Some further analyses of DCOE runs and receipts data

LBL received data on a sample of 44 companies out of a total of 155 oil refiners participating in the entitlements program (the sample is described in Appendix F). The total crude oil receipts and the total runs to stills data are available for each of 26 months. Data from 3 of the companies was insufficient to include them in the analysis shown below.

An index was defined to express the differences between the crude oil Receipts and the Runs to Stills as a percentage of the volume of oil received and processed by a given company, i.e.,

Table 1 Company 1

DATE	RUNS	RECEIPTS	DIFFERENCE	CUMULATIVE DIFFERENCE	FRACTIONAL DIFFERENCE

BARRELS X1000					

7602.	83.556	100.340	-16.784	-16.784	-0.182538
7603.	82.183	92.446	-10.263	-27.047	-0.117541
7604.	76.353	75.206	1.147	-25.900	0.015136
7605.	80.294	86.527	-6.233	-32.133	-0.074727
7606.	79.410	69.836	9.574	-22.559	0.128298
7607.	81.802	78.111	3.691	-18.868	0.046163
7608.	70.844	69.296	1.548	-17.320	0.022092
7609.	86.429	98.449	-12.020	-29.340	-0.130032
7610.	105.409	113.585	-8.176	-37.516	-0.074669
7611.	100.223	104.792	-4.569	-42.085	-0.044572
7612.	103.162	99.017	4.145	-37.940	0.041003
7701.	87.611	95.251	-7.640	-45.580	-0.083560
7702.	66.923	67.532	-0.609	-46.189	-0.009059
7703.	101.513	102.561	-1.048	-47.237	-0.010271
7704.	296.545	293.304	3.241	-43.996	0.010989
7705.	317.930	322.048	-4.118	-48.114	-0.012870
7706.	126.815	130.781	-3.966	-52.080	-0.030792
7707.	111.623	108.873	2.750	-49.330	0.024944
7708.	139.071	135.350	3.721	-45.609	0.027119
7709.	130.266	136.681	-6.415	-52.024	-0.048062
7710.	124.147	116.730	7.417	-44.607	0.061583
7711.	116.328	123.334	-7.006	-51.613	-0.058466
7712.	132.079	133.123	-1.044	-52.657	-0.007873
7801.	82.819	84.830	-2.011	-54.668	-0.023991
7802.	103.203	104.303	-1.100	-55.768	-0.010602
7803.	139.192	129.493	9.699	-46.069	0.072196
7804.	117.175	131.269	-14.094	-60.163	-0.113458

MEAN FOR RUNS	116.4				
MEAN FOR RECEIPTS		118.6			
SD FOR RUNS	59.09				
SD FOR RECEIPTS		58.6			
CARDS	54.				
ERROR	0.				
+++++					

Table 2 Company 2

DATE	RUNS	RECEIPTS	DIFFERENCE	CUMULATIVE DIFFERENCE	FRACTIONAL DIFFERENCE
		BARRELS	X1000		
7602.	9.770	9.770	0.0	0.0	0.0
7603.	9.965	9.965	0.0	0.0	0.0
7604.	9.318	9.318	0.0	0.0	0.0
7605.	9.872	9.872	0.0	0.0	0.0
7606.	8.946	8.946	0.0	0.0	0.0
7607.	9.850	9.850	0.0	0.0	0.0
7608.	8.970	8.970	0.0	0.0	0.0
7609.	9.141	9.141	0.0	0.0	0.0
7610.	9.348	9.348	0.0	0.0	0.0
7611.	11.130	11.130	0.0	0.0	0.0
7612.	11.287	11.287	0.0	0.0	0.0
7701.	11.904	11.904	0.0	0.0	0.0
7702.	11.214	11.214	0.0	0.0	0.0
7703.	14.065	14.065	0.0	0.0	0.0
7704.	16.888	16.888	0.0	0.0	0.0
7705.	18.171	18.170	0.001	0.001	0.000055
7706.	16.881	16.881	0.0	0.001	0.0
7707.	18.074	18.074	0.0	0.001	0.0
7708.	18.793	18.793	0.0	0.001	0.0
7709.	19.808	19.808	0.0	0.001	0.0
7710.	19.408	19.408	0.0	0.001	0.0
7711.	18.628	18.628	0.0	0.001	0.0
7712.	20.785	20.785	0.0	0.001	0.0
7801.	19.108	19.108	0.0	0.001	0.0
7802.	20.072	20.072	0.0	0.001	0.0
7803.	20.556	20.556	0.0	0.001	0.0
MEAN FOR RUNS	14.30				
MEAN FOR RECEIPTS		14.30			
SD FOR RUNS	4.568				
SD FOR RECEIPTS		4.568			
CARDS	52.				
ERROR	0.				

Table 3 Company 3

DATE	RUNS	RECEIPTS	DIFFERENCE	CUMULATIVE DIFFERENCE	FRACTIONAL DIFFERENCE
----- BARRELS X1000 -----					
7602.	33.997	33.997	0.0	0.0	0.0
7603.	27.105	27.105	0.0	0.0	0.0
7604.	25.487	25.487	0.0	0.0	0.0
7605.	29.422	29.422	0.0	0.0	0.0
7606.	33.281	33.281	0.0	0.0	0.0
7607.	26.913	26.913	0.0	0.0	0.0
7608.	30.188	30.188	0.0	0.0	0.0
7609.	32.276	32.276	0.0	0.0	0.0
7610.	43.338	43.338	0.0	0.0	0.0
7611.	53.035	53.035	0.0	0.0	0.0
7612.	63.135	63.135	0.0	0.0	0.0
7701.	56.794	56.794	0.0	0.0	0.0
7702.	80.617	80.617	0.0	0.0	0.0
7703.	98.337	98.337	0.0	0.0	0.0
7704.	102.509	102.509	0.0	0.0	0.0
7705.	120.104	120.104	0.0	0.0	0.0
7706.	135.059	135.059	0.0	0.0	0.0
7707.	144.657	144.658	-0.001	-0.001	-0.000007
7708.	155.755	155.755	0.0	-0.001	0.0
7709.	111.713	111.713	0.0	-0.001	0.0
7710.	140.207	140.207	0.0	-0.001	0.0
7711.	12.733	50.994	-38.261	-38.262	-1.200778
7712.	71.171	90.948	-19.777	-58.039	-0.243981
7801.	105.948	105.948	0.0	-58.039	0.0
7802.	115.522	115.522	0.0	-58.039	0.0
7803.	126.404	126.404	0.0	-58.039	0.0
7804.	97.805	112.388	-14.583	-72.622	-0.138758

MEAN FOR RUNS	76.80				
MEAN FOR RECEIPTS		79.49			
SD FOR RUNS	44.66				
SD FOR RECEIPTS		43.51			
CARDS	54.				
ERROR	0.				
+++++					

Table 4

Company 4

DATE	RUNS	RECEIPTS	DIFFERENCE	CUMULATIVE DIFFERENCE	FRACTIONAL DIFFERENCE

BARRELS X1000					

7602.	5.345	5.345	0.0	0.0	0.0
7603.	5.319	5.319	0.0	0.0	0.0
7604.	4.534	4.534	0.0	0.0	0.0
7605.	8.051	8.051	0.0	0.0	0.0
7606.	10.507	10.507	0.0	0.0	0.0
7607.	10.675	10.675	0.0	0.0	0.0
7608.	9.995	9.995	0.0	0.0	0.0
7609.	9.810	9.810	0.0	0.0	0.0
7610.	6.925	6.925	0.0	0.0	0.0
7611.	11.218	11.218	0.0	0.0	0.0
7612.	9.994	9.994	0.0	0.0	0.0
7701.	6.738	6.738	0.0	0.0	0.0
7702.	6.609	6.609	0.0	0.0	0.0
7703.	9.263	9.263	0.0	0.0	0.0
7704.	8.652	8.652	0.0	0.0	0.0
7705.	11.328	11.328	0.0	0.0	0.0
7706.	10.659	10.659	0.0	0.0	0.0
7707.	10.825	10.825	0.0	0.0	0.0
7708.	10.015	10.015	0.0	0.0	0.0
7709.	7.600	7.600	0.0	0.0	0.0
7710.	6.948	6.948	0.0	0.0	0.0
7711.	7.991	7.991	0.0	0.0	0.0
7712.	9.870	9.870	0.0	0.0	0.0
7801.	9.780	9.780	0.0	0.0	0.0
7802.	6.921	6.921	0.0	0.0	0.0
7803.	7.983	7.983	0.0	0.0	0.0

MEAN FOR RUNS	8.598				
MEAN FOR RECEIPTS		8.598			
SD FOR RUNS	1.980				
SD FOR RECEIPTS		1.980			
CARDS	52.				
ERROR	0.				
+++++					

Table 5 Company 5

DATE	RUNS	RECEIPTS	DIFFERENCE	CUMULATIVE DIFFERENCE	FRACTIONAL DIFFERENCE
----- BARRELS X1000 -----					
7602.	140.797	140.797	0.0	0.0	0.0
7603.	179.115	179.115	0.0	0.0	0.0
7604.	117.515	117.515	0.0	0.0	0.0
7605.	117.226	117.226	0.0	0.0	0.0
7606.	635.882	121.603	514.279	514.279	1.357860
7607.	124.875	124.875	0.0	514.279	0.0
7608.	119.117	119.127	-0.010	514.269	-0.000084
7609.	113.522	113.522	0.0	514.269	0.0
7610.	112.322	112.322	0.0	514.269	0.0
7611.	298.937	478.937	-180.000	334.269	-0.462800
7612.	301.620	121.617	180.003	514.272	0.850602
7701.	276.302	283.137	-6.835	507.437	-0.024435
7702.	284.222	284.222	0.0	507.437	0.0
7703.	309.819	311.032	-1.213	506.224	-0.003907
7704.	299.844	255.601	44.243	550.467	0.159307
7705.	308.287	310.947	-2.660	547.807	-0.008591
7706.	110.528	112.627	-2.099	545.708	-0.018812
7707.	131.246	131.336	-0.090	545.618	-0.000685
7708.	130.092	129.514	0.578	546.196	0.004453
7709.	162.637	281.182	-118.545	427.651	-0.534204
7710.	208.255	131.317	76.938	504.589	0.453147
7711.	216.504	203.558	12.946	517.535	0.061639
7712.	218.002	217.650	0.352	517.886	0.001616
7801.	213.127	213.190	-0.063	517.823	-0.000296
7802.	224.076	223.246	0.830	518.653	0.003711
7803.	227.472	225.562	1.910	520.563	0.008432
7804.	224.996	225.182	-0.186	520.377	-0.000826

