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REPORT BY THE U.S.

# General Accounting Office

## Possible Energy Effects Of A U.S. Ban On Libyan Oil Imports

Under current slack market conditions, a ban on trade with Libya is not likely to have a major impact on U.S. oil supplies or prices. Current U.S. oil imports from Libya are small, and oil is readily available from other sources. Libya could experience a temporary loss of oil revenues until it found new customers. Tight market conditions-unlikely in 1982-would maximize the potential adverse effects on the United States and minimize those on Libya. U.S. oil companies-both those producing and refining Libyan oil-are more likely to feel the adverse effects of a trade ban than the United States as a whole.

Although a ban would probably prevent direct imports of Libyan oil from entering the United States, some Libyan oil could still enter the country as products refined elsewhere.



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ENERGY AND MINERALS  
DIVISION

B-178205

The Honorable Philip R. Sharp  
Chairman, Subcommittee on Fossil  
and Synthetic Fuels  
Committee on Energy and Commerce  
House of Representatives

The Honorable Edward J. Markey  
House of Representatives

On December 15, 1981, you asked us to analyze the energy effects of a U.S. ban on oil trade with Libya. This letter summarizes the results of our analysis; appendixes I through III provide the background and details.

Our analysis of the effectiveness of a ban in stopping the flow of Libyan oil into this country; and of the effects of a ban on U.S. oil supplies and prices, U.S. oil companies, and Libya's economy showed the following:

- Under current slack market conditions, a U.S. ban on importing Libyan oil is not likely to have a major impact on U.S. supplies or prices because the ban would not reduce world oil supplies, current U.S. oil imports from Libya are small, and oil is available from a variety of other sources. Libya could likely continue to produce and sell its oil on the world market but could experience a temporary loss of oil revenues until new customers are arranged.
- A ban would likely be successful in preventing direct imports of Libyan oil from entering the United States but some indirect shipments--those passing through or refined in other countries--could still enter this country. The relative ease with which oil supplies can be legally swapped and redirected to other consumers, however, makes violation of a ban unnecessary, and therefore unlikely.
- Market conditions are the most important factors in determining the effects--if any--of a trade

ban, since they determine the ease with which the United States can replace Libyan oil, and Libya can continue to sell banned oil. In a tight oil market, a ban would maximize the potential adverse effects on the United States and minimize those on Libya. A tight oil market, however, is not expected in 1982.

--U.S. oil companies--both those producing in Libya, and those refining companies which are heavily dependent on Libyan crude--are more likely to be adversely affected by a ban than the United States as a whole.

--The United States currently imports a small amount of oil from Libya but its importance to U.S. oil supplies should not be completely discounted. Potentially higher future imports, its high quality and importance to some U.S. refineries, and the concentration of its use on the East Coast are reasons for concern about the potential loss of Libyan oil.

#### OBJECTIVES, SCOPE, AND METHODOLOGY

Our review was confined to an analysis of the potential energy effects of a trade ban on Libyan oil. It does not address the myriad of foreign affairs implications of such an action or other types of U.S. policy options for dealing with Libya. Our review also did not address issues surrounding the legal authority for a Libyan oil ban. The analysis was based on the following assumptions: (1) no retaliatory steps are taken by the Organization of Petroleum Exporting Countries (OPEC) as a whole in response to U.S. trade sanctions against Libya; (2) no further U.S. actions against Libya are taken, such as the removal of U.S. oil companies (not just their American personnel); (3) no unforeseen oil supply disruptions occur; and (4) no multinational participation takes place. Our conclusions could be sharply altered by a change in any of these conditions.

Our analysis was based on information obtained on Libya's oil imports to the United States, U.S. oil companies which produce and refine Libyan oil, the workings of the international oil market, and the effects of supply reductions. Data were gathered from a variety of sources, including the Departments of Energy and State, the American Petroleum Institute, the International Monetary Fund (IMF), and various oil industry trade presses and journals. Interviews with knowledgeable individuals from the oil industry, Government, academic institutions, and various research groups provided us with valuable insights.

We should stress that because of the immediacy of this issue, the work was completed under a tight deadline. To help meet that deadline, we relied extensively on interviews and on documents

readily available from U.S. Government sources. As you requested, we did not obtain agency comments.

THE IMPORTANCE OF LIBYAN OIL  
TRADE TO THE UNITED STATES

The United States currently imports under 150 thousand barrels per day (mbd) of crude oil from Libya, or about 3 percent of our total imports and 1 percent of total petroleum use. (See app. I, table 1.) U.S. interest in Libyan oil may, however, be greater than these figures would suggest because (1) import levels were higher in the recent past, (2) some U.S. refiners depend upon high-quality oil of the type produced by Libya and a few other countries, (3) U.S. oil companies are active in Libya, and (4) the use of Libyan oil is concentrated in certain regions of the United States.

Higher past Libyan oil imports

In 1980, the United States imported an average of 716 mbd of Libyan oil, significantly more than the current level. U.S. oil imports from Libya fell dramatically during 1981 because Libya maintained an uncompetitively high price in the face of softened world oil demand. In the absence of U.S. Government restrictions, U.S. imports may increase in the future if U.S. demand increases or if Libyan oil is priced competitively. A ban on Libyan oil imports raises questions about future U.S. access to Libyan oil.

Some U.S. refiners need  
crude of Libya's high quality

In 1981, about one-sixth of all U.S. refineries received oil from Libya. Eight U.S. refining companies received more than 10 percent of their crude stock from this source. Despite the availability of cheaper oil, American importers were willing to pay a premium for Libyan crude which is both light and sweet (low in sulfur).

U.S. oil companies in Libya

Five U.S. oil companies or their subsidiaries--Amerada Hess, Conoco, Marathon (these three companies form the Oasis Consortium), Occidental and Mobil--produce oil in Libya. As shown in table 3, (see app. I, p. 6), they accounted for 54 percent of Libyan production in 1980. These companies have a financial stake in maintaining access to Libyan crude reserves and in retaining their physical assets there. Other U.S. companies, such as oil service companies, also do business in Libya.

U.S. regional  
distribution of Libyan oil

In terms of both the amounts of Libyan oil received and of the percentage of overall supplies, the East Coast and Midwest

are the largest users of Libyan oil. As shown in table 2 (see app. I, p. 4), the East Coast used more than half of the Libyan oil imported into the United States and is the only Petroleum Administration for Defense (PAD) district where more than 10 percent of 1980 oil supplies came from Libya. In 1980, the Midwest as well received close to 10 percent of its supplies from Libya.

The Gulf region initially receives almost half of the Libyan crude entering the United States, but because of its large domestic oil production and shipments of crude and products to other regions, Libyan oil represents only 1 percent of the region's oil supply.

The West Coast and Rocky Mountain regions receive almost no oil from Libya because their location makes it more economic to import sweet crude produced in the Asia-Pacific region.

#### WOULD A BAN PREVENT LIBYAN OIL FROM ENTERING THE UNITED STATES?

A U.S. ban against importing Libyan oil would probably succeed in preventing direct Libyan imports from entering the United States; however, it might be less effective against indirect imports, that is those which have been refined or transshipped through a third country. Importers of products might not be able to discern the source of all the crude which went into their imports. This is particularly the case with Libyan oil since, in 1980, about 20 percent of imports from Libya entered the United States as refined products from the Caribbean. Including Puerto Rico and the United States Virgin Islands as part of the United States for purposes of a ban would help reduce indirect Libyan oil imports.

There are available means by which U.S. companies handling Libyan oil could circumvent the ban. It does not, however, appear that there would be either an incentive or need to do so because of the relative ease with which oil supplies can be swapped and redirected to other consumers without violating either the spirit or letter of the ban. Previous GAO reports on other commodities indicate that cooperation by other countries and private companies involved is necessary to make any ban effective. 1/

#### EFFECTS ON U.S. OIL SUPPLIES AND PRICES

A ban on importing Libyan oil to the United States is not likely to have a major impact on U.S. oil supplies or prices. Because a ban would not necessarily reduce U.S. oil company

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1/"Lessons to Be Learned from Offsetting the Impact of the Soviet Grain Sales Suspension," CED-81-110, July 27, 1981; and "Implementation of Economic Sanctions Against Rhodesia," ID-77-27, Apr. 27, 1977.

production in Libya, world oil supplies would not be reduced. Oil companies would probably reallocate Libyan oil bound for the United States, replacing it with non-Libyan oil destined for other countries.

Under present slack market conditions, the likelihood of any adverse effects of a ban is further reduced for the following reasons: (1) current U.S. imports from Libya are small, (2) substantial excess productive capacity exists in other countries that produce large volumes of sweet crude, (3) some Libyan oil users can substitute readily available higher sulfur oil, and (4) current large U.S. stocks can prevent any shortfall while new supply arrangements are sought.

Introducing a ban in a tight oil market could raise U.S. oil prices somewhat to attract sufficient replacement oil. This effect would be temporary, however, ending after the adjustment to new supply sources is made. Furthermore, barring any unforeseen supply disruptions, the world oil market is expected to remain soft throughout 1982.

World oil supplies should not shrink--redistributions will occur

Since Libyan oil would not be removed from the world market, oil companies would probably reallocate oil bound for the United States to other buyers, replacing it with non-Libyan oil. This exchange would have little net effect on U.S. oil supplies or prices. Companies producing oil in Libya have an economic incentive to continue to sell Libyan oil. They could switch customers and supplies with their own foreign subsidiaries, or swap oil with other companies so as to satisfy both the conditions of the ban and maintain their Libyan oil sales. Moreover, all five U.S. companies currently producing in Libya have operations in the North Sea, and Mobil also produces in Nigeria. Since these sources produce light sweet crude, the companies might be able to accomplish this redistribution within their own systems.

Slack market conditions limit adverse effects

Since U.S. oil imports from Libya are currently small (about 132 mbd as of November 1981), the amount of oil that the United States would have to replace would also be small. Furthermore, these reduced volumes of imports represent small percentages of U.S. oil supplies, limiting the effects of a ban on U.S. oil prices. For example, because 99 percent of U.S. oil supplies do not come from Libya, even an unlikely 10-percent increase in Libyan replacement oil prices could cause less than a 1-percent increase in U.S. oil prices.

In addition, the existence of adequate alternative sources of sweet crude should provide a further cushion against a ban's

potential adverse effects. African countries besides Libya and the North Sea region produce large amounts of oil similar in quality to Libya's, and are suitably located to ship oil to the East Coast of the United States. While there appears to be little extra capacity in the North Sea, oil production increases from new wells coming on line may allow greater oil exports to the United States in the future. In terms of presently available productive capacity, the most likely source of alternatives to Libyan oil are other African countries, especially Nigeria. Table 4 (see app. II, p. 14) shows these countries' current production and sustainable capacity. Oil production and revenues have fallen dramatically in these countries (particularly Nigeria and Algeria) because they maintained high oil prices during a period of declining demand. While this trend created the current excess capacity, recent price cuts by these countries are reducing this extra capacity. Furthermore, their proximity to, and relations with, Libya and other political factors may make these supplies somewhat insecure.

