CRITICAL ISSUES

Securing America's Energy and Mineral Needs

by
Milton R. Copulos

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The Heritage Foundation
214 Massachusetts Avenue, N.E.
Washington, D.C. 20002
U.S.A.
(202) 546-4400

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by
Milton R. Copulos

Milton R. Copulos is a Visiting Fellow at The Heritage Foundation. A veteran science and energy analyst and member of the National Petroleum Council, Copulos serves as an expert consultant on strategic and critical minerals for the Department of Interior. While a Senior Policy Analyst at The Heritage Foundation, he wrote numerous studies on energy and science-related topics.

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Table of Contents

Chapter One

Introduction

After a brief respite during the early years of the Reagan Administration, the United States once again is becoming dangerously dependent on imports for many of the commodities essential to the nation's economic and military security. These commodities include petroleum supplies and strategic minerals, which are the raw materials on which modern industrial economies are based. Without them, a modern economy cannot function. Yet, despite bitter experience demonstrating the dangerous consequences of disrupted supplies, there is little evidence in Washington of serious concern regarding America's growing vulnerability.

For the first seven months of 1988, U.S. oil imports averaged 6,967 million barrels per day (mbd), which accounted for 41.2 percent of domestic consumption. This compares with 5,401 mbd in 1981 and is up sharply from 1985 levels, when oil imports were 4,286 mbd, their lowest point since the 1974 Arab oil embargo.

It is not just the increase in imports that is a matter of concern. The source of this rising tide of foreign crude is an even greater worry. During August 1988, the most recent month for which data are available, imports of petroleum from the Persian Gulf constituted 20.3 percent of total U.S. imports – compared with 3 percent in 1985 and 11.5 percent in 1981. For the first seven months of 1988, imports averaged 19.9 percent more than in 1986. In addition, in June 1988 (the most current information available), the U.S. received 173,000 barrels of crude oil per day (b/d)) from Angola, a Soviet client-state.

Table 1
Estimated Crude Oil and Product Imports
Ten Leading Supplier Countries
January-June 1988

Country	Imports (Thousand b/d)	Percent of Total Imports	Percent of Domestic U.S. Consumption
Saudi Arabia	987	14.2	5.8
Canada	987	14.2	5.8
Venezuela	809	11.6	4.8
Mexico	729	10.5	4.3
Nigeria	547	7.9	3.2
United Kingdom	381	5.5	2.2
Algeria	308	4.4	1.8
Iraq	232	3.3	1.4
Virgin Islands	229	3.3	1.4
Angola	195	2.8	1.2

Source: U.S. Department of Energy, 1988.
Note: Figures for Canada and Saudi Arabia are identical.

Most Americans recognize instinctively the inherent vulnerability created by such a significant reliance on foreign sources for crude oil and petroleum products. Less well appreciated are the dangers of relying on imports for such other essential goods as steel, aluminum, copper wire, and circuits.

Despite America's bountiful resource endowment, a number of important minerals are either unavailable within the U.S. or unavailable in sufficient quantities to meet its domestic needs. In fact, America's dependence on foreign sources for many of these critical substances far exceeds its dependence on foreign sources of crude oil.

Of particular concern is the rising U.S. dependence on mineral imports from the Soviet Union. As can be seen in Tables 2 and 3, in several areas, the U.S. is already developing a significant dependence on the Soviet Union and its close allies for key minerals. Among the most important are the platinum group metals, platinum, palladium, and rhodium, for which U.S. dependence on East bloc suppliers is greater than its dependence on any single exporter of oil to the U.S. And this is a situation, moreover, that could deteriorate rapidly. A recent Department of the Interior study indicates that, in the event of a U.S. embargo of South African minerals, America's dependence on the Soviet Union for platinum could rise to 30 percent, for rhodium to 66 percent, and for palladium to 60 percent. In addition, the embargo would carry direct annual costs of $1.85 billion for a total of $9.25 billion over a five-year period.

Table 2
U.S. Import Dependence for Selected Nonfuel Minerals in 1987

Mineral	Percent Import Dependence
Arsenic	100
Columbium	100
Graphite	100
Manganese	100
Mica (Sheet)	100
Strontium (Celestium)	100
Yttrium	100
Gem Stones (Natural and Synthetic)	99
Bauxite and Alumina	97
Tantalum	92
Diamonds (Industrial Stones)	89
Fluorspar	88
Platinum Group Metals	88
Cobalt	86
Tungsten	80
Chromium	75
Nickel	74
Tin	73

Source: U.S. Bureau of Mines, 1988.

Table 3
Increase in Imports of Selected Nonfuel Minerals from the Soviet Union and Eastern Europe October 1986 to September 1987

Mineral	Percent Change
Ferrosilicon	+ 3,330.0
Wrought Nickel	+ 460.0
Palladium	- 36.2
Palladium Bars	+ 184.0
Platinum Sponge	+ 145.0
Rhodium	+ 486.0
Ruthenium	- 55.5
Platinum Bars	+ 421.0
Ferrosilicon	+ 467.7
Chrome Ore (Refractory Grade)	+ 257.0
Antimony	+ 4,882.0

Source: U.S. Department of Commerce, Office of Strategic Minerals, 1988.

The rise in mineral imports from the Soviet Union illustrates the difference between dependence and vulnerability. Dependence on foreign sources of supply does not necessarily constitute a threat to U.S. economic or military security, if the nation from which a commodity is obtained is friendly and reliable. For example, the U.S. is dependent on Mexico and Spain for 100 percent of the strontium neededfor cathode ray tubes. Yet, both of these nations are reasonably friendly and reliable. By contrast, only 82 percent of the chromium used by the U.S. for stainless steel and other products is imported, but the Soviet Union is becoming a major source of supply for this mineral used in defense applications.

As a general rule, the importation of strategic and critical minerals makes the U.S. vulnerable when three conditions exist:

1) The commodity is essential to some key economic activity or to national defense.

2) There are no readily available substitutes for the commodity.

3) The U.S. is heavily dependent on imports of the commodity from supplier nations that are politically unstable or hostile to U.S. interests.

An import disruption of such minerals could lead to shortages, which in turn would severely damage the economy. In the case of oil, the potential for economic disruption and reduced U.S. military security are obvious. In the decade following the 1973 embargo, the U.S. spent more than half a trillion dollars for oil imports because of OPEC price fixing. Even this enormous figure represents only part of the embargo's full cost. Other economic effects, which were not so apparent at the gas pump, were significantly greater than the rise in price of a barrel of oil. The National Petroleum Council calculates that the oil supply disruptions of 1973 and 1979 reduced America's gross national product (GNP) by as much as 3.5 percent per annum through the end of the decade, increased unemployment by some 2 percentage points, and added 3 percentage points to the annual rate of inflation. When taken together, the direct and indirect costs associated with the two oil shocks of the 1970s come to about $2 trillion.[1]

Experience teaches how serious such dependency can be in an emergency. During the Korean War, for example, with the need for a rapid expansion in the production of key commodities, the lack of sufficient stockpiles cost about $8.5 billion in taxpayer-financed production subsidies – the equivalent of $40 billion at today's prices. And in 1940, prior to America's entry into World War II, military consumption of petroleum supplies, at 14,252 b/d, accounted for only 1 percent of U.S. use. By 1945, military consumption had risen to 520,523 b/d and accounted for 29 percent of total use. During the Korean War, it was necessary to double aluminum production and to increase titanium production four-fold.

While the U.S., in the past, was able to surge to meet sudden demands for minerals and commodities, it is uncertain that the nation can do this in the future, especially with petroleum, platinum group metals, and chrome.

1 National Petroleum Council, "The Hidden Oil Crisis," September 1986.

Immediate Actions

The question facing U.S. decision makers is how to assure adequate, secure supplies of strategic materials and energy, both for future economic development and during times of conflict. There are a number of immediate actions that could slow the growth of America's dependence on imports for some of these commodities. Among them:

1) Reform federal land-use regulations to permit exploration for and development of the mineral and energy resources they may contain. Today's restrictive regulations prohibit even looking to see if vast areas of the public domain contain mineral or energy deposits. These regulations should be repealed, allowing the U.S. at least to know where mineral and energy resources can be found. In addition, where mineral deposits are found, their development should be allowed under reasonable conditions to reduce security and emergency concerns.

2) Restore the depletion allowance for oil and gas wells to 27.5 percent, up from today's 15 percent. The depletion allowance is a tax deduction similar to the depreciation allowance for other businesses. Restoring the depletion allowance to its former level would greatly stimulate capital formation for exploration and development.

3) Repeal the minimum tax on intangible drilling costs. This special 10 percent minimum tax is assessed on certain oil exploration expenses called "intangible drilling costs." It is an unwarranted burden on drillers, raising their costs, thereby often causing wells to be abandoned prematurely. Eliminating it would extend the productive life of domestic oil wells, and stimulate additional domestic production by lowering costs. In later stages, where per barrel production costs are high, this is particularly helpful.

4) Exempt mine wastes from regulation under Subtitle C of the Resource Conservation and Recovery Act (RCRA), which places design and control of mine waste regulations under the federal authority, which is more expensive than state control. Exempting mine wastes would keep this regulatory power in the states where it belongs, keeping costs down and leaving more capital for development of domestic energy.

5) Exempt drilling muds from classification as hazardous wastes. This would avoid the imposition of costly new regulations that could hinder severely U.S. oil production.

6) Immediately open offshore California and the Arctic National Wildlife Refuge to oil and gas exploration and development. This would help avoid future oil shortages by opening access to the nation's most promising areas for new development.

7) Restore the 10 percent investment tax credit for mining equipment and other mine-related capital expenditures. Restoration of the 10 percent tax credit would provide an incentive for domestic exploration and development of energy resources. It would help domestic firms modernize their facilities and become more competitive in international markets and would stimulate the development of new domestic energy production.

