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U.S. MINERALS VULNERABILITY: NATIONAL POLICY IMPLICATIONS

A REPORT

PREPARED BY

THE SUBCOMMITTEE ON MINES AND MINING

OF THE

COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS

OF THE

U.S. HOUSE OF REPRESENTATIVES

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LETTERS OF TRANSMITTAL

September 10, 1980

Members of the Committee on Interior
and Insular Affairs
U.S. House of Representatives
Washington, D.C. 20515

Dear Colleagues:

"U.S. Minerals Vulnerability: National Policy Implications," a report prepared by the Subcommittee on Mines and Mining, is transmitted herewith. The report is based upon two years of hearings and analysis, resulting in a critical appraisal of major nonfuel minerals policy issues confronting our nation today.

There is an emerging awareness in this nation that oil is not the only mineral in short supply. Access to nonfuel minerals cannot be left to chance in view of the critical role these resources play in our defense, economy, and everyday lives. Our foreign policies must incorporate the realities of our import dependence problem. Against the benefits of developing the natural resources we possess within our own lands must be weighed the costs of environmental, health and safety regulations, Federal land management policies, and balance of payments deficits. Only by the adoption of a national nonfuel minerals policy can a system of planning and coordination be developed that will assure a resolution of these sometimes conflicting demands.

The subcommittee report does not hesitate to take a stand on the issues. Its conclusions are direct, and they stand in strong contrast to the equivocation of the Nonfuel Minerals Policy Review of the Administration. The subcommittee report finds that the Federal government, rather than undertaking the responsibility of assuring adequate mineral resources, has exerted an adverse influence on domestic mineral development.

As this Committee continues to act upon policies relating to the resources of the nation, this report will provide a challenging reference point.

Sincerely,

MORRIS K. UDALL
Chairman

September 8, 1980

Honorable Morris K. Udall, Chairman
Committee on Interior and Insular Affairs
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

I am transmitting the report of the Subcommittee on Mines and Mining presenting our conclusions on the need for a national nonfuel minerals policy. As I am sure you will agree, the conclusions in our report stand in stark contrast to those of the Administration's Nonfuel Minerals Policy Review.

The Subcommittee's report portrays a sense of urgency in the need for Federal departments and agencies to recognize and act upon mineral problems before crisis situations develop. Our domestic industry is continually eroding, in large part due to governmental impediments to profitable operations. Tax policies, environmental regulations, and withdrawals of Federal lands have marked the demise of a viable American mining industry. If this trend continues, this Nation will be forced into compromising positions by foreign governments who control the flow of minerals to our borders.

The Subcommittee report deals with crucial issues objectively and clearly states its conclusions. I am confident that the report will be a valuable guide to Committee Members on critical mineral ~~issues~~.

Thank you for your continued attention to this country's need for a nonfuel minerals policy.

Sincerely,

JAMES D. SANTINI, Chairman
Subcommittee on Mines and Mining

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PREFACE

Throughout the 96th Congress, the Mines and Mining Subcommittee conducted a lengthy and detailed inquiry regarding the availability of minerals essential for maintaining the Nation's economy and security in a way its citizens have a right to expect.

During the course of that inquiry, attention was focused upon the many problems that have limited and will increasingly limit the domestic availability of minerals. The problems are many and diverse, but they funnel down to one very obvious conclusion, the United States is promoting its dependence upon foreign sources at the very time the security of many of those sources are becoming less certain. Actions and decisions of government, while seemingly unrelated to minerals adequacy, are subtly moving this Nation in a direction where the Federal Government has an overriding ability to determine when, where, and if we will mine our own minerals.

A starting point for any study of problems that affect America's ability to produce its minerals is an appreciation of their indispensable role in our society. There is not an aspect of America's large and diverse economy that is not dependent upon nonfuel minerals. The technologic creativity that has set America apart from the rest of the world has been its innovative use of nonfuel minerals and energy to produce faster and better. Notwithstanding that irrefutable fact, few Americans today realize that significance—that all of what they do depends upon minerals—and that without adequate and reasonably priced supplies, the economy would grind to a halt. Few appreciate that a modern defense capability depends upon the certainty of large quantities of special metals and alloys. Although this lack of familiarity on the part of the general public of the processes necessary to make minerals available is understandable, it is not understandable on the part of responsible public officials.

Within the executive, for instance, even those agencies with statutory obligation or responsibility regarding minerals are badly understaffed, underfunded or underutilized. More important, is the lack of guidance by policy level officials who fail to understand their role in what is now happening.

Following the 1973–1974 oil embargo and the ensuing "energy crisis," the most frequently asked questions were: "Didn't anyone see this coming?" and "Why wasn't the government ready for this?" As the United States is drawn closer to similar supply constraints regarding nonfuel minerals, the federal government finds itself again lacking much more than basic information. It is lacking a commitment to act responsibly.

What is particularly distressing is the absence of a commitment in those very Departments that are charged with ensuring domestic mineral adequacy. Compounding the problem are the 30-odd agencies, which appealing to other diverse and narrow constituencies, have created a policy atmosphere that obscures the national good of a

minerals policy. There are now serious doubts if the policy mechanism within the executive possesses the capability to resolve national questions such as this.

At the same time, Congress, with the diverse interests of its Members, and operating without full knowledge of the criticality of minerals to economic well-being, has thus far failed to adopt a truly national perspective regarding a minerals policy. It is imperative that national leaders understand the significance of nonfuel minerals and direct officials of government to make a correction.

This report represents the initial step toward the development of that national perspective. It is not, therefore, a carefully refined "balance" between other national goals and nonfuel minerals goals. Rather, it is a discussion of the importance of strategic and critical minerals to the people of this country, their economy and defense, and to our international allies. It is an effort to detail the failures—and warnings—of the past while, at the same time, indicating the dangers in the future. Legislative and administrative actions are suggested.

Above all, first priority must be a commitment to the establishment of an effective national policy. Without it, all other actions will fail as surely as the piecemeal policy attempts of the past.

REPORT HIGHLIGHTS

If the United States truly expects to maintain its economic strength; to meet tomorrow's more sophisticated challenges; to improve the quality of life of its citizens, as well as that of others; and to regain the leadership expected by the free world, it must return to a clearer realization of the indispensable role that mineral raw materials, and the technology that is so intimately a part of their use, play in the economy.

A vast majority of the United States citizens do not understand the role of minerals in the human environment in which they are intimately involved. Their homes, their travel to and from work, their places of employment all depend upon nonfuel minerals.

It seems that the further American's have collectively moved from raw materials production, the more that production is taken for granted. The more visible are the products of mining in our lives, the less is our appreciation of the need of mining.

America has developed a store-shelf mentality, expecting all that we need to appear somehow in the quantity and quality necessary, at the time and place of demand. Meanwhile we are swept along by advocates of policies that not only reduce our productive capacity but increase our reliance on others.

Yet despite the hard lessons now being learned as a result of foreign energy dependence, little attention is being paid to the consequences of increasing nonfuel mineral dependence.

The Committee is well aware that the United States cannot be totally self-sufficient in all minerals, and that the inter-reliance of nations on the free movement of minerals in international trade will of necessity remain a vital component of supply. However, the United States remains a mineral-rich country. It is in the best interest and to the advantage of the United States and to its allies to encourage industry to maximize its mineral investments within the Nation's borders.

America cannot assume as it did with energy that adequate mineral supplies will somehow be there waiting for us when we need them.

Past Studies on Minerals Policy

There have been no less than 20 mineral or material policy studies that have been prepared or commissioned by one governmental agency or another, as well as others prepared for groups outside government.

Although many studies reflected some particular outlook or condition, all adopted as a universal starting point the national significance of adequate mineral supply and the importance of a strong domestic industry. All agree, to a greater or lesser extent, that foreign imports provided least-cost benefits to the consumer. At the same time, most see the pitfalls of import dependency and how such dependency forfeits freedom to make political, economic, and defense decisions.

The most obvious conclusion that can be drawn from the various reports on mineral policy is the correctness and utility of the Mining and Minerals Policy Act.

The decline of America's mineral producing capabilities and all that it portends is not the result of the Mining and Minerals Policy Act's lack of specificity, but rather a deficiency on the part of those who have failed to understand its importance. Congress too has played a role in the decline of America's mineral capabilities, because of its fragmented policy process. Congress has failed to provide oversight, has not sought to understand how other legislation negatively affects the production of minerals, and has failed to check executive initiative oriented only toward other, and often conflicting, policy goals.

Another conclusion to be drawn from the reports of the last 10 years, is that they have made no imprint on the formation of executive policy, which, out of a concern for the attainment of other national goals has given little or no priority to the Nation's minerals. Few have yet to realize that, whether in the pursuit of improvements in the quality of the environment, assistance for developing countries in attaining larger shares of the earth's resources, or achievement of no growth or a lower living standard for the United States, any group of actions that by cumulative impact weaken America's ability to produce its minerals will exact a price that the citizens of this country may well not want to pay.

The Mining and Minerals Policy Act of 1970

In the past, government's most direct role in mineral policy implementation has been in reaction to massive mineral requirements for wartime or to major unforseen changes in external supply.

What has been lacking for ten years is neither policy nor effectuating tools but rather, desire and will.

Notwithstanding the clarity of the statutory language of the Mining and Minerals Policy Act of 1970, and the fundamental purpose of its accompanying legislative history, the Department of the Interior had chosen, for a full decade, to abdicate its assigned role and responsibility. Interior has a long record of benign neglect regarding the mining and minerals industry.

In the face of an unequivocal Congressional directive to do so, the Interior Department has made no effort to develop a system for identifying, quantifying, and evaluating the impact of proposed Federal actions on the Nation's nonfuel minerals resources. The result is that minerals now stand alone as the most neglected U.S. renewable and nonrenewable resources not to mention national policies.

Perhaps no single action by the Department of the Interior illustrates its abdication of the Mining and Minerals Policy Act of 1970 as do the annual reports issued under that statutory mandate. Initially comprehensive and at least willing to acknowledge the duties and responsibilities assigned under the Act, the reports have degenerated into a perfunctory and totally unsatisfactory fulfillment of the form but not the substance of the requirements of the Act.

It is long past time for the Department to take seriously the Congressional mandates of the Mining and Minerals Policy Act of 1970.

The Department of the Interior with its preeminent concerns for other resources, has been woefully negligent in the performance of its responsibilities regarding the Nation's minerals. The Department has blatantly ignored the findings and recommendations of numerous expert studies on minerals policy stretching over the past 30 years and has abdicated its responsibilities in implementing the single existing Congressional statement of national mineral policy—the Mining and Minerals Policy Act of 1970.

The Nonfuel Minerals Policy Review

The entire effort was a tragic waste that cost American taxpayers about $3.5 million and the loss of some 13,000 person-days.

The review provided an ideal mechanism for the executive to examine the host of problems regarding this issue from the divergent viewpoints of the various domestic and foreign policies so as to determine the direction necessary in the years ahead to maintain the strong mining industry, which is critical to the economy and national defense.

The Nonfuel Minerals Policy Review was doomed from the outset because of the lack of priority given to it by the administration.

Its failure also highlights the deficiencies of the administration's domestic policy review system.

A major conclusion that can be drawn from this frustrating, unproductive exercise is that the executive policy mechanism does not possess even arguable merits for coordinating major policy questions.

Government's Decisions and Minerals Availability

Over the past decade the development of ore deposits in the United States has become increasingly dependent upon decisions of government—a government increasingly opposed to such development. In fact, in some cases, the Federal Government's opposition to mineral development has been accomplished by the open solicitation of public opinion against such development. In other instances, government's inertia and predisposition in favor of nondevelopment must be overcome by evidence which often amounts to "proof beyond a reasonable doubt." As a result, the assumption by the Federal Government of the role of final arbiter and decisionmaker has made mineral development and production difficult, time consuming, and costly, and in the end often impossible. The Nation's mineral security has thereby become dependent, not upon the free market system, but upon the political process.

It is not so much that coordination has not improved in almost 30 years or even that government's ability to complicate coordination has made the situation exceedingly worse, but rather that today there is absolutely no Federal policy-level advocate for minerals.

There must be somewhere in government a willingness and the capacity to grasp the seriousness of U.S. mineral shortfalls that certainly lie ahead if the Nation continues on its present path.

U.S. Government policy decisions regarding mineral pricing are shortsighted, contradictory, and change according to circumstances and

the government agency involved. Government's control of mineral prices during periods of inflation reflects little understanding of cyclical international markets or of the fact that such control inhibits the ability of U.S. mineral producers to recover from periods of low prices. At the same time, government antitrust policies prevent U.S. producers from jointly discussing such matters with each other or government agencies.

On the one hand the Justice Department and the Federal Trade Commission believe that prices should be established competitively in open markets, presumably without regard to the social consequences of sharply fluctuating prices. On the other hand, the State Department worries only about the effect of fluctuating prices on the economies of developing countries.

Good mineral policy should not be a policy of reaction, but rather the product of a steady commitment that recognizes the indispensability of minerals to the Nation's industrial base and its national security.

The most debilitating element of the process now unfolding is that while government planners expect industry to solve the problems, government pursues a course that make solutions increasingly difficult if not impossible to achieve.

Government can no longer stand at arm's length to the Nation's long-term mineral interests. The decision the government must make—and, of all the decisions made during the past 10 years, the one that it has refused and failed to make—is that the development of a strong and stable domestic mining and minerals industry is in the Nation's best interest.

Capital Formation Problems

U.S. Government can and should enhance the prospect of an adequate return on investment by avoiding artificial restraints on the free-market system, by undertaking economic policies that encourage capital expenditures by the mining and mineral processing industry, and by adopting a sounder priority of national goals.

For long-term survival, the mineral industry needs adequate prices and profits on the high side of the cyclical flows to offset the loss incurred on the low side. If government interferes, and by so doing deprives the industry of return on investment, the industry's ability to attract capital will be permanently impaired and its securities will remain suspect.

If the United States ever hopes to have a mining industry capable of providing the minerals essential for our economy, it is essential for government's economic policies to encourage capital investment and development in the minerals industry.

Tax Policy Problems

Federal tax laws have not kept pace with the changed circumstances confronting the mining industry. They have not accorded any meaningful recognition of the capital and operating cost burdens currently placed on that industry. Greater incentive must be provided to assist the industry not only in meeting its general capital needs for the development and expansion or productive capacity, but also in alleviat-

ing the burden imposed on the industry by mandating environmental and health and safety expenditures. Improved financial posture of the mining industry is necessary if that industry is to regain any semblance of a competitive position in world markets.

To achieve that goal, a number of actions are essential: First, that the existing, long-standing, time-proven provisions of U.S. tax laws that recognize the importance of the mining industry—percentage depletion allowances and expensing of exploration and development costs—be continued; second, that the investment tax credit, an important incentive to capital formation, be extended to include all buildings used in mining and manufacturing and be made refundable (or at least fully creditable against a company's entire tax liability); third, that realistic, flexible capital cost recovery allowances for plant and equipment investments be adopted in lieu of present depreciation allowances; fourth, that the costs of environmental and other similar government-mandated requirements be written off over any period selected by the taxpayer, including the year of expenditure, and; finally, that tax-exempt municipal bond financing be available for nonproductive pollution control abatement equipment as well as for other government-mandated expenditures.

Antitrust Enforcement Problems

In the area of antitrust enforcement one finds much the same narrow doctrinaire approach, the same tunnel vision, the same open disregard of a national minerals policy as is found in other governmental arenas.

In the past decade, capital costs of major new mining and mineral processing ventures have grown faster than the financing capabilities of many independent U.S. mining concerns. The traditional hostility of U.S. antitrust policies toward joint ventures hinders U.S. firms in pursuing one of the most worthwhile financing alternatives open to them.

The evidence strongly suggests that U.S. antitrust policy contains and reflects serious misconceptions about the nature of competition in the world market in which American mining companies must operate. Moreover, the evidence demonstrates that the antitrust agencies have been less than diligent in advancing the cause of free competition in several important respects. Unlike the United States, the European Economic Community and Japan, in their own interest, have significantly and realistically liberalized their antitrust laws.

In 1978, proceedings were commenced before the U.S. International Trade Commission before which copper and zinc producers sought temporary limits on imports. It is fair to say that, regarding both metals, U.S. producers were resorting to the only lawful mechanism available to bring the market forces to bear upon foreign producers. Yet, in both instances, the Antitrust Division of the Justice Department intervened on behalf of foreign producers. In so doing, the Antitrust Division appears to have been pursuing abstract principles of free access to markets, while ignoring the real threat to continued participation by U.S. firms in world markets which were and are increasingly dominated by State-owned or State-controlled enterprises. Ironically the ultimate result of the end sought for both copper and zinc by the Justice Department was not a foster-

ing of competition in the world market but a further concentration of production in offshore subsidized operations.

Notwithstanding the long-term impacts of such regulations there does not appear to be a single instance in which the Antitrust Division argued, in proceedings of these agencies, for a more balanced regulatory approach so as to increase domestic supply in order to preserve competition.

If the domestic mining and minerals industry is to survive so as to provide U.S. citizens the domestically available minerals, reversal of this counterproductive approach by the Department of Justice and the Federal Trade Commission must become part of broader national goals.

Environmental and Health and Safety Regulations

This trend toward environment enhancement at any cost, regardless of economic impact, has led to excessive and unreasonable regulations which today threaten to stifle private enterprise and to cripple the basic industries of America, particularly the mining and minerals industry.

Congress is further to be faulted for its inability and unwillingness to make the difficult decisions demanded by environmental versus development concerns, instead adopting statutory mandates that are frequently expressed in ambiguous, inconsistent terms and phrasing thus providing fertile ground for the promulgation of regulations by Federal agencies.

Thus environmental, health and safety goals conflict with the objectives of national minerals policy not by their nature, nor their desirable objectives but through uncertainty, delay, excessive costs and the snuffing out of innovative approach to problem solving—which has been a hallmark of the U.S. free enterprise system.

Probably the most difficult concept for this Committee to grasp is the expectation by government regulators that they will settle for no less than perfection. The whole world recognizes intuitively that perfection is rarely attainable in anything, but environmental and health and safety regulators refuse to even consider the alternative of "an acceptable risk."