Some U.S. refiners that use Libyan or other sweet oil can substitute higher sulfur oil, which is readily available in a slack market. This action would free up sweet crude for those refineries that strictly require it. In addition, substantial excess capacity in the U.S. refining industry allows refineries which do not require sweet crude to raise their output so that a ban would have little or no impact on national oil supplies.

Current high stocks held by private industry and the Strategic Petroleum Reserve (SPR) provide an additional cushion in the unlikely event of the unavailability of replacements for banned Libyan oil. Private stocks above minimum operating levels and oil from the SPR could potentially replace current Libyan imports for nearly 10 years. Oil company stocks, however, may be substantially reduced this winter, and the use of SPR oil to replace banned Libyan imports is questionable.

Tight market conditions  
maximize adverse effects

Introducing a ban in a tight oil market could temporarily raise U.S. oil prices to attract sufficient replacement oil. Adverse price effects could also arise from the increased use of middlemen, spot market purchases, and other handling costs from changing supply arrangements. Any price increase would be in addition to the probably larger price rise resulting from the tightening of the market. The actual size of the price effect depends on how "tight" the market is in terms of availability of alternative oil supplies and stock levels, and the amount of Libyan oil the United States was importing at the time the ban was instituted. Once longer term supply arrangements are made, U.S. prices would again return to the level of world oil prices. If the market tightens after the United States has instituted a ban and made alternative long-term supply arrangements, any price increases would be the result of market conditions and not the ban.

Any adverse price effects resulting from a ban would be concentrated in the East Coast and Midwest regions because they use nearly three-quarters of Libyan oil imports, and Libyan oil represents a larger portion of their overall supplies.

#### EFFECTS ON U.S. OIL COMPANIES

U.S. oil companies--both those producing in Libya and those refining companies which are heavily dependent on Libyan crude--are more likely to be adversely affected by a ban than the United States as a whole. Assuming no Libyan retaliation, U.S. oil producers in Libya will probably be able, over time, to reallocate sales or swap supplies with other companies. Under current slack market conditions, however, companies may experience a temporary loss of sales.

A potentially more serious consequence of a ban is that it exposes U.S. companies to possible Libyan acts of retaliation, such as expulsion or expropriation. As a result, they risk the loss of assets and future access to Libyan oil.

The values of future Libyan production and of oil company assets in Libya are difficult to determine. The value of future production is highly dependent on oil market conditions and on the extent of future access that would have been likely, had the United States not imposed a ban. At \$37 per barrel, for example, and at 1980 production levels (1.8 mmbd), future oil production in Libya could be worth about \$7.3 billion per year to U.S. oil companies.

The value of material assets ranges from relatively little, if based on book value, since most of the assets have been depreciated, to several billion dollars, if based on their replacement costs. According to State Department analysts, the book value of U.S. oil company investments in Libya is between \$3 billion and \$6 billion; however, most of this has been depreciated. In terms of replacement value, the U.S. oil company investment is estimated at between \$10 billion and \$13 billion.

Refining companies that are not strictly dependent on sweet crude are likely to be the least affected by a U.S. ban on Libyan oil imports since they could shift to other grades of crude oil and other suppliers. Refineries whose physical plants require the use of high-quality sweet crude might be able to obtain these grades of oil from sources other than Libya in the current slack oil market without paying much of a premium. In a tighter oil market, however, those refineries strictly requiring sweet crude may have difficulty obtaining alternative supplies; they will have less flexibility in supply sources and might temporarily pay a higher price for the oil they are able to purchase.

U.S. refining companies which receive large percentages of their total oil supplies from Libya are most likely to be affected

by a ban. In 1981, eight U.S. oil companies received more than 10 percent of their total U.S. oil supply from Libya.

#### POTENTIAL EFFECTS ON LIBYA

Under current market conditions, Libya could experience a small, short-term loss of oil revenues during a ban, until new oil customers were arranged or world oil demand increased. The redistribution effects, which ensure the availability of U.S. supplies, would conversely promote the sale of Libyan oil to other customers. While oil revenues are the primary source of Libya's income, current U.S. imports are low, and their loss, to the extent it occurred, would not severely affect revenues. A ban would, however, add to Libya's existing income problems from its decreased sales due to relatively high prices.

Libya depends on revenue from the sale of oil for its economic resources. Crude oil revenues provide approximately 99 percent of Libya's foreign exchange earnings and, in recent years, more than 50 percent of its gross national product has come from the oil sector. Moreover, the United States has been a major customer, importing 20 percent of Libyan production in 1981, down from 40 percent in 1980. Income from sales to the United States in 1981 averaged about \$16 million per day.

The overriding factor which will determine the effect of an oil import ban against Libya is the potential availability of alternative customers for the oil which would no longer be purchased by the United States. Libya's ability to sell its oil would be determined by five principal factors: the ease and speed with which the U.S. oil companies could redirect oil supplies, market conditions, Libya's willingness to further lower its oil prices, the willingness of allies to cooperate with the United States in refraining from purchasing the banned Libyan oil, and the potential for East European or other countries to increase Libyan oil purchases.

If oil companies producing in Libya could find customers for none or only a portion of the oil boycotted by the United States, then Libya would suffer some loss in income. Even at the current low level of sales to the United States (under 150 mbd), Libya could lose as much as \$2.1 billion per year. Moreover, if it had to lower its prices by \$1 per barrel to sell the oil, it could lose \$56 million over a year. Any revenue losses would be in addition to, and much smaller than, revenues lost as a result of declining oil sales in 1981. At 1980 import levels, potential revenue losses would be significantly higher. (See app. III, p. 32.)

Libya could also lose oil revenues if a U.S. ban on exporting oil-producing equipment and parts, and the removal of American personnel hampered oil production. After a temporary adjustment period, these actions are not likely to substantially reduce Libyan oil production. In the long run, however, Libya may have

difficulty producing at full capacity without U.S. service companies and technicians.

A drop in oil revenues would add to Libya's difficulties of meeting its economic commitments. Libya, apparently, has the flexibility in the short-run to overcome some of its economic difficulties by relying on accumulated financial reserves, reducing some of its expenditures on less critical commitments, or by borrowing on the Eurocurrency market. As of early November 1981, the State Department estimated that Libya held accumulated reserves of \$17 billion, equal to about a year's imports of goods. Some experts on Libyan affairs both within and outside the Federal Government contend that the Libyan Government has over-extended itself in economic development projects, importation and subsidization of expensive foreign consumer goods, foreign aid expenditures, and large purchases of arms. There may be considerable room within these expenditures for cuts that would not severely affect the Libyan economy.

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As mentioned earlier, we did not obtain agency comments. As requested by your staff, we plan to restrict further distribution of this report for 3 days after issuance, unless its contents are released by your office before that time. Copies of this report are being sent to the Director, Office of Management and Budget and the Secretaries of Energy, State, and Commerce.



J. Dexter Peach  
Director



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### ABBREVIATIONS

bb1	barrel
Conoco	Continental Oil Company
DOE	U.S. Department of Energy
GAO	General Accounting Office
IMF	International Monetary Fund
LNOC	Libyan National Oil Company
mbd	thousand barrels per day
MMBD	million barrels per day
CPEC	Organization of Petroleum Exporting Countries
PAD	Petroleum Administration for Defense district
SPR	Strategic Petroleum Reserve

U.K. United Kingdom  
U.N. United Nations  
USDA U.S. Department of Agriculture

BACKGROUNDTHE IMPORTANCE OF LIBYAN  
OIL TO U.S. SUPPLIES

The United States currently relies on Libyan oil for a small and declining percentage of its petroleum needs. As shown in Table 1, in September 1981, the Nation received about 154 mbd of crude oil imported directly from Libya <sup>1/</sup>, the smallest amount imported since the 1973-74 Arab oil embargo. The Nation also receives Libyan oil as products refined in the Caribbean. While no Libyan crude oil entered the Caribbean refineries in September, we estimate that during the first three quarters of 1981, on average, an additional 37 mbd of Libyan oil entered the U.S. via Caribbean refineries. Since Libyan imports were at much higher levels in the beginning of 1981, we estimate that direct and indirect oil imports from Libya into the United States for January-September 1981 averaged about 418 mbd. About 6 percent of this total was purchased by the U.S. Government from private companies for the United States Strategic Petroleum Reserve (SPR).

The relatively small amount of oil the United States currently imports from Libya (as of September 1981) is only 2.6 percent of total U.S. oil imports, and only 1 percent of U.S. petroleum consumption. However, current national aggregate percentages could possibly underestimate the importance of Libyan oil to the United States because of formerly higher levels of Libyan oil imports, the high quality of crude oil produced in Libya and its potential importance to certain refineries and products, and the concentration of Libyan oil use within certain regions of the United States.

Libyan oil imports were previously higher

Previously, the United States imported a much larger quantity of oil from Libya than it does now. As shown in table 1, in 1980, the United States received about 716 mbd from Libya, or about 10 percent of its total petroleum imports. Between January and August of 1981, Libyan imports declined about 45 percent because of sagging U.S. oil demand, and the relatively high price of Libyan oil. If U.S. oil demand increases in the future, and if Libyan oil prices become more in line with the market, in the absence of possible Government restrictions, U.S. oil companies are likely to increase their Libyan oil purchases.

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<sup>1/</sup>Data for November 1981 have recently become available that showed direct oil imports from Libya declined slightly further to about 132 mbd.

Table 1  
Daily Averages of  
U.S. Oil Imports from Libya

	<u>September</u> <u>1981</u>	<u>January-September</u> <u>1981</u>	<u>1980</u>
	----- (thousand barrels a day) -----		
Total imports (note a)	154	418	716
Crude oil only	154	381	552
Estimated products (via Caribbean refineries)	0	37	164
	----- (percent) -----		
Libyan imports as a percent of total U.S. imports	2.6	7.1	10.5
Libyan imports as a percent of total U.S. petroleum use (note b)	1.0	2.6	4.2

a/Includes imports to the SPR, Puerto Rico, and the U.S. Virgin Islands. Direct product imports from Libya to the U.S. mainland are not included, but represent under 1 percent of total Libyan imports.

b/Petroleum use is measured as products supplied for domestic use, which is the sum of products refined and imported and the net withdrawals from primary stocks minus exports. These data are generally more current than petroleum consumption data.

Source: Unpublished DOE data for 1981 Libyan import data; National Foreign Assessment Center, International Energy Statistical Review and United States Department of Energy, EIA Monthly Energy Review, September 1981, p. 36 for 1980 Libyan import data; United States Department of Energy, EIA Monthly Energy Review, November 1981, p. 32 for products supplied and total imports data.

Libyan crude oil is  
light and low in sulfur

Libyan oil is both light, 1/ and low in sulfur 2/ and therefore of very high quality. The API gravity of Libyan oil ranges from 36.1 to 40.6 degrees, while the API gravity of commonly imported Saudi Arabian light oil is 34 degrees. Lightness is a desirable quality since it results in a larger proportion of highly valued, light refined products such as gasoline and diesel fuel.