8) Repeal the Transfer Rule. This rule prevents the purchaser of an oil well from taking tax benefits, such as the depletion allowance, permitted for the original owner. Repealing it would permit the new owner to continue to receive the benefits, which is particularly important for maintaining production from marginal wells that small producers are willing to operate but large firms would abandon.

9) Review current mineral stockpiles to determine if they can meet national security requirements in the event of a three-year conventional war requiring full mobilization. Currently, the strategic stockpile contains many commodities which no longer are required or for which superior substitutes exist. In addition, there may be some commodities that should be stockpiled but are not. A review would determine where additions should be made and surplus commodities sold. This would permit a much needed modernization of stockpile holdings.

10) Create a Strategic Petroleum Product Reserve for military use. The current Strategic Petroleum Reserve contains only crude oil and is intended for civilian as well as military use. In the event of conflict, however, the military will need refined products.

Long-Term Solutions

While certain short-term actions would slow the nation's growing dependence on imported energy and minerals, other measures are needed to reduce the nation's long-term dependence on imported strategic commodities. Among them:

1) Stress research and development to identify substitutes for critical materials. This can help achieve independence from insecure foreign sources of mined supplies by providing domestically based alternatives.

2) Develop incentives to make greater use of domestic energy sources. States or local governments could be allowed by the federal government to permit vehicles to burn oxygenated fuels as a method of complying with the Clean Air Act's ozone requirements. Currently, federal rules stand in the way of this by discriminating against oxygenated fuels. Allowing their use would reduce pollution without investment in expensive new emission control equipment, reduce the dependence on foreign oil, and help eliminate farm subsidies by expanding the market for fuel made from agricultural products.

3) Require that all federal vehicles used in domestic, noncombat applications be capable of using a number of different fuels. This would allow government vehicles to use fuels such as ethanol, methanol, and natural gas, reducing government reliance on refined petroleum products in times of conflict.

4) Encourage the substitution of natural gas for petroleum. Natural gas can be burned in industrial and utility boilers. In addition, small design changes would allow many motor vehicles to use natural gas. Such substitution could be spurred by amending environmental regulations to permit the use of gas in lieu of more expensive technologies as a means of meeting emission standards.

5) Develop alternative designs for a standardized, small-scale nuclear power reactor. U.S. nuclear power growth is at a standstill. This is because of public concern about possible nuclear accidents and rapidly rising costs because of escalating safety regulations. The introduction of a small nuclear reactor, such as the modular, high-temperature gas cooled reactor (MHTGR) could solve these safety and economic problems, because such reactors have inherent safety characteristics making them immune to the types of accidents that occurred at Three Mile Island and Chernobyl.

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Without specific actions to reverse current trends, the U.S. will become increasingly dependent on foreign sources of supply for a wide range of strategic minerals and energy. In the worst case, this vulnerability will seriously undermine the nation's economic and military security; at best, it will result in far higher commodity costs to consumers.

What is perhaps most disturbing about the current situation is that it demonstrates a clear failure on the part of U.S. decision makers to learn the lessons of history. In times of peace, an excessive dependence on foreign sources of supply for any essential commodity can leave the nation vulnerable to enormous economic penalties, as demonstrated by the aggregate effects of the two oil shocks of the 1970s. In times of war, the availability of strategic and critical materials and of energy can make the difference between defeat and victory.

Chapter Two

The Lessons of History

The subject of import dependence and vulnerability generally is discussed within the framework of what are called "strategic and critical resources." To be considered a "strategic and critical resource," a mineral must possess three attributes:

1) No substitutes. There is no ready substitute for the resource in question. This may be because no other substance can be used in certain applications or because substitutes are uneconomic. Example: certain processes used in catalytic chemistry require platinum group metals. Since no other substances provide the same catalytic effect, there is no substitute in these applications for the platinum group metals. By contrast, silver is a ready and technically preferable substitute for copper wire used to carry an electric current. In fact, during World War II, the Manhattan Project, which developed the nation's first atomic bomb, overcame a copper shortage by using some 200 tons of silver from U.S. Treasury stores to fabricate wiring. The famous *Liberty* ships also used silver wiring.

2) Criticality. The lack of substitutes is not the only criterion for a strategic and critical resource. The resource also must be essential to a vital commercial or defense activity. Examples: ferrosilicon is essential to the manufacture of the steels used in the hulls of naval vessels; antimony is required for the manufacture of munitions, semi-conductors, and cathode ray screens that are used for computers, sonars, and radars; and chromium is essential to the production of certain types of high-grade specialty steels.

3) **Lack of secure suppliers.** Political instability, as in Iran immediately before the fall of the Shah, or hostility to U.S. national interests, as from the Soviet Union or Iran today, make supplies from these countries unreliable. Supplies also can be jeopardized by an outside threat to an otherwise reliable supplier, such as the Iranian threat to Saudi Arabia and Kuwait. Another source of insecurity can be a long or hazardous transportation route. Shipments of cobalt from Zaire and Zambia, for example, must travel by rail to ports in South Africa and then be carried by ship around the Horn of Africa. The cobalt thus faces possible disruption from political developments in South Africa and possible interdiction by sea.

Although these three criteria define a strategic and critical resource, it is impossible to design a blanket policy to be applied in every case. For instance, import dependence is not necessarily accompanied by import vulnerability. The U.S. depends heavily on Canada for a number of important minerals, but Canada is such a reliable supplier that no real vulnerability exists.

There also are degrees of vulnerability, requiring different U.S. policies in different situations. Minerals obtained from the Soviet Union, for example, are certainly less secure than those obtained from Australia. As America's principal geopolitical enemy, the Soviet Union cannot be trusted to provide the U.S. with resources. In 1949, for example, when the U.S. was airlifting food and fuel into Berlin to break the Soviet blockade of that city, Moscow retaliated by halting shipments of chrome and manganese to the U.S. It can be assumed that Moscow would do this again. In the case of Australia, however, shipments to the U.S. of bauxite, aluminum, and yttrium are vulnerable only because they must be transported long distances by sea, leaving them open to interdiction by an enemy in the event of conflict.

Even secure supplies can, of course, be interrupted. Events ranging from natural disasters and unexpected changes in governments to equipment failures and labor unrest can interrupt supplies from a seemingly secure source. Thus, even though Canada is considered America's most secure foreign supplier, a 1969 strike by Canadian nickel workers disrupted supplies for several months at the height of the Vietnam War. Similarly, prior to the 1973 oil embargo, oil from the

Middle East was considered secure. And so was oil from Iran, prior to the fall of the Shah.

The vulnerability of a particular resource varies enormously, depending on the nature of the resource and a wide range of other factors. Among the factors determining actual vulnerability are the number of alternative suppliers. The importance of multiple supplies is best illustrated by the case of platinum group metals, which are found only in the Soviet Union and South Africa, although tiny amounts have been discovered elsewhere. The U.S. supply of platinum group metals thus is vulnerable because the number of suppliers is so limited.

Another factor affecting the degree of vulnerability is the extent to which substitutes are available. Since there is no substitute for titanium in certain defense applications, its availability is essential to national defense. Location also can be a key factor effecting vulnerability. For example, although Australia would normally be considered among the most secure and reliable suppliers, having to transport commodities obtained from that nation over long distances creates the danger that supplies can be interrupted.

In sum, a strategic vulnerability exists when U.S. imports of significant quantities of a strategic and critical resource are likely to be disrupted either by the supplier nation, or some hostile power, in time of conflict, or when increased wartime demand might prompt a serious shortfall. Yet even peacetime disruptions of certain resources can have serious economic consequences for the nation. An economic vulnerability can exist, in other words, even when no strategic vulnerability is apparent.

Recent history provides many examples of a combination of factors leading to a serious threat to the supplies of a strategic and critical resource. In some cases, the result was a direct threat to U.S. security. In others, there was no actual interruption of supplies or a security threat, but there were enormous costs to the American economy. And every case taught the U.S. some hard and costly lessons about the need for policies to secure U.S. access to essential energy and minerals.

CASE #1: THE WORLD WAR I EXPERIENCE

During World War I, Germany suffered acute shortages of nickel, copper, and tin, which seriously undermined its war production efforts. Britain and France, meanwhile, were short of basic foodstuffs and war material. Indeed, between 1915 and 1917, U.S. businessmen provided some $2 billion in secured loans to the Allies (at this time, Great Britain, France, Russia, later joined by the U.S., Italy, and Japan) for the purchase of such goods in the U.S. The U.S. soon discovered its own vulnerability, when Germany retaliated against the U.S. by placing an embargo on potash, needed for munition production, for which Germany was America's principal supplier. The resultant potash shortage in America quickly pushed up prices from $35 per ton to almost $500 per ton.

Germany's limited access to petroleum, compared with the massive U.S. oil shipments to Germany's opponents, proved a critical factor in the war, demonstrating the importance of strategic resources. The expansion of U.S. domestic production was made possible in part by congressional enactment of a new war production incentive, a 27.5 percent oil depletion allowance, which allowed drillers to recover their capital investment. Unlike World War II, Congress did not impose controls on domestic oil consumption during World War I, and consequently, domestic demand continued to grow at the same time that demand surged for exports. Yet domestic oil producers were able to satisfy civilian needs while furnishing 80 percent of the Allied requirements as well.

Access to oil supplies became a crucial factor during the later stages of the war, as newly developed aircraft, tanks, and diesel powered ships and submarines increased military demand for petroleum products. As Lord Curzon, War Minister in the British Cabinet, commented at the close of the war, "The Allies floated to victory on a wave of oil."[2]

Yet this wave of oil, as well as supplies of other strategic and critical commodities essential to the Allied victory during World War I, might not have been available with the incentives enacted by Congress to assure adequate supplies before the U.S. entered the war.

