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ATOMIC SAFETY AND LICENSING BOARD  
Before Administrative Judges:  
James P. Gleason, Chairman  
Frederick J. Shon  
Dr. Oscar H. Paris

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In the Matter of	:	
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CONSOLIDATED EDISON COMPANY OF NEW YORK,	:	Docket Nos.
INC. (Indian Point, Unit No. 2)	:	50-247 SP
	:	50-286 SP
POWER AUTHORITY OF THE STATE OF NEW YORK	:	
(Indian Point, Unit No. 3)	:	April 12, 1983
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POWER AUTHORITY'S TESTIMONY OF MELVIN A. CONANT  
ON COMMISSION QUESTION 6.3

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April 10, 1983

SECURITY AND OIL IMPORTS

(1983 - 1998)

Melvin A. Conant

for the

Power Authority of the State of New York

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## SECTION I

MELVIN A. CONANT

EDUCATION: Harvard College, Magna Cum Laude (1949)  
Harvard University, M.A., Far Eastern Studies (1951)

PROFESSIONAL EXPERIENCE:

1951-55 Executive Director of the Pacific and Asian Affairs Council, Hawaii. Responsible for operations of office and for the briefing of business and government (including defense) of events in Southeast Asia and Japan. Appointed by the Territorial Governor a founding member of the Board and Executive Committee of the International Cooperation Center -- forerunner of the present East-West Center - for the training of Asians and Americans assigned to Asia; Executive Secretary, Economic Development Committee of the Territory.

Advised elements of U.S. Air Force and U.S. Navy on political developments in Asia likely to affect operations and planning. Member of the National Security Forum, Air War College. Completed reports on Soviet diplomacy and tactics in Asia at the request of U.S. Air University (long-range planning section of the Air War College).

1955-60 Joined the Council on Foreign Relations, Inc. as a Council member and on the executive staff responsible for the programs involving over 100 private meetings held annually with foreign diplomats, journalists and politicians.

Responsible for organizing Council discussions on Security Systems in the Western Pacific and U.S. Strategic Bases Overseas and, as a consequence, was invited to lecture before the Weapons System Evaluation Group of the Department of Defense.

Initiated two other Council series on Military Strategy and U.S. Policy and Political and Strategic Problems of Deterrence.

1960-61 Professor of International Security Affairs, faculty of the U.S. National War College. Responsible for research programs on national security, policy problems (methods of analysis, presentation of argument, etc.) prepared by class members. Assisted in the analysis of current security issues. Lectured on U.S. defense relations with Canada and on India and Pakistan (in the latter cases analyzing the internal political factors affecting foreign policy objectives).

1961-73 Appointed Regional Political Advisor for Standard Oil interests in East Africa, Asia, the Far East and Australia (1961-62) then a Senior Government Relations Counselor variously for Europe, the Middle East and Asia, headquarters of the Exxon Corporation, 1251 Avenue of the Americas, New York City. Concerned with the quality of political reporting and national security fields likely to affect the regional and worldwide operations and planning of the company. Areas of interest and responsibilities sufficiently broad to include wide ranging contacts in political and defense circles especially in Europe and the Far East. Also Executive Secretary, Committee on Ocean Policies, Exxon Corporation.

1974-76 Presidential Appointment: Assistant Administrator for International Energy Affairs, U.S. Federal Energy Administration; organized staff and

programs; energy analyses and policy; member of U.S. Government delegations on energy negotiations; responsible for policy recommendations affecting access to oil, and U.S. energy interests with consumer and producer nations.

1976-Present Advisor on political aspects of access to strategic raw materials generally and oil and gas supply in particular. Studies undertaken with staff include the Geopolitics of Energy (U.S. Defense Department); Politics of Nuclear Supply (Georgetown Center for Strategic and International Studies); Competition for Middle East Oil Supply (The Rockefeller Foundation); Role of U.S. Government in International Oil Supply (Yale University); Access to Oil: The U.S. Relationships with Saudi Arabia and Iran and The Western Hemispheric Energy System (U.S. Senate Committee on Energy); Access to Raw Materials (U.S. Congress).

Chairman, World Bank Energy Policy Group (Korea). The Energy Heartland: a comprehensive assessment of the range of industrial countries' interests in long-term access to Middle East oil.

#### EDUCATIONAL EXPERIENCE:

1. Board of Trustees and Chairman, Finance Committee, Antioch College, mid 1960s.
2. Joint Visiting Committee Harvard University Observatory and Smithsonian Institution's Astrophysical Laboratory, 1970-71.
3. Board of Trustees, Woods Hole Oceanographic Institution, Finances Committee; formerly Chairman Audit Committee, now Chairman, Senior Advisors Committee of the Marine Policy Program, responsible for linking the contribution of social sciences to the research of the institution.
4. Visiting Professor, University of Virginia Law School seminar "International Energy," 1976-77.

#### PUBLICATIONS AND LECTURES:

Publications: Harvard University Monograph Series (Far East), Far Eastern Survey, International Journal (Canada), Royal Canadian Air Force College Journal; The United States and Japan (conference report) and Race Issues on the World Scene (conference report). The Long Polar Watch (Canada and the Defense of North America); "Canada in Defense of the West" Foreign Affairs, (April 1962) and Canada (published by the Foreign Policy Association, N.Y.), Heralds of Their Age: The Clipper Ship Names (South Street Seaport Museum, New York, 1972); Oil-Cooperation or Conflict (Institute for Strategic Studies, 1973); Perspective on Defense: The Canada-U.S. Compact (Canadian Institute of International Affairs, 1975). Geopolitics of Energy: Senate Energy Committee 1977; also Access to Oil: The United States Relationships with Saudi Arabia and Iran. "The International Energy Agency: An Interpretation and Assessment" (with Mason Willrich), The American Journal of International Law (April 1977); Access to Energy, University of Kentucky Press, 1979. Oil and Security, International Institute for Strategic Studies, 1981; Oil Factor in U.S. Foreign Policy 1980-1990, Council on Foreign Relations, 1981.

Editor with commentary on the papers of Walter J. Levy, international oil advisor, published in 1982: Oil Strategy and Politics, 1941-1981.

Editor of the monthly report, Geopolitics of Energy, published by Conant and Associates, Ltd.

Lecturer: Royal Canadian Defense Forces College, U.S. National War College, U.S. Air University; U.S. Air War College, U.S. Air Force Staff College; Royal Naval Staff College, England; National Defense College of Canada, National Defense College of Japan; Royal Institute for International Affairs, London; Council on Foreign Relations, New York.

Member: The Council on Foreign Relations, Inc.  
 International Institute for Strategic Studies (London)  
 Canadian Institute for Strategic Studies  
 Royal United Services Institution for Defense Studies (London)  
 Board of Trustees, Woods Hole Oceanographic Institution

ADDITIONAL EXPERIENCE:

Oil Advisor, U.S. Delegation to the U.N. Preparatory Session to the Law of the Sea Conferences: 1972, 1973, 1977.

Member, U.S. Advisory Committee on the Law of the Sea: 1972- .

Chairman of the Board and founding Trustee, Citizens for Ocean Law: 1980- .

Member, Advisory Board, Energy Policy Studies Center, University of Virginia.

## SECTION II

## INTRODUCTION\*

Indian Point Units 2 and 3 have generated over 56 billion kilowatt hours of electricity since they began operation. It would have required the burning of 102 million barrels of oil, most of it imported from members of the OPEC cartel, to generate an equivalent amount in oil-fueled plants. A permanent shutdown of the Indian Point units which supply electricity to both residential and public customers in the southeast New York region would drive an already oil-dependent region into a deeper reliance on foreign oil.

Secure oil supply and the terms on which oil will be available are pertinent to the issue of electric supply because of the importance of oil as a source of fuel for New York's electricity. The reliance on oil is particularly obvious in Southeastern New York. The purpose of this testimony is to examine issues in the security of supply, primarily over the next fifteen years, and some of the potential impacts on prices that may occur during this period.

The United States -- in common with most nations -- has a national interest in reducing its dependence on oil imports.

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\*A glossary is included Page 10

Each nation has accepted this objective because of the unpredictability of international supply. The uncertainty is not that of a market. It is the result of intervention by governments in all aspects of supply, an involvement thought necessary once their economies became vitally dependent on oil and they lacked domestic reserves to meet demand.

Having no option but to continue to import, what was once a commercial commodity has become a strategic need. With that transformation, and to help insure adequate and dependable supply, governments inject into international oil supply a host of ever-changing political, economic, financial, social and security objectives, thus making certain and permanent the "politics of oil" and guaranteeing its unpredictability. Since the Middle East's Gulf region is usually both the world's most prolific source of internationally traded oil (50 percent) and highly unstable politically, oil importers are locked into a risk-laden situation.