The sweetness of Libyan crude oil is its more important quality. Libyan oil has a range of sulfur content between 0.1 and 0.45 percent by weight. (Anything below 0.5 percent is considered to be low). Sweet crude is critical to some refineries because they are unable to process more sour crude, and because low sulfur levels are required in many petroleum products.

Regional distribution of  
Libyan oil in the United States

The importance of Libyan oil to a region rests on the quantity used, and its share of total oil use in that region. As shown in table 2, the East Coast is the largest recipient of Libyan oil in the United States. In 1981, the East Coast used more than half of the Libyan oil imported into the United States. Furthermore, in 1980, the East Coast was the only Petroleum Administration for Defense district (PAD) where more than 10 percent of its oil supply came from Libya. While we would expect reduced Libyan oil imports in the second half of 1981 to have reduced regional dependence on Libyan oil, data to document this trend are not currently available.

The Midwest (PAD-2) is also a large user of Libyan oil. Between January and September 1981, the Midwest used over 20 percent of the Libyan oil imported into the United States. In 1980, close to 10 percent of the Midwest's total oil supply came from Libya.

While almost half of the Libyan crude oil entering the United States between January and September 1981 landed in the Gulf Region, we estimate that only 21 percent of U.S. Libyan oil imports was actually used there. Much of the Libyan oil imports to PAD 3 was refined and shipped to the East Coast and Midwest. Because of the large amount of domestic oil production in PAD 3, Libyan oil represented only 1 percent of the region's oil supply.

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1/The lighter the crude, the less the specific gravity, or density of the oil, and the higher the API gravity (measured in "degrees").

2/Low sulfur, or sweet crude, contains 0.5 percent or less sulfur by weight.

Table 2Estimated Libyan Oil Use by Petroleum Administration  
for Defense District (PAD) (note a)

	<u>1980</u>			<u>January to September 1981</u>	
	<u>Quantity (note c)</u>  (mbd)	<u>Percentage of Libyan oil used in U.S.</u>	<u>Percentage of PAD's total oil supply</u>	<u>Quantity (note c)</u>  (mbd)	<u>Percentage of Libyan oil use in U.S.</u>
PAD 1 (East Coast)	352	52.8	13.8	216	56.4
PAD 2 (Midwest)	223	33.4	9.9	83	21.6
PAD 3 (Gulf States) (note b)	87	13.1	1.3	81	21.1
PAD 4 (Rocky Mountain)	4	0.6	0.6	1	0.3
PAD 5 (West Coast)	1	0.1	0.0	2	0.6

a/Estimates of Libyan oil use by PAD are based on 1980 and 1981 Libyan oil import patterns, including those from the Caribbean. Inter-district oil movements by tanker, barge, and pipeline are accounted for and based on the most current shipping numbers available (1980). We assume that Libyan oil is shipped between districts in the same proportion as all other oil.

b/PAD 3 numbers exclude SPR.

c/These numbers will not add to total imports in table 1 because they exclude Libyan imports to the SPR and the amount consumed in the Caribbean.

Source: Unpublished Department of Energy data and U.S. Department of Energy, Energy Information Administration. Crude Petroleum, Petroleum Products, and Natural Gas Liquids. December 1980, Tables 3, 13, 14, 16 and 17, pp. 8 and 14 to 21.

The West Coast and Rocky Mountain regions receive almost no oil from Libya because their location makes it less economic to import than sweet crude oil produced in the Pacific.

THE IMPORTANCE OF LIBYAN OIL  
TO THE U.S. OIL INDUSTRY

Extent of U.S. oil company  
operations in Libya

In 1980, six U.S. oil companies or their subsidiaries, maintained an equity interest 1/ in Libyan oil production. These are Amerada Hess, Conoco, Marathon, Occidental, Mobil, and Exxon. The percentage of actual gross oil production that each accounted for in 1980 is shown in table 3. Since the mid-1970s, the Libyan National Oil Company (LNOC) has maintained a 51-percent interest in all foreign oil company operations in Libya. Other U.S. companies--such as oil service, equipment, and management companies--also do business in Libya.

At present, only five United States oil companies remain in Libya. On November 4, 1981, Exxon informed the Libyan Government of its intention to withdraw from all of its oil and gas operations in Libya. The company's withdrawal from Libya was apparently motivated primarily by economic considerations. According to news reports, Exxon is believed to have been dissatisfied with the Libyan Government's reluctance to lower its price enough to make the production of Libyan oil profitable. Petroleum Intelligence Weekly reported that Exxon received total compensation of \$95 million for its Libyan assets, about 75 percent of book value. 2/ Since Exxon's assets will be taken over and operated by a newly formed branch of LNOC--the Sirte Oil Company--Exxon's action may not result in the loss of any potential oil and gas production from the world market.

Other United States companies operating in Libya have not reacted as sharply to Libya's oil overpricing as Exxon. While some drastically reduced or ceased lifting Libyan oil during 1981, no other companies have announced plans to leave Libya. Early in 1982, Libya reduced the price of Libyan light crude to \$36.50 per barrel, a price comparable with those for similar grades of crude produced elsewhere. Thus, these companies are likely to increase Libyan production.

News reports indicate that all United States oil companies operating in Libya are complying with the United States Govern-

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1/Equity oil is that portion of the oil produced accruing to the producing company under participation agreements between host countries and producing oil companies.

2/Petroleum Intelligence Weekly, Jan. 25, 1982, p. 10.

Table 3Oil Company Operations in Libya

	<u>Approximate average production, 1980</u>	<u>Percent of total Libyan production, 1980</u>
	(mbd)	
Oasis (Conoco, Marathon, Hess)	657	36
Occidental	241	13
Exxon	145	8
Mobil	86	5
Libyan National Oil Co. (LNOC)	518	28
Other (European)	<u>180</u>	<u>10</u>
Total	<u><u>1,827</u></u>	<u><u>100</u></u>

Source: Petroleum Intelligence Weekly, Aug. 31, 1981.

ment's directive to remove American personnel from Libya. These people are likely to be replaced by foreign nationals employed by the companies.

U.S. refineries receiving  
Libyan oil

While only five U.S. oil companies produce oil in Libya, 54 refineries in the U.S. owned by 34 different oil companies received Libyan oil in 1981. About one-sixth of all U.S. refineries received oil from Libya in 1981. Moreover, these tend to include many of the major refineries in the United States. The total refining capacity and degree of dependence of these companies on Libyan oil varies considerably. Regardless of refining capacity, 8 out of the 34 companies receiving Libyan oil in 1981 had more than 10 percent of their total oil supply originate in Libya. Out of the 54 individual refineries receiving Libyan oil, Libyan oil represented over 5 percent of 22 refineries' total oil supply. About half of these 22 refineries received more than 10 percent of their throughput from Libya.

CAN A TRADE BAN STOP U.S.  
IMPORTS OF LIBYAN OIL?

A U.S. ban against importing Libyan oil would likely succeed in preventing direct Libyan exports from entering the United States. However, it may be more difficult to detect and prevent indirect Libyan supplies from entering the United States. Including the U.S. Virgin Islands and Puerto Rico in the ban would help prevent the imports of refined products from Libya.

Different means are available by which U.S. companies handling Libyan oil could circumvent the ban. It does not appear, however, that there would be either an incentive or need to do so because of the relative ease with which oil supplies can be swapped and redirected to other consumers without violating either the spirit or letter of the ban.

How a trade ban might work? 1/

A Libyan oil ban would likely require that U.S. oil companies not import oil extracted from Libya. The principal means of enforcing the ban would probably be monitoring statements on Customs forms identifying the source of oil at the time of importation. Any oil declared by the importer as originating in Libya would likely not be permitted to enter the United States without a special license. Any U.S. company found to be in non-compliance with the ban would be liable to penalties as stipulated.

The effect of a ban on  
direct Libyan oil imports

A ban on Libyan oil imports would likely prevent the direct importation of Libyan oil into the United States. U.S. importers would be prevented by Customs officials at the point of entry from landing Libyan oil or would at least be identified as violators, assuming the statement of origin of the oil has not been falsified. The mere imposition of a ban with the risk of monetary penalties, imprisonment, or both in the event of violation will likely act as a disincentive for importers to even attempt circumvention.

Indirect imports of Libyan oil

It is likely that, because of the difficulty in determining the origin of the indirect imports, some banned Libyan oil would enter the United States. Indirect oil imports are supplies entering the United States after passing through or being refined in other countries.

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1/This report does not discuss the issue of the legal authority for a Libyan oil ban.

One method by which indirect Libyan oil imports could enter the United States is through transshipment to third parties. In other words, by a company's first shipping oil from Libya to a refiner outside of the United States, processing it, and then importing products into the United States, the spirit--although not necessarily the letter--of the ban could be circumvented. Violations of this sort would be difficult to detect as the true origin of the oil is disguised.

Besides deliberate violations, it is also possible that indirect imports could enter the United States by companies unknowingly importing oil originating in Libya. Because of difficulties in identifying the true origin of product purchases, in some cases, U.S. importers could purchase oil without knowing that it is Libyan oil. This is particularly the case with Libyan oil, since in 1980, about 20 percent of U.S. oil imports from Libya arrived as petroleum products from Caribbean refineries. Including the U.S. Virgin Islands and Puerto Rico in the ban would greatly reduce this possibility.

#### OBSERVATIONS ON TRADE BANS IN GENERAL

In the letter requesting this study, we were asked to assess the impacts of a trade ban on commodities other than petroleum, including the extent to which a partial or complete U.S.-Libyan trade ban would be effective. Because of the time constraints stipulated in the letter and the fact that the more general question of the effects of trade bans is complicated and requires detailed, extended analysis, we were not able to consider this issue thoroughly. Moreover, we must caution that the oil industry and market often work in different ways than do those of other commodities. Thus, one must be careful about generalizing from the experience of past trade bans on other commodities. However, based on preliminary research and previous GAO work in the area of trade bans, we are able to make some general observations about the potential effects of a U.S. Libyan trade ban.

Previous studies by us and private sources indicate that trade bans generally may have negative economic effects on the country against which the ban is declared. However, the actual economic impact will depend on numerous factors, including the particular commodities and magnitude of trade with those countries involved, and the degree of commitment and cooperation by U.S. companies and foreign countries and companies. Available analysis shows that many opportunities are available for a country or company to circumvent a ban.

The impact of a ban will depend on the extent to which it can be circumvented. Certain past examples indicate that the following can partially circumvent trade sanctions: less than total commitment by supposedly cooperating countries, uncontrolled actions by private individuals or corporations, or making transactions through "third parties" (either countries or companies) to disguise the true source or destination of trade flows. The

United Nations' (U.N.'s) trade sanctions against Rhodesia, and the U.S. ban on sales of grain to the Soviet Union illustrate these points.

#### Cooperation of other countries

It appears from previous examples of bans on exports that the unwillingness of other countries to cooperate with a trade ban because of perceived costs and benefits to their own national interest may hinder the full effects of economic trade sanctions. Our previous analysis of the effects of the U.N. sanctions against Rhodesia indicates that, although the sanctions limited Rhodesia's access to world markets somewhat, they did not eliminate its international trade. 1/ Rhodesia was able to circumvent trade restrictions primarily because other countries did not honor the sanctions dictated by the United Nations.

