

ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 86/2

427 SCOMM11: INTERIM COMM. ON TAXATION & REVENUE 1975-76

East vs. West*—oil earnings, production

	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
Gross production (MM bbl)											
West	1,243	1,288	1,355	1,402	1,389	1,483	1,517	1,505	1,565	1,536	1,494
East	2,310	2,540	2,882	3,235	3,627	3,919	4,386	5,016	5,711	6,563	7,058
Net earnings (\$MM)											
West	588	590	647	619	670	785	843	849	825	1,002	769
East	1,227	1,429	1,245	1,353	1,490	1,451	1,782	1,818	1,917	2,236	1,995
Net worth on Jan. 1 (\$MM)											
West	5,078	5,027	5,075	5,529	5,672	5,923	5,542	5,795	5,966	6,274	7,210
East	9,353	10,115	11,232	12,027	12,929	13,542	14,245	15,446	16,249	17,370	19,882
Return on net worth (%)											
West	11.6	11.7	12.7	11.2	11.8	13.3	15.2	14.7	13.8	16.0	10.7
East	13.1	14.1	11.1	11.2	11.5	10.7	12.5	11.8	11.8	12.9	10.0
Earnings (¢/bbl)											
West	47.3	45.8	47.7	44.2	48.2	52.9	55.6	56.4	52.7	65.2	51.5
East	53.1	56.3	43.2	41.8	41.1	37.0	40.6	36.2	33.6	34.1	28.3

*Based on operations of British Petroleum Co., Exxon Corp., Gulf Oil Corp., Mobil Oil Corp., Royal Dutch/Shell Group, Standard Oil Co. of California, and Texaco Inc. in Eastern and Western Hemisphere, excluding U.S.

Bank sees new emphasis on western oil

North, South American petroleum offers most-immediate relief in energy crisis. Soaring wellhead prices, proximity of reserves to huge U.S. market signal shift of attention from Eastern Hemisphere supplies.

A NEW emphasis on Western Hemisphere oil supplies promises to cut back the shift toward the Eastern Hemisphere that was so marked in the 1960's.

The petroleum potential of North and South America is far from exhausted and offers most immediate means of narrowing hemisphere's energy gap, First National City Bank says in its January energy memo.

Exotic new energy sources—from garbage oil to solar power—are being urgently examined. But at best they represent slow-moving solutions to fast-moving problems, the bank says.

In recent years, the Western Hemisphere outside the U.S. has often been downplayed because of its relatively unfavorable oil reserves, ranging from some 10 years at the current production rate in Canada to under 12 years in Venezuela and the U.S.

A large part of the Western Hemisphere's production derives from sustained investment and technical input of the seven largest international oil companies—British Petroleum Co., Exxon Corp., Gulf Oil Corp., Mobil Oil Corp., Royal Dutch/Shell Group, Standard Oil Co. of California, and Texaco Inc.—the bank says.

Over the past 10 years, gross production of the seven companies in

the Western Hemisphere outside the U.S. has been rising at less than 2% annually, significantly slower than soaring world demand.

The bank's 10-year summary shows gross production of 1.494 billion bbl in 1972 (4.1 million b/d), a 5-year low. Gross production of the same companies in the Eastern Hemisphere in 1972 amounted to 7.058 billion bbl.

The bank says the time appears ripe to reverse the recent sluggishness of production in the Western Hemisphere with increased exploration. Unparalleled high wellhead prices mean production and pipeline investments can now be justified by discoveries much smaller than hitherto. Deepwater structures have a new glitter, the bank says.

Eastward shift. Although the outlook for increased Western Hemisphere oil exports is changing for the better, the U.S. has continued to shift toward sources in the Eastern Hemisphere.

At the beginning of the 1960's crude imports from the East were only about half as large as those from the West. In 1973, crude supplies from the East for the first time moved ahead of those from the West.

Although U.S. product imports from the West outstrip the East five to one,

product as well as crude imports from the Eastern Hemisphere have begun to rise rapidly in the 1970's. And nearly half the products from Western Hemisphere sources are manufactured from Eastern Hemisphere crudes, the bank estimates.

Western advantage. Western Hemisphere production has an obvious advantage in that it is nearer the North American market, which consumes more energy per head than any other region and represents some 35% of world demand, the bank says.

Caribbean terminals are less than 2,000 miles from the U.S. East Coast, against 12,000 miles from the Middle East. Higher freight rates have strengthened this advantage dramatically in recent years.

Tanker rates rose steeply in the first half of 1973, after a decline from the 1970 peak. The Arab embargo since has triggered a reduction, and inability to buy bunker fuel has further depressed the tanker market.

Profit recovery. Rates of return earned by the seven largest international oil companies in the Western Hemisphere in the early 1960's ranged between 11.2% and 12.7%, the bank says.

From 1967 to 1971, rates of return improved, ranging from 13.3% to

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16%. But profitability declined sharply in 1972 to 10.7% in the Western Hemisphere and 10% in the East. In 1972, oil company earnings in the West outside the U.S. were some 2% below those of manufacturing companies.

There were signs in 1973 that in spite of the sharp increase in tax-paid costs, profitability of petroleum operations moved up strongly in the West as well as the East. In Venezuela, where 1972 earnings were ex-

tremely disappointing, advances were achieved by major oil affiliates, the bank says.

The five largest affiliates earned a discouraging 11.1% return in Canada in 1972.

Comparing the first three quarters of 1973 to the similar period of 1972, these earnings rose by 35%.

"In 1974, oil-importing countries will have to bear the brunt of drastic deterioration in their terms of trade with exporting countries. But changes

of this magnitude inevitably set in motion their own corrective forces," the bank says.

Energy demand cutbacks and increased energy production in North America and in those nearby countries best able to supply it are essential, Citibank asserts.

For broadly based energy companies, the new emphasis on the West will provide opportunities for challenging new investments that have been too long deferred, the bank says.

Ban sought on joint lease bids by big firms

THE Government plans major changes in offshore-leasing procedures as it moves toward President Nixon's new goal of selling 10 million acres next year.

Interior Sec. Rogers C. B. Morton told Congress of plans "to ban bidding consortia among the largest oil producers."

Departmental technicians are still working on the formula to define "the largest oil producers."

But a spokesman said last week the rules will probably bar the top 6-10 companies, based on size of reserves, from joint bidding with each other.

"Since these companies are financially able to bid alone, elimination of joint bidding among them will increase the number of competitive bidders in the sale," Morton said. "Moreover, this ban may induce the largest oil companies to enter bidding consortia with smaller independent companies, giving the latter a better opportunity to secure shares in leases than they have at present."

The new regulations won't be ready in time for application to the next offshore sale, scheduled in March, and may not be incorporated until next year, Interior officials said.

Within a few weeks, Interior plans to publish a call for nominations of areas—not tracts—to be included in future sales as the Government tries to jump offerings to 10 million acres annually from the present 3 million acres.

The U.S. Geological Survey has identified 19 areas for prospective sales and will gauge the interest of industry and the public in them.

These will be ranked according to reserves potential and environmental

safety, enabling Interior to focus on four or five target areas to be auctioned first.

"Since it is important that the most promising offshore areas be developed first," Morton explained, "if the environmental conditions are acceptable, the accelerated leasing program will be coupled with a new two-tier nominating system. Under this system industry will first rank the regions they think are the most favorable."

The public will be invited to identify environmental conditions and problems in these regions.

"The Interior Department will use

the industry and environmental rankings of regions along with its own evaluation of reserves potential and need to protect environmental values, to select the most promising regions for early development."

Later, within designated sales areas, industry will nominate individual tracts as is being done at the present time.

"The two-tier system will help to ensure that our scarce oil exploration and development resources can be employed on the most promising tracts and that major areas of environmental concern will not be touched," Morton says.

Louisiana-to-Florida gas, product pipelines planned

FLORIDA Gas Transmission Co. will spend \$136.5 million to complete parallel natural-gas and products pipelines from Louisiana to Florida, if the Federal Power Commission approves the project.

The Florida Gas Co. subsidiary has asked FPC permission to convert 880 miles of its original 24-in. natural-gas pipeline to products.

The company would complete unfinished segments of its parallel 30-in. pipeline to maintain deliveries of gas to Florida.

The main line of the proposed products system from Baton Rouge, La., to Fort Lauderdale, Fla., will transport gasoline, jet fuel, kerosene, and heating oil. Initial capacity would exceed 200,000 b/d, about one half of Florida's current daily products con-

sumption.

The \$115-million system would begin operations in January 1977, delivering products to various Florida terminals. Nearly all products brought into Florida currently are transported by barge and tanker.

The gas system, which has a capacity of 690 MMcf/d, presently consists of the 24-in. line from Baton Rouge to Miami and a 30-in. loop which parallels and interconnects with about 95% of the smaller line.

Florida Gas estimates building the remaining segments of the 30-in. line and adding compressors would cost \$21.5 million. After conversion, capacity of the gas system would be about 630 MMcf/d, but additional volumes could be moved by adding compression.

U.S. BRIEFS

GOVERNMENT

DR. Thomas V. Falkie, 39, head of the department of mineral engineering at Penn State University, has been named by President Nixon to be director of the Bureau of Mines.

On Senate confirmation, he will succeed Dr. Elbert Osborn, who resigned in September. Dr. John D. Morgan, acting director, will resume his post as assistant director—mineral position analysis.

► **The Justice Department** has granted antitrust clearance to U.S. international companies for price and ownership negotiations with producing countries. Justice has given such clearance in other instances, agreeing not to prosecute companies because of joint negotiations. However, officials added, these business review letters, advising companies as to prosecution intentions, do not amount to immunity in the event of antitrust-law violations.

OFFSHORE

A NEW offshore drilling firm, K/S Norway Jackup, has ordered a Livingston-designed Class III jack-up rig from Livingston Shipbuilding Co., Orange, Tex.

Total price of the triangular-shaped, three-legged unit is estimated at more than \$18 million, including drilling equipment and machinery. Delivery is set for September 1976.

The new rig will measure 208 ft long, have a beam of 178 ft, and be 22 ft deep. The triangular platform will have a 50-by-50-ft stern drilling slot through which nine well positions can be drilled. The unit will be capable of drilling in water depths to 300 ft, and will have legs 418 ft long.

K/S Norway Jackup is made up of Fearnley & Eger Chartering Co. Ltd.; Skips A/S Kim; and Odfjell Drilling & Consulting Co. AVA/S

► **A major facility** for the fabrication of large metal structures and components will be built on the eastern shore of Virginia by Brown & Root Inc. The Chesapeake Bay facility will be used for construction of offshore production platforms; modular plant construction; offshore power-plant construction; and storage-tank fabrication.

Brown & Root purchased the 2,000-

acre Hollywood Farm property in, and adjacent to the town of Cape Charles; however, only a small part of it, 10-20%, will be used for manufacturing during the foreseeable future. The remainder will continue in farm production and as a golf course for some time.

► **Another large semisubmersible offshore rig** of Sedco Inc.'s 700-series design will be built by Avondale Shipyards for a joint venture of Sedco and a Shell subsidiary. The latest rig, estimated to cost \$35 million, is scheduled for delivery in May 1976. It will be rated initially for 1,500-ft water depths. But it could later be equipped with dynamic positioning for operation in even deeper water. Rated drilling depth is 25,000 ft. Sedco is expected to announce yet another construction commitment for a similar rig in the next few weeks.

► **Marathon Oil Co.** will succeed Signal Oil & Gas Co. as the operator for the SLAM and Slant groups offshore Louisiana in the Gulf of Mexico, effective Apr. 1, 1974.

EXPLORATION

TEXACO INC. has a 428-b/d oil discovery on a 7,520-acre farmout from Tenneco Oil Co. in California's San Joaquin Valley, 20 miles south of Bakersfield.

The well, 1 San Emidio, was drilled to 20,704 ft, but production was found between 11,305 ft and 11,465 ft. The 428-b/d flow was recorded on a 24-hr test through a 26/64-in. choke.

Texaco has released the Loffland Bros. rig on the well but said development of the field is planned for later this year. Texaco and Tenneco also hold jointly 5,610 acres adjacent to the farmout tract.

RESEARCH

THE Atomic Energy Commission has proposed that \$107.6 million be spent over the next 5 years to develop nuclear stimulation for both natural gas and oil shale.

Of this, \$56.2 million would be spent in stimulating nuclear recovery of natural gas from tight sands. This would include a demonstration field experiment of five to six wells with three to five explosions per well. The ex-

plosives in each well would be fired simultaneously, while those in separate wells would be separated by several minutes.

The remainder of the money—\$51.4 million—would be for nuclear blasts in oil shale at a Nevada test site. The test would investigate the quantity of noncondensable gas that could be generated by explosions in carbonate rock.

The program would include a pilot-scale nuclear chimney and underground retort, with the start of a demonstration-scale plant near the end of 5 years.

GEOHERMAL

UNION Oil Co. of California has drilled a potentially commercial geothermal well in Sandoval County, N.M. The well, which would be New Mexico's first commercial geothermal project, flowed geothermal fluid at rates with a power-capacity equivalent to 6,500 kw/hr from a total depth of 6,929 ft.

Union said the test-flow rates are equal to some of the better wells drilled in northern California's Geysers field, where Union operates the largest geothermal steam project in the world.

The New Mexico well, north of Albuquerque, is located on a 100,000-acre tract on the Baca Ranch in Sandoval and Rio Arriba counties. Further drilling is planned to define the productive area.

Union holds a majority interest in the project and is the operator. Other participants are Dunigan Enterprises Inc. and Baca Land & Cattle Co.

PROCESSING

KERR-McGEE Corp. has signed an agreement to purchase Southwestern Oil & Refining Co., Corpus Christi, and Royal Petroleum Corp., New York. Southwestern owns a 100,000-b/d refinery at Corpus. Royal owns terminal facilities in the New York-Perth Amboy, N.J., area. Purchase price is not disclosed.

► **Mld-States Pipe & Supply Co.**, Tulsa, has purchased and will dismantle Phillips Petroleum Co.'s Cactus ammonia plant near Etter, Tex. Some of the more modern units will be resold.

TABLE

Profits As A Percent Of Invested Capital
Twenty Largest U.S. Petroleum Firms

Firm (Ranked according to 1971 sales)	Average Profit Rate (1967-1972)	Profit Rate 12 Mos. Ending 9/30/72
1. Exxon	12.3	17.4
2. Mobil Oil	10.7	14.2
3. Texaco	13.8	15.4
4. Gulf Oil	10.4	12.1
5. Standard Oil of California	10.4	13.5
6. Standard Oil of Indiana	9.7	12.5
7. Shell Oil	10.6	11.4
8. Atlantic Richfield	8.4	6.9
9. Continental Oil	10.1	12.1
10. Tenneco	11.2	NA
11. Occidental Petroleum	14.2	NA
12. Phillips Petroleum	8.4	10.0
13. Union Oil of California	9.2	9.2
14. Sun Oil	9.5	9.4
15. Ashland Oil	11.6	NA
16. Standard Oil of Ohio	8.2	7.6
17. Getty Oil	8.5	8.0
18. Marathon Oil	11.4	13.5
19. Clark Oil	15.2	30.1
20. Commonwealth Oil Refining	11.5	9.8
Average	10.8	12.5
Average: All Manufacturing (1967-1971) ¹	10.8	

¹Economic Report of the President, January 1973, p. 280.

Source: Fortune, May issues and Business Week, Nov. 10, 1973, p. 27.

Worldwide oil at a glance

COUNTRY	RESERVES 1-1-74		WELLS		OIL PRODUCTION		REFINING Capacity (1,000 b/cd) 1-1-74			
	Oil (1,000 bbl)	Gas (billion cu ft)	Producing oil 7-1-73	Drilling 12-1-73	Estimated 1973 (1,000 b/d)	% change from 1972	Refin- eries	Crude	Cracking	Reform- ing
ASIA-PACIFIC										
Afghanistan	†89,840	4,100	13	4	0.2					
Australia	2,300,000	37,100	394	7	420.0	23.3	10	680.9	144.7	156.7
Bangladesh		8,000		1			1	30.6		1.6
Brunei-Malaysia	1,600,000	20,000	126	5	325.0	17.7	3	123.2		5.7
Burma	67,800	210	700	7	23.0	15.0	2	25.3		
China Rep. (Taiwan)	14,000	410	50	2	0.2		2	210.0	9.0	20.0
Guam							1	29.5		
India	779,000	2,000	1,500	9	150.0	- 0.5	10	499.1	36.1	21.8
Indonesia	10,500,000	15,000	2,567	25	1,300.0	22.6	8	427.7	19.5	7.0
Japan	19,000	700	1,084	11	15.0		45	4,939.8	277.4	486.0
Khmer Republic							1	12.5		1.8
Korea, South							3	420.0		27.6
New Zealand	†224,000	15,000	4	1	3.6	33.0	1	54.0		18.0
Okinawa (R.I.)							3	212.0		12.0
Pakistan	31,200	10,120	16	5	8.0	-11.1	3	80.5		2.5
Philippines		180		3			4	283.8	21.7	42.6
Singapore							4	699.6		20.0
Sri Lanka							1	38.0		3.5
Thailand	10,200		25	2	0.2		4	166.2	7.0	23.5
Total Asia-Pacific	15,635,040	114,200	6,479	82	2,245.2	20.0	106	8,932.7	515.4	850.3
†Condensate										
EUROPE										
Austria	157,000	589	1,250	5	50.0		1	220.0	16.5	24.0
Belgium							8	916.7	55.3	90.8
Cyprus							1	15.0		2.7
Denmark	248,500	1,800	4	1	3.1	-11.4	3	226.5	18.0	19.3
Finland							2	196.0	32.0	25.8
France	80,000	6,500	284	5	26.3	-12.6	23	3,140.0	182.4	389.6
Germany, West	544,000	12,308	2,782	6	133.0	- 3.4	33	2,825.7	126.1	332.9
Greece†							4	313.6		21.5
Ireland†							1	58.0		13.3
Italy-Sicily	212,000	5,300	125	7	22.3	3.7	34	3,882.0	304.7	374.6
Netherlands	251,000	92,000	319	9	28.6	- 8.6	7	1,825.5	75.0	163.9
Norway	4,000,000	23,000	4	6	37.5	13.6	3	168.0		18.5
Poland*							6	145.8	13.5	10.8
Portugal							2	110.0	12.0	15.6
Romania*							10	320.0		
Spain	60,000	500	26	4	22.2	788.0	9	1,163.0		138.5
Sweden							5	248.0		47.8
Switzerland							2	140.0		23.0
United Kingdom	10,000,000	50,000	63	18	1.5	-11.7	20	2,762.1	188.0	386.2
Yugoslavia	**438,000	1,800	1,012	8	71.0	9.7				
Total Europe	15,990,500	193,797	5,869	69	395.5	5.9	158	18,110.1	1,010.0	2,088.0
†Oil or gas discovered but not developed. *Not included in non-communist total. **Government estimate adjusted.										
MIDDLE EAST										
Abu Dhabi	21,500,000	12,500	142	4	1,285.5	22.5				
Bahrain	360,000	4,000	215		63.7	- 8.7	1	250.0	34.2	14.3
Dubai	2,500,000	1,000	39	2	223.0	45.8				
Iran	60,000,000	270,000	350	9	6,000.0	19.5	5	660.0	36.0	41.3
Iraq	31,500,000	22,000	133	9	1,888.2	30.5	6	98.5		5.0
Israel	2,500	25	29	1	†100.0	- 7.0	2	212.0		27.0
Jordan							1	14.1	2.3	1.0
Kuwait	64,000,000	32,500	692	1	2,890.2	- 3.6	5	646.0		20.4
Lebanon							2	53.5	7.2	7.3
Neutral Zone	17,500,000	8,000	362	1	507.5	-11.2		††		
Oman	5,250,000	2,000	97	2	271.9	- 3.5				
Qatar	6,500,000	8,000	92	3	555.5	15.2	1	1.0		
Saudi Arabia	132,000,000	50,900	627	3	7,417.9	29.4	2	428.3		15.1
Sharjah	1,500,000	1,500	*	2						
South Yemen (Aden)							1	162.0		8.6
Syria	7,100,000	700	123	1	105.7	-12.1	1	51.3		
Turkey	450,000	200	286	6	65.0		4	305.5	28.6	28.3
Total Middle East	350,162,500	413,325	3,187	44	21,374.1	18.1	31	2,882.2	108.3	168.3
†Includes captured Sinai fields. *Not yet producing. ††Included in Kuwaiti figures.										

REFINING capacity in non-Communist countries outside the U.S. and Canada will be just over 38 million b/d on Jan. 1, 1974, according to the Journal's detailed world-wide survey.

The 38.3-million-bbl total compares with 34.8 million b/d on Jan. 1, 1973, for a 10.1% growth. But, this rate of growth is expected to slow appreciably for the next year or so. The Journal projects a 38.9 million bbl capacity for Jan. 1, 1975, and 40.0 million b/d for Jan. 1, 1976.

Biggest increases in crude capacity the past year came in Western Europe, where a 1.3-million-b/d gain was chalked up. Close behind was the Asia-Pacific area, which accounted for a hike of 1.0 million b/d.

Recognizing the importance of catalytic cracking and catalytic reforming in the world's refineries, the Journal made a change this year in reporting on cracking and reforming operations. In previous years, the totals included both thermal and catalytic capacities. This year, only the catalytic operations are totaled.

Though catalytic-cracking operations have not been as important in other countries as they are in the U.S. and Canada, Western Europe shows 1.0 million b/d capacity. Latin America 636,000, and Asia-Pacific, 515,000 b/d. Catalytic reforming shows up more strongly in Western Europe, with 2.1 million b/d capacity, and in the Asia-Pacific area, with 850,000 b/d.

Hydroprocessing in Western Europe totals 5.1 million b/d, while that in the Asia-Pacific area amounts to 3.3 million b/d. Total Western bloc outside the U.S. and Canada shows 10.6 million b/d hydroprocessing capacity.

Over the next 2 years, hydroprocessing is expected to show the biggest gains in downstream processing throughout the non-Communist nations. Total capacity outside the U.S. and Canada is expected to hit 11.4 million b/d on Jan. 1, 1976.

Cat reforming should show about 500,000-b/d growth in the 2-year period, to 4.0 million b/d. Cat-cracking growth should be more modest, from 2.3 to 2.6 million b/d.

OPEC startled the world in mid-October when the oil ministers, sitting in Kuwait, unilaterally seized the initiative and boosted crude postings by 66-70%. In future, OPEC said, prices will no longer be subject to negotiation, but will be set by host governments.

That move spelled the end of cheap energy for good. The producers had discovered through observation and personal experience in their sales of participation crude, that market prices had moved up to and often above posted prices. This, they believed, meant the oil companies were reaping unconscionable profits in the market.

To correct the situation, the Arabs and Iranians declared that henceforth posted prices should remain at a constant 40% above market prices, but at year-end, they were still unable to

reach a method of determining just what a "market price" really is.

Thus rang the death knell for the so-called "5-year security" Tehran agreement of 1971—a major casualty of the oil war.

The year of Libya. Libya spent 1973 in a vigorous campaign to gain control of its oil industry, taking its cue from Iran.

Early in the year, the government served notice that it wanted not 25% participation in oil-company operations as the Gulf states had gained, but 50%.

In midyear, it began touting for 100% control, but this proved a smoke-screen, for the country is in no position technically to operate its vast oil fields.

In frustration, in mid-August, the

(Capacities in 1,000 b/d)

	1-1-73	1-1-74	Projected 1-1-75	1-1-76
Crude-oil capacities				
Asia-Pacific	7,916	8,933	9,100	9,300
Africa	825	1,092	1,200	1,400
Middle East	2,758	2,882	3,000	3,200
Latin America	6,451	7,266	7,300	7,500
Western Europe	16,826	18,110	18,300	18,600
Sub total	34,776	38,283	38,900	40,000
U.S. and Canada	14,812	15,171	15,100	17,000
Total, non-Communist	49,588	53,454	55,000	57,000

Catalytic cracking				
Asia-Pacific	475	515	525	550
Africa	50	60	61	63
Middle East	100	108	110	115
Latin America	575	636	645	655
Western Europe	1,000	1,010	1,100	1,200
Sub total	2,200	2,329	2,441	2,583
U.S. and Canada	4,850	4,940	4,999	5,017
Total, non-Communist	7,075	7,269	7,440	7,600

Catalytic reforming				
Asia-Pacific	765	850	900	950
Africa	116	139	145	150
Middle East	214	168	173	178
Latin America	351	329	335	345
Western Europe	2,042	2,088	2,200	2,400
Sub total	3,488	3,574	3,853	4,023
U.S. and Canada	3,459	3,568	3,647	3,793
Total, non-Communist	6,947	7,142	7,500	7,773

Hydroprocessing				
Asia-Pacific	2,788	3,309	3,500	3,700
Africa	126	259	270	280
Middle East	478	552	560	570
Latin America	1,220	1,377	1,390	1,410
Western Europe	4,557	5,067	5,200	5,300
Sub total	9,169	10,563	10,920	11,300
U.S. and Canada	6,229	6,897	7,100	7,300
Total, non-Communist	15,398	17,460	18,020	18,600

government announced that Occidental Petroleum had yielded to its demand for 51% control of its operations, and the die was cast. One by one, the independent dominoes fell before the government onslaught and gave in to the 51% control demand.

The major companies held out. But on Sept. 1, as a birthday gift to the Libyan revolution of 1969, Col. Qaddafi announced a unilateral takeover of 51% of all the major-company operations. The sole exception was Esso's gas liquefaction plant at Brega. At year-end, the majors continued their holdout, and the Libyans, distracted by the Arab-Israeli war and the cut-back-embargo operations, were not seriously pushing their case. But there's no doubt that 1974 will see the complete takeover established.

COUNTRY	RESERVES 1-1-74		WELLS		OIL PRODUCTION		REFINING			
	Oil (1,000 bbl)	Gas (billion cu ft)	Producing oil 7-1-73	Drilling 12-1-73	Estimated 1973 (1,000 b/d)	% change from 1972	Capacity (1,000 b/cd) 1-1-74			
							Refin- eries	Crude	Crack- ing	Reform- ing
AFRICA										
Algeria	*7,640,000	105,945	574	10	1,035.4	- 2.6	4	115.3		30.5
Angola-Cabinda	1,500,000	1,500	169	5	160.0	14.7	2	24.5		1.9
Congo Brazzaville	4,888,000	1,000	19	3	39.0	490.9				
Dahomey†										
Egypt	5,125,000	4,200	261	4	180.0	-15.0	4	180.0		
Ethiopia†							1	14.4		1.9
Gabon	1,500,000	6,500	122	4	145.0	15.4	1	17.0		2.0
Ghana†							1	25.3		9.4
Ivory Coast							1	44.2		5.0
Kenya							1	48.0		4.0
Liberia							1	10.0		2.0
Libya	25,500,000	27,000	895	9	2,116.6	- 4.5	5	16.4		1.5
Malagasay							1	1.5		0.3
Morocco	750	25	22	2	0.9	4.2	2	58.5	3.6	7.6
Mozambique†							1	17.0		2.5
Nigeria	20,000,000	40,000	898	28	2,000.0	10.0	1	60.0		6.0
Rhodesia							1	(not operating--not included in total)		
Senegal							1	18.0		2.0
Sierra Leone							1	10.0		
Sudan							1	22.0		2.0
Tanzania							1	17.0		2.6
Tunisia	950,000	1,500	56	4	87.0	4.6	1	21.4		3.0
Union of South Africa†							5	331.0	55.9	46.1
Zaire††	200,000	50					1	16.1		2.7
Zambia							1	24.6		5.6
Total Africa	67,303,750	187,720	3,016	69	5,763.9	1.8	39	1,092.2	59.5	138.6

*Revised. †Oil or gas discovered but not developed. ††To go on production at 25,000 b/d in 1975.

WESTERN HEMISPHERE										
Antigua							1	17.3		1.9
Argentina	2,500,000	8,000	4,096	30	442.0	2.0	14	623.6	101.2	51.4
Bahamas							1	500.0		
Barbados†	250						1	3.0		
Bolivia	260,000	10,000	253	4	47.0	7.8	5	25.5		
Brazil	799,000	921	1,265	25	170.0	3.0	10	791.8	168.6	20.8
Chile	124,000	3,400	466	6	30.0	-12.8	3	123.5	26.3	10.0
Colombia	1,432,000	2,500	2,023	8	186.0	- 5.8	6	166.1	49.5	2.0
Costa Rica†							1	7.6		1.1
Cuba							3	122.0	14.6	11.7
Dominican Republic†							2	46.0		7.0
Ecuador	5,675,000	5,000	829	6	197.0	148.1	3	35.2		
El Salvador							1	13.7		2.1
Guatemala†							2	26.0		6.0
Honduras							1	14.0		1.8
Jamaica							1	33.0		2.3
Martinique							1	14.0		2.5
Mexico	3,600,000	11,000	4,345	45	478.0	8.4	6	625.0	109.0	56.3
Netherlands Antilles							2	945.0	35.0	15.0
Nicaragua							1	13.2		2.6
Panama							1	75.0		7.5
Paraguay							1	5.0		
Peru	1,050,000	3,500	2,499	13	68.0	1.8	5	106.8	6.7	1.8
Puerto Rico							3	307.8	47.8	75.5
Trinidad & Tobago	2,200,000	5,000	2,932	15	159.0	12.4	3	461.0	26.5	27.0
Uruguay							1	43.0	4.0	3.0
Venezuela	14,000,000	42,000	12,461	20	3,370.0	4.7	12	1,531.6	46.6	9.8
Virgin Islands							1	590.0		
United States	*34,700,249	247,310	503,505	1,411	9,225.0	- 2.4	247	13,383.0	4,512.5	3,273.1
Canada	9,424,170	**50,299	22,996	171	1,750.0	14.0	41	1,788.1	427.6	250.0
Total W. Hemisphere	75,764,669	388,930	557,670	1,754	16,122.0	2.0	380	22,436.8	5,575.9	3,897.2

†Oil or gas discovered but not developed. **Does not include Arctic gas. *Includes Alaska 10 billion.

Total Non-Communist	524,856,459	1,297,972	576,221	2,018	45,900.7	9.8	714	53,454.0	7,269.1	7,142.4
Communist World	*103,000,000	†735,400			9,312.0	4.5				
Total World	627,856,459	2,033,372			55,212.7	8.8				

*Including Russia with 80 billion, Red China 20 billion, and others 3 billion.

†Including Russia 706 trillion, Red China 20 trillion, Hungary 3 trillion, and others 6.4 trillion.

061

The year of Iraq. Iraq, following its June, 1972 nationalization of Iraq Petroleum Co.'s northern oil fields, reached a surprisingly quick settlement with the company in late February.

Under its terms, IPC yielded title to all the northern fields, agreed to pay \$350 million in back claims, and gained 15 million tons of Kirkuk crude entitlement as compensation. It further affirmed Basrah Petroleum's title to fields in southern Iraq and committed Basrah, an affiliate of IPC, to a vigorous expansion program.

But Basrah was not spared. With the outbreak of the Arab-Israeli war on Oct. 6, the Iraqi government slapped a nationalization decree on the American holdings in the company—Near East Development Co. (50-50 Mobil and Exxon) held a 23.75% interest in Basrah.

Then, as the war rolled on, and Holland was classed an "unfriendly country" in the Arab oil war against the west, Iraq made a further seizure by nationalizing the Dutch share of the Royal Dutch/Shell group's interest in Basrah.

The group's 23.75% interest was held 60% by Dutch interests and 40% by British interests. Thus at year-end, Iraq held all its northern fields and 38% of Basrah, in the south.

Throughout the war and the cut-back-embargo campaign, Iraq has been quite vocal in its demand for nationalization of all western producing interests in Arab countries. It shunned the cutbacks as useless and went all-out to market as much crude as it could on world markets (except, of course, the U.S. and other embargoed countries).

The year of Saudi Arabia. Kingpin

of the war and of the oil weapon throughout the year was Saudi King Faisal. Not many months ago, he decried the mixing of politics and oil, but 1973 saw him reverse his stand and take the reins of leadership in the Arab world.

Faisal had given ample warning to the U.S. to change its policy toward Israel and the Middle East, or suffer the consequences. But Washington didn't respond to his overtures.

In mid-year, Pres. Sadat of Egypt gained the king's ear, and together the two leaders laid plans to achieve their goals.

Sadat would provide the political savvy, and Faisal the money.

Sadat also was eager to cast off the contentious Col. Qaddafi of Libya, who pursued his campaign to merge with Libya. Qaddafi killed his own plan by a disgraceful visit to Cairo in which he alienated the Egyptian people. Then he staged an actual "march on Cairo" with thousands of Libyan peasants trudging and driving down the principal highway eastward.

This was too much for Sadat. Hence his flight into the arms of Faisal, who conditioned his support for Sadat on Qaddafi's demise from the picture. And this is what did happen. In early December, Qaddafi closed his Cairo embassy and the Libyan-Egyptian marriage ended in divorce before it started.

A year for Algeria. In the early part of the year, Algeria racked up some new gains it had long sought. New 51-49% joint exploration agreements were signed with Sun Oil Co., Spain's Hispanoil, and France's Cie. Francaise des Petroles. Thus the state oil company, Sonatrach, gained some potent partners in its search for new oil and

gas reserves.

But Algeria had other surprises for the industry. In late September, Sonatrach announced to the world that it would pursue its own pricing pattern, and make some changes in the rules for buying its high-gravity, low-sulfur crude.

In all candor, the company confessed it had oversold itself in crude-sales contracts, and was making a 7% cut in 1973 deliveries and at least a 20% cut in 1974 and 1975—possibly 25%.

Sonatrach also sprang a new approach to oil-finding on the industry. Boiled down, it reads "if you want to buy our oil, you must help us find more."

Each crude-buyer, under the new plan, will be asked to "contribute" to exploration programs in Algeria. Buyers may choose between "active" and "passive" participation in the program.

The "active" participant may set up a joint-venture with Sonatrach on the usual 49-51% pattern and spend 35¢/bbl of lifted oil on exploration.

A "passive" participant can simply contribute 20¢/bbl of lifted oil to the Sonatrach exploration programs.

Thus did Sonatrach show its heels to other producing countries in a progressive new path to renewed exploration in the desert country.

Light ahead? Oilmen look to 1974 with mixed emotions. Some have hopes that OPEC will pursue a sensible course in its new-found muscular approach to the consuming countries and the international oil companies. Others fear even more turmoil in the year ahead.

In any case, nobody will ever forget 1973. That, indeed, was the year that was!

Worldwide refining

WORLDWIDE REFINING	Company and refinery location	Crude	Catalytic cracking	Catalytic reforming	Hydro- processing	Other processing
ALGERIA	SONATRACH:					
	Arzew	54,600		16,000	1,000 DHT	10,300 V, 1,500 L, 1,300 A
	El Borma	600				
	Hassi Messaoud	3,135				
	Maison Carree	57,000		14,500		
	Total	115,335		30,500	1,000	
ANGOLA	Cabinda Gulf, Cabinda	2,550				
	Companhia de Petróleos de Angola (SARL), Luanda	21,700		1,900	3,800 DHT 2,800 DHD	1,900 V, 11,300 Vis, 950 A
	Total	24,500		1,900	6,600	

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Refining capacity registers largest "nickel and dime" jump in history

LEO R. AALUND
Refining Editor

THE striking gain in U.S. refining capacity last year rates as one of the biggest statistical surprises in the history of the industry.

Announced projects at the beginning of 1973 indicated a bleak increase of only some 160,000 b/d, or growth in the range of 1%.

What really happened is that capacity, as reported to The Oil and Gas Journal, shot up some 830,000 b/d—a jump of over 6% (Table 1). This is the biggest volume gain in recent memory and except for the 6.6% hike in 1967 the largest percentage increase in at least a decade.

In hindsight, the jump is not a total surprise, though the suddenness of it borders on a crash program. It illustrates what a mixture of government policy and profitability can produce.

Refiners have repeatedly said that given proper incentives and firm government policy that they could get moving. The first break in the logjam came last spring when crude-oil import regulations were revamped. As a result, a refiner could get all the oil he could chase down. There was also a rosy future of burgeoning world oil production, particularly in Saudi Arabia.

At the same time product prices firmed and moved up. Many refiners who hung on by their nails in 1971 and 1972 found they could compete in the improved climate.

Good product prices also made it possible to spend more on incremental expansions in large refineries. This accounted for most of last year's increase which has been called the big-

Crude capacity shows big gain

Table 1

	Capacity		Est. % change by 1-1-75	Construction	
	1-1-74	% change from 1-1-73		1974 completions*	1975 completions*
Crude, b/cd	14,216,287	+ 6.2	+3.0	425,000	725,000
Crude, b/sd	14,876,050	+ 6.3	+3.0	447,000	763,000
Feed, b/sd					
Thermal operations	1,491,950	+ 3.5	+0.8	12,000	27,000
Cat reforming	3,358,038	+ 2.6	+3.2	108,500	185,000
Cat cracking†	4,618,580	+ 2.4	+1.0	46,000	58,000
Cat hydrocracking	855,840	- 1.0			6,500
Other hydroprocessing	5,780,110	+10.6	+6.7	386,000	897,000
Products, b/sd					
Alkylation	849,080	+ 4.6	+3.6	31,000	
Aromatics and isomerization	348,010	+ 4.3	+9.8	34,000	
Lubes	237,118	+ 6.9			
Coke, ton/day	43,410	+ 1.6			
Asphalt	683,601	+ 6.1	+1.7	12,000	17,000

*Known as of Mar. 1, 1974

†Fresh feed

Smaller refiners have relatively larger capacity gain

Table 2

	Companies with more than 200,000 b/d		Companies with less than 200,000 b/d	
	1-1-74	1-1-73	1-1-74	1-1-73
(Thousands of bbl)				
No. companies	17	16	115	115
No. refineries	110	109	136	136
Capacity, b/cd	11,324.3	10,736.9	2,892.0	2,646.1
Capacity, b/sd	11,888.7	11,227.9	2,987.3	2,763.7
Annual change % (b/cd)	5.5	3.4	9.3	2.3
% of U.S. total b/cd	79.6	80.2	20.4	19.8
Cat cracking (F.F.), b/sd	3,892.5	3,772.5	724.1	739.5
% of crude	34.4	33.6	24.0	26.7
Cat reforming, b/sd	2,723.2	2,716.7	634.8	557.2
% of crude	23.0	24.2	21.2	20.1
Hydrocracking, b/sd	779.4	785.0	76.5	80.0
% of crude	6.6	7.0	2.6	2.9
Other hydroprocessing, b/sd	4,877.4	4,456.5	92.7	77.2
% of crude	41.0	39.7	30.2	27.9
Alkylation, b/sd	734.2	658.8	114.9	153.2
% of crude	6.2	5.8	3.8	5.5

FCC capacity shows healthy gain*

Table 3

Type unit	Capacity 1-1-72	% recycle	Capacity 1-1-73	% recycle	Capacity 1-1-74	% recycle	Capacity 1-1-75 (est.)
FCC	3,985.3	21.7	4,034.0	18.9	4,242.3	18.6	4,292.0
TCC	490.0	19.7	384.6	16.8	312.8	20.3	312.8
Houdrflow	97.5	25.8	93.5	21.7	63.5	14.8	63.5

*Capacity in thousand's b/sd

Bimetallics capture more cat-reforming capacity

Table 4

Type reformer	Catalyst	Capacity* 1-1-72	% of total capacity	Capacity* 1-1-73	% of total capacity	Capacity* 1-1-74	% of total capacity
Semiregenerative	Conventional	1,421.0	44.8	1,349.8	41.2	1,180.6	32.5
Cyclic	Conventional	743.4	23.4	739.9	22.7	833.0	24.8
Semiregenerative	Bimetallic	874.8	27.6	967.0	29.5	1,172.7	35.0
Cyclic	Bimetallic			122.1	3.8	73.1	2.2
Other	Bimetallic	49.0	1.6	52.0	1.5	95.0	2.8
Other	Conventional	80.8	2.6	43.0	1.3	3.6	<1

*Capacity in thousand's b/sd

furic acid. The remainder is burned.

With our sixfold increase in sulfur, essentially all must be recovered to comply with environmental regulations. For recovery, a central amine (MEA) system is provided. Scrubbers are located throughout the refinery. The rich amine is returned to the central regeneration system where it is combined and stripped of H_2S . The following streams are scrubbed:

- Fuel gas.
- Ultracracker ethane and propane.
- Distillate Ultrafiner offgas.
- Coker propane and butane.
- Fluid cat cracker propane-propylene.

After recovery, the H_2S is converted to elemental sulfur in a conventional two-train Claus sulfur-recovery unit. Each train consists of three stages, and is designed for 200 long tons/stream day recovery. The normal sulfur recovery will be about 300 long tons/day. The two, 200-long ton/day trains are provided so that even when one train is down, there will be no significant sulfur emissions to the atmosphere. Operating adjustments will be made to bring the load quickly down to 200 long ton/day when one train is down.

Disposal of sour water will be to a disposal well, which is the present refinery practice. To provide future flexibility, in case well disposal becomes unacceptable, the sulfur-plant design provides for future addition of sour-water strippers.

Hydrogen supply. Both before and after the change in crudes, the refinery operation produces (in the Ultraformers) and uses (in the Ultracracker) large amounts of hydrogen. At present the production and use are roughly in balance, and no external source of hydrogen is needed.

After the switch, however, this will not be the case. Usage will increase for desulfurization of kerosine and diesel fuel in the distillate Ultrafiner, and production will drop because of the change in feedstocks to the Ultraformers.

We are always a little squeamish about the accuracy of relatively small numbers derived as the difference between much larger numbers.

Thus, we felt a certain lack of enthusiasm for the original design capacity number for the hydrogen plant to supply the future deficit. Another facet of the hydrogen plant also

bothered us a little — energy consumption. We had decided we should use natural gas for feed and fuel, but were not happy with the BTU loss involved.

Fortunately, an alternative was available which pleased us more. Hydrogen-rich offgases were found to be available from Amoco Chemicals Co. processing units in Texas City and nearby Chocolate Bayou. Our present plans are to purify these streams to supply the needed hydrogen — at a considerable overall saving in energy. Also, since several chemical plants will supply the hydrogen, we will not have all our hydrogen eggs in a single hydrogen-plant basket.

Utilities. The program will require some additional steam. A new 555,000-lb/hr boiler will provide steam at 850 psi to fit the existing steam-power generating cycle. Additional power will be purchased. Assignment of processing units to purchased power or to refinery power must be made.

In general, the more-critical units will be placed on refinery-produced power. This will involve a considerable rearrangement of the power-distribution system.

The new boiler, the larger new furnaces, and three existing boilers will be equipped to burn oil. At present the refinery is entirely gas fired, but these changes will make it possible to implement the crude-replacement program without importing additional natural gas.

Environmental. Currently, coke drums are steamed to a blowdown system. To reduce air pollution, a system will be provided to oil-scrub the vapors from both old and new coke drums.

Measures are included to protect the quality of the effluent water. These include a more-extensive system for collecting sour waters to avoid spilling these streams, unit separators on the new units, and maximum use of air cooling.

Integration. Major changes to an existing refinery, such as required for this program, are more complex and difficult to coordinate, and to execute than a clean new refinery project. Not only must the new facilities be installed efficiently, but there must be minimum interference with existing operations.

Obviously these two goals occasionally conflict. Schedules must not only accommodate equipment and materi-

al deliveries (difficult in itself these days), but tie-ins to existing units and systems must be consistent with the regularly scheduled maintenance turnarounds.

Considering these complexities, Amoco management set up a slightly different organization than it normally uses. A three-man team (the authors of this article) was appointed to handle all facets of the program. Fundamental assignments are shown in Table 2.

Our primary tool for proceeding with work in the early stages was an arrow diagram showing each of the detailed tasks to be done, a time for completion, and responsibility assignment to one of the three of us in line with the general assignments in the following Table 2.

Table 2

Texas City refinery-revamp team

C. W. Peters

Planning
Process studies
Economic studies
Coordination with research, marketing, and other head-office departments

J. A. Bauer

All liaison with refinery
Optimum integration of new and old facilities
Ecology matters
Recruitment and training of new staff
Control of refinery expense

E. P. Wells

Process design
Estimating
Project engineering
Procurement
Construction
Schedule responsibility
Cost responsibility

We met together at least every week, at first, for proper coordination. When major management decisions were required, we met with the vice-president of refining transportation and engineering, the manager of refining, and the manager of engineering for prompt answers and guidance.