CASE #2: WORLD WAR II AND KOREA

Access to natural resources proved even more decisive during World War II. In fact, not only was access crucial to the Allied victory,

2 As quoted in Robert Goralski and Russell W. Freeburg, *Oil and War* (New York: William Morrow and Co., Inc., 1987), p. 15.

but the global conflict was in part triggered by the protagonists' lack of secure resources of strategic minerals and energy. Japanese expansionism, in particular, was driven by Tokyo's determination to obtain raw materials. As Japan industrialized at the turn of this century, it became densely populated in relation to its resources, and its need for sources of vital raw materials became acute. Indeed, as early as 1916, Japan attempted to end its lack of resources and to fulfill imperialist expansionism ambitions by effectively annexing China, a move the feeble Chinese government was able to forestall only by putting itself under the protection of Britain and the U.S. This move frustrated Japanese imperial ambitions for a time, and it did nothing to defuse the underlying economic problems.

Germany also was plagued with mineral shortages, and these heavily influenced Adolf Hitler's political and military agenda. Iron ore, manganese, and molybdenum especially were in short supply, and all were essential to Germany's economic and military needs. The most important deficiency was petroleum. Mechanization and mobility and the heavy use of airpower were essential to Wehrmacht success. This made access to oil or its substitutes a central factor in Hitler's war plans. It is small wonder, then, that one of the principal targets of the German forces invading Poland in 1939 were the Polish oil fields and refineries in Galicia.

In spite of such actions, supplies eventually proved insufficient to provide German forces with what they required to conquer Europe. A telling example of this shortfall came during the Battle of Britain, when the availability of 100 octane gasoline in Britain permitted British fighters to gain a decisive edge over the attacks of German aircraft. So critical was the availability of this high performance fuel that Geoffrey Lloyd, secretary of petroleum in the British War Cabinet, was to say later, "I think we wouldn't have won the Battle of Britain without 100 Octane. . . but we did have 100 Octane."[3]

As was the case in World War I, what supplied Britain was the enormous and friendly resource base of the U.S. Not that America was an entirely secure resource. Britain suffered enormous losses in oil shipments across the Atlantic, learning that there was a big difference between friendly suppliers and assured supplies. Nevertheless, in 1940

3 As quoted in Goralski and Freeburg, *op. cit.*, p. 39.

some 53 percent of British petroleum supplies came from America. U.S. exports to Britain for that year were 325 percent higher than during the previous year.

The U.S. resource base was also critical to victory in the Pacific. Japan's decision to attack the U.S. was influenced by two important issues related to U.S. resources. The first of these arose from the U.S. embargo on shipments of many raw materials to Japan imposed by the Roosevelt Administration in retaliation for Japan's brutal invasion of China in 1937. Initially limited to airplane parts, the embargo was extended to include a wide range of raw materials such as scrap steel, copper, iron, and especially aviation gasoline. Throughout 1941, Japan had been stockpiling aviation gasoline in anticipation of its move against Dutch, French, and British colonies in Asia.

The second influence on the Japanese war plans stemmed from a study commissioned early in 1941 by Tokyo's military authorities, which indicated that, if it did not go to war against the Allies, economic sanctions eventually would cripple Japan's ability to wage war.[4] The study also showed that in a direct conflict with the Allies, and in particular with the U.S., Japan would have sufficient supplies until the third year of war. Therefore, Japanese hawks argued that Japan could score a knockout blow in two years, followed by a favorable settlement with the U.S. A long war, by contrast, would create such serious resource problems that Japan would never achieve economic independence and military domination of the region.

The Japanese, who feared the U.S. industrial and resource base, were right. It turned out, however, that America's ability to bring its full industrial weight to bear on the war effort actually was a far more difficult task than even the pro-war Japanese officers might have believed. The reason was that American officials were dangerously overconfident about the availability of U.S. natural resources. The assumption was that, as in World War I, the only issue would be how quickly the U.S. could supply the Allies. Almost nobody believed the U.S. itself would ever be short of strategic materials. The huge U.S. resource base and industrial potential tended initially to blind planners to the fact that potential and capability are two different things. So although the Congress had enacted legislation providing for national

4 *Ibid.*, p. 99.

materials stockpiles prior to the outbreak of war, preparations proved painfully inadequate for a global conflict. As Dwight Eisenhower later wrote, describing the materials situation at the outset of America's entry into World War II and his experiences with materials shortages during the Korean War:

> ... our lack of an adequate stockpile of strategic and critical materials gravely impeded our military operations. We were therefore forced into costly and disruptive expansion programs. The nation was compelled to divert, at a most critical time, scarce equipment, and machinery to obtain the necessary materials...
>
> ... But, even after this experience, we had not fully learned our lesson. After World War II, stockpiling was confined too much to mere talk, it neglected implementation. After we became involved in hostilities in Korea, we went through experiences almost identical with those of World War II... only then did realistic stockpiling begin.[5]

Eisenhower's comment underscores the dilemmas associated with assuring that adequate resources are on hand for times of conflict. Stockpiles in essence are an insurance policy, which must be accumulated in times of peace. Politicians, however, are usually loath to spend taxpayer dollars for purposes that do not yield some immediate, tangible benefits. The accumulation of stockpiles, moreover, implies that conflict is possible; and this is something that most politicians would rather avoid acknowledging in times of peace.

Because of such political resistance, and despite passage of the Strategic and Critical Materials Stockpiling Act of 1946, which had as its goal a $4.2 billion stockpile of important industrial commodities for wartime use, only $1.6 billion worth of materials had been acquired when war broke out in Korea in 1950. And as would any householder who failed to buy insurance, the U.S. found the cost of actions needed to meet the crisis far greater than that for adequate stockpiling would have been. By failing to spend the additional $2.6 billion mandated by the act, the federal government was forced to spend $8.4 billion in out-

5 1963 letter from President Eisenhower to Senator Clifford Case.

lays under the Defense Production Act to produce the critical materials it had not stockpiled.

CASE #3: THE OIL SUPPLY DISRUPTIONS OF THE 1970s

Even international crises not involving actual conflict often have been very costly in terms of energy or strategic minerals. According to a 1987 report by the National Petroleum Council, for instance, the two oil supply disruptions of the 1970s reduced U.S. aggregate gross national product by 3.5 percentage points, increased unemployment by 2 percentage points, and added 3 percentage points to the annual inflation rate, during the eight years 1973-1981 affected by the embargoes.[6] These effects were broadly felt until the end of the decade. The direct and indirect economic costs of the oil crises of the 1970s came to a staggering $2 trillion.

Yet these were only part of the total price exacted. As the nation struggled to respond to the perceived "energy crisis," Congress increasingly felt pressured to "do something." In some instances, congressional actions added to the damage, such as with the price and allocation controls on crude oil and refined products. These measures simply slowed the development of new oil supplies and the ability of the market to distribute oil and gasoline quickly and efficiently.

Beyond the damaging economic consequences of the U.S. energy vulnerability in the 1970s, the supply crisis forced unwelcome changes in U.S. foreign policy and threatened U.S. interests in the Middle East. Iran's gushing oil revenues, combined with the Shah's overly ambitious and premature program of industrial modernization eroded the political stability of that country, provoking the rise of Muslim fundamentalism and leading eventually to the Shah's fall. These events have gone on to require significant additional U.S. defense expenditures in the region to offset the loss of America's principal ally in the Persian Gulf and to protect friendly nations supplying oil to the West.

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6 National Petroleum Council, *U.S. Oil and Gas Outlook*, February 1987.

CASE #4: THE WORLD COBALT PANIC OF THE LATE 1970s

The mere perception of a shortage sometimes can disrupt the supply of certain materials. And if the government is ill-prepared to deal with the situation, or fails to respond appropriately, a hidden vulnerability can be exposed.

This is what happened between 1978 and 1979, when a combination of rising world demand and fears that attacks by rebel forces would cut off supplies from Zaire resulted in panic buying of cobalt, a metal used for making high-performance steel alloys and for other defense and industrial purposes. This spate of buying drove up prices on the world market. Spot prices (prices for commodity purchases made on the open market rather than by long-term contract) for cobalt rose from $6.85 per pound in February of 1978 to $47.50 per pound that October. Prices fell to $25 per pound by early 1979, almost four times the level a year earlier.

The economic impact of this panic buying was aggravated by a change in U.S. federal stockpile policy. Between 1968 and 1976, Washington had been selling between 6 million and 9 million pounds of cobalt from the stockpile each year to bring down the stockpile to 11 million pounds. Cobalt users in the U.S. and abroad came to rely on these sales for a significant portion of their supplies. Indeed, U.S. government sales accounted for roughly half of all domestic commercial consumption at the time and 10 percent of free world consumption.

Though the U.S. stockpile in 1976 still contained 40 million pounds of cobalt, Washington abruptly revised its goal for stockpiled cobalt and called for a buildup to 85 million pounds. As a result, U.S. federal sales were suspended, and Washington became a buyer rather than a seller. Since world economic conditions were still moderately depressed in 1976, U.S. officials did not anticipate a dramatic change in the market because of their shift in policy.

But by 1978, economies were expanding; there was a particularly strong market for jet engines made of alloys requiring cobalt. These new market conditions, in a time of concern about political conditions in Zaire, led to panic buying, which caused the price to skyrocket.

Though there was never literally an actual cobalt shortage, an unwise change in U.S. stockpile management policy reinforced a temporary but costly price shock wave through the world cobalt market.

Eventually the market calmed, as fears of an interruption of supplies began to dissipate. Prices then returned to their pre-crisis levels. But the cost of the crisis was high. Between 1979 and 1980, U.S. industrial consumers paid a total premium of some nearly $600 million for the commodity.

CASE #5: THE 1969 CANADIAN NICKEL STRIKE

While the wild price fluctuations accompanying the perceived cobalt shortage were at least in part the result of political uncertainties in Zaire and the surrounding region, similar disruptions can occur suddenly even in the case of secure suppliers. An example is the Canadian Nickel Strike of 1969.

In that year, Canadian nickel miners shut down Canada's production for four months. Unlike the cobalt panic of 1978-1979, however, the nickel strike created a real shortfall of supplies. This had to be made up by a combination of recycling nickel scrap, identifying alternative suppliers, and, eventually, releasing supplies from the U.S. strategic minerals stockpiles. Despite the brevity of the interruption, the economic effect on nickel users was significant; nickel prices on commodity markets soared by 350 percent, rising from $1.33 per pound to $6 per pound.