The U.S. embargo against grain sales to the Soviet Union in 1979 further illustrates the ability of a country to circumvent trade bans when other countries fail to comply. According to one of our past analyses, two major ways the Soviet Union was able to offset the suspension's impact substantially were by: increasing grain imports from other countries, and increasing imports of non-U.S. soybeans, soybean products, and substitute feeds. 2/

The latter report states that, according to U.S. Department of Agriculture (USDA) estimates, the Soviet Union was able to replace about half the suspended U.S. grain through shipments from other exporting countries. Representatives from Argentina, Australia, Canada, and the European Economic Community informally agreed to cooperate with the suspension. However, USDA estimates that nearly 70 percent of the grain which the Soviet Union was able to substitute for embargoed supplies was shipped from these countries. The remaining 30 percent was supplied by other sources, such as East European countries, Sweden, Thailand, and Turkey.

#### Compliance of U.S. companies

The Rhodesian case also illustrates that the effects of a trade embargo also depend greatly on the cooperation and compliance of U.S. companies. Our report on Rhodesia indicates that compliance by U.S. companies is often difficult to determine. The report states that it is not possible to make a judgment from available information on the extent of compliance by U.S. companies with the U.N. sanctions against Rhodesia.

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1/"Implementation of Economic Sanctions Against Rhodesia," ID-77-27, Apr. 20, 1977.

2/"Lessons to Be Learned From Offsetting the Impact of the Soviet Union Grain Sales Suspension," CED-81-110, July 27, 1981.

According to that report, difficulties in monitoring U.S. companies' compliance with the sanctions further complicated an assessment of the extent of compliance. U.S. agencies responsible for administering the sanctions were hindered by: a lack of sufficient personnel to administer and ensure compliance; the inability of the United States to impose restrictions in certain areas due to other countries' national law, the difficulty in controlling the transshipment of Rhodesian products, the lack of cooperation by allies and other nations which supposedly were supporting the sanctions program, and a lack of authority for cases involving diversions or reexport by foreign firms.

#### The U.S. ban on trade with Iran

A recent journal article by Robert Carswell, former Deputy Secretary of the Treasury, illustrates that cooperation by both foreign allies and U.S. companies can increase the likelihood that a trade ban will produce its intended economic results.

The United States' trade sanctions against Iran in 1979-80 demonstrated that when the circumstances of a particular case are such that multilateral action will willingly be undertaken, it can successfully restrict the trading of some commodities. The nature of the Iranian hostage crisis gained for the U.S. Government a degree of sympathy and cooperation from both U.S. and foreign companies and American allies.

According to Carswell, U.S. trade was successfully curtailed, although not totally eliminated, because support for the measures among Americans and voluntary compliance by U.S. companies was so great. Few exports went directly from the United States to Iran because longshoremen refused to load goods to be shipped to Iran. In addition, major U.S. companies had no great interest in trading with Iran, although some smaller companies expressed interest in export licenses and a few violations were alleged.

The U.S.' allies (U.K., France, West Germany, Switzerland, Italy, Japan) also imposed sanctions against Iran, specifically prohibitions against military supply exports and against extensions of new credit to Iran. Regarding allies' sanctions, Carswell states that while there is evidence of cases where transshipments were prevented, etc., evidence also shows that commodities, particularly oil and gas equipment and parts, made their way to Iran. The United States can monitor only a portion of such transactions, but it appears that the sanctions caused Iran difficulties but not critical problems.

LIKELY ENERGY EFFECTS OF A BAN ON LIBYANOIL IMPORTS ON THE UNITED STATESEFFECTS ON U.S. OIL SUPPLIES AND PRICES

A ban on importing Libyan oil to the United States is not likely to have a major impact on U.S. oil supplies or prices. Because a ban would not necessarily reduce U.S. oil company production in Libya, world oil supplies would not be reduced. Oil companies would probably reallocate Libyan oil bound for the United States, replacing it with non-Libyan oil destined for other countries.

Under present slack market conditions, the likelihood of any adverse effects of a ban is further reduced for the following reasons: (1) current U.S. imports from Libya are small, (2) substantial excess productive capacity exists in other countries that produce large volumes of sweet crude, (3) some Libyan oil users can substitute readily available higher sulfur oil, and (4) current large U.S. oil stocks can prevent any shortfall while new supply arrangements are sought.

Introducing a ban in a tight oil market could raise U.S. oil prices to attract sufficient replacement oil. This effect should be temporary, however, ending after the adjustment to new supply sources is made. Furthermore, barring any unforeseen supply disruptions, the world oil market is expected to remain soft throughout 1982.

World oil supplies should not shrink--prices should remain stable

Since a ban would not substantially reduce world or U.S. oil supplies, U.S. oil prices should remain fairly stable. However, a ban could cause slight price increases during the time period in which importers seek alternative supply sources.

A ban would not prevent U.S., or other oil companies operating in Libya from producing oil there and selling it to other customers. Therefore, Libyan oil would not be removed from the world market. The world oil supply would only be reduced if the United States took further actions which removed Libyan oil from the market (e.g., removed U.S. oil companies so they could not produce oil). The effects of these actions are distinct from, and should not be confused with, the effects of a ban.

World oil supplies will likely be redistributed on the international market so that Libyan oil formerly shipped to the United States would go elsewhere in the world, displacing other oil supplies. The oil displaced by this action might then be diverted to the United States with no net effect on U.S. oil supplies. This process is likely to occur because companies producing oil in Libya would have an economic incentive to continue to sell banned oil.

Thus, they would switch customers and supplies with their own foreign subsidiaries or swap oil with other companies to satisfy both the conditions of the ban and maintain their Libyan oil sales.

Because a ban would not reduce U.S. oil supplies, U.S. oil prices are likely to remain stable. During the time in which new supply arrangements were made, however, the temporary dislocation from changing supply sources and the potential increased use of middlemen and spot market purchases could increase slightly the price of the replacement oil. Any price increase would be small and very temporary because Libyan oil represents a small percentage of total U.S. supplies, supply network changes should be minimal, and international market transactions can occur very quickly. Even in 1980, before Libyan imports fell, Libyan oil represented only 4 percent of the total U.S. supply. Therefore, any price increase of replacement oil would have a small effect on overall U.S. prices. Because all U.S. companies producing oil in Libya have operations in other countries which produce oil similar in quality to Libya's, redistributions could possibly only involve oil transfers within oil companies.

Several oil industry experts we interviewed, including John Lichtblau, Director of the Petroleum Industry Research Foundation, and Alvin Alm, Director of the Harvard University Energy Security Program, have agreed that in the event of a ban, redistribution of oil on the international market would occur quickly and prevent significant losses to U.S. oil supplies. Furthermore, these experts stated that any price increase would probably be small during the period of adjustment to new supply sources.

#### Slack market conditions reduce the likelihood of adverse effects

Under present slack market conditions, the following factors further reduce the likelihood of a ban's reducing U.S. oil supplies or raising prices: (1) the low volume of current U.S. imports from Libya, (2) the availability of alternative sources of sweet crude, (3) the ability of some Libyan oil users to substitute readily available higher sulfur oil, and (4) large U.S. oil stocks.

#### Present Libyan oil imports are small

Since U.S. oil imports from Libya have been decreasing throughout 1981, the amount of replacement supplies needed would be relatively small. Replacing U.S. oil imports from Libya at the October 1981 level of under 150 mbd should be substantially easier than replacing 716 mbd, the average 1980 Libyan import level. In addition, the small percentage of U.S. supplies affected by a ban would limit the extent of any national supply or price effect. Because 99 percent of our oil does not come from Libya, even an unlikely 10-percent increase in Libyan replacement oil prices could cause less than a 1 percent national price increase.

Adequate alternative sources of sweet crude oil

In the event that oil companies are unable to redistribute supplies to fully replace banned oil, adequate alternative sources of sweet crude should provide a further cushion against a ban's potential adverse effects. Besides the continental United States, Africa, the North Sea, and the Asia-Pacific areas also produce large amounts of oil which is both low in sulfur and light in gravity. Libya's September 1981 production represented only 12 percent of oil production in countries producing high-grade sweet crude in these areas.

In terms of available productive capacity, the most likely sources of alternatives to Libyan oil are other African countries, especially Nigeria. Their proximity to, and relations with, Libya and other political factors may make these supplies somewhat insecure. Fully analyzing these political considerations was beyond the scope of this study.

Political considerations aside, substantial excess productive capacity makes African countries better candidates for replacing Libyan oil than North Sea or Asian-Pacific producers. Table 4 shows that, particularly between the second and third quarters of 1981, oil production by African countries fell dramatically (54 percent between January and August of 1981), while North Sea and certain Asia-Pacific production remained fairly constant. This was because African producers maintained high oil prices in the face of softened oil demand. In contrast, North Sea producers lowered their prices, and Indonesia retained a competitive price over this time period. The result of these trends is substantial excess productive capacity in Africa, and little spare capacity in Indonesia and the North Sea. (See table 4.) However, Africa's excess capacity is diminishing as producers are currently cutting oil prices and boosting production. As of November 1981, Nigeria was producing at 73 percent of capacity, up from 39 percent in the third quarter of 1981. Therefore, the cushioning effect of readily available alternative sweet crude supplies is shrinking.

African countries--As shown in table 4, the largest African sweet crude producers besides Libya are Nigeria and Algeria. Other African countries such as Tunisia and Gabon produce enough sweet oil to make incremental contributions but not in sufficient quantity to totally replace banned Libyan oil.

Since Nigeria is the largest of the African sweet crude producers, and has a strong financial incentive to raise production, it is the most likely candidate for replacing Libyan oil, political factors notwithstanding. Nigeria's current financial straits, brought on by lost oil production and revenues, in conjunction with large domestic expenditures give that country a strong economic incentive to increase production. The United States already buys a sizeable amount of oil from Nigeria, purchasing about 40 percent of its oil exports in October 1981. In November 1981, less than one-third of Nigeria's excess capacity would be reduced if it

Table 4

Oil production (excluding NGL)  
by major foreign producers of sweet 1/ crude  
(mbd)

	<u>Current</u> <u>(November</u> <u>1981)</u>	<u>1st</u> <u>quarter</u> <u>1981</u>	<u>2nd</u> <u>quarter</u> <u>1981</u>	<u>3rd</u> <u>quarter</u> <u>1981</u>	<u>Maximum</u> <u>sustainable</u> <u>capacity*</u>	<u>Percent of maximum</u> <u>Sustainable capacity</u> <u>currently used</u>
<u>North Africa</u>						
Nigeria	1600	1909	1421	846	2200	73
Libya	920	1616	1400	717	2100	44
Algeria	600	950	867	626	1100	55
Tunisia	120 <u>2/</u>	116	116	120	NA	NA
<u>Asia-Pacific</u>						
Indonesia	1600 <u>2/</u>	1629	1610	1600	1650	97
Malaysia	423 <u>2/</u>	436	435	424	NA	NA
<u>North Sea</u>						
United Kingdom	1847 <u>2/</u>	1825	1760	1778	NA	NA
Norway	398 <u>2/</u>	530	553	453	NA	NA

1/Under 0.5 percent sulfur by weight.