Environmental controls, regardless of the desirability of their objectives. cannot long continue to operate in total disregard of the economic feasibility of their attainment. The Federal Government, as a fundamental aspect of national minerals policy, must seek balance between the environmental, health and safety statutes and regulations on the one hand, and the need to ensure the reliable availability of strategic and critical minerals on the other. The flaw most obvious in the executive mechanism, once again, lies in the total absence of a responsible official to advocate balance or, at a minimum one who understands and shows an interest in the essential need for a strong U.S. minerals posture.

Public Land Access Problems

Given the anomalous nature of economic mineral deposits and the continuing need for domestic supplies of nonfuel minerals, it would

seem natural that the government would encourage new-exploration in the United States. Instead government policies have proved to be counterproductive to the discovery and the development of mineral deposits.

The United States still knows little about the total mineral resource potential of its land. However, the discovery of mineral deposits is no longer a matter of relying on the abilities of exploration crews to find such deposits. The most precious asset and the most fundamental requirement, access to land—primarily the mineral-rich public land—in which to search for minerals could well become the scarcest component in America's mineral supply future.

The most deplorable aspect of this shortsightedness is that it is being done without knowledge of the losses involved, without any attempt to understand long-term impacts, and without any government accountability for the consequences. Over the last 10 years the United States has made grave, fundamental errors in administering the public lands with respect to minerals. despite the provision in the organic acts of the principal land managing agencies of adequate authority for mineral development.

This growing denial of acces for mineral exploration development is aggravated by the total lack of interest within the executive for specifically determining the availability of public lands for mineral development.

The scarcity of information of mineral resources has been used by the Department of the Interior—the Nation's chief manager of Federal minerals—as a reason for not considering minerals.

Technological Innovation Problems

There is frightening evidence that U.S. industry, as a whole, is losing its edge in technology and, as a result, in productivity. This is due in large part to the cumulative impact of government's regulatory, tax, and antitrust policies and more generally, to the absence of a reasonably stable investment future as a result of the uncertainties of inflation. The consequence has been a decline in the competitivenes of American industry in general and of the mining industry in particular, which in turn has discouraged capital formation and prevented the profits necessary for investments in innovation.

The special nature of commodity markets, the unknowns of future supply and demand forces, and uncertainty of prices that are determined in international markets have all acted as constraints upon innovation in the minerals industry. Large investments in existing capacity and the long life necessarily designed into that capacity—which seldom can be replaced with existing cash flows—mean that innovation spreads slowly within the industry. Perhaps the major deterrent to innovation is simply the cost and time needed to prove new technology on scales large enough to be meaningful. The uncertainty of outcome and the high risks involved in demonstrating large scale innovative concepts has discouraged efforts by individual companies. This is at least one responsibility that must be shared between the public and private sectors.

XVI

Foreign Mineral Dependence

To the extent that a country is dependent on import sources for its basic raw materials, its economy can be held at ransom by an association of exporting countries—whether instituted by political or economic concerns—determined to manipulate prices to their advantage.

Control, in the full sense of a cartel—an organization with the ability to artificially maintain high prices or deny supplies over a long period of time—is unlikely except possibly for chromium and platinum group metals. Nevertheless, producer associations, particularly during periods of short supply and rising prices, will increasingly be capable of exacting higher prices. In addition, they may well be willing and able to restrict supplies to certain consuming nations for political purposes. The ability to undertake cartel-like action is enhanced by the shift in world ownership patterns of several important nonfuel minerals whereby governments themselves, with their own particular goals and objectives not necessarily involving profit, have assumed ownership of important parts of the mineral sector. Moreover, the failure to fully appreciate the growing sophistication of producer strategies and the dangers they pose renders impotent America's ability to alter and correct past mistakes and to develop alternatives.

No agency or department within the U.S. Government is today weighing the worldwide lag in new mineral development, the growing lead times for development, and the effects of inflation on such developments against increasing world demands and, most importantly, U.S. Government policies that are, in effect, promoting offshore reliance. The only possible conclusion is that the executive is simply not planning for long-term mineral needs of the U.S. economy and its defense. It would certainly appear that the responsibility for the assurance of long-term foreign supplies is too important an objective to lie solely within the Department of State whose foreign policy interests appear to subordinate domestic and even national interests in this area. The foreign policy of the U.S. Government has failed to evidence a basic responsibility for the adequacy or costs of mineral imports. American foreign policy has disregarded both America's legitimate mineral interests abroad and the security of mineral access—even in the subarea of economic policy.

There are extremely serious security implications currently being ignored in the Federal Government's inconsistent approach to mineral adequacy. Minerals, essential to the production of military hardware, and its industrial base, are of vital importance to the Nation not merely in times of international tension but at all times so as to minimize existing vulnerabilities and forestall crisis provocation. This is particularly true if the source nations for such materials are either potential adversaries or politically unstable. The United States will be incapable of fulfilling mutual security commitments if a significant part of its energies must be expended to guarantee the flow of critical mineral resources essential to mere national survival.

The stockpile today relative to some important commodities is neither of adequate quality nor quantity. Holdings of some vital materials are far below present objectives, and for some there are no holdings at all.

U.S. MINERALS VULNERABILITY: NATIONAL POLICY IMPLICATIONS

THE ROLE OF MINERALS IN UNITED STATES ECONOMY

Much has been written of the importance of minerals to every facet of modern existence. D. A. Viljoen in tracing the connection between civilization and minerals recently summed up the importance of minerals this way:

> Never in the history of mankind have mineral resources of the earth been so essential to human existence as they are today; nor has proof of their influence upon man's progress and destiny been so obvious.[1]

It is axiomatic that a healthy and viable domestic nonfuel minerals industry is an essential national goal. As succinctly put by the Public Land Law Review Commission in its 1970 report to the President and the Congress:

> . . . our survival as a leading nation depends on our mineral supplies. The close relation between minerals and our national security is too apparent to require detailed explanation.[2]

Without adequate and dependable mineral supplies, the most fundamental needs of America's highly interdependent industrial society could not be met, society's very life support systems would collapse, and the security of the free world would be jeopardized. If the United States truly expects to maintain its economic strength; to meet tomorrow's more sophisticated challenges; to improve the quality of life of its citizens, as well as that of others; and to regain the leadership expected by the free world, it must return to a clearer realization of the indispensable role that mineral raw materials, and the technology that is so intimately a part of their use play in the economy.

Although the United States—the world's leading industrialized nation—produces about one-fourth of the world's output of raw and processed materials of nonfuel mineral origin, its mining industry when compared with the Nation's whole economy is relatively small. In fact, from a dollar standpoint, it appears unimportant, having an output value of but 1 percent of the Nation's $2.4 trillion economy. From an employment standpoint, the nonfuel mining industry employs less than 1 percent of the Nation's work force. Of our total population of 222 million, about 6 million are employed in the min-

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[1] D. A. Viljoen, Minerals from the Dawn of Mankind to the Twenty-first Century, Journal of the South African Institute of Mining and Metallurgy, September 1979, pp. 410–420.

[2] One Third of the Nation's Land. A Report to the President and to the Congress by the Public Land Law Review Commission, Washington, D.C., June 1970, p. 121.

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erals and allied industries with less than 1 million employed directly in mining.[2a]

However, the economic structure of the United States might be visualized as an inverted pyramid where the bulk of the economy overshadows the raw materials that is its base. Domestically mined nonfuel mineral raw materials such as iron ore, copper ore, phosphate rock, and limestone were valued at about $24 billion in 1979. However, when processed along with imported raw materials ($5 billion) and recycled scrap ($5 billion) into such products as steel, copper, fertilizers, and cement, the value jumped nearly eight-fold to $225 billion.[3]

The pyramiding of America's gross national product on a nonfuel minerals base can best be appreciated by an examination of the annual consumption of 87 nonfuel mineral commodities by key U.S. industries as shown in table 1. What becomes obvious is the utter dependence on minerals of the durable goods, transportation, communications, and construction industries, which together with the mining industry, employ about 25 percent of the Nation's full-time labor force and account for about 30 percent of the GNP. Even more revealing is the importance of nonfuel minerals to the motor vehicle manufacturing industry, which uses 26 percent of the iron and steel, 16 percent of the aluminum, 12 percent of the copper, 69 percent of the lead, 34 percent of the zinc, 40 percent of the platinum group metals, and smaller amounts of 10 others such as metals for steel alloying.

[2a] An industrial society's dependency on the products of mining and agriculture—the two primary sources of wealth in any economy—to fulfill needs and create and sustain jobs is seen in the 1979 average U.S. employment figures:

6,000,000 mineral workers:	
Primary metal industries	1,240,000
Mining	960,000
Fabricated metal products	1,730,000
Stone, clay, and glass products	710,000
Chemicals and allied products	1,110,000
Petroleum and coal products	210,000
And 6,000,000 agricultural workers:	
Agriculture	3,300,000
Food and kindred products	1,720,000
Lumber and wood products	760,000
Create jobs for 87,000,000 other workers:	
Machinery	2,460,000
Electrical and electronic equipment	2,110,000
Transportation equipment	2,050,000
Other manufacturing	6,870,000
Construction	4,640,000
Transportation and utilities	5,150,000
Wholesale and retail	20,140,000
Finance, insurance, real estate	5,000,000
Services	17,000,000
Government (Federal, State and local)	15,610,000
Armed services	2,090,000
Others	4,170,000

Who in turn support 122 million others in total population of 221 million.

[3] John D. Morgan Jr., "Minerals Availability—The Minerals Position of the United States," Mining Congress Journal, February 1980, p. 49–54.

TABLE 1

U.S. TOTAL MINERAL DEMAND IN 1976, BY END USE

COMMODITY	UNITS	20 FOOD PRODUCTS	26 PAPER PRODUCTS	28 CHEMICALS	30 RUBBER PRODUCTS	32 NON-METALLIC PRODUCTS	33 PRIMARY METALS INDUSTRIES
METALS AND MINERAL FORMING ELEMENTS							
ALUMINUM	**THOUSAND S.T.**	—	—	327	—	312	—
ANTIMONY	**S.T.**	—	—	26,539	1,862	1,862	—
ARSENIC	**S.T.**	—	—	W	—	W	—
BERYLLIUM	**S.T.**	—	—	—	—	—	—
BISMUTH	**THOUSAND LB**	—	—	1,398	—	—	492
BORON	THOUSAND S.T.	—	—	27	—	50	—
BROMINE	MILLION LB	—	—	102	—	—	—
CADMIUM	S.T.	—	—	1,400	—	—	—
CESIUM	LB	—	—	490	—	—	—
CHLORINE	THOUSAND S.T.	—	1,567	6,284	—	—	—
CHROMIUM	**THOUSAND S.T.**	—	—	50	—	—	—
COBALT	**THOUSAND LB**	—	—	1,783	—	5,291	—
COLUMBIUM	**THOUSAND LB**	—	—	—	—	—	—
COPPER	**THOUSAND S.T.**	—	—	—	—	—	—
FLUORINE	**THOUSAND S.T.**	—	—	171	—	5	386
GALLIUM	KG	—	—	—	—	—	—
GERMANIUM	THOUSAND LB	—	—	—	—	—	—
GOLD	THOUSAND T.OZ	—	—	—	—	—	—
HAFNIUM	S.T.	—	—	—	—	2	—
INDIUM	THOUSAND T.OZ	—	—	—	—	—	218
IODINE	**THOUSAND LB**	1,100	—	5,400	—	—	—
IRON IN ORE	**MILLION S.T.**	—	—	—	—	—	—
LEAD	**THOUSAND S.T.**	—	—	106	—	—	—
LITHIUM	**S.T.**	—	—	—	—	890	1,410
MAGNESIUM-METAL	**THOUSAND S.T.**	—	—	3	—	—	21
MAGNESIUM-NONMETALLIC	THOUSAND S.T.	—	—	73	—	—	850
MANGANESE	THOUSAND S.T.	—	—	47	—	—	—
MERCURY	THOUSAND FL	—	—	24	—	—	—
MOLYBDENUM	THOUSAND LB	—	—	4,800	—	—	—
NICKEL	THOUSAND S.T.	—	—	30	—	—	—
NITROGEN-FIXED	**THOUSAND S.T.**	200	40	12,300	30	—	—
NITROGEN-ELEMENTAL	**THOUSAND S.T.**	725	—	3,625	—	—	1,100
PALLADIUM	**THOUSAND T.OZ.**	—	—	128	—	—	—
PLATINUM	**THOUSAND T.OZ**	—	—	84	—	42	—
RARE EARTHS AND YTTRIUM	**S.T.[1]**	—	—	—	—	1,900	4,700
RHENIUM	LB	—	—	—	—	—	—
RHODIUM	THOUSAND T.OZ	—	—	19	—	4	—
RUBIDIUM	LB	—	—	105	—	—	—
SCANDIUM	KG	—	—	—	—	—	—
SELENIUM	THOUSAND LB	—	—	247	—	296	—
SILICON	**THOUSAND S.T.**	—	—	40	—	—	—
SILVER	**MILLION T.OZ**	—	—	—	—	—	—
STRONTIUM	**S.T.**	—	—	3,250	—	700	650
SULFUR	**THOUSAND L.T.**	4	272	8,448	10	—	115
TANTALUM	**THOUSAND LB**	—	—	—	—	—	—
TELLURIUM	THOUSAND LB	—	—	W	W	W	W
THALLIUM	LB	—	—	465	—	—	—
THORIUM	S.T.	—	—	—	—	19	—
TIN	M.T.	—	—	5,700	—	—	—
TITANIUM-METAL	THOUSAND S.T.	—	—	—	—	—	—
TITANIUM-NONMETALLIC	**THOUSAND S.T.**	—	109	322	14	10	—
TUNGSTEN	**THOUSAND LB**	—	—	322	—	—	—
VANADIUM	**S.T.**	—	—	540	—	—	—
ZINC	**THOUSAND S.T.**	—	—	71	99	—	—
ZIRCONIUM-METAL	**S.T.**	—	—	—	—	—	—
ZIRCONIUM-NONMETALLIC	THOUSAND S.T.	—	—	1	—	25	33
NONMETALLIC MINERALS							
ASBESTOS	**THOUSAND S.T.**	—	31	—	—	—	—
BARITE	**THOUSAND S.T.**	—	—	128	—	90	—
CEMENT	**THOUSAND S.T.**	—	—	—	—	—	—
CLAYS	**THOUSAND S.T.**	176	2,475	323	304	8,082	693
CORUNDUM	**S.T.**	—	—	—	—	—	—
DIAMOND-INDUSTRIAL	THOUSAND KT	—	—	—	—	7,600	—
DIATOMITE	THOUSAND S.T.	—	—	111	—	300	—
FELDSPAR	THOUSAND S.T.	—	—	—	—	697	—
GARNET	S.T.	—	—	—	1,200	8,000	—
GRAPHITE	THOUSAND S.T.	—	—	—	—	29	21
GYPSUM	**THOUSAND S.T.**	—	—	1,714	—	550	—
KYANITE	**THOUSAND S.T.**	—	—	—	—	W	W
LIME	**THOUSAND S.T.**	1,041	1,135	4,585	4	1,452	9,902
MICA-SCRAP AND FLAKE	**THOUSAND S.T.**	—	—	21	5	36	—
MICA-SHEET	**THOUSAND LB**	—	—	—	—	150	—
PEAT	THOUSAND S.T.	—	—	1,276	—	—	—
PERLITE	THOUSAND S.T.	—	—	47	—	110	—
PHOSPHATE ROCK	THOUSAND M.T.	258	—	28,893	—	—	—
POTASH	THOUSAND S.T.	—	—	6,149	—	—	—
PUMICE	THOUSAND S.T.	—	—	—	—	32	—
QUARTZ CRYSTAL	**THOUSAND LB**	—	—	—	—	—	—
SALT	**THOUSAND S.T.**	2,848	3,385	31,049	—	1,909	754
SAND AND GRAVEL	**MILLION S.T.**	—	—	—	—	28	—
SODA ASH	**THOUSAND S.T.**	—	454	2,646	—	3,553	—
STONE-CRUSHED	**MILLION S.T.**	2	—	41	—	161	24
STONE-DIMENSION	THOUSAND S.T.	—	—	—	—	339	—
TALC	THOUSAND S.T.	—	60	40	19	363	—
VERMICULITE	THOUSAND S.T.	—	—	39	—	—	—
COMMERCIAL GASES							
ARGON	**THOUSAND S.T.**	—	—	15	—	—	22
HELIUM	**MILLION C.F.**	—	—	—	—	—	68
OXYGEN	**THOUSAND S.T.**	—	—	1,900	—	—	12,050

* ESTIMATE. W WITHHELD BECAUSE OF INDIVIDUAL COMPANY CONFIDENTIALITY. DATA MAY NOT ADD TO TOTALS SHOWN BECAUSE OF INDIVIDUAL ROUNDING.

[1] CONTAINED RARE EARTH OXIDES (REO).