The effects of the strike were severe for the U.S. for three main reasons. First, Canada was at that time the free world's principal supplier of nickel, accounting for about 50 percent of noncommunist production. Second, although other nations were expanding their nickel production capability, they had not done so fully. And third, the strike took place during a period of rising demand. U.S. needs, in particular, were increasing rapidly, thanks to the military demands of the Vietnam War.

As with the world cobalt panic, nickel consumers responded quickly to the higher prices and shortages. The use of scrap nickel by U.S. steelmakers, for instance, jumped 64 percent in 1969. High-manganese stainless steel was substituted for nickel alloys whenever possible (although it has inferior corrosion resistance characteristics). Alternative sources of supply in Greece, New Caledonia, and Norway were identified. And U.S. federal policy during the nickel crisis helped market adjustments, rather than reinforcing price rises as in the case of the cobalt crisis. Richard Nixon authorized the release of nickel supplies from the nation's strategic stockpiles and embargoed nickel exports.

WHY MARKETS MATTER

The above case histories reveal how serious a supply interruption can be, especially during wartime. The experience of the two World Wars, moreover, demonstrates not only that access to strategic minerals can provoke major conflicts and help determine their outcome but also that it is dangerous for the U.S. to overestimate its ability to respond to a crisis. The oil crisis reinforced this painful lesson. And as the cobalt and nickel crises showed, foreign supplies cannot be considered secure just because they come from a friendly country.

These and similar experiences confirm the shortcomings of government in anticipating supply problems and responding to them. More often than not, officials try to take an active role to show the public they are doing something by substituting bureaucratic actions for the operation of markets. Yet markets consistently outperform government in responding quickly and efficiently to supply crises.

Changes in supply almost instantaneously prompt price changes. This in turn causes customers to alter their buying decisions and encourages profit-maximizing producers to step up supplies or develop substitutes. By contrast, government takes much longer to respond, often acting only after significant economic disruption occurs. In the three peacetime case histories reviewed, consumers were quick to respond to the price hikes and the perception of short supplies by recycling, identifying substitutes, and locating alternative sources of supply. More important, the price rises stimulated the development of additional production capacity by new suppliers, ultimately reducing vulnerability to supply disruptions.

The expansion of alternative sources of oil supply from such regions as the North Sea and Mexico, trimmed OPEC's share of the world oil market 50 percent in the decade following the 1973 embargo. In the case of cobalt, enough substitutes were developed for certain uses, such as magnets, that by 1981 world demand had dropped by 41 percent from the 1978 peak. And in the case of nickel, so much new capacity was available by the late 1970s, when world demand began to fall, that nearly half of Canada's capacity remained idle and never fully recovered.

Government intervention is seldom needed once an interruption actually has occurred. More often than not, government intervention does much more harm than good. In the case of oil, price and allocation controls following each interruption, together with federal leasing policies, tax measures to cream off "excess" profits, and a host of other actions taken in response to the energy crisis, hamstrung the ability of U.S. oil firms to respond to the shortage.

Only in the case of the nickel strike, where government action was minimal, limited to releasing stockpile holdings in response to the price rise and to a short-term ban on exports, could the effect of government action be said to be beneficial. And in the specific case of nickel, the government acted solely to assure the production of military equipment for the Vietnam War and not to manipulate commodity markets. Moreover, as a supplier, it made the rational economic decision to release supplies of the metal when the price rose. On the other hand, when government tries to manipulate the market, as in the case of oil, a supply problem quickly is turned into a supply crisis.

Chapter Three

America's Current Energy Vulnerability

An irony of the energy crisis of the 1970s was that the United States at no point actually was short of energy. In fact, at the time of the 1973 OPEC embargo, the U.S. was the Free World's largest oil producer. And although U.S. production was eclipsed briefly during the later 1970s by Saudi Arabia, it has again assumed its leading role. The same is true of energy in general. In 1985, the most recent year for which final figures are available, the U.S. produced 21.4 percent of total world energy, compared with 11.5 percent for Western Europe, 8.2 percent for the Middle East, 11.7 percent for the Soviet Union, and 0.96 percent for Japan. In addition to leading the Free World in total energy output, the U.S. is well ahead of these countries in energy produced by nuclear power, coal, and natural gas. It is second only to Canada in hydroelectric generation.

U.S. energy reserves also are enormous. The U.S. ranks eighth in the world in proved oil reserves, accounting for roughly 4 percent of the world total. It is third in natural gas reserves with 6 percent of the world total. And the U.S. leads the world in recoverable coal reserves.

How, then, could the U.S. have been so vulnerable to supply interruptions in the 1970s? And why is there so much concern about energy security today? The reason is that regulatory and tax policies prevented the market from adjusting fully in the 1970s, and this situation still exists today.

HOW REGULATION STRANGLES THE ENERGY INDUSTRY

Public concern about the environmental impact of oil exploration, spurred by the disastrous 1969 Santa Barbara oil spill, led to numerous regulatory constraints. Among them: the Clean Air Act (1970), the Clean Water Act (1977), the Surface Mining Control and Reclamation Act (1977), and the Resource Recovery Act (1977). In addition, the Environmental Protection Agency was established in 1970. It quickly began setting standards for a wide range of pollutants and issuing regulations as to how businesses were to control these pollutants.

In the rush to correct the consequences of generations of environmental abuse, many actions were taken on the basis of insufficient or incorrect data. Little or no consideration was given to the accuracy of the environmental data as standards were being set, while the economic effects of the rapidly proliferating regulations usually were ignored. Nor was consideration given to the regulations' potential effects on the nation's ability to produce the energy or minerals it required. Indeed, in a backhanded compliment to the power of the marketplace, an implicit assumption of the environmental regulatory process was that industry would somehow find a way to meet the new regulatory requirements and still continue to furnish U.S. energy needs.

The costs of compliance with the new regulatory regime have been enormous, over $960 billion to date according to the Department of Commerce. Ultimately this has been passed on to the consumer in higher energy costs and prices for products. The high costs caused by environmental regulation can make the investment required for an energy project unacceptably high, given the commercial risks normally encountered. Moreover, those environmental activists whose primary purpose is to forestall economic growth have learned to manipulate regulations to block a project for so long that its sponsors abandon it. The use of red tape and legal maneuvers by activists, for instance, has led to a de factomoratorium on nuclear power plant construction in the U.S., exacerbating dependence on foreign energy supplies. This also has led electric utilities to avoid virtually all major capital projects. And while installed capacity currently remains sufficient to meet domestic electricity requirements, several regions of the nation are fast approaching a time when they will suffer shortages of generation capacity.

Similar red tape and obstructionism by anti-growth advocates have hamstrung many oil and gas development projects, jeopardizing U.S. access to secure energy resources. For instance, plans to permit exploration of the nation's two most promising regions for new oil and gas discoveries – offshore California and the Arctic National Wildlife Refuge (ANWR) – remain stalled by environmentalist opposition. Indeed, in congressional hearings on ANWR in 1987, many of the same organizations and individuals who voiced dire and, as it turned out, completely erroneous predictions in the early 1970s about the environmental impact of developing the Prudhoe Bay oil field on Alaska's North Slope were raising exactly the same objections to developing ANWR.

Opposition currently being mounted to oil exploration and development on the Arctic National Wildlife Refuge, in fact, typifies how energy regulations allow a small group of activists to aggravate America's energy vulnerability. Lost in their campaigns are energy security concerns and evenhanded analysis of the impact of exploration. The experience at Prudhoe Bay indicates that development in an area such as ANWR's coastal plain can take place without significant environmental damage. Contemporary oil exploration techniques do not disturb the environment as did exploration some years ago. It is now possible to conduct extensive geophysical and geologic research without leaving any permanent effects at all. Not even a minimal disturbance of a tiny section of coastal plain would occur unless there were a significant oil or gas find. Nevertheless, environmental regulations continue to stand in the way of America even finding new oil reserves for emergencies, let alone actually recovering them.

THE ASSAULT ON ENERGY PROFITS

The growth of environmental regulation beginning in 1969 is only one factor frustrating efforts to make U.S. energy supplies more secure. The other is the continuing assault on the profitability of energy development.

Congress in 1969 reduced the depletion allowance from 27.5 percent to 22 percent. The depletion allowance for mineral development is essentially the equivalent of depreciation for a manufacturing business. It is an allowance against taxable income based on the notion that a resource deposit constitutes the principal capital of a mining operation. Therefore, as the mineral is extracted and the deposit is depleted, the capital is consumed – just as a manufacturing firm's capital would be consumed as its machinery deteriorates. While seemingly a modest cut, the reduction in the depletion allowance to 22 percent was a radical departure from half a century of energy policy. Since its creation in 1918, the 27.5 percent depletion allowance had been the bedrock of domestic oil policy. It was intended to permit oil and gas producers to recover their capital for reinvestment in the same rapid fashion as other sectors of manufacturing recovered their capital through depreciation.

The attack on the depletion allowance intensified. Congress in 1969 also limited the allowance to a small class of independent producers, and then, during the Ford Administration, started to phase out the allowance completely. This was followed by other tax changes that cut deeply into the profits that oil companies had used to finance new expenditures. Congress in 1976, for example, placed a minimum tax on what it called "intangible drilling costs." Typical of these are the cost of building a road to an oil well site, the cost of drilling muds used to lubricate the rotating shaft of an oil rig, or the energy used to operate the rig, all of which were made subject to a tax of 10 percent of their value. In any other industry, these are treated as normal business expenses.