2/October 1981 numbers are provided as they are the most currently available.

\*Maximum sustainable or operational capacity is the maximum production rate that can be sustained for several months; it considers the experience of operating the total system and is generally some 90-95 percent of installed capacity. This capacity concept does not necessarily reflect the maximum production rate sustainable without damage to the fields.

Sources: National Foreign Assessment Center, International Energy Statistical Review (1st, 2nd and 3rd quarters and October 1981, and maximum sustainable capacity). Oil and Gas Journal 11/02/81 for more current data.

supplied the United States with an additional 150 mbd. However, the economics of the situation may be complicated by political factors which need further study.

The potential for increased Nigerian oil exports to the United States depends on how it and the rest of OPEC would perceive a U.S. ban against Libya and react to it. While relations between Nigeria and Libya have been strained for some time, Nigeria may not want to be seen as supporting U.S. interests over those of a fellow OPEC member. Furthermore, Nigeria has expressed its displeasure with some of the United States' African policies. However, these factors may not influence oil transactions, since sales would normally occur between Nigeria and U.S. oil companies without U.S. Government involvement.

Since Algeria's oil was priced even higher than Nigeria's, its production continued to fall through November of 1981. Since Algeria is only producing at 55 percent capacity (as of November 1981), it too has a strong economic incentive to increase production. However, Algeria might also be sensitive about appearing to favor the United States' interests over those of OPEC, particularly since the government directly controls all production.

Indonesia--The United States already imports a sizeable amount of oil from Indonesia. However, its Pacific location and lack of excess productive capacity make Indonesian oil a poor candidate for replacing banned Libyan oil. While Indonesian oil coming to the United States generally goes to the West Coast, about 80 percent of Libyan oil is used in the East and Midwest. Also, due to competitive pricing (\$35/barrel through most of 1981), Indonesia is currently producing at 97 percent of capacity. (See table 4.)

North Sea countries--The United Kingdom and Norway already sell a sizeable portion of their oil exports to the United States. In 1980, 18 percent of the United Kingdom's and close to 30 percent of Norway's oil exports were purchased by the United States. While these two countries may have some desire to increase oil exports to the United States, both are reported to be producing oil close to capacity. Both countries have kept their prices relatively low so they have been able to maintain maximum production levels in spite of the slack market. Furthermore, the United Kingdom's restrictive policy on gas flaring limits surge production. While there may be little surge capacity in the North Sea, oil production increases from new wells coming on line may allow greater oil exports to the United States in the future.

#### Substitution of higher sulfur crude oil

To a certain extent, some U.S. refiners have the capability of substituting higher sulfur (more sour) crude oil from other suppliers for the very low-sulfur (sweet) crude supplied by Libya. While some refiners can use only sweet crude, those which can use other grades as well can substitute, freeing limited sweet crude

supplies for other users. Furthermore, there is currently so much excess refining capacity in the United States <sup>1/</sup> that refineries which do not require sweet crude could raise their output from other grades of crude, while refineries strictly dependent on sweet crude reduce their output. While this action may adversely affect some refiners, there should be little or no effect on national supplies.

On a national basis, the substitution of more sour crude oil for Libyan sweet appears to be a valid alternative. In fact, evidence indicates that this substitution may have been taking place over recent months. An analysis of data on imports of oil from the four principle OPEC suppliers of sweet crude indicates that over recent months, U.S. imports of sweet crude have declined nearly twice as much as other OPEC imports. Furthermore, there were no apparent negative effects on U.S. supplies or prices. While not totally conclusive, these data do suggest that it might be feasible to maintain oil supplies with less sweet crude if Libyan oil were unavailable to the United States.

During a trade ban, alternative supplies of somewhat less sweet crude could be more readily available than crude of Libya's quality. Producers such as Saudi Arabia have excess production capacity (10 mmbd production capacity, with current production around 8.5 mmbd) and could possibly increase production to supply adequate amounts of crude if necessary. Whether they or other producers would be willing to increase production under these circumstances is debatable.

#### High U.S. stock levels

In the unlikely event that the United States could not find readily available alternative sources of oil during a ban, high U.S. private stock levels and large additions to the Strategic Petroleum Reserve (SPR) since 1979 provide an additional cushion against the United States experiencing a temporary oil shortfall and price increases. However, expected stock drawdown during the winter reduces their cushioning effect, and the use of SPR oil to replace prohibited Libyan imports is questionable.

The United States could potentially replace the currently low level of Libyan imports for nearly 10 years by using private oil stockpiles above the minimum operating level <sup>2/</sup> and the SPR. While this may not be an acceptable means of replacing prohibited oil, it illustrates the degree of protection available from U.S. stockpiles.

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<sup>1/</sup>In November 1981, U.S. refineries produced at an average of 65 percent of capacity.

<sup>2/</sup>950 million barrels is the minimum operating level Exxon Corporation estimates to sustain the U.S. oil distribution and storage network. Exxon Corp., World Oil Inventories. Exxon Background Series, Aug. 1981.

Our current stock level provides us with far more protection than did the stock level immediately preceding the 1979 Iranian oil cutoff. The current (Jan. 22, 1982) 1.2 billion barrels of private crude and petroleum product stocks give the United States two thirds more cushioning power, in terms of import days above the minimum operating level, as the 4th quarter 1978 level. While current stock levels provide a large cushion against a small supply shortfall, it is important to note that by spring 1982, expected stock drawdown should reduce the size of the cushion. In addition to expected seasonal drawdown during the winter months, oil companies have been drawing down on world stocks, possibly in anticipation of further world crude oil price reductions.

The SPR reached about 230 million barrels in January 1982, covering five times the number of import days covered in 1978. However, the desirability of using the SPR to cover a 150 mbd shortfall is questionable. Furthermore, as we pointed out in a recent report on oil import disruptions, the current SPR plan does not specify "under what conditions the SPR would be used, the rate and timing of use, how it would be distributed or priced."<sup>1/</sup>

Tight market conditions maximize  
the likelihood of adverse effects

Instituting a ban on Libyan oil imports in a tight oil market <sup>2/</sup> may still not have a large effect on U.S. oil supplies because a ban would still not reduce or prevent the redistribution of world oil supplies. While a tightening of the world oil market would by itself raise world oil prices, this should not be confused with the effects of a ban. If the market tightens after the United States has instituted a ban and made alternative supply arrangements, any price increases would be the result of market conditions and not the ban. However, because there would not be readily available alternative oil supplies to act as a buffer while new supply arrangements are sought, instituting a ban in a tight oil market could temporarily raise U.S. oil prices above what they would be from the tight market alone. It should be noted, however, that the world oil market is expected to remain soft throughout 1982, making these effects unlikely.

Instituting a ban in a tight oil market would maximize any adverse price effects occurring during the period in which new supply arrangements were sought. The higher level of demand in a

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<sup>1/</sup>U.S. General Accounting Office, "The United States Remains Unprepared for Oil Import Disruptions," EMD-81-117, Sept. 29, 1981.

<sup>2/</sup>A tight oil market is defined here as one where demand at a given price is high relative to supplies at that price. It is usually caused by unanticipated high demand or reduced supply that cannot readily be made up by stocks or excess productive capacity.

tight market, and the lack of readily available alternative oil supplies, could increase the difficulty of replacing banned oil in a tight oil market. As a result, U.S. oil prices could rise to attract oil to replace the temporary shortfall. This temporary price increase would probably be quickly eroded as additional suppliers increased shipments to the United States to take advantage of the temporarily higher price. Once enough oil was sent over to cover the shortfall, U.S. prices would again return to the level of world oil prices.

Adverse price effects from a ban could also arise from the increased use of middlemen, spot market purchases, and other handling costs. Furthermore, new suppliers might take advantage of U.S. refiners' reduced flexibility in supply sources and charge slightly higher prices. Once longer term supply arrangements are made, these effects would also be diminished. The reduced flexibility may be more of a nuisance than a factor actually adding to costs.

Several oil industry analysts, including John Lichtblau, Director of the Petroleum Industry Research Foundation and Charles K. Ebbinger, Director of the Program on Energy and National Security in the Center for Strategic and International Studies of Georgetown University, have agreed that price increases due to instituting a ban in a tight oil market would be temporary. There is less agreement, however, on the size of the price increase. Some oil market experts have stated that a ban instituted in a tight oil market could substantially increase U.S. oil prices. This large price effect is predicated on the assumption that we would be importing a larger amount of oil from Libya in a tight market, and that most of the price effect would be concentrated in the Northeast.

The position that the price effect would be small is mostly based on assumptions that much of the prohibited oil would be replaced through swapping existing supplies. Even in the worst scenario, however, where the entire amount of Libyan oil is not replaced, and U.S. Libyan imports are increased to their substantially higher 1980 level, the price effects of a ban would be limited, because Libyan oil would still represent a small percentage of U.S. oil supplies. Adverse effects would be largest on the East Coast where, in 1981, more than half of the Libyan oil imported into the United States was consumed. In 1980, Libyan oil represented nearly 14 percent of the region's overall oil supply. Because the price of 86 percent of the East Coast's supply would not change, a 10-percent increase in Libyan replacement oil prices would cause no greater than a 1.5-percent regional price increase. At worst, even an extremely unlikely temporary 50-percent increase in Libyan replacement oil prices would temporarily increase the East Coast's oil prices by 7.5 percent. The actual size of the price effect depends on how "tight" the market is in terms of availability of alternative oil supplies and stock levels, and the amount of Libyan oil the United States was importing at the time the ban was instituted.

While the size of the price increase from instituting a ban in a tight oil market is uncertain, it is clear that a tight oil market will maximize any adverse effects on the United States. Thus, the desirable time to consider a ban is during a slack period. Most forecasts indicate that the market should be slack through the spring of 1982 and is likely to stay soft through the rest of the year.

#### EFFECTS ON U.S. OIL COMPANIES

Assuming no Libyan retaliation, U.S. oil producers in Libya could redistribute and swap oil supplies to minimize the impact of a ban. Under current slack market conditions, they could experience a temporary loss of oil sales. Moreover, a U.S. ban exposes these companies to possible retaliation by Libya. As a result, they face possible loss of assets, expulsion, and the loss of future access to Libyan oil. In most cases, U.S. refinery operations should not be disrupted if a ban is instituted in the current slack market. Most refiners should be able to either obtain adequate supplies of similar quality oil, or replace Libyan oil with higher sulfur crude. However, in a tight market, U.S. refiners heavily dependent on sweet crude may have more difficulty arranging for alternative supplies during a ban. Consequently, some refiners might have to pay a premium in order to obtain adequate supplies.