Source: Mineral Trends and Foecasts, Bureau of Mines, 1979

TABLE 1

-U.S. TOTAL MINERAL DEMAND IN 1976, BY END USE (CONTINUED)

34 FABRICATED METAL PRODUCTS	35 MACHINERY	36 ELECTRICAL	38 INSTRUMENTS	39 JEWELRY & ARTS	49 ELECTRIC, GAS & SANITARY SERVICES	29, 32, 33, 34 CONSTRUCTION	13, 29, 46, 49 OIL & GAS INDUSTRIES	28, 32, 36, 37 TRANSPORTATION	65, 70, 88 HOUSEHOLD & COMMERCIAL	OTHER	TOTAL
METALS AND MINERAL FORMING ELEMENTS											
1,085	417	1,062	—	—	—	1,279	—	902	—	373	5,757
—	2,794	—	—	—	—	—	—	12,106	—	1,397	46,560
—	—	—	—	—	—	—	—	—	—	W	W
—	—	26	—	—	11	—	—	9	—	5	51
—	698	—	—	—	—	—	—	—	—	—	2,598
10	—	—	—	—	—	—	—	—	—	25	112
—	—	—	—	—	—	—	238	—	—	33	373
2,000	—	1,300	—	—	—	—	—	1,000	—	230	5,930
—	—	930	—	—	—	—	—	—	—	12,880	14,300
—	—	—	—	—	660	—	—	—	—	1,938	10,449
35	83	—	—	—	—	110	—	86	—	154	518
—	3,145	5,513	—	—	—	—	—	3,458	—	611	19,801
—	900	—	—	—	—	2,401	1,201	1,201	—	300	6,003
—	290	1,160	—	—	—	333	—	230	—	143	2,156
—	—	—	—	—	—	—	—	—	—	11	573
—	—	—	8,210	—	—	—	—	—	—	670	8,880
—	—	30	16	—	—	—	—	—	—	2	47
—	—	960	—	2,562	—	—	—	—	—	1,126	4,648
—	—	2	23	—	—	—	—	—	—	1	28
—	—	55	164	—	—	—	—	—	—	109	546
—	—	—	300	—	—	—	—	—	—	400	7,200
8	24	7	—	—	—	30	7	38	—	5	118
73	—	128	—	—	—	50	240	783	—	130	1,510
—	130	—	—	—	—	—	—	260	—	190	2,880
—	55	—	—	—	—	—	—	20	—	13	112
—	—	—	—	—	—	—	—	—	—	—	923
63	186	69	—	—	—	238	53	298	—	410	1,364
—	—	27	7	—	—	—	—	—	—	10	68
—	15,600	2,400	—	—	—	—	16,800	16,800	—	3,600	60,000
19	17	43	—	—	—	19	19	49	—	17	214
—	—	—	—	—	—	—	—	—	—	1,286	13,859
650	—	775	—	—	—	—	—	—	—	3,826	10,503
—	—	152	139	11	—	—	7	194	—	26	657
—	—	89	27	23	—	—	59	481	—	46	851
—	—	—	—	—	—	—	5,800	—	—	1,100	13,500
—	—	—	185	—	—	—	7,450	—	—	665	8,300
—	—	9	—	5	—	—	—	—	—	4	41
—	—	315	—	—	—	—	—	—	—	1,680	2,100
—	—	3	—	—	—	—	—	—	—	3	6
—	—	—	345	—	—	—	—	—	—	99	987
—	115	72	—	—	—	133	24	163	—	52	604
—	12	45	56	39	—	—	—	—	—	20	172
—	—	10,050	—	—	—	—	250	—	—	800	15,700
—	—	33	—	—	—	—	675	—	—	1,211	10,769
—	199	956	—	—	—	—	—	67	—	106	1,328
—	—	W	—	—	—	—	—	—	—	—	W
—	—	1,116	—	—	—	—	—	—	—	279	1,860
—	—	—	—	—	9	—	—	4	—	8	40
9,800	6,100	8,500	—	—	—	8,100	—	6,500	—	1,900	56,600
2	—	—	—	—	—	—	—	4	—	2	8
—	—	—	—	—	—	—	—	—	—	49	504
—	12,080	1,771	—	—	—	—	—	1,772	—	162	16,107
—	2,865	—	—	—	—	1,590	—	2,800	—	1,984	9,779
—	60	155	—	—	—	488	—	322	—	176	1,371
520	—	80	—	—	3,400	—	—	—	—	—	4,000
—	—	—	—	—	—	—	—	—	—	13	72
NONMETALLIC MINERALS											
—	—	—	—	—	—	671	—	—	—	24	726
—	—	—	—	—	—	—	1,986	—	—	—	2,204
—	—	—	—	—	—	75,226	—	—	—	—	75,226
—	—	—	—	—	—	36,103	1,240	—	—	346	49,942
600	—	—	450	—	—	—	—	—	—	150	1,000
—	7,000	—	—	—	—	3,400	2,100	4,500	—	1,800	26,400
—	—	—	—	—	—	—	—	—	—	76	487
—	—	—	—	—	—	—	—	—	—	37	734
—	—	1,200	—	—	—	—	—	7,000	3,500	768	21,668
—	—	1	—	2	—	—	4	3	—	7	67
—	—	—	—	—	—	15,683	—	—	—	—	17,927
—	—	—	—	—	—	—	—	—	—	W	W
2	—	—	—	—	—	1,226	89	—	—	821	20,257
—	—	—	—	—	—	56	—	—	—	—	120
—	—	5,408	—	—	—	—	—	—	—	—	5,558
—	—	—	—	—	—	—	—	—	—	10	1,286
—	—	—	—	—	—	288	—	—	—	78	523
—	—	—	—	—	—	—	—	—	—	1,938	31,089
—	—	—	—	—	—	—	—	—	—	—	6,149
—	—	—	—	—	—	3,660	—	—	—	522	4,214
—	—	349	—	—	—	—	—	—	—	—	349
—	—	—	—	—	—	—	724	—	—	6,867	47,536
—	—	—	—	—	—	853	—	—	—	—	853
—	—	—	—	—	—	—	—	—	—	205	6,856
—	—	—	—	—	—	645	—	—	—	27	900
—	—	—	—	—	—	1,048	—	—	—	13	1,400
—	—	—	—	—	—	244	—	—	—	175	901
—	—	—	—	—	—	208	—	—	—	7	254
COMMERCIAL GASES											
198	—	6	—	—	—	—	—	—	—	23	284
93	—	—	60	—	24	—	—	127	—	205	578
960	—	—	—	—	—	—	—	—	—	953	15,853

A vast majority of the U.S. citizens do not understand the role of minerals in the human environment in which they are intimately involved. Their homes, their travel to and from work, their places of employment all depend upon nonfuel minerals. It comes as a surprise to most that each American man, woman and child require the annual mining of about 21,000 pounds of nonfuel minerals. Few realize that their colored television set contains about 35 mineral commodities and that a telephone contains about 40.[4]

This complacency has evolved as a result of generations of adequately supplied, reasonably priced minerals. This, in part, is due to the affluence that productivity—accomplished through the use of minerals, mineral fuels, and technology under free market incentives—has provided us. As our dependence on minerals has grown, the less the significance of that dependence is perceived and the less the processes needed to make minerals available are understood. It seems that the further Americans have collectively moved from raw material production, the more that production is taken for granted. The more visible are the products of mining in our lives, the less is our appreciation of the need of mining. We are, as a Nation, so far removed from our extractive industries that we no longer are conscious of the fact that the car we drive originated not in Detroit but in a Michigan iron mine, an Ohio limestone mine, a West Virginia coking coal mine, an Arizona copper mine, a Colorado molybdenum mine, a Missouri lead mine, a Tennessee zinc mine, and many others within and outside our borders. America has developed a store-shelf mentality, expecting all of what it needs to appear somehow in the quantity and quality necessary, at the time and place of demand. Meanwhile we are swept along by loud advocates of policies that not only reduce our productive capacity but increase our reliance on others.

Richly endowed with minerals, the progress, prosperity and power of the United States came about largely through their prodigious use. American technology is historically recognized as having manufactured "products" that are far more mineral resource-intensive than any other market economy. This natural mineral endowment combined with the self-initiated accumulation of technology and capital became an important source of the real growth of national income, the standard of living.

For 150 years, the United States was almost totally self-sufficient for its own mineral requirements. Until the late 1920's, America had a surplus balance of trade in both fuel and nonfuel minerals. Less than 50 years later, a trade deficit in raw and processed nonfuel minerals reached $8 billion, growing fourfold since 1973. During the same period, the U.S. negative balance of trade for fuel minerals rose from $6.4 billion to $28.5 billion. Yet despite the hard lessons now being learned as a result of foreign energy dependence, little attention is being paid to the consequences of increasing nonfuel mineral dependence. The decline in the U.S. mining and mineral processing industries is shown in table 2.

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[4] A. G. Chynoweth, Electronic Materials, Functional Substitutions, Science, vol. 191, February 20, 1976, p. 725–732.

TABLE 2.—SEGMENTS OF THE U.S. MINING AND MINERAL PROCESSING INDUSTRY THAT HAVE EXPERIENCED DECLINES IN PRODUCTION OR MARKET SHARE

Mineral industry	Decline in physical production		Decline in U.S. producers' share of—			
			Domestic market		World market	
	1953/57 to 1973/77	1973/77 to 2000	1953/57 to 1973/77	1973/77 to 2000	1953/57 to 1973/77	1973/77 to 2000
Bauxite mining	X		X	X	X	X
Alumina refining			X	X	X	X
Aluminum smelting			X	X	X	X
Asbetos mining					X	
Chromium mining	X		X		X	
Ferrochromium smelting	X		X	X	na	na
Cobalt mining	X		X		X	
Copper mining				X	X	X
Cooper refining			X		X	X
Iron mining	X		X		X	X
Lead mining				X	X	X
Lead smelting	X			X	X	X
Manganese mining	X	X	X	X	X	
Ferromanganese smelting	X		X	X	na	na
Nickel mining						
Phosphate rock mining					X	X
Silver mining	X				X	
Silver refining	X	X		X	X	X
Zinc mining	X			X	X	
Zinc smelting	X		X		X	

X—indicates decline.

Over the last decade, an increasing number of writers on mineral policy have pessimistically stressed that because America has found and mined its richer, near-surface mineral deposits, it is left largely with subeconomic resources.[5] Unfortunately, this assertion has been used to justify national policies that promote and encourage foreign dependence. In the past, America has repeatedly underestimated its mineral resources and its ability to solve technological problems that have made them mineable. One of the more classic instances of such pessimism was Secretary of the Interior Harold Ickes' 1940 statement that, because World War II had "bankrupt some of our most vital resources", the United States "should be listed with the 'Have Nots', such as Germany and Japan."[6] Actually, there was some reason for Secretary Ickes' gloomy forecast of future dependency because little in the way of major new mining developments occurred during World War II or, in fact, until the end of the Korean War.[7] Pessimistic views,

[5] This view is not held by those engaged in mineral exploration and mining, the experts who know most about the mineral character of our land as well as the difficulties of making major new discoveries and designing the technologies to make them mineable.

[6] Harold E. Ickes, Jr., "The War and Our Vanishing Resources," American Magazine, No. 140, December 1945, 20 p. For an excellent historical review of the development of American mineral policy see the recent book by Alfred E. Eckes, "The United States and the Global Struggle for Minerals," University of Texas Press, 1979, 352 p.

[7] John P. Albers, Discovery Rate and Exploration Methods for Metallic Deposits in the U.S., 1940–76, Engineering and Mining Journal, January 1977, p. 71. In Albers' study of the discovery and development of 65 large deposits (he admits that his data may not be complete), the most startling conclusion is that no totally new major mines came on stream in the 12 years of 1940–1952. (Increased production did occur with regard to bauxite, chromium, and manganese. However, such increases were the result of numerous small operations, which in the case of chromium and manganese were uneconomic under normal market conditions.) While at least 12 major discoveries were made during those years, the lack of development of those discoveries was due to the combination of (1) lack of adequate exploration and capital during the preceding depression years, (2) wartime efforts to maximize production from existing mines, and (3) the long lead time required to start a major mine. The analogy between the above analysis and perspective and the present state of the U.S. mining and mineral industry pose grave implications should the United States find itself involved in a lengthy conventional war (particularly if its mineral-short allies are involved), or in a strategic "resource war." If the United States continues to remove mineral-rich public lands from mineral development as has been done over the past 10 years and to harass our industry out of business, the United States would find it more difficult to survive such a conflict and recover economically afterward.

however, are often made by those less acquainted, if not totally unfamiliar, with the history of mineral discoveries, the development of mines, the evolution of geologic science, and the technology that has made mineral development possible.[8]

Some writers on minerals policy suggest that the United States should not worry about its increasing foreign dependence. Instead, they assert, that in order to be in harmony with lesser developed countries, the United States must accept the export of its basic mining and minerals processing industries and in the end accept a lower standard of living for the resulting benefits to accrue to foreign nations. This view is better known as the "interdependence" approach to issues of foreign economic policy and has dominated the natural resource objectives of the present administration. This interdependence is based upon political consideration, while interdependence which results from the unequal physical distribution of resources is an established reality.

The Committee is well aware that the United States cannot be totally self-sufficient in all minerals, and that the inter-reliance of nations on the free movement of minerals in international trade will of necessity remain a vital component of supply. However, the United States remains a mineral-rich country. It is in the best interest and to the advantage of the United States and to its allies to encourage industry to maximize its mineral investments within the Nation's borders.

Notwithstanding the ill-conceived Club of Rome's "Limits of Growth" forecasts,[9] the discovery and development of new mineral deposits in the United States will be largely limited by the degree of resource independence desired and by the political and economic freedom necessary for that independence. Present U.S. difficulties in the case of oil, and the greater difficulties that lie ahead, are the result of this Nation's inability to adopt and implement a strategic energy policy since oil prices quadrupled in the fall of 1973. It was not OPEC that brought about energy and resulting economic problems of the United States, but an inability by government leaders to see priorities in a larger perspective and to act decisively when there was still time. America cannot assume as it did with energy that adequate mineral supplies will somehow be there waiting for us when we need them.

The Comptroller General summed up the views of the General Accounting Office regarding the country's unwillingness to tackle the problem in this way:

> . . . to continue to treat our materials problems in isolation, without some linkage to larger national goals, will tend to perpetuate ad hoc decision making and leave the United States even more vulnerable to economic catastrophe from what might otherwise be manageable events.

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[8] Even recognized experts in the field have made some wrong assumptions. Elmer Pehrson, Chief of the Mineral Economics and Statistics Branch of the Bureau of Mines was an early proponent of the "have not" thesis. His 1945 analysis suggested that the U.S. had exhausted nearly 60 percent of its petroleum reserves, about 75 percent of its zinc reserves, and about 80 percent of its lead reserves. His views were based on the declining rate of new mineral discoveries and on the absence of the discovery of any new major mining district since 1916. See "The Mineral Position of the United States and the Outlook for the Future," Annual Report of the Board of Regents of the Smithsonian Institution, 1945, pp. 175–199.

[9] D. H. Meadows, J. Randers, W. W. Behrens, III, The Limits of Growth: A Report for the Club of Rome's Project on the Predicament of Mankind, Potomac Associates-Universe Books, New York, 1972. According to this study by the Massachusetts Institute of Technology (sponsored by the Club of Rome) the world may be heading for disaster within the next 100 years partly as a result of resource depletion. One version of the study's neo-Malthusian scenario projects the need to mine lower and lower grade ores which will claim an increasing share of capital, stymieing growth in other sectors until the virtual exhaustion of resources brings about a total collapse of civilization.

We often forget that *time* itself has become one of our most critical national resources. If we expect to solve the problems that will confront us in the 1980's and the 1990's, we must begin by planning our strategy now.[10]

PAST STUDIES ON MINERALS POLICY

Introduction

The first national commission to examine the use of the Nation's natural resources was President Theodore Roosevelt's National Conservation Commission, which in 1909 predicted that domestic resources of petroleum and high-grade iron ore would be depleted by mid-century.[11] From the years immediately prior to World War I until 1952 when President Truman's Materials Policy Commission released its historic report,[12] there were accelerating debates in and out of government on wartime shortages, strategic stockpiles, and the ever-present question of least-cost imports versus self-sufficiency. Although emphasis centered on meeting mineral demands during three major wars, it became increasingly clear that a sustained policy on minerals was imperative.

Most of government's studies between the first two world wars strategic and critical minerals: the War Department's 1921 list of 28 minerals (the so-called Harbord List) in short supply during World War I; the list of 39 critical and strategic minerals from the 1939 Bureau of Mines-Geological Survey study of national mineral availability; and the 1947 Bureau of Mines-Geological Survey reserve estimates of 39 minerals in their report, "The Minerals Position of the United States." [12a]

The urgency and the complexities of a national minerals policy were readily apparent to government officials who had firsthand knowledge of the serious supply problems experienced during World War II. About a year after the end of that war, Secretary of the Interior J. A. Krug told the mining industry:

Such a policy must have universal understanding and endorsement. No one person or group can satisfactorily devise it. The problems involved are too numerous, too diverse in technical nature, and too interrelated in political aspect. The legislative and executive branches of the Federal government must work together in creating mineral policy.[13]

The Paley Report

This country was just 6 months into the Korean War when President Truman appointed the President's Materials Policy Commission,

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[10] Elmer B. Staats, Keynote address, Fifth Henniker Conference on National Materials Policy on "Building a Consensus on Legislation for a National Materials Policy," Federation of Materials Societies, House Committee on Science and Technology Report, Serial DDD, December 1978, p. 12–13. In the face of the lengthening time requirements (10–20 years) to bring new mineral discoveries into production as a result of financial, environmental, political and negotiating delays, a latent but real problem of sufficient productive capacity persists.

[11] Actually, U.S. iron ore reserves after the heavy iron and steel demands of World War II (a record average 95 million long tons/year produced during the war years) were 3.7 billion long tons in 1944; 4 billion long tons in 1952; and 25 billion long tons in 1980. (More recent Bureau of Mines studies should double present reserves. This increase in reserves, in the face of accelerating mining, was accomplished primarily by improved ore processing technologies.

[12] Resources for Freedom; Foundations for Growth and Security, A Report to the President by the President's Materials Policy Commission, Washington, D.C., Government Printing Office, June 1952. Known as the Paley Report after its Chairman, William S. Paley, this 18-month, 5-volume, study is still a classic.

[12a] See "Mineral Position of the United States" in Investigation of Natural Resources, hearing report of a subcommittee of the Committee on Public Lands, U.S. Senate, Government Printing Office, 1947, pp. 167–310.

[13] J. A. Krug, address to American Mining Congress, September 11, 1946, Denver, Colorado.

more commonly called the Paley Commission, to begin the task of examining where the country was heading in the next quarter century. Although the Commission's report was prepared during wartime, when minerals availability was a national imperative, its analysis was based primarily on peacetime demands when national objectives and the policies necessary to attain them were less easy to define. In the Commission's words, the major premise of its undertaking was clear:

> The overall objective of a national materials policy for the United States should be to insure an adequate and dependable flow of materials at the lowest cost consistent with the national security and the welfare of friendly nations.[14]

The elements of this massive and comprehensive analysis included: mineral products underpinned the security and productivity of a free enterprise economy; the domestic resource base must be strengthened; dependence on foreign sources was a fact of life but the security of those sources remained uncertain and was destined to become a larger problem; and, to compensate for the growing complexity of the problems, government must be prepared to make decisions from a broader policy perspective.