An oil-importing nation can break from this dependence on someone else's oil by reducing its consumption and by developing alternative sources of energy. The record to date in the United States and other countries is of insufficient achievements in both respects. It is not possible to attain both objectives without lead times which stretch well into the next fifteen years. For the period ahead, there is no escape from the vulnerabilities associated with oil imports; there is, therefore,

an imperative not to add to one's consumption of oil, especially of imports.

Keeping foreign oil out is made more difficult when economic recovery increases the demand for energy. Oil's role as the industrial nations' leading commercial fuel (50 percent) will then increase in importance for there will be no readily available substitute for oil. The temptation to obtain more oil from foreign sources multiplies the risks involved. Only the strictest of energy discipline and a determination to exploit all options other than oil can keep the dangers linked to imports within present bounds, however uneasy these should still make us.

Competition between oil importing nations for internationally traded oil intensifies concern about adequate and dependable supply. While oil demand may not increase among industrial nations as it did in the sixties and seventies, the requirement for oil from other claimants could well increase the total number of barrels needed by 1998 in international trade to 45 million barrels a day (mmb/d), compared with the 25 mmb/d supplied today. Thus LDCs, the Soviet Union and China, and rising needs of oil exporters' own domestic economic growth will generate still further competition for oil.

The total demand for oil could be met over the next fifteen years, and possibly longer, if the physical size of proven reserves and the technical capacity to produce were the only

considerations. They are not. No one can be certain as to future discoveries or the availability of improved recovery techniques which would reverse a long-standing situation in which the world has been drawing down on its oil "capital" from regions other than the Middle East. More oil is pumped than is added to proven reserves. Oil is a finite and diminishing resource.

Oil exporting nations understand this fully. They intend to prolong the oil era for revenues from oil usually their prime source of wealth. Whenever economic circumstances permit, oil exporters will reduce output and increase prices. Everywhere, oil exporting governments have had a "preferred producing rate" defined to meet a range of national objectives which extend beyond meeting market demand. From the perspective of all oil importers, including the United States, the result has been and will again be still more limited foreign supply to meet insistent demands for oil -- and competition for the internationally traded barrel will increase; with it, tension will again rise between nations and security concerns will increase.

The security aspects are complex, unending and explosive. They stem from instabilities within oil exporting nations, from superpower intrusions into the Middle East (and elsewhere), and from the profusion of advanced weapon systems which threaten already highly vulnerable oil facilities and tankers. Oil importers have to live with these risks; they do all they can not to increase them by a still greater dependence on oil.



However, since most nations have no alternative to a continuing dependence on imported oil and more particularly on oil from the Middle East, they must have serious and continuing reservations over the volume of oil likely to be made available, whether interruptions will occur, and the threat of further price surges which would again make oil payments difficult for most and impossible for some.

In light of the unprecedented possibility that vital facilities in the Middle East could be severely damaged by war or sabotage and of the general political and economic volatility of the Middle East, industrial nations have sought to reduce their dependence on foreign sources of oil and thus their vulnerability to interrupted supply. The United States is no exception. Hence a rise in imports implies increased vulnerability to supply interruption and is contrary to the national interest.

The United States has a particular oil concern beyond its domestic needs which arises in part from its position as a superpower. For many years the U.S. has an almost unbroken record of failing to discover enough additional reserves to replace oil consumed from domestic fields; thus, over time unless this historic trend is dramatically reversed, and alternative energy sources become available, the United States' dependence on imports will persist. It could even increase and, with it, the nation's vulnerability.



With particular reference to Indian Point units, they are an example of an energy facility of considerable importance and an outstanding example of the kind of installation which reduces the need for fuel oil and thus limits the vulnerability of the nation to unpredictable supply from foreign sources.

GLOSSARY

Conventional Oils	- refers to oil which is produced through established primary recovery techniques usually under pressure or by pumping.
Unconventional Oils	- is the term applied to resources which have to be mined or subjected to different processes from those customarily relied on to obtain crude oil.
"Gulf"	refers to the region of the Middle East in which the key oil exporting nations are located.
IEA	International Energy Agency (for sharing a supply in an emergency).
LDC	Less developed country.
--mb/d	thousands of oil barrels per day
--mmb/d	millions of oil barrels per day
--mmb	millions of oil barrels
OECD	Organization for Economic Cooperation and Development -- the industrial nations of the free world.
OPEC	Organization of Petroleum Exporting Countries
PPR	Preferred Producing Rates (defined by oil producing nations).
SPR	Strategic Petroleum Reserves

## SECTION III

Demand Projectionsa. OECD Nations' Gross National Product and Energy\*

Central to this appraisal of security and oil imports are the following economic and energy growth rates: an OECD average annual economic growth rate in the decade of the eighties and possibly into the following decade in a range of 2.0-3.0 percent with some countries performing at a lower growth rate and Japan possibly above 3 percent. For OECD generally, national increases in energy use are expected to grow in a range from 1.5 to 2.5 percent a year. These growth rates might be considered optimistic but fall within the range of OECD and World Bank estimates as well as those of recent leading analysts.\*\*

The U.S. GNP growth rate is assumed to be at the lower range for the OECD with an energy growth rate about .5 percent lower, or 1 to 2 percent.

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\*OECD - The Organization for Economic Cooperation and Development whose membership includes the free industrial nations. "OECD" is thus a convenient reference to those nations which consume over 75% of the world's commercial fuels.

\*\*Report of Americans for Energy Independence, November 1980 and testimony of John Lichtblau (Petroleum Industry Research Foundation) and Ted Eck (Standard Oil of Indiana), Joint Economic Committee, April 23, 1982.

Oil use in the OECD nations was 35 mmb/d in 1982. If the OECD economic performance is better than these percentages, an added burden will be placed on internationally traded oil since through this decade there do not appear to be readily available alternatives to meet incremental requirements for energy much less those necessary to displace petroleum.

If the above economic and energy growth projections are realized, and if there are some further conversions from oil to other fuels, oil use in the OECD may amount to only 35 mmb/d in 1990, nearly 8 percent less than the 38 mmb/d consumed in 1980.

While it is entirely possible that the OECD will experience a lower annual average economic growth rate over the next five years, claims that substantial, continued savings will derive from conservation and improved efficiency in energy use (such as a further 20 percent reduction in energy demand in the United States by 1990), should be carefully examined.\* Further savings in oil use pre-suppose continuing and costly replacement of capital equipment with more efficient models. If such a dramatic reduction in oil is to be realized, it must be found in an early, widespread and inexpensive substitute for transport fuel which, in 1982, accounted for 44 percent of U.S. oil consumption.

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\*Energy Conservation, Shell (U.S.) Reports, July 1981 is a particularly important assessment.

Additional savings in oil could come through the availability of other energy sources which can substitute for oil in other sectors such as power generation and heat. This has long been appreciated by oil importers, but the increased availability of coal, gas, and nuclear energy also take time and money. Not enough has been accomplished to change significantly OECD use of oil as the prime fuel. The importance of these comments is to be seen in the continuing dependence of most of the industrial world on oil imports--that is, on access to someone else's supply.

A conservative projection of future oil import needs for the U.S. West Europe, and Japan, and others of OECD has their total imports no higher than the present 18.4 mmb/d into the nineties. The estimate is based on the claim that the industrial nations' energy growth will be met by alternatives to oil. This assertion must assume a continuing high degree of further energy savings through conservation since the likelihood of major additions to energy through alternatives has to be discontinued at least through the next ten years. That is the least time required to begin obtaining the benefit from large new discoveries or investments. In this respect we know now what will be available then. Whether the nineties will be different depends on large-scale efforts which may or may not be made in the next several years. Added to this 18.4 mmb/d estimate for total OECD import requirements for the late eighties are the minimum net import requirements of the non-oil LDCs (7 mmb/d), the East Bloc

(3 mmb/d) and China (2 mmb/d), for a world total import requirement of a plausible 30.4 mmb/d.

The present maximum technical sustainable producing capacity of OPEC is estimated to be 35 mmb/d (of which 7 could be required for domestic use of the early nineties) leaving 28 mmb/d for international supply. Non-OPEC exporters could probably provide 8.5 mmb/d for a potential total placed in international trade of 36.5 mmb/d. Since, as argued later, oil exporters have reasons to keep supply tight and might well not increase production capacity, there could be little spare margin and a situation of severely constrained supply would again be brought about.

b. New Claimants for Oil

It is generally agreed that over the next fifteen years increased consumption of oil will more likely be a result of LDC and Communist nations' growing requirements, rather than the result of substantial increases in consumption by the industrial nations of the free world.