All phases of the project have now been contracted and meetings of our threesome (or troika, as we have called it) are less frequent, as are our meetings with top management.

Progress is as good as the present environment permits, and our somewhat foggy crystal ball predicts completion in about mid-1976. END

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gest nickel and dime expansion in history.

Talk of a big increase in capacity in early 1974 does have Alice-in-Wonderland overtones. The crude-oil embargo has idled much capacity in the U.S. refining industry.

Comparable? There is no doubt that the refining industry does today have much more capacity than expected. But the question is: Can we compare this 830,000-b/cd increase to that added in previous years on a barrel-for-barrel basis? Certainly, much of that expansion does not have the quality of that from, say, five 150,000-b/d new grass-roots refineries.

Also, a slight statistical aberration may have been introduced last year. American Petroleum Institute last year introduced some precise guidelines for counting capacity. For one thing, operable capacity was any capable of being put on stream within 30 days. The Journal adopted a modified version of these definitions.

No doubt many refiners have included this type capacity in the past, but last year all the 200 plus U.S. refiners were using the same rules.

Where it came from. An analysis of where the increase came from shows relatively less originated from refiners controlling more than 200,000 b/cd of capacity. Smaller refiners contributed more on a percentage basis (Table 2).

The top 16 companies in Table 2 were responsible for adding 481,000 b/cd of the 830,000-b/d increase. American Petrofina's contribution is not included in the preceding major refiner increase since it joined the 200,000-b/d club for the first time this year (it got in by purchasing BP's Port Arthur, Tex., refinery and reactivating a sizable portion of the capacity there).

Reactivations played a solid role in the 1973 expansion. Marathon put 75,000 b/d of mothballed capacity back on line at Robinson, Ill., and made additional increases there. At least 125,000 b/d of shutdown capacity was put back on line by refiners in 1973.

Also, last spring Exxon said it would make incremental expansions at several refineries totalling 100,000 b/d. The company apparently got this on line in 1973. This, along with 160,000 b/d of earlier known expansions plus reactivations, accounted for 43% of the increase.

Following are some of the highlights

Tulsa's newest hotel



Welcome to the Fairmont, Tulsa's newest hotel. New in every way you would want a new hotel to be. New in the way Mobil Tour Guide would expect a new hotel to be to receive a four-star rating. And the Fairmont is the only hotel in Oklahoma to receive an esteemed four-star rating, of course. But the Fairmont you will visit on your landmark in Tulsa for years, of course. One of the most elegant next trip to Tulsa is the newest and brightest suites. One of the most elegant Fairmont Hotel. New, beautifully designed suites. Service you get only at a genuine four-star restaurants in the Southwest. Service you get only at a genuine four-star Fairmont. The newest hotel in Tulsa.

Processing profile of refiners with over 200,000 b/cd capacity

Company	No. refineries	Crude capacity		Cat cracking		Cat reforming, b/sd	Hydro-cracking, b/sd	Other hydro-processing, b/sd	Alkylation, b/sd
		b/cd	b/sd	Feed, b/sd	Recycle,* b/sd				
1. Exxon	5	1,252,000	1,307,000	466,000	118,000	268,000	67,900	691,400	82,500
2. Shell	8	1,109,000	1,164,000	379,500	112,000	288,200	105,500	711,500	65,500
3. Texaco	12	1,083,000	N.R.†	442,270	132,591	232,780	38,890	352,800	59,970
4. Amoco	10	1,065,000	1,121,060	398,500	122,000	237,900	38,000	387,200	68,300
5. Standard (Calif.)	12	984,000	1,035,205	227,100	55,900	245,400	175,500	248,000	40,730
6. Mobil	8	932,000	972,800	327,700	68,100	178,400	47,000	448,600	67,000
7. Gulf	8	860,500	884,700	323,800	47,200	228,300	40,400	395,500	90,800
8. ARCO	6	789,800	846,550	174,000	15,000	249,000	89,200	432,000	22,200
9. Union Oil	4	487,000	508,100	133,700	19,000	122,000	51,000	245,400	24,800
10. Sun Oil	5	484,000	510,000	200,000	35,900	147,800	26,000	141,300	36,600
11. Phillips	6	403,700	N.R.†	173,800	53,800	111,600	22,000	155,800	58,500
12. Sohio/BP	4	384,250	406,300	127,900	31,000	119,700	56,000	137,500	21,000
13. Ashland	7	358,200	383,500	125,000	20,800	58,000	.....	155,000	18,000
14. Continental	7	349,200	360,500	111,100	28,880	79,300	.....	130,800	18,100
15. Marathon	3	314,000	332,000	86,500	16,400	71,300	22,000	57,100	12,650
16. Cities	1	268,000	282,100	125,000	20,000	46,000	.....	96,000	35,300
17. American Petrofina	4	200,000	210,210	70,600	5,700	39,500	.....	91,500	12,500
Total	110	11,324,350	11,888,726	3,892,500	902,271	2,723,180	779,390	4,877,400	734,150

*Calculated in some cases as 30% of fresh feed. †Calculated.

of the downstream scene:

Cat cracking. Catalytic cracking picked up its growth last year after a lag in 1972. However, total growth was held back by the retirement of units using older technology (Table 3).

Cat reforming. The exceptional growth of cat reforming continued to slacken off during 1973, growing only 2.6% between 1/1/73 and 1/1/74. This compares to a growth rate of over 6% during the previous 5 years. That was the period when U.S. refiners put much of their energy and financial muscle into units to make no-lead gasoline.

Ironically, barring literally an act of Congress or some higher authority, this country enters the no-lead gasoline era in just over 90 days—a time when it may be difficult to find any kind of gasoline.

But the trend to bimetallic catalysts continues strong. By the end of 1973, 40% of all cat-reforming capacity in this country used bimetallic catalysts compared with 30% at the beginning of 1972 (Table 4).

Inspection of the results also shows that continuous reforming, which makes up the majority of the "other" category in the table, is getting a good toehold in refineries.

Hydroprocessing. With the exception of hydrocracking, which declined, hydrotreating and hydrorefining processes chalked up the biggest gain of any downstream processes. Capacity used for hydrogen processing of mid-distillates stocks zoomed up 25% (Table 5).

Hydrotreating and hydrorefining surges

Table 5

Type feed	1-1-73, b/sd	1-1-74, b/sd	1-1-75 (est.), b/sd
1. Cat-reformer feeds	2,947,310	3,153,730	3,296,730
2. Middistillate stocks	1,230,500	1,542,360	1,735,160
3. Cat-cracking feed and recycle	276,200	339,690	350,000
4. Other	782,178	744,330	782,000

The large increases in hydrotreating and hydrorefining are a sign of the times. A large portion of the U.S. refining industry does not have the capability to process high-sulfur crude oil.

Many refiners must now develop the flexibility to process any of the world crudes they will have to import, many of which will be high in sulfur content.

Late last year, over \$530 million had already been dedicated for revamps to allow refiners to process sour crudes. Paradoxically, these costly projects will add little to U.S. refining capacity.

The big expansions by the majors that are due to start going on stream late next year and thereafter will be equipped to process sour crude. Hydrodesulfurization of vacuum gas oil and residuum will lead the processing wave for that round of activity.

Alkylation. Hydrofluoric and sulfuric acid alkylation displayed good growth last year, moving up 4.6%. HF alkylation carved out a bit larger slice of the alkylation pie and is expected to increase its share this year (Table 6).

Alkylation

Table 6

	HF, b/sd	H ₂ SO ₄ , b/sd	Total, b/sd
1-1-72	267,095	554,774	821,869
1-1-73	276,345	535,700	812,045
1-1-74	310,410	538,670	849,080
1-1-75*	330,410	549,670	880,080

*Est.

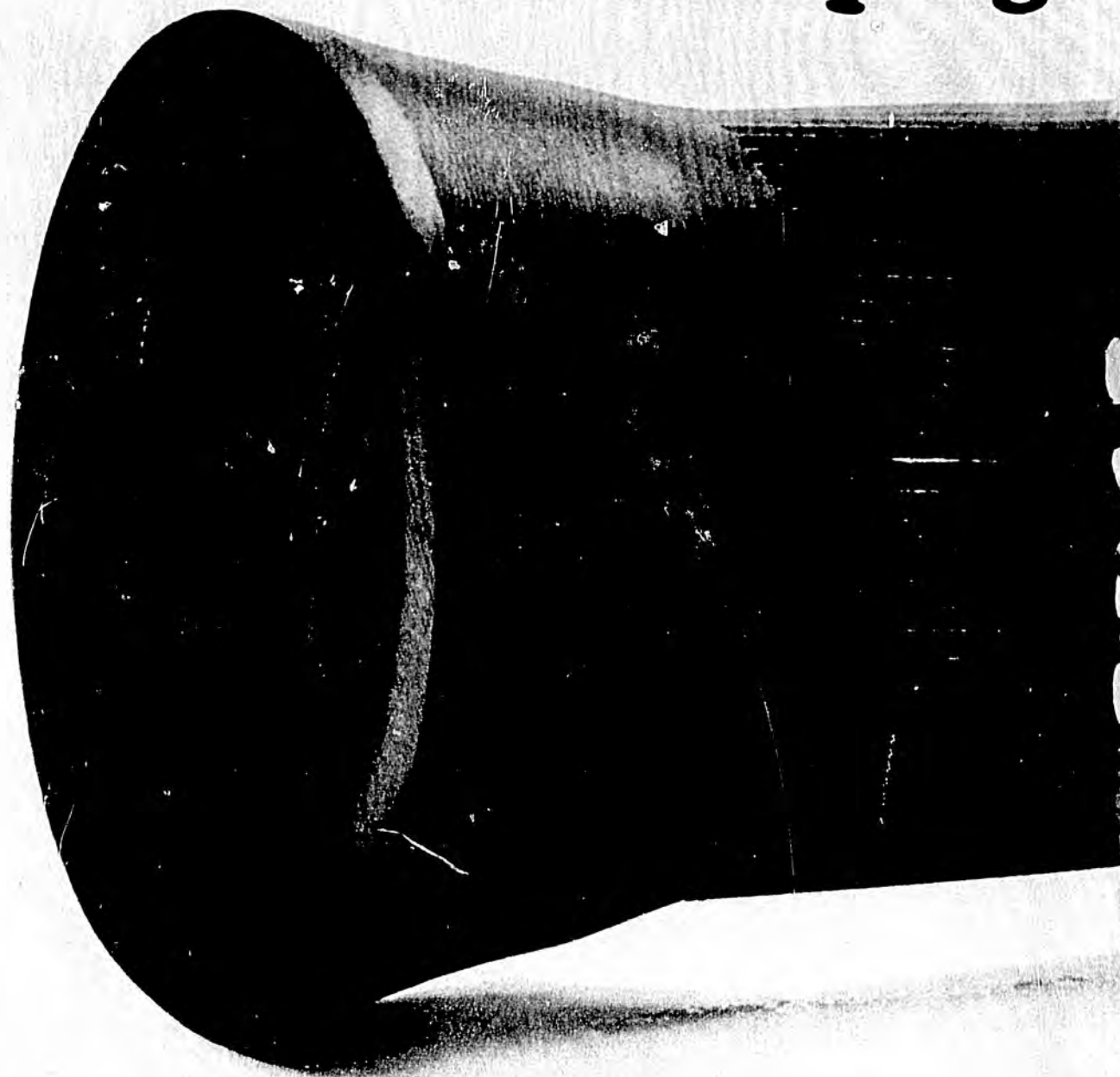
The future. This year, some 400,000 b/d of capacity is due to be added to the U.S. refining establishment. If the oil embargo is lifted, if the U.S. continues its energy belt-tightening, and if the rising cost of energy dampens demand, this may well be enough to get the country by.

A healthy batch of capacity is due on line in 1975. Most of that will be late in the year and come from Standard Oil Co. of California's huge expansion program. Given the proper climate, a half-dozen or so fuels refineries could be started this year and be on line by late 1976.

Whether this happens or not, the refining capacity now on blueprints around the country represents a staggering total.

END

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The Tube Turns Swel-

Oil scene may be brighter than first expected

OPTIMISM is growing among oil economists that Americans will escape a disastrous shortage of heating oil this winter despite an embargo on petroleum imports from Arab oil producing areas.

They now have, in fact, begun to express concern over the outlook for gasoline this spring and summer. And here the industry faces a dilemma.

There still is much winter weather ahead which requires continued refinery emphasis on producing heating oils, middle distillates and residual at least through February and perhaps

into March. But just as soon as possible, refiners need to switch yield patterns to produce more motor fuels to replenish dwindling gasoline stocks and meet rising demand for transportation fuels.

The problem? If refiners switch too soon, heating-oil supplies could get squeezed by prolonged winter weather. If the switch is made too late, the nation will be in serious trouble on gasoline all summer.

The industry normally makes these delicate decisions by individual action of each refiner reacting quickly to trends in the market. But this year, the Federal Energy Office is calling many of the shots on refinery runs and yield patterns. The Government's ability accurately to gauge market trends and fine tune refinery operations quickly is untested and, of course, plagued by uncertainties on the volume of imports.

Role of prices. But the big news is the belief flatly expressed by several oil econs that "we are past the critical danger point on heating oils this winter."

This is a real turn-about from the atmosphere of gloom and doom that prevailed in mid-November and early December when predictions of fuel runouts, closed factories, massive unemployment, and a depression were

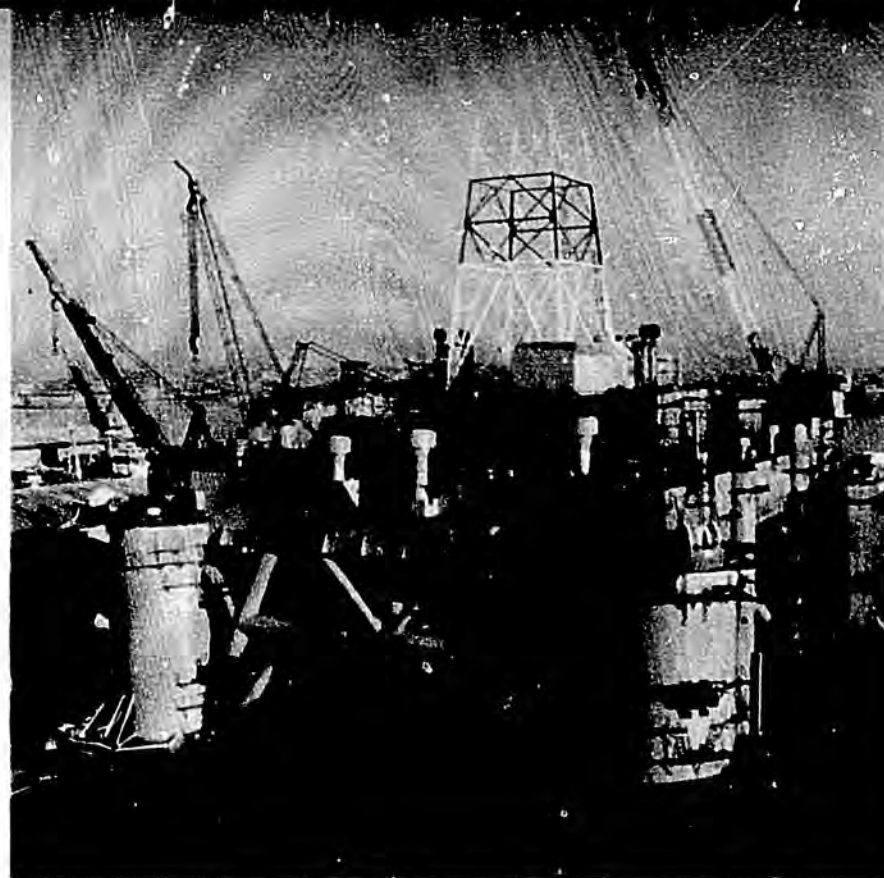
openly talked. Several things have happened since to brighten this picture. The import embargo hasn't proved as tight as expected, and imports of crude and products have remained higher than predicted. Refineries have managed to keep operations high. And consumers have slackened demand for gasoline and heating oils, thanks to conservation efforts and unusually warm weather early in the winter.

A few analysts attribute the improved supply-demand outlook to the fact that federal energy executives wisely have permitted the price mechanism to work.

"Imports are still coming in," one economist told The Oil and Gas Journal, "because we have allowed the price increases imposed by OPEC nations to flow through to the American consumer."

"The Arab countries and others who follow their price lead seem willing to let us have enough oil to get by if the price is right and we don't embarrass them. Caribbean refiners have been able to get the crude and process it into products knowing that we were willing to pay their price and let the costs flow through."

The Arab relaxation of planned production cutbacks and crude-price escalations led another analyst to observe that "the Arab embargo was related



FIRST semisubmersible drilling rig to be built on the U.S. East Coast is being completed at Bethlehem Steel's shipyard near Baltimore. The rig was built for Ocean Drilling & Exploration Co., New Orleans, and will drill in the Gulf of Mexico for Pennzoil Co.



A PIPE DREAM is what drillers would call this 267 miles of 24-in.-diameter pipe if it were casing which is so short it has hampered drilling recently. But it's line pipe destined for Ashland Oil's crude line from Owensboro to Catlettsburg, Ky.

more to economics than politics."

Some economists believe the prospects are good that total imports will continue strong probably in the 5-million-b/d range through the first half of 1974 and even increase appreciably if the Middle East political climate improves.

The result will be that price will be a restricting factor on demand and will encourage conservation and a switch to other fuels. "The experiences this winter," one economist observed, "proves the elasticity of energy demand, that price is an important supply-demand factor."

The shortfall. Economists agree on one point: their inability to make an accurate supply-demand forecast for

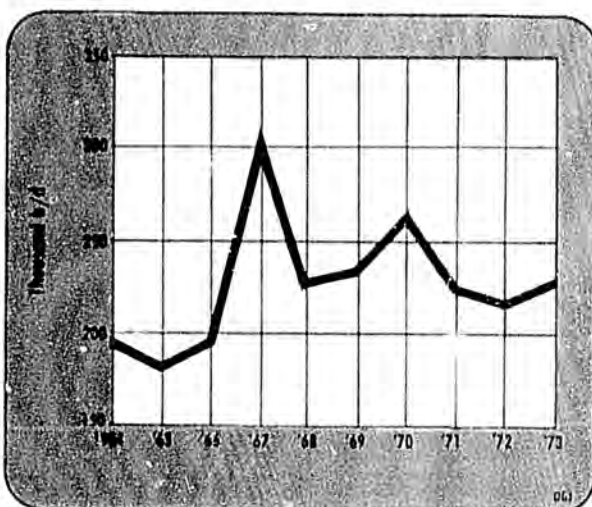
1974. The unknown variables just are too numerous.

Original estimates of the world crude shortage—7.5 million b/d in the first quarter of 1974—were changed when Libya joined Iraq in declining to enforce the embargo and when the Arab states eased their production restraints in late December. This prompted analysts to estimate the world shortage instead at 4 million b/d and to change the estimated U.S. shortfall from 3 million b/d to 1.5 million b/d. With heavier than normal stock withdrawals, the U.S. shortage thus could be cut to about 1 million b/d in the first quarter, a cut of about 5% in expected demand. On this basis, the shortage has manageable proportions.

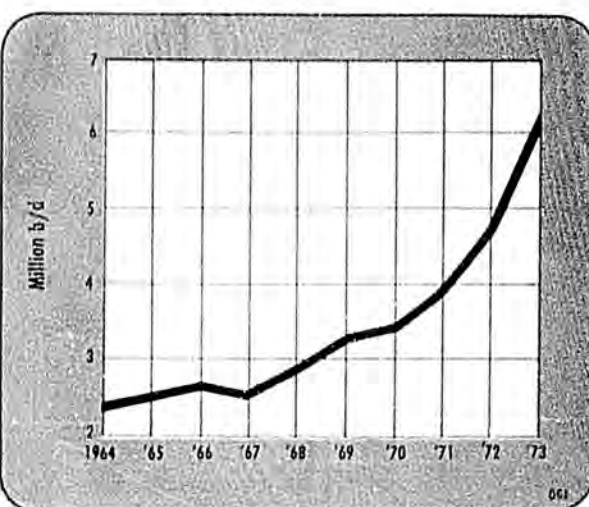
Because of better than expected imports and energy savings by consumers, gasoline rationing could be delayed until summer. There is a danger, however, that the improved prospects could prompt Americans to relax their attitude toward saving energy.

Oil supply will continue to be a serious problem. Even before the Arab oil embargo was imposed in mid-October, the U.S. petroleum supply-demand outlook was touch and go for this winter and next summer. As long as the embargo persists and for a considerable time after, one economist warned, U.S. consumption of petroleum will be limited by supply. The only short-term options are to increase

Exports turn up



Total imports increase



How embargo upsets supply-demand balance

	(1,000 b/d)			
	1973 Preliminary	1974 Predicted pre-embargo	1974 Demand limited by supply	Comments
Supply				
Domestic production				
Crude	9,203	9,032	9,200	Range is 9 MMb/d to 9.4 MMb/d. Some economists consider 1.7 MMb/d more realistic.
Gas liquids	1,735	1,725	1,775	
Total	10,938	10,757	10,975	
Imports				
Crude	3,212	3,937	2,500	Imports big question. Crude imports could dip to 2.3 MMb/d and products to 2.4 MMb/d.
Residual	1,849	2,167	1,600	
Other products	1,074	1,331	960	
Total	6,135	7,435	5,060	
Other supply	348	523	400	Processing gains.
Total supply	17,421	18,715	16,435	
Stock change	+ 114	- 28	???	Stock draw will augment supply.
Demand				
Gasoline	6,610	7,035	5,630	Assumes 13,475 Mb/d input at refineries; yields of 41% gasoline, 26.9% distillates, 9.6% resid, 7.4% av fuels, 15.1% others; plus imports. Does not include military draw on fuel some of which will be exported.
Aviation fuels	1,060	1,140	1,167	
Distillates	3,200	3,560	3,980	
Residual	2,750	3,150	2,894	
Other products	3,447	3,650	2,364	
Domestic demand	17,067	18,525	16,035	
Exports	240	218	200	
Total demand	17,307	18,743	16,235	

domestic energy supplies by all means and reduce consumption.

A look at '73. The Arab embargo came too late to change the record U.S. oil consumption in 1973.

Preliminary calculations indicate that supply slightly exceeded demand in 1973 and the industry was able to

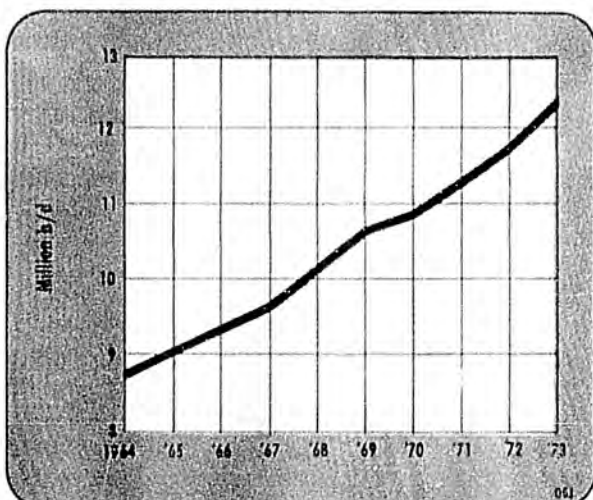
build inventories by a small margin. Estimates are 17,421,000 b/d for supply and 17,307,000 b/d for demand.

The supply came from total domestic production of 10,938,000 b/d, including 9,203,000 b/d of crude and condensate and 1,735,000 b/d of natural-gas liquids. Imports added another 6,135,000 b/d to

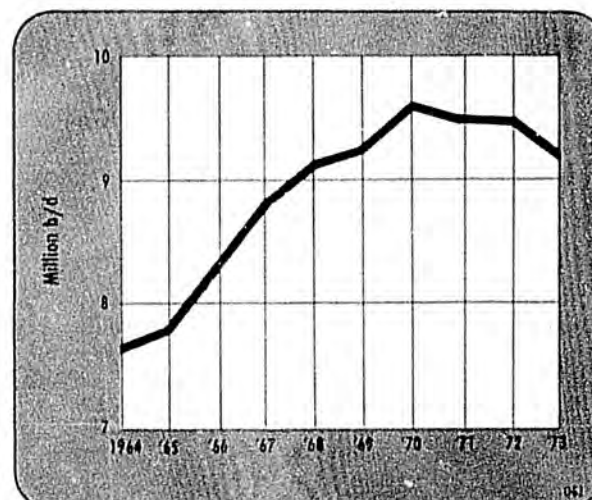
supply with crude shipments averaging 3,212,000 b/d and products 2,923,000 b/d.

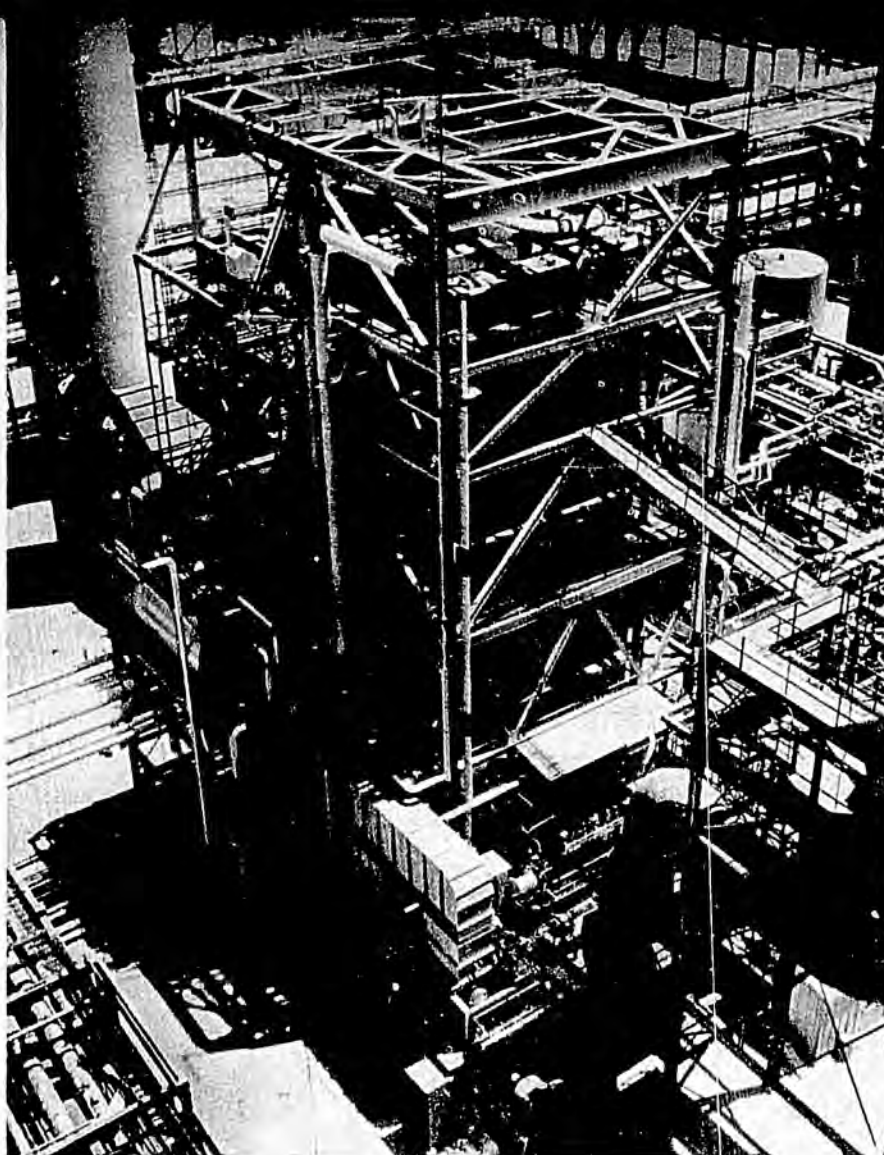
Demand for the major products saw gasoline consumption reach 6,610,000 b/d, distillates 3,200,000 b/d, residual 2,750,000 b/d, and aviation fuels 1,060,000 b/d. Domestic demand ran 17,067,-

Crude runs follow upward trend



Crude production declines





A POLLUTION FIGHTER in strange form but that's what this Badger Co. boiler is. The boiler eliminates carbon monoxide emissions and was installed by Getty Oil Co. as a part of its environmental program at the Delaware City, Del., refinery.

000 b/d and exports 240,000 b/d.

Early estimates for 1974 called for even greater increases in supply and demand. When company economists gathered for the IPAA's supply-demand committee's annual session in early October, the consensus was that 1974 demand would average 18,743,000 b/d after record 19,788,000 b/d demand in the first quarter and 19,900,000 b/d in the fourth quarter. The Arab embargo was imposed shortly afterwards, however, and these figures immediately became hopeless.

A look at '74. As for the 1974 supply-demand picture, there are as many different estimates as there are economists making them. The best formula is this: Supply this year is whatever you can get your hands on, and demand is whatever supply is. In other words, demand will be supply-limited.

One optimistic estimate, presented in the table on p. 109, calls for a supply total of 16,435,000 b/d at least

for the first half year which might be increased nearly to 17 million b/d by heavy withdrawal of crude and product inventories.

But there's nothing certain about any element in the outlook.

Take domestic production. Crude output was expected to decline to slightly above 9 million b/d this year from 9.2 million in 1973. But with currently higher crude prices—\$5.25/bbl for top "old" production and \$10/bbl for marginal and "new" production—operators are known to be planning programs and projects to step up production. But these efforts take time and may not become effective soon enough to offset the normal decline in the nation's aging fields. The range of estimates on domestic crude production thus range from a low of about 9 million b/d to as high as 9.4 million b/d on the optimistic side. Even the 9.2 million b/d used in the table could be too high.

There are several opinions on the

production level of natural-gas liquids. Early forecasts called for output of 1,725,000 b/d based on gas withdrawal remaining about steady with 1973. Some economists think the industry will be fortunate to keep NGL production at 1.7 million, but the more optimistic think an increase to 1,775,000 b/d is possible.

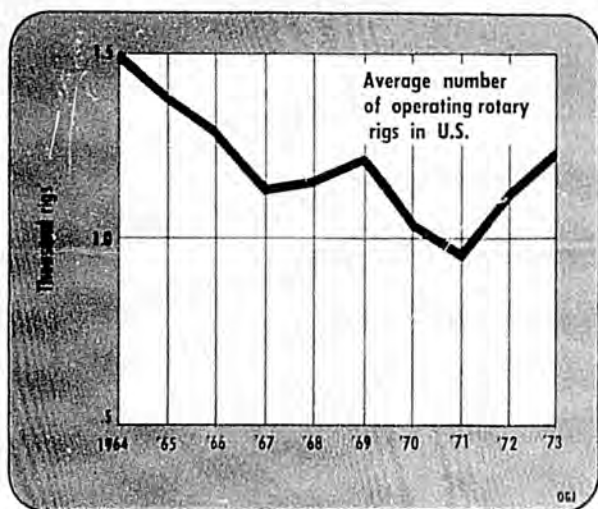
The big supply question for 1974, of course, is the level of imports. Best estimates are that imports under the present embargo will run from 1.5 million b/d to 1 million b/d less than last year or a total of 4-5 million b/d, about equally divided between crude and products. The more-optimistic 5-million-b/d level was used in the table.

Fitting refinery operations into this supply outlook will require some very interesting juggling of crude and product yields which for the first time is involving restrictions from the federal Government. Federal energy authorities at first estimated that refiners would be able to operate at only 85% of capacity and suggested a yield pattern of 39.2% gasoline, 27.9% middle distillates, 9.7% residual, 7.7% jet fuel, and 15.6% other products. This, of course, penalized gasoline production enormously in favor of other products, especially distillate and residual fuels.

Some economists question the advisability of cutting gasoline production that severely. They think that with luck crude supply will allow higher refinery operations and a yield of 42-44% on gasoline should be considered, particularly after the first quarter. Unless higher yields of gasoline are permitted, the necessity for rationing is believed inevitable; and may be so even with higher yields.

The table presented here assumes refinery input of 13,475,000 b/d—an optimistic assumption—will be available with permitted yields of 41% gasoline, 26.9% distillates, 9.6% resid, 7.4% aviation fuels, and 15.1% other products. With expected imports, this will allow gasoline production of 5,630,000 b/d, nearly 1 million b/d below 1973 demand and almost 1.5 million b/d below expected gasoline demand for 1974. Even higher yields still will leave a gap in gasoline supply which will require severe curtailment this summer. The gap can be narrowed by drawing on inventories, but stocks going into the motoring season are lower than normal and will provide only limited relief.

U.S. rig activity revives



A glance at the other product volumes which may be available show clearly how much of the shortage is being covered with gasoline. Aviation fuels available are estimated at 1,167,000 b/d. This normally would be sufficient, but this will be reduced sharply by military-fuel demands which may range from 300,000 to 600,000 b/d in the first part of the year. These will be mainly in jet fuels but will also affect the supply of others. Under the assumed yield pattern the volume of distillates and residual expected appear almost comfortable, but it's doubtful these yields will hold for the entire year under the pressure for more gasoline by mid-summer.

The calculations are not intended as a forecast of supply-demand for the year but are offered to illustrate the variety of assumptions that are necessary and the juggling of yields needed to produce the right volumes of fuels at the right time.

Hopefully, the Arab embargo will be eased considerably or lifted before the year is out and some of the pressure will be taken from U.S. petroleum supply. But higher prices alone will compel Americans to continue restricting consumption as much as possible and increase domestic production to the limit. Under present level of world prices, crude and products will lay into this country at about \$10/bbl. If import levels remain only at the 5-million-b/d mark, this will mean a cost of \$18.25 billion annually. Such a fuel bill will play havoc with this country's balance of trade. The old care-free days of high petroleum con-

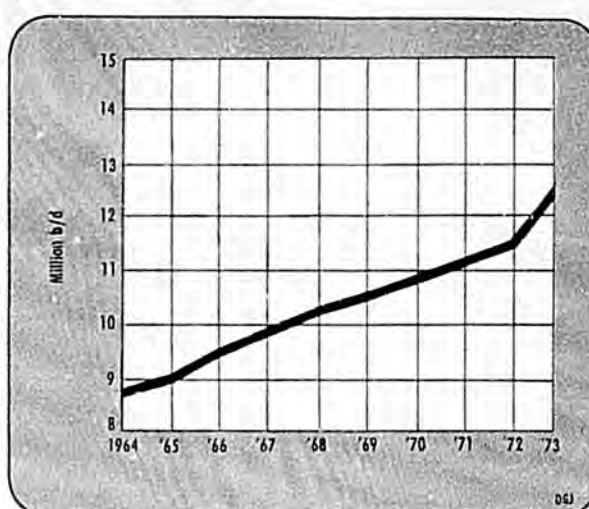
sumption at low cost clearly have come to an end.

A look back. From an operations standpoint, 1973 was not a vintage year for the U.S. petroleum industry. Although percentage gains in most instances were small, operating records still were established.

A quick rundown (for details see following tables) shows:

- Crude production dipped 2.9% to average 9,203,000 b/d compared with 1972's high mark of 9,477,000 b/d.
- Natural gas marketed increased 2% to average 62.9 billion cu ft/day for a record, and a record volume of 2.8 billion cfd was imported.
- Natural-gas liquids and liquefied refinery gases also set a production record of 2,081,000 b/d.
- Refiners averaged running 12,429,000 b/d of crude compared to 11,730,000 b/d in 1972 and operated their plants at 89.7% of capacity. Highest operating rates were reached by East Coast refiners at 95.7% and Mid-Continent refiners at 94.5%.
- Imports of crude averaged 3,212,000 b/d, also a record. Canada remained the major source of imported crude with shipments averaging 998,000 b/d, but Nigeria moved into second place with 461,000 b/d of imports while Saudi Arabia sent 445,000 b/d, Venezuela 318,000 b/d, Iran 191,000 b/d, and Libya 148,000 b/d.
- Imports of products averaged 2,923,000 b/d, up from 2,245,000 b/d in 1972. Residual represented by far the major imported product at 1,849,000 b/d with distillate imports reaching 377,000 b/d and kerosine jet fuel 163,000 b/d.

New U.S. crude supply



• Exports also increased slightly, causing a political flap in Congress where charges were heard that exports represented attempts by American oil companies to profiteer on world markets by shorting customers at home. Exports averaged 239,100 b/d for the year compared with 222,700 b/d in 1972 and with a record 307,100 b/d in 1967.

• Petroleum stocks at year-end topped 1 billion bbl, nearly 50-million-bbl higher than the year before but below the 1.04 billion mark of 1971.

• Drillers completed 27,863 wells including 8,008 wildcats during 1973 and made 139.6 million ft of hole. The outlook for 1974 is for 30,637 wells including 9,500 wildcats and 154.4 million ft of hole. Rotary-rigs active averaged 1,194 ranging from a low of 970 rigs at work to a high of 1,440. The rig activity was the best since 1969.

The drilling statistics were a disappointment since operators had expected to complete more than 31,000 wells in 1973. That goal ran into problems of weather early in the year and a shortage of casing and drill pipe in the later months.

But the higher level of crude and product prices are stirring the industry into expansion plans for 1974 and the years ahead. Operators are planning bigger drilling programs, enhanced recovery projects, and substantially larger capital outlays for plants and facilities.

This is the only answer to what happened in 1973 and the only way out if the nation is to escape zero growth and constant restraints on energy consumption. END

U.S. production of crude oil and lease condensate

	Percent change	(Thousands of barrels daily)											Total* 1859-1972
		1973†	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963	
District I:													
Fla., N.Y., Pa., W.Va.	+65.2	109	66	36	31	29	28	31	32	32	30	30	2,050,635
Total District I	+65.2	109	66	36	31	29	28	31	32	32	30	30	2,050,635
District II													
Illinois	-13.6	83	96	107	120	139	154	162	169	175	192	205	2,981,903
Indiana	-17.7	14	17	18	21	21	24	28	31	30	31	33	442,156
Kansas	-8.4	185	202	215	232	243	258	272	284	287	290	299	4,563,265
Kentucky	-7.7	24	26	29	32	35	38	43	49	53	54	50	614,873
Michigan	+8.3	39	36	33	32	33	35	37	39	40	43	44	625,053
Nebraska	-16.7	20	24	28	31	33	36	37	38	47	52	60	343,155
North Dakota	-5.4	53	56	59	60	62	68	69	74	72	70	69	416,302
Ohio	+4.5	23	22	23	27	30	30	27	30	35	43	17	792,172
Oklahoma	-7.1	527	567	584	613	616	611	632	615	557	555	553	11,000,841
Other		2	2	2	1	2	3	1	1	1			8,618
Total District II	-7.5	970	1,048	1,098	1,169	1,214	1,257	1,308	1,330	1,297	1,330	1,330	21,788,338
District III:													
Alabama	+22.2	33	27	21	20	21	21	20	22	22	23	25	139,808
Arkansas	-1.7	50	51	50	49	49	53	58	65	71	73	75	1,379,948
Louisiana	-8.3	2,251	2,455	2,562	2,485	2,314	2,233	2,122	1,848	1,630	1,502	1,411	14,836,941
Gulf Coast	-8.3	2,140	2,334	2,438	2,355	2,181	2,094	1,971	1,699	1,478	1,356	1,273	+
Rest of state	-8.3	111	121	124	130	133	139	151	149	152	146	138	+
Mississippi	-7.2	155	167	176	178	176	160	157	151	154	155	161	1,458,007
New Mexico	-9.3	274	302	324	351	354	351	346	340	327	311	301	3,073,214
Texas		3,569	3,565	3,351	3,424	3,156	3,097	3,067	2,898	2,742	2,704	2,679	38,153,093
Gulf Coast	-1.8	703	716	654	694	631	609	591	539	515	524	516	+
West Texas	+1.6	1,797	1,769	1,646	1,634	1,497	1,453	1,427	1,352	1,262	1,212	1,195	+
East Texas field	+2.8	217	211	186	199	159	145	142	124	111	119	120	+
Rest of state	-1.6	852	869	865	897	869	890	907	883	854	849	848	+
Total District III	-3.6	6,332	6,567	6,484	6,507	6,070	5,915	5,770	5,324	4,946	4,768	4,652	59,041,011
District IV:													
Colorado	+10.0	99	90	75	68	78	87	93	92	92	95	105	1,030,731
Montana	+1.1	94	93	95	104	120	132	66	97	90	84	84	829,856
Utah	+21.1	86	71	65	64	64	64	66	66	69	78	92	462,529
Wyoming	+1.0	390	386	405	439	424	394	373	368	379	379	396	3,794,577
Total District IV	+4.5	669	640	640	675	686	677	628	623	630	636	677	6,117,693
District V:													
Alaska	-1.5	199	202	218	229	202	181	80	39	31	30	29	553,562
Arizona	-33.3	2	3	3	5	7	9	8					15,192
California	-3.1	922	951	982	1,020	1,028	1,026	984	946	867	820	824	16,447,891
Coastal region	+1.4	215	212	237	222	180	176	191	190	182	178	184	+
Los Angeles region	-7.0	362	389	392	430	465	453	380	340	296	279	279	+
San Joaquin Valley	-1.4	345	350	353	368	383	397	413	416	389	363	361	+
Nevada						1	1	1	1	1			2,949
Total District V	-2.9	1,123	1,156	1,203	1,254	1,238	1,217	1,073	986	899	850	853	17,019,594
U.S. Total	-2.9	9,203	9,477	9,461	9,636	9,237	9,094	8,810	8,295	7,804	7,614	7,542	106,017,271

*Thousand of barrels. †Preliminary. ‡Not available.

Supply and demand of crude in the U.S.

	1973*	1972	1971	1970	1969	(Thousands of barrels daily)							
						1968	1967	1966	1965	1964	1963	1962	1961
SUPPLY:													
Crude imports	3,212	2,222	1,681	1,324	1,409	1,290	1,128	1,225	1,238	1,199	1,131	1,126	1,045
Crude production	9,203	9,477	9,463	9,637	9,238	9,095	8,810	8,295	7,804	7,614	7,542	7,332	7,183
Total new supply	12,415	11,699	11,144	10,961	10,647	10,385	9,938	9,520	9,042	8,813	8,673	8,458	8,228
DEMAND:													
Crude refinery runs	12,429	11,731	11,199	10,870	10,629	10,312	9,815	9,444	9,043	8,807	8,687	8,410	8,183
Crude transfers	20	12	17	14	14	14	12	12	13	12	11	14	13
Crude exports	1	1	1	14	4	5	73	4	3	4	5	5	9
Crude loss	13	13	12	11	11	11	9	10	10	10	10	9	9
Total crude demand	12,463	11,757	11,229	10,909	10,658	10,342	9,909	9,470	9,069	8,833	8,713	8,438	8,214
Stock change	-48	-58	-46	+31	-11	+43	+29	+50	-27	-20	-40	+20	+14

*Preliminary.