The Paley Commission made numerous recommendations regarding the responsibilities of government and industry for improving the Nation's mineral reserve base while taking strong exception to nondevelopment in the name of conservation. Although the Commission badly missed in its projections of industry's ability to produce some minerals,[15] it correctly recognized that no nation can be totally self-sufficient, laying to rest the self-sufficiency argument. In reviewing the complexity of policy issues, the Commission arrived at the same conclusion that Congress was to reach 18 years later in the passage of the Mining and Minerals Policy Act—that because many other national goals affect the availability of minerals, it is not possible to spell out in law definitive directions for those responsible for policy implementation. Therefore, at the core of any minerals policy must lie a national understanding of the importance of minerals and a commitment to make the necessary decisions to carry out that policy.

Of the Paley Commission's 63 recommendations, the final two emphasized its strong conclusions regarding government's responsibilities: First, the analytical capability of government must be strengthened from top to bottom, and second, the dimensions of the issues require direction by a policy group within the Executive Office of the President.

The Eisenhower Report

The 1954 "Report of the President's Cabinet Committee on Mineral's Policy" was a series of mineral policy recommendations pointedly aimed at national security. Started 3 months after the end of the Korean War, the report, while reflecting an extension of President Truman's policy of free world trade and international cooperation,

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[14] Op. Cit. See footnote 12, vol. 1, p. 10.

[15] Interestingly, the Paley Commission underestimated the capacity of the industry to discover new mineral deposits and to advance technology. The Commission said that the U.S. would be largely dependent upon imports of lead and copper by 1977. Except for 12 years in the case of lead, the U.S. has led the world in both lead and cooper production since the year of the Paley report (1952), and present reserves are larger than they were in that year. However, while such leaps are possible in the future, 1952 to 1977 is not 1980 and beyond. Since 1970, for example, the Congress had adopted tens of statutes adversely affecting the mining and mineral industry and its ability to provide America its own minerals.

strongly emphasized government's role in strengthening domestic mineral productivity and the building of strategic and critical stockpiles as a fundamental step toward national security:

> Overriding in importance in any consideration of policies relating to mineral production and utilization is the security of the Nation. The lack of available metals and minerals has in the past proved the weak link in American security.[16]

National Commission on Materials Policy

In 1970, the same year that Congress enacted the Mining and Minerals Policy Act, it enacted the National Materials Policy Act so as to:

> . . . enhance environmental quality and conserve materials by developing a national materials policy to utilize present resources and technology more efficiently, to anticipate the future materials requirements of the Nation and world, and to make recommendations on the supply, use, recovery, and disposal of materials.[17]

The only consequence of that Act was the formation of the National Commission on Materials Policy, which based its 1973 report, "Material Needs and the Environment Today and Tomorrow",[18] on the underlying assumption that there is no insurmountable contradiction between growth, production and commerce, and the need to protect the environment. In its attempt to achieve balance, emphasis was placed on the supply side of minerals: The importance of domestic development and the role of the private sector; the necessity of access to public lands; and the need for improved technology. Like the Paley Commission, the National Commission on Materials Policy made strong recommendations that government must improve its analytical capabilities. It also recommended that Congress specifically require compliance with the Mining and Minerals Policy Act of 1970, and that the President require executive agencies to adhere to that Act in administering their programs—just as they are required to adhere to the National Environmental Policy Act. Nevertheless, the Commission's 198 recommendations were mainly on the side of conservation, recycling, and more government controls, all in an enveloping thesis of government planned and controlled growth.

In its one-sided enthusiasm for control because of past environmental imbalances, the Commission did not foresee and perhaps could never have foreseen the future imbalance so heavily weighted on the side of unreasonable governmental controls, an imbalance which now is adversely affecting the development and production of domestic minerals. Neither did it foresee the effect of the then-developing lag in new capacity worldwide, a factor in the mineral shortages of 1973–74. The Commission's conclusion regarding environmental protection—"existing legislation is neither extensive enough in scope or powerful enough in sanctions to induce the social response desired"—is a key to its perception of balance.

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[16] Page 2 of the "Report of the President's Cabinet Committee on Minerals Policy" was transmitted to President Eisenhower on November 30, 1954, (20 p.) by the Secretaries of the Interior, State, and Commerce and the Director, Office of Defense Mobilization. Clearly these four officials were assigned this responsibility so as to assure a cohesive minerals position, which, representing the various perspectives of foreign policy, domestic policy, and national security policy, provided a coordinated effort to carry it out.

[17] National Materials Policy Act, section 202. This Act is the separately titled section 201 of the Resource Recovery Act of 1970 (P.L. 91–512).

[18] Material Needs and the Environment Today and Tomorrow, Final Report of the National Commission on Material Policy, Superintendent of Documents, Washington, D.C., June 1973.

Like the Paley Commission, the National Commission on Materials Policy recognized the role of foreign supplies and the need to rely on market forces, but at the same time it recommended that when dangerous and costly reliance upon imports appears the outcome of trends, Government must intervene. Inconsistence appears in the Commission's treatment of the national security aspects of commodity policy. It makes the startling observation that "Net imports represent only U.S. acquisitions, not U.S. dependence" [19] when it subsequently states that it is not possible to gauge the implications of large net import reliance of individual strategic minerals on the national security. This conclusion is particularly surprising when in the year of the Commission's report (1973), the Nation embarked upon a self-imposed learning process of the relationship between oil dependence and national security.

National Commission on Supplies and Shortages

In 1974, the National Commission on Supplies and Shortages was established by an Act which bore that name.[20] Passed after the 1973–74 oil embargo and during a period of worldwide commodity shortages, the Act, for the first time, contained a legislative reference to shortages, dependency, and foreign disruptions. The Commission's 1976 report, "Government and the Nation's Resources",[21] like other studies, refuted the Club of Rome's gloomy forecast of impending resource exhaustion; however, it also concluded that the United States should not become overly concerned about the continued growth of imports.

The report's basic thrust was that government must take a more active role in minerals policy by improving its information base and analytical capabilities and by increasing its role in research and development, and recycling. The causes of the severe widespread mineral shortages of 1973–74 were laid to the worldwide surge in demand beginning in 1972, the shortage of productive capacity, and the buildup of industrial inventories.

The report of the Commission on Supplies and Shortages was a study of international peacetime minerals supply, which reflected a mood of an increasingly interdependent world motivated in large part by the new demands of developing countries for a "New International Economic Order." The report saw little need for the United States to become concerned with foreign embargoes, cartels, or sustained-price

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[19] This observation was a manifestation of a developing world-interdependency element of U.S. commodity policy that views U.S. dependence not from the perspective of dealing with the realities of international trade, but from the political perspective of world order economics. Earlier, it, in part, saw improved United States-Soviet relations facilitating U.S. access to Russian minerals. Interdependence theorists see the need for integration of economic systems and collective security over unilateral security. The underlying theme, in the name of equality, would preclude freedom of action that states have claimed in the area of sovereign independence and thereby proposes the acceptance of loss of economic autonomy. Growing U.S. foreign mineral dependency was not cited as an issue in reports of the Secretary of the Interior under the Mining and Minerals Policy Act after the second report of 1973. The next report, issued in 1975, contained the statement that import trends should not cause alarm because "problems arise only when foreign sources become unreliable." For a foreign policy analysis of interdependence versus traditional economic concepts, see James A. Nathan and James K. Oliver, "The Growing Importance of Economics: Can the United States Manage this Phenomenon," Evolving Strategic Relations, Implications for U.S. Policymakers, The National Defense University, Fort McNair, Washington, D.C., 1980, pp. 73–99.

[20] National Commission on Supplies and Shortages Act of 1974. Enacted as section 720 in the Defense Production Act Amendments of 1974 (Public Law 93–426).

[21] Government and the Nation's Resources, Report of the National Commission on Supplies and Shortages, Superintendent of Documents, Washington, D.C., December 1976, 211 pp.

manipulations.[22] It concluded that any significant shortages in the next quarter century would result from short-run shocks producing shifts in supply or demand that would exceed the immediate response capabilities of industry. More international investment in mineral development was the solution proposed.

Despite its title, the Commission's report failed to address the benefits of domestic production—which have greatly aided America in managing its vulnerabilities—or the consequence of problems that affect that production.[23] The Commission passed over the national security implications of over-dependence with such parenthetical phrases as "Aside from keeping the national security in mind." Almost paradoxically, the report warned that the United States must be able to protect itself against the effects of actual or threatened disruptions, recommending economic stockpiles as an appropriate devise. The Commission's recommended solution was that of a broader perspective for government policy—best accomplished from the Executive Office of the President. Perhaps the major flaw in the study of the National Commission on Supplies and Shortages is that it leaves the impression that more information and analyses will somehow solve problems. This same theme was later developed rather extensively during the Nonfuel Minerals Policy Review.

Conclusion

There have been no less than 20 mineral or material policy studies that have been prepared or commissioned by one governmental agency or another, as well as others prepared for groups outside government. Additional studies have examined at least some part of mineral policy questions. Although many studies reflected some particular outlook or condition, all adopted as a universal starting point the national significance of adequate mineral supplies and the importance of a strong domestic industry. All agree, to a greater or lesser extent, that foreign imports provide least-cost benefits to the consumer. At the same time, most see the pitfalls of import dependency and how such dependency forfeits freedom to make political, economic, and defense decisions. All strongly urge better governmental analytical capability and improved means of integrating information into a comprehensive picture portraying the synergistic impacts of governmental policies or actions upon industry and, beyond that, the broad national interest. In more recent reports, recycling and conservation receive more atten-

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[22] The National Materials Advisory Board stated (Contingency Plans For Chromium Utilization, National Academy of Sciences, 1978, p. 18) that this and other conclusions by the National Commission on Supplies and Shortages were unjustified with respect to chromium. Further, the NMAB said:

"Experts on international trade frequently state that ultimately economic forces prevail and that as long as deposits are plentiful, dislocations tend to be short-lived since the economic needs of the exporters and importers are brought into balance. However, during the period that extends from the perception of a change in the marketplace to the time in which the new balance is realized, many severe problems can, and often do, occur. *Failure to appreciate the unique strategic characteristics of chrome to U.S. industry only intensifies the criticality of the situation and works against developing long lead-time technologies, stockpiles, or international agreements that may avoid economic dislocations.*" (Emphasis Supplied.)

[23] One of the strong recommendations made by the Commission was to eliminate the percentage depletion allowance for domestic mining. However, in identifying this incentive as a subsidy, the Commission did not compare, overall, U.S. versus foreign incentives (or subsidies). Similarly, in describing the vagaries of the market system, it did not determine, if with elimination of the allowance, the U.S. would weaken its "relatively self-contained economy," promoting further dependence and increasing the likelihood of repeating the 1973–74 situation.

tion and a progressively stronger case is made for increased government participation in development of long range technological innovation.

The most obvious conclusion that can be drawn from the various reports on mineral policy is the correctness and utility of the Mining and Minerals Policy Act. Congress in 1970 placed upon the Secretary of the Interior full responsibility for understanding the nature and state of the mining and minerals industry and for its promotion and encouragement through liaison with other Federal agencies. The decline of America's mineral producing capabilities and all that it portends is not the result of the law's lack of specificity, but rather a deficiency on the part of those who have failed to understand its importance. Congress too has played a role in the decline of America's mineral capabilities. Because of its fragmented policy process, Congress has failed to provide oversight, has not sought to understand how other legislation negatively affects the production of minerals, and has failed to check executive initiative oriented only toward other, and often conflicting, policy goals.

Another conclusion to be drawn from the reports of the last 10 years, is that they have made no imprint on the formulation of executive policy, which, out of a concern for the attainment of other national goals has given little or no priority to the Nation's minerals. Few have yet to realize that, whether in the pursuit of improvements in the quality of the environment, assistance for developing countries in their attaining larger shares of the earth's resources, or achievement of no growth or a lower living standard for the United States, any group of actions that by cumulative impact weaken America's ability to produce its minerals will exact a price that the citizens of this country may well not want to pay. In the case of energy, Americans have already learned the cost of subordinating U.S. interests to those of others and have concluded that the cost is too great. It is likely that, should the past for energy prove to be a prologue for nonfuel minerals, United States citizens will reach that same conclusion once again. The question remains—will its government?

THE MINING AND MINERALS POLICY ACT OF 1970

Introduction

No study need prove what history has already demonstrated—that a society's ability to produce minerals is an invaluable economic asset. Neither is it necessary to show that the economic system and military strength of the United States have unquestionably benefited from a strong and reliable minerals industry. One need simply review the heated policy debates that took place throughout the 1940's, before World War II had even ended, to understand the pragmatic relationship between minerals, the national security and the industrial base.

Many laws directly or indirectly affect domestic production of nonfuel minerals, their movement in trade, and, at times, their subsequent use, and as such constitute aspects of minerals policy. However, in the past government's most direct role in mineral policy implementation has been in reaction to the massive mineral requirements for wartime

or to major unforeseen changes in external supply. During the late 1940's and through the 1950's, the emphasis on strategic and critical mineral stockpiling and increased production from both domestic and foreign sources was a product of lessons learned from two major wars and from the Soviet mineral cutoff of 1950. Despite this rather traditional approach of government to mineral policy, forces were at work through the late 1950's and 1960's which would lead Congress to the conclusion that a broad approach and perspective was essential. When Congress enacted the Mining and Minerals Policy Act in 1970, after 12 years of effort, it adopted a policy that was thought to provide a means of addressing not only the changes in reliability of foreign supplies but, more importantly, to establish a national value of domestic production. The 1970 Act is, on its face, simply a statement of fundamental principles and objectives that establishes and was intended to establish a set of Congressional priorities against which the executive is to weigh other objectives and proposed actions. The Congress thus declared that while, mining and mineral activities lie solely within the private sector, the Federal Government is responsible for fostering and encouraging those activities.

Except for the declaration that the domestic minerals industry be economically sound and stable, and that domestic resources be developed in an orderly and economic manner, the 1970 Act does not provide, nor does the legislative history suggest, that other national policies automatically yield to the needs of the mineral industry. Nevertheless, the Congress clearly intended that individual and collective impacts on the mining sector of other national priorities be completely and carefully evaluated in full recognition both of the importance of mining and of the consequences of contemplated Federal actions.

Legislative History

As the 91st Congress began its deliberations in 1969 regarding the Mining and Minerals Policy Act, a number of warning signals had already been given, and a combination of economic and political circumstances were already in position that would soon foster a worldwide lag in new mineral capacity. Lack of investment capital caused by an extended period of low profits; investment uncertainties caused by higher interest rates, inflation, and a weakened dollar; higher capital requirements and continuing delays caused by compliance with environmental and health and safety regulations; market uncertainties caused by stockpile releases; and investment uncertainties overseas caused by nationalization all contributed to the growing shortage in new capacity—a shortage which would be a major factor in the extraordinary price increases of 1973–74. Someone in the executive, reasoned Congress, had to monitor the situation:

> The function of a number of agencies of the Federal Government affect minerals and mining directly and indirectly, including international relations, foreign trade, taxation, and air and water pollution, to name a few. Yet there is no stated policy or overall set of guidelines by which their actions can be coordinated.[24]

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[24] United States Senate, Interior and Insular Affairs Committee, Establishing A National Minerals Policy, Rept. No. 91–390, Sept. 3, 1969, p. 2.

Yet, Congressional concern was not limited to the absence in the executive of a minerals advocate or a national minerals policy. The Congress, as early as 1969, recognized the growing body of Federal statutes which forewarned of a cumulative adverse impact upon America's ability to produce and process its minerals:

> There are myriad Federal laws that affect the mining and minerals industry, but each was passed to meet a particular problem or purpose, and usually, the overview of the direction of the minerals industry was not considered. As a result, some of the actions taken were counterproductive of the objectives of this measure. (This Act) would give clear direction to the executive branch of Government in its implementation and coordination of these laws.[25]

Recognition of the critical role of minerals and the absence of a national minerals policy was not limited to Congress. The Secretary of the Interior in a July 9, 1969, letter to the Senate Committee on Interior and Insular Affairs provided the views of the Administration:

> . . . the Government has a variety of obligations and a significant supporting role as our security and overall economic well-being depend upon the continued availability and an adequate and dependable flow of mineral raw materials."
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> No overall single solution applies to the national problem of mineral supply, but generally accepted positions exist on essentially every facet of this complex subject . . . the principal and most important element is recognition of minerals as being critical and essential to the Nation's economy and security. . . . It seems safe to assume that this position will continue to prevail and gain in significance.[26]

A national minerals policy, long absent from United States statutes, was provided by the passage of the Mining and Minerals Policy Act of 1970. That such was the case seems beyond question:

> The purpose of (this Act) . . . *is to establish a broad overall national minerals policy with particular emphasis on the need for an economically sound and stable domestic mining and minerals industry.* (Emphasis supplied.)
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> * * * * * * *
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> Both the Government and private industry must assume their proper role and responsibility if progress is to be made towards a long-range minerals program. Congress must provide the necessary legislative tools; the *executive branch must act vigorously and aggressively to implement the policy;* and private industry must assume its responsibility in the extraction, production and fabrication of raw materials into finished products. *Enactment of (this Act) would accomplish the first step in this three-step process.* (Emphasis supplied.)
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> (This Act) is not the first effort to establish a national minerals policy. Previous attempts were largely unsuccessful due to the complexity of the problem and lack of accord on the substance of the proposals. This Committee recalls that in 1959 it held extensive hearings and that Congress passed House Concurrent Resolution 177. This expressed, as the sense of the Congress, the need for a strong domestic mining and minerals industry and called for increased emphasis on research, technology, and programs to maintain a sound and vigorous domestic minerals position. However, as House Concurrent Resolution 177 did not have the force of law it was *largely ignored by all subsequent administrations.* (Emphasis supplied.)
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> This Nation can no longer afford to ignore this Nation's needs for a long-range national minerals policy. *It is with a sense of urgency that* favorable action on this legislation is recommended. (Emphasis supplied.)[27]

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[25] Ibid.
[26] Ibid., p. 10–12.
[27] House of Representatives, Interior and Insular Affairs Committee, Establishing a National Mining and Minerals Policy, Report No. 91–1442, Sept. 9, 1970, p. 2–5.