#### Effect on U.S. oil company production operations in Libya

Assuming no Libyan retaliation, U.S. oil producers in Libya will probably be able to compensate for a U.S. ban on Libyan oil. By redistributing company supplies around the world, swapping with other companies, or otherwise obtaining alternate supplies, the companies should be able to meet the requirements of a Libyan oil ban; maintain crude supply obligations; and continue Libyan production operations at whatever level the market bears.

However, U.S. oil companies operating in Libya could incur economic losses as a result of a ban because of lost Libyan oil sales, lost company assets, or loss of future access to Libyan oil. The extent of the effect is dependent on the status of the oil market at the time the ban is instituted and Libya's reaction to the ban.

#### Loss of oil sales

In the current slack market, a unilateral ban by the United States might cause a marginal, short-term loss of Libyan oil sales, especially if other producers of sweet crude use the ban as an opportunity to capture business of U.S. importers which previously obtained oil in Libya. The extent of the loss would be limited because many companies producing Libyan oil will be able to reallocate their own oil supplies, such that Libyan oil is shipped to countries besides the United States, freeing up other supplies to replace Libyan oil in the United States.

Multinational participation in a ban would make reallocating supplies more difficult, and increase the potential for lost sales. Any loss of sales for U.S. producing companies would be in addition to losses already incurred in 1981 from Libya overpricing its oil, and the slack oil market conditions. Potential sales losses in a slack market could be somewhat greater if U.S. oil imports from Libya were higher at the time a ban was instituted. If a ban was introduced in a tight oil market, U.S. companies would be less likely to lose oil revenues, because they would have little difficulty selling Libyan oil to other customers.

#### Loss of assets

While a U.S. ban on Libyan oil imports would not force U.S. oil companies to leave Libya, it would expose them to potential acts of Libyan retaliation, and possible loss of assets. If U.S. oil-producing companies were forced to leave Libya, they would not only have to search for alternative crude supplies, but they might also lose future access to Libyan oil production, as well as their material assets in Libya. While assessing the likelihood of retaliation is beyond the scope of this report, we can point out that it appears to be in Libya's economic interest to keep U.S. companies there, at least in the short-run. In 1980, U.S. oil companies were responsible for 62 percent of Libya's oil production. Libya does not have a sufficient number of adequately trained personnel on hand to assume immediate responsibility for this oil production. While a recent agreement between Iran and Libya might make more personnel available to Libya, 1/ not enough is presently known about the agreement to speculate on its potential effects on relations between Libya and oil producing companies.

Libya's recent conciliatory behavior towards U.S. oil companies may indicate that Libya believes it needs these companies. Since Exxon announced its decision to end Libyan operations, Libya has lowered its oil prices somewhat, allowing remaining U.S. companies to sell more oil and increase profits. In addition, Libya has not, to date, retaliated against U.S. companies in response to the U.S. Government's directive to remove all American personnel. Libya's agreement to compensate Exxon for its Libyan assets, is another example of Libya's recent behavior towards U.S. oil companies.

#### Valuation of U.S. oil company interests in Libya

It is difficult to assess the economic losses to U.S. oil companies if they were forced to leave Libya, since it is difficult to accurately determine the value of oil company assets in Libya and future Libyan production.

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1/"Iran to replace U.S. Oil Technicians in Libya," The Washington Post, Jan. 22, 1982.

Access to future production--Some analysts contend that the major loss to the companies, should they have to leave Libya, would be their equity interest in future Libyan oil production. The value of access to future Libyan oil production to U.S. oil companies is difficult to accurately assess because it is dependent on future oil market conditions, and the extent and conditions of future access that would be likely under a "business as usual" scenario. Even without U.S. trade sanctions against Libya, future access to Libyan oil is uncertain. In the past, Colonel Qaddafi has stated his intent to completely nationalize the Libyan oil industry when Libya acquires sufficient domestic professional capacity to do so. 1/

Estimates of Libya's oil reserves as of January 1, 1980, converge on about 25 billion barrels. At the 1980 production rate of 1.8 mmbd, this is equivalent to a 38-year supply. After allowing for production by European oil companies in Libya, and the LNOC, and assuming a continuation of producing company equity oil share at 49 percent, future Libyan oil production could be worth about \$7.3 billion per year to U.S. producing companies, at the price of \$37 per barrel. Of course the actual future value of Libyan equity oil is dependent on future oil prices.

However, some oil companies themselves have recently been devaluing the importance of future Libyan oil production in relation to their own supply picture. In Conoco's case, despite the fact that about 40 percent of its total reserves are in Libya, news sources reported that Libyan oil fields were assigned little value when Conoco's purchase price was determined for the DuPont merger. According to statements by Conoco's Chairman and Controller, even if the company permanently lost Libyan production, its supply picture would not be harmed. 2/ This is because Conoco has been diversifying its crude oil sources in recent years. In 1982, about 24 percent of Conoco's crude will come from the North Sea--which will continue to be the focus of Conoco's overseas development program.

Occidental, which has the largest holdings in Libya of any single foreign company, has also been diversifying its crude oil sources. In 1976, 94 percent of Occidental's crude oil came from Libya. By 1981, this was trimmed to 31 percent as a result of Occidental's expanding oil production in Peru and the North Sea.

Value of U.S. companies capital investment in Libya--The value of U.S. oil company Libyan assets depend on how their value

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1/W.B. Fisher. Libya, Europa Publications Limited, p. 561

2/"Conoco Awaiting U.S. Libya Advice," New York Times, Dec. 10, 1981, p. D4; and "DuPont's Conoco Plans to Sell Part of Coal Reserves," New York Times, Dec. 10, 1981, p. 14.

is assessed. Their value could range from relatively little, if based on book value, since most of them have been depreciated, to several billion dollars if based on their replacement costs.

According to a State Department memo, the book value of U.S. oil company investments in Libya is \$3 billion to \$6 billion; however, most of this has been depreciated. In terms of replacement value, the U.S. oil company investment in Libya is estimated at \$10 billion to \$13 billion.

#### Effects on U.S. Refining Companies

U.S. refining companies that are not strictly dependent on sweet crude are likely to be the least affected by a U.S. ban on Libyan oil imports since they could shift to other grades of crude oil and other suppliers. Refineries whose physical plants require the use of high-quality sweet crude might be able to obtain these grades of oil from sources other than Libya in the current slack oil market without paying a premium. In a tighter oil market, however, those refineries strictly requiring sweet crude may have difficulty obtaining alternative supplies; they will have less flexibility in supply sources and might temporarily pay a higher price for the oil they are able to purchase.

#### Possible U.S. refining company responses to a U.S. ban on Libyan oil imports

To avoid adverse effects of a U.S. ban on Libyan oil imports, U.S. refineries must do one or more of the following: (1) substitute more sour crude, (2) remove sulfur, or (3) obtain sweet crude from alternate sources.

Substitute higher sulfur oil--The ability of a refinery to replace Libyan crude with higher sulfur oil depends on why it was using Libyan oil in the first place. Our examination of refineries receiving Libyan oil over the last 2 years and discussions with an American Petroleum Institute refinery analyst led us to conclude that there are two primary reasons why refineries need oil of Libya's high quality:

- Refineries' physical plant might necessitate the use of oil that is both sweet and light.
- Refineries with access to primarily high-sulfur oil may need very sweet oil to reduce the overall sulfur content of their supply in order to meet Federal sulfur emission standards and State-adopted product requirements.

Some refineries receiving Libyan oil cannot substitute lower quality crude because they either lack sophisticated processing equipment, or their equipment cannot tolerate sulfur. Some refineries that were originally built to run on domestic sweet and light crudes have had to import crudes of Libya's quality because

of reduced domestic supplies. While it is primarily smaller refining companies that lack sophisticated equipment to process lower quality oil, we identified several refineries of varying sizes whose metallurgy prevents them from using more corrosive, high-sulfur crude.

Most of the large refineries receiving Libyan crude in 1981 have catalytic cracking capabilities and could probably process heavier crudes. These refineries could also rearrange their oil purchases to achieve their needed sulfur level without using Libyan oil. Some evidence was presented in the last section that substitution in the use of more sour crudes has already been taking place. (See p. 16.)

There are no readily available data on which refineries, or how many, cannot process lower quality crude. It seems likely, however, that many of the refineries which continue to purchase Libyan oil as a large percentage of their supplies--in spite of the relatively higher price of this crude--do so because they are dependent on that grade of high quality oil. Alternatively, these refineries may continue purchasing Libyan crude because of reluctance to break a reliable supply connection, although the supply arrangement may have been made because of their dependence on oil of this quality. In fact, all but 6 of the 34 refining companies purchasing Libyan oil in 1981 also purchased it in 1980, demonstrating the regularity of Libyan oil customers.

Remove sulfur--Sulfur removal does not appear to be an adequate response to a short-term loss of oil. Small refineries particularly do not currently have the capacity for sulfur removal (hydroprocessing); if it was more economic than paying premium prices for high-quality oil, they would probably already be doing it. Furthermore, according to an American Petroleum Institute refinery analyst, hydroprocessing equipment is expensive to own and operate. It cannot be installed quickly because there is currently a backlog of orders for it. Thus, sulfur removal does not seem like an appropriate response to a short-term loss of low-sulfur oil.

Obtain alternate sweet crude supplies--To avoid the adverse effects of a ban on Libyan oil, refineries that cannot process more sour oil or remove sufficient sulfur to meet product requirements must find alternate sweet crude supplies.

Removing Libyan oil as a source of sweet crude might present few problems to refiners in the current slack market since other available sources could be tapped. Large refining companies may be better able to switch to new supply sources than others since they are more likely to have oil operations in other areas that produce large volumes of sweet crude. Small refiners with the least access to the international oil market may find it relatively more difficult than large refiners to acquire new supply sources under a ban. However, they would require such a small amount of oil that replacement may not be difficult. In a tight market,

however, these refining companies' dependence on sweet oil, and their reduced flexibility as to where they could purchase it, may cause suppliers to take advantage of the opportunity to charge slightly higher prices. Much of this effect should end when new long-term supply arrangements are made.

U.S. refining companies most dependent on Libyan oil

U.S. refining companies which receive large percentages of their total oil receipts from Libya are most likely to be affected by a U.S. ban on Libyan oil imports. While Libyan oil represented more than 5 percent of receipts in 22 out of 54 refineries receiving Libyan oil in 1981, some of these refineries belonged to companies which own many refineries and have access to many domestic and foreign supply sources. In only 8 of the 34 refining companies receiving Libyan oil in 1981 was Libyan oil more than 10 percent of their total U.S. supply. One refinery received nearly one-half of its 1981 oil receipts from Libya. Refineries owned by these 34 companies receiving Libyan oil in 1981 were geographically distributed among the East Coast, Midwest and Gulf regions. Half of these companies have total refining capacities of less than 50 mbd. Since four of these companies operate only one refinery, they do not have the flexibility during a ban to shift refining to a plant that can process higher sulfur oil. Three of the remaining four companies have total U.S. refining capacities of close to 500 mbd and operate at least 4 refineries apiece. In the event of a ban, these eight companies are the most likely to be adversely affected.