Rotary-rig activity by states

	Peak No.	Low No.	Average rig activity									
			1973	1972	1971	1970	1969	1968	1967	1966	1965	1964
Alabama	18	7	13	15	8	7	6	3	2	2	1	2
Alaska	10	0	5	5	5	14	28	20	21	13	6	5
Inland	8	0	4	4	5	12	18	3	5	5	3	3
Offshore	3	0	1	1	0	2	10	17	16	8	3	2
Arkansas	23	8	15	15	15	13	16	7	8	10	11	9
Arizona	5	0	2	1	1	0	2	1	3	1	1	2
California	68	34	51	46	46	52	78	87	83	79	89	93
Inland	65	33	49	45	40	42	61	65	67	70	83	87
Offshore	4	0	2	1	6	10	17	22	16	9	6	6
Colorado	58	23	42	35	30	25	23	17	16	16	19	21
Florida	15	5	9	19	11	4	1	1	2	2	4	1
Georgia	2	0	1	0	0	0	0	0	0	0	0	0
Idaho	2	0	1	0	0	0	0	0	0	0	0	0
Illinois	11	1	6	14	13	14	17	22	30	30	24	20
Indiana	2	0	0	1	1	1	1	2	3	5	5	6
Iowa	1	0	1	0	1	0	0	0	0	1	0	0
Kansas	45	8	28	24	29	30	38	35	41	55	70	87
Kentucky	3	0	1	2	2	1	2	5	9	13	12	8
Louisiana	253	161	205	214	194	204	230	233	235	256	270	282
North	31	15	23	19	16	12	19	19	20	23	30	27
Inland waters	66	43	55	54	50	57	57	64	66	72	72	83
South	76	37	56	59	54	56	69	59	58	63	73	81
Offshore	97	56	71	82	74	79	85	91	91	98	95	91
Maryland	1	0	0	1	0	0	1	1	0	4	2	2
Michigan	26	10	20	17	12	11	10	10	10	9	11	13
Mississippi	44	23	29	37	39	43	40	36	33	34	35	39
Missouri	1	0	1	0	0	0	0	0	0	1	0	0
Montana	28	9	19	20	17	17	31	34	22	24	26	21
Nebraska	10	1	5	6	5	6	10	5	5	8	10	11
Nevada	2	0	0	0	1	0	0	2	1	1	2	1
New Mexico	86	40	62	55	47	40	64	68	56	60	65	79
New York	6	0	1	0	1	0	0	1	1	1	1	1
North Carolina	0	0	0	0	0	0	0	0	0	0	0	0
North Dakota	17	5	10	7	9	9	12	13	11	12	12	14
Ohio	48	21	36	22	17	24	22	22	18	14	22	56
Oklahoma	150	80	115	90	90	98	120	106	101	141	163	158
Oregon	1	0	0	0	0	0	0	0	0	1	1	0
Pennsylvania	19	6	11	8	9	9	7	5	7	10	9	11
South Dakota	3	0	1	1	1	2	1	1	0	0	2	1
Tennessee	2	0	0	0	1	2	1	0	1	1	0	0
Texas	454	328	376	322	291	302	322	329	340	387	425	477
Gulf Coast	143	82	109	91	79	73	77	88	90	103	112	135
Offshore	18	6	9	6	5	6	10	6	7	8	5	2
North	29	14	22	16	15	17	25	25	28	31	34	42
Panhandle	29	15	23	22	16	19	19	20	21	23	25	31
East	37	15	30	26	23	25	37	34	36	38	40	43
West Central	104	73	82	71	76	77	74	67	67	82	102	121
West	115	32	101	90	77	85	80	89	91	102	107	103
Utah	49	19	38	34	17	12	12	12	15	14	14	17
Virginia	3	0	1	0	1	1	0	0	0	0	1	1
Washington	0	0	0	0	0	0	0	0	1	1	0	0
West Virginia	32	5	20	16	17	16	18	16	15	19	24	16
Wyoming	105	31	70	60	45	71	81	56	44	48	50	48
Total U.S.	1,440	971	1,194	1,087	976	1,028	1,194	1,150	1,134	1,273	1,387	1,502
Canada West	272	70	175	148	120	131	149	150	144	156	163	149
Canada East	9	0	4	4	4	3	2	1	1	1	2	1
Grand Total	1,627	1,043	1,373	1,239	1,100	1,162	1,345	1,301	1,279	1,430	1,552	1,652

Source: Hughes Tool Co. Note: Peak and low figures may not add to totals.

Drillers in 1973 failed

Well forecast for 1974

State	1973 estimate			1974 forecast				Change from 1973	
	Total wells 1973*	Total wildcats 1973*	Total footage 1973 (1,000 ft)	Total wells 1974	Wildcat wells 1974	Field wells 1974	Total footage (1,000 ft)	Total wells	
Alabama	108	80	1,196	114	71	43	1,263	+	6
Alaska	32	11	300	38	15	23	361	+	6
Arizona	9	4	23	10	10	0	26	+	1
Arkansas	289	84	1,703	329	169	160	1,939	+	40
California	1,252	189	4,071	1,641	219	1,422	5,342	+	389
Onshore	1,192	188	3,850	1,561	214	1,347	5,051	+	369
Offshore	60	1	221	80	5	75	291	+	20
Colorado	870	464	5,008	1,097	622	475	6,314	+	227
Florida	72	34	980	71	34	37	967	-	1
Georgia	2	2	12	3	3	0	18	+	1
Idaho	4	4	29	1	1	0	7	-	3
Illinois	524	177	1,212	621	197	424	1,436	+	97
Indiana	249	114	350	275	189	86	387	+	26
Kansas	2,341	794	7,765	2,581	897	1,684	8,561	+	240
Kentucky	686	155	1,070	702	171	531	1,095	+	16
Louisiana	2,658	753	21,868	2,914	862	2,052	23,462	+	256
North	817	131	3,060	971	142	829	3,636	+	154
South	1,184	384	12,426	1,219	471	748	12,793	+	35
Offshore	657	238	6,382	724	249	475	7,033	+	67
Michigan	275	194	1,428	444	384	60	2,306	+	169
Mississippi	386	227	3,771	481	284	197	4,699	+	95
Missouri	9	9	18	3	3	0	6	-	6
Montana	635	419	1,892	789	575	214	2,351	+	154
Nebraska	174	102	884	164	89	75	854	-	10
New Mexico	1,252	246	6,379	1,336	286	1,050	6,781	+	84
East	750	167	4,507	789	211	578	4,741	+	39
West	502	79	1,872	547	75	472	2,040	+	45
New York	104	10	135	121	14	107	158	+	17
North Carolina	0	0	0	1	1	0	0	+	1
North Dakota	124	67	854	126	67	59	868	+	2
Ohio	1,524	44	6,340	1,500	32	1,468	6,244	-	24
Oklahoma	2,588	394	13,590	2,644	381	2,263	13,884	+	56
Oregon	3	3	5	0	0	0	0	-	3
Pennsylvania	1,053	77	2,399	1,079	78	1,001	2,458	+	26
South Dakota	22	21	95	34	30	4	146	+	12
Tennessee	101	57	152	161	67	94	241	+	60
Texas	8,751	2,775	46,776	9,284	3,050	6,234	51,147	+	533
District 1	544	238	1,894	575	240	335	2,001	+	31
District 2	534	349	3,231	561	400	161	3,395	+	27
District 3	877	487	5,865	841	520	321	5,625	-	36
District 4	741	451	4,631	728	419	309	4,709	-	13
District 5	96	54	678	97	53	44	685	+	1
District 6	325	84	2,034	361	120	241	2,549	+	36
District 7-B	901	295	2,643	1,102	389	713	3,232	+	201
District 7-C	864	195	4,821	844	184	660	4,710	-	20
District 8	1,387	133	9,100	1,460	162	1,298	9,579	+	73
District 8-A	1,050	106	5,316	1,119	119	1,000	7,270	+	69
District 9	916	238	2,697	1,048	264	784	3,085	+	132
District 10	449	83	3,129	427	75	352	2,976	-	22
Offshore	67	62	737	121	105	16	1,331	+	54
Utah	184	64	1,654	225	89	136	2,023	+	41
Virginia	0	0	0	2	2	0	14	+	2
Washington	0	0	0	0	0	0	0		
West Virginia	722	72	2,248	787	109	678	2,451	+	65
Wyoming	860	362	5,373	1,059	499	560	6,617	+	199
Total U.S.	27,863	8,008	139,580	30,637	9,500	21,137	154,426	+	2,774
Canada*	4,771	1,360	16,470	5,068	1,582	3,486	17,582	+	297
West	4,474	1,330	15,770	4,735	1,560	3,175	16,900	+	261
Alberta	3,544	1,048	12,460	3,627	1,091	2,536	12,749	+	83
B.C.	161	73	839	246	127	119	1,281	+	85
Manitoba	16	16	47	27	27	0	79	+	11
North Arctic	78	71	602	107	101	6	826	+	29
Saskatchewan	675	122	1,822	728	214	514	1,965	+	53
East offshore	30	30	307	22	22	0	225	-	8
Ontario	267		393	311		311	457	+	44

*Estimated.

to sink as many wells as they did in '72

How the top 20 companies line up

State	1974 Fore- cast	Total wells				wildcats	Fore- cast 1974
		1973	1972	1971	1970	1973	
Alabama	19	21	36	23	15	7	8
Alaska	24	21	15	31	62	6	10
Arizona	0	0	10	2	0	0	0
Arkansas	23	15	20	30	20	1	3
California	1,194	567	839	1,431	1,561	44	58
Onshore	1,179	562	827	1,388	1,483	43	53
Offshore	15	5	12	43	78	1	5
Colorado	109	54	228	225	98	10	24
Florida	21	36	64	32	32	7	11
Georgia	3	2	0	0	0	2	3
Idaho	1	4	0	0	0	4	1
Illinois	166	88	59	84	80	1	0
Indiana	0	1	1	1	0	1	0
Kansas	57	60	322	50	37	5	8
Kentucky	6	3	20	3	24	1	2
Louisiana	1,051	862	1,156	1,044	1,192	173	212
North	138	66	82	166	140	5	17
South	453	471	491	507	592	35	66
Offshore	460	305	583	371	460	133	129
Michigan	191	117	135	51	44	28	33
Mississippi	58	39	75	128	145	14	26
Missouri	3	8	0	0	0	8	0
Montana	44	34	50	40	26	21	18
Nebraska	1	3	6	7	9	1	0
Nevada	0	0	1	2	1	0	0
New Mexico	250	154	223	171	188	22	22
East	205	139	164	132	145	19	21
West	45	15	59	39	43	3	1
New York	2	4	9	2	0	4	2
North Carolina	1	0	0	2	0	0	1
North Dakota	14	11	13	19	19	9	4
Ohio	9	5	8	5	54	0	1
Oklahoma	292	223	291	326	328	25	24
Oregon	0	1	0	0	0	1	0
Pennsylvania	263	41	14	11	0	5	7
South Dakota	6	1	1	0	0	0	3
Tennessee	1	0	0	0	0	0	1
Texas	1,818	1,547	2,138	1,686	2,166	166	256
District 1	230	104	113	24	98	10	7
District 2	49	66	54	52	46	5	7
District 3	253	175	262	263	235	12	29
District 4	234	250	264	295	329	22	13
District 5	18	6	6	9	14	6	5
District 6	56	33	43	51	55	4	8
District 7-B	11	32	22	23	33	1	1
District 7-C	78	93	52	52	50	8	13
District 8	409	389	635	526	674	21	39
District 8-A	234	230	361	294	513	8	9
District 9	41	35	238	32	43	1	0
District 10	84	110	54	40	57	48	10
Offshore	121	24	34	25	19	20	105
Utah	111	100	101	41	17	10	12
Virginia	2	0	0	0	0	0	2
Washington	0	0	3	0	12	0	0
West Virginia	142	22	35	28	18	0	23
Wyoming	182	112	330	223	322	16	43
Total U.S.	6,064	4,156	6,203	5,696	6,470	592	818

THE drilling end of the U.S. oil industry failed to drill as many wells in 1973 as it had previously planned.

U.S. operators completed an estimated 27,863 wells last year compared to the nearly 31,000 planned earlier in the year. Many factors figured into this decline in drilling, mostly weather, lack of steel, dwindling crews, and economic conditions.

Last year's total of 27,863 wells included 8,008 wildcats. Total footage drilled was 139,580,000 ft. The complete listing of 1973 well completions in all categories will be published by the API and printed in The Journal later in the quarter.

Things look much brighter for the 1974 drilling outlook. The industry looks for 30,637 wells to be drilled this year. Of this total 9,500 will be wildcats, an 18.6% increase over 1973. Total drilling will increase 9.9% over the 1973 tally. Footage to be drilled this year is 154,426,000 ft, a healthy gain over the previous year. The 1974 total includes 21,137 field wells.

A comprehensive Journal survey of operators throughout the oil kingdom covered more than 10,000 wells for 1973. The top 20 companies in the nation plan to drill 6,064 wells this year, up considerably over the 4,156 drilled in 1973. The accompanying table notes the data for past years. Big operators will drill 818 wildcats in 1974, also up considerably over the 1973 figure. Nearly every state shows an increase in total drilling.

The better drilling picture in the U.S. for 1974 is bolstered by the high number of rotary rigs working in various areas. Large increases are noted in California, up 389 wells, the best climb in recent years. Offshore operators plan 80 wells off the California Coast this year compared to 60 in 1973. Another large drilling increase will be posted in Colorado, up 227 wells over 1973. Denver basin drilling is still very active and will increase this year. Kansas drilling totals will rise 240 wells this year, a rarity in recent years. Louisiana will see a good year with 256 more wells than in 1973. Much of this increase will be in North Louisiana rather than in the southern parishes and offshore.

Michigan's Silurian reef play plus new Ordovician interest will up the state's total by 169 wells. Montana's shallow gas play will help along a busy year with 154 more wells on

the books. Texas will post a good drilling year, one of the best in recent countings. The state will drill 533 more wells than in 1973 with largest increase noted for North Central Texas, and in western counties. Finally, Wyoming will drill 199 more wells this year than last as a gas and oil play sweeps through the Powder River and Green River basins.

Canada will drill 297 more wells this year than last. Total wells should be about 4,735, compared to an estimated 4,474 wells in 1973. All provinces will have gains as will the northern and Arctic regions. Only decline will be off the East Coast in Atlantic Ocean exploration.

Total wildcats to be drilled in Canada this year will be 1,582 compared to 1,360 in 1973.

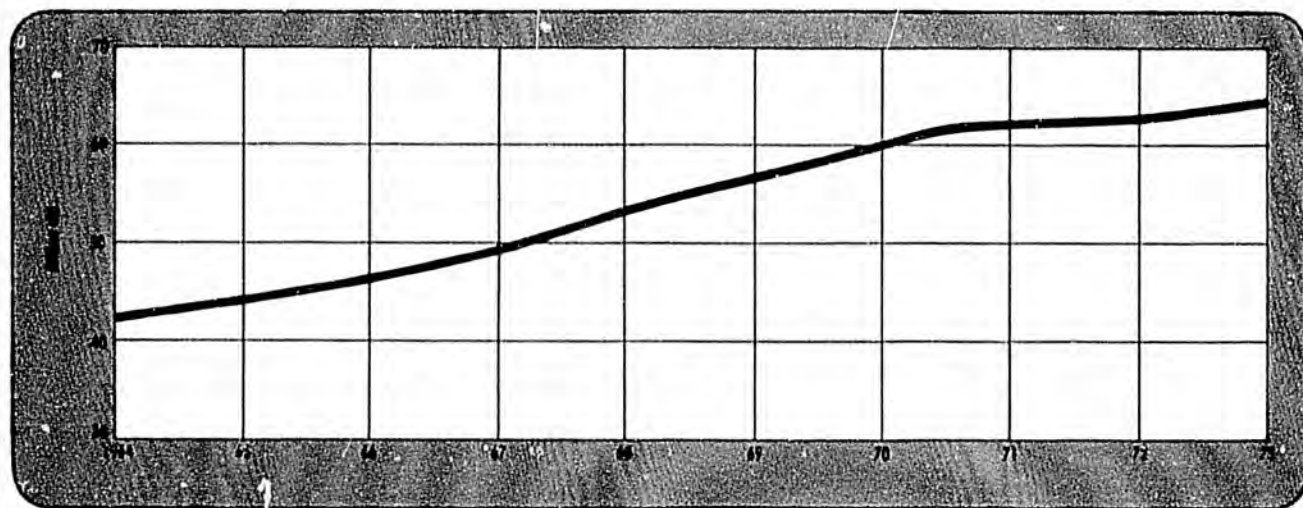
Marketed production of natural gas

(Million cubic feet per day)

	1973*	Actual 1972	1971	1970	1969	1968	1967	1966	1965	1964
Alaska	397	344	333	306	139	47	40	29	20	17
Arkansas	459	456	473	497	464	428	319	296	227	208
California	1,428	1,335	1,678	1,778	1,857	1,953	1,866	1,965	1,809	1,814
Colorado	363	320	297	290	325	332	320	326	346	312
Kansas	2,479	2,436	2,425	2,466	2,420	2,283	2,389	2,322	2,174	2,099
Louisiana	23,083	21,843	22,142	21,338	19,802	17,530	15,664	13,967	12,238	11,408
Michigan	105	94	70	106	99	111	92	105	95	86
Mississippi	276	285	325	345	360	369	382	381	457	496
Montana	155	92	90	117	113	53	71	99	77	68
Nebraska	13	10	10	16	19	22	23	27	29	30
New Mexico	3,340	3,332	3,199	3,121	3,118	3,181	2,925	2,770	2,568	2,401
Oklahoma	4,927	4,950	4,614	4,370	4,175	3,800	3,871	3,318	3,619	3,616
Texas	23,555	23,720	23,427	22,898	21,516	20,479	19,697	19,165	18,181	17,829
Utah	115	108	116	117	128	126	134	144	196	219
W. Virginia	585	589	641	664	635	647	579	585	568	557
Others	1,702	1,817	1,785	1,628	1,538	1,431	1,412	1,396	1,340	1,317
TOTAL	62,983	61,731	61,625	60,057	56,708	52,792	49,784	46,895	43,944	42,477
Volume Gain	1,252	106	1,568	3,349	3,916	3,008	2,889	2,951	1,467	2,061
Percent Gain	2.0	0.2	2.6	5.9	7.4	6.0	6.2	6.7	3.5	5.1
Imports	2,853	2,793	2,562	2,249	1,986	1,781	1,545	1,285	1,252	1,211
Exports	274	214	219	191	140	256	225	155	65	54

*Preliminary.

Marketed gas output stays level

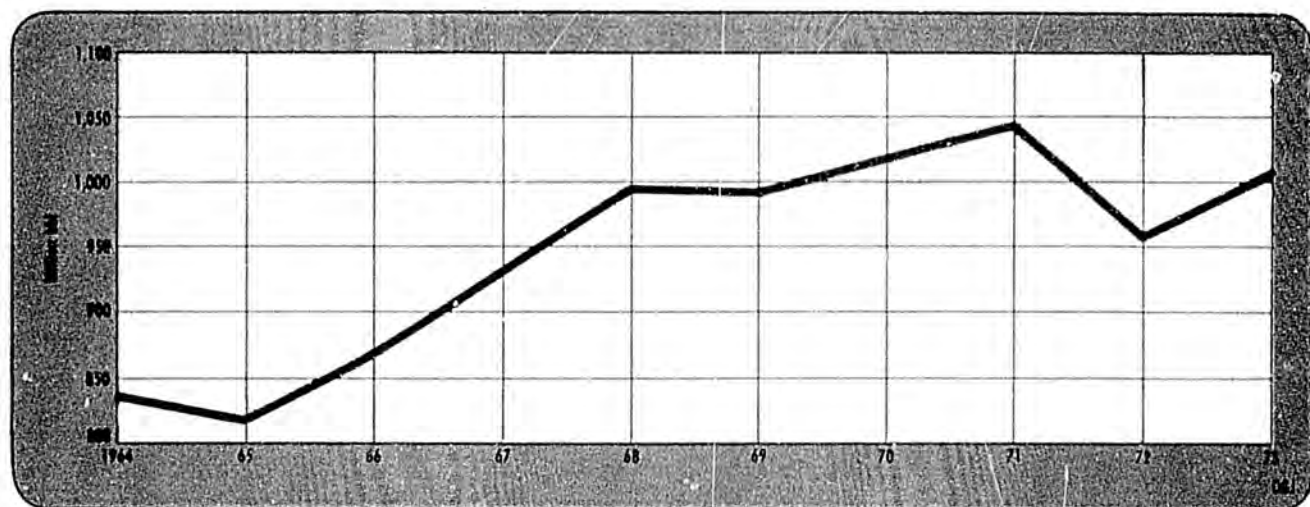


Refinery runs by districts

	(Thousands of barrels daily)												
	% of capacity	1973†	% of total 1972	1972	1971	1970	1969	1968	1967	1966	1965	1964	1963
East Coast	95.7	1,337	9.9	1,161	1,181	1,147	1,252	1,176	1,145	1,143	1,089	1,106	1,143
Appalachian: Dist 1	92.6	175	1.4	161	150	143	57	127	122	116	111	106	103
Total Dist 1	95.3	1,512	11.3	1,322	1,331	1,250	1,309	1,303	1,267	1,259	1,200	1,212	1,246
Appalachian: List 2	91.7	55	.5	54	55	60	63	59	60	78	101	101	93
Ill., Ind., Ky.	89.7	2,261	18.2	2,134	2,054	1,995	1,868	1,830	1,778	1,731	1,632	1,579	1,561
Minn., Wis., Dak.	89.0	242	1.9	228	217	200	198	185	164	162	153	147	134
Okla., Kan., Mo.	94.5	923	7.7	904	904	899	884	885	847	818	759	744	746
Total Dist. 2	90.9	3,481	28.3	3,320	3,230	3,154	3,013	2,959	2,849	2,789	2,645	2,571	2,540
Texas:													
Inland	93.2	425	3.5	416	401	395	388	371	350	340	321	316	310
Gulf Coast	86.6	2,782	22.5	2,635	2,523	2,450	2,407	2,359	2,283	2,185	2,116	2,088	2,092
Louisiana Gulf	90.7	1,656	13.7	1,604	1,377	1,317	1,285	1,214	1,101	979	911	853	776
N. La.-Ark.	76.9	133	1.1	132	148	154	145	142	135	128	126	123	120
New Mexico	73.0	46	.4	45	42	41	39	37	34	34	32	30	27
Total Dist. 3	88.0	5,042	41.2	4,832	4,491	4,357	4,264	4,123	3,903	3,666	3,506	3,410	3,325
Total Dist. 4	85.6	410	3.4	398	405	393	385	366	344	338	330	319	307
Total Dist. 5	88.8	1,984	15.8	1,858	1,742	1,676	1,658	1,567	1,452	1,392	1,362	1,295	1,269
Total U.S.	89.7	12,429	100.0	11,730	11,199	10,870	10,629	10,318	9,815	9,444	9,043	8,807	8,687

†Preliminary.

Total stocks head upward



Refined product, natural-gas-liquid, and crude stocks

Refined product stocks	1973*	1972	1971	1970	(Thousands of barrels)					
					1969	1968	1967	1966	1965	1964
Gasoline	210,500	217,149	223,771	214,348	217,392	211,526	207,715	194,177	183,058	193,622
Motor	207,000	212,894	219,352	209,255	211,199	204,496	199,790	186,393	174,717	185,755
Aviation	3,500	4,255	4,419	5,093	6,193	7,030	7,925	7,784	8,341	7,867
Special naphtha	4,700	5,232	5,384	6,193	6,292	5,829	5,742	5,583	6,209	5,879
Kerosine	23,000	19,111	24,438	27,848	26,780	23,480	25,008	24,004	24,080	27,325
Distillate	202,500	154,319	190,622	195,271	171,714	173,158	159,674	154,096	155,407	155,846
Residual	53,000	55,216	59,681	53,994	58,395	65,359	65,597	61,196	56,214	40,403
Kerosine jet fuel	22,000	19,346	20,747	20,989	19,517	15,373	13,174	12,139	10,361	8,840
Naphtha jet fuel	5,400	6,147	6,990	6,621	8,556	8,904	9,023	7,235	8,388	9,904
LRG	8,500	7,781	7,361	5,645	5,050	4,373	44,925	44,336	43,665	43,692
Unfinished oils	96,800	94,761	100,574	98,989	97,819	93,399	90,201	89,535	88,609	87,014
Other refined prod.	53,500	49,279	51,203	43,152	43,125	46,725	48,340	43,350	44,197	40,973
Total product stocks	679,900	628,341	690,771	673,059	654,640	648,126	629,339	595,651	580,188	573,498
Nat.-gas-liquids stk.	83,000	79,238	93,528	68,435	60,256	77,253	62,969	40,423	35,867	35,679
Crude stocks	243,000	246,395	259,648	276,367	265,227	272,193	248,970	238,391	220,289	230,057
Total stocks	1,005,900	953,974	1,043,947	1,017,861	980,123	997,572	941,338	874,465	836,344	839,234

*Preliminary. †Includes LRG for chemical use previously reported in petrochemical feedstocks.

Crude imports by origin

	1973*	1972	1971	(Thousands of barrels daily)			1967	1966	1965	1964
				1970	1969	1968				
Bolivia	1		2	2	15.3	18.8	19.2	3.4		
Chile			1		4.7					
Colombia	2	5	9	20	42.6	32.7	32.5	39.5	41.7	26.2
Ecuador	43									
Mexico	1				1.0				6.9	9.8
Trinidad	63	24				5.4	3.5			
Venezuela	318	256	303	268	306.1	343.5	359.1	403.9	432.5	476.0
Latin America Total	428	285	315	290	369.7	400.4	414.3	446.8	481.1	512.0
Algeria	140	87	13	6	1.0	5.3	4.0	3.8	8.9	6.1
Angola	40	16	4							
Egypt	13	8	19	21	40.5	29.5	3.6	2.3	2.4	3.0
Libya	148	110	53	47	133.9	113.6	41.9	69.0	41.6	39.4
Nigeria	461	244	95	40	49.2	8.6	3.9	11.3	14.5	
Tunisia	14	7								
Africa total	816	472	184	122	224.6	157.0	53.4	86.4	67.4	48.5
Kuwait	44	36	29	33	34.4	43.3	18.8	26.1	55.4	63.6
Saudi Arabia	445	174	115	17	34.7	51.8	81.3	125.4	132.2	96.9
Neutral Zone				23	43.5	29.4	11.0	19.3	26.7	48.0
Iran	191	136	106	33	41.9	57.8	55.2	84.5	78.5	65.9
Iraq	5	4	11				4.7	25.9	15.6	
Qatar	8	3			0.5			0.5	11.9	19.9
Abu Dhabi			80	63	13.8	15.3	5.3	13.1	13.8	3.0
United Arab Emirates†	76	74								
Middle East Total	769	427	341	169	168.8	197.6	186.3	294.8	334.1	297.3
Canada	998	856	721	672	557.0	462.9	412.1	347.1	295.2	277.6
Far East	201	167	117	70	88.4	72.6	61.7	49.9	60.7	63.0
Total crude	3,212	2,207	1,678	1,323	1,408.5	1,290.5	1,127.8	1,225.0	1,238.5	1,198.4

*Preliminary. †Abu Dhabi prior to 1972.

Imports of refined products

	1973*	1972	1971	(Thousands of barrels daily)			1967	1966	1965	1964
				1970	1969	1968				
Gasoline	114	68	59	67	62.2	59.0	42.7	48.1	37.1	40.0
Kerosine	2	1	1	4	2.6	0.5	0.1	0.6	0.3	
Jet-fuel kerosine	163	162	150	125	110.7	85.8	73.8	51.4	36.9	30.4
Jet-fuel naphtha	24	33	30	19	14.1	19.4	14.9	34.4	45.2	33.1
Distillate	377	182	153	147	139.4	131.5	50.7	37.9	35.7	32.2
Residual	1,849	1,746	1,583	1,528	1,264.7	1,120.0	1,084.3	1,032.3	944.1	808.1
Unfinished oils	136	125	124	108	106.2	80.2	96.2	96.5	92.3	89.0
Other	1258	1215	1145	97	57.5	52.9	45.9	46.9	37.7	27.5
Total U.S.	2,923	2,532	2,245	2,095	1,757.4	1,549.3	1,408.6	1,348.1	1,229.3	1,060.3

*Preliminary. †Includes plant condensate 1973, 103; 1972, 86; 1971, 36.

Exports of refined products—and crude

	1973*	1972	1971	(Thousands of barrels daily)			1967	1966	1965	1964
				1970	1969	1968				
Gasoline	2.9	2.6	4.5	3.8	6.7	5.7	18.8	15.9	17.6	22.0
Distillate	8.9	3.3	7.6	2.5	3.1	4.2	11.7	12.0	10.0	14.7
Residual	31.4	33.0	36.2	54.2	46.3	54.7	60.1	35.3	40.8	51.6
Lubricants	38.4	41.1	43.4	44.1	44.9	49.2	51.2	46.9	45.7	49.7
Coke	96.3	85.1	74.0	83.7	63.1	53.3	44.6	39.6	32.4	37.2
Asphalt	.9	0.9	0.8	1.0	1.3	1.2	1.3	1.3	1.1	2.1
LP-gas	30.6	31.4	25.7	27.3	35.1	29.0	25.4	22.4	20.6	14.6
Other refined products	28.3	24.8	30.6	28.6	28.2	28.8	21.3	21.0	14.7	6.2
Crude	1.4	0.5	1.4	13.6	3.9	4.9	72.7	4.0	3.0	3.7
Total U.S.	239.1	222.7	224.2	258.8	232.6	231.0	307.1	198.4	185.9	201.8

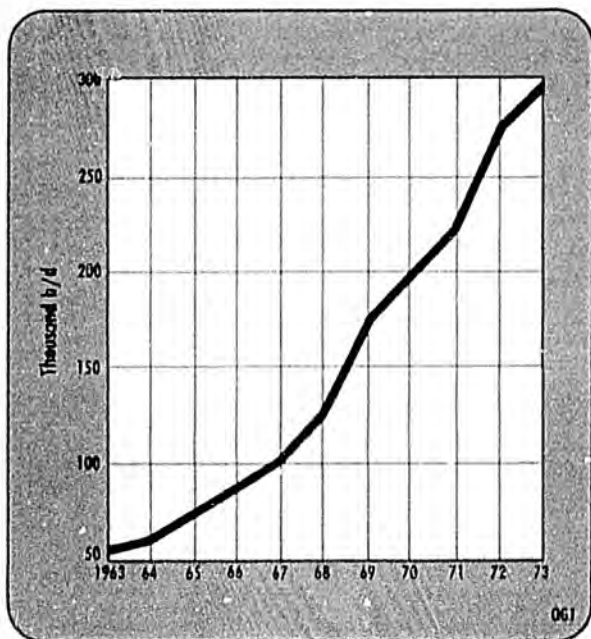
*Preliminary

Production of natural-gas liquids and liquefied refinery gases

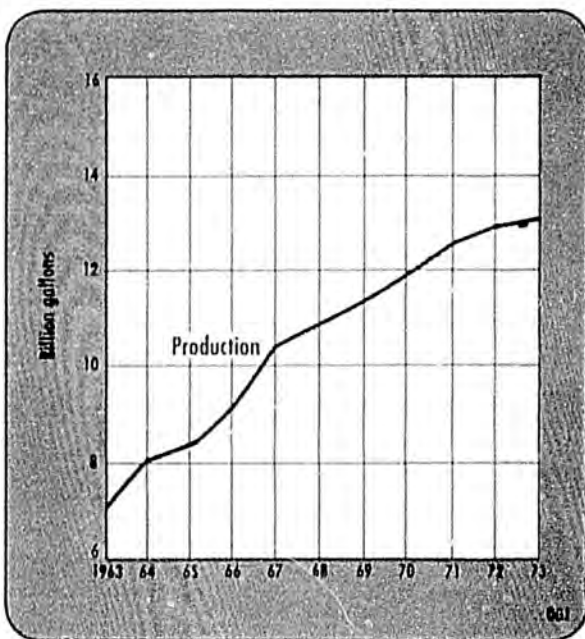
	1973*	1972	1971	1970	1969	1968	1967	1966	1965	1964
(Thousands of barrels daily)										
Ethane (from gas processing)	297	276	221	201	173	125	101	82	73	64
LP-gases:										
Propane	573	587	581	555	535	504	465	409	372	354
Butane	242	242	243	239	237	216	207	192	170	160
Butane-propane mix	10	10	11	16	16	34	42	36	24	30
Isobutane	94	92	88	84	74	81	80	73	67	62
Total LP-gases	919	931	923	894	862	835	794	710	633	606
Natural gasoline‡	417	427	453	452	423	404	382	356	356	344
Finished product and others§	71	81	96	113	117	140	132	136	119	114
Total natural-gas liquids	1,704	1,715	1,693	1,660	1,575	1,504	1,409	1,284	1,181	1,128
Liquefied refinery gas¶	352	332	331	319	313	323	306	291	293	291
Ethane (from refineries)	25	25	25	26	25					
Total all products	2,081	2,072	2,049	2,005	1,913	1,827	1,715	1,575	1,474	1,419

*Eight months actual, four months estimated. ‡Includes isopentane. §Includes plant condensate. ¶LRG figures, 1968 and earlier, include ethane. ethane.

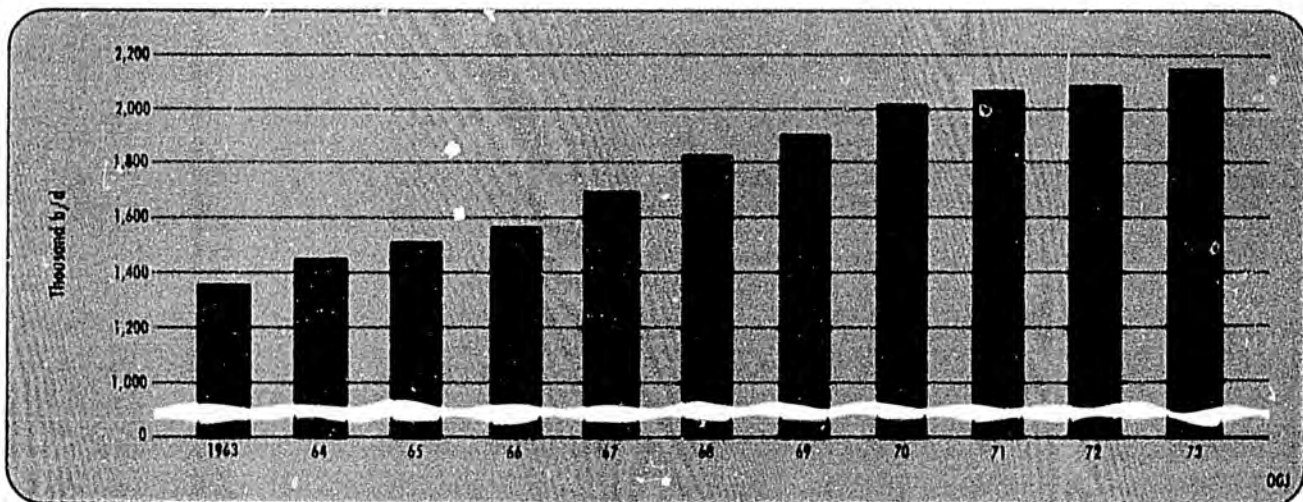
Ethane production rising



Total propane supply



Total production of NGL and LRG



Here's where the big reserves are in U.S.

MOST of the crude-oil production in the U.S. comes from the nation's giant oil fields. These fields lie in many states with Texas holding the most. California and Louisiana are also great storehouses of oil. Alaska's Prudhoe Bay field, not yet on production, is one of the largest with reserves pegged at from 10 to 20 billion bbl or more.

In order to be on this select list of U.S. oil fields, a pool must have an ultimate reserve of 100,000,000 bbl or more. Many of the fields on the listing are of 1920-1930 vintage, the age of oil giants in the U.S. Some of these fields are still producing respectable amounts of oil each year.

One of the newest fields on the list is in Florida at Jay. This is the largest of the Smackover fields in the Southeast. Its discovery set off one of the greatest wildcat campaigns in recent years.

Figures are in thousands of barrels. Only crude oil is figured into this reserve tabulation.

Field	1973 prod.	1,000 bbl Cum. prod.	Est. reserves	Est. No. wells
ALABAMA				
Citronelle	5,852	107,256	42,743	413
ALASKA				
Granite Point	4,766	51,897	38,554	25
McArthur River	39,171	214,485	175,939	52
Middle Ground Shoal	10,259	78,682	106,033	36
Prudhoe Bay	857	4,406	*	2
Swanson River	10,059	144,551	60,938	37
Trading Bay	7,830	48,902	25,505	42
*Reserves estimates range from 10 to 20 billion bbl.				
APPALACHIAN				
Alleghany	400	166,000	1,815	2,100
Bradford	2,400	656,095	12,374	17,300
ARKANSAS				
Magnolia	520	152,424	7,576	56
Schuler and East	603	105,123	4,877	107
Smackover	2,850	505,647	24,353	2,586
Walker Creek	2,883	7,983	100,477	39

GIANT oil field, produces most of the crude oil in the United States.

Field	1973 prod.	1,000 bbl Cum. prod.	Est. reserves	Est. No. wells
CALIFORNIA				
SAN JOAQUIN VALLEY				
Belridge South	8,558	186,258	73,526	2,265
Buena Vista	4,389	613,242	36,430	1,127
Coalinga	7,062	626,495	72,370	2,143
Coalinga Nose	3,583	428,980	34,463	77
Coles Levee North	994	139,274	13,984	120
Cuyama South	1,611	207,130	12,473	138
Cymric	3,279	128,573	27,324	719
Edison	1,160	112,128	8,728	472
Elk Hills	797	283,022	1,019,421	104
Fruitvale	981	100,794	6,234	335
Greeley	720	107,472	2,794	43
Kern Front	2,937	131,456	30,530	871
Kettleman North Dome	749	451,466	4,399	136
Kern River	27,973	607,784	469,288	4,370
Lost Hills	2,249	116,931	18,942	1,123
McKittrick—Main Area	5,343	155,196	42,427	646
Midway Sunset	34,699	1,192,592	413,111	5,711
Mount Poso	2,362	165,846	20,620	477
Rio Bravo	271	112,968	1,901	37

COASTAL AREA

Carpinteria Offshore	3,783	41,456	31,055	122
Cat Canyon*	6,760	208,828	44,120	626
Dos Cuadras	16,745	87,498	88,237	129
Elwood	54	103,221	519	12
Orcutt	1,965	147,009	14,811	179
Rincon	4,010	120,256	23,528	321
San Ardo	12,609	261,332	86,636	887
Santa Ynez**				
Santa Maria Valley	3,475	155,791	30,170	197
South Mountain	1,784	128,973	17,782	432
Ventura	11,022	782,054	69,946	804

*Combines Cat Canyon West and Cat Canyon East.

**Undeveloped fields, Santa Barbara Channel, uncorroborated reserves—1-3 billion bbl.

LOS ANGELES BASIN

Belmont Offshore	2,207	36,671	25,664	76
Beverly Hills	5,619	73,811	36,040	127
Brea Olinda	3,685	340,212	27,600	711
Coyote East	680	97,454	5,015	173
Coyote West	2,122	229,979	20,504	159
Dominquez	1,328	257,165	11,272	133
Huntington Beach	20,389	904,585	131,792	1,132
Inglewood	3,552	293,055	23,735	437
Long Beach	2,705	875,609	23,203	766
Montebello	612	183,927	5,678	168
Richfield	1,547	163,370	17,848	263
Santa Fe Springs	823	599,958	11,971	226
Seal Beach	1,339	186,743	8,086	179
Torrance	2,646	179,632	20,338	368
Wilmington	67,066	1,549,496	763,317	2,311

COLORADO

Rangely	19,378	491,337	108,663	387
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FLORIDA

Jay	27,977	42,217	270,783	78
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ILLINOIS

Clay City	3,126	305,224	19,776	2,335
Dale	458	100,014	4,986	636
Loudon	2,965	360,860	24,140	1,429
New Harmony	1,558	153,975	16,025	1,130
Salem	2,904	352,990	17,010	1,389

KANSAS

Bemis-Shutts	2,149	216,475	18,525	941
Chase-Silica	1,272	249,244	10,756	1,058
Eldorado	1,204	278,847	11,153	795
Hall-Gurney	2,071	125,423	14,577	1,202

Field	1973 prod.	1,000 bbl Cum. prod.	Est. reserves	Est. No. wells
Kraft-Prusa	917	116,958	8,042	602
Trapp	1,466	205,691	14,309	989

LOUISIANA, ONSHORE

Avery Island	1,839	77,556	32,444	31
Bay DeChene	6,590	69,351	40,649	76
Bay St. Elaine	6,254	138,602	51,298	92
Bayou Sale	2,816	142,348	32,652	93
Black Bay West	8,036	84,470	65,530	153
Caillou Island	25,613	498,875	201,125	375
Cote Blanche Island	5,482	72,014	57,986	46
Delta Farms	997	109,137	10,863	47
Garden Island Bay	10,384	166,426	89,911	255
Golden Meadow	2,027	113,043	21,957	238
Grand Bay	5,755	148,599	56,401	176
Hackberry East	1,647	91,739	18,261	78
Hackberry West	3,100	114,952	25,048	139
Iowa	1,244	91,113	8,887	40
Jennings	261	111,409	3,591	72
Lafitte	8,211	206,805	51,190	246
Lake Barre	5,420	166,019	53,981	169
Lake Pelto	4,069	97,637	37,363	61
Lake Salvador	2,432	73,810	36,190	84
Lake Washington	6,965	192,186	82,814	139
Leeville	3,156	122,807	27,193	88
Paradis	4,277	99,156	20,188	93
Quarantine Bay	3,946	146,125	38,875	121
Romere Pass	2,727	78,129	26,871	43
Timbalier Bay	9,456	226,634	200,111	239
Venice	5,078	153,785	51,215	124
Vinton	3,478	119,892	20,108	178
Weeks Island	9,486	193,729	96,271	86
West Bay	8,363	169,864	70,136	222
W. Cote Blanche Bay	10,288	139,436	110,564	280

LOUISIANA, NORTH

Caddo-Pine Island	3,076	309,666	30,334	8,056
Delhi	6,290	159,373	50,627	118
Haynesville (Ark. La.)	1,788	170,230	14,770	191
Rodessa (La. Tex.)	329	175,123	4,877	150

LOUISIANA, OFFSHORE

Bay Marchand Blk. 2 (Incl. onshore)	32,561	396,902	253,098	290
Eugene Island Blk. 126	4,663	84,778	40,222	54
Eugene Island Blk. 175	9,873	29,241	80,759	80
Eugene Island Blk. 276	6,322	42,082	122,918	65
Grand Isle Blk. 16	18,936	197,896	152,104	85
Grand Isle Blk. 43	20,732	142,670	227,402	222
Grand Isle Blk. 47	4,684	61,097	38,903	80
Main Pass Blk. 35	2,456	77,613	22,387	86
Main Pass Blk. 41	14,808	134,123	145,877	121
Main Pass Blk. 69	10,924	183,037	76,963	160
Main Pass Blk. 306	6,652	26,369	123,631	125
Ship Shoal Blk. 204	5,369	21,408	83,592	63
Ship Shoal Blk. 207	6,904	38,196	136,804	51
Ship Shoal Blk. 208	11,262	81,947	143,053	83
South Marsh Island Blk. 73	5,353	35,828	69,172	44
South Pass Blk. 24 (Incl. onshore)	16,740	356,253	133,747	428
South Pass Blk. 27	13,366	247,358	137,642	341
South Pass Blk. 62	8,666	41,956	148,044	68
South Pass Blk. 65	12,088	36,088	153,912	70
West Delta Blk. 30	24,626	289,876	160,124	226
West Delta Blk. 58	8,176	28,056	121,944	76
West Delta Blk. 73	9,348	120,565	154,435	102

MISSISSIPPI

Baxterville	7,902	160,160	74,840	234
Heidelberg	5,417	110,190	39,810	263
Tinsley	3,122	193,474	26,526	203

MONTANA

Bell Creek	7,967	58,912	51,088	250
Cut Bank	4,289	135,173	33,827	873
Pine	2,830	77,000	30,500	107

Field	1973 prod.	1,000 bbl Cum. prod.	Est. reserves	Est. No. wells
NEW MEXICO				
Caprock and East	620	92,326	7,674	621
Denton	1,840	123,114	16,886	196
Empire Abo	9,797	98,904	71,096	253
Eunice	4,501	122,136	18,864	1,103
Hobbs	5,159	216,729	37,954	437
Maljamar	6,821	98,251	66,749	809
Monument	295	210,025	29,975	106
Vacuum	4,216	261,834	138,166	1,168

NORTH DAKOTA

Beaver Lodge	2,985	75,377	24,623	144
Tioga	1,135	69,567	30,433	215

OKLAHOMA

Allen	2,645	124,381	15,619	1,495
Avant	410	106,242	2,758	625
Bowlegs	1,750	156,827	8,173	180
Burbank	3,870	500,354	40,646	1,075
Cement	2,470	138,956	16,044	1,475
Cushing	3,245	460,217	24,783	1,715
Earlsboro	460	215,804	4,196	190
Edmond West	715	154,522	5,478	455
Eola-Robberson	4,355	104,257	35,743	485
Fitts	2,180	148,303	11,692	610
Glenn Pool	2,150	307,441	12,559	1,015
Golden Trend	9,875	393,876	106,124	1,235
Healdton	6,880	286,665	33,335	1,520
Hewitt	6,880	212,391	37,609	1,180
Little River	365	159,571	5,429	170
Oklahoma City	1,860	731,896	18,104	280
Seminole Greater	1,190	198,446	11,554	260
Sho-Vel-Tum	33,320	968,206	181,794	8,025
Sooner Trend	11,480	189,604	60,396	2,920
St. Louis	1,185	215,045	9,955	635
Tonkawa	275	134,937	2,063	200