The Mining and Minerals Policy Act: A Comparison

Despite its brevity and apparent simplicity, the Mining and Minerals Policy Act of 1970 establishes national minerals policy while providing an effective and meaningful vehicle for implementing of that policy. As will be seen, what has been lacking for 10 years is neither policy nor effectuating tools but rather desire and will.

Entitled "(a)n Act to establish a national mining and minerals policy", it provides:

> The Congress declares that it is the *continuing policy* of the Federal Government in the national interest *to foster and encourage private enterprise in* (1) *the development of economically sound and stable domestic mining, minerals, metal and mineral reclamation industries,* (2) *the orderly and economic development of domestic mineral resources,* reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security and environmental needs.... (Emphasis supplied.)[28]

The responsibility for advancement of the national minerals policy was to be that of the Secretary of the Interior:

> It shall be the responsibility of the Secretary of the Interior *to carry out this policy* when exercising his authority under such programs as may be authorized by law other than this Act. (Emphasis supplied.)[29]

The manner in which the Secretary was to act in carrying out his responsibility was made clear in the Senate Report:

> The responsibility for carrying out the provisions of (this Act) is assigned to the Secretary of the Interior thus placing *primary, overall responsibility on a single Cabinet Officer* and assuring Congress of a direct source of advice and counsel as to attainment of the (Act's) objectives. (Emphasis supplied.)[30]

Notwithstanding the clarity of the statutory language of the Act and the fundamental purpose of its accompanying legislative history, the Department of the Interior has chosen, for a full decade, to abdicate its assigned role and responsibility. Interior has a long record of benign neglect regarding the mining and minerals industry. However, its confession of powerlessness to deal with the woes confronting that industry is of recent vintage:

> Contributing to the ad hoc, unstructured nature of the policymaking process is the *lack of a formal, operational statement of U.S. policy on nonfuel minerals.* Without such a statement of national policy—with goals broad enough to permit flexibility, and with programmatic authorizations specific enough to be operational—there is no standard against which other national policies can be judged. This void creates uncertainty as to whether a particular land use, foreign policy, environmental regulation, tax change, etc. is supportive of or contradictory to the goals of a minerals policy.[31] (Emphasis added.)

That denial of authority, which emanated from the Nonfuel Minerals Policy Review documents, was repeated by the very individual and position in whom such power was properly vested in the Mining and Minerals Policy Act—the Secretary of the Interior. In what must surely be a rare, if not solitary, instance of a government official denying to himself the authority that others would contend he had been granted, the Secretary declared the Act to be but an empty shell:

> I also want to note that, while P.L. 91–631 makes the declaration of a "Federal Government" policy, the only specific mandate within that Act is to the Secretary

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[28] P.L. 91–631.
[29] Ibid.
[30] Op. Cit. See Footnote 24, p. 2.
[31] "Background Papers: Draft for Public Review and Comment on the Report on the Nonfuel Minerals Policy Review," August 1979, p. VI–12.

of the Interior. That mandate is twofold. First, it requires that I submit an Annual Report to the Congress. Second, it requires me to carry out the policy objectives set forth in the Act in "exercising authority under such programs as may be authorized by law other than this Act." The Act does not provide to the Secretary of the Interior any authority or supervisory responsibilities over other Federal Departments as they exercise their authorities in carrying out responsibilities which affect minerals policy. This is a very critical distinction and one that must be clearly understood.[32]

The denial of statutory authority and the resultant abdication of assigned responsibility under the Mining and Minerals Policy Act of 1970 lies in sharp contrast to the approach taken by the executive with regard to similarly amorphous, relatively ill-defined authority present in other statutes. Two examples provide an illustrative comparison.

The National Environmental Policy Act of 1969 simply required "a detailed statement . . . on the environmental impact of the proposed program" regarding "major Federal action significantly affecting the human environment." It is unlikely that Members of the 91st Congress, in the adoption of the National Environmental Policy Act, envisioned the huge growth that has accompanied that simple duty incumbent upon Federal officials under 102(2)(c) of that Act.

Interestingly, that obligation carried with it no particular policy objective other than a directive to "include . . . a detailed statement" on the impacts of and alternatives to Federal action. Yet from that simple responsibility sprang full bloom over the past decade a vast system of interlocking and overlapping environmental impact statements costing millions of dollars annually and subjecting every Federal decisionmaker to the will and whim of the Council on Environmental Quality. The wisdom of that system is not at issue in this context. What is significant is the comparison between the regulatory growth that accompanied "include . . . a detailed statement" in the National Environmental Policy Act and the administrative abdication that resulted from "foster and encourage" in the Mining and Minerals Policy Act. It is of considerable significance, not simple irony, that both acts were passed within a year of each other, during the same Congress and dealt with what, then as now, are commonly viewed as the basic adversaries in land management issues: natural resource development versus environmental protection. What the National Environmental Policy Act was and became regarding the latter, the Mining and Minerals Policy Act was to have become relative to the former. The slip between the statutory cup and the regulatory lip was not just the result of an absence of will and commitment. It was a matter of preference.

A second and highly analogous comparison proves instructive, this time between the Mining and Minerals Policy Act and the Clean Air Act of 1967. The concept of "Prevention of Significant Deterioration" adopted as statutory design in the Clean Air Act Amendments of 1977 had its origins not in statutory mandate but in the phrase "protect and enhance" contained within the preamble of the 1967 Act. It was this simple phrase which the predecessor to the Environmental Protection Agency built into a regulatory scheme with which State compliance was mandatory. Subsequently, that position was upheld by

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[32] Letter to the Chairman, Mines and Mining Subcommittee, Interior and Insular Affairs Committee, from the Secretary of the Interior, September 12, 1979.

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the District Court for the District of Columbia and in 1977, for the first time, was enacted totally in statute.[33]

The conclusion to be drawn from the above analysis and comparisons—others of which can be made easily [34]—is that but for the lack of an aggressive concern for the future of the Nation's mining and mineral industry, there would exist a regulatory scheme implementing a national minerals policy—Public Law 91–631. Unfortunately, that implementation has not taken place.

Thus in the face of an unequivocal Congressional directive to do so, the Interior Department has made no effort to develop a system for identifying, quantifying, and evaluating the impact of proposed Federal actions on the Nation's nonfuel minerals resources. The result is that minerals now stand alone as the most neglected U.S. renewable and nonrenewable resources not to mention national policies.

Annual Reports Under the Mining and Minerals Policy Act

Of the several important responsibilities imposed upon the Secretary of the Interior by the Mining and Minerals Policy Act none is as openly acknowledged and accepted as the requirement for an annual report to Congress. Nonetheless, the quality of these reports has been uneven and in recent years they have degenerated to the point of being nearly useless.

The First Annual Report, submitted to the Congress in March 1972, was a strong initial effort to isolate the issues and to establish some direction toward the accomplishment of the objectives of the 1970 Act. That report indicated with concern the widening gap between domestic demand and domestic production of both fuel and nonfuel minerals—thereby the resulting significant increase in imports from 1950 through 1971. In addition, that report pointed out that domestic exploration had fallen off, the availability of skilled manpower had declined, technology was not keeping pace with requirements, and minerals research was lagging. Among its recommendations was the amending of the antitrust laws to permit joint ventures for mineral research.

The Second Annual Report (June 1973) again emphasized that the development of domestic mineral reserves was not keeping pace with demand despite the Nation's vast resources. Indicating that United States mineral exploration had continued on its downward trend during 1972, the second annual report projected that the increasing fuel and nonfuel mineral trade deficit could well reach $100 billion by the year 2000.

Congress did not receive an annual report in 1974 as a result of a policy disagreement within the Department of the Interior. That policy disagreement pivoted about whether or not the government should be concerned with the health of the private mineral sector and

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[33] The complete discussion appears in W. P. Pendley and J. M. Morgan, "The Clean Air Act Amendments of 1977: A Selective Legislative Analysis", Land and Water Law Review, Vol. XIII, No. 3, University of Wyoming College of Law, p. 747–812.

[34] The Department of the Interior Solicitor Opinion of June 25, 1979 regarding federal-state relations in western water asserted an unheard of federal right to unappropriated western water based almost solely upon the "purposes" section of the Federal Land Policy and Management Act of 1976. Despite the absence of any other statutory authority and in the face of language preserving the "status quo" regarding western water, the Solicitor finds ample authority for the taking of western water without observing state substantive or procedural law.

the increase in mineral imports. The disagreement resulted in a shift in policy that was obvious in the Annual Report of 1975 in which there was no sense of the prior urgency concerning imports. The Comptroller General had this to say about the 1975 report:

> Despite the trend of increasing dependence on imports. Interior shifted its position from earlier reports by stating in the third Annual Report that the import trend by itself should not cause alarm; problems arise only when foreign sources become unreliable. Thus, the Department's apparent sense of urgency shifted from a focus of gross levels or amounts of imports to one of focus on the political factors involved in decisions to import.[35]

The shift away from concern over increasing foreign dependence reflected the influence of advocates of world interdependency policies, a concept developed in resonance with the wide-sweeping demands of the developing nations. It also reflected the parallel growth of policies and attitudes within the Department of the Interior in opposition to mining. The conclusion in the Department of the Interior's 1975 annual report was that the United States should not be alarmed with increasing imports since "problems arise only when foreign sources become unreliable." This is a remarkably shortsighted view that fails to contend with persistent and intensifying vulnerabilities of the United States economy in the face of increasing politicization of the world's raw materials.[35a]

The 1976 and 1977 annual reports reestablished an honest effort to identify the urgency of the problems affecting long-range domestic supplies and the serious implications of removing Federal lands from mineral development. Although these reports acknowledged the responsibility and the intent of the Department of the Interior to execute effectively the 1970 policy, no legislative recommendations were forwarded to Congress as a solution to the problems foreseen.

Unfortunately, the annual reports of 1978 and 1979 took a decided turn for the worse and were clearly inferior to the earlier efforts. Essentially, these two reports covered the same ground as the previous reports regarding domestic production, consumption, and mineral prices. However, they showed little concern for long range production, national mineral adequacy, or for the national policy under which they were prepared. Written at a time when major segments of the mining and mineral industry were having serious difficulties remaining financially viable, the annual reports of 1978 and 1979 failed to address the significance or dangers of that situation. In fact, the only legislative recommendation made was for repeal of the 1872 Mining Law. Interestingly, the most positive statements made regarding domestic mineral development were in explanation of the need for the Nonfuel Minerals Policy Review initiated in December 1977.

Perhaps no single action by the Department of the Interior illustrates its abdication of the Mining and Minerals Policy Act of 1970 as do the annual reports issued under that statutory mandate. Initially comprehensive and at least willing to acknowledge the duties and

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[35] "Need to Develop a National Non-Fuel-Mineral Policy", General Accounting Office. RED–76–86. July 2, 1976, p. 7. The Comptroller General pointed out that the dollar ratios of mineral imports to domestic production had changed from 1.13 to 1.7 over the period of 1971 through 1974.

[35a] None of the annual reports following the first two raised the question of U.S. dependency as a fundamental commodity issue for consideration in economic and national security policies. Instead, present policy assumes that increased monitoring of mineral commodities for the purpose of taking action when shortages occur is a preferable option to making corrections for underlying problems as necessary to forestall shortages.

responsibilities assigned under the Act, the last two reports degenerated into a perfunctory and totally unsatisfactory fulfillment of the form but not the substance of the requirements of the Act. As dismal as has been the Department's performance regarding the implementation of the Act's "foster and encourage" language, the Department's compliance with the reporting requirements has been little better. It is long past time for the Department to take seriously the Congressional mandates of the Mining and Minerals Policy Act of 1970.

Independent Analysis—General Accounting Office Conclusions

Over the past 4 years the General Accounting Office, an independent investigative arm of the Congress, has reviewed in a number of studies the implementation of the Mining and Minerals Policy Act by the Department of the Interior. The conclusions of the General Accounting Office are as disturbing as they are instructive.

On July 2, 1976 in a report entitled, "Need to Develop a National Non-Fuel-Mineral Policy", the Comptroller General found that there existed a "basic responsibility of the Secretary of the Interior to identify requirements for achieving a coherent national policy regarding nonfuel minerals." In regard to that statutory directive, the Comptroller General recommended that the Secretary:

> Identify and evaluate laws and agency programs that affect maintaining and developing a sound and stable domestic mining and minerals industry,
>
> Weigh the trade-offs between the purposes of such laws and the Mining and Minerals Policy Act, and
>
> Advise the National Commission on Supplies and Shortages, the Administration and the Congress, of changes in the regulations and/or pertinent legislation believed needed to strengthen development of a coherent national mineral policy.[36]

On April 19, 1979, in a report entitled, "Learning to Look Ahead: The Need for a National Materials Policy and Planning Process", the Comptroller General once again warned the Congress that there existed an immediate need for a process—at the highest levels of government—to prevent economic shock resulting from rapid changes in price and supply of strategic materials or to offset their severity. The Comptroller General concluded that it was a proper purpose of the government:

> . . . to improve public awareness of the fact that materials affect America's national security, its economic performance, and the quality of its citizens' lives.
>
> * * * * * * *
>
> Even though materials are central to America's industrial health and economic welfare, the Federal Government has never given materials availability the serious, sustained attention it deserves.[37]

On October 31, 1979 in a report entitled, "The U.S. Mining and Minerals Processing Industry: An Analysis of Trends and Implications," the Comptroller General further documented the apparent absence of concern by the executive regarding the fate of the Nation's mining and minerals industry. Describing in considerable detail the causes of the declining position of the domestic industry, that report

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[36] Op. Cit. See footnote 32, pp. iii and 13.
[37] Learning to Look Ahead: The Need for a National Materials Policy and Planning Process, General Accounting Office, EMD–79–30, April 19, 1979, p. 1, 49.

concluded that although the 1970 Act did not provide for a formal mechanism to achieve its objectives, "The Congress expected that, because of the Act, questions would be answered regarding the permissible degree of dependence of foreign supplies, import and export of minerals, stockpiling for emergency situations, taxation, manpower, health and safety and environmental quality, and U.S. capability to supply its domestic needs." [38]

Conclusion

Perhaps a fitting conclusion to this discussion of the Mining and Minerals Policy Act of 1970—its impetus, its legislative history, its administrative failure—is given in the following quotation from the Department of the Interior's letter reviewing the October 31, 1979 Comptroller General's report: "(Because)) the GAO report expresses concern that the minerals production is declining and imports are increasing . . . the report would benefit from a definition of competitiveness and a discussion of its importance (since the Mining and Minerals Policy Act) does not express concern about reliance on imports.[38a] As the General Accounting Office noted in rebuttal, "The Senate Report on the Act states that 'As we permit our Nation to become more and more dependent upon foreign sources for materials . . . we tend . . . (to) encumber our foreign policy and limit our freedom of movement within the family of nations.' " [38b]

It was that very concern, in fact, which provided the impetus for the 1970 Act—a fear that in the face of other policies, or worse, in the face of national administrative apathy—America's mining and minerals industry would be weakened, forcing the United States to depend upon uncertain, unstable or unfriendly sources. Unfortunately, the greatest legislative fear of 1970 has come to be the administrative reality of 1980.

Clearly, it is not in the national interest for the government to attempt to smooth out cyclical fluctuations in the minerals markets, because that is part of competitive risk-taking inherent in the free market system. Likewise, the government should not interfere with the industrial system's handling of materials flow unless justified by an overwhelming national interest. Generally, industry has not looked to government for protection from imports except when government by its own action makes competition difficult, if not impossible, or when foreign producers operating outside the market system take unfair advantage of United States producers. It is well recognized that total self-sufficiency in minerals is not only inefficient but impossible, except in narrow circumstances when justified by strategic requirements that override economic disadvantages.

This Committee seeks what the national interest demands and what the Congress mandated in 1970: a verification by the Federal Government that domestic mineral development is important, that a climate in which industry can compete must be fostered, and that government's

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[38] The U.S. Mining and Minerals Processing Industry: An Analysis of Trends and Implications, General Accounting Office, ID–80–04, October 31, 1979, p. 68.
[38a] Ibid, p. 83.
[38b] Ibid.

other policies that adversely affect mining must be reviewed for reasonable corrections by legislative or administrative action. This does not necessarily involve tariffs, subsidies, or other financial crutches, but at the very least it would include the creation of an atmosphere of encouragement rather than discouragement.

The Department of the Interior with its preeminent concerns for other resources, has been woefully negligent in the performance of its responsibilities regarding the Nation's minerals. The Department has blatantly ignored the findings and recommendations of numerous expert studies on minerals policy over the past 30 years and has abdicated its responsibilities in implementing the single existing Congressional statement of national mineral policy—the Mining and Mineral Policy Act of 1970.

THE NONFUEL MINERALS POLICY REVIEW

Introduction

On December 12, 1977, the President of the United States announced the initiation of a cabinet-level Nonfuel Minerals Policy Review. The review was his response to a February 7, 1977, letter from 43 Members of the House of Representatives expressing deep concern regarding the direction of government policies that were adversely affecting the Nation's production of nonfuel minerals, the failure of the Department of the Interior to implement the Mining and Minerals Policy Act of 1970, and the need for a special minerals advisor in the Executive Office of the President. In the interim, on June 6, 1977, several of these 43 Members of Congress met with the President to review the long-term realities of the Nation's deteriorating mineral position.

The December 12, 1977, announcement, which assigned project responsibility to a Cabinet-level Policy Coordinating Committee under the chairmanship of the Secretary of the Interior, appeared to provide more than adequate assurance to the Congress that the effort would be given high priority within the Administration. Designated members of the Policy Coordinating Committee were Secretaries of the Interior, Commerce, State, Treasury, and Energy; Administrators of the Environmental Protection Agency and General Services Administration; Director of the National Science Foundation; Assistant to the President for National Security Affairs; Chairman of the Council of Economic Advisors; Special Representative for Trade Negotiations; Chairman of the Council of Environmental Quality; Director of the Office of Management and Budget; and Director of the Office of Science and Technology Policy.