During the 1970s, oil consumption among LDCs grew at an 8 percent average yearly rate, compared to a world oil consumption average yearly growth of half that amount. In nearly every case, the growth in LDC oil consumption exceeded growth in energy consumption by two percentage points. It may be reasonable to expect an annual average economic growth of about 4 percent in the developing countries (LDCs) in the decade of the eighties and perhaps beyond. While some efficiencies in the use of energy, including oil, may be realized among LDCs, their aggregate consumption of oil seems certain to continue to rise into the 1990s.

It is not likely there will be an earlier, general lessening in the dependence of any developed or developing nations upon a significant volume of oil imports. A few nations could become self-sufficient and even exporters of petroleum, but these will be isolated examples of no major importance to the general anticipation of nations competing again for supply once economic recovery, however limited, begins.

Only a remarkably small number of non-oil LDCs will make large demands upon international oil and these likely include only Brazil, India, South Korea, and Taiwan, at least through this decade. New claims for a share of oil in world trade may well come also from present non-OPEC oil exporters (such as Egypt and China) whose domestic requirements will grow. The Soviet Union itself is believed to be a likely claimant for a share of oil trade by the late 1980s either to supplement its own declining capacity to meet Eastern European needs, or to meet its own domestic requirements.

A compelling case has yet to be made as to the future energy situation of the U.S.S.R.: Will it be able to maintain its energy self-sufficiency, and supply East Europe, even if it loses its ability to export to West Europe? Or, will it supply its clients, but have to obtain some foreign supply to do so? It seems prudent to assume the latter, for it is through an anticipated or actual energy shortfall that the U.S.S.R. could pose issues of great strategic consequence to the United States, NATO and Japan. A critical appraisal of East Bloc needs argues that it could require possibly 2-3 mmb/d of imports by the late 1980s.\* The implications of such an import figure are twofold.

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\*Energy in Soviet Policy, U.S. Joint Economic Committee, June 1981, p. 53.



A loss in current exports from the U.S.S.R. to the Bloc of approximately 2.0 mmb/d would have had to occur; thus those who had been receiving Soviet oil would have to obtain those 2.0 mmb/d from other sources. Direct Soviet demand could further remove oil from world trade, possibly in the order of 1 mmb/d. The total new claim upon international oil might then be at least that 3 mmb/d, a substantial quantity, referred to earlier.

Similarly, it seems imprudent to believe that China will continue to be an oil exporter through the balance of this century. If the People's Republic of China (PRC) development gains momentum, it is nearly inconceivable the nation will escape the petroleum era. Rising transport demand alone could consume Chinese production and, in time, far exceed any incremental domestic production during the 1980s and 1990s. China may continue to export to its client states and to Japan for political and foreign exchange reasons, but these amounts will not be significant. Hence, China will be in a comparable situation to that of the U.S.S.R. -- both nations will lose their export capability. Nations which have imported Chinese oil will have to find other suppliers, and then the Chinese may themselves have to obtain outside supply. It is by no means impossible that the effect of a Chinese loss of energy self-sufficiency would result in a total, additional demand upon oil in world trade of something in the league of perhaps 4 mmb/d by the end of the

1980s and possibly much more, by 2000 of which 2mmb/d would be for China's own account.\*

By then, the combined East Bloc and Chinese impact upon available oil could conceivably be in the order of an increased demand of some 5 mmb/d or an annual requirement equal to today's average annual production from Saudi Arabia alone. Such a demand -- most of which would have to be met from Middle East reserves -- conveys its message loud and clear: the Oil Heartland will acquire even greater importance as the key supplier of the international oil barrel.

By 1998 the most significant impact of additional claims for oil will still come from the East Bloc, (another 2mmb/d?) China (+ 2mmb/d?) and emerging industrial nations such as Brazil, Korea, etc. which could make substantial demands for still more barrels -- as much as another 4 mmb/d. Thus their collective requirement could be for 8 mmb/d more, nearly 50 percent of March 1983 OPEC supply of oil into world trade. If one considers an anticipated further increase in the OPEC states' own energy requirements, of perhaps another 2-3 mmb/d, the outlook is one in which these claimants alone, by the ~~year~~ the nineties could, quite conceivably, total 11 mmb/d, or 60 percent of today's total OPEC production of some 18 mmb/d.) By then, world demand for the international barrel could total 45 mmb/d.

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\*In contrast to the generally optimistic prediction of China's production potential, read the Petroleum Economist, special issue on China, November 1981.

In sum, by the end of this decade, there could be a greater volumetric requirement for oil imports as OPEC has ever exported. In 1979 31 mmb/d were put in international trade; by the late eighties or early nineties the pressure upon oil exporters to provide 34.4 mmb/d will be severe; by the latter 'nineties, demand could be as much as 45.4 mmb/d of internationally-traded oil. Since available supply--at least by the end of the 'eighties--would leave little margin, if any, pressures on price and to obtain secure supply will be rising. If, in the 'nineties, very substantial additional recoverable resources are not available, price increases of very substantial amounts can only be expected as nations compete for their needs.

c. Pricing of Oil

The principal concern about future prices is not so much over moderate, periodic increases, but of the likelihood of price surges such as happened in 1970 - 1974 and 1979 - 1980 and the consequent need for immediate substantial dollar outflows to pay for imports, payments which nations will often be unable to meet quickly through ordinary trade. Beginning in 1981 prices began to slip and have recently reached a general level of about \$28 - \$29 a barrel. While this decline in OECD imports has threatened financial crisis for many suppliers of international oil, and though some analysts warn of still further declines, moderate economic recovery should restore stability and strength to prices as well as increasing volumetric demand. Quotas/production controls now being tested will become increasingly useful to oil exporters.

A serious obstacle to production controls lies in the distrust between Saudi Arabia, Iraq and Iran -- the three most important Middle East suppliers. In time, these three could conceivably set the terms for international oil; but in competition with each other, which is more likely, each would resurrect past oil grievances and historic bitternesses. In either event, Saudi Arabia is unlikely to be able, unilaterally, to manipulate international supply to the extent it has in past years despite its acceptance of such a role in the latest OPEC negotiations.

Under such conditions, oil customers might anticipate an annual increase of some 2 percent in the real price of oil, over the balance of this decade.

Of far greater significance to the consumer is the threat that supply crises could again cause price surges of the kind experienced in 1973-74 and 1979-80. The vulnerability of the oil supply system to such crises is explored in Section VI.

d. Outlook for Alternative Fuels

A basic element delaying the shift from oil is the cost of alternative energies including the unconventional oils of tar sands and shale. In a period of general economic depression, these expensive investments into alternatives to conventional oil are not being made.

Even with the resumption of a reasonably strong economy, a number of the more important alternative energy forms will appear to be economically unattractive or at best only marginally attractive unless higher real prices for oil can be anticipated with a high degree of probability.

A respected current estimate of comparative energy costs, in 1981 dollars per barrel of oil equivalent (thermal basis) indicates that at the present 1983 OPEC average official oil price of \$29.00, all conventional oil but only some oil sands and shale would be almost competitive; all conventional coal (including imports), and some LNG supplies would also be competitive. But synthetic natural gas or liquids from (imported coal and biomass sources grown for fuel) would not be.\*

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\*Energy Profile, Shell London, 1982.

e. U.S. Import Requirements

The United States' future oil requirement and the extent to which it will be met through a continuing demand for imports could be the crucial factor in the world oil outlook of the next decade and longer. On imports, nearly every analyst agrees: the United States -- at least through this decade -- will remain significantly dependent on international supply from foreign sources.

In summary, U.S. oil demand in 1990 is estimated at about 16 mmb/d with domestic production of crude and natural gas liquids (NGL) at slightly more than 9 mmb/d. The supply gap will be offset by imports which might average about 6 mmb/d.\*

Except for the addition of the North Slope reserves in 1970, U.S. additions to reserves for a decade and a half have failed to make up for oil pumped; consequently, as Table A shows, the level of U.S. reserves has declined steadily, warning that U.S. domestic oil supply will decline. The great exception to this trend came with the inclusion of North Slope (Alaskan) discoveries in 1970.

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\*Report of Americans for Energy Independence (November 1980): John Lichtblau (Petroleum Industry Research Foundation); Everett M. Ehrlich (Congressional Budget Office); Sheldon Lambert (Shell Oil); David McNicol (Energy Information Administration).

TABLE A

Net Change in U.S. Proven Oil Reserves (MMB) \*

<u>Year End</u>	<u>Crude Oil</u>	<u>Years Left of Production at Then Prevailing Rates</u>
1967	-75	10.3
1968	-669	9.8
1969	-1075	9.3
1970	+9369	11.7
1971	-938	11.7
1972	-1723	11.1
1973	-1039	11.1
1974	-1049	11.3
1975	-1567	11.3
1976	-1739	11.0
1977	-1455	10.3
1978	-1682	9.2
1979	-752	9.1
1980	-5	10.0
1981	-379	10.0

Especially foreboding is that this record of declining reserves comprised despite higher oil prices (through mid 1982) and after an unprecedented amount of drilling activity. (See Table B).