TEXAS

DISTRICT 1				
Big Wells	5,977	22,638	127,362	260
Darst Creek	2,050	139,653	20,347	837
Luling-Branyon	1,455	145,817	14,183	1,309

DISTRICT 2				
Greta All	4,598	112,475	47,525	184
Refugio All	337	94,846	5,154	66
Tom O'Connor	27,895	470,743	229,257	978

DISTRICT 3				
Anahuac	10,969	234,810	115,190	233
Barbers Hill	681	124,032	10,968	98
Conroe	21,846	518,922	156,078	581
Dickson-Gillock	1,935	106,114	43,886	79
Goose Creek & East	861	129,989	10,011	255
Hastings E&W	22,546	475,079	199,921	448
High Island All	1,499	129,655	20,345	103
Hull-Merchant	1,404	192,388	12,612	369
Humble All	1,362	160,366	29,634	377
Magnet Withers All	3,143	77,906	47,094	290
Old Ocean	879	120,730	9,270	38
Raccoon Bend	2,485	89,719	35,281	134
Sour Lake	890	116,461	8,539	286
Spindletop	181	153,570	3,430	94
Thompson All	15,858	353,752	146,248	279
Tomball	3,342	100,715	29,285	225
Webster	20,894	388,196	186,804	149
West Columbia	1,089	156,496	13,504	191

DISTRICT 4				
Aqua Dulce-Stratton	3,030	135,878	34,122	262
Borregas All	2,264	106,221	28,779	182
Kelsey All	3,040	105,393	44,607	180
Plymouth	756	115,916	9,084	101
Seeligson All	3,837	260,750	64,252	417
Tijerina-Canales-Blucher	7,094	96,661	68,339	135
White Point East	1,048	98,772	11,228	159

DISTRICT 5				
Mexia	130	107,224	2,776	98
Powell	95	129,971	1,029	31

Field	1973 prod.	1,000 bbl Cum. prod.	Est. reserves	Est. No. wells
Van and Van Shallow	16,658	403,120	146,880	467
DISTRICT 6				
East Texas	75,436	4,169,403	1,830,597	13,638
Fairway	17,175	109,962	89,975	97
Hawkins	39,513	496,067	328,933	449
Neches	4,889	55,313	44,687	129
Quitman All	3,812	76,845	32,829	242
Talco	4,138			598

DISTRICT 7-C				
Big Lake	544	124,164	10,836	94
McCamey	858	123,295	6,705	889
Pegasus	2,962	110,440	29,560	178

DISTRICT 8				
Andector	6,990	121,499	63,501	103
Block 31	5,262	137,594	52,406	111
Cowden North	13,091	261,866	63,134	964
Cowden South, Foster, Johnson	16,075	282,899	117,101	1,269
Dollarhide	5,840	144,362	65,638	152
Dune	9,181	119,028	80,972	886
Emma and Triple N.	2,483	94,701	20,299	279
Fuhrman-Mascho	1,806	72,952	27,048	597
Fullerton All	6,642	231,661	68,339	597
Goldsmith All	19,298	561,227	113,773	2,790
Hedrick	638	251,561	3,439	172
Howard Glasscock	6,761	303,251	71,749	1,872
Iatan East	3,896	82,215	42,785	837
Jordan	3,222	98,998	31,002	343
Kermit	1,121	111,440	18,560	468
Keystone	5,328	267,801	52,199	786
McElroy	10,772	297,698	62,302	1,848
Means All	7,677	139,605	70,395	376
Midland Farms All	6,658	169,643	55,357	314
Penwell	1,705	83,482	16,518	512
Sand Hills	5,841	184,013	60,987	1,045
Shafter Lake	2,689	69,708	30,292	440
TXL All	4,061	232,686	32,314	774
Waddell	3,477	78,817	31,183	406
Ward South	577	96,097	3,903	453
Ward Estes North	7,520	304,004	70,996	1,957
Yates	18,195	587,252	1,012,748	581

DISTRICT 8-A				
Anton	5,164	70,911	39,089	152
Cogdell Area	12,255	177,681	142,319	386
Diamond M	7,547	190,164	84,836	460
Kelly-Snyder	70,944	540,039	568,073	641
Levelland	11,201	220,117	104,883	1,624
Prentice	5,913	87,914	52,086	306
Russell All	2,998	109,344	25,656	237
Salt Creek	12,014	113,570	116,430	116
Seminole All	15,475	199,245	115,755	214
Slaughter	45,486	548,432	241,568	2,530
Spraberry Trend	20,383	361,443	148,557	3,524
Wasson All	83,726	616,311	716,237	2,281
Welch	6,505	82,371	67,629	378

DISTRICT 9				
KMA	2,327	165,325	19,675	966
Walnut Bend	5,286	96,434	43,566	262

DISTRICT 10				
Panhandle	12,579	1,271,238	143,762	10,503

UTAH

Greater Altamont	13,069	24,367	250,333	133
Greater Aneth	7,814	251,515	63,485	364
Greater Red Wash	3,924	90,095	49,905	226

WYOMING

Elk Basin (Mont.-Wyo.)	9,559	461,354	78,646	190
Garland	2,692	105,696	29,304	202
Grass Creek	3,124	137,631	27,369	233
Hamilton Dome	3,319	175,019	39,981	87
Hilight	7,896	42,090	92,910	190
Lance Creek	227	104,293	2,707	38
Lost Soldier	3,775	137,916	27,084	62
Oregon Basin	11,392	228,995	61,005	300
Salt Creek	15,203	529,603	65,397	976

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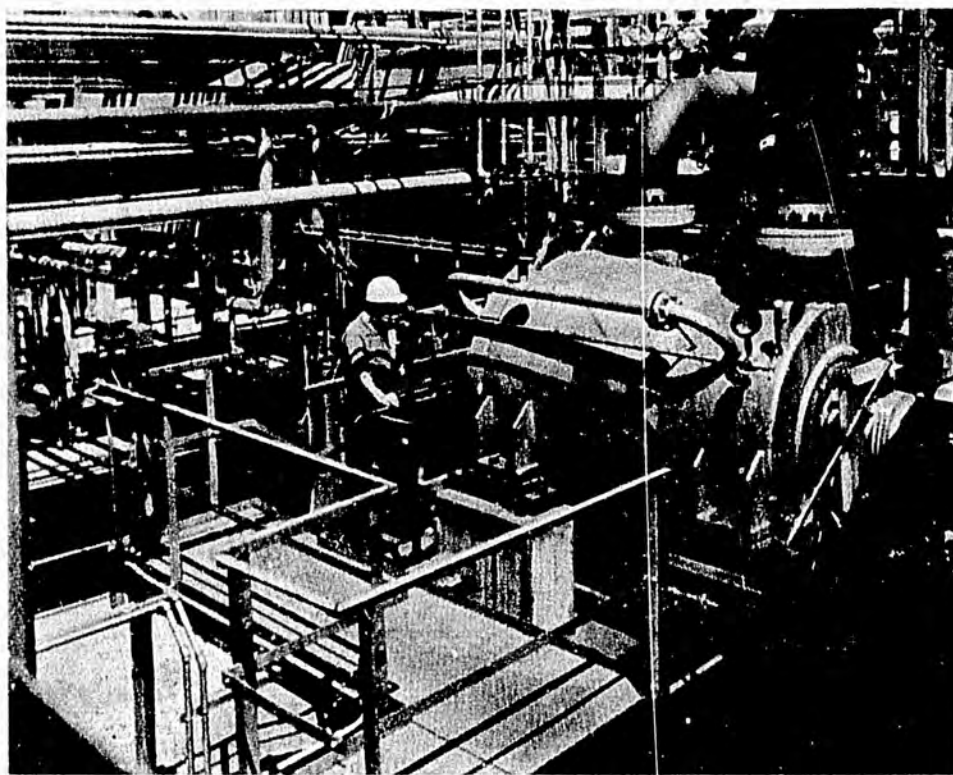
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Another big drop logged for U.S. oil and

PROVED reserves of oil and natural gas in the U.S. plunged again last year.

The surge in drilling hasn't yet been translated into reserve additions on a scale capable of offsetting the heavy withdrawals from record or near-record production rates. But the upturn in activity last year may have helped slow the rate of decline in liquids.

New reserve estimates did not take into account late-year increases

in crude prices.

The reserves committees of the American Petroleum Institute and American Gas Association reported these figures as of Jan. 1, 1974:

- Crude oil—down 1.040 billion bbl to 35.3 billion, after subtracting net production of 3.185 billion bbl, including 390 million from the Gulf of Mexico. About 80% of the decline was accounted for by Texas and Louisiana. API reported 5.144 billion bbl of indi-

cated additional reserves on top of those listed in the proved category.

- Natural-gas liquids—down 332 million bbl to 6.455 billion, after production of 741 million bbl.

- Total liquid hydrocarbons—down 1.4 billion bbl to 41.755 billion, compared with a 2.2-billion decline the year before.

- Natural gas—down 16.1 trillion cu ft to 250 trillion, marking the fifth decline in the last 6 years and the larg-

Breakout by state of crude-oil and natural-gas reserves in the United States

State or area of state	Proved reserves Jan. 1, 1973	Changes due to revisions	Changes due to extensions	CRUDE OIL (thousand bbl)		Production in 1973*	Proved reserves Jan. 1, 1974
				New field discoveries	New pools in old fields		
Alabama	56,734	+ 653	5,400	1,776		10,960	53,603
Alaska	10,096,282	+ 85,754		1,500	1,000	72,323	10,112,213
Arkansas	113,100	+ 5,898	3,540	60	75	17,121	105,552
California†	3,553,735	+ 217,566	16,740	30,000	5,800	335,741	3,488,100
Coastal region	513,322	+ 88,124	14,050		5,550	76,762	536,284
Los Angeles Basin	1,282,048	+ 48,034				132,214	1,197,868
San Joaquin Basin	1,758,365	+ 89,408	2,690	30,000	250	126,765	1,753,948
Colorado	326,411	+ 4,474	7,174	3,496	99	36,864	304,790
Florida	208,149	+ 2,449	5,697	160		32,596	183,859
Illinois	174,883	+ 3,697	1,375	1,257	238	29,107	152,343
Indiana	29,384	+ 1,204	625	292	516	5,398	26,622
Kansas	453,394	+ 6,254	5,565	2,459	5	66,588	401,089
Kentucky	48,193	- 6	325	15	275	8,822	32,980
Louisiana‡	5,028,478	+ 63,206	118,853	31,900	54,112	719,723	4,576,826
North	281,451	+ 6,277	620	103		36,063	252,388
South	4,747,027	+ 56,929	118,233	31,797	54,112	683,660	4,324,438
Michigan	62,002	+ 7,129	10,000	7,035		13,722	72,444
Mississippi	312,458	+ 26,035	3,235	2,422	410	53,511	291,049
Montana	241,248	+ 11,031	650	930		34,516	219,343
Nebraska	30,553	+ 3,820	1,068	61		7,336	28,166
New Mexico	582,593	+ 152,852	2,687	322	754	96,214	642,994
Northwest	24,246	+ 4,716		36		5,138	23,860
Southeast	558,347	+ 148,136	2,687	286	754	91,076	619,134
New York	9,246					958	8,288
North Dakota	166,033	+ 24,754	8,470	5		19,742	179,520
Ohio	127,385		6,275		44	8,793	124,911
Oklahoma	1,303,004	+ 130,704	15,584	1,251		179,579	1,270,964
Pennsylvania	37,345	+ 5,550				3,282	39,613
Texas‡	12,144,057	+ 723,449	106,682	17,825	22,904	1,258,304	11,756,613
Dist. 1	147,324	+ 13,876	2,966	253	100	20,370	144,149
Dist. 2	636,768	+ 108,159	1,519	763	4,226	74,310	677,125
Dist. 3	1,536,426	+ 104,304	12,777	1,907	3,878	169,864	1,489,428
Dist. 4	343,752	- 2,839	6,073	95	8,921	51,580	304,422
Dist. 5	98,963	+ 47,150		300	2	20,583	126,462
Dist. 6	2,208,438	+ 175	3,554	220	101	163,240	2,049,248
Dist. 7-B	235,962	+ 18,450	13,724	2,513	720	35,499	235,870
Dist. 7-C	239,270	- 22,021	16,317	5,017	161	33,748	204,996
Dist. 8	3,402,358	+ 47,514	30,060	940	1,449	276,783	3,205,538
Dist. 8-A	2,793,503	+ 323,173	9,579	2,804	2,056	345,807	2,785,308
Dist. 9	324,018	+ 72,628	9,333	2,655	1,045	45,971	363,708
Dist. 10	177,275	+ 12,250	780	358	245	20,549	170,359
Utah	244,397	+ 5,094	47,000	60	65	32,104	264,512
Virginia							
West Virginia	34,040		530		15	2,459	32,126
Wyoming	949,779	+ 68,641	22,501	12,646	1,404	138,208	916,763
Miscellaneous§	6,526	+ 1,569	165	625	100	1,429	7,556
Total U.S.	36,339,408	+ 1,551,777	390,141	116,097	87,816	3,185,400	35,299,839

*Estimate. †Economically available by fluid injection. Additional reserves from fluid injection whether injection is under way or not. ‡Includes gas category) Arizona, Iowa, Maryland, Minnesota, Missouri, South Dakota, Tennessee, Washington.

gas reserves

est on record. It would have been the sixth consecutive year of falling reserves except for the first-time inclusion of 26 trillion cu ft of newly discovered gas on Alaska's North Slope in 1970. Gross additions to reserves, including net changes in underground storage in 1973, amounted to only 6.5 trillion cu ft.

• Productive capacity of crude oil—down 600,000 b/d to 9.7 million b/d, for the sixth consecutive decrease

since API began estimating such figures in 1967. Productive capacity is the estimated amount of crude that can be produced on leases within 90 days from Dec. 31, 1973, with existing wells and surface equipment or with changes in production facilities that could be made in that period.

Officials of API and AGA stressed the need for access to new offshore acreage and price incentives to spur drilling and halt the slide in reserves. They also warned against punitive tax legislation which would frustrate efforts to get capital to bring forth new supplies.

Crude oil. Louisiana led the big drop in reserves with 452 million bbl, of which 423 million was in the southern section, including offshore.

Gulf of Mexico reserves, including both Texas and Louisiana, fell 218 million bbl to 2.3 billion.

Texas followed closely with a decline of 387 million bbl, concentrated in Dist. 6 and Dist. 8. Other major oil states also were down.

Modest increases were recorded by New Mexico, 60 million bbl; Alaska, 16 million; North Dakota, 13 million; Michigan, 10 million; and Pennsylvania, 2 million.

Changes from Jan. 1, 1973	Indicated total reserves†	Proved reserves Jan. 1, 1973	Extensions and revisions	NATURAL GAS (MMcf)		Proved reserves Jan. 1, 1974	Change from Jan. 1, 1973
				New fields and new pools	Production in 1973*		
— 3,131	22,041	245,714	+ 83,553	6,000	7,892	327,375	+ 81,661
+ 15,931	36,000	31,455,553	+ 317,398	600	130,815	31,642,636	+ 187,083
— 7,548	21,444	2,455,877	— 25,727	2,050	163,586	2,269,353	— 186,524
— 65,635	1,560,150	5,328,862	+ 242,582	110,850	478,356	5,199,837	— 129,025
+ 22,962	202,750	761,580	— 15,679	500	70,361	684,922	— 76,658
— 84,180	418,000	493,340	— 2,752		51,276	479,008	— 54,332
— 4,417	939,400	4,073,942	+ 255,509	110,350	356,719	4,075,907	+ 1,965
— 21,621	93,790	1,655,200	+ 317,401	27,914	134,276	1,868,299	+ 213,099
— 24,290	161,203	180,629	+ 1,945		33,660	148,914	— 31,715
— 22,540	6,500	545,361	+ 1,978		2,840	380,525	— 164,836
— 2,761	2,800	87,234	+ 509		1,364	66,682	— 20,552
— 52,035	1,500	11,938,716	+ 635,328	31,124	899,460	11,722,395	— 216,321
— 8,213	3,000	938,082	+ 17,604	3,610	62,396	864,921	— 73,161
— 451,652	233,877	74,971,334	+ 842,398	1,788,930	8,457,596	69,151,613	— 5,819,721
— 29,063	31,645	3,320,328	+ 37,477	24,454	412,431	2,976,133	— 344,195
— 422,589	202,232	71,651,006	+ 804,921	1,764,476	8,045,165	66,175,480	— 5,475,526
+ 10,442	7,500	1,296,815	+ 41,297	250,938	47,842	1,548,508	+ 251,693
— 21,409	22,952	1,104,336	+ 143,655	38,432	96,657	1,178,218	+ 73,882
— 21,905	51,420	1,064,036	+ 37,346	46,713	60,209	1,092,449	+ 28,413
— 2,387	4,145	50,260	+ 2,547	17	4,446	48,816	— 1,444
+ 60,401	319,510	12,335,647	+ 1,254,707	76,414	1,194,706	12,488,363	+ 152,716
— 386	4,025	8,160,874	+ 382,867	58	559,448	7,985,386	— 175,488
+ 60,787	315,485	4,174,773	+ 871,840	76,356	635,258	4,502,977	+ 328,204
— 958	2,000	139,184	+ 4,725		4,283	136,842	— 2,342
+ 13,487	14,670	441,625	+ 43,648	10	37,099	448,184	+ 6,559
— 2,474		1,146,677	+ 163,475	19,544	89,527	1,179,391	+ 32,714
— 32,040	261,000	14,492,030	+ 1,239,156	135,332	1,777,787	14,098,735	— 393,295
+ 2,268	54,770	1,406,948	+ 153,275	14,100	78,514	1,494,381	+ 87,433
— 387,444	2,083,344	95,042,043	— 3,209,546	1,345,655	8,240,478	84,936,502	— 10,105,541
— 3,175	36,702	1,620,405	— 28,772	21,352	139,715	1,473,201	— 147,204
+ 40,357	5,720	9,496,136	— 643,178	111,881	514,668	8,449,920	— 1,046,216
— 46,998	31,928	20,696,874	— 1,029,612	443,273	1,580,960	18,526,171	— 2,170,703
— 39,330	36,865	24,334,110	— 3,562,955	259,006	1,613,946	19,416,215	— 4,917,895
+ 27,499	36,000	1,171,395	+ 82,147	4,330	112,308	1,149,781	— 21,614
— 159,190	199,055	5,710,441	— 7,515	38,832	309,565	5,432,193	— 278,248
— 92	10,500	663,560	+ 64,225	6,235	79,090	652,076	— 11,484
— 34,274	9,028	2,581,980	+ 96,214	19,008	266,608	2,430,873	— 151,107
— 196,820	1,016,630	15,481,337	+ 988,512	337,009	2,010,404	14,796,454	— 684,883
— 8,195	686,861	2,366,951	— 13,449	1,140	233,137	2,121,505	— 245,446
+ 39,690	10,555	1,559,594	+ 82,591	2,563	143,465	1,502,193	— 57,401
— 6,916	3,500	9,359,260	+ 762,246	101,026	1,236,612	8,985,920	— 373,340
+ 20,115	44,100	1,022,110	+ 41,154	12,505	51,029	1,024,723	+ 2,613
— 1,914	5,000	2,345,957	+ 148,454	100	5,048	37,273	+ 1,352
— 33,016	131,644	4,088,728	+ 200,263	13,849	168,023	2,319,828	— 26,129
+ 1,030		269,987	— 2,895	196,908	376,753	4,109,523	+ 20,795
				924	759	165,931	— 104,056
— 1,039,569	5,144,760	266,084,866	+ 2,702,530	4,122,519	22,605,406	249,950,217	— 16,134,649

offshore reserves. †Includes (under crude-oil category) Arizona, Missouri, Nevada, South Dakota, Tennessee, and Virginia. Includes (under natural-

Gas-liquids reserves (1,000 bbl)

State or area of state	Reserves Jan. 1, 1973	Production in 1973*	Proved reserves Jan. 1, 1974	Change from Jan. 1, 1973
Alabama	27,606	711	44,592	+ 16,986
Alaska	442	99	343	- 99
Arkansas	7,778	1,123	5,044	- 2,734
California†	126,726	12,461	105,963	- 20,763
San Joaquin Basin	67,174	6,650	60,170	- 7,004
Coastal Region†	29,668	3,366	25,216	- 4,452
Los Angeles Basin†	29,884	2,445	20,577	- 9,307
Colorado	16,079	2,767	20,853	+ 4,774
Florida	8,800	334	3,307	- 5,493
Illinois	814	0	0	- 814
Indiana	14	0	0	- 14
Kansas	393,082	30,602	387,298	- 5,784
Kentucky	46,782	3,085	45,324	- 1,458
Louisiana†	2,135,837	246,920	1,992,537	-143,300
North	107,282	16,020	86,824	- 20,458
South†	2,028,555	230,900	1,905,713	-122,842
Michigan	19,026	1,483	25,046	+ 6,020
Mississippi	14,620	1,499	14,090	- 530
Montana	4,413	691	3,625	- 788
Nebraska	1,630	351	1,292	- 338
New Mexico	502,787	38,306	413,180	- 89,607
Northwest	270,913	16,086	255,498	- 15,415
South	231,874	22,220	157,682	- 74,192
North Dakota	45,367	2,022	53,345	+ 7,978
Ohio	0	0	0	0
Oklahoma	335,161	40,100	289,102	- 46,059
Pennsylvania	735	76	659	- 76
Texas†	2,891,583	337,944	2,830,143	- 61,440
Dist. 1	16,742	3,143	26,510	+ 9,768
Dist. 2	122,029	11,157	144,318	+ 22,289
Dist. 3†	570,324	53,637	464,794	-105,530
Dist. 4†	424,019	60,340	490,561	+ 66,542
Dist. 5	73,358	6,057	73,261	- 97
Dist. 6	384,345	28,378	355,689	- 28,656
Dist. 7-B	52,921	8,947	62,161	+ 9,240
Dist. 7-C	118,506	16,767	120,608	+ 2,102
Dist. 8	475,338	60,177	453,718	- 21,620
Dist. 8-A	258,147	39,046	264,731	+ 6,584
Dist. 9	68,280	9,450	78,462	+ 10,182
Dist. 10	327,574	40,905	295,330	- 32,244
Utah	34,002	2,385	52,544	+ 18,542
West Virginia	82,084	5,651	82,755	+ 671
Wyoming	91,191	12,221	83,665	- 7,526
Total United States	6,786,559	740,831	6,454,707	-331,852

*Preliminary net production. †Includes offshore reserves.

It was another poor discovery year, with only 116 million bbl added from new field discoveries and 88 million from new pools. The reserves committee added 2.2 billion bbl to gross reserves by upward revisions of previous figures, deducted 662 million via downward revisions, and added 390 million bbl from extensions of known fields.

The only new discoveries of consequence showing up in addition to reserves were in Louisiana, with 31 million bbl, mostly offshore, and California, in the San Joaquin Basin, 30 million bbl, probably due to Tule Elk field.

Natural gas. The record slide left proved reserves, counting the shut-in

Prudhoe Bay field in Alaska, at the lowest level since 1957.

In the Lower 48 states, reserves were down to 218.3 trillion, the lowest since 1954, when, AGA noted, gas consumption was less than half of what it is now.

The downward trend was general among major producing states. Reserves in Texas were down to 84.9 trillion cu ft from 95 trillion, Louisiana to 69.2 trillion from 75, Oklahoma to 14.1 trillion from 14.5 trillion, and Kansas to 11.7 trillion from 11.9 trillion. Alaska and New Mexico showed small increases in proved reserves.

Negative revisions of prior reserves estimates cut sharply into the total in both Texas and Louisiana. Texas

was revised downward 4.7 trillion, due mainly to new estimates for Dist. 3 and 4 on the Gulf Coast. Louisiana's negative revisions amounted to 609 billion cu ft, almost all in the southern part of the state, including offshore.

These adjustments were based primarily on data obtained from continuing production experience, AGA explained. Data indicate a greater loss of pressure with production than had been expected.

AGA included statistics separately for the first time for reserves and production off Texas and Louisiana. Last year the region produced 4.2 trillion cu ft, or 18.4%. Proved reserves in the gulf are estimated at 36.8 trillion cu ft, down 2-trillion for the year.

Canadian reserves slump. The Canadian Petroleum Association reported proved reserves of marketable gas in Canada at the end of 1973 were down by half a trillion to 52.5 trillion cu ft.

CPA hasn't included any reserves in the Mackenzie Delta, the Arctic Islands, or the East Coast offshore areas, since details of these strikes haven't been made available to the association.

Estimates for the Mackenzie Delta will become available through the National Energy Board in connection with the application of Canadian Gas Arctic Pipeline for a line from Alaska via Mackenzie Valley to the U.S.

Productive capacity. API noted that the productive capacity estimate indicates an excess of 1 million b/d over December production of 8.7 million.

It explained that the capacity figure is one that could be achieved within 90 days "under conditions of an extreme national emergency." Most of the difference is located in 14 fields, API said, with three fields making up 80% of the total. In one of these fields, which is producing at the maximum legal rate, use of incremental capacity would create equity problems concerning mineral rights, API said.

Also, it added, there would be considerable waste of natural gas because of gas production exceeding gas-processing capacity. In the case of another field, also producing at the "maximum achievable legal rate," use of the incremental capacity would create equity problems also. In an extreme emergency, API assumes that these problems could be resolved in 90 days. The third field referred to is the Elk Hills Naval Petroleum Re-

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WORLDWIDE ISSUE

1972: Year of the Arab

Frank J. Gardner
International Editor



CONSTRUCTION of pipeline and production facilities has picked up in Saudi Arabia as nation pushes for new highs in oil output.

CALL it hectic, call it turbulent; call it what you will, 1972 was the Year of the Arab.

Flexing the muscles he'd developed in 1971, he spent all 12 months of the year just closed in pursuing new advantages, and with outstanding success.

In January, the Arab nations and Iran—the Persian Gulf circle—nalled down an 8.49% increase in the prices of their crudes to compensate for loss of purchasing power stemming from devaluation of several of the world currencies, chiefly the U.S. dollar.

The settlement, reached in Geneva under the sponsorship of the Organization of Petroleum Exporting Countries

(OPEC), tacked an average 19¢/bbl on the prices for Persian Gulf crudes.

With that done, the Arab states turned immediately to the next OPEC goal—participation by host governments in the oil-company operations. Before adjourning the Jan. 20 conference, OPEC members designated Saudi Arabian Oil Minister Ahmed Zaki Yamani as their top negotiator in the search for participation.

Yamani was the logical choice, of course, for the participation concept had been his principal preoccupation since 1968. And he spent almost all of 1972 in pursuing the goal.

He got off to a slow start. At first he confined his efforts to his own country's principal concessionaire—Arabian American Oil Co. (Aramco). But Aramco refused to budge from its antiparticipation stance, even after a stern warning from Saudi King Faisal.

At the time, Yamani declared, "The attitude of the oil companies forces us to think in terms of battle rather than negotiations."

He approached the Mar. 11 OPEC special session in Beirut without much hope of avoiding an angry showdown between the Arabs and the oil companies.

But suddenly, on Mar. 10, a day before the meeting, Aramco dispatched a letter to Yamani, saying that it accepted "the principle" of participation and that "having accepted the principle, the company considers it in order, as suggested by the government, to proceed with negotiations."

That letter launched 7 months of arduous negotiations between Yamani and all the oil companies bordering the western shores of the gulf. Iran had disassociated itself from the participation talks on June 24 when the shah declared himself "uninterested."

Finally, on Oct. 5, the so-called "New York agreement" was announced, and Yamani had won his long battle.

The pact held some surprises, principally in a provision for initial participation of 25% by the host states, rather than the expected 20%. It further provided for escalation to 51% participation by 1983.

The Arab side had made some concessions to the companies, too. Among these was compensation on the basis of "updated book value," taking into consideration the effects of inflation over the years, and investments made



INDIA conducted a running feud with her foreign oil refiners throughout 1972, as it sought solutions to the rising price of crude and soaring product demand. Here, a Caltex kerosine delivery in Bombay.

during the period from discovery to date.

As the year draws to a close, the Arabs can claim a major victory in their struggle to take control of their oil. And they owe that victory to one man—Ahmed Zaki Yamani.

Iraq seizes IPC. Another major Arab event of 1972 was Iraq's sudden move on June 1 to nationalize the fields and properties of Iraq Petroleum Co. (IPC) in the northern part of the country. On May 17, the Iraqi Revolutionary Command Council (RCC) had issued an ultimatum to IPC to boost the sagging output from the northern fields by May 31 or face legislative action.

At the time, the northern fields were producing at only half the volume they had been earlier in the year. Iraq declared it was a pressure tactic by the company on the government, while the company retorted that the oil was simply overpriced in view of reduced tanker rates and slackened European oil demand.

As the deadline passed, Iraqi President Ahman Hasan al-Bakr declared the northern field nationalized. At the time, the Arab Oil Congress was gathered in Algiers, and the Iraqi an-

nouncement triggered rousing Arab shouts of approval.

In the aftermath, Cie. Francaise des Petroles (CFP), a 23.75% partner in IPC, reached agreement with the Iraqis to act as mediator in the negotiations on compensation to the company for the loss of the northern fields. From total shutdown on June 1, the northern fields have gradually built up their output to about 700,000 b/d, with most of it being exported to France, and some to Italy and the Comecon countries and India.

As mediators in the dispute, Iraq accepted CFP director Jean Duroc Danner and Nadim Pachachi, secretary general of OPEC. IPC, for its part, has held off any legal action against Iraq, pending the outcome of the negotiations. But it has declared Jan. 1, 1973, as the deadline for such action.

At the time of the nationalization in Iraq, Syria also declared nationalization of the IPC pipelines and terminals in that country. At press time, the two Arab states continued to bicker over transit fees to be paid the Syrians by Iraq.

Libya sets new terms. In another Arab country, new patterns also were being fashioned in 1972.

Libya, which nationalized British Petroleum's half-share in the giant Sarir field on Dec. 7, 1971, set forth in mid-October to grab 50% of the other half, held by independent Dallas oilman Nelson Bunker Hunt.

Only a fortnight earlier, the Libyans had sealed a 50-50 participation deal with Italy's ENI for operations on its Concession 100-A. With that in hand, they approached Hunt, demanding not only half his share of the field, but that he market the government oil, and hand over half his profits from oil sales retroactive to the date of the BP takeover.

The action foretells a similar campaign by the Libyan authorities against every other oil company in Libya.

Egypt ejects Russians. In yet another Arab state, Egypt, the biggest surprise of the year was political. In mid-July, President Anwar al-Sadat tagged the 5,000 top Russian military men and 10,000-15,000 lesser personnel as persona non grata, and demanded their withdrawal from Egypt.

The presidential action took the entire world by surprise. The move was and still is a puzzle to political ob-

servers. But there are indications that Libya's crafty Col. Muammar al-Qaddafi may have influenced Sadat, in view of his strong anticommunist stand and the proposed merger of the two countries.

Iran springs a surprise. Yet another surprise popped up in non-Arab Iran. At a London press conference on June 24, Shah Mohammad Reza Pahlavi revealed that he would sign three 5-year extensions to the Iranian Consortium's contract to produce oil from the "agreement area."

Only a year earlier, the shah had declared, "It's ridiculous that a foreign oil company should pump our oil from the well to the tanker. We can do this ourselves."

In his turnabout declaration, the shah said, "We have reached a period of close collaboration with the oil companies, which I think is in the interest of both parties."

The original agreement, signed in 1954, was to expire in 1979, but it calls for the three extensions at the option of the oil companies. Under the shah's new plan, it will extend to 1994.

The terms of the new Iranian agreement had not come to light at press time, but as the shah put it, "it will open a new page in the relations of producing countries and the oil companies, which are the intermediary between the producing countries and the consumers."

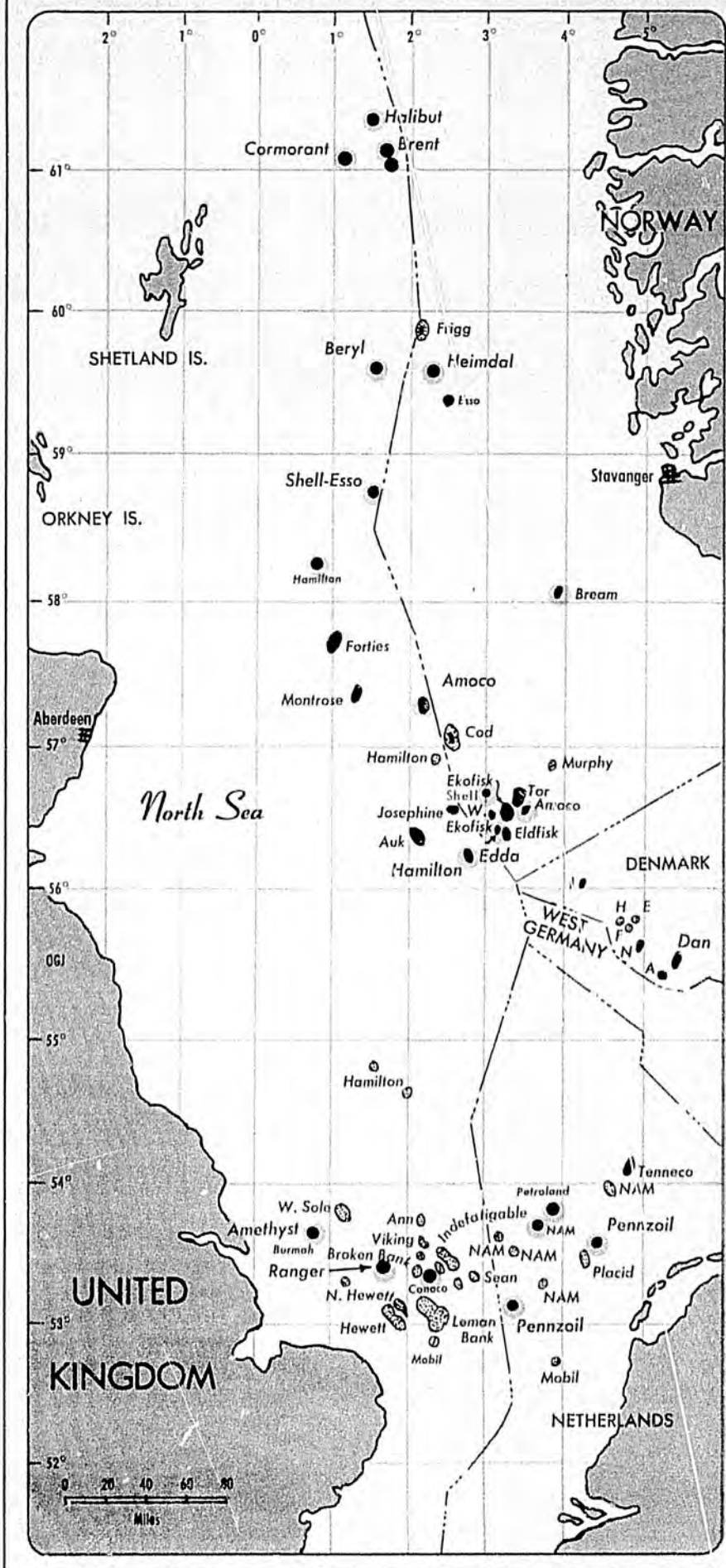
Top story in 1972. In the world of exploration for oil during 1972, the North Sea theater went unchallenged as Story No. 1.

At least 13 new oil fields came to light in the northern part of the sea during the year, and 7 new gas fields in its southern part (see map). Some of the oil finds may prove subcommercial, but the ones that are known already to be commercial are whales indeed.

Perhaps the most sensational and important finds were made in a single block—211—of the British North Sea. Here, within the space of a month (August), the Shell-Esso partnership announced two giant discoveries.

At the beginning of the month, Shell, as operator, announced that its second test of the Brent structure—well 211/29-2—had confirmed the presence of at least 1 billion bbl of recoverable reserves. Actually, the first well—211/29-1—had discovered the field in 1971, but Shell had not revealed this. However, as rumors flew

The North Sea's lucky 13 for 1972



Worldwide oil at a glance

COUNTRY	RESERVES 1-1-73		WFLS		OIL PRODUCTION			REFINING		
	Oil (1,000 bbl)	Gas (billion cu ft)	Producing oil 7-1-72	Drilling 12-1-72	Estimated 1972 (1,000 b/d)	% change from 1971	No. refin- eries	Capacity (1,000 b/d) Jan. 1, 1973		
								Crude	Cracking	Reform- ing
ASIA-PACIFIC										
Afghanistan	189,900	5,000	16	5	0.2					
Australia	2,121,460	*36,236	398	6	308.0	- 2.0	10	632.7	144.7	131.6
Bangladesh	8,000						1	30.6		1.6
Brunei-Malaysia	1,500,000	10,000	558	4	276.0	39.0	3	123.2		5.7
Burma	175,000	120	695	7	20.0	15.0	2	25.3	1.6	
Cambodia							1	12.5		1.8
Ceylon							1	37.4	9.0	2.5
Guam							1	29.5		
India	834,000	2,300	1,545	8	151.0	3.0	10	489.1	82.3	21.8
Indonesia	10,005,000	5,500	2,344	17	1,027.0	15.0	8	424.0	49.5	16.0
Japan	23,000	400	1,078	10	15.0	- 1.0	43	4,315.6	264.5	422.2
Korea, South				1			1	430.0	7.5	26.0
New Zealand	224,000	17,000	4	2	2.7	50.0	1	54.0		18.0
Okinawa (R.I.)							3	210.0		10.0
Pakistan	34,500	16,000	17	4	9.5	- 5.0	3	80.5		2.5
Philippines		180		5			4	276.3	25.9	41.9
Singapore							4	390.2		19.4
Taiwan	15,000	500	12	3	2.0	-10.0	1	199.0	18.1	20.8
Thailand	400		25	1	0.2	-33.0	4	155.8	30.0	23.8
Total Asia-Pacific	14,922,260	101,236	6,692	73	1,813.6	10.0	101	7,915.7	633.1	765.6

*Includes 14 trillion northwest shelf. †Adjusted. ‡Condensate.

EUROPE										
Austria	175,000	500	1,270	4	46.6	- 2.0	1	220.5	24.1	23.0
Belgium							8	831.6	58.6	91.3
Cyprus							1	12.0		2.0
Denmark	250,000	1,800	(*)	1	3.0		3	221.8	40.4	34.4
Finland							2	186.0	46.0	26.1
France	81,000	6,800	175	4	31.0	-16.0	23	2,949.3	220.5	399.1
Germany, West	551,000	12,700	2,833	5	138.0	- 5.0	33	2,697.7	340.4	344.7
Greece				1			4	124.5		14.4
Ireland†							1	58.0		13.3
Italy & Sicily	220,000	6,100	128	8	21.0	-12.0	34	3,593.1	322.5	384.6
Netherlands	250,000	88,000	319	8	30.0	- 7.0	7	1,825.5	83.6	158.8
Norway	\$2,000,000	15,000	4	5	34.0	496.0	3	173.0	24.0	18.5
Poland**										
Portugal							2	79.8	23.4	9.9
Romania**										
Spain	\$55,000	500	22	3	3.0	16.0	9	1,025.7	16.2	129.9
Sweden							5	243.6	33.0	44.4
Switzerland							2	120.0	21.0	20.0
United Kingdom	5,000,000	45,000	56	13	2.0	25.0	21	2,464.6	251.4	328.2
Yugoslavia	\$3,500,000	2,000		6	59.0	- 3.0				
Total Europe	12,082,000	178,400	4,807	58	367.0	2.0	159	16,826.7	1,505.1	2,042.6

*On production Aug., 1972. †Oil or gas discovered but not developed.

‡Adjusted. **Not included in free-world total. †Adjusted (government figures).

MIDDLE EAST										
Abu Dhabi	20,768,000	12,000	115	5	1,000.0	7.0				
Bahrain	375,000	5,000	236		72.0	- 4.0	1	250.0	53.2	14.3
Dubai	2,000,000	1,000	21	3	130.0	4.0				
Iran	\$65,000,000	200,000	313	10	4,900.0	8.0	4	620.0	52.0	85.3
Iraq	29,000,000	25,000	132	5	1,500.0	-12.0	6	98.5		5.0
Israel	9,000	50	30	1	120.0	- 7.0	1	147.4	57.9	16.8
Jordan							1	14.8	2.5	0.9
Kuwait	64,900,000	33,000	692	2	2,750.0	- 5.0	5	647.0	11.0	15.0
Lebanon							2	53.5		7.3
Neutral Zone	16,000,000	7,500	440	1	545.0	- 1.0				
Oman	5,000,000	1,750	97	2	280.0	- 3.0				
Qatar	7,000,000	8,000	84	2	450.0	4.0	1	0.7		
Saudi Arabia	138,000,000	50,000	535	8	5,255.0	17.0	2	428.3		29.3
South Yemen (Aden)							1	160.2		8.6
Syria	7,250,000	700	123	2	120.0	9.0	1	51.3	18.0	2.2
Turkey	550,000	150	290	5	65.0	- 1.0	4	286.0	23.6	29.0
Total Middle East	355,852,000	344,150	3,108	46	17,187.0	5.0	29	2,757.7	218.2	213.7

‡Adjusted. **Includes Sinai fields.

AGO 530117

53%
10.6% of world oil production

COUNTRY	RESERVES 1-1-73		WELLS		OIL PRODUCTION		REFINING			
	Oil (1,000 bbl)	Gas (billion cu ft)	Producing oil 7-1-72	Drilling 12-1-72	Estimated 1972 (1,000 b/d)	% change from 1971	Capacity (1,000 b/d) Jan. 1, 1973			
							No. refin- eries	Crude	Cracking	Refum- ing
AFRICA										
Algeria	47,000,000	105,000	524	17	1,061.0	36.8	3	60.7		14.5
Angola (incl. Cabinda)	1,200,000	1,000	161	6	135.0	17.4	2	16.0		1.9
Congo-Brazzaville	5,000,000	<i>export</i>	17	3	7.5	2,400.0				
Congo-Kinshasa (See Zaire)										
Dahomey†	1,000									
Egypt	5,200,000	7,500	245	4	227.0	-22.7	2	98.5		
Ethiopia							1	14.8		2.0
Gabon	1,100,000	7,000	114	3	125.0	8.7	1	17.0	7.0	2.0
Ghana†							1	26.6		6.2
Ivory Coast							1	24.4		2.8
Kenya							1	48.0		4.0
Liberia							1	12.5		2.0
Libya	30,400,000	27,500	763	8	2,230.0	-19.3	5	17.4		2.0
Malagasy							1	14.6		2.3
Morocco	1,000	15	32	2	0.3	-57.0	2	58.6	3.6	7.6
Mozambique†							1	17.0		2.5
Nigeria	15,000,000	40,000	774	30	1,800.0	17.5	1	60.0		5.7
Rhodesia							(not operating — not included in total)			
Senegal							1	12.0		2.0
Sierra Leone							1	19.0		
Sudan							1	20.0		2.0
Tanzania							1	16.8		4.2
Tunisia	1,000,000	1,000	42	3	80.0	-7.0	1	21.4		3.0
Union of South Africa†							5	242.6	66.1	46.6
Zaire†	500,000						1	16.2		2.9
Total Africa	106,402,000	189,015	2,672	77	5,665.8	- .02	34	825.1	76.7	116.2

*Revised (government figure). †Oil or gas discovered but not yet producing.