The Review

The President, through his Assistant for Domestic Affairs and Policy, issued a directive on December 12, 1977, to the Policy Coordinating Committee, which specified that a project management plan was to be completed within 6 weeks, and that options and recommendations for Presidential consideration were to be completed

within 15 months (August 1979). The "serious concerns" outlined for study in that memorandum were identified as:

> Whether the trends toward international interdependence and the politicization of certain minerals markets are increasing U.S. vulnerability to foreign supply curtailments and price manipulations;
>
> Whether U.S. reserves, production capacities, and inventories are adequate to deal with possible supply/price interruptions, or with the economic and social consequences of such disruptions;
>
> Whether the economic health of the domestic minerals industry is adequate, as reflected in energy costs and supplies, investment, transportation, manpower, and other factors related to the structure and vitality of the industry;
>
> Whether land use decisions are based on adequate minerals information and analysis;
>
> Whether current tax laws favor the use of raw minerals over recycled minerals or encourage substitution and other conservation practices;
>
> Whether current government regulations adequately protect the environment, health, and safety while not unduly affecting the supply and price of minerals;
>
> Whether minerals policies adversely affect U.S. trade posture and balance of payments; and
>
> Whether existing government policy analysis, data analysis, and data collection functions are adequate to support federal decisionmakers responsible for formulating, implementing, and monitoring nonfuel minerals policies.

According to the memorandum the Nonfuel Minerals Policy Review had two basic objectives:

> (1) to prepare for Presidential consideration a set of policy options, analyses, and recommendations on specific issues and problems relating to nonfuel minerals; and (2) to develop, test, implement, and provide for the continuing use of a policy analysis framework which federal policymakers can use to update and expand the analysis in the study as needed in the future.

The Project Plan of June 1978 [39] outlined in detail the scope, organization, and work assignments of 14 Federal departments and agencies that were to be involved in the project, scheduling completion of the Problem Analysis by December 1978 and the Policy Analysis by August 1979. The plan identified 12 representative minerals for detailed examination of problems affecting their availability. The 14 departments and agencies were assigned specific tasks in the following nine problem areas:

1. Major mineral supply problems;
2. Availability of foreign minerals to the United States and its allies;
3. Relationship of environmental quality, health and safety, and price and availability of minerals;
4. Mineral resource potential of Federal lands;
5. Financing, capital formation, and tax policies;
6. Competitiveness of the U.S. minerals industry;
7. Conservation, substitution and recycling;
8. Adequacy of minerals-related research and development; and
9. Adequacy of existing government capabilities to support Federal policymaking.

Deleted from the scope of the Presidential review were a number of critical issues directly affecting the matter of mineral availability. The issues excluded "because they had already been analyzed by the Administration and positions had been developed" were 1) Alaska land

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[39] Five months behind the Presidential schedule.

withdrawals under Section 17(d)(2) of the Alaska Native Claims Settlement Act, 2) revision of the 1872 Mining Law, 3) deep seabed mining legislation, 4) the "trigger" price mechanism for steel imports, and 5) the strategic and critical stockpiles.

Under the direct supervision of the Assistant Secretary for Energy and Minerals—acting for the Secretary of the Interior—7 days of technical forums were held in Denver, Colorado, and Washington, D.C. between September 19 and October 5, 1978, at which 56 knowledgeable representatives of various segments of industry and research organizations presented detailed testimony on the nine problem areas. Ten months later, after completion of the Problem Analysis and the publication of the document, "Report on the Issues Identified in the Nonfuel Minerals Policy Review," 42 representatives of industry, universities, and environmental groups provided public comments during 3 days of hearings (September 26–28, 1979) that were conducted in Los Angeles, Denver, and Washington, D.C.

Hearings and Conclusions

The House Committee on Interior and Insular Affairs held oversight hearings from April through December 1979 at which the Department of the Interior and other agencies testified regarding the manner in which the various problem areas were being reviewed and the direction of the review itself. On several occasions when deadlines were missed, this Committee stressed that the imperative was not time but substance.

Based on the final product of the Problem Analysis, the August 1979 "Report on the Issues Identified in the Nonfuel Minerals Policy Review", however, it must be concluded that neither time nor substance was imperative to those in the executive conducting the review. The entire effort was a tragic waste that cost American taxpayers about $3.5 million and the loss of some 13,000 person-days. Of the 42 witnesses who testified on the "Report on the Issues" at the Administration's September 1979 hearings, none considered the final product adequate. In fact, nearly every witness stated that report should be withdrawn and completely redone.

The Committee also received testimony from experts representing producing and consuming mineral industries, academia, and private consultants and institutions. To a witness, these experts took issue with the findings of the Department of the Interior.

Initially, hopes were high within the Congress regarding the Nonfuel Minerals Policy Review. For the first time, executive departments and agencies whose authorities and responsibilities affect directly and indirectly the availability of America's strategic and critical minerals had been given the opportunity, under a directive of the President, to attempt to solve and reverse this Nation's growing mineral supply problems. The review provided an ideal mechanism for the executive to examine the host of problems regarding this issue from the divergent viewpoints of the various domestic and foreign policies so as to determine the direction necessary in the years ahead to maintain the strong mining industry. In effect, the project was a concerted undertaking by the executive of what the Congress had intended to be a continuing responsibility of the Secretary of the Interior when in 1970 it passed the Mining and Minerals Policy Act.

Although dedicated efforts were made by many employees of individual agencies, the Nonfuel Minerals Policy Review was doomed from the outset because of the lack of priority given to it by the Administration. Some departments and agencies saw little reason to participate, and thus did not, while most saw only their own goals as paramount.[40] In the end, the review became essentially a Department of the Interior product. The enigma of its failure is that the primary responsibility of national minerals adequacy lies with that department as provided by the 1970 Act, the same department with the primary responsibility for the Nonfuel Minerals Policy Review. This failure also highlights the deficiencies of the Administration's Domestic Policy Review System, which was established in the Office of the Assistant to the President for Domestic Affairs and Policy to coordinate major national economic issues the first of which was the Nonfuel Minerals Policy Review.

The Nonfuel Minerals Policy Review went nowhere. Although a great deal can be written on shortcomings of the "Report on the Issues"—even in meeting its own objectives—its deficiencies may be summarized as follows. The report:

> Fails to come to grips with the need for hard decisions on problems, impacts and interrelation for the national good. The evidence presented is so equivocal that explicit interpretation is impossible as to the magnitude or relative importance of problems or whether solutions are possible or even worthwhile;
>
> Fails to acknowledge that government has a unique role to play in assuring the Nation of adequate mineral raw materials and how the negative outlook of the government toward the value of mineral development differs completely from other governments of the world;
>
> Absolves government of its adverse influence on domestic mineral development;
>
> Does not identify the consequences of present trends to the year 2000, but assumes that somehow the minerals industry will be able to meet a large part of national needs in spite of the restrictions placed in its path;
>
> Fails to analyze the Nation's strategic and critical stockpiles from the perspective of a 3-year production capacity, and how a reduced capacity affects stockpile goals;
>
> Fails to examine public mineral land issues from the perspective of how cumulative withdrawals and delays increasingly reduce mineral productivity while increasing costs and the negative balance of trade; how government's mineral studies are important but do not replace industry's exploration; how land managers are almost totally oriented to non-mineral land use;
>
> Glosses over the consequences of the loss of competitiveness of America's mineral industry—a major cause being government's unconcern—and the long range consequences of exporting this industry overseas;

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[40] An example of the former is provided by the Department of Defense, which despite its assignment to three of the nine problem areas, could only devote 5 person-days to the entire project. Given the critical nature of minerals to national defense such a reality is shocking. The Department of Treasury could not find time to carry out its lead responsibility or prepare the analysis for the problem area on financing, capital formation, and tax policies, so another group had to write its report. The Department of Energy appeared only for the first meeting.

Omits the national security aspects of the increasing loss of United States mineral capacity and the problems of increased foreign dependency during a national emergency;

Assumes, incorrectly, that there will always be alternative world sources of cheap mineral supplies. Does not evaluate United States vulnerability in a world of increasing resource nationalism;

Avoids totally the findings of every study on mineral policy concerning the inadequacy of the present policy process, which Congress saw in 1970 when it passed the Mining and Minerals Policy Act; observes that "the existing nonfuel mineral policy-making process can be said to work adequately;"

Fails to deal candidly with the unique problems and burdens created by environmental regulations versus the benefits expected; and

Reflects serious misconceptions of the nature of competition in the world market in which U.S. companies must operate as it relates to U.S. antitrust policies.

The Problem Analysis was to have been conducted to determine whether or not existing government policies exacerbate the problems faced by the minerals industry as well as the interrelation of increasing imports on the gross national product, inflation, employment, and foreign policy. In each problem area, the agency with the lead role was the agency with the primary jurisdiction of that particular issue. Consequently, not one regulatory agency was moved to recognize its own goals, regulations, and policies as worthy of any change. The Department of the Interior did not view the Nation's mineral needs as being worth changing its negative attitude on public land management; the Treasury Department saw only the primacy of existing tax codes; and the Environmental Protection Agency saw its goals as overriding all other national goals. A major conclusion that can be drawn from this frustrating, unproductive exercise is that the executive policy review mechanism does not possess even arguable merits as a mechanism to achieve interagency concensus for coordinating major policy questions.

Perhaps the single most disturbing aspect of the "Report on the Issues" is that it shows a purposeful ignorance of the inherent problem stemming from import vulnerability in an international setting increasingly dominated by resource nationalism and state controlled enterprises, a situation that relates not only to national security but to inflation and the Nation's balance of payments. Importantly, import dependence has grown in many mineral commodities for which the United States has a strong resource base and for which there was once a strong competitive processing capacity.

Conclusion

President Carter's willingness to initiate the Nonfuel Minerals Policy Review is noteworthy. Nevertheless, his unwillingness or inability to give the review the direction and priority necessary for its satisfactory completion was in the end its downfall. Without a serious commitment on the part of the President and his highest appointees, the review struggled along, barely alive until it died only to be reborn in

yet another review.[41] What is needed is positive government action, not further governmental paralysis by analysis.

GOVERNMENT'S DECISIONS AND MINERALS AVAILABILITY

Introduction

A mineral resource is of little value unless some combination of marketing, technology, and initiative can convert it into a reserve. However, a reserve is of little value unless capital is available and political incentives are sufficiently strong to promote its development.

The Federal Government—and to a lesser extent, State and local governments—have always held the power, through regulatory decisions, to adversely affect the profitability of a particular mining or mineral activity. Those regulations, their pervasiveness in activities of the mining and mineral industry, their origins within diverse agencies and departments having different mandates and responsibilities, and their ability to decide the fate of a mining operation have grown significantly over the last decade. However, of even more recent vintage is the development within government of a belief that government, not the marketplace, should mandate the fundamental decision as to whether an ore deposit should be mined or its minerals processed. The former—the matter of regulations and their synergistic impact—relates to governmental coordination and executive development of broad policy objectives. The latter, however, which relates to basic orientation, concerns a much more fundamental change in the functioning of the U.S. economy—and thus poses a greater danger to mining and mineral processing.

Over the past decade the development of ore deposits in the United States has become increasingly dependent upon decisions of government—a government increasingly opposed to such development. In fact, in some cases, the Federal government's opposition to mineral development has been accomplished by the open solicitation of public opinion against such development. In other instances, government's inertia and predisposition in favor of nondevelopment must be overcome by evidence which often amounts to "proof beyond a reasonable doubt." As a result, the assumption by the Federal Government of the role of final arbiter and decisionmaker has made mineral development and production difficult, time consuming, and costly, and in the end often impossible. The Nation's mineral security has thereby become dependent not upon the free market system but upon the political process.

Operating free of short-term risk, government's decisions nevertheless affect risk. When the government attempts to decide, for instance, whether a particular mineral deposit on public lands should be developed by ascertaining whether the mineral production is needed in the marketplace, it assumes that government regulators—far removed

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[41] As of this writing the Nonfuel Minerals Policy Review has ended. One aspect of the review, the matter of national security regarding four specific minerals has been referred to the National Security Council for study. This NSC study is expected to be completed in January 1981.

from the marketplace—have a genuine interest in,[42] or, more importantly, have the information and hence the capability, for making the correct decision. Unfortunately, such decisions are becoming the rule rather than the exception, particularly with regard to Federal leasable minerals such as phosphate and coal.

In the case of those leasable minerals, however, the government has made serious errors in its efforts to determine if production is warranted, because the government is neither part of nor understands the market process.

The Presidential Review's "Report on the Issues" admits to "ad hoc and often uncoordinated" Federal decisionmaking regarding America's mineral supplies. While citing the Paley Commission's findings that "There must be somewhere a mechanism for looking at the problem as a whole, for keeping track of changing situations and the interrelation of policies and programs," the review overlooks an important perspective. It is not so much that coordination has not improved in almost 30 years or even that government's ability to complicate coordination has made the situation exceedingly worse, but rather that today there is absolutely no Federal policy-level advocate for minerals. While the Paley Commission certainly saw the necessity for coordinated policymaking, coordination was not to be an end in itself but merely a means of assuring and providing for the Nation's mineral needs. In the face of the abdication of the Department of the Interior's responsibilities under the Mining and Minerals Policy Act of 1970, and given its lack of interest in the matter of mineral supply, no amount of coordination will alter the final outcome of the present process. There must be somewhere in government a willingness and the capacity to grasp the seriousness of U.S. mineral shortfalls that certainly lie ahead if the Nation continues on its present path. The Comptroller General in assessing the sharp and sudden impacts that resulted from the serious and widespread commodity shortages of 1973–74, said:

> The use of "crisis management" without effective communication, coordination, and planning has resulted in decisions that have been fragmented in terms of decisionmaking responsibility, application of alternative policy actions, sources and flows of policy analysis, and informational input and have led to continuing conflict over policy priorities, options, and short-supply policy alternatives.[43]

In 1974, the House of Representatives Committee on Banking and Currency saw the ability of the Federal decision process to handle mineral shortages this way:

> The problem of scattered and overlapping jurisdictions has increased, both in the executive and legislative branches. Such fragmented jurisdiction over the natural resource area maximizes bureaucratic competition and jealousy, while at the same time inhibiting unified policy formulation and implementation. Since natural resource and commodity decisions *involve domestic economic and political considerations as well as foreign economic and political policies, a true national perspective must transcend the interests of a particular agency.* Still, each agency's information and policy input tends to be directed by a concern for its own

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[42] Even assuming a genuine professional desire on the part of the regulator to make the correct determination regarding essentially business decisions the choices presented to him involve not matters of personal economic survival and the wellbeing of a company and its employees, but esoteric questions with little personal impact. While professionalism is a desirable motivator, it cannot compete with personal financial survival.

[43] U.S. Actions Needed to Cope with Commodity Shortages, General Accounting Office, B–114824, April 29, 1974, p. 17.

clientele rather than by a broad consideration of the national interest. (Emphasis added)[44]

In its study on the mineral shortages of 1973–74, the National Commission on Supplies and Shortages made a similar observation:

> If the experience of recent years teaches us anything, it is that Government policies developed and implemented without an understanding of how they affect specific industries and interact with other policies, often create more problems than they solve. This is particularly true of policies affecting the key materials-producing industries.[45]

Thus, while the Federal decisionmaking process remains hampered by the lack of commitment and coordination within the government—rendering it incapable of resolving even short-term problems—it continues to make ad hoc decisions that aggravate serious long-term problems.

Government's Decisions That Affect Prices

Past government decisions to intervene in the marketplace have sometimes had significant adverse impacts upon longer term supplies. Past stockpile acquisitions to assist foreign trade or to stimulate domestic employment, or stockpile disposals for the purpose of controlling prices or of meeting peacetime industrial shortages have had a disruptive influence on commodity markets. The heavy liquidation of stockpiled commodities during the 1960's, for example, was a factor in inhibiting expansion of new mineral capacity, which helped to bring about the major shortages of 1973–74.

Management of the cobalt stockpile provides a striking illustration of nonfuel minerals policy at its worst. At one time, the stockpile contained over 102 million pounds of cobalt, but decisions to reduce the goal caused a substantial share to be declared surplus.

As a consequence, 60 million pounds were sold between 1964 and 1975 (about 35 percent of annual consumption during that period). At that time, no problem existed regarding cobalt production or world supplies. Yet, these stockpile sales doubtless contributed to holding down cobalt prices, thus annoying the government of Zaire—the world's major producer—and discouraging potential producers of by-product cobalt from investing in projects to recover that metal. In 1976, when the U.S. Government substantially increased the stockpile goal to 85.4 million pounds, stockpile sales stopped, but by then the inventory was down to 40.8 million pounds. With the invasion of Zaire in 1978, the market tightened and prices skyrocketed. However, at that time the stockpile was no longer in a position to sell. Today, the United States has a stockpile which is 48 percent of its goal, a dependency on southern Africa for 76 percent of its requirements, and until recently, cobalt priced at $25 a pound. There is little question that the United States Government shares a large part of the responsibility for cobalt's present chaotic market conditions.

U.S. Government policy decisions regarding mineral pricing are shortsighted, contradictory, and change according to circumstances

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[44] Meeting America's Resource Needs: Problems and Policies, Ad Hoc Committee on the Domestic and International Monetary Effect of Energy and Other Natural Resource Pricing, Committee on Banking and Currency, House of Representatives, 93d Congress, 2d Session, 1974, p. 96.

[45] Government and the Nation's Resources, Report of the National Commission on Supplies and Shortages, Washington, D.C., December 1976, p. 107.

and the government agency involved. Government's control of mineral prices during periods of inflation reflects little understanding of cyclical international markets, or of the fact that such control inhibits the ability of U.S. mineral producers to recover from periods of low prices.

The government's policy on copper prices has such a contradictory history. In 1965–67 while world prices were rising rapidly, the Johnson administration took the position that the domestic copper price should be held in check. When in the fall of 1965 a 2-cents-a-pound increase was announced—from 36 to 38 cents a pound—a strong statement by Government caused the cancellation of the increase at a time when the world price was in excess of 50 cents a pound. A stockpile sale of 250,000 tons of copper underscored the Government's position. The 36-cent price remained in effect until 1967 while the world price continued to soar. Only after a 9-month strike in 1967–68 was a price increase tolerated by the administration and even then the new level of 42 cents a pound was well below the world market.