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\*American Petroleum Institute, Committee on Reserves and Productive Capacity and (after 1980) U.S. Department of Energy, Energy Information Administration.



TABLE B  
DRILLING ACTIVITY (1965-1981)\*

	Total Wells	Exploration Wells	New Field Wildcats	New Field Wildcats As % Total Wells
1965	41,432	9,466	6,175	15%
1966	38,194	10,313	6,158	16%
1967	33,818	8,878	5,260	16%
1968	32,914	8,879	5,205	16%
1969	34,053	9,701	5,956	17%
1970	29,467	7,693	5,069	17%
1971	27,300	6,922	4,462	16%
1972	28,755	7,539	5,086	18%
1973	27,602	7,466	4,989	18%
1974	32,893	8,619	5,652	17%
1975	39,097	9,214	6,104	16%
1976	41,455	9,234	5,840	14%
1977	46,479	9,961	6,101	13%
1978	48,513	10,677	6,505	13%
1979	51,263	10,484	6,413	13%
1980	62,464	11,916	7,034	11%
1981	80,537	15,168	8,052	10%

If estimates of the growth of energy alternatives prove to have been too optimistic, or conservation does not result in sufficient energy savings, then U.S. energy demand must be met, of necessity, by even higher imports. In this respect, the change in the origins of oil imports since 1973 is significant to U.S. energy security over the 1980s:

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\*1965-1981, American Petroleum Institute, 1983.

Venezuela and Canada, considered as two dependable and leading suppliers, have been replaced by Saudi Arabia and Nigeria, with Mexico as a new major source.

The United States ought to be prepared for a prolonged dependence upon foreign oil. In 1981, the United States import share of oil consumed was 33 percent, but for Europe it was closer to 90 percent, and for Japan it remained virtually at 100 percent. Without extensive and unremitting efforts to conserve and to increase the production of energy from coal, gas, and nuclear power, there is no reason why these proportions should change.

## SECTION IV

Potentials for Oil Supplya. Adequate Resources

The single most critical technical determinant of world oil production levels is proved oil reserves\* -- those amounts of oil that are known with a high degree of certainty to exist and that can be recovered under current economic conditions with present technology. Reserves are the total of past discoveries, plus new discoveries, extensions and revisions, less production. In short, reserve figures are an effective barometer of the net results of oil exploration and use. At the end of 1981 total world proved crude oil reserves were listed as 678 billion barrels, a figure which is approximately 23 times the same year's world oil production of 30 billion barrels.

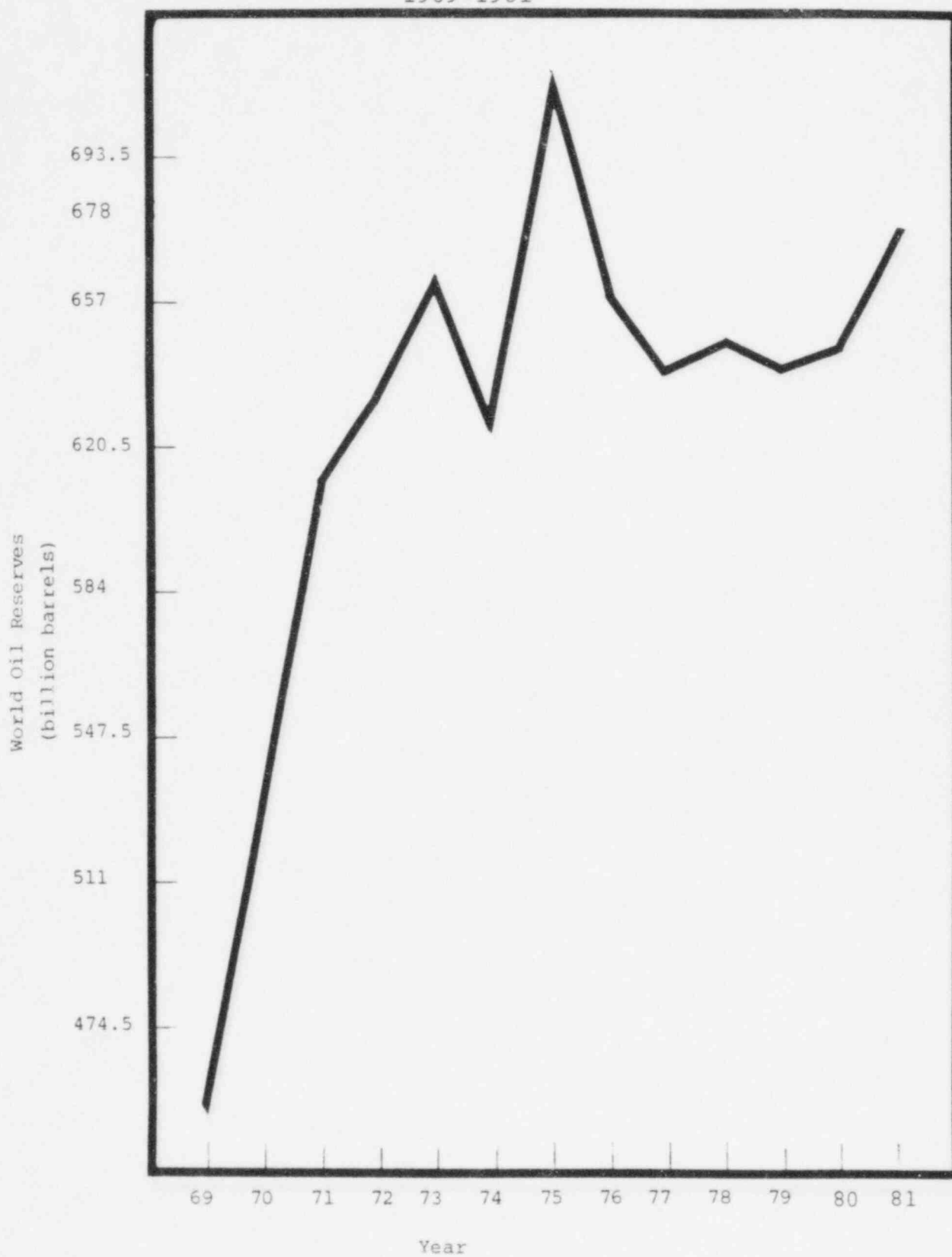
Figure I depicts estimated proven world oil reserves from 1969 to 1981. The immediate striking feature of the graph is the nearly unbroken high rate of growth (7.8 percent/year) in reserves from 1969 to 1975, in contrast with the 2.6 percent/year decline in reserves from 1975 to 1979. Significantly, this

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\*BP Statistical Review of World Energy, 1981.

draw down of reserves occurred when the economics were increasingly favorable, and concerns about security of supply prompted renewed efforts to find exploitable oil sources outside of the Middle East. The more recent modest increase in reserves world-wide indicates some new additions to reserves, whether from discoveries, revisions, or extensions. But given increased exploration activity, these results are not necessarily significant. The crucial question is whether the upward trend from 1969-75 is to be continued or whether the 1975-79 decline heralds the long-anticipated coming to a close of the petroleum era which the record of the past two years will not belie.

FIGURE I  
WORLD CRUDE OIL RESERVES (PROVEN)  
1969-1981



b. Production

World reserves at the end of 1981 totalled 670 billion barrels, some 50 billion less than peak in 1975. In other words, despite some additions to reserve, during the past six years the world has in balance produced oil at a faster rate than it has added to its oil "capital." It would be incautious and even reckless for oil importers to base their expectations on anything other than a continuation of this general situation.