WESTERN HEMISPHERE										
Antigua							1	17.3		1.9
Argentina	4,900,000	8,800	5,311	50	435.0	2.8	15	601.6	218.7	48.0
Bahamas							1	250.0		
Barbados*	750			1			1	3.0		
Bolivia	200,000	5,000	235	2	32.0	-13.5	5	21.7		
Brazil	857,000	918	1,213	28	167.0	-0.4	10	718.3	164.7	24.6
British Honduras										
British West Indies										
Chile	125,000	5,000	374	7	32.5	-7.5	3	123.5	34.7	10.0
Colombia	1,500,000	2,400	1,865	6	192.0	-16.2	6	172.1	65.5	2.0
Costa Rica							1	7.6	2.7	1.1
Cuba	9,000		20	3	3.5					
Dominican Republic							1	16.0		
Ecuador	5,750,000	<i>Egypt 500</i>	717	6	59.4	1,548.6	3	35.5	8.5	
El Salvador							1	14.0		4.6
Guatemala*	10,000			1			2	26.0		6.0
Honduras				1			1	14.0		1.8
Jamaica							1	31.0	2.8	
Martinique							1	11.0		2.1
Mexico	2,800,000	11,500	3,421	43	440.0	0.1	6	624.5	141.0	87.3
Netherlands Antilles							2	880.0	455.0	22.0
Nicaragua							1	13.2		2.6
Panama							1	75.0	19.0	7.5
Paraguay							1	5.0		
Peru	750,000	3,000	2,296	10	60.2	-2.9	5	101.5	22.7	1.8
Puerto Rico							3	291.0	70.5	76.0
Trinidad & Tobago	2,000,000	7,500	2,896	13	143.0	10.8	3	441.0	26.5	27.0
Uruguay							1	40.0	4.0	2.0
Venezuela	13,700,000	34,600	11,245	20	3,200.0	-9.8	12	1,499.0	170.0	8.8
Virgin Islands							1	418.0		13.5
United States	536,823,271	271,455	525,885	1,163	9,500.0	-0.3	247	13,087.0	4,852.0	3,169.1
Canada	10,200,000	155,000	20,911	163	1,490.0	10.4	41	1,725.0	427.0	290.0
Total W. Hemisphere	79,625,021	405,673	576,389	1,517	15,754.6	-1.0	378	21,262.8	6,685.3	3,809.7

*Oil or gas discovered but not yet producing. †Does not include Arctic gas.

‡Includes Alaska 10 billion.

Total Free World	568,893,281	1,218,474	593,668	1,771	40,788.6	2.0	701	49,588.0	9,118.4	6,947.8
Communist World	*98,000,000	†664,400			8,910.0	5.2				
Total World	666,893,281	1,882,874			49,698.6	3.0				

*Including Russia 75 billion, Red China 19.5 billion, Hungary 1 billion, others 2.5 billion.

†Including Russia 685.4 trillion, Red China 21 trillion, Hungary 3 trillion, & Poland 5 trillion.

06J

Trends in western-bloc refining

	Capacities in 1,000 b/d					Projected Capacities in 1,000 b/d		
	1-1-68	1-1-69	1-1-70	1-1-71	1-1-72	1-1-73	1-1-74	1-1-75
Crude-oil capacities								
Asia-Pacific	4,265	4,920	5,554	6,061	6,818	7,916	8,500	8,900
Africa	732	756	785	925	902	825	875	925
Middle East	2,053	2,296	2,438	3,172	2,851	2,758	2,900	3,100
Latin America	4,675	4,984	5,113	5,679	6,139	6,451	6,700	7,000
Western Europe	11,085	12,884	13,941	15,177	16,962	16,826	17,500	18,000
Total	22,810	25,840	27,831	31,014	33,672	34,776	36,475	37,925
Total, western bloc	35,698	39,274	41,921	45,743	48,692	49,588	51,750	53,425
Cracking (thermal & catalytic)								
Asia-Pacific	421	453	507	609	629	633	650	675
Africa	58	58	74	90	86	77	80	85
Middle East	131	111	155	197	212	218	230	240
Latin America	1,492	1,420	1,426	1,381	1,443	1,406	1,500	1,600
Western Europe	1,255	1,245	2,284	1,716	1,558	1,505	1,600	1,700
Total	3,347	3,287	3,446	3,993	3,928	3,839	4,060	4,300
Total, western bloc	11,789	11,857	12,278	13,029	13,032	13,900	14,000	14,500
Reforming (thermal & catalytic)								
Asia-Pacific	464	525	593	642	702	765	780	800
Africa	133	130	133	152	143	116	130	150
Middle East	212	243	215	235	233	214	230	250
Latin America	268	258	279	386	357	351	370	390
Western Europe	1,431	1,749	1,949	2,027	2,185	2,042	2,200	2,300
Total	2,508	2,905	3,169	3,442	3,620	3,488	3,710	3,890
Total, western bloc	5,098	5,657	6,179	6,606	6,918	6,947	7,300	7,500
Hydroprocessing								
Asia-Pacific	770	1,056	1,263	1,619	2,025	2,788	2,900	3,100
Africa	124	127	123	247	233	126	140	150
Middle East	158	341	332	473	489	478	490	500
Latin America	300	311	514	734	1,049	1,220	1,400	1,500
Western Europe	1,830	2,533	2,986	3,592	4,465	4,557	4,600	4,800
Total	3,182	4,368	5,218	6,665	8,261	9,169	9,530	10,050
Total, western bloc	7,346	8,724	9,834	11,570	13,531	15,398	16,000	17,000

during the summer of '72, Shell decided to issue a statement to counter unfounded rumors.

In late August, Shell announced a discovery—no figures revealed—at its 211/26-1 wildcat, only 20 miles west-northwest of the Brent field. Despite the lack of statistics, industry observers are confident that the second giant, now named Cormorant, is probably bigger even than Brent, for in August 1971, the two companies had plunked down \$50 million in an auction bid for block 211/21 immediately north of the Cormorant discovery. This "golden block" is now being drilled for the first time.

Not long after the Shell announcements came word from the Signal Group 2 (19% Signal, 22.5% Champin, 20% United Canso, 22.5% Santa Fe International, 5% North Sea Petroleum Ltd., 1% Charterhouse Se-

curities, and 10% Tricentrol) that it too had found oil in Block 211.

The wildcat, 211/18-1, flowed 5,293 b/d of 37° low-sulfur oil on an 8-hr test on a 40/65-in. choke from an undisclosed horizon. While Signal was careful not to overplay the find, it is believed that another giant has been tapped at the site, now called Halibut. Signal is to drill some confirmation wells on the structure next spring.

Other oil discoveries of the year came at Heimdal (Pan Ocean Group) in Norwegian block 25/4; Beryl (Mobil) in U.K. block 9/13; Bream (Phillips Group) in Norwegian block 17/12; Shell-Esso in U.K. block 16/8; Hamilton Bros. in U.K. block 15/24; Amoco in U.K. block 23/21; Hamilton Bros. in U.K. block 30/24; and three new strikes in the Ekofisk complex off Norway—Phillips Group's Edda (2/7-4X), Amoco's 2/5-3, and Shell's 1/6-1.

World output tops 50 million. The industry saw its production record over a new milestone in 1972, as the world total topped 50 million b/d for the first time in April. For the next 3 months, it fell back, but in August surged again to 51.2 million b/d and to 52 million b/d in September. It probably will never drop below the 50 million mark again.

Worldwide, crude production will grow about 3½% for all of 1972. The Communist bloc is growing faster at 5% than the free world at about 2.5-3%.

The Middle East continues to supply the bulk of free-world oil (43%), with an 8½% growth rate over the year, to reach about 19 million b/d.

Refining climbs. Western-bloc refining capacity outside the U.S. and Canada will hit nearly 35 million b/d on Jan. 1, 1973, according to the Journal's detailed worldwide survey.

The 34.8-million-bbl total compares with 33.7 b/d chalked up on Jan. 1, 1972. Or, using a stream factor of 0.95, the growth was 2.6 million b/d during 1972. (Journal figures for Jan. 1, 1972, and before are on a stream-day basis; those for Jan. 1, 1973, and later will be on a calendar day).

Projected total crude capacities for western bloc outside U.S. and Canada for Jan. 1, 1974, and Jan. 1, 1975, respectively, are 36.5 and 37.9 million b/d. When U.S. and Canadian figures are added, projected western-bloc totals are 51.8 and 53.4 million b/d for 1974 and 1975.

Biggest increase in crude capacity during the past year came in the Asia-Pacific area, where a 1.1-million-b/d gain was chalked up. Japan showed a 500,000-b/d growth, and South Korea added over 200,000 b/d.

The Asia-Pacific area also recorded a growth of nearly 800,000 b/d in hydroprocessing capacity. Most of the increase was recorded in Japan, where total hydroprocessing capacity now stands at 1.81 million b/d.

There was little change in western-bloc cracking and reforming capacity total during 1972.

Other "firsts." A few other landmarks were posted in international oil in 1972. Among them was a welcome to two new oil countries, as the first discoveries were made in Guatemala and in the Persian Gulf emirate of Sharjah. Both should begin production next year.

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AG0 530123

est producer, as crude from the North Sea's Dan field began flowing into Danish refineries in August.

And Ecuador became the world's newest exporter of crude oil, as oil from its eastern Oriente fields flowed over the Andes to the Pacific Coast for the first time in July.

Another country to come into flush

production for the first time was Congo-Brazzaville, where Elf-Congo began test production in January at its offshore Emeraude Marine field. Elf found the 7-billion-bbl giant in 1969.

Something to remember. 1972 will go into oil's history books as the year that the balance of power shifted from the international oil companies

to the producing countries, an event that was unimaginable only 3 years ago.

Despite its turbulence, its upsets, its nationalizations, its permanent changes, the year brought about a kind of peace between producer, transporter, and consumer that will be something to remember. END

Worldwide refining

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
ALGERIA	Cia. Raffinage en Afrique du Nord (CRAN), Hassi Messaoud	3,135	.....	.....	.....
	Sonatrach—Raffinerie d'Alger, Maisan Carree	57,000	.....	14,500 C	.....
	El Borma	600	.....	.....	.....
	Total	60,735	.....	14,500 C	.....
ANGOLA	Cabinda Gulf, Cabinda	2,800	.....	.....	.....
	Companhia de Petroleos de Angola (SARL), Luanda	13,200	.....	1,900 C	1,900 V, 2,800 DHD, 950 A
	Total	16,000	.....	1,900 C	.....
ANTIGUA	West Indies Oil Co., Ltd., St. John's	17,300	.....	1,920 C	2,000 DHT, 4,800 DHD
ARGENTINA	Astrasur, Refinerías Patagónicas de Petróleo Sociedad Anónima, Comodoro Rivadavia	6,800	2,200 T 3,200 Vis	.....	4,800 V, 5,300 A
	Cóndor, Sociedad Anónima Petrolera Argentina, Lomas de Zamora	1,425	450 T	.....	450 V, 450 L
	Esso SAPA, Campana	87,400	13,800 CK 17,900 FCC 9,000 Vis	8,000 C	47,800 V, 8,000 DHT, 1,000 L, 570 C, 3,300 A
	Galván	17,000	.....	.....	450 V, 450 L
	Lottero Papini SA, Avellaneda	1,900	.....	.....	.....
	Ragor SAIC, Quilmes	600	.....	.....	.....
	Refinería de Petróleo la Isaura SA, Bahía Blanca	12,580	1,450 T	.....	.....
	Shell Compañía Argentina de Petróleo SA, Buenos Aires	115,000	20,000 Vis 21,000 C	9,000 C	25,000 DHT
	Yacimientos Petrolíferos Fiscales:				
	Campo Durán	26,900	.....	.....	.....
	Dock Sud	5,700	2,300 T	.....	1,500 V
	El Centauro, Tierra del Fuego	18,000	.....	.....	.....
	La Plata	182,500	40,500 FCC 22,100 CK	15,500 C	61,000 V, 3,800 DHT, 8,500 DHD, 700 Alky, 440 P, 3,150 L, 650 C, 1,550 A
	Luján de Cuyo	107,700	3,400 T 9,100 Vis 17,000 CK 14,300 FCC	15,500 C	56,800 V, 18,700 DHC, 2,500 DHD, 1,000 C
	Plaza Huincul	4,800	5,700 T	.....	.....
	San Lorenzo	31,100	4,000 T 11,300 Vis	.....	9,000 V
	Total	601,585	93,700 C 125,000 T	48,000 C	.....

Abbreviations used with the refining tabulations

(All figures in barrels per calendar day).

All figures are as of 1-1-73

Cracking processes:
C—Cat cracking
CK—Coke
FCC—Fluid cat cracking
HD—Houdrifiow cat cracking
T—Thermal cracking

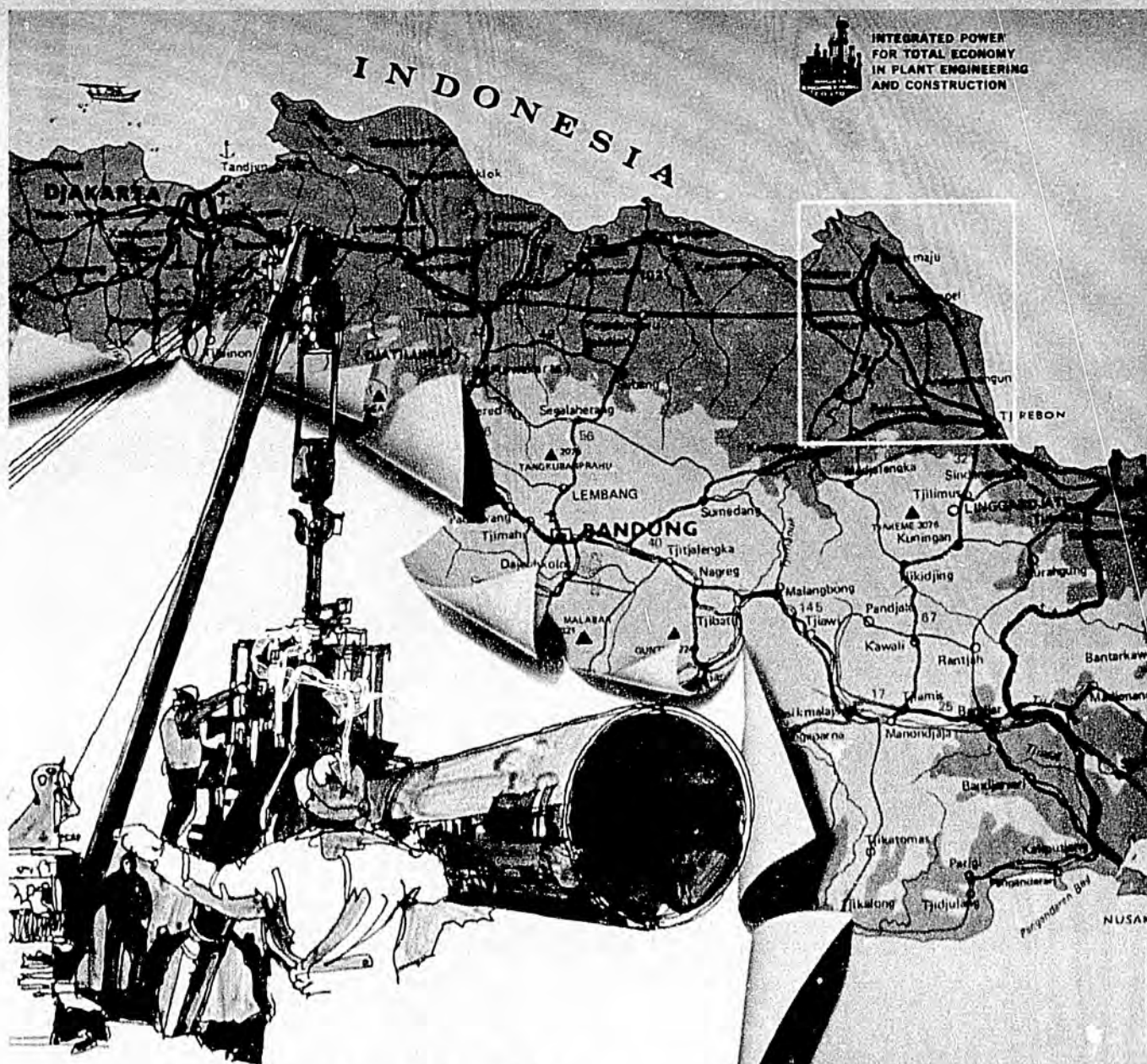
TCC—Thermoform cat cracking
Vis—Visbreaking

Reforming processes:
C—Catalytic
T—Thermal

Other processing:
A—Asphalt
Alky—Alkylation
C—Coking (t/d)
DHT—Distillate hydrotreating
DHD—Distillate hydrodesulfurization
RHC—Residual hydrocracking
DHC—Distillate hydrocracking

Is—Isomerization
L—Lube manufacture
P—Polymerization
RHD—Residual hydrodesulfurization
SD—Solvent decarbonizing
V—Vacuum distillation
W—Waxes

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
AUSTRALIA	Amoco Australia Pty. Ltd., Brisbane	25,000	8,750 FCC	5,000 C	14,500 V, 14,250 DHD, 1,400 Alky, 8,600 A
	Ampo: Refineries Ltd., Lytton	60,000	21,500 FCC	11,800 C	26,000 V, 2,500 Alky, 1,500 Poly
	Australian Oil Refining Pty. Ltd., Kurnell	93,000	40,900 FCC	13,300 C	48,500 V, 3,200 Alky, 2,800 Poly, 12,800 SD
	Kurnell (lube refinery) .....	.....	.....	.....	7,100 V, 6,500 DHT, 3,775 L
	BP Australia Ltd., Kwinana	98,735	14,520 FCC	17,630 C	40,950 V, 16,380 DHT, 7,735 DHD, 1,553 L, 475 A
	Westernport	45,500	.....	13,333 C	3,185 V, 15,470 DHT, 678 A
	Petroleum Refineries Australia Pty. Ltd.— Adelaide	45,000	.....	14,500 C	2,500 V, 30,000 DHD, 1,000 A
	Alltona	98,500	24,000 FCC	24,000 C	22,000 V, 30,000 DHT, 9,500 DHD, 2,000 Alky, 3,000 A
	Shell Refining (Australia) Pty. Ltd., Clyde	55,000	17,000 C	9,900 C	22,000 DHT, 6,000 DHD
	Geelong	92,000	18,000 C	17,000	36,000 DHT, 11,000 DHD
AUSTRIA	Total Refineries Australia Ltd., Matraville ...	30,000	.....	6,000 C	12,000 V, 11,000 DHT, 4,300 DHC
	Total	632,735	144,670 C	131,563 C	
BAHAMAS	Osterreichische Mineralolverwaltung AG, Schwechat	220,500	16,300 FCC 7,800 T	23,000 C	48,000 V, 24,780 DHT, 23,000 DHD, 700 L, 36,000 A
	Bahamas Oil Refining Co., Freeport	250,000	.....	.....	70,000 V
BAHRAIN	Bahrain Petroleum Co. Ltd., Awali	250,000	34,200 FCC 19,000 Vis	14,300 C	40,500 V, 14,300 DHD, 1,300 Poly, 2,400 A
	Eastern Refinery Ltd., Chittagong	30,600	.....	1,620 C	1,804 DHT, 1,660 DHD
BANGLADESH	Mobil Oil Barbados Ltd., Bridgetown	3,000	.....	.....	400 A
	BARBADOS				
BELGIUM	Albatros SA, Antwerp	57,000	.....	8,550 C	15,930 DHD
	Anglo-Belge des Petroles SA, Antwerp-Kiel ...	4,900	.....	.....	.....
	Belgian Shell NV, Ghent	9,000	.....	.....	.....
	Esso Belgium NV, Antwerp	95,000	9,500 FCC	7,800 C	32,000 V, 40,600 DHT, 550 L, 7,500 A
	NV Societe Industrielle Belge des Petroles SA (SIBP), Antwerp	297,700	49,100 FCC	28,400 C	105,900 V, 55,800 DHT, 53,900 DHD, 4,300 Alky, 1,560 Poly, 11,400 A
	Raffinerie Belge de Petroles, Antwerp	98,000	.....	19,000 C	14,000 V, 27,000 DHT, 10,000 DHD, 9,200 A
	SA Chevron Belgium NV, Feluy	130,000	.....	10,000 C	60,000 V, 10,000 DHT, 23,000 DHD, 2,300 A
	Texaco Belgium NV, Ghent	140,000	.....	17,500 C	46,000 DHT
	Total	831,600	58,600 C	91,250 C	
	BOLIVIA				
BRAZIL	Yacimientos Petroliferos Fiscales Bolivianos (YPFB):				
	Camiri	1,140	.....	.....	.....
	Cochabamba	13,300	.....	.....	450 V, 450 L
	Sanandita	570	.....	.....	.....
	Santa Cruz	2,850	.....	.....	.....
	Sucre	3,800	.....	.....	.....
	Total	21,660	.....	.....	
	BRAZIL				
BRAZIL	Companhia de Petróleo da Amazonia, Paredao, Manaus	10,000	2,000 FCC	.....	3,000 V, 100 A
	Petróleo Brasileiro SA (Petrobras):				
	Betim, Minas Gerais	57,000	12,000 FCC	.....	22,000 V, 1,500 A
	Canoas, Rio Grande de Sul	57,000	12,000 FCC	.....	22,000 V, 1,500 A
	Cubatao, Sao Paulo	170,000	43,000 FCC	10,000 C	85,000 V, 5,000 A
	Duque de Caxias, Rio de Janeiro	190,000	34,000 FCC	11,000 C	100,000 V, 4,400 DHT, 4,400 L, 4,000 A
	Mataripe, Bahia	72,000	15,000 FCC	.....	40,000 V, 2,000 A
	Paulina, Sao Paulo	114,000	30,000 FCC	.....	57,000 V, 3,000 A
	Refinaria de Petróleo Ipiranga SA, Rio Grande	9,300	.....	.....	1,098 A
	Refinaria de Petróleos de Manguinhos SA, Rio de Janeiro	9,500	3,600 Vis	3,600 T	



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around the world*. It's an experienced, grass-roots, project engineering service, and it covers a lot of ground: petroleum refining plants, petrochemical plants, environmental control systems, nuclear plants, long-distance pipelines and a lot more.

NIIGATA is a name worth thinking about when you're wondering how to get your next project up and away.

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WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
BRAZIL—Continued	Refinaria e Exploracao de Petroleo (Uniao) SA, Capuava, Sao Paulo	29,450	13,050 TCC		9,000 V, 900 P
	Total	718,250	161,050 C 3,600 T	21,000 C 3,600 T	
BRUNEI	Sarawak Shell Berhad, Seria	60,000			
BURMA	Myanma Oil Corp., Chauk	6,100			
	Syriam	19,200	1,635 T		
	Total	25,300	1,635 T		
CAMBODIA	Societe Khmere de Raffinage de Petrole, Krung Kompong Som	12,540		1,800 C	5,850 DHT
CEYLON	Ceylon Petroleum Corp., Sapugaskanda	37,400	9,000 Vis	2,500 C	1,900 V, 7,600 DHT, 7,000 DHD, 1,000 A
CHILE	Empresa Nacional del Petróleo, Concepción ..	72,000	14,300 FCC 8,400 Vis	4,000 C	38,000 V
	Concón	50,000	12,000 FCC	6,000 C	24,000 V, 1,100 Alky, 1,000 A
	Magallanes	1,500			
	Total	123,500	26,300 C 8,400 T	10,000 C	
COLOMBIA	Colombian Petroleum Co., Tibú	4,200			
	Empresa Colombiana de Petróleos, Barrancabermeja	110,000	35,000 FCC 16,000 Vis	2,000 C	55,000 V, 2,500 Alky, 3,300 L, 3,500 A, 1,300 W
	International Petroleum (Colombia) Ltd., Cartagena	49,000	14,500 C		30,000 V, 3,500 P, 450 L
	La Dorada	5,500			
	Texas Petroleum Co., Guamo	2,300			
	Orito (with Gulf Oil)	1,110			
	Total	172,110	49,500 C 16,000 T	2,000 C	
COSTA RICA	Refinadora Costarricense de Petroleo SA, Moin, Limon	7,600	2,700 T	1,080 C	1,980 DHT
CUBA	Cia. Petrolera Shell de Cuba, Havana	27,000		5,000 C	
	Esso Standard Oil Co., Havana	46,000	24,000 FCC	7,000 C	2,000 DHT, 1,300 P, 1,000 A
	The Texas Co. (West Indies) Ltd., Santiago de Cuba	20,000		3,000 C	
	Total	93,000	24,000 C	15,000 C	
	All privately owned companies seized by government and now operated by Empresa Consolidada de Petrolea, S.A.				
CYPRUS	Cyprus Petroleum Refinery Ltd., Larnaca	12,000		2,000 C	
DENMARK	A/S Dansk Shell, Fredericia	59,000	24,000 Vis	10,000 C	14,000 DHT, 8,000 DHD
	Dansk Esso A/S, Kalundborg	72,800		7,300 C	22,000 V, 8,000 DHT, 12,000 DHD, 11,000 A
	Gulhavn, Skaelskor	90,000	10,700 T 5,700 Vis	17,100 C	14,950 V, 26,360 DHT, 24,225 DHD
	Total	221,800	40,400 T	34,400 C	
DOMINICAN REPUBLIC	Falconbridge Dominicana C por A, Santo Domingo	16,000			
ECUADOR	Anglo-Ecuadorian Oilfields Ltd., La Libertad ..	27,200	8,500 T		
	Petroleos Gulf del Ecuador CA, La Libertad ..	7,300			
	Texaco Petroleum Co., Lago Agrio	950			
	Total	35,450	8,500 T		
EGYPT	Alexandria Petroleum Co. (Petmex), Alexandria Amreya refinery	66,500 32,000			
	Total	98,500			
EL SALVADOR	Refineria Petrolera Acajutla SA (RASA), Acajutla	14,000		2,600 T 2,000 C	4,650 DHD

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
ETHIOPIA	Ethiopian Petroleum SC, Assab	14,790		2,000 C	1,840 V, 3,300 DHT, 440 A
FINLAND	Neste Oy, Naantali	56,000	11,000 TCC	6,800 C	15,000 V, 7,620 DHT, 7,400 DHD, 2,600 Poly, 6,500 A
	Porvoo	130,000	14,000 Vis 21,000 FCC	18,000 C 1,300 T	53,000 V, 29,100 DHT 14,000 DHC, 37,000 DHD, 7,500 Poly, 6,400 A
	Total	186,000	32,000 C 14,000 T	24,800 C 1,300 T	
FRANCE	Antar Petroles de l'Atlantique, Donges	180,000	12,500 FCC	33,300 C	13,000 DHD, 3,200 A
	Valenciennes (Nord)	78,000		14,000 C	
	Vern-sur-Seiche	31,000		7,500 C	
	Compagnie Francaise de Raffinage, Gonfreville l'Orcher	484,000	24,300 FCC	64,380 C	56,000 V, 69,400 DHT, 85,000 DHD, 2,800 Poly, 7,400 L, 20,250 A
	La Mede	212,000	26,500 FCC	41,000 C	47,500 V, 820 DHT, 53,000 DHD, 820 Poly, 16,200 A
	Compagnie Rhenane de Raffinage, Reichstett Vendenheim	75,000	16,000 Vis	13,000 C	24,000 DHT, 16,000 DHD
	Elf Union: Raffinerie de L'ile de France, Grandpuits	84,000		12,000 C	27,000 V, 24,000 DHT, 8,300 DHD, 3,100 A
	Raffinerie du Vexin, Gargenville	130,000			
	Raffinerie Elf Rhone-Alpes, Feyzin	151,000	16,000 FCC 11,000 Vis	7,000 C	33,000 V, 7,000 DHT, 3,500 A
	Raffinerie Union Industrielle des Petroles, Ambes	42,000	7,700 FCC	4,400 C 4,000 T	19,600 V, 760 Poly
	Esso Standard SAF, Bordeaux	58,000		8,000 C	28,000 V, 2,400 A
	Fos sur Mer	70,000	11,500 FCC	10,700 C	19,600 V, 22,800 DHT, 2,200 A
	Port Jerome	150,000	12,000 FCC	27,000 C	42,000 V, 46,500 DHT, 12,000 DHD, 5,600 L, 7,800 A
	Mobil Oil Francaise, Frontignan	80,000	11,000 TCC	17,000 C	22,000 DHT, 25,000 DHD, 1,000 A
	Notre Dame de Gravenchon	72,500		14,500 C	10,500 V, 14,500 DHT, 7,000 DHD, 3,700 L
	Raffinerie de Strasbourg, Herrlisheim Bas-Rhin	95,000		21,600 C	19,080 V, 21,600 DHT, 13,500 DHD, 7,380 A
	Shell Francaise, Berre l'Etang	165,000	4,000 Vis 17,000 C	24,000 C	33,000 DHT, 13,000 DHD
	Pauillac	90,000	24,000 C	15,000 C	32,000 DHT, 13,000 DHD
	Petit Couronne	180,000	6,000 Vis 21,000 C	16,000 C	31,000 DHT, 14,000 DHD
	Societe Francaise des Petroles BP, Dunkirk	113,750		12,900 C	17,290 V, 5,187 DHT, 3,262 L, 2,440 A
	Lavera	232,960		6,880 C	40,586 V, 14,287 DHT, 13,650 DHD, 1,858 A
	Vernon	70,070		9,890 C	5,100 V, 18,200 DHT, 10,920 DHD, 1,356 A
	Societe de la Raffinerie de Lorraine (CRF 51%, Esso 40%, Elf Union 9%), Hauconcourt	105,000		15,000 C	16,000 V, 35,000 DHT, 11,500 DHD, 9,100 A
	Total	2,949,280	183,500 C 37,000 T	395,050 C 4,000 T	
GABON	Société Equatoriale de Raffinage, Port Gentil	17,000	7,000 Vis	2,000 C	4,000 DHT
GERMANY, WEST	BP Benzin und Petroleum AG, Dinslaken	103,740	10,912 FCC	12,040 C	21,840 V, 9,100 DHD, 3,729 A
	Hamburg	99,550		6,880 C	46,950 V, 8,645 DHD, 1,492 A
	Vohburg	100,100	10,560 FCC	15,480 C	21,840 V, 25,480 DHT, 13,468 DHD, 4,068 A
	Callex Deutschland GmbH, Raunheim	90,000		3,500 C	28,000 V, 6,500 DHT, 8,600 DHC
	Deutsche Marathon Petroleum GmbH, Burghausen, Bavaria	60,000			10,000 DHT, 550 C
	Deutsche Shell AG, Godorf	180,000	38,500 T	20,000 C	55,000 DHT, 49,000 DHD
	Harburg/Grasbrook	85,000	12,000 C 17,000 T	8,000 C	16,000 DHT, 12,000 DHD, 600 P, 3,452 L
	Ingolstadt	55,000	11,000 T	7,000 C	17,000 DHT, 17,000 DHD 1,726 L
	Monheim	7,000			
	Deutsche Texaco AG, Heide	65,000	8,000 TCC	14,000 C	21,000 V, 24,000 DHT, 800 P, 3,500 A
	Erdol Raffinerie Duisburg GmbH, Duisburg	37,800		7,300 C	7,300 DHT, 4,200 DHD

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
GERMANY—Continued					
	Erdoelraffinerie Ingolstadt AG, Ingolstadt-Donau	65,000	.....	13,500 C	13,500 DHT, 6,500 DHD
	Erdol-Raffinerie Mannheim GmbH, Mannheim	123,000	.....	7,900 C	3,500 DHD
	Erdol-Raffinerie Neustadt GmbH & Co., Neustadt-Donau	99,000	11,700 FCC	17,700 C	24,000 V, 26,500 DHT, 21,000 DHD, 8,550 A
	Erdoel-Raffinerie Speyer, Speyer	57,800	.....	.....	.....
	Esso AG, Hamburg	122,000	7,500 FCC	13,400 C	15,300 V, 37,900 DHT, 22,300 DHD, 2,300 L, 11,300 A
	Ingolstadt	102,000	14,500 FCC	13,400 C	27,700 V, 31,300 DHT, 32,800 DHD, 9,100 A
	Karlsruhe	183,000	22,600 T	30,000 C	45,000 V, 54,700 DHT, 58,700 DHD, 30,600 A
	Koln	116,300	.....	9,300 C	17,000 V, 9,700 DHT, 11,700 DHD, 12,900 A
	Gelsenberg AG, Gelsenkirchen-Horst	144,000	23,400 Ck 11,000 TCC	30,700 C	16,100 V, 16,300 DHT, 31,400 DHD, 370 C
	Gewerkschaft Erdol-Raffinerie Deurag-Nerag, Misburg	54,000	12,000 Ck	8,000 C	7,000 DHD, 2,301 L
	Gulf-Erdoelwerke Frisia AG, Emden	47,500	.....	9,500 C	15,590 DHT
	Mobil Oil AG, Bremen	30,000	7,500 TCC	5,500 C	6,500 V, 6,000 DHT, 6,000 DHD, 800 L
	Worth	75,000	12,000 FCC	14,000 C	18,000 V, 26,000 DHT, 19,000 DHD
	Oberrheinische Mineralolwerke GmbH, Karlsruhe	128,000	11,600 T 4,700 Vis	20,500 C	21,200 V, 20,500 DHT, 18,100 DHD, 11,800 A
	Occidental Oel GmbH, Brunsbüttel	7,500	.....	.....	6,700 A
	Stadthafen Essen	15,000	.....	.....	10,000 V, 7,500 A
	Oelwerke Julius Schindler MmbH, Hamburg	7,600	.....	.....	5,460 V, 5,000 DHT, 3,384 L
	Saarland-Raffinerie GmbH, Kokereistraße	55,000	.....	.....	.....
	Union Rheinische Braunkohlen Kraftstoff AG, Wesseling	125,000	43,000 Vis	9,750 T 8,400 C	15,100 DHT, 10,100 DHD 650 P
	Veba-Chemie AG, Gelsenkirchen-Buer	162,000	17,000 Vis 4,900 FCC	22,800 C	6,300 V, 31,300 DHT, 10,900 DHD, 3,800 A
	Wintershall AG, Lingen, Emsland	91,000	15,400 Ck 13,600 FCC	15,830 C	16,100 V, 20,490 DHT, 12,820 DHD, 930 Poly, 420 C
	Salzbergen	4,790	.....	.....	770 DHT, 1,920 L, 1,170 A
	Total	2,697,680	124,172 C 216,200 T	334,930 C 9,750 T	
GREECE					
	Hellenic Aspropyrgos Refinery SA, Aspropyrgos (near Athens)	38,000	.....	8,100 C	5,860 V, 2,250 A
	Petrola Hellas, Athens	10,000	.....	.....	.....
	Athens	10,000	.....	.....	.....
	Thessaloniki Refining Co., Thessaloniki	66,500	.....	6,300 C	6,300 V, 24,120 RHT, 9,000 DHD, 2,430 A
	Total	124,500	.....	14,400 C	
GHANA					
	The Ghanaian Italian Petroleum Co. (Ghaip) Ltd.	26,600	.....	6,175 C	.....
GUAM					
	Guam Oil & Refining Co., Agaña	29,500	.....	.....	.....
GUATEMALA					
	Refinería Petrolera de Guatemala-California Inc., Puerto Barrios	12,000	.....	3,000 C	5,000 DHD
	Texas Petroleum Co., Escuintla	14,000	.....	3,000 C	5,000 DHT
	Total	26,000	.....	6,000 C	
HONDURAS					
	Refinería Texaco de Honduras SA, Puerto Cortes	14,000	.....	1,800 C	5,000 DHT
INDIA					
	Assam Oil Co. Ltd., Digboi	12,100	990 Ck	.....	1,100 L, 45 C, 427 A
	Burmah-Shell Refineries Ltd., Trombay, Bombay	110,000	17,000 C	7,000 C	33,000 V, 8,500 A
	Caltex Oil Refining (India) Ltd., Visakhapatnam	32,000	9,100 FCC	.....	15,200 V, 3,600 SD, 1,337 A
	Cochin Refineries Ltd., Cochin	53,500	14,210 Vis	5,640 C	7,400 V, 26,080 DHD, 2,822 A
	Esso Standard Refining Company of India Ltd., Trombay, Bombay	70,000	10,000 FCC	.....	9,000 V, 6,500 A
	Indian Oil Corp., Barauni	44,000	12,000 Ck	.....	15,000 V, 850 L, 270 C
	Baroda	82,000	.....	7,000 C	.....
	Gauhati	16,000	6,500 Ck	.....	125 C

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
INDIA—Continued	Lube India Ltd. (Esso), Bombay	19,500	.....	.....	1,700 DHT, 3,200 L
	Madras Refineries Ltd., Manali	50,000	12,454 T	2,158 C	20,000 V, 5,922 DHT, 17,870 DHD, 6,062 RHD, 3,774 L, 4,000 A
	Total	489,100	36,100 C 46,154 T	21,798	
INDONESIA	Lemigas, Tjepu, East Java	4,000	.....	.....	.....
	Pertamina:				
	Balikpapan	75,000	.....	.....	13,000 V
	Dumai, Central Sumatra	100,000	.....	.....	.....
	Pakning (South), Central Sumatra	50,000	.....	.....	.....
	Pangkalan Brandan	2,000	.....	.....	200 L, 300 A
	Pladju, South Sumatra	110,000	10,000 T	16,000 T	24,000 V, 1,100 A, 350 P, 500 A
	Sungei Gerong	79,000	20,000 T 19,500 FCC	.....	87,000 V, 650 Alky, 1,200 P
	Wonokromo, East Java	4,000	.....	.....	750 A
	Total	424,000	30,000 T 19,500 C	16,000 T	
IRAN	Iranian Oil Exploration & Producing Co., Masjid Sulaiman	75,000	.....	.....	.....
	Iranian Oil Operating Companies, Abadan	430,000	36,000 FCC	44,000 T 25,000 C	90,000 V, 25,000 DHT, 10,600 Alky, 1,000 L, 9,750 A
	National Iranian Oil Co., Kermanshah	15,000	.....	2,780 C	4,980 DHT
	Tehran	100,000	16,000 Vis	13,500 C	40,000 V, 13,500 DHT, 16,000 DHC, 4,800 A
	Total	620,000	36,000 C 16,000 T	41,280 C 44,000 T	
IRAQ	Oil Refineries Administration:				
	Daura	71,000	.....	5,000 C	13,000 DHT, 8,160 L, 1,815 A
	K3-Haditha	7,000	.....	.....	.....
	Khanaqin	12,000	.....	.....	.....
	Muthia	4,500	.....	.....	.....
	Qaiyarah, Mosul	2,000	.....	.....	920 A
	Iraq Petroleum Co. Ltd., Kirkuk	2,000	.....	.....	.....
	Total	98,500	.....	5,000 C	
IRELAND	Irish Refining Co. Ltd., Whitegate	58,000	.....	13,300 C	5,000 DHD
ISRAEL	Oil Refineries Ltd., Haifa	147,368	42,105 T 15,789 Vis	16,842 C	51,263 DHT, 736 L, 3,167 A
	Total	147,368	57,894 T	16,842 C	
ITALY	Amoco Italia SpA, Cremona	100,000	.....	2,700 T 4,000 C	7,600 DHT, 7,100 DHD, 3,600 Isom
	ANIC SpA, Gela	92,000	21,000 FCC	14,200 C	32,000 V, 24,000 DHT, 26,000 DHD, 9,500 Alky, 1,000 C, 1,000 A
	Sannazzaro d'Burgondi	120,000	80,000 FCC	24,500 C	60,000 V, 24,500 DHT, 12,000 DHD, 5,200 Alky, 2,500 A
	Anonima Petroli Italiana, Falconara Marittima	81,000	9,000 Vis	3,600 T 10,000 C	13,000 V, 9,500 DHD, 3,000 A
	Aquila SpA, Aquilina, Trieste	50,000	.....	7,700 C	10,000 V, 300 DHT, 5,000 DHD, 1,300 L, 2,300 A
	BP Italiana, Volpiano	72,800	.....	10,750 C	18,200 DHT, 10,920 DHD, 5,280 Isom
	Edoardo Garrone, Genoa	147,000	12,520 Vis	14,270 C	21,400 DHD
	Gaeta Industrie Petroli SpA, Gaeta	39,900	27,000 FCC	11,250 C	10,800 DHT, 225 L
	Gulf Italiana SpA, Bertinico	78,000	.....	12,700 C	14,600 V, 18,500 DHT, 11,700 DHD, 2,400 Isom, 4,575 A
	Industrie Chimiche Italiane del Petrolio SpA (ICIP), Mantova-Frassino	65,000	.....	9,700 C	7,500 V, 14,600 DHT, 5,000 DHD, 2,000 Isom, 4,300 A
	Industria Leganti Stradali del Affini (Ilsea), Como	7,885	360 T	1,350 C	.....
	Industria Raffinazione Olii Minerali (IROM), Porto Marghera	110,000	.....	18,000 C	18,000 DHT, 18,500 DHD
	Liquichimica SpA, Milan	12,000	.....	1,000 C	.....
	Lombarda Petroli SpA, Villasanta, Milan	23,500	.....	3,600 C 630 T	4,800 DHT
	Mediterranea SpA, Milazzo, Sicily	479,750	5,400 Vis 40,500 FCC	9,000 T 9,000 C	9,000 DHD, 4,500 Alky

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
ITALY—Continued	Mobil Oil Italiana, Naples	130,000	14,500 TCC	12,500 C	7,500 V, 13,500 DHT, 10,500 DHD, 3,500 Alky, 750 L, 650 A
	Montecatini Edison SpA, Brindisi	41,800	.....	.....	.....
	Raffineria Dellepiane SpA, S. Quirico, Genoa	20,000	.....	.....	12,200 A
	Raffineria di Roma SpA, Rome	80,300	.....	12,300 C	9,300 V, 18,900 DHT, 8,500 DHD, 3,100 A
	Raffineria IPIOM, Sarissola, Genoa	31,200	.....	.....	5,700 V, 2,850 A
	Raffineria Olii Lubricanti (ROL), Viguzzola	1,425	.....	.....	.....
	Raffineria Sarde, Saras, Cagliari, Sardinia	256,500	27,000 FCC	17,550 C	45,000 V, 17,730 DHT, 27,000 DHD
	Raffinerie Siciliane Oli Minerali SpA (Rasiom), Augusta, Siracusa	210,000	40,000 FCC	15,300 C	189,200 V, 23,500 DHT, 25,000 DHD, 7,700 Alky, 5,200 L, 6,700 A
	Sanquirico SpA, Genoa	32,500	.....	1,300 C	11,500 DHD
	Sarpom, Novara	235,000	12,200 FCC	27,200 C	22,800 V, 89,300 DHT, 1,600 Poly, 2,800 A
	Shell Italiana SpA, La Spezia	86,000	.....	20,000 C	24,000 DHT, 12,000 DHD
	Rho	75,000	15,000 C	18,000 C	21,000 DHT, 12,000 DHD
	Taranto	90,000	.....	16,000 C	24,000 DHT, 12,000 DHD
	Sincat SpA, Priolo	313,500	18,000 FCC	9,450 C	36,000 V, 18,000 DHT, 15,300 DHD
	Societa Azionaria Raffinazione Olii Minerali (Sarom), Ravenna	153,900	.....	12,600 C 4,500 T	25,200 DHT
	Societa Italiana Resine SpA (Sardoil), Porto Torres, Sardinia	118,750	.....	11,700 C	14,400 DHD
	Societa Petroliifera Italiana, Arcola, La Spezia	18,400	.....	.....	.....
	Stanic Industria Petroliifera, Bari	105,000	.....	10,500 C	10,500 DHT, 19,300 DHC, 2,000 A
	Leghorn, Livorno	115,000	.....	24,000 C 3,740 T	26,800 DHT, 7,800 DHD, 6,700 L
	Total	3,593,110	295,200 C 27,280 T	360,420 C 24,170 T	