MEAN FOR RUNS	215.05				
MEAN FOR RECEIPTS		195.78			
SD FOR RUNS	110.5				
SD FOR RECEIPTS		89.28			
CARDS	54.				
ERROR	0.				
+++++					

Table 6

Company 6

DATE	RUNS	RECEIPTS	DIFFERENCE	CUMULATIVE DIFFERENCE	FRACTIONAL DIFFERENCE
		BARRELS X1000			
7801.	3402.038	253.978	3148.060	3148.060	1.722125
7802.	5324.004	5324.004	0.0	3148.060	0.0
7803.	795.354	795.354	0.0	3148.060	0.0
MEAN FOR RUNS		3173.8			
MEAN FOR RECEIPTS		2124.4			
SD FOR RUNS		2272.9			
SD FOR RECEIPTS		2784.1			
CARDS	6.				
ERROR	0.				
+++++					

Table 7

Company 7

DATE	RUNS	RECEIPTS	DIFFERENCE	CUMULATIVE DIFFERENCE	FRACTIONAL DIFFERENCE
		BARRELS	X1000		
7710.	249.487	249.487	0.0	0.0	0.0
7711.	296.150	296.150	0.0	0.0	0.0
7712.	303.460	303.460	0.0	0.0	0.0
7801.	306.495	306.495	0.0	0.0	0.0
7802.	279.738	261.610	18.128	18.128	0.066973
7803.	298.668	177.620	121.048	139.176	0.508298
7804.	299.250	58.908	240.342	379.518	1.342099
MEAN FOR RUNS	290.5				
MEAN FOR RECEIPTS		236.2			
SD FOR RUNS	19.99				
SD FOR RECEIPTS		90.1			
CARDS	14.				
ERROR	0.				

$$R'' = \frac{\text{Runs to Stills} - \text{Receipts}}{1/2 (\text{Runs to Stills} + \text{Receipts})}$$

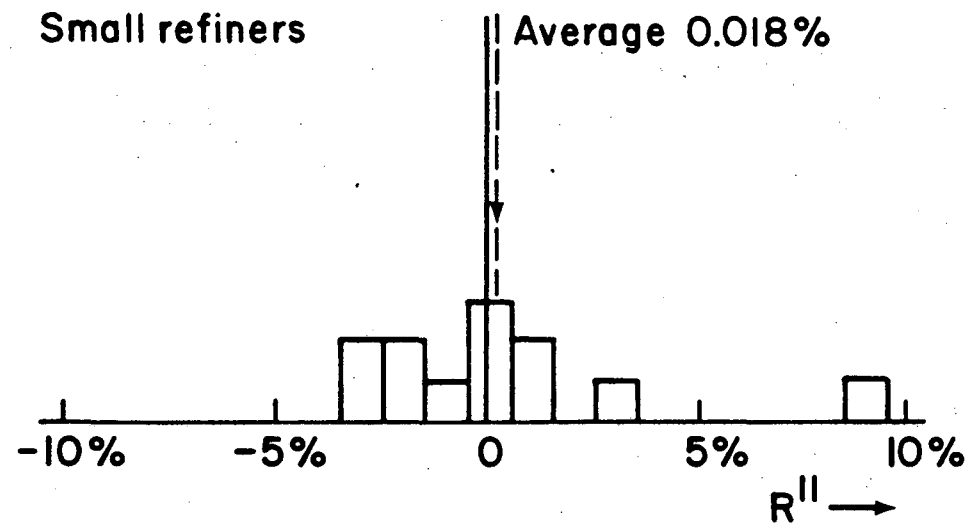
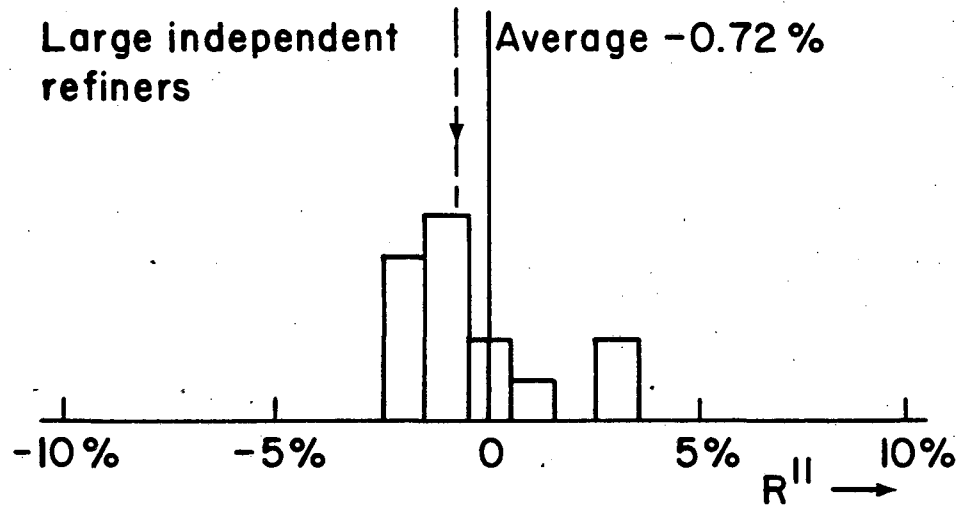
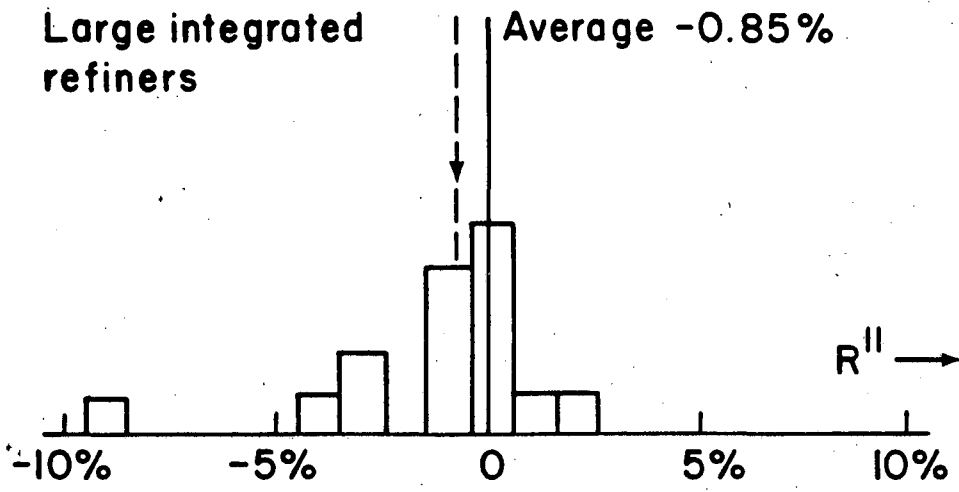
The denominator of this expression constitutes a normalization factor which is the average of receipts and runs. It is to be noted that both the total receipts and total runs to stills obtained from ERA-49 do not correspond exactly to the physical quantities of receipts and runs for a refiner. Hence, positive values of R'' are possible.

Although several different manipulations have been attempted in the past few months, the most easily understood is shown in Fig. 3 . Here a simple histogram, or frequency distribution of the number of refiners with a given R'' value averaged over 26 months, have been plotted. The refiners are broken out into three classes, Large Integrated Refiners, Large Independent Refiners, and Small Refiners. As expected, the average of each class is slightly negative, except for the Small Refiners. There the average would be negative if the refiner with the very large positive value of R'' were not included. The data from this refiner should be carefully scrutinized. Similarly there is an anomalous refiner among the Large Integrated Refiners and it too should be examined to see why its loss of oil between receipt and runs to stills are ten times the average for its class.

VI. STRATEGIC PETROLEUM RESERVE DELIVERIES

DOE regulations provide that for the purpose of computing entitlements, a refiner's crude oil runs to stills be increased by the total number of barrels of imported crude oil delivered to the Strategic

Histogrammed frequency distribution of R''



Note: $R'' = \frac{\text{Runs to Stills} - \text{Receipts}}{1/2(\text{Runs to Stills} + \text{Receipts})} \times 100$

XBL 795-1495

Figure 3

Petroleum Reserve (SPR) (10 CFR § 211.67 (d).) The participating firm is required to submit a report of each month's SPR transactions on the fifth day of the following month (10 CFR § 211.66 (k).) These cited regulations do not make it clear how the refiner's entitlement position is adjusted to reflect SPR transactions. ERA, in calculating the entitlements position of each firm, adds submitted SPR sales to the crude oil runs to stills reported on ERA-49 for each month in which the SPR sale took place. If the refiner submits both a record of SPR transactions in the required report and adds these figures to the runs to stills reported on ERA-49, double counting of SPR sales results.

Evidence substantiating the existence of double counting of Strategic Petroleum Reserve (SPR) sales in crude runs to stills is found in the following excerpt from an LBL field interview with two representatives of one of the refiners in the 44 firm sample (sample specified in Appendix F).

Supplemental Questions:

Interviewer: Do you sell oil to the Strategic oil reserve?

Respondent 1: "Yes, we do; we just contracted to sell X barrels."

Interviewer: Does this affect the ERA-49?

Respondent 2: "Yes, we have to add each barrel to the run to stills."

Interviewer: When is the addition accomplished?

Respondent 2: "When we send the invoice to the government."

Interviewer: Do you actually add this total to your runs?

Respondent 2: "Yes, we do it at X...."

VII. RECOMMENDATIONS CONCERNING FUTURE DATA QUALITY STUDIES

After examining the available information, DOE should make a decision as to whether further DCOE data quality investigations are to be conducted. If such studies are to take place, the investigators should be given adequate and prompt access to all data necessary for conduct of the study. This did not occur during LBL's DCOE validation study and severely hampered and delayed the conduct of these investigations. Exploratory data analysis is detective work⁷, and requires open access to the relevant information.

The basic method of data quality checking developed and applied in this report is the use of consistency checks between data elements within one reporting system or between several related data sets. Such checks can be based on accounting identities, physical conservation equations or other relationships.

It is recommended that such consistency checks be developed for use in DOE's information systems and be applied in both routine data checks and validation studies. Such consistency checks should be considered in the specification of data requirements and the design of information systems. Cross checks can be made most effective when built in during the design of a group of related reporting forms and data systems.

The findings on data quality obtained so far are the result of preliminary exploratory studies. These have yielded indications of several problem areas. To complete an assessment of DCOE data quality, further exploratory studies are necessary, followed by thorough confirmatory analysis of identified problems.