POTENTIAL EFFECTS OF A U.S. OIL IMPORT BAN ON LIBYA

Our analysis indicates that Libya potentially could suffer some loss in oil revenues from a U.S. oil ban introduced under current slack market conditions. However, this revenue loss is not expected to be either large or of long duration because: (1) oil companies will probably be able to maintain most oil sales by transferring supplies among customers, (2) a relatively small amount of oil and revenue is involved, and (3) reasonable prospects exist for locating other customers for prohibited oil.

Libya is heavily dependent on oil revenues, and a drop of potentially billions of dollars in oil revenues over the next year would add to Libya's difficulties in meeting its economic commitments. Libya can lower its oil prices and hopefully increase revenues. Furthermore, this Nation has the flexibility in the short-run to overcome some of its financial difficulties by relying on accumulated financial reserves, reducing expenditures on less critical commitments, or by borrowing on the Eurocurrency market.

Our analysis indicates that the removal of U.S. personnel and/or a restriction on U.S. oil equipment transfers will have little permanent detrimental effect on Libya's ability to produce oil beyond a temporary adjustment period.

Our analysis of the potential impact of a ban on Libya considered two key questions:

- Will Libya suffer a loss of oil revenues because of a ban on oil imports to the United States?
- How important are oil revenues--and specifically revenues from oil sold to the United States--to Libya's economy, and what alternative financial resources are available should oil revenues be restricted?

WILL LIBYA LOSE REVENUES FROM A U.S. TRADE BAN?

A U.S. ban on trade with Libya would result in a loss in revenue to Libya only to the extent that the prohibited oil could not be sold to other consumers. Our analysis indicates that, in the short-run, there may be some difficulty in arranging alternative customers for prohibited oil due to slack market conditions and time lags until the supply transfer mechanism comes into full play. However, as prohibited oil is redirected to non-U.S. customers by producers in Libya and as these customers' supplies are substituted in the United States, banned Libyan oil would be sold to other customers, and revenues would probably stabilize.

Availability of alternative oil customers

The overriding factor which will determine the effect of a ban on Libyan oil revenues is the potential availability of

alternative customers for the oil which would no longer be purchased by the United States. Libya's ability to sell its oil would be determined by five principal factors: the ease and speed with which the U.S. oil companies can redirect oil supplies; world oil supply and demand conditions; Libya's willingness to further lower its oil prices; the willingness of allies to cooperate with the United States in refraining from purchasing the banned Libyan oil; and the potential for East European or other countries to increase their Libyan oil purchases.

#### Oil swaps on the international oil market

Because of the ability of the U.S. multinational oil companies producing in Libya to switch supply sources and customers, it appears that Libya would be able to sell some of the prohibited oil to other countries. However, if the swap mechanism fails to function as anticipated, Libya may have to lower its oil prices further to sell boycotted oil to other customers, especially under the current slack oil market conditions.

#### Market conditions

Under current slack market conditions, Libya would probably lose oil sales. It does not appear that there are any oil consumers which need to buy additional Libyan oil. Otherwise, demand for this oil would not have dropped by two-thirds over the past year. There are ample supplies of comparable quality oil from less expensive sources such as Nigeria.

Determining the precise amount of lost sales and revenues is difficult since experts differ somewhat on the potential ability of Libya to sell boycotted oil to other customers under current market conditions. John Lichtblau, an international oil industry expert, in a December 10, 1981, interview, stated that a ban would not severely hurt Libya. He stated that the boycotted oil could be sold elsewhere if Libya would only drop the price to be more in line with the market. Likewise, Arab expert Michael Hudson, Director of Georgetown University's Center for Contemporary Arab Studies, stated in a television interview on December 7, 1981, that at least half of the oil could be sold elsewhere. 1/ On the other hand, another oil expert, Henry Schuler, a former oil company executive, holds the opposite view. In the same December 7, 1981, interview session, Schuler stated that the boycotted oil would likely go unsold because prospective customers either did not need the oil or had access to alternative supplies. 2/

If world oil demand increases during 1982, Libya would be better able to sell the boycotted oil. Furthermore, in the event

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1/Public Broadcasting Service, McNeil-Lehrer Report, Dec. 7, 1981.

2/Ibid.

of some supply shortage or disruption from another producer--particularly those with comparable qualities of oil--the potential for Libya to replace its U.S. oil sales would increase considerably.

Likelihood of cooperation of  
other consumers in a U.S. ban

Most analysts agree that a boycott of Libyan oil imports would be much more likely to have an economic impact on Libya if it were multilateral rather than unilateral in nature. However, the consensus of views among these analysts is that U.S. allies and other consumers would be unwilling to cooperate with a U.S. oil ban either by terminating their own oil imports from Libya or agreeing not to purchase additional amounts of Libyan oil as the need arises.

The question of the willingness of U.S. allies to cooperate is difficult to answer since it involves critical political as well as economic considerations. Generally speaking, some of the United States' European allies have a greater dependence on Libyan oil as a percentage of total oil needs than does the United States. In addition, France, Germany, Italy, the United Kingdom, and Japan each export a greater volume of goods to Libya than does the United States. These extensive trade relations, and the potential negative impact on these relations of a ban on oil imports from Libya, may discourage U.S. allies from supporting a U.S. oil boycott. Table 5 illustrates the extensive trade relations between Libya and key industrial countries, and the particularly strong dependence of Italy and West Germany on Libyan oil imports and their relatively larger commercial interaction compared to the United States. In addition to those countries listed in table 5, several other key European countries such as Turkey, Greece, and Spain rely on Libya for substantial amounts of their oil supplies.

State Department analysts and other experts support the view that U.S. allies would be unlikely to cooperate with a boycott. State Department analysts conclude that European major purchasers of Libyan oil would be reluctant to join the United States in a ban because of their greater overall dependence on Libyan oil and their reluctance to alienate a traditional and dependable supplier. Libya aided European countries during previous Gulf supply disruptions by supplying them with oil. Oil expert John Lichtblau concurs that Europeans are not likely to be interested in joining the United States in a Libyan oil boycott.

If the United States was able to convince its principal allies to boycott Libyan oil, it would likely have a serious effect on Libya. Libyan income would be cut considerably, with little short-term prospect for selling its boycotted oil. An indication of the potential effect on Libya's income can be seen by observing the percentage of Libya's total petroleum exports which went to the United States and its principal allies. Table 5 indicates that these six industrial countries accounted for \$16.3 billion, or 73

percent, of Libya's petroleum revenues. Based on these statistics, if even these five industrialized countries were to join the U.S. in a boycott of Libyan oil--a very unlikely prospect according to experts--Libyan export revenues could potentially decline by

Table 5

Key Developed Countries' Trade With Libya, 1980

	<u>Export to Libya</u>	<u>Petroleum Imports from Libya</u>		<u>Libyan Oil as a percent of:</u>	
				<u>Net Petroleum Imports</u>	<u>Petroleum Consumption</u>
	(million, U.S. dollars)		mbd	(percent)	
United States	\$ 509	\$7,395	716	10.5	4.2
Japan	527	361	22	0.5	0.5
West Germany	1,251	4,325	296	15.2	12.6
France	671	666	36	1.6	1.8
United Kingdom	670	108	2	0.2	0.1
Italy	2,545	3,469	243	13.1	15.2

Source: National Foreign Assessment Center, International Energy Statistical Review.

roughly 75 percent. The relevant point is that the larger the number of countries that the United States could convince to cooperate in a ban against Libyan oil, the more severe the economic impact on Libya potentially could be.

The likelihood of additional purchasers of boycotted Libyan oil

West European countries that currently receive much of their oil from Libya may wish, as the need arises, to further expand supplies from a proven reliable source. Under current slack market conditions, however, few or none of these countries need to increase supplies from Libya, nor is there much incentive to do so because of Libya's relatively higher prices.

East European countries are also potential purchasers of boycotted Libyan oil. These countries will likely be in the market for new sources of supply in coming months due to announced 10-percent cutbacks in deliveries of Soviet energy supplies for the

coming year. Their location, relatively close to Libya compared to some other Middle East producers, may make Libyan oil supplies appear more attractive in the likely event that shortages occur in these countries. In fact, the Wall Street Journal reported that, in recent months, Libya has sold approximately 300,000 barrels a day on a barter basis to Eastern bloc countries such as Bulgaria and Hungary. <sup>1/</sup> The conditions of these agreements appear to be a reflection of the need by East European countries for oil supplies and their relative scarcity of foreign exchange for purchasing this oil. This latter fact may restrict these countries' usefulness to Libya as a customer for boycotted oil.

While other potential customers may certainly arise--such as other African or Third World countries--geographical factors, economic considerations, and past supply relationships appear to dictate European countries as the most likely candidates for purchasing excess Libyan oil, primarily if and when the current slack diminishes and/or Libyan oil prices are lowered.

Would U.S. actions reduce  
Libyan oil production?

Past a temporary adjustment period, a ban on U.S. oil producing equipment and the removal of American personnel should not severely hamper Libyan oil production. Here again, European participation would increase the likelihood of adverse effects on production.

The effect on oil production of restricted  
U.S. oil technology transfers

It is unlikely that a ban on sales of U.S. oil equipment and replacement parts to Libya would adversely affect Libya's production seriously. It is likely that the European companies operating in Libya could easily provide comparable oil technology and equipment to maintain oil production in their own, as well as in any U.S. concessions.

In addition, it is likely that Libyan and European companies operating in Libya would be able to acquire U.S. technology even with a ban through transshipments through other countries and purchases from foreign subsidiaries of U.S. companies. The need to purchase through third parties would likely complicate the procedures, delay equipment supplies, and limit the availability of certain types of equipment. But ultimately, these purchases would still lessen the impact of the ban on the Libyan oil industry.

To adversely affect Libyan production, a restriction on U.S. technology transfers would likely require the cooperation of all

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<sup>1/</sup>"Libya Schedules 50 cents Cut in Crude Prices" The Wall Street Journal, Dec. 27, 1981, p. 53.

companies and countries which buy, sell, and use U.S. oil technology. In addition, non-U.S. companies and other countries would have to agree not to supply Libya and its operating companies with comparable non-U.S. technology where possible.

Effect on Libyan oil production  
of withdrawing U.S. personnel

An issue which is closely related to the prospect of a U.S. ban of Libyan oil is the potential impact on Libya's oil production of the withdrawal of U.S. company technicians which is currently underway. There appears to be a consensus among experts we interviewed regarding the effect on Libya of withdrawing U.S. personnel. Both State Department and independent experts generally agree that a removal of American personnel would likely have some limited negative effect--at least in the short-run. These experts believe, however, that after an initial period of adjustment, acceptable levels of production could be maintained without U.S. technicians. In the longer term, however, the loss of U.S. managers and technicians could prevent Libya from producing as much as before.