Then in 1979 came the so-called Windfall Profits Tax. Before the 1973 OPEC embargo, periods of rising oil prices caused by supply changes were accompanied by sharp increases in investments in exploration and development financed by profits from the price surge. The market's ability to respond in this way, however, was blocked in 1974, when Congress made permanent the "temporary" price and allocation controls on crude oil and refined petroleum products. This created severe disincentives for domestic production, thus setting the stage for the 1979 oil shock with its consequent steep rise in imports. In 1979, Congress did take the sensible action of phasing out oil price and allocation controls, allowing the market to function. But it offset this wise action with the imposition of the windfall profits tax, which reduced the funds available for new exploration. The Windfall Profits Tax required an oil producer to pay as tax a portion of the amount received for a barrel of oil in excess of a federally established "base price." The tax set up a complex system of categories into which oil was

Table 4
Net Income as a Percent of Stockholder's Equity
Oil and Non-Oil Companies

Year	Oil Companies	Non-Oil Companies
1968	12.5	14.7
1969	11.3	13.8
1970	10.9	10.3
1971	10.4	11.3
1972	9.8	13.0
1973	15.0	15.5
1974	18.6	13.9
1975	12.8	12.3
1976	14.0	15.1
1977	13.4	15.0
1978	13.7	15.8
1979	20.9	16.4
1980	22.8	12.9
1981	18.8	13.7
1982	13.1	9.8
1983	12.4	12.2
1984	11.1	15.0
Median	13.1	13.8

Source: U.S. Department of Treasury, Internal Revenue Service, 501 Bulletin, Fall 1987.

classified, depending on the date the deposit was discovered. The base price was determined by the specific category into which the oil fell.

Popular support for imposing the tax was fueled largely by continuing media reports of "excessive" profits earned by domestic oil companies. Indeed, the press charged that companies were profiting from previous discoveries and thus did not deserve the additional profits. The reports did not, of course, note that price controls had been in existence since 1971 and that the higher prices producers were receiving actually were a reflection of oil's true value in the market.

These reports on oil company profits were deeply misleading in another important way. The reports always were given in terms of percentage increases over the previous year. Therefore even a modest improvement on a low rate of return could represent a large percentage increase over the previous year. A more meaningful picture of oil company profits, using the return on stockholders' equity, would have given quite a different picture of oil industry profits. The return on investment for the 24 largest oil companies, compared with that of all nonpetroleum manufacturing industries, illustrates this (see Table 4).

As Table 5 indicates, the tax has diverted billions of dollars from the search for energy to federal coffers.

Table 5
Windfall Profits Tax Collections
1980-1984

Year	**Tax** (in billions of dollars)
1980	9.925
1981	25.944
1982	16.754
1983	10.668
1984	8.874
Total	72.165

Source: U.S. Department of the Treasury, Internal Revenue Service, 501 Bulletin, Fall 1985.

Some defenders of the tax argued that, because of the recent low world price for oil, the tax imposed little burden on the industry. But the Windfall Profits Tax acted as a barrier to investment in oil and gas exploration, because it siphoned off much of the income producers received from investments if prices improved. This meant that it reduced the incentive to invest in oil exploration and development today to counter any potential future supply interruption. Fortunately, Congress finally recognized its mistake and repealed the Windfall Profits Tax as part of the 1988 Trade Bill.

Congress did not stop with the Windfall Profits Tax. In 1980, Congress imposed a special tax on oil companies to finance the Superfund, and in 1985, increased taxes on refined petroleum products. The

Treasury helped cloud the oil industry's financial picture that year by sending confusing signals to financial markets, further inhibiting investment in oil and gas exploration.

States have tightened the noose even more by raising gasoline taxes and imposing "severance taxes" on minerals extracted within their boundaries. In short, rather than enjoying the favorable tax treatment needed to boost exploration and production to counter growing concerns about America's energy security, the oil industry has become one of the most heavily taxed sectors of the U.S. economy.

HOW TO INCREASE DOMESTIC SUPPLIES OF ENERGY

With regulatory and tax policies constraining the ability of American energy firms to respond to the potential threat of future supply interruptions, the U.S. faces the prospect of another damaging energy crisis. To avoid this, Congress needs to allow the energy industry greater opportunities for exploration and to remove the disincentives imposed by the system.

Eliminating Constraints on Access to Federal Land

Easing access to federal lands for mineral exploration and development is essential to assure adequate mineral supplies to succeeding generations. To accomplish this, specific actions could include:

1) Open the Arctic National Wildlife Refuge (ANWR) to oil and gas exploration.

There is more than ample evidence, based on a decade of operating experience at Alaska's Prudhoe Bay, that oil and gas can be extracted in the Arctic without damaging the environment. The few oil spills that have occurred have been contained and cleaned up without the disastrous consequences once predicted by environmental activists. Indeed, none of the grim environmental catastrophes forecast at the time Prudhoe Bay was first being developed have come to pass.

The nation needs oil from ANWR. Prudhoe Bay is fast approaching its peak, and is expected soon to begin a steady production decline. ANWR not only represents the potential to replace this loss of productive capacity, but is probably the last "Supergiant" (over one billion barrels) oil field left in the U.S. Moreover, because oil from ANWR could be transported through the existing Alaska oil pipeline, it would not need a new and expensive transportation system. Yet oil development in the Arctic is a time consuming and expensive process. Even if ANWR development were to begin today, it would be more than a decade before significant amounts of oil would be produced. Congress needs to approve development of ANWR now to avoid a massive shortfall when Prudhoe runs dry.

2) Eliminate blanket application of "severely restrictive" land-use designations on large tracts of land.

More than 342 million acres in four states inspected by the Bureau of Mines fall into "highly restrictive" land-use categories, meaning that land so classified is closed to exploration for mineral or energy resources for all practical purposes. The enormous amount of land identified as highly restrictive suggests that these categories are being applied without discrimination. This area is roughly one-sixth the total U.S. land mass. An additional 59.5 million acres of Alaskan land are also restricted. As much as 90 million acres of Alaska's land remains unexplored. Since these areas hold the greatest potential for new energy and mineral discoveries, it is all the more important that it be accessible to mineral exploration.

At a minimum, no parcel should be closed to exploration before its economic value has been assessed. Areas already closed, moreover, should be reopened to determine whether they contain important energy or mineral deposits. Many such areas are believed to have high potential value.

Thanks to new technologies, much exploration can take place with virtually no damage to the environment. For example, seismic work no longer requires the use of explosives to produce the sound waves that help geologists map subsurface strata. Advanced radars and infrared photography can be used to help pinpoint promising candidates for mineral or energy exploration, thereby reducing greatly the size of areas that must be explored by seismic and geophysical crews. And with modern reclamation techniques, mined areas can be returned to virtually pristine conditions.

Using the Interior Department's review of areas with high potential for mineral discovery as a guide, many areas that are currently closed to exploration and development of natural resources, but are believed to have high potential, should be opened to judicious development —

with the requirement that they be reclaimed after mining or oil and gas operations are concluded. In this way, the environment can be preserved while the nation's resource security is assured.

Improving the Tax Structure for Oil Companies

1) Restore the 27.5 percent depletion allowance for oil and gas exploratory and development wells.

Increasing oil and gas development will require that the firms searching for new oil be able to recover their investment quickly. This traditionally was accomplished in part through the use of the depletion allowance, the equivalent of the tax depreciation write-offs available to manufacturing firms for their capital expenditures. The elimination in 1969 of the depletion allowance for all but the smallest firms essentially eliminated this mechanism for capital recovery and thereby sharply reduced the ability of drillers to attract investors. Even for small firms, the value of percentage depletion was sharply reduced by the application of the so-called " minimum tax" on oil income. This meant that revenues from a well that normally would not have been subject to federal income taxes, thanks to the depletion deduction, became subject to a flat rate tax.

The elimination of percentage depletion was particularly damaging to oil companies, as their principal asset is the oil in the ground. This is consumed as it is recovered. Denying oil companies the right to deplete (in effect depreciate) this asset for tax purposes is the equivalent of not permitting a manufacturing firm to depreciate its plant and equipment. The result is that it takes longer to recover capital and this, in turn, makes investments in oil and gas much less attractive.

A 1987 study by the Department of Energy concluded that Treasury revenues would fall $680 million annually by restoring fully the depletion allowance. This estimate, however, does not take into account the fact that new employment stimulated by drilling companies would generate significant new payments of federal income taxes, thereby at least partially offsetting the Treasury loss on taxes collected under the "minimum tax" on the income of oil drillers. If just the minimum tax is taken into account, then the actual reduction in Treasury revenues would be only $227 million. By contrast, the naval expenditures in excess of budgeted amounts required by the reflagging of tankers in the

Persian Gulf cost the Defense Department $20 million per month in most of 1988. Seen in this context, the cost to the Treasury of a restored depletion allowance seems a modest revenue loss.

Moreover, the restoration of the full depletion allowance would result in increased domestic production of at least 280,000 b/d, according to the Department of Energy. If the minimum tax is repealed as well, domestic production could rise by as much as 840,000 b/d, largely eliminating the need for reliance on the Persian Gulf exporters.

2) Repeal the minimum tax on intangible drilling costs.

Intangible drilling costs are normal costs of doing business in the oil fields. They include such items as the cost of building a road to an oil drilling site or the " drilling mud" used to lubricate a wellshaft as it is being drilled. Because of an arcane theory of taxation employed by the Internal Revenue Service, the federal government has made these costs subject to the minimum tax. As with the elimination of the depletion allowance, this tax provision unfairly penalizes oil development as it denies legitimate costs that are equivalent to those routinely deducted by other businesses. This results in a reduction of capital available for investment in oil and gas exploration. It should be repealed.

3) Permit expensing of geologic and geophysical expenses.

In the oil and gas industry, investments made in geological and geophysical work are the equivalent of research and development expenses in other industries. Yet, whereas other industries are able to treat research and development outlays as current expenses, fully deductible in the tax year in which they are incurred, oil firms are required to treat geologic and geophysical outlays as capital expenditures and spread depreciation of them over several years. This reduces the amount of money immediately recoverable for drilling operations and thereby further erodes the capital position of the industry.

4) Repeal the special taxes on petroleum products and crude oil such as the Superfund tax.