The difference between the world price and domestic price of copper persisted until 1969. When the Nixon administration took office an investigation of copper pricing was undertaken by the Council of Economic Advisors headed by Professor Houthakker. The Council found that domestic copper producers should not sell at so-called producer prices, as was done at the urging of the Johnson administration, but rather at auction prices determined on commodity exchanges. This finding in effect condemned the industry in 1969 for having done what it did in 1967–68 at the urging of the previous administration.

Shortly after the Houthakker report was made public in August 1971, the Nixon administration instituted price controls that fixed domestic copper at 60 cents a pound, which remained in effect until December 1973 when the authorities permitted a price rise to 68 cents. Price controls lapsed in May 1975, and domestic producers, free to establish prices consistent with the market, raised their price first to 80 cents and then to 85 cents a pound. But it was too late. The onset of the severe recession of mid-1974 caused the world market to weaken and by mid-1975 the price had fallen back to 60 cents. After allowing for inflation, this then provided a materially lower return than any prices of the previous 11 years.

The aggregate effect of the "jawboning" and price controls prevented U.S. producers from sharing in periods of strong prices for 11 years, while their overseas competitors earned greater profits during good years to offset low returns during lower prices of poor years.

The story is not finished. Beginning about 1968, domestic copper producers incurred substantial funded debt, and are now carrying a continued burden of high-interest costs, for heavy mandated capital expenditures and higher operating costs to meet environmental regulations. During 1977, virtually every domestic copper producer operated at a loss. Then in 1973, when Government had the copper price fixed at 68 cents a pound, and domestic producers had to meet Government defense orders at that price, the Government turned around and sold 225,000 tons of copper from its stockpile at prices as high as $1.20 a pound. It is an amazing contradiction in logic to presume that while domestic producers had to sell at low prices to minimize

inflation, Government sales at much higher prices had no inflationary effect.

At the same time, government antitrust policies prevent U.S. producers from jointly discussing such matters with each other or government agencies. Unable to benefit from the consensus views of U.S. producers, the government, in pursuit of different policy objectives and in order to create goodwill with mineral exporting countries, participates in international commodity agreements to stabilize prices. Delegates of foreign governments to such international commodity meetings have free exchange with their industry groups on the sensitive issue of price, whereas U.S. delegates, who lack detailed knowledge of the industry and its commercial practices, are unable to meet with representatives of American industry as a group.

And so it goes. On the one hand, the Justice Department and the Federal Trade Commission believe that prices should be established competitively in open markets, presumably without regard to the social consequences of sharply fluctuating prices. On the other hand, the State Department worries only about the effect of fluctuating prices on the economies of developing countries such as Zaire, Zambia, Peru and others.

An excellent example is provided by the cooperation intended in the international lead and zinc markets. The United Nations chartered the International Lead/Zinc Study Group to encourage government and industry officials of both producing and consuming countries to discuss in open meetings the factors affecting worldwide supply and demand. These meetings performed a useful function, especially for the developing countries, by helping to reduce the boom-and-bust conditions so prevalent in the lead and zinc markets of the 1950's. For some years prior to the international meetings, American consuming industries met with the Department of Commerce while American producers met with the Department of the Interior, and subsequently with the Department of State. This forum provided U.S. Government officials an understanding of consensus views regarding U.S. interests in the context of worldwide developments. However, the Department of Justice decided that the meetings were in violation of antitrust law and ruled that thereafter government could only meet with industry officials one at a time.

An interesting paradox is presented by the Department of Justice's approach in the case of zinc pricing during its 1975–78 investigation of cartel-like actions by foreign zinc producers. In 1977, when U.S. producers sought relief before the International Trade Commission from the flood of cheap zinc imports under the "escape-clause" of the 1974 Trade Act, the Justice Department intervened on behalf of foreign producers and their governments, showing no concern for the larger implications. In the end, the domestic industry was denied the relief it sought, which paved the way for the subsequent loss of a major segment of domestic zinc processing.

In the case of domestic prices, the impact of government's decisions regarding price controls reach well into the future, even after controls have been removed. Such controls have reduced industry's ability to maintain financial stability or to accumulate capital for new investments. Price increases for raw materials tend to lag behind the

general economy in periods of growth since higher inventories accumulated during the previous downturn must be sold. As a result, mineral profits lag, sometimes peaking as much as three quarters after the economic crest and turning up two quarters after the economic trough.

Government economic planners, however, find inflationary pressures unbearable late in the upturn. Thus, the urge to impose price controls becomes irresistable with controls catching the minerals industry prior to the recovery of commodity prices. The mandatory price freeze of August 1971 and the voluntary controls of October 1978 both occurred at a time when the prices of many metals, on the average and in terms of deflated real dollars, had recovered only about 35–40 percent above the lows of the prior 5 years.

The experience of zinc in the early 1970's provides an excellent example. In August 1971, the government established the price for zinc at 17 cents a pound at a time when the London Metals Exchange price was 15 cents. While the price of U.S. zinc was allowed to rise to 21 cents, by the time the controls were removed on December 5, 1973, (controls on individual metals removed December 1973–April 1974) the LME price, reflecting the world price, had risen to a high of 73 cents. Although all producers were caught in the recession that followed, U.S. producers, by losing the opportunity to take part in the entire upswing, were in a much worse position. A sidelight of this episode is that U.S. producers, needing foreign zinc concentrates to supplement declining domestic mine production—another impact of price control—could not afford to purchase the higher priced concentrates in the face of the low fixed price of their own metal.

The willingness of the State Department to pursue international commodity agreements represents yet another area where decisions are reached unmindful of their long-term effect on the domestic minerals industry and, thereby, on the domestic economy. For example, the State Department's 1979 international copper buffer stock proposal [46] could well have serious impacts on private decisionmaking for domestic mineral development, a consequence apparently of little importance to the State Department.

If the experience of the International Tin Agreement, which has failed to stabilize world tin prices, is any indication, the cost of a copper buffer stock massive enough to stabilize prices would be prohibitively expensive. Moreover, given an initially attractive price and no producer country production or export controls (as is the case with the State Department proposal), oversupply would be encouraged that would eventually "stabilize" prices at the lowest possible level, undoing its original purpose. On the other hand, with production and export controls, prices could ultimately rise to suit higher-cost producers, jeopardizing the market system and posing political ramifications. The International Tin Agreement, of which the United States Government became a partner in 1976, has worked well for the developing country producers under production or export controls, but it has not protected consuming nations from excessive prices—an equally important

[46] Consideration of International Measures of Copper. Copper Price Stabilization, Proposal Submitted by the Delegation of the United States, Sixth Preparatory Meeting on Copper, UN Conference on Trade and Development, February 26, 1979, Geneva, Switzerland.

objective. The present conflict in the Sixth International Tin Agreement between the producer and consumer countries is over what constitutes justifiable market stabilization efforts and what constitutes market interference.[47]

Government Environmental Decisions

The Environmental Protection Agency and the Occupational Safety and Health Administration have shown little interest in linking the decline in domestic mineral capacity—as a result of EPA & OSHA regulations—to a larger national perspective reflective of the interrelationship between domestic supplies, loss of market position, increased foreign reliance, and trade balance. An excellent example of that linkage is provided by the permanent closure in 1979 of the Monaca, Pennsylvania, zinc smelter with the loss of about 1,500 jobs. That smelter, which produced 224,000 tons of zinc metal in 1974 and 164,000 tons in 1978 (about 25 percent of United States capacity), was closed after an expenditure by the company over the preceding 5 years of $35 million in order to meet EPA's SO_2 and particulate emission standards but could not commit another $25 million to meet EPA's and OSHA's new lead (a zinc smelter by-product) standards after financial losses in zinc during the prior 2 years.[48] While the United States has suffered a significant (60 percent) loss of domestic zinc smelter capacity over the last 10 years, the result of the closure of 10 old plants (only one of which was replaced), zinc production overseas has increased through the replacement of old plants under foreign government policies that encourage production. The concern that must be raised is why our government has not, as a matter of policy, attempted to prevent such losses or at least questioned the wisdom of its national policy that would on the one hand wipe out domestic capacity while on the other mandating the purchase of an added 112,000 tons of zinc for the strategic stockpile at a present cost of approximately $80 million to compensate for the loss of that capacity.

The policy conflicts between mineral production, the environment, and the United States balance of trade provide an excellent example of how domestic policy decisions to attain one set of national goals are made without coordination or knowledge of the impacts of those decisions on another set of national goals. Just recently, for example, Anaconda Copper Company—third largest copper producer in the United

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[47] Under export controls, the amount of tin produced worldwide (7 principal producers) has not materially changed in the last 10 years, driving the price steadily upward by about 500 percent. U.S. participation in the Fifth International Tin Agreement was a triumph of State Department over the almost total opposition of the Departments of Commerce, Treasury, Agriculture, and Interior and the Council of Economic Advisors. An interesting aspect of the present U.S. position on copper is that the same agencies that opposed U.S. participation in the tin agreement agreed (at Assistant Secretary level) to the State Department's copper proposal 1 week before its February 26, 1979, submittal in Geneva. More interesting is the fact that a primary proponent of State's copper position is Treasury s Assistant Secretary of its International Division, who testified as a private citizen before the Subcommittee on Mines and Mining on March 29, 1974, that because the world had become so highly interdependent—politically, strategically and economically—and because the Soviet Union, China and the U.S. were courting the developing countries less, the U.S. should not only support international commodity agreements but individual country export limitations under new international rules. See Oversight Hearings in Mineral Scarcity, Committee on Interior and Insular Affairs, Report 93–48, 1974, pp. 49–50.

[48] See testimony of Charles R. Carlisle, Nonfuel Minerals Policy Review Oversight Hearings, Subcommittee on Mines and Mining, Committee on Interior and Insular Affairs, Part II, Serial No. 96–9, November 28, 1979, p. 162.

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States—announced the closing of its 200,000-ton/year copper smelter at Anaconda, Mont., and its 250,000-ton/year refinery at Great Falls, Mont., because it can no longer justify spending additional sums to meet changing emission standards. The company had already spent $65 million over the last 8 years to meet the standards plus $15 million for studies on alternative solutions. With no assurance that additional expenditures would meet the standards, the only viable decision was to end additional losses. Reportedly, the company has entered into discussions with Japanese copper producers regarding either custom smelting and refining of its copper concentrates for return to the United States or the outright sale of those concentrates to the Japanese. Add to this the closure of three other U.S. copper smelters totaling 275,000 tons of annual capacity, which the Department of Commerce projected to occur within the next 3 years because of similar problems, and the expected loss of existing smelting capacity will total one-half million tons/year or 25 percent of U.S. capacity (38 percent of 1979 smelter production). In another instance, the Amax Corporation, half owner of the Twin Buttes copper mine in Arizona is already shipping its share of concentrates to Japan. The growing likelihood of the export of more of America's primary copper processing capacity despite the presence in the United States of 20 percent of the world's copper reserves is extremely troublesome, particularly when no one in the Federal Government shows any concern for balance or reasonable modification of the policy decisions which have created this result.[49]

The lack of concern of responsible governmental officials regarding the implications of lost processing capacity is evident in an exchange of correspondence between the Committee and the Secretary of the Interior in April and June 1979. In response to a question of the Committee as to why the Department showed no interest in the Department of Commerce's findings that regulatory impacts on the copper industry would close three smelters, increase imports, and cause job losses,[50] the Secretary responded—notwithstanding the Department's mineral responsibilities: "I . . . have not considered it a high priority for this Department to undertake the type of evaluation you suggest." [51]

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[49] By comparison, when Japan saw that its domestic copper industry was incapable of meeting growing demands (production satisfied 100% of demand in 1955 but only 31 percent in 1978), it made the decision to get behind its industry to make an aggressive search for offshore ores and concentrates to maintain its smelting and refining capacity. See P. C. F. Crowson, The National Mineral Policies of Germany, France and Japan, Mining Magazine, London, June 1980. Japan has maintained differential tariff structures on copper concentrates (which together with ores provide 60% of imports) and refined metal, artificially protecting its market by allowing Japanese companies to bid preemptively in world markets for mine production.

[50] The Potential Economic Impact of U.S. Regulations on the U.S. Copper Industry, Industry and Trade Administration, Department of Commerce, April 1979. The findings of this study were that, in the 10-year period (1978–87), regulations would 1) shut down 3 domestic smelters and preclude any new smelters; 2) increase the net imports of copper; 3) cause the loss of 31,000 jobs that would have been created; 4) require additional investment of $1.8 billion and an additional operating cost of $3.5 billion (1974 dollars), and 5) increase copper prices by 43% over the normally projected increases (1974 dollar basis).

[51] Another example of minerals/environmental/trade balance policy conflicts is seen in the 1985 mandated fuel economy goals and emission controls for American cars. For weight reduction by 1985, annual iron and steel consumption for automotive use will be reduced by an estimated 10.2 million tons, and annual aluminum consumption increased by 2.2 million tons (of which 1.6 million tons or more will be imported). Rhodium imports (for catalysts) will be increased by 50,000 ounces. The loss of domestic steel production should further reduce the industry's low profits and increase its difficulties to raise capital for plant modifications required to meet environmental standards and for modernization necessary to meet the threat of cheaper, below-cost imports. In the case of aluminum, the chances of significantly increasing domestic smelting capacity are small because of high energy requirements and environmental difficulties. Increased imports in 1977 constant dollars will probably cost at least $1.8 billion. Compared to the cost saved

The Public and Private Sector—Linkage

Although the distinction between domestic and foreign policies is maintained by the organization of the executive and, to a lesser extent, the legislative branch, in reality that distinction in the way policies interact has become increasingly blurred. The end result of this is a national mineral policy that lacks form, substance, and coordination. Federal agencies whose functions have traditionally involved "domestic" policies are having a greater effect, directly and indirectly, on "foreign" policies. Governmental decisions that adversely affect domestic mineral production are, in turn, fostering U.S. dependency on foreign sources. On the other hand foreign policies that might negatively affect the security of foreign supplies are not offset by policies that alternatively promote domestic production. In fact, just the opposite has occurred.[52]

Similarly, the distinction between government and private sector decisionmaking has become blurred. Since domestic economic policy is greatly influenced by environmental policy, private mineral development becomes increasingly subject not to general economic decisions, but to environmental decisions. On the other hand, foreign policy decisions can often disrupt the flow of critical foreign minerals, as in the case of Rhodesian chromium and asbestos, or can affect investments in new sources, as in the case of Namibia where intense pressure has been applied to keep U.S. companies from developing new rich uranium deposits.

While the United States Government continues its uncoordinated decisionmaking regarding minerals, policy decisions by other Western governments play large roles in the development and acquisition of overseas minerals, indirectly placing the U.S. minerals industry at a disadvantage. Japan's phenomenal success in raw material investments around the world is in large part the result of the pragmatic national interest of its government toward its minerals industry. At the same time, governments of Western Europe are much more oriented toward assisting their investors in securing overseas sources.

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in imported oil, increased imports of aluminum means a larger negative balance of trade, not less. The 50,000 ounces of annually imported rhodium (for rhodium/platinum catalysts on 1981 cars) will exceed the amount available, and a near doubling of the price to about $1,000 per ounce should be expected (the present recession will hold demand and price down in 1980). Another facet of rhodium imports is that they must come from the Soviet Union, a supplier that has acted highly irregularly in past marketing of co-product platinum, and South Africa, a totally reliable supplier to date. See Policy Conflict—Energy, Environmental, and Materials: Automotive Fuel-Economy Standards' Implications for Materials, General Accounting Office, EMD–80–22, February 5, 1980, 38 p.

A potential conflict regarding minerals availability that cuts across a number of other national policies, will surface in the attainment of solar energy goals. In the case of gallium requirements (gallium arsenide cells show the greatest potential for achieving acceptable solar energy conversion efficiencies), current research indicates that 25,000 metric tons will be required between 1991 and 2000 to produce 25 GW of power. Present annual consumption of gallium (derived entirely as a byproduct of zinc and aluminum ores) of about 9 metric tons (mid-1980 prices $500/kilogram; 35 percent import dependent) is used almost totally in electronics. An evaluation of possible domestic and foreign sources shows that the cost of extraction (up to $1,700/kilogram) from some possible sources would make solar energy uneconomic. Moreover, the projected annual requirements by the year 2000 (4,500 metric tons) mean that the United States would require 99 percent of estimated world production, which could postpone or even prevent the development of some large-scale solar systems. See L. W. Long and S. Smith, "Possible Material Supply Constraints for Photovoltaic Solar Cells," Mining Congress Journal, July 1980, pp. 43–44.

[52] The continued withdrawal of potential oil-bearing public lands in Alaska and along the Overthrust Belt area of Wyoming, Idaho, and Montana since the oil embargo of 1973–74 provides ample evidence. Another of many examples is the lack of leadership by the Department of the Interior to resolve the 3½-year national squabble over the correctness of the environmental impact statement on the construction of the Trans-Alaska Pipeline to deliver oil from the largest discovery in the U.S., forced Congress to resolve the matter by legislation.

It seems reasonable, therefore, to ask whether the U.S. Government by its decisions, or its indecisions, can afford to let its minerals industry further decline. Decisions made now, or those delayed, will have major consequences on U.S. ability to deal with the world it confronts in 1990 or in the year 2000. Good mineral policy should not be a policy of reaction, but rather should be one of a steady commitment that recognizes the indispensability of minerals to the Nation's industrial base and its national security.