The effect of withdrawing U.S. technicians depends on the extent to which either U.S. technicians and/or Libyan fields are so unique that other countries' technicians would have difficulty running Libyan oil fields. Oil industry experts we contacted indicated that skills required to operate and maintain Libyan oil fields are not unique to U.S. firms and that foreign technicians could easily replace U.S. personnel after a relatively short period of adjustment. Oil industry officials we interviewed generally agreed that while Libya's oil fields require artificial lifting techniques and continued maintenance, they are not so complex as to make them unique or prevent substitution of non-U.S. personnel. In fact, relative to other countries, Libyan fields are less complex in that production is onshore, the climate is dry, and the wells are not deep. Oil company representatives also stated that it would be fairly simple to replace U.S. experts with Europeans within about 3 to 6 months with little detrimental effect on Libyan production beyond their initial "learning period." Furthermore, European firms could increase production to replace almost any loss from a cessation of U.S. operations.

As long as demand for Libya's oil remains low, sufficient productive capacity could be maintained without U.S. personnel. If demand increases for Libya's oil, however, the achievement and maintenance of higher levels in the long run may require U.S. expertise. State Department analysts contend that the efficient medium- and long-term maintenance of production capacity requires the special geological knowledge of U.S. firms. According to the General Manager of production of an oil company operating in Libya, the real loss to Libya of a withdrawal of U.S. personnel will be in the area of service company operations. American service companies perform special services such as special

drilling operations, electric logging 1/, etc., and provide personnel from companies which manufacture and maintain U.S. equipment. The estimates by State Department and industry analysts for the amount of production that could be maintained without U.S. technicians range from 900 mbd to 1.5 MMBD in the short-term and up to 1.7 to 1.8 MMBD in the longer term.

Most analysts agree that the cooperation of the United States' European allies would enhance the negative effect of the removal of U.S. personnel. The Libyan National Oil Company does not possess the requisite expertise to run its fields without both U.S. and European technical skills. According to State Department analysts, it is clear that European cooperation with the United States--in terms of refusing to either replace U.S. technicians or increase their own Libyan production--is essential, otherwise Libya would be able to bring oil production to acceptable levels.

#### U.S. OIL REVENUES AND LIBYA'S ECONOMY

##### The Libyan economy

Libya depends on revenue from the sale of oil for its economic resources. Crude oil revenues provide approximately 99 percent of Libya's foreign exchange earnings and, in recent years, more than 50 percent of its gross national product has come from the oil sector.

The most recent available annual statistics provided by the International Monetary Fund indicate that, at the end of 1980, Libya's total international financial reserves amounted to approximately \$13.2 billion, and the foreign exchange component of this totaled about \$12.8 billion. Total exports in 1980 amounted to \$22.6 billion, 99.9 percent of which was revenues from crude petroleum exports. Estimated total Libyan imports for 1980 were \$9.8 billion. This is illustrated in Table 6.

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1/Electric logging is the procedure of lowering certain instruments into a well and shooting electric currents through them to test formations.

Table 6  
Key Economic Indicators  
of the Libyan Economy - 1980  
(\$ billions U.S.)

Total international reserves:	
(SDRs <u>a/</u> , foreign exchange, gold)	\$ 13.23
foreign exchange reserves)	12.84
Total exports:	22.58
crude petroleum exports	22.57
Total imports	9.78

a/Special Drawing Rights (SDRs) are units of credit or financial liquidity available to a country through the International Monetary Fund.

Source: International Monetary Fund, International Financial Statistics.

The drastic decline in Libya's revenues for 1981 due to a decline in oil demand potentially could have serious implications for the Libyan economy. The potential loss of additional revenues in this event could possibly exacerbate Libya's economic problems. One private policy analyst and expert in North African affairs states that Libya has overextended itself. Libya is committed to a \$70-billion 5-year domestic development plan, and an expansion of the military, while continuing expensive foreign policy objectives. These latter policies have involved large purchase of arms and substantial amounts of foreign aid. The drop in oil revenues in 1981 may make it increasingly difficult for Libya to meet all its economic commitments.

Potential oil revenue losses  
from a U.S. trade ban

The effects of a ban on Libya's economy depend on the amount of oil revenues Libya could lose as a result of the ban. Recent figures on the value of U.S. oil purchases from Libya indicate the potential magnitude of lost income if none of the banned oil was sold elsewhere.

If U.S. oil imports from Libya continued through 1982 at the September 1981 level of 154 mbd, the potential annual revenue loss (at \$36.50/bbl) would be about \$2.1 billion. However, U.S. imports from Libya over 1982 could increase. Average revenues from 1980, a year of substantially higher U.S. oil imports from Libya, show a maximum probable level of revenue losses. (We assume it extremely unlikely that 1982 imports would rise beyond the 1980 import level.) In 1980, the United States imported an average of 716 mbd, an amount of oil that is worth about \$9.5 billion at current prices. Thus, the potential range of annual lost revenue, if none of the banned oil is sold elsewhere, is

about \$2 billion to 9.5 billion. The actual amount depends on the level of U.S. oil imports from Libya when the ban is instituted. It is expected, however, that through the supply transfer mechanism of U.S. oil companies, much of the banned oil will, in fact, be sold and will thus not reduce revenues substantially.

If Libya were forced to lower oil prices to be able to sell all the banned oil to other customers, this could also result in a loss of income, assuming that a price decrease would not generate demand beyond the former U.S. level. If Libya lowered prices by \$1 (from \$36.50 to \$35.50) to maintain sales of banned oil of 154 mbd, it would lose about \$56 million in revenues over a year. At 1980 import levels, the loss would rise to \$261 million over a year.

#### Alternative policies available to Libya for adjusting to lost income

If the United States were to ban Libyan oil imports, to the extent that prohibited oil could not be sold elsewhere, the potential loss in income could adversely affect Libya's economy. However, the effect is not likely to be severe because the lost income could be compensated for by one or a combination of economic adjustments. Libya can adjust to lost income by: (1) relying on accumulated financial reserves until demand increases and income needs are met, (2) reducing expenditures on less critical commitments, and/or (3) borrowing on the Eurocurrency market.

#### Libya's financial reserve position

Our analysis indicates that, if a U.S. ban deprived Libya of some oil revenues for a short period, Libya could fall back on international financial reserves to avoid adverse economic effects. The period during which Libya would have to further drain its financial reserves would depend on how quickly demand increases and if and when Libya further lowers its prices.

Libyan international reserves, consisting of foreign exchange reserves, Special Drawing Rights in the International Monetary Fund, and gold are important in that they indicate the extent to which Libya has international financial liquidity. These reserves are roughly equivalent to a volume of financial resources that can easily be mobilized to either meet international commitments--pay for imported goods, repayment of debts, foreign aid, etc.--or obtain other resources to meet these obligations. For our purposes, Libya's reserve position indicates the store of financial resources that it can use in lieu of oil revenues--or in conjunction with potentially decreased oil revenues in the event of a ban--to fund its imports. The larger this volume of reserves, the longer Libya can continue importing goods with lower volumes of export income.

Libya appears to have the capability to "ride-out" reduced income by using international reserves. At the end of 1981, Libyan

international reserves were estimated as ranging from \$13 billion to \$17 billion. 1/ This is the equivalent of roughly 9 months to a year's worth of imports. 2/ Since Libya can draw down over \$1 billion a month for a year, a loss of \$166 million per month (based on the previously estimated \$2 billion annual loss) would not have a major impact on Libya's reserve position if it were forced to substitute reserves for lost revenue. Thus, Libya has sufficient reserves to buy time for either world oil demand to increase or domestic economic adjustments to be made, or both before serious damage to its economy is incurred.

#### Potential for reducing expenditures

Some experts on Libyan affairs both within and outside the U.S. Government contend that Libya has overextended itself in economic development projects, importation and subsidization of expensive foreign consumer goods, foreign aid expenditures, and large purchases of arms. Considerable room within these expenditures may exist for cuts that would not negatively affect Libya's economy severely.

In the event of a U.S. oil ban with possible income declines, economic development projects could likely be trimmed somewhat in the short-run. Libya's 1981-85 development plan calls for expenditures of \$62.5 billion--more than double the amount allocated for the 1975-80 plan. The State Department has recently learned that many Libyan spending plans have already been curtailed due to reduced foreign exchange receipts as a consequence of the oil glut.

Likewise, Libya could make cuts in importation and subsidization of consumer goods. Cuts in these expenditures, however, are likely to be very visible domestically and could potentially lead to domestic economic discontent manifested in political opposition and disruption.

Alternatively, in the event of an income crunch, Libya could suspend or reduce expenditures on foreign activities and further purchases of arms. The Congressional Research Service and other sources have asserted that Libya already has purchased more arms--such as tanks and fighter jets--than it has trained personnel to operate and maintain.

#### Borrow on the Eurocurrency market

A third alternative available to adjust to a short-term decline in income would be for Libya to go to the Eurocurrency

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1/International Monetary Fund, Department of State, and the Director of Georgetown University's Center for Contemporary Arab Studies.

2/Assumes Libyan imports of \$1.4 billion per month.

market as it has in the past. The decline in oil revenues during 1981 caused Libya to seek a short-term foreign exchange loan from this market. This would provide an option either, instead of, or in addition to drawing down reserves and/or cutting expenditures in the event that Libya is not immediately able to make up the loss of sales to other consumers.

PHILIP R. SHARP, IND., CHAIRMAN

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ROOM H2-331, HOUSE ANNEX NO. 2;  
PHONE 202 225-0320

December 15, 1981

Mr. Charles A. Bowsner  
Comptroller General of the United States  
United States General Accounting Office  
441 G Street, N.W.  
Washington, DC 20548

Dear Mr. Bowsner:

Several proposals have been made in the Congress to ban trade between the United States and Libya. In considering any actions of this sort, it is important that the Congress become better informed about the consequences of such a prohibition.

On November 16, 1981, your Energy Policy and National Security staff briefed some of us on the likely effects of a Libyan oil import ban. We would like GAO to confirm this information and prepare a report presenting a more thorough analysis of the energy effects of a ban on Libyan oil imports so that we may share your findings with other members of Congress.

Specifically, we would like you to address the following energy-related questions:

- Given the complexities of the world oil market, to what extent is it possible to effectively "target" a particular country by means of import quotas or trade bans? Would Libya be affected by a U.S.-imposed ban on its oil? If so, in what ways would Libya be affected?
- Given current market conditions, how would a ban on Libyan oil imports affect U.S. oil supply and prices? What would be the effect if the market tightens once again?
- What regions of the U.S. and which U.S. refineries, if any, might be affected by a ban?

- How would a ban affect U.S. companies producing and/or importing oil from Libya? How would a ban affect those companies which do not operate in Libya but either import Libyan oil or trade indirectly in Libyan oil?
- Given the present market, would U.S. oil companies have difficulty replacing Libyan oil? Would replacement be more difficult in tighter markets? Which countries would be more likely to supply alternatives or substitutes for Libyan oil?

Additionally, we would like the GAO to assess the impacts of a trade ban on commodities other than petroleum, including the extent to which a partial or complete U.S.-Libyan ban would be effective.

We would like to receive your analysis as quickly as practicable and, if at all possible, before January 31, 1982.

Sincerely,

  
Philip B. Sharp  
Chairman

  
Edward J. Markey  
Member

(001705)









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