The Superfund tax resulted from yet another myth widely accepted in Congress concerning oil industry revenues. The oil industry is not, in general, responsible for the abandoned hazardous waste sites that Superfund was created to clean. Yet the oil and gas industries were singled out for a special tax to cover the costs of Superfund. This ignored both the facts and the "polluter pays" principle that is central to sound environmental policy. The Superfund tax, too, siphons off money that should be available for exploration, and it should be repealed.

Administrative Actions

1) Encourage the use of alternative fuels by revising environmental regulations.

Current environmental regulations hinder substituting such other domestically produced fuels as natural gas as a means of meeting federal air quality standards. The rules set different levels of permissible emissions associated with different types of fossil fuels. For instance, firms using coal are permitted several times the emission levels allowed for natural gas. The problem is that, while new technologies have evolved to permit mixtures of fuels to be used to reduce emissions without costly emission control devices, the regulations do not take account of these breakthroughs. Thus, a plant burning a mixture of coal and natural gas may be able to reduce its emission levels by as much as half without using much of the pollution control equipment it would need if it burned coal alone. Yet the rules are so rigid the plant would still have to employ the pollution control equipment needed for coal as its only fuel. This eliminates the financial incentive to convert to a fuel mixture, while allowing plant emissions at a level higher than would be the case were the regulations more flexible. Similarly, inconsistencies occur in the rules governing the use of oxygenated fuels, such as alcohol and methanol, and the use of compressed natural gas to power buses in urban areas as a means of reducing automobile pollution. This discourages motorists from using substitutes for gasoline, such as methanol, which is produced domestically. The Environmental Protection Agency, at the same time, is considering the imposition of harsh penalties on states not in compliance with Clean Air Act standards because of automobile and bus emissions.

Yet, the emissions could be brought into compliance if the regulations made allowance for oxygenated fuels and compressed natural gas as supplements to gasoline. Therefore, EPA should seek legislation to revise its emission standards to permit the use of new fuels to meet air quality standards.

2) Create a military petroleum reserve of refined products.

In time of war, military requirements for refined petroleum products, especially for jet fuel, would increase consumption sharply. Since the rise in demand is likely to occur suddenly, adding crude oil to the Strategic Petroleum Reserve would do little to address the most pressing problem: providing fuel for aircraft, tanks, and other military vehicles while maintaining supplies for the nation's industrial base.

During World War II, military fuel requirements were met simply by diverting civilian supplies to military use. Today that would be far more difficult. America's labor force is now far more reliant on the automobile as a means of transportation. Thus civilian stores of motor fuels could not be diverted without serious impact on the country's industrial capacity. The problem would be complicated, moreover, by the fact that there is little refining-capacity "surge" possible to produce additional fuel in the early stages of a conflict.

This combination of low refining capacity, relatively inelastic civilian requirements, and the likelihood that military needs would rise rapidly points to the need for a separate military fuel stockpile consisting of already refined products. One problem with such a stockpile is that refined products, in contrast to crude oil, cannot be kept for long periods because they break down after a few months. Thus the stockpile would have to be designed to permit rotation of the fuel. This might be accomplished by providing incentives to civilian users of jet fuel and other essential refined products to store the needed extra supplies along with their normal inventories.

3) Maintain the Strategic Petroleum Reserve.

The Strategic Petroleum Reserve (SPR), was designed for civilian use during an oil supply disruption of relatively short duration. Intended to provide a 90-day supply in the event of a disruption, the SPR held 554.64 million barrels of crude on October 7, 1988, enough oil to offset a total loss of imports for 80 days. A total loss of imports, including supplies from such secure sources as Canada, however, is relatively remote. A more likely situation would be a loss of supplies from just the Persian Gulf. In this case, the SPR currently would provide sufficient crude oil to offset a disruption of 504 days. Therefore, it is more than adequate to serve its intended short-term purpose.

The principal benefit of the SPR is as a stabilizing factor in oil market psychology. The oil market is particularly prone to price fluctuations based on perceptions rather than facts. The SPR helps reduce anxiety over the potential consequences of a supply disruption. As such, it helps to reduce the chances of panic-driven price increases that might accompany a political crisis.

The SPR, of course, can only minimize the consequences of a supply disruption. Over the long term, the only way to assure the nation's energy security is to develop secure sources of new supplies.

4) Revive the nuclear industry.

The U.S. civilian nuclear power industry is near collapse. A cumbersome and litigious regulatory process – the result of public hysteria fanned by anti-nuclear activists – has increased the time required for licensing a nuclear power plant to about fifteen years. Even this has failed to assuage public concerns over the safety of nuclear power plants. As a result, there has not been an order for a new domestic nuclear plant in a decade, while many which were on order have been cancelled. The decision by the State of New York in the spring of 1988 to purchase the completed Shoreham nuclear power plant from the Long Island Lighting Company, and then dismantle it rather than permit it to start operation, illustrates how contentious the licensing process has become. The irrationality of the current environmental opposition to nuclear power is underscored by the fact that, in denying the U.S. access to the atom, the environmentalists are blocking an energy source that could help reduce the carbon dioxide emissions environmentalists believe are damaging the ozone layer, causing the so-called "Greenhouse Effect." Thus, unlike other leading industrialized countries, such as France, the U.S. effectively has denied itself this important alternative form of energy. And although there are several proposals before Congress to streamline the regulatory process, public concern still makes further growth of nuclear power unlikely without some technical advance to restore public faith in nuclear power.

One promising approach is a new generation of nuclear reactors, the Modular High-Temperature Gas Cooled Reactor (MHTGR). The MHTGR utilizes an inert gas to cool its nuclear fuel, instead of the water used in conventional nuclear power plants. In addition, its fuel is encased in a ceramic shell that can withstand extremely high temperature. Also, it is built in small modules, each being about one-eighth the size of a conventional nuclear plant. Streamlined licensing procedures should be developed for this new technology. Because of its unique design features, this new type of reactor is not subject to the kind of accident that occurred at Three Mile Island and Chernobyl. In the circumstances that gave rise to the two worst nuclear accidents in the industry's history, an MHTGR merely would shut down automatically. For this reason, it is termed "inherently safe."

Widespread use of such an inherently safe reactor design might help to restore public acceptance of nuclear power. In addition, because it does not require the expensive safety equipment used by conventional plants to ensure they maintain necessary levels of water to cool their core, an MHTGR is significantly less costly per installed kilowatt than conventional nuclear units. Moreover, because they come in small modules, utilities can choose to build new capacity incrementally, using the MHTGR design, at a cost roughly competitive with coal.

5) Renegotiate the 1988 energy agreement with Canada.

The most recent example of an attempt to increase the availability of secure sources of supply from beyond U.S. borders is the recent free trade agreement with Canada. This includes provisions affecting energy and minerals. While the agreement has been applauded as a major step toward U.S. energy security, there are several serious deficiencies in the new accord. First, it does not resolve the problem of barriers to U.S. firms that wish to invest in developing Canadian energy and mineral resources. Second, while it would permit the flow of heavily subsidized Canadian natural gas into the midwest market, thereby helping consumers in the short run, it would discourage investment in U.S. natural gas sources. Moreover, should Canadian subsidies be removed in the future, perhaps in response to the strong demand for gas from the U.S., the price to U.S. consumers could rise sharply, offsetting any near-term price relief. Third, since the Canadian natural gas is subsidized, U.S. producers will have difficulty in competing, and it may therefore result in a reduction in U.S. production. The issue of Canada's use of subsidies is not limited to natural gas. Canada has recently reached an agreement with Norsk Hydro for the construction of a large magnesium smelter that will benefit from heavily subsidized electric power. Press announcements concerning the accord state that the new plant is aimed at capturing the U.S. market. Unsubsidized U.S. producers cannot compete with the subsidized Canadian product, and have stated they might have to close their domestic operations, leaving the U.S. totally dependent on imports for magnesium.

Although the accord is a first step toward energy security for the whole of North America, it needs considerable improvement. A key element of that renegotiation should aim at the elimination of subsidies to producers so that both trading partners will operate in a true free market environment. Renegotiation of the pact thus should be a priority for the U.S. government.

Chapter Four

The Growing Nonfuel Minerals Crisis

While energy security concerns dominate the discussion of minerals policy, government policies also jeopardize U.S. supplies of nonfuel minerals. U.S. vulnerability in this regard is not as immediately apparent as in the case of energy, but the potential damage to the national economy is just as serious.

FINDING ENOUGH RAW MATERIALS

One reason for most Americans' lack of concern is the general perception that the U.S. has an abundance of raw materials. Indeed, throughout its early history, the U.S. was a commodity exporter, and America's vast production of a wide variety of commodities ranging from foodstuffs to oil was critical in winning two world wars. Yet as the economy has grown and industrial processes have become more complex, the need for certain minerals has intensified. In many cases, these minerals must be imported, because they are not available at all domestically, or exist only in such low concentrations that they cannot be produced profitably.

While the U.S. now imports a wide range of minerals, by no means all of these imports pose a resource vulnerability. For example, there has been a significant rise in coal imports from Colombia over the past several years by electric utilities in the southern U.S. The reason for this is that sea transportation costs from Colombia are much lower than those to move domestic coal by rail. If there were a sudden interruption of Colombian supplies, it would be relatively easy to substitute supplies from domestic mines, albeit at a slightly higher price.

Even where a particular material cannot be produced within the U.S., a severe vulnerability may not exist if there are secure sources of supply, or if there are ready substitutes – though supplies from even friendly neighboring countries can be cut off, as in the Canadian nickel strike. Table 6 indicates the sources of several key minerals for which the U.S. depends significantly on imports.