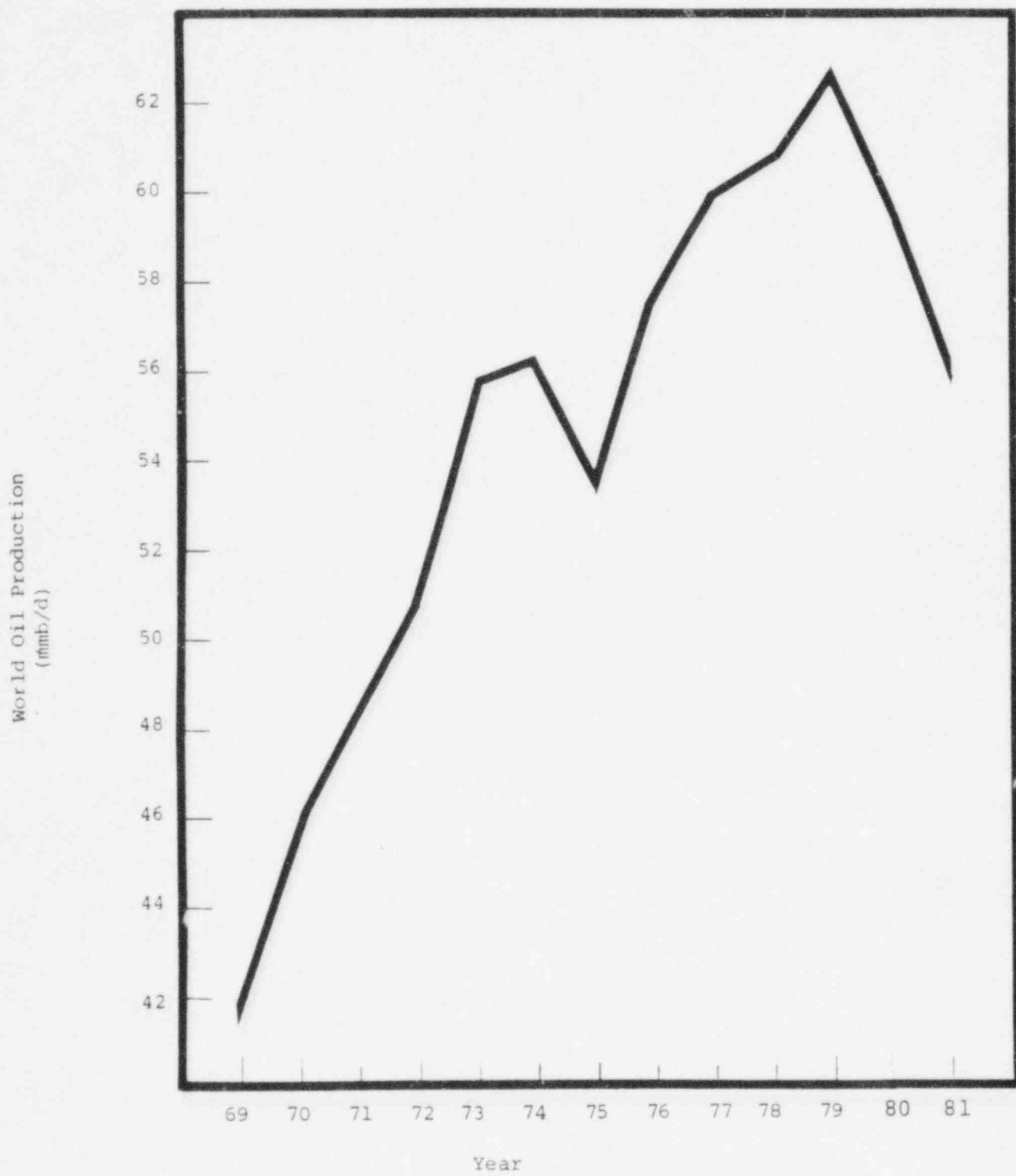
If only technical limitations on the supply of oil are being considered, then the ultimate restraint on the cumulative supply of oil is the amount of recoverable oil in the ground. In attempts to divine the future (and before the advent of preferred producing rates), numerous studies have been made that used various methods to estimate the total volume of recoverable oil, with a resulting general consensus of some 2000 billion barrels. Of this amount, roughly half, 1044 billion barrels, has been discovered and consists of proven reserves (670 billion barrels) and cumulative production (366 billion barrels). Thus, if conventional wisdom is correct, and past experience is a guide to the future, the amounts of oil remaining to be discovered may be about as large as the total that has been found to this date.\*

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\*Read "World Oil Production" by Andrew R. Flower, Scientific American, March 1978 for a definitive review.

FIGURE II

WORLD OIL PRODUCTION 1969-1981



There is, of course, little factual basis to such an assessment -- it is largely an extrapolation from past experience.

The discovery of oil is never certain and even maintaining the average rate of additions of approximately 15 billion barrels per year, which is the record of the past decade, is doubtful. The most promising regions have been surveyed and the largest fields may have already been found. A respected analyst, Richard Nehring, combined these two factors in a 1978 study of giant oil fields and determined that the discovery of new supergiant fields (at least 5 billion barrels) has declined to almost zero. Furthermore, much of the potentially large oil-bearing areas are offshore or in disputed or international regions such as the Arctic, which raises added difficulties.\*

It is not clear how much of the lack of growth in reserves stems from a genuine dearth in prospective regions. A prominent contributory factor of the poor discovery record in recent years originates in the adverse political policies of governments which have discouraged the major oil companies from pursuing the search barrels must be added to reserves annually through discoveries and improved recovery techniques. Obviously, this is not yet happening and may never do so.

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\*\*Richard Nehring, Giant Oil Fields and World Oil Resources, Rand Corp., Santa Monica, California, 1978.



Because large additions to these reserves cannot be counted on, producing nations have thought about a worst-case scenario: that of no additions to their reserves. Obviously, this is not likely to be the true case; there will almost always be at least some additions, some discoveries. Nevertheless, prudence dictates consideration of such a worst case scenario especially when a country depends heavily on its revenue from oil sales. It is largely these scenarios that have provided the background technical factors which, together with the political, economic, and social considerations, argue for restrained or no production increases when oil prices more than meet the anticipated revenue needs of the supplier which was the case during the 'seventies and through mid 1982; it will again be the case when the market firms.

International oil analysts attempt to weigh some of these factors to estimate the amount of oil likely to be put in international trade. They tend to divide exporting nations into low or high "absorber" categories depending upon their assessment of the degree to which a producer can spend oil revenues effectively. The analysis is so subjective as to be of little value. The final judgment is that of the supplier and no supplier discloses the reasoning behind the selection of a particular volume and later on, of subsequent changes in that amount.

Thus, the technical capacity to produce oil in even larger volumes exists. The designed capacity of facilities (the highest

productive level allowed by the original design of the facility) of OPEC members (where the spare capacity lies) is 41.4 mmb/d; the maximum sustainable capacity to produce at high rates for limited periods is 35 mmb/d while "available" production from producers (their preferred rate) has been about 24 mmb/d. Current production is at 17.5 mmb/d (with some 15 mmb/d for export).

In summary, although world reserves are adequate to meet demand for a great many years, there is still a finite life to these diminishing resources. In many instances, the steady drain on reserves has already alerted producers to the time when their income and energy needs can no longer be met from their oil. Thus the physical adequacy and technical capacity to produce begin to set limits of their own on the availability of oil.

c. Importance of Middle East Supply\*

A critical factor for world oil supply will be the Middle East's continuing position as the prime source (50 percent) of internationally-traded oil. On a percentage basis, the Middle East's contribution to world supply may decrease through the successful implementation of preferred producing rates (discussed later) and/or a possible increase in supply from other OPEC or non-OPEC suppliers. Nevertheless, between now and 1998 there is no reason to expect there will be a large enough increase in oil supplies outside the Middle East to affect its role as paramount supplier to the world.

At present, exports from the Gulf total not much more than 10 mmb/d, an exceedingly low volume compared to some 22 mmb/d in 1977. The Middle East's production potential is so great as to allow it to continue or increase its preeminent position among oil exporters through the end of the century. Even if Middle East exporters achieve only minimal success in improving upon their capability to increase recovery rates from just present fields, they should have the technical capacity to maintain the previous high levels of exports throughout the next ten years and even longer in spite of domestic oil consumption increases.

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\*Defined as the Gulf region of key suppliers.

Ultimately, growing demand will result in most of the oil produced outside the Middle East being consumed regionally or within the producing country itself, with the possible exception of Mexico. Thus, the prime source for oil in inter-regional or world trade will remain the Middle East. It may only be with the coming into large-scale production of the unconventional oil resources of the Western Hemisphere -- not expected before the year 2000 at the earliest -- that the role of the Middle East in international energy supply will be seriously challenged.\*

The disturbing observation is that, for oil importers generally, dependence upon Middle East supply is inescapable yet the region remains politically volatile. It is subject to internal strains which are difficult enough to cope with but are made worse by the conflicting interests in the region between the U.S.S.R. and the United States. None of these complicating factors will disappear; each holds an acute potential for affecting supply.

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\*"Unconventional" oil is the term applied to resources which have to be mined or subjected to different processes from those customarily relied on to obtain crude oil.

## SECTION V

Availability of Oil (Actions by Governments)a. The Objectives of Oil Exporters

From the foregoing, despite uncertainties about future discovery rates and improved recovery techniques, there will be no shortage of oil for physical/technical reasons for the next ten years and beyond. There is also no reason to doubt the other proposition there will be no rival to oil -- no general displacement of it -- from any alternative energy source through the next several decades. But the volume actually placed in international trade is almost certain to be limited by the actions of governments and for reasons in addition to concerns about the life expectancy of reserves.