The data quality studies listed below represent a continuation of work already carried out at LBL. This approach is recommended, if such studies are to be resumed immediately. If, however, there is to be a substantial break in time before EIA resumes data quality analyses on these topics, then a coherent strategy should be devised for examining the larger topic of information quality concerning crude oil production, flow and use. Consistency checks amongst various pertinent reporting systems should be emphasized in such studies.

If further DCOE data quality studies are pursued soon, the following strategy is suggested:

- I. The most obvious, easy to study and well defined discrepancies and errors should be investigated first.
- II. The complete DCOE data files should be searched for other occurrences of the type of problems investigated in Stage I.
- III. The various consistency checks described in this report should then be carried out.
- IV. Field investigations should be coordinated to follow-up on problems disclosed by the analytical studies and should be guided by results from company specific data analyses.

Recommendations for further data quality studies are listed in Table 8. Items one through five of this Table, consist of well defined studies discussed in previous sections of this report. In accordance with the approach suggested above, the implications of findings from those studies should guide exploration of the broader questions listed as items 6, 7 and 8 of Table 8.

External consistency checks covering a wider range of related reporting systems were discussed and recommended in the DCOE interim validation report LBL-8436⁸ and are tabulated in Table 9 (copied from LBL-8436). The question of the accuracy of reporting of crude oil tier classifications is not addressed in this report. LBL was able to complete only preliminary investigations of this topic; these studies are reported in the LBL Interim Validation Report on the Domestic Crude Oil First Purchaser System⁹.

TABLE 8

FURTHER DATA QUALITY INVESTIGATIONS

1. Follow-up studies on the company data showing exactly equal runs and receipts
2. Search for other instances of exactly equal runs and receipts data
3. Follow-up on indication of incorrect reporting of sales to the Strategic Petroleum Reserve. Search for other instances of such practices
4. Mass balance checks on FEA-P320 data
5. Comparison of runs to stills data from P320 with equivalent information calculated from ERA-49 data
6. Further detailed consistency checks on national totals
7. Field investigations to follow-up on problems disclosed by the analyses listed above.
8. Comparison of ERA-49 data with other data series (see Table 9).

TABLE 9

PRELIMINARY PLAN FOR EXTERNAL CONSISTENCY CHECKS OF ERA-49 DATA

Crosscheck	Data Set Names	Status of Data Acquisition	Comments
DOE Form P110: Refiners' Monthly Cost Allocation Report	Old Oil Volume	Requested but not received.	a) Have to clarify if only "controlled" oil is old oil for purposes of P110. b) A good crosscheck for large refiners that import their own crude oil.
	Old Oil Cost		
	Imported Oil Volume		
	Imported Oil Cost		
DOE Form P124: First Purchasers' Report	Old Oil Volume	Available	a) Universe might be different. b) Crude oil might include condensate. c) Nonrefinery uses are included. d) Pipeline fuel use is included. e) Exports by resellers are included. f) Resellers' inventory fluctuations might account for some differences. g) P124 is a better crosscheck for cost than for volume.
	Old Oil Cost		
	New Oil Volume		
	New Oil Cost		
	Crude Oil Volume		
DOE Form P320: Refinery Report	Crude Runs to Stills	Requested but not received.	a) Treatment of processing agreements have to be clarified. b) Volumes include lease condensate. c) Universe might not be the same due to geographical differences. d) Canadian plant condensate volumes are not included.
	Crude receipts - Domestic - Foreign		
DOE Form P101-Q-1: Allocation Program Refinery Quarterly Report	Crude Runs to Stills - Domestic - Foreign	Requested but not received.	a) Monthly figures are available. b) Data is not processed on a computer. c) Stopped being mandatory on October 1977. Since October 1977 only the data for small refiners exist. d) Because of the allocated oil this seems like a good crosscheck for large refiners.
	Processing Agreements		
	Crude Processed for Non-Refiners		
California State Data: Form OR-02	California Imported Oil Receipts (Total)	Available	a) The crosscheck can be done provided total for California is obtained from ERA-49.
Texas State Data	Crude Receipts Crude Runs Crude Imports (1 company)	Available	a) Have to clarify the definition
Louisiana State Data	Crude Receipts Crude Runs (5 companies)	Available	a) Includes plant condensate. b) Includes amount of crude used for blending.

ACKNOWLEDGEMENTS

The basic investigation on the DCOE system were carried out the original study team led by Phiroze J. Nagarvala. Other members of the team were Peter Hayes, Mahmut Karayel, Ira Katz, Nirvikar Singh, and Ahmet Toprak. Professor David Freedman advised and assisted on data and statistical problems and John Boe participated in report writing. Additional work since January 1979 was carried out by Mahmut Karayel, William Klein, Ahmet Toprak and Carl York. This report was written by Mark Horovitz, William Klein and Carl York. We would like to thank Mary Hart for her assistance with clerical and administrative matters. Carl J. Blumstein suggested numerous changes which were incorporated in the text and structure of the report.

REFERENCES

- 1 Draft Interim Validation Report
Domestic Crude Oil Entitlements System
Phiroze J. Nagarvala, David Freedman, Peter Hayes,
Mahmut Karayel, Ira Katz, Nirvikar Singh,
Ahmet Toprak and John Boe
LBL-8436, Lawrence Berkeley Laboratory, December 1978
- 2 LBL-8436, pages 6-7
- 3 LBL-8436, section IIB, page 37
- 4 LBL-8436, page 87
- 5 LBL-8436, page 103
- 6 LBL-8436, page 83
- 7 Exploratory Data Analysis. John W. Tukey, Addison-Wesley
Publishing Co., 1977; page 1.
- 8 LBL-8436, pages 97-101
- 9 Draft Interim Validation Report
Domestic Crude Oil First Purchaser System
Martin O. Stern, John P. Burkett, Robert W. Denham,
Jaxk O. Reeves and Ravi Thomas
LBL-7878, Lawrence Berkeley Laboratory, December 1978

ABBREVIATIONS

DCOE	Domestic Crude Oil Entitlements
DOE	U.S. Department of Energy
DOSR	Domestic Crude Oil Supply Ratio
ERA	Economic Regulatory, Administration, U.S. Department of Energy
LBL	Lawrence Berkeley Laboratory University of California
OEIV	Office of Energy Information Validation, Energy Information Administration, U.S. Department of Energy
SPR	Strategic Petroleum Reserve

APPENDICES

- A Project History
Appendix A contains a brief history of the project while some of the background and motivation for this report are documented in Appendices B through E. Details of the sample of respondents investigated are presented in Appendix F and the Form ERA-49 and instructions for its completion are shown in Appendices H and G respectively.
- B Memo: Main Findings DCOE System
by Phiroze J. Nagarvala (January 4, 1979)
- C Memo: Main Findings of the DCOE System
by Phiroze J. Nagarvala (January 8, 1979)
- D Memo: Findings of the Domestic Crude Oil Entitlements (DCOE) Systems Validation Study at Lawrence Berkeley Laboratory (LBL)
by John B. Shewmaker (January 30, 1979)
- E A Chronology of Data Requests
by W. Klein
- F Sample Plan and Sample Selection: Entitlements System
(Reproduced from LBL-8436)
- G Form ERA-49 - General Instructions
- H Form ERA-49

Project History

Major events which occurred during the study, are listed in Table 1.

Preliminary work on the LBL validation study of the DCOE system was carried out in the Spring of 1978 by C. R. Glassey and A. Toprak. P. J. Nagarvala was recruited to manage the study starting May 24, 1978. Requests for DCOE data were initiated in June 1978. The project staff experienced difficulties and delays in obtaining access to the DCOE data during the period June 1978 through March 1979. A chronology of written data requests covering the period August 1978 through March 1979 is displayed in Appendix E.

A draft interim validation study report on the DCOE system was produced during November and December 1978 and transmitted to OEIV on December 14, 1978. The report contains the statement that "The Domestic Crude Oil Entitlements information system is basically sound".⁵ A number of problem areas requiring further study were identified, including additional data analyses.

During October 1978, ERA-49 data for a sample of forty-four companies were placed into the LBL storage files in the OSI/EIA computer. Analysis of these data was postponed until after completion of the draft interim study report. The DCOE validation study at LBL had planned to continue data analysis and other investigations until the summer of 1979 with delivery of the final study report scheduled for August 1979. On January 2,

1979, LBL was informed that OEIV intended to terminate the LBL Energy Information Validation Project. P. J. Nagarvala summarized the findings of preliminary analyses of individual company data undertaken in December 1978, and hence not covered in the interim report, in two memos dated January 4, 1979, and January 8, 1979. (These memos are reproduced in Appendices B and C.)

During January and early February 1979, discussions between EIA and LBL resulted in agreement to proceed as follows: Termination of the current project was to occur as quickly as possible with final transmission of project documents to OEIV to be completed by the end of February 1979. This activity was termed Task A. In addition, a review of the previous year's work was to be conducted by LBL during the period February 1 through June 30, 1979. This review, called Task B, includes four sub-tasks, one of which covers the review of DCOE data analysis discussed here. This DCOE sub-task was requested by J. Shewmaker, OEIV, in a memo dated January 30, 1979, displayed in Appendix D.

An attempt was made to retain key staff members with knowledge of the DCOE study, until completion of this DCOE review report. However, by the end of March 1979, all members of the original DCOE validation study team had either terminated their employment at LBL or transferred to other projects. OEIV and LBL agreed that some further DCOE data analysis be carried out, provided that LBL could promptly acquire the necessary data. The attempt to obtain additional data in time failed, and no analysis of new data has been completed since January 1979.

TABLE 1

HISTORY OF DOMESTIC CRUDE OIL
ENTITLEMENTS VALIDATION STUDY

Spring 1978	Preliminary work by C. R. Glassey and A. Toprak
May '78-January '79	Main Study managed by P. Nagarvala
June '78	Initial requests for DCOE data files
October '78- December '78	Preparation of draft interim validation Report
October '78	LBL obtains access to company specific DCOE data files
December '78	Draft interim validation report delivered to OEIV
December '78	Preliminary data analysis reveals problems with company specific data
January 2 '79	OEIV informs LBL that EIV project is to be terminated
January 4 '79 January 8 '79	P. Nagarvala summarizes new findings in two memos
January 30 '79	J. Shewmaker officially requests review of DCOE data analysis
January-February '79	EIV Project close-down
March 30 '79	Draft report reviewing data analysis is sent to OEIV
April 17 '79	Oral presentations given by M.W. Horovitz, of DCOE data quality review findings, to Dr. Lincoln Moses, EIA & ERA staff.
June 30 '79	DCOE data analysis review report due for delivery to OEIV, and close of project.