IVORY COAST	Societe Ivoirienne de Raffinage, Abidjan-Urudi	24,417		2,794 C	3,172 DHT
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JAMAICA	Esso West Indies Ltd., Kingston	31,000	2,800 FCC		610 V, 13,700 DHT, 320 A
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JAPAN	Asia Oil Co. Ltd., Hakodate	23,750		1,170 C	1,350 V, 2,700 DHD
	Sakaide	60,000	8,000 FCC		40,000 V, 14,000 DHD, 15,000 RHD
	Yokohama	95,000	.....	12,600 C	1,260 V, 6,300 DHC, 11,700 DHD
	Daikyo Oil Co. Ltd., Yokkaichi	185,250	18,000 FCC 3,150 HD	8,100 C	79,325 V, 3,600 DHT, 37,800 DHD, 31,500 RHD, 4,300 L, 5,490 A
	Fuji Kosan Co. Ltd., Kainan	77,600	.....	.....	44,000 V, 9,000 DHT, 20,000 DHD, 13,600 L, 17,500 A
	Fuji Oil Co. Ltd., Chiba	133,000	.....	5,850 C	30,150 V, 23,850 DHD, 20,700 RHD
	General Sekiyu Seisei KK, Kawasaki	52,700	.....	4,750 C	15,200 DHT
	Sakai	116,400	.....	24,250 C	50,300 V, 74,300 DHT, 29,450 DHD
	Idemitsu Kosan Co. Ltd., Chiba	310,000	25,000 FCC	35,000 C	60,000 V, 53,500 DHT, 38,000 DHD, 40,000 RHD, 5,753 L
	Hyogo	110,000	.....	15,000 C	22,000 DHT, 25,000 DHD, 40,000 RHD
	Tokuyama	140,000	15,000 FCC	15,000 C	20,000 V, 15,000 DHT, 30,000 DHD, 976 A
	Kansai Oil Co. Ltd., Sakai	110,000	.....	5,000 C	34,000 V, 20,000 DHT, 20,000 DHD
	Kashima Oil Co. Ltd., Kashima	180,000	14,000 FCC	6,000 C	25,000 V, 25,000 DHD, 45,000 RHD
	Koa Oil Co. Ltd., Marifu	141,550	13,500 Ck 14,000 FCC	11,520 C	45,000 V, 12,600 DHT, 2,250 DHC, 7,200 DHD, 225 C
	Osaka	76,000	14,400 FCC	8,100 C	49,500 V, 6,300 DHT, 10,800 DHD
	Kyokuto Petroleum Industries Ltd., Chiba	99,000	.....	5,000 C	67,000 V, 7,000 DHT, 67,000 DHD
	Kyushu Oil Co., Ohita	95,000	.....	8,100 C	22,500 V, 14,400 DHT, 12,600 DHD
	Maruzen Oil Co. Ltd., Chiba	195,000	20,000 FCC	25,000 C	65,000 V, 45,000 DHD, 35,000 RHD, 490 A
	Matsuyama	50,000	.....	3,500 C	12,000 DHD
	Shimotsu	37,500	6,500 FCC	7,000 C	14,460 V, 2,300 DHT, 4,500 DHD, 1,660 L, 920 A

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
JAPAN—Continued	Mitsubishi Oil Co., Kawasaki	99,750	.....	10,800 C	8,170 V, 20,250 DHT, 1,043 A
	Mizushima	161,500	18,000 FCC	25,830 C	92,150 V, 71,640 DHT, 38,250 DHD, 1,800 P, 2,641 L, 2,086 A
	Nichimo Sekiyu Seisei KK, Kawasaki	54,150	.....	5,400 C	19,800 V, 2,160 DHT, 9,000 DHD, 14,400 RHD
	Nihonkai Oil Co. Ltd., Toyama City	30,000	.....	.....	.....
	Nippon Mining Co., Funakawa	13,735	.....	.....	1,746 V, 665 L, 750 A
	Mizushima	175,680	.....	20,700 C	27,000 V, 73,170 DHT, 2,700 DHC, 27,900 RHD, 3,450 L, 3,450 A
	Nippon Oil Co. Ltd., Niigata	24,700	.....	4,590 C	1,900 V, 14,850 DHT, 540 L, 396 A
	Nippon Petroleum Refining Co. Ltd., Kudamatsu	39,900	.....	4,680 C	4,275 V, 7,290 DHT, 360 L, 1,305 A
	Muroran	9,500	.....	.....	.....
	Negishi	313,500	18,000 FCC	27,900 C	135,850 V, 88,110 DHT, 61,200 DHD, 3,105 L, 6,210 A
	Yokohama	66,500	5,040 FCC	2,970 C	23,750 V, 9,540 DHT, 1,341 L, 3,357 A
	Seibu Sekiyu KK, Onoda	47,000	.....	6,000 C	26,000 DHT, 9,000 DHD
	Showa Sekiyu KK, Kawasaki	140,000	.....	20,000 C	20,000 DHT, 42,000 DHD
	Niigata	42,000	.....	4,000 C	11,000 DHT, 2,000 DHD
	Showa Yokkaichi Sekiyu KK, Yokkaichi	170,000	15,000 C	32,000 C	32,000 DHT, 33,000 DHD
	Taiyo Oil Co. Ltd., Kikuma	56,050	.....	4,500 C	3,600 V
	Teiseki Topping Plant Co., Kubiki	3,895	.....	.....	.....
	Toa Nenryo Kogyo KK, Kawasaki	190,000	36,000 FCC	.....	110,700 V, 69,300 DHT, 54,000 DHD, 520 A
	Shimizu	41,300	.....	4,140 C	3,420 V, 13,140 DHT, 190 L, 950 A
	Wakayama	177,700	20,970 FCC	32,400 C	71,550 V, 85,800 DHT, 22,500 DHD, 1,130 Alky, 5,930 L, 3,160 A
	Toa Oil Co. Ltd., Kawasaki	95,000	.....	9,900 C	12,600 DHD
	Toho Oil Co. Ltd., Owase City	38,000	.....	.....	.....
	Tohoku Oil Co., Sendai	38,000	.....	5,400 C	12,600 DHT
	Total	4,315,610	251,060 C 13,500 T	422,150 C	
JORDAN	Jordan Petroleum Refinery Co. Ltd., Zerqa	14,774	2,480 FCC	780 C	3,980 V, 1,340 DHT, 490 A
KENYA	East African Oil Refineries Ltd., Mombasa	48,000	.....	4,000 C	16,000 DHT
KOREA	Honam Oil Refinery Co. Ltd., Yosu	160,000	.....	7,100 C	11,400 DHT, 2,100 A
	Korea Oil Corp., Ulsan	215,000	7,460 C	16,150 C	3,450 V, 28,370 DHT, 1,980 A
	Kyung In Energy Co. Ltd., Incheon	55,000	.....	2,700 C	6,700 DHT
	Total	430,000	7,460 C	25,950	
KUWAIT	American Independent Oil Co., Mena Abdulla	132,000	.....	.....	112,000 V, 32,000 RHD
	Arabian Oil Co. Ltd. (Japan), Ras Al Khafji	30,000	.....	.....	.....
	Getly Oil Co., Mina Saud	50,000	5,000 Ck	.....	.....
	Kuwait National Petroleum Co., Shuaiba	135,000	.....	15,000 C	70,000 V, 95,000 DHT, 14,000 DHC, 37,000 RHC
	Kuwait Oil Co. Ltd., Mina al Ahmadi	300,000	6,000 C	.....	915 A
	Total	647,000	6,000 C 5,000 T	15,000 C	
LEBANON	Iraq Petroleum Co. Ltd., Tripoli	36,000	.....	4,400 C	6,730 DHT, 900 A
	Mediterranean Refining Co., Sidon	17,500	.....	2,900 C	2,900 DHT
	Total	53,500		7,300 C	
LIBERIA	Liberia Refining Co., Gardnersville	12,500	.....	2,000 C	1,000 V, 1,000 DHT
LIBYA	American Overseas Petroleum Ltd., Nafuora	1,800	.....	.....	.....
	Esso Standard Libya, Marsa el Brega	9,025	.....	1,980 C	2,880 DHT
	Mobil Oil Libya Ltd., Amal	1,800	.....	.....	.....
	Occidental of Libya Inc., Intisar	1,800	.....	.....	.....
	Zeutina	3,000	.....	.....	300 A
	Total	17,425		1,980 C	
MALAGASY	Societe Malgache de Raffinage, Tamatave	14,600	.....	2,300 C	5,200 DHD

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
MALAYSIA	Esso Standard Malaya Berhad, Port Dickson ..	32,200	.....	3,700 C	2,800 V, 12,780 DHT, 6,400 DHD, 1,100 A
	Shell Refining Co. Berhad, Port Dickson	31,000	.....	2,000 C	8,000 DHT, 4,000 DHS
	Total	63,200	.....	5,700 C	
MARTINIQUE	Societe Anonyme de la Raffinerie des Antilles (SARA), Fort-de-France	11,000	.....	2,120 C	3,400 DHT, 2,300 DHD
MEXICO	Petroleos Mexicanos: Atzacapotzalco	100,000	20,000 Vis 23,000 FCC	26,000 C	50,000 V, 3,000 Alky, 650 P
	Ciudad Madero	169,000	8,000 Vis 23,000 FCC	19,000 C	78,000 V, 18,000 DHT, 15,000 DHD, 3,000 Alky, 650 Poly, 400 C, 16,000 A
	Minatitlan	208,000	24,000 FCC 21,000 TCC	29,300 C	60,000 V, 21,000 DHT, 29,000 DHD, 600 P, 3,000 L
	Poza Rica	27,000	.....	5,000 C	.....
	Reynosa	20,500	.....	.....	.....
	Salamanca	100,000	4,000 T 18,000 TCC	8,000 C	51,200 V, 17,600 DHT, 18,500 RHC, 28,000 DHD 7,100 L, 3,000 A
	Total	624,500	109,000 C 32,000 T	87,300 C	
MOROCCO	Societe Cherifienne des Petroles, Sidi-Kacem ..	8,550	3,600 TCC	1,080 C	1,080 DHT
	Societa Am. Marocaine Italienne de Raffinage (Samir), Mohammedia	50,000	.....	6,500 C	9,100 DHT
	Total	58,550	3,600 C	7,580 C	
MOZAMBIQUE	Sociedade Nacional de Refinacao de Petróleos (Sonarep), Salazar	17,000	.....	2,500 C	5,000 V, 2,500 DHT, 1,000 A
NETHERLANDS	BP Raffinaderij Nederland NV, Rotterdam ..	475,020	.....	18,920 C	160,160 DHT, 18,200 DHD
	Chevron Petroleum Maatschappij Nederland NV, Pernis	300,000	.....	39,000 C	25,000 V, 39,000 DHT, 38,000 DHD, 5,000 A
	Esso Nederland NV, Rotterdam	325,000	.....	43,800 C	128,800 DHT
	Gulf Oil Raffinaderij NV, Rozenburg	94,000	8,600 T	7,350 C	31,000 V, 31,350 DHT, 2,850 L, 4,200 A
	Mobil Oil NV, Amsterdam	125,000	.....	24,000 C	36,500 DHT, 29,000 DHD
	NV Smid & Hollander, Amsterdam	6,500	.....	.....	6,500 V, 6,400 A
	Shell Nederland Raffinaderij NV, Rotterdam ..	500,000	75,000 Vis	26,000 C	96,000 DHT, 55,000 DHD
	Total	1,825,520	83,600 T	158,770 C	
NETHERLANDS ANTILLES	Lago Oil & Transport Co. Ltd., Aruba	520,000	280,000 Vis 40,000 FCC	.....	130,000 V, 77,000 DHT, 70,000 DHD, 7,800 Alky, 3,100 Isom
	Shell Curacao NV, Emmastad	360,000	100,000 Vis 35,000 C	15,000 C 7,000 T	52,000 DHT, 25,000 DHD
	Total	880,000	75,000 C 380,000 T	15,000 C 7,000 T	
NEW ZEALAND	New Zealand Refining Co. Ltd., Marsden Point, Whangarei	54,000	.....	18,000 C	32,000 DHT, 5,000 DHD
NICARAGUA	Refinería Esso Managua, Managua	13,200	.....	2,600 C	1,900 V, 10,600 DHT, 730 A
NIGERIA	Nigerian Petroleum Refining Co. Ltd., Alesa Eleme, Port Harcourt	60,000	.....	5,700 C	.....
NORWAY	A/S Norske Esso, Slagen, Tonsberg	110,000	.....	8,500 C	18,000 DHT, 8,100 DHD
	Valloy, Tonsberg	3,000	.....	.....	2,100 V, 700 DHT, 700 L, 2,400 A
	A/S Norske Shell, Solo	60,000	24,000 Vis	10,000 C	14,000 DHT, 8,000 DHD
	Total	173,000	24,000 T	18,500 C	
OKINAWA	Gulf Sekiyu Seisei Co. Ltd., Henza	92,500	.....	.....	17,900 DHT, 50,100 DHD
	Nansei Sekiyu, Nishihara	93,000	.....	10,000 C	36,300 DHT
	Toyo Petroleum Refining Co. Ltd., Naha	25,000	.....	.....	.....
	Total	210,500	.....	10,000 C	
PAKISTAN	Attock Oil Company Ltd., Rawalpindi	11,640	.....	.....	1,200 V, 350 L, 13,000 A
	National Refinery Ltd., Korangi	13,850	.....	.....	5,250 V, 1,550 DHT, 1,550 L, 1,650 A

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
PAKISTAN—Continued	Pakistan Refinery Ltd., Korangi	55,000	.....	2,500 C	21,000 DHT, 217 A
	Total	80,490	.....	2,500 C	
PANAMA	Refinería Panamá SA, Las Minas, Colon	75,000	19,000 Vis	7,500 C	14,000 V, 30,000 DHT, 5,000 A
PARAGUAY	Refinería Paraguaya SA, Villa Elisa	5,000	.....	.....	210 A
PERU	Compañía de Petróleo Ganso Azul Ltda., Pucallpa	2,375	.....	.....	.....
	Petróleos del Perú, Iquitos	1,100	.....	.....	.....
	La Pampilla	30,000	6,670 FCC	1,760 C	9,360 V, 2,700 DHT
	Talara	60,000	16,000 T	.....	1,000 L, 2,000 A
	Refinería Conchán Chevron SA (en administra- ción judicial), Miraflores, Lima	8,000	.....	.....	3,000 V, 3,000 A
	Total	101,475	6,670 C 16,000 T	1,760 C	
PHILIPPINES	Bataan Refining Corp., Limay	103,500	14,492 TCC	20,713 C	21,204 V, 59,496 DHT
	Caltex Philippines Inc., Batangas	72,000	11,400 FCC	8,600 C	18,100 V, 15,200 DHT, 900 Poly, 3,500 SD
	Filoil Refinery Corp., Rosario	33,800	.....	4,600 C	8,500 V, 9,090 HDS, 800 A
	Shell Philippines Inc., Batangas	67,000	.....	8,000 C	12,000 DHT, 6,000 DHD
	Total	276,300	25,392 C	41,913 C	
POLAND	Glinik Mariampolski	2,470	.....	.....	.....
	Jasto	2,660	.....	.....	.....
	Jedlicze	3,800	.....	.....	.....
	L. Warynski, Czechowice	13,300	.....	.....	.....
	Mazovia, Plock	114,000	13,500 C 9,000 T 9,000 Ck	10,800 C	54,000 V, 16,200 DHD, 2,520 L, 5,400 A
	Trzebinia	9,500	.....	.....	.....
	Total	145,730	13,500 C 18,000 T	10,800 C	
PORTUGAL	Sacor, Cabo Ruivo, Lisbon	35,150	9,000 TCC	.....	5,400 DHD, 477 P, 315 A
	Boa Nova, Porto	44,650	14,400 T	9,900 C	9,900 V, 18,450 DHT, 891 DHD, 2,790 L, 684 A
	Total	79,800	9,000 C 14,400 T	9,900 C	
PUERTO RICO	Caribbean Gulf Refining Co., Bayamón	40,000	8,500 FCC	6,000 C	15,000 V, 6,600 DHT, 11,000 DHD, 500 Poly, 1,000 A
	Commonwealth Oil Refining Co. Inc., Peñuelas	185,000	40,000 C 22,000 Vis	70,000 C	65,000 V, 88,000 DHT, 6,000 Alky, 4,200 Poly
	Yabucoa Sun Oil Co., Yabucoa	66,000	.....	.....	35,000 V, 14,000 DHT, 11,200 DHC, 8,300 DHD, 5,400 L
	Total	291,000	48,500 C 22,000 T	76,000 C	
QATAR	National Oil Distribution Co., Umm Said	680	.....	.....	.....
RHODESIA	Central African Petroleum Refineries Pvt. Ltd., Umtali	20,000	(Not in operation: not included in total.)		
ROMANIA	Brazi	76,000	.....	.....	2,025 DHT
	Pitesti	57,000	.....	.....	86,400 DHT, 15,570 L
	Sulpacu Barcau (Crisana oil field)	5,700	.....	.....	.....
	Total crude capacity for all refineries: 320,000 b/cd. Other refineries at Borzetsi, Brazov, Cimpina, Darmanesti, G. Gheorghiu Dej—Onesti, Ploiesti, Teleajen.				
SAUDI ARABIA	Arabian American Oil Co., Ras Tanura	415,000	.....	12,800 T 13,800 C	100,000 V, 22,800 DHD, 3,500 A
	Jeddah Oil Refinery Co., Jeddah	13,270	.....	2,650 C	1,380 V, 2,650 DHT, 3,750 DHD, 390 A
	Total	428,270	.....	16,450 C 12,800 T	
SENEGAL	Société Africaine de Raffinage (SAR), Dakar	12,000	.....	2,000 C	2,000 DHT
SIERRA LEONE	Sierra Leone Petroleum Refining Co. Ltd., Freetown	10,000	.....	.....	.....

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
SINGAPORE	BP Refinery Singapore Pte. Ltd., Pasir Panjang	24,570	.....	.....	.....
	Esso Singapore Private Ltd., Pulau Ayer Chawan	88,000	.....	5,400 C	7,200 V, 30,800 DHT, 12,600 DHD, 6,800 A
	Mobil Oil Singapore Pty. Ltd., Jurong	27,600	.....	4,000 C	13,000 DHD
	Shell Eastern Petroleum Pte. Ltd., Pulau Bukom	250,000	.....	10,000 C	60,000 DHT, 20,000 DHD
	Total	390,170	.....	19,400 C	.....
SOUTH AFRICA	Caltex Oil (S.A.) (Pty.) Ltd., Cape Town	46,000	9,500 Vis 10,400 FCC	.....	21,000 V, 30,500 DHT, 900 A
	Mobil Refining Co. South Africa Pty. Ltd., Durban	60,000	14,500 FCC	7,000 C	22,000 V, 7,500 DHT, 12,500 DHD, 300 Poly, 2,000 A
	National Petroleum Refiners of South Africa (Pty.) Ltd., Sasolburg	50,000	14,000 FCC	9,600 C	18,000 V, 8,700 DHT, 9,400 DHC, 6,200 DHD, 4,300 Alky, 430 A
	Shell & BP South African Petroleum Refineries Pty. Ltd., Durban	84,000	17,000 C	30,000 C	55,000 DHD
	South African Torbanite Mining and Refining Co. Ltd., Boksburg North	2,600	650 T	.....	515 A
	Total	242,600	55,900 C 10,150 T	46,600	.....
SOUTH YEMEN	BP Refinery (Aden) Ltd., Aden	160,160	.....	8,600 C	2,730 DHD
SPAIN	Asfaltos Españoles SA (Asesa), Tarragona	18,000	.....	.....	15,000 V, 11,700 A
	Cia. Española de Petróleos (Cepsa), Algeciras, Cádiz	85,500	.....	18,450 C 22,680 T	30,800 V, 26,280 DHT, 8,820 DHC
	Santa Cruz de Tenerife, Canary Islands	167,200	.....	18,000 C	10,620 V, 13,500 DHT, 10,800 DHD, 1,170 L, 6,300 A
	Cia. Ibérica Refinadora de Petróleos SA (Petroiber), La Coruña	114,000	16,200 Vis	14,850 C	14,850 DHT
	Empresa Nacional Calvo Sotelo, Puertollano	120,000	.....	6,800 C	5,000 V, 5,200 DHD, 2,000 L
	Esso Petróleos Espanoles SA, Castellón de la Plana	72,000	.....	7,000 C	30,000 DHT, 6,000 DHD
	Refinería de Petróleos de Escombreras SA, Escombreras	209,000	.....	21,150 C	12,150 V, 13,500 DHT, 18,000 DHC, 23,400 DHD, 1,350 P, 2,790 L
	Refinería de Petróleos del Norte SA (Petronor), Somorrostro, Bilbao	160,000	.....	16,000 C	23,000 DHT, 18,000 DHD
	Río Gulf de Petróleos SA, Huelva	80,000	.....	5,000 C	7,600 V, 13,000 DHT, 2,900 A
	Total	1,025,700	16,200 T	107,250 C 22,680 T	.....
SUDAN	Shell & BP Sudan Ltd., Port Sudan	20,000	.....	2,000 C	9,000 DHT
SWEDEN	AB Nynas-Petroleum, Gothenburg	5,700	.....	.....	4,500 V, 900 A
	Malmö	3,800	.....	.....	.....
	Nynasham	28,500	.....	6,300 C	4,500 V
	BP Raffinaderi, Gothenburg	105,560	.....	21,070 C	36,400 DHT
	Koppartrans Olje AB (Shell), Gothenburg	100,000	33,000 Vis	17,000 C	27,000 DHT, 14,000 DHD
	Total	243,560	33,000 T	44,370 C	.....
SWITZERLAND	Raffinerie de Cressier SA, Cressier	50,000	21,000 Vis	10,000 C	17,000 DHT, 8,000 DHD
	Raffinerie du Sud-Ouest SA, Collombey-Muraz	70,000	.....	10,000 C	17,400 DHT
	Total	120,000	21,000 T	20,000 C	.....
SYRIA	General Petroleum Co., Homs	51,300	18,000 Ck	2,160 T	2,880 V, 30,600 DHT, 2,520 A
TAIWAN	Chinese Petroleum Corp., Kaohsiung	199,000	9,040 Ck 9,040 TCC	20,800 C	3,160 V, 22,600 DHD, 810 Alky, 605 P, 2,758 A
TANZANIA	Tiper—Tanzanian and Italian Petroleum Refining Co. Ltd., Dar es Salaam	16,800	.....	4,200 C	5,000 DHD
THAILAND	Defense Energy Department, Bangkok	55,000	10,000 Vis	10,000 C	18,000 DHD, 400 A
	Fang refinery, Chiang Mai	800	.....	.....	700 V, 200 L
	Esso Standard Thailand Ltd., Sriracha	35,000	.....	4,800 C	5,900 V, 13,400 DHT, 4,300 DHD, 3,300 A

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
THAILAND—Continued	Thai Oil Refinery Co. Ltd., Bangkok	65,000	13,000 Vis 7,000 FCC	9,000 C	14,500 V, 32,000 DHT, 10,000 DHD, 1,400 A
	Total	155,800	21,000 T 7,000 C	23,800 C	
TRINIDAD	Shell Trinidad Ltd., Point Fortin	80,000		7,000 C	19,000 DHT
	Texaco Trinidad Inc., Brighton	6,000			
	Pointe-A-Pierre	355,000	26,500 FCC	20,000 C	187,000 V, 45,000 DHT, 80,000 DHD, 1,200 Alky, 350 Poly, 4,000 L
	Total	441,000	26,500 C	27,000 C	
TUNISIA	Societe Tuniso Italienne de Raffinage (STIR), Zarzouna, Bizerte	21,375		2,970	
TURKEY	Anadolu Tasfiyehanesi AS, Mersin	90,000		9,500 C	20,000 DHT, 9,500 DHD
	Istanbul Petrol Refinerisi AS (Ipras), Izmit ..	110,000	19,585 FCC	9,330 C	50,000 V, 11,975 DHT, 18,525 DHD, 10,000 A
	Turkish Petroleum Co., Aliaga-Izmir	62,370		8,881 C	32,225 V, 14,995 DHT, 12,760 DHD, 3120
	Batman	23,625	4,000 TCC	1,228 C	2,000 V, 1,228 DHT, 3,186 A
	Total	285,995	23,585 C	28,988 C	
UNITED KINGDOM	ENGLAND				
	Berry Wiggins & Co., Ltd., Kingsnorth on Medway, Kent	5,890			
	Weaste, Lancashire	3,420			
	BP Refinery Kent Ltd., Isle of Grain	232,960	17,600 Ck 15,840 FCC	38,700 C	62,790 V, 5,400 DHT, 13,650 DHD, 2,728 Alk, 2,800 L
	Burmah-Castrol Co., Ellesmere Port	26,520	1,230 Vis	5,060 C	14,370 V, 6,430 DHT, 6,430 DHD, 6,150 L, 240 A
	Conoco Ltd., Humber Refinery, South Killingholme	80,000	21,000 T 28,000 Ck	22,500 C	86,000 DHD, 670 C
	Esso Petroleum Co. Ltd., Fawley	389,500	76,500 FCC	50,400 C	60,750 V, 225 DHT, 73,800 DHD, 3,150 P, 5,230 L, 4,200 A
	Lindsey Oil Refinery Ltd., Killingholme, Lincolnshire	179,600		27,400 C	14,200 V, 35,000 DHT, 30,500 DHD, 7,100 A
	Mobil Oil Co. Ltd., Coryton, Essex	135,000	9,500 TCC	27,000 C	43,000 V, 33,000 DHT, 34,000 DHD, 5,500 L
	Phillips-Imperial Petroleum Ltd., North Tees ..	100,000			
	Philmac Oils Ltd., Castham, Cheshire	11,000			9,000 V, 7,260 A
	Shell U.K. Ltd., Heysham	39,000			
	Shell Haven	200,000		32,000 C	32,000 DHT, 16,000 DHD
	Stanlow	215,000	50,000 C	14,000 C	14,000 DHT, 13,000 DHD
	Teesport	110,000		15,000 C	31,000 DHT, 14,000 DHD
	Total England	1,727,890	151,840 C 67,830 T	232,060 C	
	NORTH IRELAND				
	BP Refinery Ltd., Belfast	13,850		5,590 C	10,010 DHT, 3,276 DHD
	SCOTLAND				
	BP Refinery Ltd., Grangemouth	182,000	15,840 FCC	20,640 C	77,350 V, 54,600 DHT, 24,900 DHC
	Shell U.K. Ltd., Ardrossan	6,000			
	Total Scotland	188,000	15,840 C	20,640 C	
	WALES				
	BP Refinery Ltd., Llandarcy, Neath	168,350	15,840 FCC	14,190 C	27,300 V, 3,185 DHT, 13,650 DHD, 854 L, 542 A
	Esso Petroleum Co. Ltd., Milford Haven	123,500		20,250 C	18,900 DHD
	Gulf Oil Refining Ltd., Milford Haven	103,000		18,000 C	35,100 DHT
	Texaco Ltd., Pembroke	140,000		17,500 C	10,000 V, 41,000 DHT
	Total Wales	534,850	15,840 C	69,940 C	
	Total United Kingdom	2,464,590	183,520 C 67,830 T	328,230 C	
URUGUAY	Administracion Nacional de Combustibles Alcohol y Portland (Ancap), La Teja, Montevideo	40,000	4,000 FCC	2,000 C	12,000 V, 7,000 DHD, 4,100 A
VENEZUELA	Chevron Oil Co. de Venezuela, Bajo Grande ..	61,500			15,300 V, 7,000 A
	Cia Shell de Venezuela Ltd., Cardon	348,000	32,000 C 94,000 T		44,000 DHT, 32,000 DHD

WORLDWIDE REFINING	Company and refinery location	Crude	Cracking	Reforming	Other processing
VENEZUELA—Continued	San Lorenzo	32,000	.....	.....	.....
	Corporación Venezolana del Petróleo, Morón,	.....	.....	.....	.....
	Estado Carabobo	25,000	.....	1,800 C	1,200 V, 720 A
	Creole Petroleum Corp., Amuay Bay	630,000	13,000 FCC	.....	366,000 V, 17,500 DHT, 219,000 DHD, 1,400 L, 15,200 A
	Caripito	84,000	.....	.....	.....
	Mobil Oil de Venezuela, El Palito	102,000	.....	7,000 C	7,000 DHT
	Phillips Petroleum Co., San Roque	4,600	.....	.....	.....
	Sinclair Venezuelan Oil Co., Guanta,	.....	.....	.....	.....
	Puerto la Cruz	37,525	.....	.....	.....
	San Silvestre, Barinas	5,400	.....	.....	.....
	Texas Petroleum Co., Tucupita	10,000	.....	.....	.....
	Venezuela Gulf Refining Co., Puerto la Cruz	159,000	16,000 Vis 15,000 FCC	.....	2,400 Alky
	Total	1,499,025	60,000 C 110,000 T	8,800 C	.....
VIRGIN ISLANDS	Amerada Hess Corp., St. Croix	418,000	.....	13,500 C	45,000 V, 28,800 DHT, 48,600 DHD
YUGOSLAVIA	Government, Bosanski Brod	53,982	.....	5,861 C	1,200 V, 945 MC, 666 A
	Lendava	4,218	.....	.....	.....
	Novi Sad	12,654	.....	.....	.....
	Pancevo	29,878	14,652 T	3,996 C	8,793 DHD
	Rijeka	96,135	7,459 T	13,720 C	4,662 DHD, 4,000 L, 866 A
	Sisak	76,627	5,328 T 2,997 C	2,664 C	2,464 DHD, 1,000 A
	Note: Lube-oil manufacture is combined total of 3,330 b/sd for all refineries except Rijeka.				
ZAIRE	Societe Zairo-Italienne de Raffinage (Soziri), Muanda	16,150	.....	2,850 C	4,750 DHD

Worldwide production

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
ABU DHABI	Murba, Bab & Bu Hasa, 1960	8,500	53	.....	24	595,267	1,024,562,647	39.2
	Umm Shaif, 1958*	9,150	24	.....	11	121,904	307,267,940	37.5
	Zakum, 1964*	9,100	38	.....	6	226,224	311,238,841	40.5
	Total	.....	115	.....	41	943,395	1,643,064,428	.....
	*Offshore Note: Japanese-owned Mubarras field to go on stream in March, 1973							
AFGHAN- ISTAN*	Angot, 1950	2,100	.....	.....	.....	5	15,475	.....
	Hodja-Gugerdag, 1961†	5,400	10	.....	.....	126	.....	51.0
	Khuiaja-Borhan, 1964†	4,170-4,700	1	.....	.....	.....	.....	51.0
	Sari-pul, 1959	5,000	.....	2	.....	30	15,900	28.0
	Yatim Tagh, 1950†	1,290-4,019	2	.....	.....	.....	.....	51.0
	Total	.....	13	13	.....	161	72,375	.....
	†Gas-condensate *Data are estimates							
ALGERIA*	ALREP	.....	.....	.....	.....	.....	.....	.....
	Haoud Berkauui, 1965	10,300	7	.....	.....	28,230	58,462,694	46.0
	Hassi Messaoud North, 1956	11,000	77	.....	11	185,800	608,837,180	49.0
	C.P.A.	.....	.....	.....	.....	.....	.....	.....
	Gassi Touil, E., 1966	6,100	2	.....	.....	1,100	3,896,887	44.0
	CREPS	.....	.....	.....	.....	.....	.....	.....
	Achob, 1963	7,900	7	.....	2	2,260	9,219,751	43.0
	Edjeleh, 1956	1,900-3,000	100	.....	86	18,690	137,306,322	36.0
	El Adeb Larache, 1958	3,900	3	.....	28	4,280	30,273,927	45.0
	Hassi Mazoula, So., 1962	4,400	.....	.....	6	2,790	10,408,620	49.0
	Ohanel, So., 1960	7,900	4	.....	5	9,050	15,148,112	43.0
	Ohanel, No., 1960	7,900	10	.....	10	6,590	48,177,918	44.0
	Tiguentourine, 1956	2,000-3,600	4	.....	54	4,080	36,317,944	45.0
	Tin Fouye No. & So., 1965	4,500	.....	.....	40	16,240	128,408,735	40.0
	Zarzaitaine, 1958	3,200-4,600	12	.....	124	41,770	436,657,725	42.0
	Others	.....	9	.....	.....	3,340	10,939,017	.....
	PETRAL	.....	.....	.....	.....	.....	.....	.....
	Askarene, 1962	8,000	5	.....	3	3,200	13,772,744	40.0

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
ALGERIA—Continued	Gassi Touil, 1963	6,100	19	....	26	48,710	159,762,143	44.0
	Guelta, 1962	8,900	4	....	2	2,790	14,468,031	41.0
	REPAL							
	Hassi Messaoud, S., 1956	11,000	122	....	9	239,070	817,527,236	47.0
	Nezla E. & No., 1965	8,500	4	....	1	7,190	14,242,539	48.0
	SEPAL							
	El Gassi El Agreb, 1959	10,500	20	....	1	35,140	127,770,526	48.0
	SONATRACH							
	Djebel Onk, 1960	3,900	....	1	1	860	1,260,456	37.0
	Djoua W., 1966	5,500	2	....	4	1,220	4,222,875	40.0
	El Borma, 1967	8,500	8	....	....	21,890	114,023,764	41.1
	Rhourde el Baguel, 1962	9,500	16	....	1	55,130	208,959,715	41.0
	Timedratine E., 1966	7,870	2	....	....	1,000	3,177,030	38.0
	Tin Fouye Tabankort, 1966	4,500- 6,700	23	10	....	27,470	29,233,354	40.0-42.0
	Rhourde Nouss, 1963	8,900	4	....	2	3,080	9,547,634	39.0
	Others		28	18	4	1,280	12,110,595	
	Total		492	32	420	772,260	3,064,134,074	
	*Data are estimated							
ANGOLA	ANGOLA PROPER:							
	Mulenvos, 1966	6,500	1	7	2	1,068	2,338,669	25.0
	Quenguela Norte, 1968	4,900- 6,200	33	....	8	9,360	14,546,740	29.0
	Others	2,100- 8,000	14	3	17	687	32,303,495	29.0-33.0
	Sub-total		48	10	27	11,115	49,188,904	
	CABINDA							
	Malongo N., 1966*	1,500- 8,500	46	0	5	52,164	58,728,240	25.0-37.0
	Malongo, S., 1966*	1,300- 1,500	25	0	1	14,466	19,157,967	23.0-26.0
	Malongo, W., 1969*	1,800- 8,750	30	0	7	55,932	24,695,561	22.0-23.0
	61-1, 1968	5,900	2	0	0	206	551,378	23.0
	Sub-total		103	0	13	122,768	103,133,146	
	Total		151	10	40	133,883	152,322,050	
	*Offshore							
ARGENTINA*	Chubut, 1907	2,500- 6,000	25	1,200	200	70,833	520,008,545	22.8-24.5
	Jujuy, 1969	11,000-15,000	20	....	....	30,870	6,492,240	32.0
	La Pampa, 1968	5,000- 5,500	17	....	....	12,201	7,452,475	....
	Mendoza, 1943	7,500- 8,000	4	800	30	116,445	383,508,850	....
	Neuquen, 1918	3,000- 6,000	50	300	50	52,815	148,810,170	30.0
	Rio Negro, 1960	2,800- 6,000	200	250	110	68,439	114,117,235	....
	Salta, 1930	11,000-15,000	60	15	140	6,090	121,835,850	22.5-54.0
	Santa Cruz, 1944	4,000- 6,000	240	2,100	365	77,427	593,254,855	41.8
	Tierra del Fuego, 1952	6,000- 7,000	5	25	10	6,300	40,697,500	41.0
	Total		621	4,690	905	441,420	1,936,177,720	
	*Data are estimated							
AUSTRALIA	Alton, 1964	6,000	....	5	1	310	1,483,643	52
	Barracouta, 1968*	4,500	5	....	....	6,375	5,574,842	63
	Barrow Island, 1964*	2,200- 6,700	159	164	13	42,580	59,953,640	7
	Halibut, 1967*	7,500	21	....	....	118,292	129,394,803	43
	Kingfish, 1967*	8,450	42	....	....	135,093	53,875,055	47
	Moonie, 1961	5,800	1	1	4	1,837	16,377,380	44
	Total		228	170	18	304,487	276,659,363	
	*Offshore							
AUSTRIA	VIENNA BASIN							
	Matzen, 1949	4,200- 7,200	59	731	152	23,089	288,260,369	25.7
	Muehlberg, 1942	3,900- 5,500	9	54	21	963	35,503,938	35.0
	Pirawarth, 1957	2,400- 4,200	8	44	4	2,139	4,251,450	28.4
	St. Ulrich, 1938	2,900- 4,100	3	119	158	1,403	35,629,529	33.0
	Schoenkirchen (incl. Prottes + Strasshof Tiet)	7,800- 9,600	13	3	1	9,824	34,450,571	31.1
	Gaiselberg, 1938	3,400- 6,500	1	39	18	1,285	27,223,051	24.8
	Others	....	....	122	48	1,215	....	....
	MOLASSE ZONE							
	Piberbach, 1968	3,500	....	7	....	987	1,129,643	39.0
	Voitsdorf, 1962	6,800	4	17	3	3,549	12,363,456	35.8
	Others		2	35	7	2,152	7,041,506	....
	Total		99	1,171	412	46,606	493,917,340	
BAHRAIN	Awali, 1932	1,850- 4,600	195	41	3	72,640	518,881,000	33.0
BOLIVIA	Camiri, 1927	3,936	16	47	....	2,268	412,742	55.0
	Caranda, 1960	2,296	6	14	....	1,551	282,580	52.0
	Colpa, 1961	8,200- 9,500	27	....	....	4,087	745,258	42.0-46.0
	La Pena, 1965	8,100-11,200	18	....	....	4,290	778,670	42.0
	Monteagudo, 1966	5,576	24	1	....	9,404	1,710,627	59.0

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
BOLIVIA—Continued	Rid Grande, 1961	9,000	16	....	....	7,994	1,456,821	62.0-65.0
	Tatarenda, 1962	2,296	6	14	....	1,551	282,580	52.0
	Others		2	44	....	816	148,433	....
	Total		115	120	....	31,961	5,817,711	
BRAZIL	Agua Grande, 1951	3,281-6,562	47	47	70	23,801	207,642,009	38.0-42.0
	Aracas, 1965	3,281-6,562	11	55	31	26,384	32,065,249	41.0
	Buracica, 1959	2,395-2,559	....	85	6	19,141	67,225,845	35.0
	Candeias, 1941	3,281-6,562	15	26	92	6,238	59,631,661	30.0-31.0
	Carmopolis, 1963	2,460	....	179	8	19,788	39,549,497	24.0
	Cassarongongo, 1959	4,757	....	20	5	3,194	4,900,909	32.0
	Dom Joao, 1947	918	....	373	122	11,605	52,097,409	38.0
	Boa Esperenca, 1956	7,874-8,530	4	3	2	2,211	3,941,419	38.0-40.0
	Imbe, 1964	2,132-8,202	5	17	4	2,325	4,991,830	38.0-42.0
	Miranga, 1965	3,281-6,562	53	61	27	32,218	81,912,014	39.0-41.0
	Plataforma Continental, 1958*	4,085-8,750	....	....	4*	....	175,713	43.0
	Riachuelo, 1961	1,476	....	37	20	2,211	2,997,597	28.0
	Siririzinho, 1967	1,640	....	69	14	5,374	7,574,534	30.0
	Taquipe, 1959	3,117-3,937	14	49	15	8,574	50,032,710	40.0
	Others		7	36	96	4,549	20,096,117	....
	Total		156	1,057	516	167,613	634,834,513	
	*Two offshore fields have been found—Guaricema and Ciaoba—not yet producing.							
BRUNEI-MALAYSIA	Ampa, S.W., 1963*	7,068-8,155	59	25	25	110,073	158,760,800	41.0
	Bakau, 1971*	....	1	....	....	2,966	340,000	39.0
	Baram, 1967*	9,500	15	9	....	37,622	17,684,400	40.5
	Baronia, 1970*	11,000	1	....	4	1,278	116,300	42.0
	Champion, 1970*	4,300	8	....	3	14,389	1,450,700	20.0
	Fairley, 1969*	10,740	3	4	....	7,820	4,841,600	42.0
	Jerudong, 1968	....	....	....	2	....	636,800	39.0
	Mini, 1911†	300-3,000	....	70	12	374	79,703,500	27.0
	Seria, 1928	834-10,450	....	344	182	45,689	792,374,400	36.0
	West Lutong, 1965*	6,800	19	....	....	52,346	33,707,700	39.5
	Total		106	452	228	272,557	1,089,616,200	
	*Offshore.							
	†Field abandoned Nov., 1972.							
BURMA*	Chauk-Lanywa, 1902	3,500	2	290	....	2,100	148,400,750	
	Mann, 1970	3,955-6,934	16	4	....	6,000		
	Myanaung, 1965	....	88	....	....	6,800		
	Prome, ?	....	40	....	....	2,150		
	Yenangyaung, 1902	5,000	20	235	....	4,500		
	Total		156	529	....	21,550		
	*Data estimated.							
CHILE	MAINLAND							
	Canadon, 1962	6,560	23	6	17	2,843	8,877,424	38.0
	Daniel, 1960	5,975	56	15	34	6,126	24,327,846	32.0
	Daniel Este, 1961	5,740	23	5	10	4,761	16,203,688	32.0
	Posesion, 1960	6,100	35	....	3	4,466	12,688,269	63.0
	TIERRA DEL FUEGO							
	Calafate, 1955	6,200	23	5	25	5,265	15,389,914	49.0-60.0
	Catalina Sur, 1962	5,890	19	7	18	925	5,083,121	43.0
	Cullen, 1954	5,840	44	16	33	3,101	33,064,862	41.0
	Tres Lagos, 1957	5,640	22	1	28	1,780	9,446,651	40.0
	Others		51	23	48	3,151	53,990,926	....
	Total		296	78	216	32,418	179,072,701	
CANADA	ALBERTA				Production in bbl		Gravity °API	
		Name of field and discovery date	Depth (ft)	No. of wells capable of production	Daily avg. 1st 6 mos. 1972	Cumulative 7/1/72		
		Acheson, 1950	4,600-5,100	63	10,974	52,000,397	33.0-40.0	
		Ban Try, 1948	2,500-3,265	113	4,519	16,818,227	24.0	
		Bellshill Lake, 1955	3,000	101	4,594	14,285,799	26.0	
		Bonnie Glen, 1958	3,950-7,000	72	46,408	163,530,600	34.0-42.0	
		Carson Creek, North, 1958	8,650-8,750	28	17,983	32,613,550	43.0	
		Cessford, 1950	2,813-3,395	80	2,685	10,695,310	24.0-28.0	
		Clive, 1951	6,150	69	5,754	13,278,282	40.0-41.0	
		Countess, 1951	2,858-3,570	47	4,492	4,599,412	29.0	
		Crossfield, 1959	6,650	70	1,441	13,732,268	36.0-37.0	
		Erskine, 1952	5,400	63	1,839	16,204,071	22.0-28.0	
		Excelsior, 1949	3,900	13	2,024	14,896,362	37.0	

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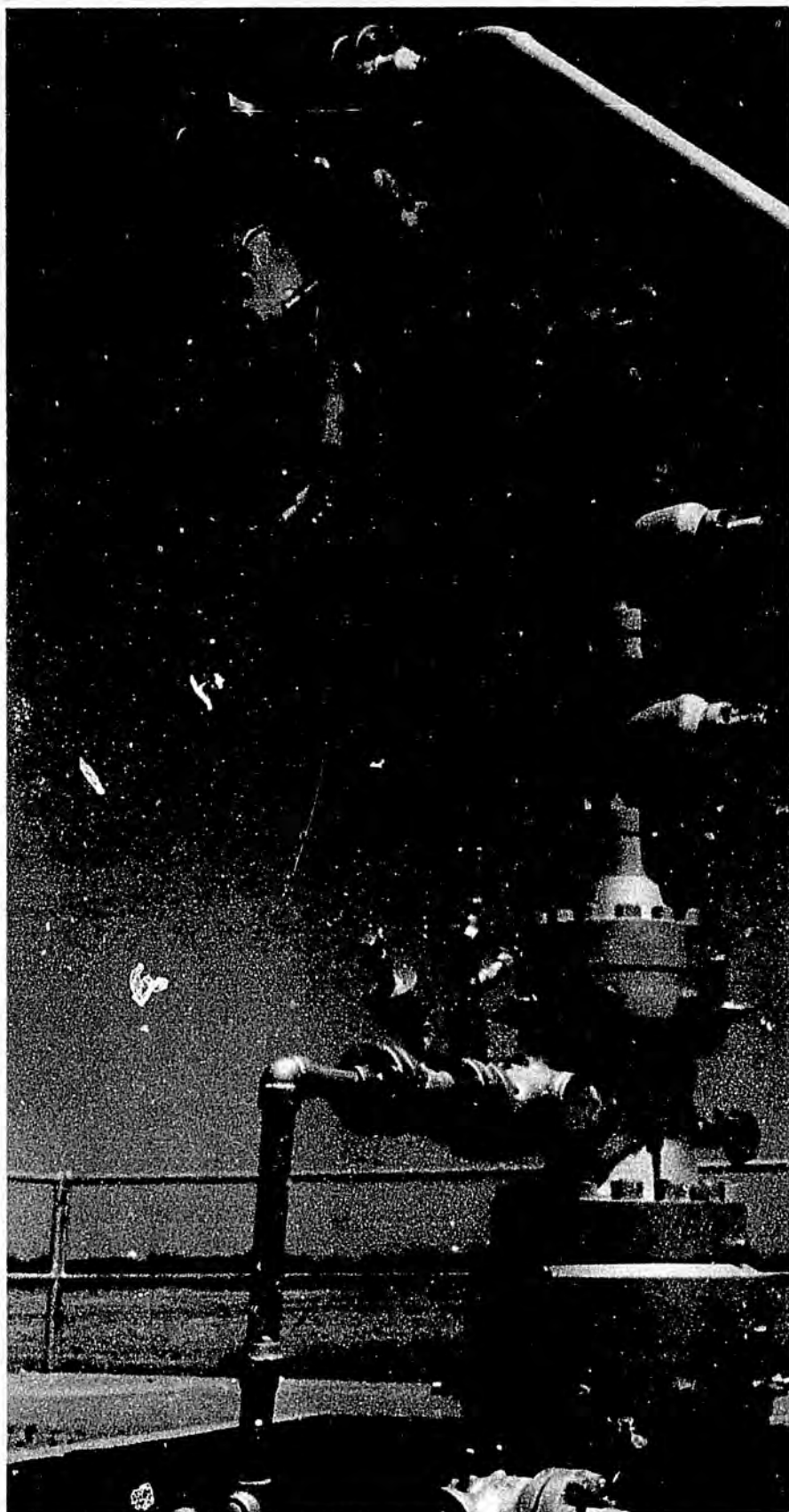
When it's four miles or more to the bottom, O-C-T should be on top

After you've spent the money to go down 20,000 feet or more to get to the oil and gas, you can't afford to go for anything but the best completion equipment. Because if there's one thing certain about deep production, it's pressure. Extreme pressure. And controlling that kind of pressure is what O-C-T wellheads are all about.