In the near-term future the availability of oil will most likely be determined to a large extent by non-technical factors. Political, social, economic, and security considerations -- and not market forces alone -- will influence the determination of export volumes. The factors, however, will be placed against a

background of technical judgments about their reserves that will predominate in the long-term. Supplying nations are fully aware of their finite nature. In the meantime, it is vital to each supplier to maximize the return on the sale of its oil. Again and again this compels the suppliers to want to limit the amount of oil exported.

Reflecting this consideration, the dominant feature governing the supply of oil is the adoption by all Middle East oil producers of a policy of Preferred Producing Rates (PPR) when the world price of oil is such that national objectives can be achieved by a production level lower than capacity. Over the past ten years, only the last two have seen a lowering world price and reduced demand which does not correspond to producers' basic revenue needs. It is their basic assumption that the current decline in demand will prove temporary -- that the contemporary so-called "glut" will be soaked up in economic recovery and, once again, it will be the oil exporters which will determine volumes and prices.

Historically, production forecasts followed a general methodology. Oil demand estimates were based upon projected economic growth rates and/or the continuation of past trends. The probable, usually maximum, output from non-OPEC nations was set against demand and the remainder was assigned, in effect, to OPEC -- predominantly Middle East members -- to supply. Thus, projections for OPEC production levels were not what those

nations might decide to produce for reasons of their own, including their appraisal of the market, but were instead what OPEC would have to produce if there was to be no supply "gap."

The producing nations of the Middle East have declared over many years that they no longer intended to be the automatic provider of oil to the industrialized world. They have the longer-run intention of increasing real prices and causing demand to drop to a level which they define as in their interest to supply. As long as the OECD nations do not invest in alternatives, the oil suppliers know that even moderate economic recovery will leave the latter as the settler of volumes and prices for internationally traded oil. The hopes held in the Western world that now and in the long run suppliers' preferred producing rates will give way to increasing demand without major real increases in price stand little chance of being realized. Faced with too rapid economic growth and social change and, above all, the desire to prolong the oil era, producers still have many incentives to limit production increases or to invoke production cutbacks to sustain price and conserve their diminishing reserves.

b. Preferred Producing Rate (PPR)

Producers' oil interests are thus defined by their present and prospective circumstances and their domestic and foreign objectives. Each producer will be different from all the others. In the context of developments in Iran and Afghanistan and continuing Iraqi-Iranian hostilities, additional objectives may be served -- such as securing Western military and political support. Rebuilding of Iranian and Iraqi oil facilities will become a central objective of these nations and competition between them and with Saudi Arabia will greatly heighten tension in the region.

Note, moreover, that in addition to the factor of OECD demand, and whatever amount of oil imports the U.S.S.R., China, and LDCs may require, oil exports may decrease simply as suppliers' domestic demand for oil products increases. A producer nation's PPR may rise to meet its own requirements not to satisfy a demand for more oil in world trade.\*

The political ingredient in decisions setting levels of oil production and thus of exports is of growing importance. The primary political constraint on oil production levels was most recently demonstrated in Iran, where the new leadership first ordered lower oil production but now is encouraging higher

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\*OECD/IEA World Energy Outlook, 1982.



levels to obtain revenue which cannot be earned quickly on the scale required through the sale of any other asset.

But the principle of reduced oil production is also seen as a way to lessen what is viewed in several OPEC nations as destructive "westernization" of their societies. Fearing that their societies face domestic instability because of over-rapid growth, diverse opposition groups with different purposes in mind are protesting production levels which result in revenues in excess of basic needs. The general anti-western attitude in the region which has deep historical roots focuses discontent over manifestations of unwanted change on the catch-all of "westernization," which some equate with industrial development. It is the convenience of anti-western symbols which makes possible a producer nation's adoption of lower PPRs for political, anti-foreign reasons as well as for concern about the pace and direction of social change caused by large oil revenues.

In addition, producers see insufficient evidence that oil importing nations will continue to lower consumption, reduce imports, or invest the requisite sums in the research and development of alternative energy sources, as matters of national priority. There are already national security implications for oil producers when, by increasing exports to meet the failures of OECD to limit oil consumption, they perpetuate or even increase the dependence of oil importers on the supplying nations. If demand increases, the pressure upon exporters then to increase

the level of supply could become so great enough as to raise the specter of an attack to obtain oil. It is a phenomenon which has haunted oil supplying nations. Yet the situation becomes more complicated still for other producers with abundant oil resources (such as in the Gulf) which have an interest in shaping their oil policies to increase supply (at lower prices) in order to discourage the development of energy alternatives.

None of these considerations evaporate because of lower OECD oil demand. Any one familiar with the cyclical history of oil knows that the temptation has to be guarded against assuming that the present "market" holds for the long-term.

b. OPEC Longer-Term Strategy

The tumultuous events which overwhelmed the world oil market during 1979-80, and which resulted in at least a tripling of the price of international oil, culminated in 1981 and early 1982 in the realization of the worst fear of the producers: a deepening recession in OECD and a sudden sharp drop in oil imports approximating 15 percent by early 1982. In 1980, however, and extending into early 1981, Saudi Arabia, already apprehensive of the effects on oil demand of such sudden price surges, sought OPEC support of a collective long-term strategy.

The long-term plan addressed four general issues: (1) long-term supply outlook; (2) long-term pricing strategy; (3) relations between OPEC and other developing countries and (4) relations between OPEC and the industrial nations.

A special ministerial meeting in May 1980 adopted only the proposal dealing with relations with non-oil developing countries. Relations with industrial nations (oil importers) were postponed for lack of agreement on a price-changing formula. Plans for other meetings were then upset by the Iraqi-Iranian war and by the drop in OECD import demand which preoccupied producers seeking early relief from the consequences of a worldwide recession to which their own actions on prices had contributed.

Their most immediate concerns have eclipsed all else: how to maintain an OPEC discipline to keep agreed-to production limits.

The critical observation is that from the producers perspective, the concept of a free market is unacceptable; it gives them no control over the disposition of their only major resource.

d. Refining Considerations

It has been a traditional assumption that residual fuel oil would always be available. This assumption was based in part on the quantities of oil reserves in the Middle East and Venezuela and the fact these reserves were composed of heavier crude oils than those produced in the United States and hence produced markedly higher distillates yields of residual fuel. It also reflected the strong growth in demand for light oil products (gasoline and heating oils) with which residual fuel is produced as a by product.

Today the prospect is changing. High prices, conservation efforts and maturing markets curtailed the demand growth for gasoline and heating oil (especially in the United States East Coast, where projections generally confirm an appreciable reduction in demand through the 1980s). With high crude oil prices, refiners worldwide have been maximizing the yields of higher-valued products. This they are able to do through new processing technologies and refinery upgrading. Further incentive for this upgrading has come from efforts of producers (notable Saudi Arabia, Iran and Mexico) to force markets for their less desirable crudes by requiring proportionate liftings of light and heavy grades.

A different set of forces has been at work where oil importing nations have moved to the coal alternative to reduce or

diversify their energy import dependence. In some instances, the substitution of coal has resulted in a direct reduction of residual fuel imports; in other instances when coal displaced oil, refiners have sought to offset this by importing and processing lighter grades of crude oil. The immediate effect of these measures has been to weaken the world market for residual fuel and heavy crudes; the longer-term effect is to strengthen the economic incentives for refining processes for the conversion of heavy oils to light products.

For most countries the reduction in oil use for power generation is a major element in their national energy policies for reasons of both price and security. This is a particularly significant point for the United States East Coast, where a preponderance of residual fuel supplies has been imported. It is of increasing long-term importance to all consuming nations as suppliers increasingly insist that greater processing of crudes occur within their borders, not in the importing countries.

e. Market Participation by Governments

The process of change in the international oil system which became revolutionized in the early 1970s has not yet run its course. Over the next decade and a half it is highly probable that the role of government will increase still further. Imports are so vital that oil is no longer an ordinary commercial commodity; it is now a strategic need. Yet deeper government involvement absolutely insures the politicization of supply.

Given even only modest economic growth, there is likely to be again a condition of tight supply with possibly sporadic shortages in some crudes and products. Competition for supply will once more engage the attention of governments which will press every advantage to secure imports.

The government of virtually every oil-importing country has adopted the device of a government oil company to supplement, or to substitute for, the private oil sector. And every oil-exporting government long ago adopted this device; moreover, most OPEC states insist they prefer to deal through official channels.

The percentage share of oil moving in world trade as a result of government-to-government deals was nearly zero in 1970.