January 4, 1979

M E M O R A N D U M

TO: Mark Horovitz
FROM: Phiroze J. Nagarvala *P. J. N.*
SUBJECT: Main Findings DCOE System

The main findings of the DCOE information study to date are:

1. Internal consistency of data.

- a. Runs to stills versus oil receipts. For a period of almost eighteen months total reported runs to stills have exceeded total oil receipts: an impossible situation. A brief analysis of company specific data indicates:
- Some companies consistently report runs to stills higher than receipts.
 - Other companies report the same numbers for both runs and receipts.
 - Other companies report a constant difference between runs and receipts (eg. 1 barrel).
- b. Oil exchanges between companies. Evidence indicates that companies either do not understand or do not explicitly follow the regulations in reporting inter-company exchanges of crude oil.
- c. Reporting of strategic petroleum reserve oil. A quirk in the reporting methods may have permitted certain companies to get double credit (entitlements) for oil sent to the SPR.

2. Consistency of data with other reported data.

Very little work was accomplished here, due to data acquisition problems. The problem of 'disappearing old oil,' ie the discrepancy between the Entitlements System data (P102) and the First Purchaser data (P124) remains to be resolved.

3. DOE Calculation Errors. DOE (ERA) introduces calculation errors. Due to the number of on/off instructions from Washington this analysis was not completed. However, we do know ERA's processing of amended data is error-prone.

January 4, 1979

Page two

4. Field work. From what little has been undertaken to date, it is clear that companies do have the problems discussed in 1 (b) and 1 (c) above.

In conclusion it should be emphasized that the project had just barely acquired the data necessary to conduct a respectable analysis. This delay in acquiring data can be laid to bureaucratic problems within DOE. Initial data requests made in May/June of 1978 were still being pursued in December.

At this state the project is capable of assessing the overall validity of the DCOE system. This system should not be considered 'basically sound' as stated in our draft interim report. Data made available to our project since the draft was published indicate the data reported to the DCOE system is not sound.

Methods of analysis used in this investigation would be useful in guiding DOE audits. In view of the statute of limitations, and as our period of investigation was 1974-1978, it is recommended that this investigation be diligently and promptly pursued.

PN:cs

cc: Carl York

APPENDIX C

January 8, 1979

TO: Mark Horovitz
FROM: Phiroze J. Nagarvala
SUBJECT: Main Findings of the DCOE System



As per our discussion this memo elaborates further on the material discussed in my January 4, 1979 memo on the main findings of the DCOE System.

The draft interim report (LBL - 8436, dated December 1978) categorized the DCOE system as 'basically sound'. This judgement was based on nationally aggregated data then available to the project. The draft interim report had indicated the provisional nature of this conclusion and stated the need for a sample of company - by - company analysis to resolve weak or suspicious data.

The kind of data needed for this (and other similar) analyses was initially requested in June 1978. The first company specific data was made available to LBL in about November 1, 1978 in the form of computer files on OSI Account No. 6424. For some reasons not quite clear to the project, DOE scratched these files about November 15, 1978. Following further requests these files were revived in December. It should therefore be obvious that since the data arrived too late to be analyzed for the draft interim report, no through analysis could be undertaken. However, a cursory analysis indicates that the DCOE system can no longer be categorized as 'basically sound'. Not only do there appear to be severe structural inconsistencies in the data (see the draft interim report for the definition of structural inconsistencies in data), but these 'inconsistencies' should be immediately apparent to an analyst with access to the data.

The question then remains whether this apparently poor data ever instigated any further analysis within DOE. At least one person within DOE/ERA indicated that ERA was aware of problem areas and had conducted internal investigations. However, this informant told us that "House and Bardin had put a lid on internal investigations," and had a special taskforce looking into the matter. Our informant did not have, or did not wish to give us, copies of any internal investigations. Other senior ERA persons connected with the DCOE system denied any such investigations had been conducted. On several occasions I discussed the possible existence of these reports with Chuck Shirkey, and he agreed to look into the matter. The topic was also discussed with Charles Smith, John Shewmaker and Chuck Shirkey during the overall project reviews in August and October, 1978. At that time it was agreed that DOE locate and forward these reports to LBL. However no such reports have yet been received.

Based on the national aggregate analysis (i.e., comparing total crude oil runs to stills to total crude oil receipts) discussed in the draft interim report, a sample of 45 companies was chosen for more detailed company level analysis. DOE supplied data on 44 of these companies. Data on the last one, (Coastal), was not provided. In summary our observations over the twenty seven month period, February 1976 through April 1978 are:

- o Runs generally smaller than receipts - - - 26 companies
- o Runs generally larger than receipts - - - 13 companies
- o Runs generally equal to receipts - - - 3 companies
- o No specific relationship - - - 2 companies

Since runs to stills should normally be 2 to 5 per cent less than receipts, at least one third of the companies sampled seem to be problematic. More detailed investigations (perhaps even audits) are necessary.

U.S. DEPARTMENT OF ENERGY
memorandum

DATE: January 30, 1979

REPLY TO
ATTN OF: BI-72

SUBJECT: Findings of the Domestic Crude Oil Entitlements (DCOE) Systems
Validation Study at Lawrence Berkeley Laboratory (LBL)

TO: The Record

A memorandum from Phiroze J. Nagarvala to Mark Horovitz of January 4, 1979 was received by Charles Shirkey of the Office of Energy Information Validation on or about January 12, 1979 when he was at LBL. Findings of the DCOE study were reported in the memo based on data analysis completed after submission of the interim report in December. Follow-up on these findings by OEIV was delayed until completion of serious financial discussions concerning the validation project at LBL on January 26.

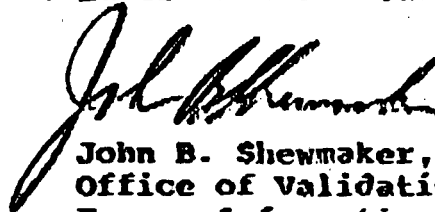
The findings included:

- o Some companies consistently report runs to stocks higher than receipts.
- o Other companies report the same numbers for both runs and receipts.
- o Other companies report a constant difference between runs and receipts.
- o Companies either do not understand or do not explicitly follow the regulations in reporting inter-company exchanges of crude oil.
- o Certain companies may be permitted double credit (entitlements) for oil sent to the Strategic Petroleum Reserves.

These findings may be significant for further investigation. During telephone conversations between Carl York and John Shewmaker on January 26 and between Mark Horovitz and John Shewmaker on January 29, LBL estimated that these findings could be documented in about a month to include:

- o specific findings of importance to EPA,
- o detailed description of the evidence supporting such findings, and
- o recommendations for further research as appropriate.

It was agreed that, following further examination by LBL of the work required to produce the documentation, a request would be sent from EIA to LBL requesting the work. Mark Horovitz will call no later than Thursday to discuss specific details.



John B. Shewmaker, Director
Office of Validation Analysis
Energy Information Administration

cc: L. Moses
C. Smith
W. Keene
C. Shirkey
B. House, Assistant Administrator
for Fuels Regulation, ERA
P. Bloom, Special Counsel
for Compliance, ERD

A Chronology of Data Requests

8/16/78 (Telephone memo Hayes to file)

Chuck Shirkey discusses security clearance problems associated with DCOE data requests; clearance may be delayed to 9/1/78.

Dave Welsh discusses physical transfer of DCOE files: 9/1 completion date "collation system" files are characterized as "active"; operator is able to simply "dump" data into LBL account ("trivial").

8/21/78 Memo of P. Nagarvala to Murray (telefaxed 8/24)

Data Requested:

1. Data collation study (exceptions and appeals entitlements; small refiner bias entitlements; runs, residual oil imports, receipts, DOOSR.
2. ERA-49 Data
3. P129 Naptha Imports for (all) 3 firms
4. P113 Data (?)

(Data requested for sample of 45 firms)

8/24/78 N. Nagarvala - Shirkey

P320 data for sample of 15 firms requested to validate ERA-49 data.

8/25/78 P. Nagarvala - Shirkey

Request audit trails of a sample of companies to check accuracy of ERA-49 data.

Names of companies not required; stratum is sufficient.

8/28/78 P. Nagarvala - Shirkey

Follow-up of P320 data request (8/24/78)

List of refineries for each refiner given.

Request made that DOE confirm completeness of list

8/30/78 P. Nagarvala - File

John Murray voices concern over volume of data requested.

- Wants: 1) Project work plan and schedule
2) Justification/proposed use for particular data request.

Agrees to consult with Shirkey regarding LBL data needs.

8/24 Memo P. Nagarvala - Murray (telefaxed 8/31)

Request:

1. Master file for 4/78
2. CALCENT Program and related JCL purpose sensitivity analyses of entitlements w.r.t. input data.

8/31/78 P. Nagarvala - File

In absence of Murray, follow-up with Dave Welsh on CALCENT request (8/24 memo to Murray; telefaxed on 8/31)

1. Murray et al. reluctant to "hand out" company data. Feel aggregate data suffices.
2. Concern that LBL study constitutes "audit" more than "data validation".

Conversation inconclusive.

9/1/78 Memo P. Nagarvala - File (Telephone memo)

1. Shirkey says A. Linden's office feels overwhelmed by data requests.
2. C. Shirkey says LBL acquire earlier studies based on P320, P102 data.

P. Nagarvala responds that such studies, although useful, do not substitute for data.

9/6/78 P. Hayes to Murray

1. Reviews proposed COE time series analyses; justification for data requests.
2. Review and itemizes ERA-49 data request and P124, P320 data for external data cross-checks.

9/20 P. Nagarvala - Bidwell (ERA)

Data request: 45 firm samples

P101 data: refinery capacity; data related to crude runs, processing agreements.

9/22/78 P. Nagarvala - Antonelli

Request of CALCENT Program; master file for sensitivity analysis.

(Cites original request to Murray of 8/24 and Keene memo to Antonelli of 9/13/78).

9/25/78 P. Nagarvala - Shirkey

Requests ERA audits, studies for examination of "fluctuating old oil" problem.

(cf. 8/25/78 request to Shirkey)

9/29/78 P. J. Nagarvala to Shirkey

Review of study; justifications for data requests.

10/2/78 P. Nagarvala to Wolfrey (EIA)

Request for crude oil cost data (P110) external check.

10/2/78 P. Nagarvala to Murray

Request for DCOE amendments data to fill in gaps in data collected by hand by A. Toprak in August visit to D.C.

10/4/78 P. Nagarvala - Shirkey (repeat)

Amendments data request (cf 10/2 memo to Murray)

10/6 P. Nagarvala - Wolfrey

List of 45 companies in sample for which data requested.