Every configuration, every trim, for every type of service is available from O-C-T in a variety of sizes with pressure ratings to 20,000 psi. And you can bet that if your casing and tubing will hold so will your O-C-T wellhead.

With more and more wells going below 20,000 feet, operators are looking for the experience and dependable equipment that can handle the special conditions that such depths create. And they're finding just what they're looking for at O-C-T.

Because when better ways to control pressure are needed, O-C-T will be right on top.



Wells illustrated range from 18,000 to more than 25,000 feet in depth.

This was a bad trip



Shale-Trol[™], a new Milchem product, stops expensive downtime situations resulting from bit balling and flowline plugging encountered while drilling "gumbo" or "sticky" shales. It is compatible with all fresh, sea, and saltwater mud systems. Shale-Trol has been field-tested and proven to provide trouble-free drilling of sticky shales.

Shale-Trol eliminates bit balling and plugged flowline situations to provide real benefits like:

- more on-bottom rotating hours
- reduced control drilling in gumbo
- minimized sticking, swabbing, and drag
- fewer loss of circulation problems
- less trip time

Shale-Trol saves operational time and decreases drilling cost.

Shale-Trol is adsorbed on the drill solids by a process[†] which provides a highly non-dispersive environment. Under these conditions, the gumbo cuttings are carried from the hole primarily as individual particles.

Call, write, or wire Milchem Incorporated, P. O. Box 22111, Houston, Texas 77027 for complete information—A Baker Oil Tool Company



Milchem Incorporated
Houston, Texas

Drilling Fluids and Drilling Controls

[†] Pat. Pend.

AGO 530140



AGO 530141

	Name of field and discovery date	Depth (ft)	No. of wells capable of production	Production in bbl		Gravity °API
				Daily avg. 1st 6 mos. 1972	Cumulative 7/1/72	
CANADA—Continued						
	Fenn-Big Valley, 1950	5,300-5,400	184	23,878	123,068,441	22.0-33.0
	Ferrier, 1955	6,655-8,526	75	3,486	6,294,189	44.0
	Garrington, 1954	6,600	71	1,538	11,533,745	39.0-43.0
	Gilby, 1955	5,850-7,050	78	5,254	23,717,039	27.0-41.0
	Glen Fork, 1951	4,627-6,200	9	2,031	7,995,634	29.0-39.0
	Golden Spike, 1949	3,570-5,861	21	34,328	135,742,322	36.0-38.0
	Goose River, 1963	7,764-9,100	13	6,146	9,493,803	40.0
	Harmattan East, 1957	8,040-8,558	32	6,913	27,491,875	38.0
	Harmattan Elkton, 1955	8,796-9,000	34	4,527	27,282,519	38.0
	Hussar, 1952	3,719-4,666	40	2,150	9,475,743	36.0
	Innisfail, 1956	6,730-8,440	14	8,131	31,348,024	38.0-44.0
	Joarcam, 1949	3,179	179	7,266	66,985,239	38.0
	Joffre, 1953	4,983-6,779	65	8,324	59,952,232	41.0
	Judy Creek, 1959	8,307-8,721	85	57,052	126,417,471	42.0
	Kaybob, 1957	4,586-10,442	29	13,868	40,508,241	45.0-48.0
	Kaybob South, 1958	6,947	49	7,630	15,455,103	45.0-48.0
	Leduc, 1947	3,062	464	18,545	307,486,926	40.0
	Lloydminster, 1933	1,840	132	2,221	17,984,886	11.0-17.0
	Medicine River, 1956	6,339-7,355	121	6,318	19,039,200	36.0-38.0
	Mitsue, 1964	5,908	120	40,790	59,839,149	42.0
	Nipist, 1965	5,648-5,726	145	39,147	47,876,499	42.0
	Pambina, 1953	2,991-3,470	2,881	150,272	688,924,763	32.0-37.0
	Rainbow, 1965	4,994-6,045	87	70,555	102,819,556	34.0-44.0
	Rainbow South, 1965	6,158-6,338	17	8,921	13,472,151	34.0-44.0
	Red Earth, 1956	4,184-4,878	56	7,779	8,160,631	38.0-39.0
	Redwater, 1948	2,012-3,200	307	74,999	433,297,719	35.0
	Simonette, 1958	10,464-11,460	7	5,537	13,221,934	47.0
	Snipe Lake, 1962	8,500	47	8,936	21,749,719	37.0
	Stettler, 1949	3,910-5,310	70	4,086	29,537,073	27.0-30.0
	Sturgeon Lake, 1952	8,901	8	2,199	9,232,495	38.0
	Sturgeon Lake South, 1953	4,912-8,471	99	15,305	55,040,708	37.0
	Sundre, 1954	8,022-9,090	29	3,302	17,607,187	32.0-41.0
	Swan Hills, 1957	7,851-8,740	406	100,134	232,041,912	40.0
	Swan Hills South, 1960	8,227	87	45,561	99,312,477	37.0
	Sylvan Lake, 1953	6,768-7,300	57	2,859	7,009,463	26.0-53.0
	Taber, 1942	3,200	38	1,373	4,781,826	20.0
	Taber South, 1963	3,200	53	2,733	7,628,528	21.0
	Turner Valley, 1913	3,100-9,150	109	2,562	121,499,722	39.0
	Utikuma Lake, 1963	5,624	27	2,179	4,123,329	34.0
	Virginia Hills, 1957	9,210	32	18,143	48,904,679	34.0
	Virgo, 1968	9,210	82	8,777	14,896,133	...
	Wainwright, 1925	2,190	264	6,510	22,655,346	22.0
	West Drumheller, 1952	5,475-5,651	54	2,488	20,313,422	41.0-42.0
	Westerose, 1952	6,818	11	14,929	37,632,550	42.0
	Willesden Green, 1956	5,195-8,100	379	15,022	42,403,477	39.0-41.0
	Wizard Lake, 1951	4,600	15	37,823	97,247,016	33.0-37.0
	Zama, 1967	6,000	142	15,986	27,598,721	29.0-35.0
	Others	....	1,387	2,489	92,328,687	....
	Total		9,430	1,033,715	3,801,083,845	
BRITISH COLUMBIA						
	Aitken Creek, 1959	4,400	7	1,271	2,962,578	38.0
	Beaton River, 1958	3,800	10	1,228	4,853,413	40.0
	Blueberry, 1953	6,950	23	1,153	8,601,327	40.0
	Boundary Lake, 1955	4,300-4,600	301	23,295	80,916,104	40.0
	Inga, 1966	5,300	63	9,940	12,886,475	40.0
	Milligan Creek, 1956	3,750	19	7,111	29,148,710	41.0
	Peejay, 1959	3,900	86	10,614	37,665,726	39.0
	Weasel, 1965	3,800	17	2,836	7,041,428	40.0
	Others	....	318	8,881	12,412,079	....
	Total		844	66,329	196,487,840	
MANITOBA						
	Daly 1951	2,550	106	1,684	15,275,930	32.0
	Virden-Roselea, 1953	2,030	193	3,624	24,788,414	30.0
	N. Virden-Scallion, 1963	2,010	220	7,099	36,595,774	35.0
	Routledge, 1955	2,100	110	1,444	10,460,414	35.0
	Others	....	66	479	6,420,401	....
	Total		695	14,330	93,540,933	
SASKATCHEWAN						
	Alameda, 1956	4,420	84	2,758	12,078,556	37.0-39.0
	Coleville, 1951	2,700	184	4,815	22,625,949	14.0
	Battrum, 1955	2,900	124	6,533	27,369,160	32.0
	Dollard, 1953	4,600	43	8,568	56,580,320	23.0
	Fosterton, 1952	3,200	37	6,932	43,354,097	22.0-24.0
	Instow, 1954	4,500	45	4,593	30,352,884	23.0
	Midale, 1953	4,600	374	13,150	68,650,462	28.0-32.0
	North Premier, 1953	3,300-3,500	50	4,613	13,113,932	23.0-24.0

	Name of field and discovery date	Depth (ft)	No. of wells capable of production	Production in bbl		Gravity °API
				Daily avg. 1st 6 mos. 1972	Cumulative 7-1-72	
CANADA—Continued	Steelman, 1954	4,590	607	25,703	155,779,880	31.0-39.0
	Weyburn, 1955	4,600	537	30,001	167,652,004	24.0-33.0
	Others	....	4,191	132,554	580,316,436	....
	Total	....	6,276	240,220	1,177,873,680	....
	ONTARIO	....	NA	....	....	....
	Rodney	200	174	1,250	6,593,255	....
	Total all fields*	....	....	3,182	51,787,774	....
	NEW BRUNSWICK	....	....	....	....	....
	Stoney Creek	....	....	25	750,639	....
	NORTHWEST TERRITORIES	....	....	....	....	....
	Norman Wells	....	41	2,618	14,547,410	....
	Total Canada	....	7,460	1,494,160	5,336,072,121	....

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
COLOMBIA	Acae, 1964	10,600	7	....	3	6,212	7,990,943	30.3
	Bonanza, 1964	4,000	2	11	2	2,668	5,516,599	32.5
	Boquete, 1961	8,000	7	....	3	2,793	7,854,308	27.0
	Caribe, 1969	7,750	2	1	1	1,144	999,557	32.0
	Casabe, 1941	3,880	....	285	46	7,374	192,623,988	20.9
	Cocorna, 1963	2,000	....	14	4	1,467	2,358,902	12.8
	Cristalina, 1959	10,700	....	3	....	845	3,232,784	30.2
	Dina, 1962	2,900	4	4	7	2,316	3,878,334	21.5
	Galan, 1945	3,800	....	58	16	1,327	14,740,747	19.0
	Infantas, 1918	2,000	1	306	13	4,208	205,744,492	26.0
	La Cira, 1925	3,250	1	635	40	17,598	394,821,751	24.0
	Lisama-Tene.A.B.1, 1957	9,500	9	5	3	1,643	3,820,583	31.4
	Llanito, 1960	7,350	2	23	8	1,460	8,124,730	21.0
	Orito, 1963	6,600	37	3	18	44,645	68,817,576	35.6
	Palagua-Velasquez, 1946	4,925	....	107	63	19,008	176,595,705	19.0
	Payoa, 1962	8,000	15	....	13	6,703	50,975,942	34.0
	Provincia, 1962	8,000	31	....	4	18,437	83,636,572	33.1
	Rio Zulia, 1962	5,600	10	5	5	24,353	86,746,252	41.3
	San Antonio, 1971	9,500	1	3	....	1,021	779,512	30.7
	Tibu, 1940	4,200	8	130	48	10,892	192,389,680	36.8
	Yariri, 1943	6,850	....	35	6	9,169	79,716,019	20.9
	Others	....	27	79	103	6,229	97,652,008	....
	Total	....	164	1,701	406	191,512	1,689,016,984	....
CONGO (Brazzaville)	Emeraude Marine, 1969*	1,900	....	12	3	5,000	910,000	23.0
	Pointe Indienne, 1957	5,000	5	....	4	300	5,771,000	37.0
	Total *Offshore	....	5	12	7	5,300	6,681,000	....

CONGO-KINSHASA (See Zaire)

DENMARK	Dan*	5,900- 6,562	....	....	5	Production began July, 1972		30.0
	*Offshore.	....	....	....	....	....	....	....

DUBAI	Fateh, 1966*	7,600- 8,500	21	....	1	129,605	104,360,389	32.3
	Fateh, SW, 1970*	7,500- 9,000	....	....	7	....	....	32.0
	Total *Offshore.	....	21	....	8	129,605	104,360,389	....

ECUADOR	SANTA ELENA:	....	....	....	....	....	....	....
	Ancon, 1921	4,000	4	543	1,668	2,878	97,373,772	37.0-40.0
	Others	1,000- 3,000	20	128	339	492	8,915,637	30.5-37.0
	Sub-total	....	24	671	2,007	3,370	106,289,409	....
	ORIENTE:	....	....	....	....	....	....	....
	Lago Agrio, 1967	10,200	22	....	3	29,924*	1,376,501	28.7
	Total *May 15, 1972-July 1, 1972.	....	46	671	2,010	33,294	107,665,910	....

EGYPT	Abu Rudeis, 1957†	8,500	....	....	....	....	13,204,947	23.0
	Al Yusr, 1966	4,264	15	....	....	7,531	6,735,000	20.5
	Asl, 1948†	3,000	....	....	....	....	34,269,304	23.0
	Belayim (Land & Offshore)* 1954†	7,000- 8,500	....	....	....	....	224,777,435	28.0
	El Alamein, 1966	8,700	8	....	6	19,066	38,832,032	33.5
	El Morgan, 1965*	....	....	....	....	....	....	....
	Kareem	5,500- 6,400	41	6	13	157,230	354,603,798	32.0
	Belayim	5,100- 5,700	2	....	....	6,136	810,000	27.0
	Kareem, 1958†	2,200	....	8	12	1,800	6,243,500	19.0
	Ras Amer, 1965†	4,264	1	3	....	1,000	2,079,400	20.0

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
EGYPT—Continued	Ras Bakr, 1958†	3,280	15	35		9,500	38,660,000	20.0
	Ras Gharib, 1938†	2,100		90	12	7,000	206,841,000	25.0
	Razzak, 1972	7,700	3			8,424	454,905	36.0
	Sidri, 1959†	8,100					4,038,736	23.0
	Sudr, 1946†						39,198,071	23.0
	Yidma, 1971	9,000	6		1	8,039	1,675,375	43.8
	Others		10	2	1	2,000	42,014,000	....
	Total		101	144	45	227,726	1,014,437,503	

†Data estimated.

*Offshore.

†These fields on Sinai Peninsula being produced by Israel. Data is confidential, but daily output is estimated at 120,000 bbl. Cumulative production for the captured fields is carried forward for the record (data as of June 5, 1967).

FRANCE	ALSACE (All fields shut in)						26,368,290	....
	AQUITAINE BASIN							
	Esso Rep fields:							
	Cazaux, 1959	8,200	4	23	2	6,722	39,741,296	34.2-37.3
	Lavergne, 1962	10,550	2	1		1,212	8,547,387	40.4
	Parentis, 1954	7,550	7	13	4	15,682	153,381,235	33.0
	Others			14	2	1,125	13,003,090	....
	SNPA fields:							
	Lacq, 1949	2,130	7	21	17	1,062	20,218,161	20.6
	PARIS BASIN							
	Copeseq fields	1,530- 4,525		13	1	489	6,186,353	15.9-32.8
	Erap-CFP fields	2,000- 5,575		12	43	2,702	20,321,915	27.1-35.3
	Erap-RAP fields	4,985- 7,500	2	25	7	1,084	5,998,528	31.4-35.9
	Petrorep fields:							
	Coulommies, 1958	6,070	5	26	12	1,195	9,661,780	32.6
	Total France		27	148	88	31,279	303,428,035	

GABON	Anguille Marine, 1962*	8,300	16		3	25,773	36,552,818	31.8
	Anguille Northeast, 1968*	7,480	7			10,636	11,202,006	31.4
	Anguille, Northwest, 1968*	7,500	1			1,868	550,386	31.4
	Cap Lopez North, 1962	6,700	4		5	6,139	12,051,621	23.9
	Gamba, 1963	3,000	30		11	34,036	76,814,800	32.4
	Ivinga, 1967	3,100	11		9	20,856	23,971,400	32.5
	Pointe Clairette, 1956	4,000- 5,000	17		12	2,900	23,305,248	29.9
	Port Gentil Ocean, 1964*	8,100	3		2	3,812	7,477,872	33.6
	Tchengue, 1959*	3,500	9		14	3,438	19,505,365	30.6
	Tchengue Ocean, 1962*	6,200	5		1	1,390	4,530,290	33.1
	Torpille Marine, 1968*	9,487	6			8,529	2,221,075	33.9
	Others		5		5	1,318	8,626,409	....
	Total		114		62	120,695	226,809,290	
	*Offshore.							

GERMANY, WEST	BAVARIA							
	Arlesried, 1964	4,900		17		2,293	5,024,669	47.0
	Darching, 1967	14,400	1			1,115	1,403,926	....
	Monchsrot, 1958	4,800		17		1,583	5,936,452	36.0
	Others		10	29		1,882	16,120,240	....
	Total		20	63		6,873	28,485,287	
	EMSLAND							
	Emlichheim, 1944	2,600		99		3,131	25,750,983	25.0
	Georgsdorf, 1944	1,800- 2,600	45	167		9,606	59,251,361	24.0-23.0
	Meppen-Schwefingen, 1960	4,000	8	8		1,370	5,166,550	28.0-30.0
	Ruhlermoor, 1949	2,000- 4,700				13,362	78,974,962	25.0-34.0
			16	359				
	Ruhlermoor, 1949	2,350- 2,900				2,304	20,816,042	25.0
	Scheerhorn, 1949	3,550- 3,750		128		4,643	27,435,252	30.0
	Others			171		2,298	21,878,238	....
	Total		75	932		36,714	239,273,386	
	SCHLESWIG-HOLSTEIN							
	Plon-Ost, 1959	6,400	2	56		8,924	26,901,113	36.0
	Preetz, 1962	8,350- 8,550	1	24		1,291	7,114,597	29.0
	Reitbrook, 1937	1,450- 2,100	7	46		3,287	29,799,949	29.0
	Others		1	85		1,290	40,953,341	....
	Total		11	211		14,792	104,769,000	
	HANNOVER							
	Eldingen, 1949	4,750		24		1,633	133,034,490	35.0
	Hankesbüttel, 1954	4,450- 5,100	12	33		10,634	56,100,784	33.0
	Hardesse, 1958	6,050	9	11		1,030	2,705,235	34.0
	Hohne, 1951	4,300- 5,900		37		5,126	30,208,094	33.0-34.0
	Knesebeck, 1958	5,100- 5,200		24		2,293	8,872,793	36.0

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 5 mo. 1-72	Cumulative 7/1/72	
WEST GERMANY—Continued	Lieferde, 1956	2,600	2	27		1,967	13,624,787	34.0
	Lüben, 1955	3,950	1	14		1,292	6,394,750	35.0-38.0
	Meckelfeld, 1938	1,000-1,300	1	25		1,669	10,166,164	24.0-32.0
	Nienhagen-Hanigsen, 1899	800-4,100		73		1,001	54,821,990	22.0-32.0
	Oelheim-Süd, 1968	1,650	9	4		1,413	2,028,598	33.0
	Orrel-Wesendorf-Nord, 1954	4,450		38		973	6,835,158	
	Rühme, 1954	1,950		40		944	4,840,091	
	Sinstorf, 1960	6,750-7,150		20		3,039	10,999,171	
	Suderbruch, 1949	3,750-7,550		60		1,363	18,275,897	15.0-38.0
	Vorhop, 1952	2,950-6,900	2	28		1,426	9,975,918	36.0
	Others		18	283		4,168	131,805,198	
	Total		54	741		39,971	500,689,118	
	UPPER RHINE VALLEY							
	Landau, 1955	3,950-4,800		78		3,074	14,544,379	36.0
	Others			19		355	9,797,546	
	Total			97		3,429	24,341,925	
	WESER-EMS							
	Barenberg, 1953	2,300-3,300	9	33		3,081	22,565,675	29.0
	Bockstedt, 1954	3,750		28		2,286	11,104,804	
	Bramberge, 1958	2,560-3,300	55	5		15,435	44,373,572	29.0
	Düste, 1954	2,600-4,250		147		2,620	29,427,789	
	Gross Lessen, 1969	3,300	3			5,439	3,299,015	
	Süd-Oldenburg, 1950	1,700-6,500	4	106		2,279	29,989,953	
	Volgtei, 1953	1,150-1,500	2	80		1,874	17,928,665	31.0-34.0
	Wehrbleck, 1957	3,400		63		527	9,729,258	33.0
	Others			94		175	17,771,384	
	Total		73	556		36,416	186,190,115	
	Total Germany West		233	2,600		138,195	1,083,748,833	
GHANA	Block 10, 1970*	7,700-8,500			1			37.0-40.0
	*Offshore. Production start up unknown.							
INDIA*	GUJARAT STATE							
	Ankleshwar, 1960	2,953-3,937		186				
	Bakrol, 1968	4,593-4,921		2				
	Kadi, N., 1968	2,953-3,609		9				
	Kadi, S., 1968	5,906-6,562		6				
	Kalol, 1961	4,265-5,250		106				
	Kuthana, 1965	5,250-5,906		6				
	Kholka, 1966	4,265-5,577		5			76,000	
	Kosamba, 1963	1,968-2,625		6				
	Nawagam, 1963	4,429-6,562		63				
	Sanand, 1963	4,265-4,593		13				
	Sobhasen, 1968	4,429-5,906		9				
	Wovel, 1963	4,265-4,593		1			400,822,880	22.0-48.0
	ASSAM STATE							
	Digboi, 1890	300-7,500		733				
	Geleki, 1968	12,632-12,795		1				
	Lakwa, 1965	8,038-12,795		64			74,000	
	Moran, 1958	11,000		45				
	Nahorkatiya, 1953	9,500		251				
	Rudrasagar, 1961	10,171-10,500		39				
	Total India			1,545		150,000		
	*Data are estimated							
INDONESIA	SUMATRA							
	P. T. Caltex:							
	Bangko, 1970	1,820-2,681		31		98,027	17,840,877	34.2
	Bekasap, 1955	2,500		24	5	87,163	200,613,101	31.9
	Bekasap, So., 1968	3,500		5	1	11,733	7,297,247	28.1
	Duri, 1941	600		326	50	34,455	219,957,994	22.1
	Kotabatak, 1952	4,575		31	2	36,455	13,465,881	30.9
	Leko, 1971	2,400		2	2	6,474	1,195,930	35.8
	Minas, 1944	2,400		146	41	373,466	1,446,013,332	35.2
	Mindal, 1971	3,200	1	1	1	1,698	1,065,649	36.0
	Pematang, 1959	6,500		15	2	54,028	81,600,453	29.2
	Petani, 1968	4,800		13	1	77,944	88,497,661	32.0
	Pungut, 1951	4,200		3	4	5,036	10,142,216	36.7
	Rangau, 1969	6,200		5	1	1,832	1,349,335	41.0
	Sintong, 1971	3,600		5	7	1,282	233,467	34.0
	So. Balam, 1969	1,253-2,500		19	1	17,693	3,220,185	30.9
	Tandun, 1970	3,000	1	2	1	2,151	2,312,004	31.9
	Others			3		424	458,409	
	P. T. Stanvac (Central):							
	Lirik, 1939	1,600		20	13	3,828	22,148,846	35.0
	Molek, 1956	2,600		12	11	4,028	3,394,746	35.0
	Pulai, No., 1951	1,800		26	14	4,563	26,165,755	35.0

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
INDONESIA—Continued	Sago, 1940	1,800	....	88	124	11,825	97,955,790	35.0
	Others	....	....	18	17	1,747	10,945,211	....
	P. T. Stanvac (South)							
	Abab, 1951	6,000	20	2	23	19,930	15,768,672	33.9
	Benakat, 1952	1,600	....	77	209	5,308	120,338,168	35.0
	Dewa, 1971	7,675	8	....	5	2,847	518,620	....
	Ibul, 1970	5,600	16	1	19	16,697	6,459,943	....
	Jirak, 1930	900	....	41	182	1,373	49,954,185	36.8
	Talang Akar, 1922	2,800	61	6	423	1,419	247,693,683	35.0
	Others	....	42	4	243	1,775	133,415,734	....
	Pertamina Unit I (North)							
	Lee Tabue, 1971	2,112-3,564	44	....	31	11,848	2,627,946	....
	Julo Rayeu, 1929	2,520-90	26	....	42	4,287	5,383,044	54.5
	Rantau, 1929	950-4,540	204	1	223	34,242	166,558,324	48.5
	Others	....	15	7	572	1,586	74,384,292	....
	Pertamina Unit II (South Sumatra)							
	Belimbing, 1964	5,200	11	....	3	4,609	11,978,755	27.6
	Gunung Kemala, 1938	6,340	8	....	43	1,053	21,696,512	27.0
	Kenali Asam, 1931	3,800	12	53	200	2,210	84,511,186	36.1
	Kluang, ?	....	....	9	....	1,174	214,670	41.1
	Kuang, 1967	4,800	7	....	3	2,086	2,652,364	....
	Limau, 1928	4,500-5,400	9	....	148	11,532	183,567,058	27.6
	Talang Jimar, 1937	4,200	4	71	127	4,679	151,222,128	28.7
	Tandjung, Tiga, 1948	4,600	....	29	47	2,413	43,890,419	28.0
	Tempino, 1931	2,700	1	68	106	1,796	79,159,311	41.3
	Others	....	13	33	248	1,791	139,408,530	....
	WEST IRIAN							
	Pertamina Unit V							
	Klamono, 1936	500	....	32	16	1,347	86,954,342	18.8
	JAVA							
	ARCO							
	Ardjuna, 1968*	2,200-3,300	14	....	....	22,035	5,565,338	36.0
	IIAPCO							
	Cinta, 1970*	3,300	9	....	....	35,500	8,927,885	33.7
	Pertamina Unit III	....	5	24	30	250	11,242,176	....
	Lemigas (Oil & Gas Institute)	....	2	58	453	1,171	123,584,459	....
	KALIMANTAN (Indonesian Borneo)							
	Pertamina Unit IV							
	Bunyu, 1923	2,020-7,800	33	1	46	4,642	51,410,292	24.5-32.6
	Sanga-Sanga, 1898	1,200	21	68	558	1,273	236,894,345	17.0-35.0
	Tanjung-S. Warukin, 1938-1965	2,500-7,300	14	51	104	9,994	86,478,755	32.8
	Tarakan, 1906	200-2,400	6	183	701	1,579	195,167,470	20.0-21.0
	Others	....	1	19	294	460	61,379,311	32.4
	MADURA	....	....	....	....	....	23,260	....
	CERAM							
	Gulf & Western Bula, ?	500-600	....	15	17	1,635	9,036,596	21.6
	Total Indonesia		696	1,648	5,414	1,050,393	4,673,941,862	
	* Offshore.							

IRAN

CONSORTIUM FIELDS:								
Agha Jari, 1938	6,500	45	....	....	958,518	4,994,552,000	33.9	
Ahwaz, 1958	9,000	22	....	....	281,085	688,507,000	32.7	
Bibi Hakimeh, 1961	6,800	15	....	....	448,186	773,090,000	29.6	
Binak, 1959	11,600	1	....	....	49,437	61,489,000	29.8	
Gach Saran, 1928	7,000	29	....	....	865,629	2,648,295,000	31.3	
Haft Kel, 1927	3,500	11	....	....	41,211	1,637,591,000	37.4	
Karanj, 1963	7,800	4	....	....	188,215	283,658,000	33.8	
Kharg Island, 1962	11,800	4	....	....	50,868	48,948,000	33.4	
Kupal, 1965	1,000	2	....	....	1,774	2,571,000	34.2	
Lali, 1948	8,000	1	....	....	1,456	58,953,000	36.2	
Marun, 1964	11,000	30	....	....	1,003,090	1,223,023,000	32.2	
Masjid-e-Sulaiman, 1908	2,500	19	....	....	8,001	1,077,193,000	39.8	
Naft Safid, 1935	6,000	11	....	....	30,893	235,964,000	35.4	
Paris, 1964	5,700	15	....	....	366,208	240,198,000	33.9	
Par-e Siah, 1967	6,000	1	....	....	10,710	7,516,000	38.1	
Pazanan, 1961	9,000	2	....	....	20,180	115,378,000	35.4	
Rag-e Safid, 1964	8,300	4	....	....	34,929	62,068,000	30.4	
Ramshir, 1963	9,100	2	....	....	11,716	12,357,000	28.8	
Total Consortium		218	....	....	4,372,106	14,171,351,000		
SIRIP FIELDS:								
Bahrgansar, 1960*	9,000-12,300	7	....	3	20,500	80,900,000	32.0	
Hendijan, 1968*	9,850-11,000	5	....	....	32,440	11,200,000	32.0	
Nowrouz, 1966*	8,587-10,850	10	....	5	42,120	16,300,000	30.0	
Total Sirip		22	....	8	95,060	108,400,000		
AMOCO FIELDS:								
Cyrus, 1962*	7,000	7	....	5	18,287	26,733,411	19.0	
Darius, 1961*	1,000	12	....	1	109,897	229,534,711	34.0	
Total Amoco		19	....	6	128,184	256,268,122		

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
IRAN—Continued	IMINOCO FIELDS:							
	Rakhs, 1969*	7,500- 9,750	11		3	54,400	15,100,000	36.7
	Rostam, 1966*	7,200- 9,800	18	7	6	35,100	49,400,000	38.7
	Total Iminoco		29	7	9	89,500	64,500,000	
	LAPCO FIELDS:							
	Sassan, 1966*	4,000- 6,800	12		6	150,125	177,284,186	31.0-34.0
	NIOC FIELDS†:							
	Alborz, 1956	8,000- 9,000			17		5,115,892	39.0
	Naft-i-shah, 1923	2,000- 3,000	6			10,000	79,730,000	
	Sarajeh, 1958	8,000- 9,000			(7 gas)			
	Total NIOC		6		17	10,000	84,845,892	
	Total Iran		306	7	46	4,844,975	14,862,649,200	
	*Offshore.							
	†Estimated.							
IRAQ	Ain Zalah, 1939	5,200- 6,500	6		6	20,200	145,134,558	31.0
	Bai Hassan, 1953	4,800- 5,400			5	56,500	204,290,511	35.0
	Butmah, 1952	3,900		3		5,000	31,268,950	31.0
	Jambur, 1954	5,500	2		2	8,400	59,565,452	35.0
	Kirkuk, 1927	2,800- 4,200	47		19	900,000	5,733,017,018	36.0
	Naft Kaneh, 1923*	3,000	4			7,000	76,100,000	
	Rumaila, 1953	10,800	26		2	534,500	1,476,910,000	35.0
	Rumaila, N., 1953*	10,500	10			30,000	2,730,000	35.0
	Zubair, 1948	7,400-11,200	25		5	103,700	592,830,000	35.0
	Total		129	3	38	1,665,300	8,321,846,489	
	*Data are estimated							
ISRAEL	Heletz-Brur, 1955	5,970		20		730	260,000	30.0
	Kochav, 1963	5,630		10		240	93,000	26.5
	Total			30		970	353,000	
ITALY	Gela, 1956	10,800-11,150	*9	*1	4			
			36	13	7	10,370	64,074,430	10.1
	Pisticci-S. Cataldo, 1960	6,560	8		2	1,041	3,128,817	11.4
	Ragusa, 1954	12,460		33	16	6,814	1,245,441	19.7
	Others		21	7	17	2,420	16,345,208	
	Total		74	54	46	20,645	84,793,896	
	*Field lies on and offshore.							
JAPAN	Kubiki, 1954*	1,099- 6,370	133		6	1,228	9,838,353	31.0
	Minami-Aga, 1964	7,278- 9,574	18		8	2,681	9,298,518	38.5
	Sarukawa, 1958	3,880	54		4	1,418	6,171,855	32.8
	Others		188	685	481	9,273	139,185,694	
	Total		393	685	499	14,600	164,494,420	
	*Offshore.							
KUWAIT	Uthrah, 1956	8,500	2					
	Burgan, 1938	4,800	368					
	Magwa/Ahmadi, 1952	4,800	178					
	Minagish, 1959	10,000	14					
	Raudhatain, 1955	8,500	51					
	Sabiriyah, 1957	8,000	48					
	Umm Gudair, 1962	9,300	31					
	Total		692			2,965,637	13,354,751,371	
LIBYA	Amal, 1959	9,900		1	18	136,340	383,522,505	36.0
	Arshad, 1966	10,100	2		5	2,352	5,651,531	48.0
	Bahi, 1968	3,600- 3,750		40	1	103,414	95,790,974	43.4
	Beda, 1959	4,000		34	34	6,855	70,424,016	36.0
	Belhedan, 1962	7,200	4		2	6,197	24,032,261	33.7
	Dahra, 1959	3,100- 3,700	6	38	89	36,837	338,272,619	37.0-41.0
	Defa, 1969	5,400- 5,900	55		7	146,699	200,044,659	36.5
	Dor, 1967	6,400		3	2	5,026	10,860,744	32.0
	Dor-Marada, 1967	9,000	1		7	4,720	10,127,740	50.0
	Ed-Dib, 1970	3,500		1	3	2,004	2,104,933	38.0
	Farigh, 1969	12,000	3		1	2,242	3,887,964	39.0
	Farrud, 1964	3,000		3	3	3,283	14,512,806	47.0
	Gialo, 1961	2,200- 6,300	4	140	34	312,304	883,822,028	35.7
	Intisar A, 1967	9,750	16		1	119,387	423,523,348	45.0
	Intisar C, 1967	9,650	6		1	31,069	28,256,414	39.0
	Intisar D, 1967	9,400	13			265,845	362,499,372	40.0
	Jebel, 1962	8,100	20		1	15,927	90,502,020	37.0
	Kotla, 1963	5,500		9	3	9,467	30,750,016	32.0
	Lehib, 1966	9,100	9		5	11,448	22,208,526	49.0
	Nafoora, 1965	2,200-10,000	21	18	9	67,577	138,281,048	36.0

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
LIBYA—Continued	Nafoora-Augila Unit, 1965-1968*	8,800-9,000	43	....	18	215,077	415,590,300	35.0
	Ora, 1962	4,700-7,500	1	23	13	8,225	57,794,427	36.0
	Raguba, 1961	5,400	44	....	28	95,664	342,508,452	43.0
	Rakb, 1962	2,500-11,000	3	7	2	8,084	17,770,329	34.0
	Ralah, 1964	7,650	3	....	1	2,341	4,740,795	37.0
	Sahabi, 1968	10,300	6	1	2	10,626	10,080,345	39.0
	Samah, 1961	6,400	11	....	9	50,889	199,096,994	33.8
	Sarir, 1961	9,000	50	....	38	202,352	627,817,512	37.8
	Ummfarud, 1962	3,300	....	7	1	3,207	14,224,482	47.0
	Waha, 1960	6,600	....	43	19	117,307	426,037,137	36.5
	Zaggut, 1962	6,000	5	....	3	2,354	14,711,072	36.5
	Zelten, 1959	5,500-7,600	61	....	55	238,152	1,535,479,299	39.0
	Magid, 1968	9,600-9,800	6	....	1	14,224	15,336,595	40.5
	Mansour, 1968	6,400	1	1	....	2,072	3,143,870	32.3
	Others†	....	....	....	89	346	84,024,447	....
	Total	....	394	369	505	2,260,113	6,907,431,670	....

†Gas-lift wells excluded. *Unitized Nov. 1, 1971. Amoseas operator. †Includes Ain Jarbi & Khuff (abandoned), and Hofra and Bu Attifel (shut in).

MEXICO	NORTHEASTERN DISTRICT, NORTHERN ZONE							
	Monterrey, 150	6,950	15	10	....	3,477	7,914,846	47.0
	Others	....	34	7	....	1,196	18,511,388	....
	NORTHERN DISTRICT, NORTHERN ZONE							
	Arenque, 1970*	11,362	6	....	....	7,305	3,098,409	26.0
	Constituciones, 1956	6,300	49	54	....	6,866	37,887,508	17.0
	Ebano-Panuco, 1901	1,450	222	270	....	8,845	922,648,040	12.0
	Tamaulipas, 1956	4,200	65	44	....	7,470	33,757,814	18.0
	Others	....	15	6	....	591	10,716,122	....
	SOUTHERN DISTRICT, NORTHERN ZONE							
	Gabo Nuevo, 1967†	5,753	3	....	....	2,302	9,118,550	16.0
	Isla de Lobos, 1963*	6,875	5	....	....	4,184	14,344,672	40.0
	Naranjos-Cerro Azul, 1909	1,800	188	....	....	8,690	1,146,133,319	20.0
	Tiburón, 1965*	7,314	7	....	....	2,497	4,341,276	20.0
	Tres Hermanos, 1959	6,960	41	....	....	12,895	79,712,026	21.0
	Others	....	45	....	....	1,204	27,672,885	....
	POZA RICA, CENTRAL ZONE							
	Atún, 1966*	9,040	11	....	....	7,290	23,921,147	37.0
	El Hallazgo, 1955	10,170	1	53	....	6,427	52,545,421	25.0
	Jiliapa, 1958	7,390	....	33	....	2,166	21,274,422	34.0
	Miquetla, 1959	6,480	2	....	....	1,632	15,388,196	35.0
	Morsa, 1971	10,434	4	....	....	10,511	4,040,306	37.0
	Poza Rica, 1930	7,090	56	263	....	58,009	1,012,658,443	35.0
	Remolino, 1962	10,745	6	42	....	3,843	13,211,535	....
	San Andres, 1962	10,410	5	150	....	35,045	218,525,601	29.0
	Others	....	20	56	....	4,712	50,857,326	....
	NUEVA FAJA DE ORO							
	Acuatempa, 1955	4,085	14	....	....	2,052	21,072,148	21.0
	El Muro, 1966	3,966	11	....	....	4,725	5,805,934	17.0
	E. Ordóñez, 1952	5,220	12	....	....	3,008	49,388,582	21.0
	St. Aqveda, 1953	4,789	33	....	....	5,671	86,361,770	16.0
	Others	....	76	....	....	3,258	39,732,433	....
	VERACRUZ DISTRICT, CENTRAL ZONE							
	Angostura, 1953	4,405	8	....	....	425	21,243,185	15.0
	Others	....	....	....	....	....	173,315	....
	ISTHMUS OF TEHUANTEPEC, SOUTHERN ZONE							
	Agata, 1956	3,830	2	14	....	1,243	8,923,152	34.0
	Cuichapa, 1935	2,200	165	8	....	44,925	39,759,417	30.0
	El Burro, 1931	2,200	1	18	....	1,036	16,376,889	26.0
	El Plan, 1931	1,700	5	81	....	4,702	137,214,702	30.0
	Ixhuatlán Oriente, 1965	3,952	16	2	....	1,440	3,139,359	22.0
	Los Soldados, 1953	4,492	17	6	....	2,695	16,410,025	32.0
	Moloacán, 1948	1,397	9	82	....	3,493	4,132,800	26.0
	Tacuilolapa, 1955	2,925	3	4	....	951	2,021,009	36.0
	Tonalá, 1928	1,770	2	52	....	1,670	70,856,429	28.0
	Tunel, 1967	1,230	(Included in Moloacan field)			....	....	....
	Others	....	4	60	....	2,026	48,433,639	....
	TABASCO, SOUTHERN ZONE							
	Caracolillo, 1969	11,480	5	....	....	1,837	838,414	....
	Carrizo, 1962	4,820	10	8	....	3,252	4,894,029	25.0
	Castarrical, 1967	10,086	28	9	....	9,804	13,200,981	34.0
	Cinco Presidentes, 1960	6,862	75	103	....	38,442	164,383,740	35.0
	El Golpe, 1963	8,836	31	48	....	19,526	32,422,591	35.0
	La Venta, 1954	4,730	2	47	....	3,294	42,397,361	41.0
	Magallanes, 1957	4,240	18	192	....	18,989	85,535,741	27.0
	Mecoacan, 1958	7,110	23	18	....	5,412	25,400,083	24.0
	Ogarrio, 1957	5,790	25	60	....	11,634	71,222,696	38.0

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
MEXICO—Continued	Otates, 1965	7,469	16	9	....	6,065	11,657,270	39.0
	Pajonal, 1967	9,840	4	5	....	1,173	1,295,671	27.0
	Samaria, 1960	2,624	2	10	....	1,075	3,328,222	23.0
	San Ramon, 1967	9,883	37	22	....	17,757	11,497,276	30.0
	Santa Ana, 1959†	9,517	1	13	....	1,454	28,205,561	29.0
	Santuvario, 1966	9,617	17	....	....	5,356	2,673,401	37.0
	Tintal, 1968	5,904	9	....	....	1,354	1,350,896	22.0
	Tucan, 1968	10,824	3	10	....	2,399	3,259,283	36.0
	Tupilco, 1959	9,685	27	18	....	11,928	18,447,393	27.0
	Others	....	10	4	....	1,459	9,377,284	....
	Total Mexico		1,518	1,903	....	441,736	4,830,711,933	
	*Offshore. †Partly offshore.							
MOROCCO	Haricha, 1957	3,000	2	1	....	25	2,747,000	40.0
	Sidi Fili, 1947	....	19	8	....	110	7,488,000	40.0
	Sidi Rhalem, 1961	5,600	....	2	....	175	4,860,000	40.0
	Total		21	11	....	310	15,095,000	
NETHERLANDS	De Lier-Monster, 1955	5,200	16	....	11	1,250	11,976,300	33.2
	Ijsselmonda-Ridderkerk, 1956	3,100-5,000	48	....	10	7,787	58,138,200	18.0-24.2
	Schoonebeek, 1943	2,500	198	....	104	14,423	151,281,800	24.8
	Wassen-Mayendel, 1956	4,200	25	....	7	5,005	29,463,900	18.6
	Zoetermeer, 1957	3,200	13	....	5	900	6,228,500	16.4
	Others	....	19	....	25	481	8,123,200	....
	Total		319	....	162	29,846	265,211,900	
NEUTRAL ZONE	Hout, 1969*	5,470-9,130	26	....	6	59,434	58,868,000	34.0
	Khalji, 1961*	5,570-7,540	89	....	7	322,240	893,234,000	28.4
	So. Fuwaris, 1962	6,700	....	4	4	2,133	9,653,430	24.5
	So. Umm Gudair, 1966	9,100	10	4	3	49,058	72,237,964	23.4
	Wafra:							
	Burgan, 1953	3,600	11	35	9	20,507	172,619,081	34.5
	Eocene, 1954	1,200-2,200	8	222	85	37,965	336,246,099	18.5
	Ratawi, 1955	6,750	3	28	8	53,150	263,379,923	24.5
	Total		147	293	122	544,487	1,806,238,497	
	*Offshore. Note: Two fields—Lulu (2 wells) and Dorra (1 well) not yet producing.							
NEW ZEALAND	Kapuni, 1959	11,323-12,504	4	....	....	2,706	1,760,213	49.0
	Others*	....	....	....	....	....	217,000	....
	Total		4	....	....	2,706	1,977,213	
	*Old (1866) Moturoa field at New Plymouth was abandoned in 1972.							
NIGERIA	GULF OIL*							
	Delta, 1965	5,600-9,400	11	....	1	15,499	26,887,576	28.3
	Delta So., 1965	7,100-9,200	14	....	4	42,858	61,936,838	39.4
	Isan, 1970	5,800-9,000	5	....	3	10,120	1,436,985	44.0
	Malu, 1969	4,800-6,300	15	....	....	29,687	12,822,135	39.3
	Meji, 1965	5,200-10,900	10	....	1	14,370	24,553,816	33.0
	Meren	5,000-7,500	32	....	9	91,147	96,472,732	35.7
	Okan, 1969	5,500-8,900	39	....	3	69,415	153,401,745	35.7
	Parabe, 1968	4,500-8,200	25	....	....	38,560	16,644,176	39.3
	MOBIL OIL*							
	Asabo, 1966	5,412	8	....	1	35,285	27,719,805	33.2
	Ekpé, 1966	7,503	11	....	....	51,790	10,379,147	38.2
	Idoho, 1966	8,536	2	....	2	9,922	14,552,170	39.3
	Inim, 1966	5,914	4	....	....	15,036	2,751,598	38.3
	Ubit, 1968	4,842	14	....	4	36,492	18,120,575	37.2
	Utue, 1966	5,656	3	....	....	2,755	504,245	38.7
	AGIP-PHILLIPS							
	Ebocha, 1965	9,200-10,100	8	....	1	15,000	24,100,000	42.1
	Mbede, 1966	9,850-10,800	13	....	5	35,000		
	SAFRAP							
	Obagi, 1964	7,300	18	....	5	51,609	30,126,846	24.7
	TEXACO-CHEVRON*							
	Pennington, 1964	8,000-12,000	7	....	2	11,425	6,745,839	37.0
	SHELL-BRITISH PETROLEUM (MIDWEST)							
	Ugh-Ogini, 1964	5,860	6	....	2	6,198	2,258,600	17.5
	Ugh-Uzere East, 1960	8,500	11	....	1	13,706	29,127,600	22.6
	Ugh-Uzere West, 1960	8,500	11	....	....	20,778	45,847,900	27.7
	Ugh-Olomoro, 1963	7,000-10,000	24	....	7	67,697	123,631,800	22.3
	Ugh-Okech, 1964	12,300	9	....	2	22,313	46,660,000	26.8
	Ugh-Kokori, 1961	8,000-9,800	18	....	3	83,046	103,165,800	44.9
	Ugh-Asfriesfre, 1966	8,000-9,000	14		3	17,922	18,757,900	23.8
	Ugh-Eriemu, 1961	12,500	8		2	5,144	6,397,900	29.9