By 1978 it was 19 percent and nearly 33 percent in early 1982.\* The United States is unique among the key importers in not having reduced the role of private enterprise in securing imports by adopting the now prevalent practice of some form of government mechanism overseeing supply and providing assistance in the actual obtaining of oil.

Further evolution of the system for the obtaining of oil will depend mainly on how governments anticipate the market--if oil is plentiful, then the private oil companies can be the principal agents; if a chronic or occasional shortage arises for any of the cited reasons, or is only anticipated, then governments will deepen their involvement in oil to better insure themselves of supply. In any case, most governments will be unwilling to permit the commercial interests of international companies to make the vital decisions. For instance, one objective of oil importers is now nearly universal: they urgently want geographically diversified suppliers to relieve dependence upon the Middle East.

The crucial point about the role of either an oil exporting or an oil importing government is the inevitable further politicization of oil. The obtaining of adequate and continuous supply becomes the key interest and all the instruments available to a government become engaged, greatly complicating the terms, and subjecting one side or the other to political pressures.

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\*Petroleum Intelligence Weekly, February 8, 1982, p. 4.



For the United States, the impact of these developments upon its imports is sometimes thought to be less because it does not itself engage in the obtaining of commercial supplies. Nevertheless, the erosion of the role of the international oil company in international supply has hit directly at the five major U.S. international companies in their own dealings with producers and hence affected their role as important suppliers to other oil importers. They have been buffeted nearly continuously by unilateral (producer government) changes in the terms for supply. Since dependable supply for allies is as important to U.S. interests as the obtaining of its own imports, those changes in the management of the international oil system are of magnified importance to the United States.

f. The Fifteen Year Prospect

From the foregoing discussion, three key points emerge concerning the availability of oil:

(1) Oil importing nations have every reason to anticipate trouble. Oil suppliers, for a number of reasons, will continue to inject uncertainties into supply. These reasons range from non-observance of contracts to the uses to which exporters will apply oil to attain domestic and foreign political objectives, and to the limitations on supply imposed through disruption or declining reserve-production ratios.

(2) If oil price changes were determined by economic market forces alone then oil importers generally could adjust; there is, however, a high probability of supply crises and a re-appearance of the price surge phenomenon of the past decade.

(3) The fatal cause of the loss of control by the private sector over the international oil supply system came when a producer nation discovered it could unilaterally abrogate a contract in whole or in part, with impunity. Non-observance of contracts was tested against the companies in the sixties; their failure to insist upon commercial standards left them extremely vulnerable. The damage is scarcely repairable. The disappearance of dependable commitments underscores the present unpredictability of oil supply.

The single most important lesson about the availability of oil taken from these points is that an oil importing nation must reduce its dependence on oil imports essentially for reasons of price surges and of the risks from undependable supply. Actions which serve to maintain that dependence, or to increase it are, by definition, contrary to the national interest.

## SECTION VI

The Vulnerability of Oil Suppliesa. General Considerations:

Oil security is a broad term with very specific ramifications: security of oil supply -- imports -- has three elements.

- o adequate supply (over short- or near-term there is generally little flexibility to shift to other fuels -- especially true for transport)
- o dependable supply (the logistics system requires uninterrupted availability of crude/product)
- o manageable price (imports to be obtained through the normal processes of international trade).

There are three uncertainties to assured flows of oil: (1) the unpredictability injected into supply through oil exporters' disregard of contracts when some other objective becomes more important; (2) the unpredictability caused by the occasional political uses to which oil is put by the exporters, aimed either at importers, other suppliers, or to secure national domestic objectives and (3) interruptions of supply through accident, internal disturbances, sabotage or war damage.

Some of the events which would affect directly, or indirectly, the secure flow of oil are listed below; war is not a necessary element in these situations to impact upon supply; a threat of war, or just the risk of it or of some other circumstance which hampers secure passage of tankers or otherwise affects supply will suffice. In addition to the present Iraq-Iranian conflict:

Confrontation between:

Spain vs Great Britain (Gibraltar)  
 Nigeria vs South Africa  
 Algeria vs Morocco  
 Libya vs Egypt  
 Libya vs Nigeria  
 Libya vs Malta  
 Arabs vs Israel  
 Yemenis vs Saudi Arabia  
 Iraq vs Syria  
 Iraq vs Kuwait  
 Saudi Arabia vs Iraq  
 Saudi Arabia vs Iran  
 Syria vs Iraq  
 Iran vs Gulf states including Oman  
 Mexico vs the United States, etc.  
 Closure of Hormuz, Suez or Bab el Mandeb; Panama Canal  
 or Strait of Malacca

Additionally: attacks/sabotage of terminals, pipelines, refineries, offshore facilities as in the Middle East's Gulf, North Sea, in the Gulf of Mexico and the Caribbean and on the East Coast of the United States, etc.

b. Political Uses of Oil

With governments engaged in oil supply, their use of oil to secure political interests and objectives became crucial to reliable supply. Instances of such uses of oil include Syria's actions cutting Iraq's supply, Arab embargoes of oil to the Republic of South Africa, then Norway's threat and Nigeria's action to withhold oil from those supportive of South Africa; Malaysia's threat to cancel oil agreements in the course of its campaign to diminish the British presence; Libya's political actions curtailing oil; contract clauses allowing for cancellation by Saudi Arabia for political reasons and Saudi and Iraqi withholding of oil over Israel's actions along with general embargoes by others.

c. Internal Instabilities

Throughout the Middle East, the risk of internal disorder is a clear and present danger to supply. The shi-a of Saudi Arabia's Eastern Province present such dangers for the predominantly Sunni Kingdom. Oman is subject to a domestic upheaval which would affect supply through the Strait of Hormuz; the Sudan's perennial political weakness could affect Red Sea traffic; the Yemens are perennial sources of uneasiness. Lebanon is not only torn by internal strife but is also a pawn in the broader interests of the PLO, the Syrians and the Israelis in the festering Arab-Israeli conflict.

When internal disorders lead to a change in government, the prospect of radical/traditionalist alliances uniting for political coups suggest the possibility of changes in oil policy (as in Iran) which could sharply affect the volume produced. Particular difficulties are anticipated in this respect as the Islamic fundamentalist movement takes on an anti-modernization theme coupled with general anti-western attitudes. Slowing the development pace (and the rate of social change) would be among the priorities of different regimes; doing without oil revenues surplus to re-defined goals would be an early action. No country in the region is immune to these movements.

d. Vulnerability of facilities

Since September 1980, a wholly different situation certain to affect oil arose in the Gulf region with the Iraqi attack on Iran. The damage to oil facilities on both sides, but especially Iraqi, resulted in an immediate combined loss of 5.5 mmb/d or just under 25 percent of all oil then in international trade. No one knows how long the repairs might take. No one knows today whether Iran's Kharg Island facility may be further damaged in the course of the war, or whether Ras Tanura could be attacked since Iran has directly threatened Saudi Arabia for its support of Iraq, or whether Arab oil facilities might be hit by Israel precipitating a major curtailment of supply and shortages among oil-importers. In any event, oil facilities generally are now exceptionally vulnerable, wherever situated, to a determined attacker or saboteur.

e. Regional Strains

In view of the centuries-old antagonisms between the Fertile Crescent and the peoples of Iran--and now between them and the Israelis--there is every reason to believe that conflict on many levels is more likely to be a chief source of instability--the other being the prospect of internal instabilities. The risk to oil supply of these highly incendiary situations is most likely going to remain of continuing concern to oil exporters and importers.

The Iraqi-Iranian war is only one of a number of danger points: there is the persistent struggle over Lebanon, the unending risk of a Syrian-Iraqi outbreak; of an Israeli attack upon Jordan, Syria and Iraq--and the always to be considered threat of an attack upon Saudi facilities, or of an Iranian attack upon Kuwait. In addition, the Gulf states are increasingly threatened by the prospects of revolutionary Iran attempting to export Khomeini's holy war. The Soviet Union is not yet a leading actor in these regional conflagrations, yet its presence in one form or another serves to fuel traditional adversaries (the Kurds or the Yemenis).

The Arab nations are more politically fragmented today than at any time since the end of World War II. The pursuit by external powers--especially the United States and the Soviet Union--of their interests in the Middle East endlessly



complicates Arab affairs and makes the region even more unsettled. Moreover, two developments greatly heighten the sense of insecurity: (1) the ample provision of advanced weapons to all comers has introduced longer-range attack systems which increase vulnerabilities and hence tensions and (2) the likelihood that oil facilities will not be left unscathed which had been the rule prior to the Iraqi-Iranian war.