10/12 P. Nagarvala - Shirkey

Cites possible error in Entitlements

Requests Notices for 4, 5, 6/76

Audit trail for several (named) companies.

10/12 P. Nagarvala - Boldt

Request audit results for several ERA-49 line items for a sample of companies; company names not requested.

(cf earlier requests in 8/25, 9/25 memoranda to Shirkey)

10/12 P. Nagarvala - Shirkey

Repeat 8/25, 9/25 request for audit results (cf 10/12 memo to Boldt)

10/23 George Day to JDM

"LBL data request"

Notes that ENTIT.CMPY.TBL1, ENTIT.CMPY.TABL2, ENTIT.NATL.TBL1 data (comprising ERA-49 and collation study request) dumped into LBL account.

11/14/78 Murray - Keene

Verify that LBL data request filled on 10/24/78.

1. Believes that data comprises all LBL requests.
2. Feel free to request additional data "when necessary".

12/12/78 Hayes to P. Nagarvala

Summary of a data request status:

1. ERA-49 requests filled (cf Murray memo to Keene of 11/14/78)
2. Master file received; modified CALCENT Program for data analysis not received.
3. P320, P101-0-1 data requested for external cross-checks; not received.
4. P110 MST data in tape form; contents not yet verified.

2/7/79 M. Horovitz - Shirkey

Additional ERA-49 data requested. Justification: Substantiate findings of P. Nagarvala (1/4/79 & 1/8/79).

3/12/79 M. Horovitz - Shirkey

Limited data request:

1. ERA-49 exports of refined/residual oil (original request on 2/7/79)
2. P320 data (original request 8/24/78)
3. Strategic Petroleum Reserve data (original request 2/7/79)

APPENDIX F

SAMPLE PLAN AND SAMPLE SELECTION: ENTITLEMENTS SYSTEM

A. MAIN SAMPLE

There are presently 180 refiners in the Entitlements System. Of these, 15 can be classified as large-integrated, 15 as large-independent, and 150 as small. (Note that the latter two categories are not based on ERA classification.) The first 30 account for a very large percentage (80%) of all oil refined. Therefore they are most important in assessing the overall validity of the data. Whenever possible, it is planned to investigate all 30 of these companies. There are many provisions of the Entitlements System, however, which affect only the smaller refiners. Therefore they must be adequately sampled too. A random sample of 15 has been chosen from this set of 150.

For sample selection, an alphabetical list of the 180 companies was used. This list is current as of August 18, 1978. The companies were numbered sequentially. Random numbers were generated by a programmable TI-58 calculator. The process was continued till 15 numbers which did not correspond to any previously chosen companies (including the 30 large companies) had been generated. See Table I.1 for the names of the companies in this sample.

B. SUBSAMPLE

It was found out that accessing the data for the large main sample may sometimes require extensive time and resources. Furthermore, doing some of the contemplated detailed analysis (on all members

of the main sample) would not be always feasible due to limited resources. Consequently, a smaller sample of 15 companies was drawn from the main sample. Five companies from each of the first two strata were randomly sampled, giving proportional weight to the company's capacity. A simple random sample of five companies was drawn from the third stratum, equally weighing the fifteen companies. The fifteen companies in the subsample are identified by an asterisk on Table I.1.

TABLE I.1

SAMPLE OF COMPANIES

<u>Large Integrations</u>	<u>Large Independents</u>	<u>Small Refiners</u>
Exxon*	Amerada - Hess*	Cross
Shell*	Sohio*	Canal
Amoco*	Ashland*	Sage - Creek*
Texaco	Coastal	Bayou
Chevron	Tosco	Claiborne
Mobil	Kerr-McGee	US - Oil*
Gulf*	Champlin*	MacMillan
Arco*	Amer - Petrofina*	US & So. - Amer
Union	Corco	Caribou
Sun	Murphy	Mountaineer*
Marathon	Koch	Edgington - Oil*
Conoco	Energy - Coop	Bruin*
Phillips	Clark	Goldking
Citgo	Crown	Hiri
Getty (and Skelly)	Tenneco	Shepherd

APPENDIX GDEPARTMENT OF ENERGYDOMESTIC CRUDE OIL ENTITLEMENTS PROGRAM
REFINERS MONTHLY REPORT ERA-49GENERAL INSTRUCTIONSI. PURPOSE

- o Form ERA-49 provides the means by which refiners report pursuant to 10 CFR 211.66(h).
- o Form ERA-49 is designed to collect necessary data for each reporting refiner under the provisions of the Domestic Crude Oil Entitlements Program (10 CFR 211.67).

II. WHO MUST SUBMIT

- o Form ERA-49 must be completed by all refiners of crude oil (domestic and imported) in compliance with the Mandatory Petroleum Allocation Program (Code of Federal Regulations, Title X, Chapter II, Part 211, Subpart (c) paragraphs 211.66(h), (i) and (j)).

III. TO WHOM

- o Participants must submit Form ERA-49 and any attachments which may be required, in triplicate (original plus two copies), to:

Domestic Crude Oil Entitlements Program
20th Street Postal Station
Post Office Box 19326
Washington, D. C. 20036

IV. WHEN

- o Form ERA-49 must be in receipt of DOE by the fifth (5) day of the second month following the month for which the report is filed. For example: June reporting data must be in receipt of DOE by August 5th.

V. DEFINITIONS

- Adjusted crude oil receipts means, the crude oil receipts of a refiner for a particular month, which are adjusted to reflect any invoice received in that month for domestic crude oil (including crude oil sold under buy-sell program (10 CFR 211.65)) delivered to that refiner in any previous month (excluding months prior to November 1974). These adjustments to a month's reported crude oil receipts must have the effect of increasing or decreasing the previous month's volume of old or upper tier crude oil reported by that refiner under 10 CFR 211.66(h).

However, these invoice adjustments may be made only in cases where previously reported volume was based on either a prior invoice, or a good faith estimate based on the refiner's past experience as to the old and upper tier crude oil content of the domestic crude oil delivery to which the adjustment is to be made.

- Adjustment means, the receipt of an invoice of recertified crude oil previously booked into your account which results in a change to the volume and/or category as previously reported on the Pl02 or the ERA-49 and a subsequent invoice to a reported volume based on either a prior invoice or a good faith estimate. A good faith estimate is a volume based on that refiner's past experience as to its composition for pricing purposes of domestic crude oil of the same origin. For the Form ERA-49 filing purposes, exclude adjustments prior to November 1974.
- Alaskan North Slope Crude Oil (ANS) means, crude oil transported through the Trans-Alaska Pipeline System.
- Amendment means, a resubmission of a previously filed report resulting from an internal company error. Do not file amended reports to adjust for subsequent invoices (see adjustment).
- Bureau of Mines East Coast Refining District means, the District of Columbia and the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina,

Georgia, Florida, and the following counties of the State of New York: Cayuga, Tompkins, Chemung, the following counties in the State Of Pennsylvania: Bradford, Sullivan, Columbia, Montour, Northumberland, Dauphin, York, and all counties east thereof.

- California ANS Oil Receipts, means, crude oil transported through the Trans-Alaska pipeline and included in the crude oil receipts of that refiner that are physically attributable to refineries located in the State of California.
- California New Oil means, crude oil produced in California (or produced from federal lands off the shore of California) that is subject to the upper tier ceiling price set forth in section 212.74 of Part 212.
- California Old Oil means, crude oil produced in California (or produced from federal lands off the shore of California) that is subject to the lower tier ceiling price rule set forth in section 212.73 of Part 212.
- California Imported Oil Receipts means, crude oil imported into California and included in the crude oil receipts of that refiner that are physically attributable to refineries located in the State of California. Crude oil imported into California by a refiner that is subsequently exchanged on a barrel-for-barrel basis for other crude oil (which is then processed by that refiner) shall not be included in this reporting entry by the importing refiner, but shall be so included by the refiner that processes the imported crude in a refinery located in California.
- Crude Oil Receipts means, as to a particular refiner, the volume of crude oil (a) booked into its refineries in accordance with accounting procedures generally accepted and consistently and historically applied by the refiner concerned, for its own account or for the account of a firm other than a refiner, or (b) if not previously so booked into its refineries, delivered by that

refiner for its account to another refiner pursuant to a processing agreement with that other refiner. Crude oil receipts shall not include crude oil received by a refiner for the purpose of processing at its refineries for the account of another refiner. A particular crude oil receipt shall be deemed to have occurred when the related cost is booked into refinery inventory in accordance with accounting procedures generally accepted and consistently and historically applied by the

(continued next page)

refiner concerned, whether or not such crude oil has been actually received by that refiner, except that crude oil delivered by one refiner to another refiner pursuant to a processing agreement will be deemed to have been delivered by the delivering refiner to the other refiner when the risk of loss passes to the other refiner under the particular processing agreement, or when the crude oil is received at the refinery of the other refiner, whichever occurs first. Crude oil which has been added by a refiner to its inventory and which is thereafter sold or otherwise disposed of without processing for the account of that refiner shall be deducted from its crude oil receipts at the time when the related cost is deducted from refinery inventory in accordance with accounting procedures generally accepted and consistently and historically applied by the refiner concerned. The volume of domestic crude oil included in a refiner's crude oil receipts shall be evidenced by and consistent with invoices received with respect to such crude oil receipts.

- o Crude Oil Runs to Stills means, in the case of a refiner the total number of barrels of crude oil input to distillation units processed by a refiner and measured in accordance with Form FEA β 320-M-0, and all other inputs to the distillation units qualifying under 10 CFR 211.67.
- o Entitlement means, for a particular month, the right of the refiner owning the entitlement to include one barrel of deemed old crude oil (as provided in 10 CFR 211.67(b)), in its adjusted crude oil receipts in that month. The issuance and transfer of entitlements shall be evidenced on records maintained by the DOE.
- o Navy Petroleum Reserves (NPR) means, that oil produced on any of four Navy reserve sites established by law.