Table 6
1987 U.S. Net Import Reliance on Select Nonfuel Minerals

Mineral	Import Dependence (percent)	Sources
Arsenic	100	Sweden, Canada, Mexico
Columbium	100	Brazil, Canada, Nigeria, Thailand
Graphite	100	Mexico, China, Brazil, Madagascar
Mica (Sheet)	100	South Africa, France, Gabon, Brazil
Strontium	100	Mexico, China, Spain
Yttrium	100	Australia
Gem Stones	99	Belgium-Luxembourg, Israel, India, South Africa
Bauxite and Alumina	97	Australia, Guinea, Surinam, Jamaica
Tantalum	92	Thailand, Brazil, Australia, Canada
Diamond (Industrial)	89	South Africa, Britain, Ireland, Belgium Luxembourg

Fluorspar	88	Mexico, South Africa, Spain, Italy, China
Platinum Group Metals	88	South Africa, USSR, Britain
Cobalt	86	Zaire, Zambia, Canada, Norway
Tungsten	80	China, Canada, Bolivia, Portugal
Chromium	75	South Africa, Zimbabwe, Turkey, Yugoslavia
Nickel	74	Canada, Australia, Norway, Botswana
Tin	73	Brazil, Thailand, Indonesia, Bolivia
Potash	72	Canada, Israel, USSR, East Germany

Source: U.S. Department of the Interior, Bureau of Mines, 1988.

While each of the 19 minerals listed in Table 6 is important to U.S. economic or defense needs, in seven of the cases a major supplier is Canada, America's most secure and reliable source. In four other cases, Mexico is a major source of the commodity. Mexico, of course, is by no means as politically stable as Canada, but it would be difficult for a hostile power to interrupt supplies. The suppliers of several other commodities are more distant, such as Australia, but they still are friendly, stable nations. In other instances, the U.S. imports large quantities of a material, such as silver and cobalt, where domestic production is possible but would cost far more than importing it. Still, in times of conflict, this internal productive capacity could be used to offset any import losses.

Certain minerals are absolutely essential to the nation's defense. For example, a Pratt and Whitney F-100 Turbofan engine, used in both the F-15 and F-16 fighter aircraft, requires the following key minerals:

Table 7a

Mineral	**Amount Needed (per engine in pounds)**
Titanium	5,479
Nickel	4,597
Chromium	1,573
Cobalt	888
Aluminum	715
Columbium	163
Tantalum	3

Each M-1 Tank contains:

Table 7b

Mineral	**Amount Needed (in pounds)**
Chromium	343
Columbium	25
Cobalt	21
Titanium	3

Source: Evan Anderson, "The Strategic Minerals Program: U.S. Vulnerability and Government Policy," National Critical Materials Advisory Committee, U.S. Department of the Interior, 1986.

Many of these and other minerals critical for U.S. defense must be obtained abroad. Where there is a secure source of supply, this may not pose a serious problem, although only domestic supplies are absolutely secure. However, there is increasing concern among military analysts at the recent growth of U.S. dependence for a number of key commodities on perhaps the most insecure source of supply of all: the Soviet Union and its East bloc allies.

Since late 1986, the Commerce Department has been monitoring imports of strategic and critical materials from communist nations. Its findings are particularly bothersome concerning this U.S. reliance on the Soviet Union and its close allies. In 1987, for example, the U.S. obtained from the East bloc 18.7 percent of U.S. platinum group metals needs, 13.4 percent of chrome needs, and 13.0 percent of silicomanganese (a key mineral in aluminum and steel production) needs. These figures represent not only a significant proportion of U.S. requirements, but also a large increase from previous import levels. In the case of platinum group metals, imports from the East bloc were 43 percent above the average for the four previous years. For chrome the increase was 28.8 percent, and for silicomanganese it was a 100 percent increase.

Worse still, many of the commodities for which import levels from communist nations are growing have important defense or economic applications. Among them:

Chromium: Essential for many aerospace applications, including the manufacture of stainless steel and superalloys. Chromium also is needed for power plant construction and the fabrication of corrosion-resistant materials for the transportation industry.

Manganese: Used in producing high-quality steel alloys. It is essential for cast iron production.

Platinum Group Metals: Used in a wide range of catalytic processes, including oil refining and the manufacture of catalytic converters for automobiles. They are needed to produce fertilizers, explosives, and electrical equipment.

Vanadium: Another in the family of alloying materials needed for specialty steels. It is also widely used as a catalyst.

Cobalt: Necessary for aircraft engines, the fabrication of superalloys, and the manufacture of cemented carbides used in tools, mining, and drilling equipment.

Antimony: Essential to the manufacture of munitions, including tracer rounds, and for the production of the cathode ray screens used as monitors for sonars and radars.

In most instances, U.S. reliance on supplies is a function of the world distribution of available supplies, as Table 8 indicates.

The platinum group metals, together with chromium and manganese, represent the most serious U.S. dependence on supplies from the USSR. In many instances the chief alternative to East bloc supplies is South Africa, which may become politically unstable and with which the U.S. has troubled relations. Indeed, South African officials recently threatened to cut off shipments of critical minerals to the U.S. in response to U.S. sanctions on American activity in South Africa. Not only does South Africa hold a large share of the world's reserves of certain key minerals, but it also has a huge proportion of the production

Table 8
World Reserve Base for Select Nonfuel Minerals, 1987

Mineral	Percentage of World Reserves in each country
PLATINUM	
South Africa	89.4
USSR	9.4
U.S.	0.8
Canada	0.4
CHROMIUM	
South Africa	83.5
Zimbabwe	11.0
USSR	1.9
Other	2.5
MANGANESE	
South Africa	68.7
USSR	20.2
Australia	3.9
Gabon	3.6
Other	3.7
COBALT	
Zaire & Zambia	31.5
Cuba	21.7
New Caledonia	10.3
U.S.	10.3
USSR	2.7
Other	23.5
VANADIUM	
USSR	24.6
U.S.	13.1
China	9.9
Other	5.3

Source: Department of the Interior, Bureau of Mines, 1988.

capacity. The U.S., the European Economic Community (EEC), and Japan are significantly dependent on South African production for many of these commodities (see table 9).

Table 9
Western Dependence on South Africa for Selected Nonfuel Minerals

Mineral	Percentage of Total U.S. Imports from South Africa 1982-1985	Overall Import Dependence		
		U.S.	EEC	Japan
Platinum	44	98	100	95
Chromium	48	82	92	99
Manganese	30	100	99	95
Cobalt	52*	92	100	100
Vanadium	31	40	100	70

*Percent of U.S. imports that is transported through the Republic of South Africa.

Source: U.S. Bureau of Mines, 1987.

PUBLIC LANDS: OFF LIMITS

As in the case of energy supplies, heavy U.S. dependence on nonfuel mineral imports is caused in part by restrictions on access to 740 million acres of U.S. public lands. There may well be large deposits of many strategic minerals available domestically. But restrictions on exploration keep such deposits hidden and unknown. The emphasis on environmental protection that ignores strategic considerations has placed vast tracts of public lands under restrictions that prohibit virtually any form of commercial activity, including even preliminary geological and geophysical work to determine if mineral deposits exist for use in an emergency.

Most Americans maintain that environmental concerns should play an important role in determining access for exploration. But in practice, the effect of federal environmental policy has been to place virtually all public lands off limits. And analysts believe that the public lands hold significant quantities of cadmium, chromium, cobalt, gold, graphite, gypsum, manganese, mercury, molybdenum, nickel, titanium, tungsten, and vanadium, while the U.S. currently depends on foreign suppliers, often potentially hostile countries, for many of these minerals.

Recognizing that limited access to the public domain was potentially a serious threat, in light of America's increasing vulnerability to imports of critical minerals and energy, the Reagan Administration called for a review of public lands in the President's 1982 *Mineral Program Plan and Report to Congress*. The purpose of the review was to determine the extent to which lands had been foreclosed to exploration for mineral and energy resources. This review was of particular importance because most of the promising areas for new domestic discoveries of energy and mineral resources were found to be within lands that are part of the public domain.

In conducting the study, the Department of the Interior was building on earlier research conducted by the House Committee on Interior and Insular Affairs in 1977. That report, issued by the Task Force on the "Availability of Federally Owned Mineral Lands" indicated that as much as half of the public domain was subject to extremely severe restrictions on access for mineral use.[7] The Task Force found that 42 percent of federal lands were completely closed to hard rock mining, that 16 percent were under other severe restrictions, and that at least 10 percent were under moderate restrictions.

Stated the Task Force report:

> It can only be assumed that lands now closed or restricted have increased by 10-15 percent. In addition, it is impossible to predict the total acreage that will be severely restricted or effectively withdrawn under the National Wilderness Preservation System... and under the BLM's new Areas of Critical Environmental Concern, and under other restrictions,

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7 "Report of the Task Force on the Availability of Federal Lands," U.S. House of Representatives, Committee on Interior and Insular Affairs, 1980.

withdrawals and classifications and designations yet to be developed.[8]

There would be little cause for concern about these withdrawals if they involved lands that had little or no potential for new mineral or energy discoveries. This, however, was unknown, since there had been little systematic assessment of the potential of restricted areas. It was for this reason that the Reagan Administration initiated its study of federal lands in eleven western states to determine the mineral potential of these restricted areas.

Under the auspices of the Interior Department's Bureau of Mines, a comprehensive review has been undertaken of the land-use restrictions and mineral potential of federal lands in eleven western states. Although incomplete to date, the review already has yielded important information about the status of areas of high mineral potential within the public domain.

So far, the Interior Department has concluded reviews of lands in Washington State and Colorado and has partial data on Arizona, Oregon, and four out of six regions of Alaska. The report divides the degree of restriction on access for mineral exploration and development into three categories, "minimal," "severe," and "extremely severe." Over 30 percent of the federal land in Oregon, Washington State, and Colorado, comprising 342 million acres, is classified as "severely restricted," meaning that for all practical purposes, energy and mineral exploration or development is forbidden. In Alaska, 80 percent of the land studied, or 137.6 million acres, is similarly classified.

When the areas under severe restrictions are compared with those believed to hold great potential for new mineral discoveries, the effect of the restrictions becomes apparent. In Arizona, Colorado, and Oregon, for example, more than 2.3 million acres of the most promising areas are closed to exploration. Restrictions on exploration in these states, however, pale compared to the federal regulations in Alaska. There, 90 percent of the land believed to have some mineral potential falls under severe federal land-use restrictions, effectively closing it even to exploration, let alone development.