Of events likely to occur over the next decade, attacks on Arab Gulf facilities could be exceedingly damaging and difficult to repair quickly. Extensive damage to Ras Tanura (the key Saudi Gulf terminal), for example, could remove for an indefinite period most of today's Saudi exports through the Gulf of some 5 mmb/d. What would be removed also for three to six months would be Saudi Arabia's spare producing capacity of another 5.5 mmb/d, an amount which could be of greatest importance to international supply.

Closure of the Strait of Hormuz for any reason would affect today some 12 mmb/d of daily production and another 8 mmb/d spare Gulf capacity which is the reason why of all likely contingencies affecting supply from the Gulf, closure of the Strait would affect all NATO members and Japan in view of their very large dependence (about 80 percent) on Gulf oil.

No oil importing nation is oblivious to these issues and of the risk of a spark igniting the area. Middle East oil reserves

are so incomparably vast that access to them is a key objective of oil importers; their dependence upon the Arab world insures their entanglement in whatever happens in a profoundly unstable region.

f. Mediterranean

In the Mediterranean additional tensions pose continuing risks to oil exporters, Algeria, Libya, Egypt, and Syria (at times providing a key logistics system for Iraqi oil). Libyan-U.S. confrontation, Algerian, Libyan and Syrian (plus PLO) support for Iran, Greek-Turkish rivalries, the cockpit of Lebanon, and secure transit of Suez remain almost daily pre-occupations of those with oil and closely related defense responsibilities. The fragility of the Middle East extends westward into the Strait of Gibraltar. The same tensions giving rise to new Islamic political movements in the Middle East are now present in the North African littoral.

g. Western Hemisphere

In a very different part of the world--the Western Hemisphere--the United States has other vulnerabilities. The oil sources of interest to the U.S. are Canada, Venezuela, and Mexico plus the Caribbean refineries. The oil logistics of the Caribbean are also crucial--over half of all U.S. petroleum imports transit the sea lanes converging on the U.S. Gulf. To the extent that political unrest, Cuban-sponsored military projects, and anti-U.S. activities etc. threaten these lanes, supply is at risk.

Venezuela and Mexico, two major and traditional oil suppliers to the United States, warned that if the Falklands war continued, each might organize Latin American opposition to Britain and a United States which was considered to be an active and vital supporter of British interests. Earlier, Mexico had begun to use the oil lever against U.S. policies in Central America. Moreover, Mexico--as does most of the Caribbean--has difficult internal challenges which could complicate and even interrupt the flow of oil. Even Canada has not always been a wholly reliable supplier of either oil or gas given the record of changes in the volumes to be exported.

In short, in one fashion or another, oil import-dependent countries are subject to varying degrees of uncertain or endangered supply or harassment. The risks run from the

vulnerabilities of choke-points for sea supply, the peril of damage to key facilities, to the possibility of regional conflicts, political upsets and long-standing grievances in an environment in which sophisticated weapons are available to any side.

#### h. Crisis Management

Few nations could cope alone with the consequences of a major cut in oil supply for few possess the emergency stocks necessary to manage internal energy needs. It was this observation which led the United States in 1974 to urge upon its allies the creation of an international emergency supply program whose central purpose would be to see to it that nations participating build emergency stocks, uniformly restrain oil use when supplies are curtailed and agree to an arrangement whereby one or more of them would share in whatever oil was moving internationally. The International Energy Agency (IEA) in Paris is the result. While not yet tested in a time of actual need, the IEA's existence has increased confidence that sudden supply crises could be dealt with.

Thus some of the tension is eased over possible events in the Middle East. Yet, the IEA is a political instrument and as such can be implemented only by its member governments adhering to a complex set of steps and measures. Since it is likely that a producer's embargo, for example, would not be aimed at all IEA members but a few of them, it is not certain that the rest of IEA would wish to activate the emergency plan when they had not been affected.\*

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\*"The International Energy Agency: An Interpretation and Assessment," Mason Willrich and Melvin A. Conant, American Journal of International Law, April 1977.

While the IEA is a considerable improvement over earlier arrangements, its existence does not permit large oil importers to be sanguine about the predictabilities of supply; for them the IEA is a kind of limited insurance.

The most effective security against supply interruptions comes in the form of IEA member nations holding stocks in strategic petroleum reserves--assets which were not available in earlier years. While all members are obligated to hold stocks, including commercial stocks, equal to 90 days' net imports, some importer countries, notably the United States, West Germany, and Japan, have elected to establish segregated, dedicated strategic petroleum reserves.

The United States Strategic Petroleum Reserve (SPR) is presently about 300 million barrels which, on the basis of present imports of some 5 mmb/d, offers full replacement of all imports for 60 days. However, since each IEA member is also expected to have demand restraint plans ready to stretch out emergency supply, the length of time a society should be able to cope with a major loss in supply is considerably extended. The U.S. SPR suffers from doubt as to whether emergency oil will actually be drawn upon and distributed effectively in a supply emergency for no agreed-upon plan for its disposition exists or for its long-range funding.

As of now, the Department of Energy argues an "appropriate" size for the SPR is 750 mmb but asks that the larger target of one billion barrels be kept. The existing 300 mmb was intended to reach 750 mmb by 1990. If U.S. imports in 1990 will be 6 mmb/d then the U.S., at a minimum, would have some 125 days of imports available--assuming allocation plans were ready and implemented and keeping in mind that no country should approach the exhaustion of its SPR. The United States, for example, could need some 60 days after supplies are restored to replenish stocks from the Gulf. Venezuela and Nigeria would be closer but there will be strong demands from Europe for their supply from these proximate sources. So, the actual relief time provided by a SPR is difficult to calculate (and impossible to do so as long as its allocation is still not agreed to). It is, in any case, much less than the simple division of the SPR fill by imports-per-day. And the United States cannot be viewed as an oil importer apart from allies. If allies are in deep trouble over oil, the United States will be also.

Thus it remains imperative for the United States, in its own interest, to reduce its vulnerability to uncertain foreign supply both because of the impact upon its economy of shortfalls and because oil is a vital ingredient in its shared commitments with allies. The challenge for this nation is to reduce the share of oil generally and of imports in particular in the U.S. national energy budget.



## SECTION VII

Summary and Conclusion

The outlook for oil (1983-98) rests on the following propositions:

- o While there is no reason to doubt the physical adequacy of proven oil reserves or the capacity to produce to meet plausible increases in demand over the next decades, every producer will keep in mind the eventual exhaustion of recoverable oil--it is a diminishing resource. Additions to reserves are not matching the oil being pumped, which is most particularly the situation of the United States.
- o Because of the lead time required to complete major investments into alternative forms of energy (seven to ten years for each facility--much more to work a fundamental change in a nation's energy mix), there is no realistic possibility that oil will be displaced as the prime commercial fuel in the period 1983-98. Moreover, there is every evidence that recent investments in alternatives have been stretched out or cancelled outright.
- o Despite the size of oil reserves virtually all industrial and most developing states have national

energy policies aimed at reducing the share of oil in their energy budgets. It is the fact of their large and foreseen continuing dependence upon imports--of access to someone else's oil--and the uncertainty of continuous supply or of non-commercially defined prices which prompts them to reduce their oil consumption and thus their dependence on oil imports.

- o Moreover, the physical adequacy of oil reserves and the existence of very substantial spare producing capacity among oil exporting nations does not cancel out their longer-term intention to limit export volumes to sustain real price increases, to conserve a diminishing resource or to achieve diverse economic and political objectives.
- o Throughout the 1980s and the subsequent decade, the continuing high importance of the Middle East as the supplier of a large share of internationally traded oil dooms importers to dependence upon a politically highly volatile region. For the next decades, there is no realistic possibility of reducing the key role of Middle East oil and this observation alone permits importing nations to use all available means to decrease their dependence on foreign supply.

- o Oil will still be the price setter for energy. It will not be less expensive than other fossil fuels. In recent months the price of oil (domestic and international) has declined under pressure of depressed demand and large commercial inventories. There are now indications that the inventory cycle is being reversed and prices will firm. The general forecast is still for higher prices in the longer run. The vulnerability of supply to sudden shocks warns that sharp increases in prices could again be imposed by oil suppliers on oil importing nations.

For all of these reasons, measures which lead to increased oil demand, and thus for higher imports, are contrary to the national interests of the United States.

\* \* \*

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

DOCKETED  
INFO

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In the Matter of

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.  
(Indian Point, Unit No. 2)

POWER AUTHORITY OF THE STATE OF NEW YORK  
(Indian Point, Unit No. 3)  
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Docket Nos.

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50-286 SP

April 12, 1983

Certificate of Service

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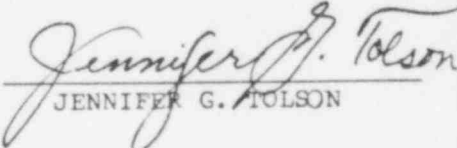
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