- o New Crude Oil means, with respect to a specific property, (1) prior to February 1, 1976, the total number of barrels of domestic crude oil produced and sold in a specific month, less (a) the base production control level for that month, and less (b) the current cumulative deficiency; (2) effective February 1, 1976, the total number of barrels of domestic crude oil produced and sold in a specific month less (a) the property's base production control level for that month and less (b) the current cumulative deficiency since February 1, 1976; and (3) that the total number of barrels of domestic crude oil shall not in either period include any number of barrels not certified as new crude oil pursuant to the provisions of 10 CFR 212.131(a)(1) within the consecutive 2-month period immediately succeeding the month in which the crude oil is produced and sold except where such recertification is explicitly required or permitted by DOE order, interpretation, or ruling.
- o "New Oil" or "Upper Tier Oil" means (i) for the period February 1 through August 31, 1976, new crude oil as defined in Sections 212.72 and 212.75 of this chapter (see above) and crude oil produced and sold from a stripper well lease as defined in Section 212.74 of this chapter, and (ii) effective September 1, 1976, new crude oil as defined in Sections 212.72 and 212.75 of this chapter, except that upper tier crude oil included in a refiner's adjusted crude oil receipts shall not include condensate recovered at the inlet side of a gas processing plant.
- o Old Crude Oil, means (1) prior to February 1, 1976, the total number of barrels of crude oil produced and sold from a property in a specific month, less the total number of barrels of new crude oil for that property in that month, and less the total number of barrels of released crude oil for that property in that month; (2) effective February 1, 1976, the total number of barrels of crude oil produced and sold from a property in a specific month, less the total number of barrels of new crude oil for that property in that month.

- o Old Oil, means old crude oil as defined in 10 CFR 212.72 (see above), except that old oil included in a refiner's adjusted crude oil receipts shall not include condensate recovered at the inlet side of a gas processing plant.
- o Other Domestic Oil means, crude oil that is not covered in the crude oil definitions as explained in 10 CFR 212.
- o Refined Petroleum Product means, for the purposes of this form, gasoline, kerosene, middle distillate (including No. 2 fuel oil), LPG, lubricating oils, or diesel fuel.
- o Reporting Period means, for the purposes of this form, a calendar month.
- o Residual Fuel Oil means the fuel oil commonly known as (a) No. 4, No. 5, and No. 6 fuel oils; (b) Bunker C; (c) Navy Special Fuel Oil; and (d) other fuel oils which have a 50 percent boiling point over 700 degrees F in the ASTM D-86 standard distillation test.
- o Stripper Well oil means, for the purpose of this form, crude oil certified as having been produced on a stripper well lease (a lease whose average daily production per well did not exceed 10 barrels per day during any calendar year beginning after December 31, 1972).
- o Synthetic Crude Oil (Petroleum substitute) means a) a liquid produced from oil shale found in the United States and used as a feedstock or fuel in a domestic refinery and b) such other liquid synthetic fuels designated pursuant to orders issued by the ERA.
- o Tertiary Oil means that oil which is produced under a qualified tertiary enhanced recovery project.
- o Upper Tier Crude Oil means, effective February 1, 1976, new crude oil except that upper tier crude oil included in a refiner's adjusted crude oil receipts shall not include plant condensate, as covered in Section 212.72.

VI. SPECIAL INSTRUCTIONS

o Buy/Sell Crude

Purchasers of Crude Oil under the Buy/Sell Program should include in their receipts on page one of the ERA-49 (1) the cost of the buy/sell crude in the reported volume, cost, and weighted average cost of imported crude oil if the crude is purchased on or after July 7, 1975, and (2) the cost by category of crude as certified by the seller, if the purchase is before July 7, 1975, and should include the receipts in oil oil (Page 2) and upper tier (Page 3).

Sellers of crude oil under the Buy/Sell Program should include in their receipts on page one of the ERA-49 any reduction of crude oil receipts for crude oil sold under the Buy/Sell Program where (1) the reduction should be to imported oil at the weighted average cost of that refiners imported oil, even if domestic crude oil is delivered, where the date of sale is on or after July 7, 1975 and the domestic oil is deemed to be retained by the seller and should be reported as receipts (page 1), old oil (page 2) and upper tier (page 3); or (2) the reduction should be pro-rated to all crude categories based on the receipt volumes (page 1) as a percentage of the total receipts, regardless of the actual crude delivered, where the date of sale is before July 7, 1975, and the receipts of Old Oil (Page 2) and Upper Tier (Page 3) should be reduced by the same amounts as Page one receipts.

o EXCHANGES

Volumes of crude oil exchanged away or sold pursuant to a matching purchase/sale transaction should be retained as a receipt for purposes of the ERA-49 by the refiner exchanging away or selling such volumes.

Example: Refiner A exchanges or sells 100 barrels of stripper well oil to Refiner B and receives, in return, 100 barrels of imported oil. Refiner A reports the 100 barrels of stripper well oil for purposes of the ERA-49 and refiner B reports the 100 barrels of imported oil.

The exchange volumes become a receipt for purposes of the ERA-49 where the refiner books the cost relative to those volumes into its refinery inventory in accordance with its existing accounting procedures if generally accepted, consistently and historically applied by the refiner concerned. When a refiner receives the exchange delivery prior to giving up its reciprocal exchange volume, provide an estimate of the volume and cost of the crude oil to be given up in the month of the delivery receipt and adjust volumes, if necessary, in the appropriate reporting period.

Where a refiner exchanges away or sells domestic crude oil in a matching purchase/sale transaction and receives in exchange or purchases foreign crude oil that is delivered for sale or processing outside the United States, that refiner must include the domestic crude oil exchanged away or sold by it in its crude oil receipts as of the date that the domestic crude oil was exchanged away or sold.

These handling procedures also apply to firms other than refiners under the certification requirements of 10 CFR 212.131. It should be noted that the exchange situation described above is not provided as an all-encompassing explanation. Please refer to 10 CFR 211.67(g).

VII. FORMAT INSTRUCTIONS

All volumes are to be reported in actual barrels. Volumes should be entered so that any unused blocks are to the left of the number entered. Negative numbers should be entered with the minus sign in the block furthestmost to the left, filling any extra blocks with zeros. Zero filling should not be done for positive numbers.

A volume of negative 283,124 barrels should be entered as:

/-/0/0/2/8/3/1/2/4/

A volume of positive 283,124 barrels should be entered as:

/ / / /2/8/3/1/2/4/

All weighted average costs should be rounded to the nearest cent.

A weighted average cost of \$8.51 per barrel should be entered as:

/ /8/./5/1/

All total costs can be rounded to the nearest dollar.

A total cost of \$8,436,024.57 should be entered as:

/ / / /8/4/3/6/0/2/5/./0/0/

All company short names should be entered one letter to a block, beginning with the block furthestmost to the left. Use hyphens, not periods, to fill blocks between words. For example:

/S/T/A/R/-/R/E/F/I/N/I/N/G/ / / /

It is imperative that the official name listed in the Entitlement Notice be used. This official name must also be used when reporting processing agreements.

If more spaces are needed for any item than are available on the Form ERA-49, enter "See Continuation Sheet" under that item on the form. Prepare the item in its entirety on a separate page or pages. Number additional pages with the item number from the form. For example, continuation pages for Item 3 would be numbered "3-1,"

"3-2" and so forth. Be careful to include all entries on continuation sheets in the subtotals and/or totals requested on the form itself.

Complete the blocks for Reporting Firm Short Name, Date of Report, and Report Period on the top of each page.

VIII. SPECIFIC INSTRUCTIONS

The refiner must complete each item of Form ERA-49 as specified below.

Item No. 1. REPORTING FIRM IDENTIFICATION INFORMATION

- (a) In Item 1(a), enter the name of the reporting firm.
- (b,c,d,e) In Items 1(b) through (e), enter the complete address, including ZIP Code, of the reporting firm.
- (f,g) In Items 1(f) and 1(g), respectively, enter the name and telephone number, including area code, of an official of the reporting firm who can answer inquiries regarding this report and who may be contacted by DOE or other parties with respect to entitlement transactions.
- (h) In Item 1(h), enter the reporting firm short name. The short name is the name as it appears in the official list of participants. If the reporting firm has not been assigned a short name, Item 1(h) should be left blank. The DOE will assign a short name after the receipt of the first report.

If there has been any changes in identification data since the last submission of this form, check the box provided in the upper right corner.

- (i) In Item 1(i) check the block if the report filed is an amendment and indicate the number of the amendment on the line provided.

Item No. 2. REPORTING DATES

- (a) In Item 2(a), enter the date on which this report is completed by year, month and day. For example, April 2, 1978, would be entered as "Year /7/8/, Month /0/4/, Day /0/2/."
- (b) In Item 2(b), enter the year and month for which this report is submitted.

Item No. 3, CERTIFICATION

- o Enter the name and title of the individual designated by the company to sign the certification and the date of signing in the spaces provided on the form.

Item No. 4, CRUDE OIL RECEIPTS

- o In lines 10109, 10119, 10199, 10209, 10219, 10229, 10239, 10259, 10269, 10279, 10289, 10299, 10309, 10319, and 10399, enter in Column (D) in the appropriate category and line number, the actual barrels of crude oil receipts received for your account and received for processing for your account by other refiners for the reporting period. Enter the receipts processed at your account for non-refiners if an estimate of cost can be provided.
- o In lines 10109, 10119, 10199, 10209, 10219, 10229, 10239, 10259, 10269, 10279, 10289, 10299, 10309, 10319 and 10399, enter in column (E), in the appropriate category and line number, the total cost of the volume received and listed in column (D). Cost includes any cost associated with the delivery of crude oil to the refinery, including transportation. Do not include prior month cost adjustments or the entitlement dollar effect.

- In lines 10109, 10119, 10199, 10209, 10219, 10229, 10239, 10259, 10269, 10279, 10289, 10299, 10309, 10319, and 10399, enter in Column (F) in the appropriate category and line number, the weighted average cost per barrel. This amount should be calculated by dividing the total cost in Column (E) by the total volume in Column (D). When dividing, round out to the nearest dollar and/or cent.
- In line 10109, report the volume, cost, and weighted average cost all old oil including the California Old Oil.
- In line 10119, report the volume, cost, and weighted average cost of only California Old Oil which should be included in Old Oil (line 10109) and on page 6 (Item 9) of the ERA-49.
- In line 10199 report the volume, cost and weighted average cost of only California New Oil. This volume should also be included in line 10209 and on page 6 (Item 10) of the ERA-49.
- In line 10209 report the volume, cost and weighted average cost of New Oil including California New Oil (line 10199).
- In line 10259, report the volume, cost, and weighted average cost of California ANS Oil (i.e., physical ANS Oil received into refineries located in California).
- In line 10309, Column (D), enter the total volume in actual barrels, of imported crude oil received during the reporting period. For refiners required to file transfer pricing report forms under 10 CFR 212.84, costs of imported crude oil shall be as reported on that form.
- In line 10309, Column (E), enter the total cost of the imported crude oil received and listed in Column (D).
- In line 10309, Column (F), enter the weighted average cost per barrel of the imported crude oil received and listed in Column (D). This amount may be calculated by dividing the total cost in line 10309 Column (E) by the total volume in line 10309, Column (D).