8 *Ibid.*

MAINTAINING STRATEGIC STOCKPILES

Given the critical importance of many minerals for U.S. defense capability and economic needs, and the heavy dependence on unstable or hostile nations for supplies, the U.S. maintains stockpiles of certain minerals. Understandably, there has been debate about the appropriate levels of these stockpiles. Unlike the decisions concerning which materials should be stored, the issue of how much to store is more difficult to resolve. It is always possible to argue for ever larger stockpiles. At some point, however, stockpile acquisitions begin to distort commodity markets and create a needless drain on tax dollars. Therefore a balance must be achieved between the need to assure adequate supplies of strategic materials in times of conflict and such needs as fiscal responsibility.

In 1979, Congress determined that stockpiles should contain three years' supply of strategic minerals. The Strategic Materials and Stockpiling Act (PL 96-41) of that year requires the federal government to maintain stockpiles at this level. Under the stockpile policy, the government purchases on the open market quantities of minerals or materials designated to be stockpiled. As a rule, these commodities are not produced in the U.S., or U.S. production capabilities for them are insufficient to meet potential wartime needs.

The 1979 law also restricts the use of the stockpiles to meeting national materials needs in time of war. The reason for this limitation was that throughout the 1960s every review of stockpile goals and objectives led to a reduction in levels. Concerned that the reductions were excessive and could leave the nation vulnerable to extreme shortages in the event of conflict, Congress felt compelled to ensure that at least minimum levels of key commodities were stored and that they would be used solely for defense.

These stockpiles represent the most effective means of assuring adequate supplies of key commodities in the event of conflict. They avoid the need for an extremely costly expansion of domestic production capacity where there are domestic supplies. Also they avoid the byproduct of crash production programs during a crisis — huge production surpluses that distort commodity markets once the crisis ends.

The Reagan Administration's attitude toward minerals stockpiles has been inconsistent with its overall defense policy. While the White House has been vigilant in strengthening defenses, in 1985 it recommended a 95 percent reduction in the stockpile levels legislated in 1979. The proposal was based on a National Security Council study, which maintained that stockpiles of such minerals as manganese, platinum, and cobalt could be reduced drastically or eliminated. The NSC study maintained that stockpiles should only insure adequate supplies for partial mobilization. It also assumed that U.S. allies would be able to maintain adequate supplies for U.S. defense needs. Administration officials added that sales from federal stockpiles would ease the budget deficit.

This proposal, and the assumptions behind it, have come under heavy attack, forcing the Administration to put its plan on hold. That is where it should remain. It ignores long-term U.S. strategic interests.

Some Reagan Administration officials argue that large stockpiles of strategic minerals are unnecessary because market forces will quickly respond to any interruption in foreign supplies. They argue that markets provide the best response to sudden changes in oil supplies; the same holds true for all the nonfuel minerals. These arguments ignore the facts. The U.S. has huge available supplies of energy; and alternatives to oil, such as coal, could be used for many purposes where oil is currently a more economic fuel. But many key strategic minerals do not have interchangeable uses, nor does the U.S. have significant resources of some materials which are vital for defense, such as chromium, platinum, and titanium metal.

Much wiser than its 1985 proposal is the Reagan Administration's Executive Order 12626 of February 25, 1988, transferring responsibility for the strategic stockpiles to the Department of Defense. Previously, the stockpiles were managed by the Federal Emergency Management Administration (FEMA). As the ultimate consumer of the stockpiles, the Pentagon is the best candidate to manage them until needed. This move establishes firmly the link between the stockpiles and national defense. It also helps to reduce the tendency to view stored commodities as a potential source of revenues to help balance the budget, or as a mechanism through which domestic mineral producers could be subsidized or world commodity markets manipulated. In short, the focus will be where it belongs: on the stockpiles as an element of national defense preparedness.

INSURING CRITICAL MINERAL SECURITY

As in the case of energy policy, the formulation of U.S. mineral policies often are developed without consideration for their broader economic implications. Although some Reagan Administration officials have tried to approach mineral policy within a broader economic context, they are a minority in policy making circles. As a consequence, natural resource policies have in recent years been characterized by contradictory and counterproductive mandates. This has made it virtually impossible to conduct either development or conservation policies in a rational, efficient fashion. Thus if the U.S. is to enjoy a secure supply of strategic minerals, policies must be formed with full appreciation of broad economic considerations.

Within this context, there are a number of specific actions that should be taken to help eliminate existing government-imposed barriers to the efficient functioning of resource markets. Among these:

1) Reform federal land-use policies.

Perhaps the single most important action that the federal government could take to reduce U.S. dependence on insecure imports of minerals would be to reform the process by which access is granted to federal lands for mineral and energy exploration. The most promising areas for future discoveries of nonfuel minerals, as well as oil and gas, lie largely within the boundaries of federally owned lands. At present, vast areas of these lands have been closed to exploration and development because of restrictive land-use policies. These policies pay no regard to the potential strategic importance of the minerals that might be found.

As in the case of oil, development of minerals can be conducted today in a manner that minimizes environmental damage. Further, the amount of land that would be affected in developing mineral resources would be minuscule in comparison with the 740 million acres that comprise U.S. public lands. Environmental concerns could be addressed through a requirement that mining sites must be restored to their original condition after the mineral deposit is exhausted and operations discontinued.

2) Modernize the strategic minerals stockpiles

A Pentagon program should upgrade and modernize the nation's strategic stockpiles of minerals. Currently, they contain many commodities which are either in surplus or in the wrong form to be of use in the event of conflict. Example: large amounts of bauxite are stored, even though the nation no longer has sufficient processing capacity to upgrade this bauxite quickly into aluminum. These should be sold, and the revenue used to purchase more important minerals. The stockpiles should be reviewed annually and sales or acquisitions made, according to changes in the market and in America's need for particular minerals.

3) Restore the investment tax credit for mining and mineral processing equipment.

The repeal of the investment tax credit, in 1986, had the unintended effect of reducing the ability of domestic mineral producers and processors to upgrade their facilities to maintain a competitive position in the world market. This has increased dependence on foreign supplies. Restoring the credit would help hard-pressed firms attract the capital needed to improve their plant and equipment.

4) Permit unlimited "carry forwards" for losses suffered by domestic mineral producers.

The mineral industry is highly cyclical. Long periods of depressed prices often occur, followed by sudden rapid price escalations when the demand cycle surges. Given the long lead time needed in mining operations and the capital-intensive nature of mining, U.S. firms are at a competitive disadvantage in the world market if losses incurred in times of depressed prices cannot be used, for tax purposes, to offset profits in times of firm prices. U.S. firms are further disadvantaged because they often compete with foreign companies, which are government-owned and less concerned with profitability than with earning hard currency or maintaining employment levels. Permitting U.S. firms an unlimited carry-forward on losses for tax purposes would improve their cash flow, increasing the commercial attractiveness of domestic mineral production.

5) Eliminate royalties for marginal production.

Low world prices on commodity markets can result in the premature abandonment of a U.S. mineral deposit, because it becomes unprofitable to continue operations. This leads to greater reliance on foreign sources. Given the security threat of such dependence, steps should be taken to make marginal mines or wells more economic. One way to do this would be to reduce or eliminate federal royalties when collecting these fees would result in the cessation of production. Royalty payments to the federal government can sometimes make the difference between continued production and abandonment of the property. Forgiving royalty payments on marginal mineral and energy properties could extend their productive life and reduce dependency on foreign sources for strategic minerals and energy.

6) Defer bonus payments in frontier areas.

High prices for federal energy and mineral leases for so-called frontier areas (harsh or expensive regions such as the Arctic or deep waters offshore) place an enormous economic burden on firms seeking to develop these resources. This is especially true of the requirement to pay "bonuses" (that is, large cash payments made in addition to royalties for the mineral rights on a parcel of land at the time a lease is granted). Since these are paid at a time when the firms are receiving no income from the property, they discourage companies from seeking leases. In some cases, development in those areas can take a decade or more. By deferring payment of bonuses until such time as a lease is producing revenues, firms would have substantially more capital available for exploration.

7) Relax antitrust restrictions on joint ventures.

The best prospects for new mineral and energy discoveries lie offshore and in frontier areas such as Alaska. The process of finding, developing, and producing these commodities in such frontier areas is extremely expensive, and the risks involved are far greater than those in less hostile regions. In many cases, firms are unwilling to commit the amount of capital required to search for minerals in such regions on their own but would be willing to do so in concert with other firms, so that the risk would be spread among several companies. But U.S. antitrust laws can make such joint ventures difficult, if not impossible. A relaxation of the antitrust statutes would foster the creation of joint ventures for mineral and energy projects in frontier areas, thereby increasing supplies.

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CRITICAL ISSUES

Securing America's Energy and Mineral Needs

History teaches that secure supplies of strategic materials can make the difference between victory and defeat, as the Allies found out in both World Wars. Despite America's abundant resource endowment, however, the U.S. has been importing some 40 percent of its oil from such Third World and Soviet bloc nations as Saudi Arabia, Iraq, and Angola, and scarce minerals such as platinum, rhodium, and palladium, needed for a wide variety of military and industrial applications, from the Soviet Union and South Africa. Should the flow of these strategic substances be disrupted, the U.S. would be left in a dangerous and vulnerable position, according to Heritage Foundation Visiting Fellow Milton R. Copulos.

To prevent vulnerability to unstable and hostile suppliers, says Copulos, the U.S. should follow a two-pronged strategy. First, government-imposed restrictions on energy and mineral exploration on federal lands should be relaxed. This will open a number of very promising sites to development. Modern techniques permit this with minimal environmental damage. Tax and antitrust obstacles to exploration and development, moreover, should be removed.

Second, the Pentagon should modernize its strategic mineral stockpiles. These currently contain minerals that either are in surplus or are in the wrong form for use in a conflict. The stockpiles should be reviewed annually and acquisitions or sales made according to changes in the market and America's need for particular minerals.

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