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291-83

GENERAL  ELECTRIC

WORLD LEADER
IN INFORMATION
SERVICES

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
NIGERIA—Continued								
	Ugh-Ughelli E., 1959	11,800	6	....	2	26,986	36,350,600	33.6
	Ugh-Ughelli W., 1959	7,400-10,200	6	....	....	8,026	8,993,300	20.0
	Ugh-Utorogu, 1964	9,000	19	....	....	40,059	41,547,000	25.0
	Ugh-Oroni, 1964	12,000	6	....	1	7,872	5,962,000	19.0
	Ugh-Warri-Ri-1, 1961	12,264	4	....	....	5,094	1,057,300	30.8
	Ugh-Evwreni, 1967	10,900	7	....	2	11,365	13,071,100	25.0
	Ugh-Rapele, 1965	12,934	3	....	....	8,910	2,129,700	25.0
	Ugh-Osioka, 1967	12,885	2	....	....	3,653	601,300	30.0
	Forc-Odidi, 1967	10,980	15	....	....	16,385	6,515,200	30.0
	Forc-Jones Cr., 1967	7,000-9,000	26	....	....	141,325	56,401,700	25.0
	Forc-Egwa, 1967	9,350	11	....	....	21,521	13,672,600	37.0
	Forc-Forc Est., 1969	7,000	38	....	3	100,309	51,987,900	25.0
	Forc-Batan, 1968	11,000	6	....	1	11,165	2,633,000	21.0
	Forc-Escravos Beach, 1969	9,391	8	....	....	4,894	447,000	36.0
	Forc-Ajuju, 1970	13,324	1	....	....	2,294	371,500	30.0
	Others		3	....	18	875	167,200	....
	SHELL-BRITISH PETROLEUM (EASTERN)							
	PHL-Bomu, 1968	6,700-7,500	27	....	1	41,917	212,296,600	33.2
	PHL-Isimiri, 1964	5,900-11,000	5	....	....	7,747	12,015,300	28.8
	PHL-Imo River, 1959	5,800-10,100	38	....	....	95,097	181,284,000	32.0
	PHL-Ebubu, 1958	8,200	6	....	....	3,397	10,668,100	26.0
	PHL-Onne, 1965	10,384	2	....	....	2,471	610,700	30.0
	PHL-Nkali, 1963	12,000	6	....	1	5,604	10,157,800	41.0
	PHL-Obigho-N, 1963	6,500-10,000	15	....	1	28,338	65,154,200	24.2
	PHL-Efelenwa, 1959	11,000	5	....	....	7,401	2,619,100	38.0
	PHL-Agbada, 1960	8,000-12,000	20	....	....	30,333	44,304,400	32.1
	PHL-Umuechem, 1959	5,800-10,700	15	....	....	31,759	81,925,900	37.6
	PHL-Apara, 1960	9,000	3	....	....	1,061	4,472,400	34.0
	PHL-Obele, 1964	10,000	3	....	....	2,006	600,100	22.0
	PHL-Bodo W., 1962	9,700	9	....	1	24,977	24,876,600	22.5
	PHL-Afam, 1956	6,000	9	....	2	9,935	15,242,300	45.0
	PHL-Korokoro, 1969	8,000-9,800	7	....	....	14,446	46,184,500	35.2
	PHS-Alakiri, 1962	10,000	13	....	....	33,294	20,519,700	32.5
	PHS-Buguma Creek, 1960	12,195	2	....	1	4,632	444,400	35.0
	PHS-Cawth. Ch., 1963	11,000	11	....	1	70,618	57,333,400	39.0
	PHS-Ekulama, 1958	10,483	5	....	....	6,313	999,600	20.2
	PHS-Soku, 1958	11,500	17	....	2	35,245	7,599,600	35.0
	PHS-Oloibiri, 1956	8,000-9,800	7	....	....	3,961	15,046,300	22.0
	EGB-Oguta, 1965	10,300	11	....	2	23,894	8,274,100	30.0
	EGB-Assa, 1961	11,300	2	....	....	2,120	194,200	17.5
	EGB-Egbema, 1960	10,470	6	....	....	16,822	12,069,200	28.0
	EGB-Ahia, 1965	11,500	13	....	....	31,273	24,919,500	35.5
	CESW-Adibawa, 1966	11,950	5	....	2	8,708	2,223,300	30.0
	Others		11	....	17	1,981	2,167,300	....
	Total Nigeria		774	....	119	1,768,857	2,021,114,728	
	*Offshore							
NORWAY								
	Ekofisk, 1970*	10,200-10,900	4	....	....	32,482	8,207,458	35.6
	Ekofisk W., 1970*	10,000	....	....	1	....	....	35.6
	Tor, 1970*	10,000	....	....	1	....	....	35.6
	Total		4	....	2	32,482	8,207,458	
	*Offshore							
OMAN								
	Fahud-Natih, 1964	2,000-6,080	35	....	43	114,454	311,201,000	32.5
	Huwaisa-Shuaiba, 1970	5,550	10	....	....	32,864	16,468,100	33.0
	Natih-Natih, 1963	7,500	15	....	15	58,235	147,234,400	31.3
	Yibal-Shuaiba, 1962	8,465	37	....	5	70,459	35,040,400	39.7
	Total		97	....	63	276,012	509,944,000	
PAKISTAN								
	Balkassar, 1946	8,200	....	5	....	2,415	26,581,073	24.3
	Dhulian, 1937	8,500	5	2	....	3,190	34,632,000	43.0
	Meyal, 1968	12,500	2	....	....	2,500	2,398,000	44.0
	Others		3	....	1	1,250	8,430,660	....
	Total		10	7	1	9,355	72,041,733	
PERU								
	COASTAL							
	Area Talara, 1869-1943†	2,000-9,000	104	1,004	5,224	10,513	521,772,830	25.0-40.0
	Concesiones Lima, 1905	2,000-9,000	62	847	1,833	23,529	246,640,232	32.0-35.0
	Others	500-1,500	....	....	55	....	4,205,455	33.0-34.0
	†Includes La Brea y Parinas and Los Organos.							
	EASTERN							
	Agua Caliente, 1939	1,000-1,500	....	23	12	1,123	12,399,235	34.0
	Maquila, 1957	1,000-1,500	6	7	1	1,146	5,611,807	37.0
	Area Corrientes, 1971	12,000	....	....	3	....	....	....
	CONTINENTAL SHELF							
	Humboldt, 1960*	3,000-7,500	46	58	42	17,284	15,027,534	38.0
	Litoral y Mirador, 1955*	1,500-6,000	1	96	70	4,336	22,097,600	37.0-40.0
	Providencia, 1967*	3,000-6,000	2	31	29	1,903	8,183,692	....

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
PERU—Continued	Delfin y Ballena*	3,000-7,000	2	7	2	353	1,519,918	.....
	Others							.....
	*Offshore							.....
	SIERRA Pirin, 1925						287,000	.....
	Total Peru		223	2,073	7,272	60,187	837,745,303	
QATAR	Duklan, 1940	6,200-7,200	57	....	4	210,000	1,270,953,069	41.0
	Bul Hanine, 1970*	6,000	2	....	1	8,283	753,700	35.0
	Idd El Shargi, 1960*	4,500-8,250	14	....	....	43,579	114,570,800	35.5
	Maydan-Mahzan, 1963*	7,000-7,600	11	....	....	148,188	275,809,600	38.0
	Total		84	....	5	431,750	1,662,545,100	
	*Offshore.							
SAUDI ARABIA	Abqaiq, 1940	6,670	74	5	3	931,879	3,886,450,366	38
	Abu Hadriya, 1940	9,930	7	3	0	95,919	212,584,748	35
	Abu Safah, 1963*	6,650	9	0	1	94,748	148,634,819	30
	Berri, 1964†	7,450	18	10	1	313,487	165,692,250	33
	Dammam, 1938	4,620	20	0	4	23,084	517,871,607	34
	Fadhili, 1949	8,110	3	2	0	51,381	111,557,756	40
	Ghawar, 1948	6,700	205	23	8	2,668,202	7,127,596,792	35
	Harmaliyah, 1971	8,400	0	1	0	....	....	36
	Khurais, 1957	5,100	9	1	1	22,610	28,131,775	33
	Khursaniyah, 1956	6,750	10	0	2	129,020	371,550,624	31
	Mani'a, 1957*	7,950	5	2	0	49,480	89,268,143	28
	Marjan, 1971	5,200	0	1	0	....	....	32
	Mazali, 1971	5,200	0	1	0	....	....	31
	Qatif, 1945*	7,050	20	0	2	122,976	353,018,536	31
	Safaniyah, 1951*	5,100	83	12	8	909,924	2,140,954,223	27
	Shaybah, 1968	5,000	1	7	0	....	9,870	42
	Zuluf, 1965	5,800	0	3	0	....	....	32
	Total		464	71	30	5,412,710	15,153,321,509	
	*Offshore, †Partly offshore.							
SPAIN	Ayoluengo, 1964	4,000	....	22	5	2,960	6,200,000	37.0
	Amposta, 1971*	10,000	....	....	4	....	....	19.0
	Total			22	9	2,960	6,200,000	
	*Offshore							
SYRIA*	Hamsch, 1956	6,000	....	....	1	....	....	21.0
	Jibissa, 1968	6,000	....	....	1	....	....	23.0
	Karatchouk, 1956	6,500	13	3	1	10,000	....	23.0
	Rumalan, 1956	6,500	4	....	1	5,000	115,933,446	25.0
	Souedie, 1959	6,500	80	23	31	105,000	....	25.0
	Total		97	26	35	120,000	115,933,446	
	*Data are estimated							
TAIWAN	Tiehchanshan, 1962	8,500-18,000	26	....	2	1,700	926,736	53.0
	Others		25	....	17	230	125,636	....
	Total		51	....	19	1,930	1,052,372	
THAILAND	Boh Ton Kham (Chaiprakarn), 1953	700	....	12	12	10	196,000	16.0-17.0
	Mae Soon Luang, 1963	2,000-2,500	1	12	5	146	359,000	32.0
	Total		1	24	17	156	555,000	
TRINIDAD & TOBAGO	Area 1:							
	North Marine, 1959	3,000-15,000	1	....	7	168	1,129,000	23.2
	Soldado, 1955*	5,100-11,000	139	78	69	51,010	225,760,000	24.8
	Area 2:	1,000-10,626						
	Area IV Guapo, 1913-1922		1	34	110	511	32,417,000	25.5-16.9
	Parry Lands (1-5), 1913-1918		16	40	148	774	33,250,000	30.2-10.7
	Point Fortin Central and West, 1907-1916		16	25	149	639	30,370,000	45.1-20.4
	Area 3:							
	Brighton, 1908†	700-7,500	28	179	225	4,264	64,098,000	32.8
	Area 4:	460-12,718						
	Palo Seco, 1926-1929		....	8	61	27	1,565,000	22.1
	Palo Seco-Erin, 1915-1926		81	316	400	10,061	69,495,000	21.2
	Area 5:	500-11,000						
	Forest Reserve, 1913		59	594	965	16,657	307,002,000	23.0
	Fyzabad, 1918-1920		21	215	313	5,231	148,030,000	20.8-32.7
	Point Fortin East, 1929		4	56	50	2,304	20,011,000	34.4
	Area 6:	288-14,000						
	Coora-Quarry, 1936		19	163	356	3,260	76,547,000	24.1-20.4
	Area 7:							
	Oropouche, 1944		4	9	27	643	2,831,000	38.6-19.8

WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
TRINIDAD & TOBAGO—Continued	Area 8:	1,300-11,067						
	Barrackpore, 1911		15	23	135	1,725	22,009,000	41.2-26.9
	Penal, 1936		31	58	84	3,106	54,227,000	55.7-37.5
	Wilson, 1936		4	32	33	531	18,396,000	26.4
	Area 9:	1,400- 9,693						
	Catshill, 1950		4	51	18	1,345	19,534,000	46.3-38.3
	Moruga-North & West, 1956		1	37	71	376	8,967,000	31.4-25.0
	Trinity, 1956		1	51	20	788	12,575,000	32.2
	Area 10:							
	Guayaguayare, 1903	500-10,750	12	191	314	7,758	68,271,000	33.7
	Area 11:							
	Galeota, 1972*	1,100- 6,304	1	16		1,942	118,000	
	Teak, 1972*	7,250-15,191	11		1	19,374	3,526,000	29.3
	Others	3,000- 7,560	49	202	972	3,527	99,178,000 ^a	40.7-14.1
Total Trinidad and Tobago			518	2,378	4,528	136,021	1,319,312,000	
*Offshore. †Partly Offshore.								
(a) Others cumulative have changed as some fields were taken out and included under the Area Totals.								
TUNISIA	Aquitaine:							
	Douleb, 1966; Tamesmida, 1968	3,300- 4,950	2			3,716	5,827,340	41.6-43.0
	ENI:							
	Fl Borma, 1964	8,250- 8,900	39		11	73,100	147,500,000	41.1
	Others			1	2	100	106,500	
Total			41	1	13	76,916	153,433,840	
TURKEY	Adiyaman, 1971	5,600		12	2	2,591	1,076,979	26.6
	Barbes, 1972	7,200	1			1,199	218,240	29.6
	Beykan, 1964	5,200		8	3	10,963	28,229,249	33.2
	Garzan-Ger., 1951	5,100		38	32	3,192	25,261,966	25.0
	Kahla, 1958	3,500		5	1	1,570	3,047,777	11.5
	Kayakoy, 1961	6,000		6	7	2,982	6,671,954	38.2
	Kayakoy West, 1964	5,300	1	4	1	4,971	8,728,536	35.0
	Katin, 1971	6,800	2		1	828	251,696	29.3
	Kürkan, 1963	4,500		6	6	10,238	20,487,425	31.4
	Kürkan South, 1967	5,500	3		1	1,567	2,573,586	34.2
	Magrip, 1961	6,400		13	12	1,312	10,571,297	19.3
	Malatepe, 1970	5,000	1	2		1,220	1,021,508	32.7
	Piyanko, 1968	6,300	1		3	843	880,890	35.5
	Raman, 1940	4,500		24	23	2,599	19,856,271	18.5
	Raman West, 1961	4,300		126	12	5,362	16,369,805	13.4
	Silivanka, 1962	7,500		14	1	1,746	2,388,339	19.6
	Sahaban, 1966	5,400	3		1	1,463	6,148,306	34.4
	Selmo, 1964	5,800	2	9	1	10,109	29,852,901	34.2
	Others		2	6	8	297	2,444,224	
Total			16	274	115	65,052	186,080,949	
UNITED KINGDOM	Bothamsall, 1958	3,300		9	7	320	1,835,000	
	Egmanton, 1955	3,250		14	37	273	2,855,000	
	Gainsborough, 1959	3,200- 4,600		25	20	518	2,049,000	
	Kimmeridge, 1959	1,800		1	2	376	1,298,000	
	Others			8	10	243	10,033	
Total				56	74	1,730	18,070,000	
VENEZUELA	STATE OF ANZOATEGUI							
	Araibet, 1954	8,970-10,516	6		31	1,320	25,236,709	42.6
	Boca, 1951	9,500	16	1	62	3,571	66,733,111	35.6
	Caico Seco, 1946	6,500- 7,300	13		64	4,550	41,167,999	34.8
	Chimire, 1948-1952	7,000- 7,200	62		141	13,610	331,027,073	35.5
	Dacion, 1957	6,700	84	10	28	9,915	162,202,696	19.9
	Elias, 1954	5,100- 6,470	31	19	54	17,920	49,779,024	38.9
	El Roble, 1939	3,500-11,500	14		21	1,020	35,817,216	49.9
	Guara, 1946	5,000-10,000	94	103	194	26,389	473,083,942	26.3
	Guaria, 1940	5,000-10,000	8		52	1,739	41,856,675	49.5
	Guico, 1944	4,500- 7,000	23	6	50	2,634	80,990,786	27.1
	Inca, 1948	7,250	8		18	2,356	12,044,627	38.1
	Junta, 1954	6,720	1	8	13	1,434	21,910,122	20.8
	La Ceiba, 1946	9,480	20	1	11	7,926	21,897,184	41.5
	La Ceibita, 1963	9,870- 9,878	25		20	15,406	49,822,059	42.8
	Leona, 1938	2,200-12,800	32	70	107	11,336	121,922,697	22.0
	Mapiri Este, 1952	9,500	2		14	1,283	22,244,136	35.9
	Mata, 1954	9,000-12,500	134	14	277	47,230	412,079,612	33.9
	Me:ey, 1937	5,400- 5,700	9	263	113	20,273	156,367,957	11.4
	Nipa, 1945	6,000- 8,500	134	40	262	27,905	411,413,233	28.4
	Oficina, 1937	5,900	69	187	373	36,392	616,823,766	21.3
	Oscurote, 1952	9,513	26	16	42	10,906	103,180,754	19.7
	Rosa, 1958	1,250-11,412			3	1,332	6,307,003	50.8
	San Joaquin, 1939	6,560	24		48	2,744	75,585,369	47.5
	Santa Ana, 1936	8,500	37		47	6,997	81,850,318	37.9
	Santa Rosa, 1941	8,500	113		56	35,934	276,253,872	44.7
	Solo, 1950	9,500	41		174	7,615	154,685,316	37.3

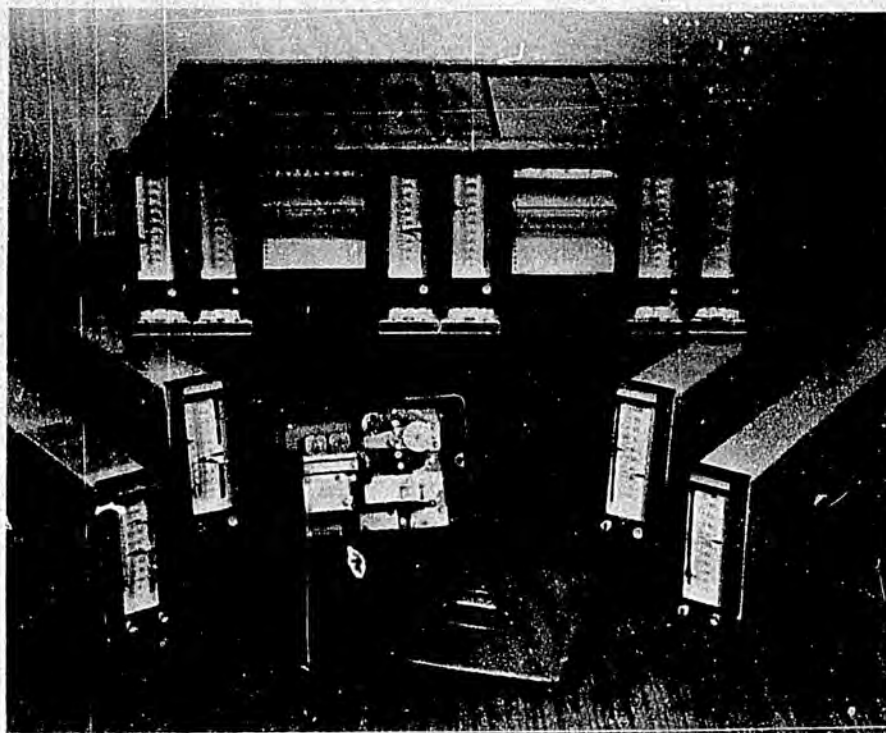
WORLDWIDE PRODUCTION	Name of field and discovery date	Depth (ft)	No. of Wells			Production in bbl		Gravity °API
			Flowing	Pumping	Shut-in	Daily avg. 1st 6 mo. 1972	Cumulative 7/1/72	
VENEZUELA— (Continued)	Tapuco, 1953	10,000	4	....	23	2,447	23,891,327	36.8
	Yopales, 1937	4,600	17	46	66	11,759	83,367,066	22.5
	Zanjas, 1958	13,270	7	....	7	4,651	17,147,429	32.8
	Zapatos, 1955	11,500	21	....	39	15,581	104,133,702	35.8
	Zorro, 1953	11,100	13	....	13	7,211	53,823,812	25.4
	Zulus, 1957	12,710	4	....	13	2,007	13,359,246	35.0
	Zumo, 1954	9,200	9	16	10	4,924	55,156,470	17.8
	Others		74	33	284	17,046	181,361,810	....
	Total		1,175	833	2,730	385,363	4,384,524,118	
	FEDERAL TERRITORY OF AMACURO							
	Tucupita, 1945	5,600	12	15	39	3,957	44,002,774	16.8
	Others		....	....	25	....	57,415,540	....
	Total		12	15	64	3,957	101,418,314	
	STATE OF MONAGAS							
	Acema, 1960	12,520-13,750	42	4	32	23,850	38,609,132	26.3
	Aguaguay, 1955	8,100-13,400	25	....	35	14,369	69,289,739	38.7
	Jobo, 1956	3,600-4,000	....	61	66	32,490	30,698,652	12.3
	Morichal, 1958	3,312	....	109	61	16,783	92,156,033	10.7
	Oritupano, 1950	7,657	9	66	34	17,779	87,825,075	20.0
	Orocual, 1933	2,954	12	6	19	3,577	14,410,441	20.9
	Piritai, 1958	450-1,100	....	58	7	3,882	16,163,585	16.8
	Quiriguire, 1928	7,000-7,200	....	377	87	19,996	711,895,138	16.4
	Santa Barbara, 1941	5,020-6,500	108	15	216	4,757	154,826,805	27.5
	Tacat, 1953	1,830-3,668	....	52	76	2,889	34,269,221	16.9
	Temblador, 1936	3,500-4,500	38	2	9	4,811	94,119,831	20.3
	Others		37	....	322	5,564	394,723,412	....
	Total		271	750	964	150,747	1,738,987,067	
	STATE OF GUARICO							
	Las Mercedes, 1942	1,200-4,500	30	12	113	1,388	125,869,817	29.1
	Ruiz, 1949	4,450	28	1	11	956	30,021,542	32.4
	Budare, 1958	4,523	23	....	6	19,454	20,168,225	31.3
	Others		30	60	147	2,753	56,656,263	....
	Total		111	73	277	24,551	242,715,847	
	STATE OF BARINAS							
	Hato Viejo, 1961	9,543	2	7	3	5,458	26,261,739	26.6
	Maporal, 1957	10,944	....	3	1	1,669	6,010,659	28.6
	Silvan, 1949	10,862	2	6	....	3,664	34,203,146	27.7
	Silvestre, 1948	8,850	1	21	17	11,490	98,725,003	25.8
	Sinco, 1953	8,500-9,100	7	34	27	23,714	185,856,407	25.6
	Others		6	4	7	8,361	6,822,005	....
	Total		18	75	55	54,356	357,878,359	
	STATE OF FALCON							
	Tiguaje, 1953	3,300	1	16	5	798	7,965,296	27.2
	Others		....	40	70	351	96,913,848	....
	Total		1	56	75	1,149	104,879,144	
	STATE OF ZULIA							
	Bachaquero, 1930	3,444	584	1,370	1,153	583,058	4,273,896,910	23.6
	Barua, 1958	10,500	4	1	1	4,698	9,726,949	20.4
	Buscan, 1946	6,500-7,500	....	168	195	43,933	444,187,230	10.3
	Cabimas, 1917	2,200	185	314	318	64,431	1,195,408,549	23.8
	Ceutro, 1957	12,568	79	1	38	108,504	261,844,525	30.8
	Cruces Manueles, 1916	300-8,000	10	41	46	4,050	160,008,814	31.7
	Ceuta, 1956	9,600-11,000	49	5	37	62,326	184,263,276	30.8
	La Concepción, 1953	3,148-8,000	3	67	45	5,547	110,549,839	35.4
	Lago, 1958	11,450	24	....	14	49,808	92,390,080	31.4
	Lagunillas, 1926	3,000	1,132	1,483	1,251	800,226	7,858,462,050	25.3
	Lama, 1957	8,320	219	2	88	308,049	1,618,442,703	32.5
	Lamar, 1958	13,003	69	....	30	140,000	567,563,588	33.8
	La Paz, 1925	4,268-8,000	48	29	29	21,117	766,902,401	32.5
	Los Claros, 1960	9,328	....	9	5	4,782	25,703,356	10.3
	Mara, 1945	5,248	27	21	47	10,812	368,186,884	27.4
	Mene Grande, 1914	4,132	1	303	164	11,980	570,399,155	18.3
	Sibucara, 1948	13,451	2	....	3	1,882	38,421,055	34.7
	Tarra West, 1947	4,250-5,500	6	11	17	3,133	61,039,609	39.0
	Tia Juana, 1928	3,000	310	1,255	509	303,425	2,616,950,221	19.1
	Others		18	5	24	14,299	18,969,012	....
	Total		2,770	5,085	4,014	2,546,060	21,243,316,206	
	Venezuela Total		4,358	6,887	8,179	3,166,183	28,173,719,655	

ZAIRE REPUBLIC

GC-1X, 1970*
*Offshore—Not yet on production.

11,825 2

Remote-mounted controller offered



PNEUMATIC CONTROLLER makes efficient, compact package for services requiring rugged, weatherproof unit.

A NEW Model 138 remote-mounted pneumatic controller has been announced that reportedly provides an efficient and compact package for applications requiring a rugged, weatherproof unit with advanced features. The new Foxboro controller features the rugged, weatherproof/dustproof universal case similar to that used for the maker's field transmitters.

An advantage of the remote-mounted controller is that it eliminates the unacceptable pneumatic transmission lags that occur when distances between the process and control panel are great. For operator convenience, the Model 138 unit is used with a panel-mounted display and control station that allows full use of controller functions.

When maintenance is needed, the circuit board and components can be easily removed without affecting manual operation of the loop.

Foxboro Co., Foxboro, Mass. 02035.

Heavy machinery, engine grouting data available

EPOXY RESIN GROUT, tradenamed 604 Machine Bond for grouting heavy machinery and engines to resist vibration, chemical attack, high-torque loads, and other stresses in such installations is detailed in this four-page brochure, yours on request. Uses, surface preparation, forming, mixing and placing, temperature factors, clean up, health precautions, and estimating and ordering are explained in the brochure.

Carter-Waters Corp., 2440 Pennway, Kansas City, Mo. 64108.

Gate valves have seats that can be field re-energized

GATE VALVES with seats that may be re-energized in the field are described and detailed in this free 14-page catalog, yours on request. OCT gate valves are said to eliminate the field performance and maintenance problems usually associated with pro-

duction gate valves. Features include blocking and bleeding in either open or closed position; nonrotating rising stem that places stem threads on outside of the valve; compact size that permits use of closer tubing center, smaller casing, and wellhead; light floating seats and gates that reportedly eliminate pressure locking; non-lubricated design seals; prolonged packing life; and needle bearings to more evenly distribute load. The valves, for multiple completion, come available in 1 3/4 to 4-in. sizes in 2,000 to 5,000 psi wp for duals, triples, and quadruples. Also covered in the catalog are 10,000 and 15,000 psi wp production gate valves.

Oil Center Tool Div., FMC Corp., Box 3091, Houston, Tex. 77001.

Chlorination guide available

THIS CHLORINATION GUIDE, Bulletin 922, yours on request may help you plan and install chlorination systems for potable and process-water

treatment and for industrial wastes treatment. The bulletin's 16 pages of information include a sizing guide, definitions, typical chlorination installation layout, data on water and waste treatment, a planning and check-off table, and describes some Advance chlorination system.

Capital Controls Co., Advance Lane, Colmar, Pa. 18915.

Gaskets may cut downtime

DOWNTIME in refineries, petrochemical plants, and pipeline pumping and compressor stations for gasket replacement may be reduced with new Topog-E rubber gaskets which are molded (not cut out or stamped) from a specifically formulated material suitable for 180 psi and 380° F. service. The maker says they will positively stop leaks since they conform to the topography of both surfaces of

For more facts, address inquiry coupon directly to the manufacturer.

Drilling activity highest ever in Black Warrior

ABOUT a year ago this page noted that aggressive exploration was under way in the Black Warrior basin of northeastern Mississippi and northwestern Alabama.

This widespread campaign has not let up and success has been reported at several wildcats. Indications are that the basin will enjoy continued wildcatting and field-development work in the months to come as natural gas becomes more and more a rare commodity.

Dual success. Both states fared well in the current Black Warrior basin exploratory program.

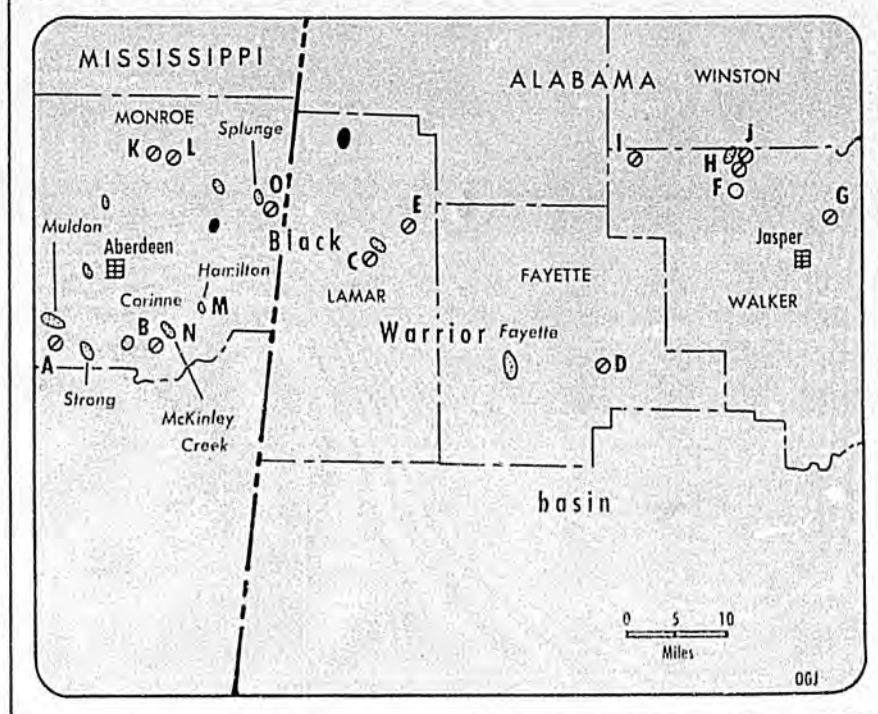
Newest successes are two Monroe County wildcats in northeastern Mississippi. Gibraltar Oil Corp. and Ladner & Hildebrand 1 R. J. Lilley et al. unit, 3-16s-6e, 2 miles south of Muldon field (A on map), drilled to 5,800 ft. Core and logs indicated 30 ft of gas sand in the Sanders Mississippian sand topped at 5,712 ft. Also, there were shows logged in the Carter Mississippian sand and in two basal Pennsylvanian sands.

About 1 mile northeast of Corinne field, the same operators have found gas shows in the Pennsylvanian sand. This sand has indicated production in Corinne field, but is not being produced. New prospect is the 1 Turnage et al. in SE NW 6-16s-8e, 5 miles southwest of Hamilton (B on map). This well is reportedly across the fault from Corinne, paving the way for a new reservoir.

In a strong program. There are more wells drilling in the Black Warrior basin today than at any time.

A new Paleozoic test has rigged up in the Fairview area of Lamar County in Alabama at Skelton Operating Co. Inc. 1 J.P. Barnes unit, SE SW 13-14s-15w, 1½ miles south of an unnamed gas area. Target is 3,100 ft with M&C Drilling Co. holding contract (C on map). At D on map, Northwest Gas & Oil Co. Ltd. 11-1 Cleveland Lumber, 11-16s-11w, is an apparent Paleozoic discovery. In Lamar County (E on map), Oscar O. Hembree et al. 1 John Raymond Young, 33-13s-14w, is an active deep test. Lamar Properties 1 Moss-Mc-

Black Warrior campaign rolls on



Cormick Mineral Co. 5-2 is drilling to 2,300 ft in Walker County (F on map). Shenandoah Oil Corp. 1 First National Bank 25-13, 25-13s-7w, is shut in (G on map). The 1 First National Bank 29-11 in 29-12s-8w is also shut in (H on map). In Winston County (I on map), Oil & Gas Properties Inc. 9-11 McCoy is a Paleozoic location in 9-12s-10w. P. W. Pitzer et al. A-1 Worthington Est. 4-4, 4-12s-8w (J on map), is also a Paleozoic location.

Four Mile Creek field (K on map) has two active locations, both Pruet & Hughes Co. The 1 Myers (K on map) is in 19-12s-18w and the 1 Tubbs (L on map) is in 20-12s-18w. Ladner & Hildebrand et al. 1 Seeley et al. (M on map) is drilling in Hamilton field, 11-15s-18w. McKinley Creek field (N on map) has an active spot at Ladner, Stewart, and Gibraltar 1 West et al., 21-15s-18w. Well flowed 1,500 Mcfd on choke and tested 15 b/d. In Splunge field, (O on map), Pruet & Hughes have two active wells, 24-12s-17w at 1 Crowe unit 25-3 and 1 Weyerhaeuser Co. Unit 18-13 in 18-12s-16w.

Undoubtedly some new oil and/or gas discoveries will result from this active hydrocarbon hunt in one of the nation's most neglected basins. Geologists for years have thought this Paleozoic arena would some day come into its own. Frankly, the basin just hasn't had enough holes punched in it yet. McKinley Creek is a good example of what the basin holds. The field discovery well, Ladner & Stewart and Gibraltar 1 Nevins, 20-15s-18w, a dual well, flowed from both Nevins and Lewis sands. Upper flow was 1,285 Mcfd, lower 1,300 Mcfd. Later, a Carter sand well was added to the field with development continuing.

The Alabama portion of the Black Warrior basin has its largest gas well yet at a Lamar County discovery.

Skelton Operating Co. Inc. of Laurel, Miss., reports that the 3 S. H. Gilmer in SW NE 18 14s-14w, northwest offset to the Fairview field discovery well, flowed 1,207 Mcfd on ¼-in. choke from perforations in the Mississippian Carter sand at 2,442-48 ft. Tubing pressure was 860 psi.

Worldwide crude production

(Daily average in thousands of bbl)

	Oct. 1973	Sept.* 1973	Daily prod. 1972	Daily prod. 1973	10-month average Daily prod. 1973	Change from Vol. %
WESTERN HEMISPHERE						
Argentina	415.0	414.9	430.0	417.0	— 13.0	— 3.0
Bolivia	45.0	45.0	43.0	47.0	4.0	9.3
Brazil	169.0	168.0	165.0	168.0	3.0	1.8
Canada	1,812.0	1,745.0	1,505.0	1,791.0	286.0	19.0
Chile	31.0	31.0	34.0	32.0	— 2.0	— 5.9
Colombia	200.0	190.0	199.0	196.0	— 3.0	— 1.5
Ecuador	210.0	210.0	51.0	203.0	152.0	298.0
Mexico	480.0	470.0	441.0	462.0	21.0	4.8
Peru	67.0	67.0	66.0	67.0	1.0	1.5
Trinidad	160.0	165.0	141.0	164.0	23.0	16.3
United States	9,123.0	9,149.0	1,463.0	9,208.0	—255.0	— 2.7
Venezuela	3,371.0	3,387.1	3,208.0	3,365.0	157.0	4.9
TOTAL	16,083.0	16,042.0	15,746.0	16,120.0	374.0	2.4
EASTERN EUROPE						
Austria	48.0	48.0	47.2	49.2	2.0	4.3
Denmark	4.0	4.0	3.0	4.0	1.0	33.3
France	27.0	27.0	31.0	27.0	— 4.0	— 12.9
West Germany	128.0	128.5	139.0	130.0	— 9.0	— 6.5
Italy	15.0	15.0	22.0	15.0	— 7.0	— 31.8
Netherlands	27.0	34.0	31.0	30.0	— 1.0	— 3.2
Norway	38.0	40.6	35.0	36.0	1.0	2.9
Spain	20.0	20.0	3.0	15.0	12.0	400.0
United Kingdom	2.0	2.0	2.0	2.0	—	—
Yugoslavia	70.0	70.0	64.0	68.0	4.0	6.3
TOTAL	379.0	389.1	377.2	376.2	— 1.0	— 0.3
MIDDLE EAST						
Abu Dhabi	1,340.0	1,381.0	1,032.0	1,342.0	310.0	30.0
Bahrain	68.1	68.0	71.0	68.0	— 3.0	— 4.2
Dubai	214.0	273.0	137.0	236.0	99.0	72.3
Iran	5,978.0	5,793.0	4,905.0	5,825.0	920.0	18.8
Iraq	1,797.0	2,167.0	1,421.0	1,949.0	528.0	37.2
Israel	20.0	100.0	100.0	100.0	—	—
Kuwait	3,058.4	3,520.3	3,291.0	3,115.0	—176.0	— 5.3
Oman	304.0	302.1	282.0	291.0	9.0	3.2
Qatar	589.0	608.3	463.0	591.0	128.0	27.6
Saudi Arabia	7,797.9	8,574.2	5,883.0	7,840.0	1,957.0	33.3
Syria	40.0	125.0	119.0	114.0	— 5.0	— 4.2
Turkey	65.0	65.0	65.0	64.0	— 1.0	— 1.5
TOTAL	21,280.4	22,976.9	17,769.0	21,535.0	3,766.0	21.2
ASIA-PACIFIC						
Afghanistan	—	—	—	—	—	—
Australia	414.0	432.0	324.0	518.0	94.0	29.0
Burma	20.0	20.0	19.0	20.0	1.0	5.3
Brunei-Malaysia	330.0	325.0	272.0	316.0	44.0	16.2
India	148.0	148.0	150.0	148.0	— 2.0	— 1.3
Indonesia	2,406.0	1,338.0	1,046.0	1,305.0	259.0	24.8
Japan	15.0	15.0	15.0	15.0	—	—
Pakistan	8.0	8.0	8.0	8.0	—	—
Taiwan	2.0	2.0	2.0	2.0	—	—
Thailand	0.2	0.2	0.2	0.2	—	—
TOTAL	2,343.2	2,288.2	1,836.2	2,232.2	396.0	21.6
AFRICA						
Algeria	1,020.0	1,100.0	1,060.0	1,098.0	38.0	3.6
Angola	15.0	15.0	12.0	14.0	2.0	16.7
Cabinda	150.0	140.0	125.0	136.0	11.0	8.8
Congo	50.0	45.0	6.0	40.0	34.0	566.7
Egypt	60.0	209.0	216.0	194.0	— 22.0	— 10.2
Gabon	155.0	155.0	125.0	143.0	18.0	14.4
Libya	2,383.7	2,286.0	2,219.0	2,272.0	53.0	2.4
Morocco	0.3	0.3	0.3	0.3	—	—
Nigeria	2,190.4	2,100.0	1,799.0	2,011.0	212.0	11.8
Tunisia	82.0	82.0	83.0	83.0	—	—
TOTAL	6,106.4	6,132.3	5,645.3	5,991.3	346.0	6.1
COMMUNIST						
China	630.0	630.0	580.0	630.0	50.0	8.6
Romania	275.0	275.0	275.0	275.0	—	—
U.S.S.R.	8,689.0	8,663.0	7,881.0	8,356.0	475.0	6.0
Other	110.0	110.0	100.0	110.0	10.0	10.0
TOTAL	9,704.0	9,678.0	8,836.0	9,371.0	535.0	6.1
WORLD TOTAL	55,896.0	57,506.5	50,209.8	55,625.0	5,416.0	10.8

*Figures adjusted.

Gas production

	Oct. *73	Sept. *73	Cum. 1973
(billions cu ft)			
WESTERN HEMISPHERE			
Argentina	21.7	23.6	198.5
Bolivia	12.0	12.1	124.6
Brazil	2.9	3.2	40.4
Canada	259.7	244.3	2,698.1
Chile	19.7	21.1	213.5
Colombia	10.4	9.5	106.3
Ecuador	0.4	0.5	5.5
Mexico	52.8	54.0	570.3
Peru	6.7	7.0	52.2
Trinidad	11.2	9.2	114.2
United States	1,900.1	1,811.9	19,052.5
Venezuela	140.9	141.1	1,401.0
TOTAL	2,438.5	2,337.5	24,577.1
EASTERN EUROPE			
Austria	6.7	5.2	60.8
Denmark	—	—	—
France	18.9	17.1	215.6
West Germany	50.4	46.2	479.1
Italy	46.7	42.1	398.1
Netherlands	200.7	193.9	2,248.9
Norway	—	—	—
Spain	—	—	—
United Kingdom	80.1	76.8	959.9
Yugoslavia	4.9	3.6	57.8
TOTAL	408.4	384.9	4,420.2
MIDDLE EAST			
Abu Dhabi	—	—	—
Bahrain	1.0	1.1	18.1
Dubai	—	—	—
Iran	142.6	143.7	1,401.4
Iraq	11.7	12.7	132.1
Israel	0.1	0.1	2.9
Kuwait	0.2	0.2	50.3
Oman	—	—	—
Qatar	0.0	0.1	7.2
Saudi Arabia	—	—	—
Syria	—	—	—
Turkey	—	—	—
TOTAL	155.6	157.9	1,612.0
ASIA-PACIFIC			
Afghanistan	3.9	4.1	63.4
Australia	16.0	14.2	121.6
Burma	0.3	0.4	5.7
Brunei-Malaysia	—	—	—
India	1.0	1.1	15.1
Indonesia	7.6	8.9	108.9
Japan	7.2	6.1	72.0
Pakistan	7.1	8.2	113.3
Taiwan	2.0	1.9	24.6
Thailand	—	—	—
TOTAL	45.1	44.9	524.6
AFRICA			
Algeria	1.7	1.6	79.5
Angola	1.9	3.2	20.4
Cabinda	—	—	—
Congo	0.2	0.4	2.3
Egypt	2.7	3.1	25.5
Gabon	0.0	0.1	1.5
Libya	4.9	6.2	33.3
Morocco	1.7	2.5	33.6
Nigeria	4.2	4.9	51.7
Tunisia	4.1	5.4	11.6
TOTAL	21.4	27.4	259.4
COMMUNIST			
China	13.0	12.4	133.3
Romania	110.4	111.2	1,114.8
U.S.S.R.	673.2	653.1	6,815.4
Other	60.9	51.7	542.6
TOTAL	857.5	828.4	8,606.1
WORLD TOTAL	3,926.5	3,781.0	39,999.4

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