- In line 10319, report the volume, cost and weighted average cost of California Imported Oil (i.e., physical Imported Oil received into refineries located in California).

Item No. 5, OLD CRUDE OIL RECEIPTS

- In Line 20119, Column (C), enter the total volume of old crude oil, in actual barrels, received for your account at own refineries for the reporting period.
- In line 20129, Column (C), enter the total volume of old crude oil, in actual barrels, received for processing at own refineries for non-refiners for the reporting period.
- In lines 20131 through 20138, Column (A), enter the company short name of other refiners who received old oil for processing for your account during the reporting period. Use the name of the refiner that appears in the official list of participants. Enter in Column (B) the volume of old oil, in actual barrels, received for your account by each refiner listed.
- In line 20139, Column (C), enter the total volume of old oil, in actual barrels, received for processing for your account by other refiners. This number is the total of lines 20131(B) through 20138(B) and any attached continuation sheets.
- In lines 20199, Column (D), enter the total receipts of old oil for the reporting period. Calculate this volume by adding the volumes in Column (C) for lines 20119, 20129, and 20139.

Adjustments

- In line 20219, Column (C), enter the volume of total adjustments, in actual barrels, to receipts of old oil for your own account at your own refineries during the reporting period. If the adjustment is negative, indicate with a minus sign in the left most position of the field and zero fill. Do not include corrections resulting from internal errors.

- o In lines 20229, Column (C), enter the volume of total adjustments, in actual barrels, to receipts of old oil for non-refiners at your refineries. If the adjustment is negative, indicate with a minus sign. Do not include corrections resulting from internal errors.
- o In line 20239, Column(C), enter the volume of total adjustments, in actual barrels, to receipts of old oil for your account at other refineries. If the adjustment is negative, indicate with a minus sign. Do not include corrections resulting from internal errors.
- o In line 20299, Column (D), enter the volume, in actual barrels, of the total adjustments in lines 20219 through 20239. If the total adjustment is negative, indicate with a minus sign.
- o In line 20399, Column (D), enter the volume, in actual barrels, of the total adjusted monthly receipts for the reporting period. Calculate this volume by adding line 20199, Column (D) to the volume in line 20299, Column (D). If the total adjusted monthly receipts are negative, indicate with a minus sign.

Item No. 6, UPPER TIER OIL RECEIPTS

- o Those instructions detailed under Item No. 5, OLD CRUDE OIL RECEIPTS, also apply to Upper Tier Oil Receipts with the exception to the change in crude oil category and the first digit of line number. Please refer to Item No. 5 instructions when completing this Item.

Item No. 7, RUNS TO STILL

- o For Own Account at Own Refineries

In line 40119, Column (C), enter, in actual barrels, the total volume of crude oil processed for your account at your own refineries during the reporting period.

o For Own Account at Other Refineries

In lines 40131 through 40138, Column (A), enter the company short name of other refiners whose refineries processed crude oil for your account during the reporting period. Use the company short name of the refiner that appears in the Entitlement Notice. In Column (B), enter for each refiner named the volume of crude oil processed, in actual barrels, during the reporting period.

- o In line 40139, Column (C) enter the total volume of crude oil processed at other refineries. This figure will be the total of lines 40131, Column (B) through 40138, Column (B), and any attached continuation sheets.

- o In line 40189, Column (D), enter the total volume of crude oil processed, in actual barrels, for the reporting firm's own account. Calculate the total by adding the volume in line 40119, Column (C) to the volume in line 49139, Column (C).

o For Synthetic Crude Oil

In line 40169, Column (C), enter the total volume of synthetic crude oil processed by or for you during the reporting period.

o For Non-refiners at Own Refineries

In line 40129, Column (C), enter the total volume, in actual barrels, of crude oil processed for all non-refiners during the reporting period.

o Exports of Refined Petroleum Products and Residual Fuel Oil

In line 40159, Column (C), enter the total volume in barrels of refined petroleum products (excluding refined lubricating oils and bunker C and Navy special fuel oils, which are sold for use as a marine fuel on a voyage departing from a U. S. port, but including residual fuel oil) refined and exported by you, or sold by you to a domestic purchaser certifying the product for export. The effective inclusion date of residual fuel oil in this item was April 1, 1976. Do not make corrections to reported volumes of residual fuel oil in this item if errors occurred prior to April 1, 1976.

o Total Runs to Stills

In line 40199, Column (D), enter the total volume of crude runs to stills, in actual barrels, during the reporting period. Calculate this volume by adding the volume in line 40119, Column (C) to the volume in line 40139, Column (C) to the volume in line 40169, Column (C) to the volume in line 40129, Column (C) and subtracting any exports of refined petroleum products (excluding refined lubricating oils but including residual fuel oil), line 40159, Column (C). NOTE: Do not preface line 40159 with a minus sign on form.

o Volumes (excluding processing agreements) not qualifying for the Small Refiner Bias.

In line 40399 Column (C), enter the total volume of crude oil not qualifying for the Small Refiner Bias. Do not include processing agreement volumes.

o For Other Refiners at Own Refineries

In lines 40141 through 40148 Column (A), list the company short names of other refiners for whom the reporting firm processed crude oil during the reporting period. Use the company short name of the refiner that appears in the Entitlement Notice. In Column (B), enter the volume of crude oil processed, in actual barrels, for each other refiner listed.

o In line 40149, Column (C), enter the total volume of crude oil processed, in actual barrels, for other refiners. This entry will be the total of lines 40141, Column (B) through line 40148, Column (B) and any attached continuation sheets.

o Total for Others

In line 40179, Column (D), enter the total volume of crude oil processed, in actual barrels, for others by the reporting firm. This volume may be calculated by adding the volume in line 40129, Column (C) to the volume in line 40149, Column (C).

Item No. 8, RESIDUAL FUEL OIL (OPTIONAL)

- o This item is to be completed only by those reporting firms producing residual fuel oil for sale in the

BOM East Coast Refining District. The provisions of 10 CFR 211.67(d)(4) do not apply to the first 5000 barrels per day of residual fuel oil production for sale in the BOM East Coast Refining District. However, reporting of volumes of less than 5000 barrels per day is required..

- A. For domestic refiners that sell residual fuel oil in the Bureau of Mines East Coast Refining District, enter on Line 50199 the total volume of residual fuel oil sales in or into the Bureau of Mines East Coast Refining District during the reporting period. Do not include any production of residual fuel oil that was entered as an export in Part 7, Line 40159.
- B. Enter on Line 50399 the average volume of residual fuel oil per day for sale in or into the Bureau of Mines East Coast Refining District. This volume may be calculated by dividing the number of barrels on Line 50199 by the number of calendar days in the reporting period.

ITEM NO. 9, CALIFORNIA OLD OIL RECEIPTS

- o In Column B of the line items specified below, enter the weighted average API gravity truncated to the next lowest degree, i.e., 27.9 gravity would be entered as 27.
- o In line 60119, Column (C), enter the total volume of California old crude oil, in actual barrels, received for your account at own refineries for the reporting period.
- o In line 60129, Column (C), enter the total volume of California old crude oil, in actual barrels, received for processing at own refineries for non-refiners for the reporting period.
- o In line 60139, Column (C), enter the total volume of California old oil, in actual barrels, received for processing for your account by other refiners.

Adjustments

- o In line 60219, Column (C), enter, in actual barrels, the total volume of California old oil adjustments.

If the adjustment is negative, indicate with a minus sign in the left most position of the field and zero fill. Do not include corrections resulting from internal errors.

- o In line 60399, Column (D), enter the volume, in actual barrels, of the total adjusted monthly receipts for the reporting period.

ITEM NO. 10, CALIFORNIA NEW OIL RECEIPTS

- o In Column B of the line items specified below, enter the weighted average API gravity truncated to the next lowest degree, i.e., 27.9 gravity would be entered as 27.
- o In line 63119, Column (C), enter the total volume of California New crude oil, in actual barrels, received for your account at own refineries for the reporting period.
- o In line 63129, Column (C), enter the total volume of California New crude oil, in actual barrels, received for processing at own refineries for non-refiners for the reporting period.
- o In line 63139, Column (C), enter the total volume of California New oil, in actual barrels, received for processing for your account by other refiners.

Adjustments

- o In line 63219, Column (C), enter the volume of total adjustments, in actual barrels, to receipts of California New crude oil. If the adjustment is negative, indicate with a minus sign in the left most position of the field and zero fill. Do not include corrections resulting from internal errors.
- o In line 63399, Column (D), enter the volume, in actual barrels, of the total adjusted monthly receipts for the reporting period.

APPENDIX H

<p align="center">ECONOMIC REGULATORY ADMINISTRATION Washington, D.C. 20461</p> <p align="center">DOMESTIC CRUDE OIL ENTITLEMENTS PROGRAM REFINERS MONTHLY REPORT</p> <p align="center">ERA-49</p>	<p align="center">APPROVED OMB 38-R0215</p> <p align="center">FOR ERA USE ONLY</p> <p>ACCESSION NUMBER: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p> <p>DATE: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p> <p align="center">YEAR MONTH DAY</p>																																																																
<p><small>This report is mandatory under Public Laws 93-159, 94-163, and 93-375 as amended.</small></p>																																																																	
<p>1. REPORTING FIRM IDENTIFICATION INFORMATION: <i>Check If Any Change In Identification Data</i> <input type="checkbox"/></p> <p>a. Name _____</p> <p>b. Street/Box/RFD _____</p> <p>c. City _____ d. State _____ e. ZIP Code _____</p> <p>f. Name of Contact Person _____ g. Telephone (Including Area Code) _____</p> <p>h. Reporting Firm Short Name _____ i. Amendment Number _____</p>																																																																	
<p>2. a. DATE OF REPORT: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> b. REPORTING PERIOD: <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/></p> <p align="center">YEAR MONTH DAY YEAR MONTH</p>																																																																	
<p>3. CERTIFICATION</p> <p align="center">I CERTIFY THAT THE INFORMATION SUBMITTED ON AND WITH THIS FORM IS FACTUALLY CORRECT, COMPLETE AND IN ACCORDANCE WITH ERA REGULATIONS (TITLE 10, CODE OF FEDERAL REGULATIONS) AND THE INSTRUCTIONS TO FORM ERA-49.</p> <p>a. Name and Title of Certifying Official _____ b. Signature _____ c. Date Certified _____</p>																																																																	
<p align="center"><small>THE U.S. CODE, (CRIMES AND CRIMINAL PROCEDURES), SECTION 1001, MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION.</small></p>																																																																	
<p>4. CRUDE OIL RECEIPTS</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:35%;">CATEGORY OF CRUDE OIL (A)</th> <th style="width:15%;">TOTAL VOLUME (BARRELS) (D)</th> <th style="width:20%;">TOTAL COST (E)</th> <th style="width:30%;">WEIGHTED AVERAGE COST PER BARREL (F)</th> </tr> </thead> <tbody> <tr><td>10109 Old Oil.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10119 Calif. Old Oil Receipts.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10199 Calif. New Oil Receipts.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10209 New Oil.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10219 Stripper Wash Oil.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10229 Tertiary Oil.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10239 Other Domestic Oil.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10259 Calif. A&S Oil.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10269 Alaskan N. Slope (PAOS).....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10279 Alaskan N. Slope (PAO1-4).....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10289 Synthetic Crude.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10299 Naval Petroleum Reserve</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10309 Imported Oil.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr><td>10319 Calif. Imported Oil.....</td><td><input type="text"/></td><td>\$ <input type="text"/></td><td>\$ <input type="text"/></td></tr> <tr> <td>10399 TOTAL CRUDE OIL RECEIPTS <small>(Sum all lines except 10119, 10199, 10259, and 10319)</small></td> <td><input type="text"/></td> <td>\$ <input type="text"/></td> <td>\$ <input type="text"/></td> </tr> </tbody> </table>		CATEGORY OF CRUDE OIL (A)	TOTAL VOLUME (BARRELS) (D)	TOTAL COST (E)	WEIGHTED AVERAGE COST PER BARREL (F)	10109 Old Oil.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10119 Calif. Old Oil Receipts.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10199 Calif. New Oil Receipts.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10209 New Oil.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10219 Stripper Wash Oil.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10229 Tertiary Oil.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10239 Other Domestic Oil.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10259 Calif. A&S Oil.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10269 Alaskan N. Slope (PAOS).....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10279 Alaskan N. Slope (PAO1-4).....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10289 Synthetic Crude.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10299 Naval Petroleum Reserve	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10309 Imported Oil.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10319 Calif. Imported Oil.....	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>	10399 TOTAL CRUDE OIL RECEIPTS <small>(Sum all lines except 10119, 10199, 10259, and 10319)</small>	<input type="text"/>	\$ <input type="text"/>	\$ <input type="text"/>
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<p align="center">ERA-49 PAGE 1</p>																																																																	

ECONOMIC REGULATORY ADMINISTRATION Washington, D.C. 20461 DOMESTIC CRUDE OIL ENTITLEMENTS PROGRAM REFINERS MONTHLY REPORT ERA-49	FOR ERA USE ONLY ACCESSION NO. _____ DATE: ___ ___ ___ YEAR MONTH DAY
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REPORTING FIRM SHORT NAME _____	DATE OF REPORT	YEAR ___	MONTH ___	DAY ___
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6. UPPER TIER OIL RECEIPTS	REPORTING PERIOD - YEAR ___ MONTH ___
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UPPER TIER OIL <small>(A)</small>	VOLUME IN BARRELS <small>(B)</small>	SUBTOTALS (VOLUME IN BARRELS) <small>(C)</small>	TOTALS (VOLUME IN BARRELS) <small>(D)</small>
30119 FOR OWN ACCOUNT AT OWN REFINERIES		_____	
30129 FOR NON-REFINERS AT OWN REFINERIES		_____	
FOR OWN ACCOUNT AT OTHER REFINERS			
NAME			
30131 _____	_____		
30132 _____	_____		
30133 _____	_____		
30134 _____	_____		
30135 _____	_____		
30136 _____	_____		
30137 _____	_____		
30138 _____	_____		
30139 FOR OWN ACCOUNT AT OTHER REFINERS		_____	
30199 TOTAL UPPER TIER OIL RECEIPTS (30119+30129+30139)			_____
ADJUSTMENTS			
30219 FOR OWN ACCOUNT AT OWN REFINERIES		_____	
30229 FOR NON-REFINERS AT OWN REFINERIES		_____	
30239 FOR OWN ACCOUNT AT OTHER REFINERS		_____	
30299 TOTAL ADJUSTMENTS (30219+30229+30239)			_____
30399 ADJUSTED MONTHLY RECEIPTS (30199+30299)			_____

30409 30499	NET CORRECTION FROM PRIOR MONTH AMENDED REPORTS CORRECTED MONTHLY RECEIPTS FOR CALCULATIONS	_____ _____
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ECONOMIC REGULATORY ADMINISTRATION Washington, D.C. 20461 DOMESTIC CRUDE OIL ENTITLEMENTS PROGRAM REFINERS MONTHLY REPORT ERA-49		FOR ERA USE ONLY ACCESSION NO. _____ DATE: ___ ___ ___ YEAR MONTH DAY	
REPORTING FIRM SHORT NAME _____		DATE OF REPORT: YEAR ___ MONTH ___ DAY ___	
7. RUNS TO STILL		REPORTING PERIOD - YEAR ___ MONTH ___	
(A)	VOLUME IN BARRELS (B)	SUBTOTALS (VOLUME IN BARRELS) (C)	TOTALS (VOLUME IN BARRELS) (D)
40119 FOR OWN ACCOUNT AT OWN REFINERIES FOR OWN ACCOUNT AT OTHER REFINERS NAME		_____	
40131 _____	_____		
40132 _____	_____		
40133 _____	_____		
40134 _____	_____		
40135 _____	_____		
40136 _____	_____		
40137 _____	_____		
40138 _____	_____		
40139 TOTAL FOR OWN ACCOUNT AT OTHER REFINERS		_____	
40189 TOTAL FOR OWN ACCOUNT (40119 + 40139)			_____
40169 FOR SYNTHETIC CRUDE OIL		_____	
40129 FOR NON-REFINERS AT OWN REFINERIES		_____	
40159 EXPORTS OF REFINED PETROLEUM PRODUCTS OR RESIDUAL FUEL OIL		_____	
40199 TOTAL RUNS TO STILL (40119 + 40139 + 40169 + 40129 - 40159)			_____
40219 Net Correction From Prior Month Amended Reports			_____
40259 Processing Agreements Net Correction <i>FOR ERA USE ONLY</i>		_____	
40299 Corrected Monthly Runs To Stills For Calculations			_____
40399 Volumes (Excluding Processing Agreements) Not Qualifying For Small Refiner Bias			_____
PROCESSING AGREEMENTS FOR OTHER REFINERS AT OWN REFINERIES NAMES			
40141 _____	_____		
40142 _____	_____		
40143 _____	_____		
40144 _____	_____		
40145 _____	_____		
40146 _____	_____		
40147 _____	_____		
40148 _____	_____		
40149 TOTAL FOR OTHER REFINERS AT OWN REFINERIES		_____	
40179 TOTAL FOR OTHERS (40129 + 40149)			_____

ECONOMIC REGULATORY ADMINISTRATION
 Washington, D.C. 20461

DOMESTIC CRUDE OIL ENTITLEMENTS PROGRAM
REFINERS MONTHLY REPORT

 ERA-49

FOR ERA USE ONLY

ACCESSION NO. _____

DATE: | | | | | |
 YEAR MONTH DAY

REPORTING FIRM SHORT NAME _____ DATE OF REPORT: YEAR | | MONTH | | DAY | |

B. RESIDUAL FUEL OIL

REPORTING PERIOD - YEAR | | MONTH | |

A. FOR REFINERS THAT SELL RESIDUAL FUEL OIL IN OR INTO THE BOM EAST COAST REFINING DISTRICT, ENTER THE TOTAL VOLUME OF RESIDUAL FUEL OIL PRODUCED FOR SALE IN OR INTO THE BOM EAST COAST REFINING DISTRICT DURING THE REPORTING PERIOD.

50199 _____ BARRELS

B. AVERAGE VOLUME OF RESIDUAL FUEL OIL PER DAY

50399 _____ BB/DAY

FOR
ERA
USE
ONLY

50509 TOTAL CORRECTIONS FROM PRIOR MONTH AMENDED REPORTS

50599 CORRECTED MONTHLY RESIDUAL FUEL OIL PRODUCTION

ECONOMIC REGULATORY ADMINISTRATION
 Washington, D.C. 20461
DOMESTIC CRUDE OIL ENTITLEMENTS PROGRAM
REFINERS MONTHLY REPORT
 ERA-49

FOR ERA USE ONLY

ACCESSION NUMBER:

DATE:
 YEAR MONTH DAY

REPORTING FIRM SHORT NAME:

DATE OF REPORT:
 YEAR MONTH DAY

REPORTING PERIOD:
 YEAR MONTH

9. CALIFORNIA OLD OIL RECEIPTS

(A)	WEIGHTED AVERAGE GRAVITY (B)	SUBTOTALS (VOLUME IN BARRELS) (C)	TOTALS (VOLUME IN BARRELS) (D)
60119 For Own Account At Own Refineries.....	<input type="text"/>	<input type="text"/>	
60129 For Non-Refiners At Own Refineries.....	<input type="text"/>	<input type="text"/>	
60139 For Own Account At Other Refiners.....	<input type="text"/>	<input type="text"/>	
60219 Adjustments.....	<input type="text"/>	<input type="text"/>	
60219 Adjusted Monthly Receipts (60119 + 60129 + 60139 + 60219).....	<input type="text"/>		<input type="text"/>
60409 FOR ERA USE ONLY	<input type="text"/>	Net Correction From Prior Month Amended Reports	<input type="text"/>
60499	<input type="text"/>	Corrected Monthly Receipts For Calculations	<input type="text"/>

10. CALIFORNIA NEW OIL RECEIPTS

63119 For Own Account At Own Refineries.....	<input type="text"/>	<input type="text"/>	
63129 For Non-Refiners At Own Refineries.....	<input type="text"/>	<input type="text"/>	
63139 For Own Account At Other Refiners.....	<input type="text"/>	<input type="text"/>	
63219 Adjustments.....	<input type="text"/>	<input type="text"/>	
63399 Adjusted Monthly Receipts (63119 + 63129 + 63139 + 63219).....	<input type="text"/>		<input type="text"/>
63409 FOR ERA USE ONLY	<input type="text"/>	Net Correction From Prior Month Amended Reports	<input type="text"/>
63499	<input type="text"/>	Corrected Monthly Receipts For Calculations	<input type="text"/>

This report was done with support from the Department of Energy. Any conclusions or opinions expressed in this report represent solely those of the author(s) and not necessarily those of The Regents of the University of California, the Lawrence Berkeley Laboratory or the Department of Energy.

Reference to a company or product name does not imply approval or recommendation of the product by the University of California or the U.S. Department of Energy to the exclusion of others that may be suitable.

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