Past Answers—No Answer

Although the free market system accepts unavoidable fluctuations in supply and demand, the concept of the 1970's, essentially predicated on the benefits of an international economic order, is that the United States should expect short-term disruptions and market irregularities of foreign minerals, but that no major long-term supply problems will occur. The assumption is that the marketplace will adjust to present supply and present demand, that scarcity will bring about prices that in turn will bring about conservation, substitution, and the development of alternative supplies. However, divergent governmental policies dramatically affect the ability of industry to make supply and demand corrections or to find economic and adequate substitutes or alternative supplies. There are serious questions whether some of these alternatives are economically or technologically viable—or politically possible—given the suddenness with which shortages can develop and the long lead times required to make corrections, even in the best of circumstances. It is instructive to note that while both the first and second annual reports under the Mining and Minerals Policy Act identified the seriousness of energy dependence, Government, caught up with the cry for cheap imports, saw neither the severe impacts of energy shortfalls nor high prices initiated by the oil embargo in the fall of 1973. Neither did Government see the price increases and shortages of nonfuel minerals during 1973–74. Nonetheless, we appear willing to accept world order advocates of "interdependence" explained not from the perspective of an international system of free market trade but from the perspective that sees U.S. raw material vulnerabilities as a key to successful integration of world economies. Despite our experience in the case of energy, that there is no such thing as a predictable and stable level of vulnerability, we hear that we need not be concerned with increasing mineral dependence.[52a]

In the past, we have been assured that through the application of technology the United States will solve longer term problems of inadequate mineral supplies or unreasonable prices. America's ingenuity, under incentives of the free enterprise system, will find substitutes. Unfortunately, the conditions that once promoted ingenuity have also

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[52a] In a recent speech, a newly appointed Bureau of Mines official, departing from the long-held Bureau position supportive of domestic production to minimize imports, stressed how the phrase, "increasing mineral dependence" was a negative oversimplification. He correctly pointed out that dependence did not mean vulnerability, but he oversimplified dependence and its relation to policy with his questions: "Who gets to say, 'hold chromium imports to the present level,' for instance, or 'reduce copper imports from this country or that' "? "Even more important, on what basis do such decisions get made?" He might instead have asked: "What should commodity policy as an element of U.S. foreign policy be to maintain security of access to foreign chromium sources?" "What domestic policies are needed to promote the competitive development of U.S. copper deposits or to limit export of U.S. smelter capacity?" "What are the distinguishing features of dependence as political, economic, and national defense implications define vulnerability?"

changed. In some mining and mineral processing systems, for example, we have probably reached the peak in opportunities for further improvements by economies of scale. Most of the more recent technological improvements have been in small increment with "breakthroughs" much more rare, difficult, and expensive. Moreover, with industry's innovative capabilities significantly reduced as a result of capital problems—its research and development expenditures are increasingly devoted to research for compliance with regulations—and, with the emphasis of Bureau of Mines mineral supply research shifted to attain environmental goals, it is questionable whether major innovations will provide reliable insurance for even longer term problems. The most debilitating element of the process now unfolding is that while government planners—the conclusions of the Nonfuel Minerals Policy Review are an excellent example [53]—expect industry to solve the problems, government pursues a course that make solutions increasingly difficult to achieve.

Without exception, past mineral policy studies have emphasized government's responsibility for better analytical capabilities to isolate the many variables that affect supply and demand. As well, such studies have reiterated the need for more sophisticated forecasting methods for minerals policy. In the last several years, however, government has asserted these recommendations as justification for its failure to implement a minerals policy or to make a commitment supportive of domestic minerals production.

The alleged lack of adequate information and insufficient analysis was asserted at least a dozen times in the August 1979 "Report on the Issues" as inhibiting factors in the identification of problems, their significance, or even their existence as causes of problems. The emphasis in that report was placed not on minerals availability as a long-term economic goal, but on the need for more information before decisions could be made—the traditional refuge of those unwilling to make decisions.

In fact, better analytical capabilities will seldom provide insight into supply disruptions or price escalations triggered by unforeseen political or other foreign events. Nor can improved analytical capabilities automatically identify and provide domestic alternatives. Ironically, the Bureau of Mines probably has one of the better mineral supply-demand analytical capabilities in the world, a capability that is constantly improving. However, no amount of analytical capability will ever provide policy benefits if there is no national commitment in support of the goals of the Mining and Minerals Policy Act of 1970. Government can no longer stand at arm's length to the Nation's long-term mineral interests. The decision the government must make—and, of all the decisions made during the past 10 years, the

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[53] An example of government's unwillingness to recognize the impacts of its decisions is the treatment of loss of U.S. competitiveness in the "Report on the Issues." The Administration states that lower grade ores and higher labor costs are the two "principal economic factors" causing loss of U.S. competitiveness. The Department further reasons that U.S. regulatory costs taken together with the subsidies and promotional policies provided foreign industry are the "principal non-economic factors," hedging on the latter by stating that these matters require more study. The Administration feels free to state that there is nothing inherently wrong with this type of "workable competitive market." It then concludes its case with the wisdom that because of "natural causes (lower ore quality)" and "competing higher priorities (environmental protection)," the United States has "no real cause for concern." The assumption that U.S. mining is operating in a "workably competitive market," and that there should be "no real cause for concern" if this industry is further exported offshore, leaves serious doubts about the credibility of the Administration on mineral matters.

one that it has refused and failed to make—is that the development of a strong and stable domestic mining and minerals industry is in the Nation's best interest.

CAPITAL FORMATION PROBLEMS

Three features distinguish investment in the nonfuel minerals industry from other industries: (1) large capital requirements, (2) long lengths of time before debt retirement,[54] and (3) the high risk nature of investments. At the same time, because of the direct impact of government's discriminatory decisions on mining and mineral processing, political uncertainties add substantially to normal financial risks. As well, high inflation, high interest rates, and increasing debt loads continue to affect adversely the profitability of the industry thus lowering its attractiveness in capital markets.

Capital Needs

Mining is the most capital intensive of all industries. Single projects can cost as much as a billion dollars or more. Without question, the capital needs to finance vital growth and expansion in the mineral industry in the years ahead will continue to grow.[55] Mining balance sheets already reflect an average of approximately one dollar of depreciable fixed assets to support each dollar of annual sales, the highest of the 24 industries reported quarterly by the Federal Trade Commission.[56]

Inflation

From 1970 through the end of 1979 the Commerce Department's price index of capital goods used in mining, including fuel mining, rose a staggering 182 percent. In contrast, capital goods used in all industries rose 121 percent and the Gross National Product price deflator only 84 percent.[57]

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[54] The history of the world-class Mt. Isa mine (lead-zinc-silver-copper) in Australia is illustrative of the delay between discovery of a large important mineral deposit and investor return. Discovered in 1923, minor production started in 1932, but it was not until 1947 that the first dividend was paid. Thus it took 24 years of financing this venture before it began to yield a return. See Simon D. Strauss, Minerals Availability: An Industry Point of View, Proceedings at the Mineral Economic Symposium Council of Economics, American Institute of Mining Metallurgical and Petroleum Engineers, Arlington, Va., Nov. 11, 1975. For an analysis of the lead times required to develop some of Arizona's important copper deposits (historically, some deposits from initial discovery to large-scale development took 90 years), see Lorraine B. Burgin, Time Required in Developing Selected Arizona Copper Mines, Information Circular 8702, Bureau of Mines, 1976, 144 pp.

[55] A 100,000 ton-per-year copper project (mine to refinery) can cost $700–800 million (more in a developing country lacking any infrastructure), see C. F. Barber; a 500,000 ton-per-year aluminum project, mine to smelter, can cost about $2 billion.

[56] Financial Report for Manufacturing, Mining and Trade Corporations, First Quarter 1979. Federal Trade Commission.

[57] Survey of Current Business, Bureau of Economic Analysis, U.S. Department of Commerce, 1979. See also New Investment in Basic Industries, British-North American Committee, June 1979, 22 pp. The disturbing implications of the deferral or abandonment of major new investment projects in a variety of basic mineral industries during the 1970's (the BNAC report spans 1970–77, but its analysis is applicable to the full decade) portends a serious risk of eventual shortages causing severe economic disruptions and the loss of significant numbers of job opportunities. The "quantum jump" in the cost of new capacity, whether or not new technology is incorporated, is so large that product prices required would have to be increased up to 50 percent over then current prices. For the group of 10 basic industries surveyed, new project costs were growing on average at over three times the relevant inflation rates during the 1970's. The average increases in the U.S. compared to the average inflation rates over the number of years shown are: Copper mine 3.0 to 1 over 6 years; aluminum smelter, 3.1 to 1 over 6 years; integrated primary metals, 3.5 to 1 over 4 years; and iron foundry, 6.7 to 1 over 3 years.

Interest Rates and Debt Load

Not surprisingly, the mineral industry suffers from the high interest rates that accompany inflation. New mining ventures are often financed with credits based upon floating interest rates such as the prime rate which recently soared to 20 percent. Years ago, mining corporations financed growth from internally generated funds; debt was nonexistent or was but a small percentage of the capital structure.[58] In the 1950's when government saw the urgent need of increasing domestic copper production by 240,000 tons per year it provided price guarantees, accelerated writeoffs, or loan advances against production. Today such programs are not available, and funds generated internally are inadequate to meet expansion programs, necessitating the raising of large amounts of money in private capital markets. A survey by Moody's Investors Service revealed that the debt of 10 major mining companies, during the 10 years ending in 1977, rose from 11 percent of capitalization to 32 percent.[59] Due to declining profits, the total coverage of interest by pre-tax earnings fell from 25 times in 1967 to only 2.5 times in 1977. In the last 3 years, Standard and Poor's has lowered the senior debt ratings of 8 mining companies while raising none.[60] Downrating increases the cost of borrowing, affects the availability of funds, and forces companies to turn to bank debt at substantially higher interest rates.

Environmental and Safety Expenditures

The very nature of mineral operations requires large capital and operating expenditures for pollution control, health and safety equipment, and mined land reclamation. Funding for achieving these worthwhile objectives has placed a heavy burden upon the already strained mining industry. McGraw-Hill studies have found that pollution control expenditures during the past 9 years by the entire mining industry averaged 8 percent of their total capital expenditures (and a staggering 19 percent for the nonferrous metal industry) compared to only 6 percent for all industries.[61]

Foreign Competition

The profitability of certain domestically produced minerals in some cases has been depressed as a result of excessive production by government-controlled overseas operations which trade profitability for employment and foreign exchange. Total production costs of some government-controlled operations are actually higher than those of domestic operations and in times of low prices debt servicing and other indirect costs are allowed to slide—much to the consternation of lending institutions.

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[58] In the mid-1960's almost 80 percent of capital fund requirements were financed internally. See Martin V. Alonzo, The Economics and Financing of U.S. Mining: Crisis and Remedy, Mineral Economics Symposium, AIME, George Washington University, Washington, D.C., Nov. 14, 1979.

[59] Moodys Bond Survey, Bond Ratings and the Outlook for the Mining Industry, Apr. 24, 1978, pp. 1278–1280.

[60] Standard and Poor's Industry Surveys.

[61] Annual Survey of Pollution Control Expenditures, McGraw-Hill Publishing Co., various years.

Equity Capital

Common shares of mining companies, over the long-run, generally have sold at depressed levels with price-earnings ratios below the industrial average. Thus, the raising of equity capital has been made difficult and prohibitively expensive, hastening the disappearance of independent mining corporations. In the last few years, ten major nonferrous producers, representing over half of the United States copper capacity, have merged or have placed a significant portion of their equity with other corporations. Six of the ten transactions involved oil companies which seemed better able to provide capital than traditional sources did.

Conclusion

U.S. Government can and should enhance the prospect of an adequate return on investment by avoiding artificial restraints on the free market system, by undertaking economic policies that encourage capital expenditures by the mining and mineral processing industry, and by adopting a sounder priority of national goals. Needless to say, arrest and containment of inflation would greatly benefit the financial state of the minerals industry as it would all industries.

It is essential to maintain a free market system in order for the minerals industry to function efficiently. In that regard, a major problem of public policy has been "adverse reaction to high prices and profits during periods of high demand," to quote from the "Report on the Issues". The minerals industry operates in cyclical markets, and price controls, which prevent the industry from taking advantage of high prices on the world market, can do nothing to shorten the duration or magnitude of the depressed part of those cycles. Although the current price program exempts a number of mineral products, the exceptions are not always applicable since they cannot be extended to downstream processed products. For long-term survival, the mineral industry needs adequate prices and profits on the high side of the cyclical flows to offset the loss incurred on the low side. If government interferes, and by so doing deprives the industry of return on investment, the industry's ability to attract capital will be permanently impaired and its securities will remain suspect.

Government can and must ease the funding problems faced by mining companies by amending the laws pertaining to tax-exempt bonds. Industry's access to low-cost pollution control financing is now limited by regulations that reduce eligibility if incidental mineral by-products are recovered in a facility. For example, expensive water pollution and solid waste control facilities installed at mines often are not eligible, nor is land reclamation equipment, even though the Federal Government mandates such expenditures. In addition, the availability of industrial revenue bond financing for plants costing less than $10 million is rarely utilized since most mines require investment far in excess of that statutory ceiling.

The capital investment ratio and productivity growth of the United States industries generally are among the lowest in the industrial

world. If the U.S. ever hopes to have a mining industry capable of providing the minerals essential for our economy, it is essential for government's economic policies to encourage capital investment and development in the minerals industry.

TAX POLICY PROBLEMS

An essential ingredient of a workable nonfuel minerals policy is a Federal income tax system which allows—indeed encourages—the mining industry to make the capital investments that are necessary to find, develop, and produce the minerals on which our economy and national security depend. This Nation must find ways, whether through taxation policies or other measures, to maintain the domestic industry's ability not only to remain competitive, but also to acquire the financial capability to take the risks we expect of it. Without some commitment to the fundamental importance of the mining industry and its particular circumstances, that industry cannot achieve the rate of return that is critical to the task.

Traditionally, Federal income tax laws have recognized the unique circumstances of the mining industry—including its fundamental importance to the economy as well as the high degree of risk associated with its investments—through the percentage depletion allowance [62] and the current expensing of exploration and development costs. These have provided an important source of capital funds for the mining industry, especially for the smaller mining companies which have a narrow capital base from which to finance operations and therefore an even greater need for improved cash flows. Investment tax credit also has been an important incentive for capital investment in the mining industry.

In the last decade, however, a number of changes have occurred that have imposed substantial new burdens on the domestic mining industry. The industry's traditional requirements for capital have been exacerbated by recent inflationary pressures and by rising energy costs. As well, the deteriorating financial condition of the industry has required that it rely increasingly on debt financing for its capital needs. These factors, when coupled with the normal cyclical pattern of mineral prices, have increased the industry's needs for funds while simultaneously decreasing its ability to obtain those funds.

Of equal importance, the proliferation of environmental and health and safety requirements has necessitated tremendous expenditures by the domestic industry. Although these costs serve important social purposes, the fact remains that by raising the cost of U.S. mineral production, they are reducing its productive capacity. Of even more

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[62] The Paley Report (1952) and the National Commission on Materials Policy report (1973) strongly recommended that percentage depletion be retained as an important incentive for exploration and development, thereby promoting domestic production. The Paley Commission, for example, called it a "strong inducement to risk capital to enter the mineral industries" and recommended additional materials to the list. The Commission on Supplies and Shortages report (1976), however, recommended repeal of this "subsidy." The latter's argument that elimination of percentage depletion would promote competitiveness (meaning lower prices) and the use of recycled materials over virgin materials, lost sight of the fact that mineral prices are determined in international markets. and that the elimination of percentage depletion would probably close down some U.S. mines, convert U.S. reserves back to rock in marginal cases. and further promote foreign dependence. The Commission on Supplies and Shortages went to great lengths in its attempt to prove its case by citing Treasury Departmet and EPA studies on depletion.

importance, unreasonable costs are converting mineral reserves to non-economic resources.[62a] For the purpose of mineral production and the public policy goal of assured availability, those costs are a burden—not a benefit. Somehow that reality must be addressed. Federal tax laws, therefore, have not kept pace with the changed circumstances confronting the mining industry. They have not accorded any meaningful recognition of the capital and operating cost burdens currently placed on that industry. Greater incentive must be provided to assist the industry not only in meeting its general capital needs for the development and expansion of productive capacity, but also in alleviating the burden imposed on the industry by mandated environmental and health and safety expenditures. Improved financial posture of the mining industry is necessary if that industry is to regain any semblance of a competitive position in world markets.

To achieve that goal, a number of actions are essential: First, that the existing, long-standing, time-proven provisions of U.S. tax laws that recognize the importance of the mining industry—percentage depletion allowances and expensing of exploration and development costs—be continued; second, that the investment tax credit, an important incentive to capital formation, be extended to include all buildings used in mining and manufacturing and be made refundable (or at least fully creditable against a company's entire tax liability); third, that realistic, flexible capital cost recovery allowances for plant and equipment investments be adopted in lieu of present depreciation allowances;[63] fourth, that the costs of environmental and other similar government-mandated requirements be written off over any period selected by the taxpayer, including the year of expenditure, and, finally, that tax-exempt municipal bond financing be advisable for nonproductive pollution control abatement equipment as well as for other government-mandated expenditures.

Regarding the final two points, instead of the detailed, complex, and restrictive requirements of present law as to whether environmental expenditures qualify for special tax treatment, that treatment—flexible write-offs and tax-exempt financing—should be authorized when the government agency mandating the expenditures such as the Environmental Protection Agency, certifies to the Internal Revenue Service that the expenditure has been necessitated by the requirements of that agency. This would eliminate layers of red tape

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[62a] An unpublished study for the National Science Foundation of costs and benefits of regulations on the copper industry showed that with other regulatory costs the cost of attaining 98 percent SO_2 emission control on the basis of 1977 costs (15 percent return) and copper prices shifts 70 percent of reserves at 15 Arizona copper operations to subeconomic resources. This is equal to 30 years of production at 1977 levels. At an average 20¢/pound increase (about 97¢/pound) in the price of copper, compliance costs shift 10 percent of reserves to resources. "Applied Research on the Benefits and Costs of Public Regulation of the Copper Industry," NSF contract ARP 77–19752, Harbridge House, Inc., June 1979.

[63] Similar action has been taken by both Canada and the United Kingdom. In testimony before the Mines and Mining Subcommittee on October 10, 1979, Dr. John F. Elliott, Professor of Metallurgy, M.I.T., made the following remarks regarding comparative depletion and depreciation rates: ". . . the steel industry of Canada can market steel in the midwest of the United States at the trigger prices and make a good profit. In many ways, the conditions for the Canadian industry are very similar to those of the American industry. On the other hand, in Canada the method of figuring depletion allowances on mining operations and the depreciation schedules are much more favorable than they are for the U.S. industry. The Canadian industry also is able to obtain more relief from regulations and costs associated with pollution abatement." Nonfuel Minerals Policy Review, Oversight Hearings, Part II, Serial No. 96–9, p. 258.

and bureaucracy which prevent any meaningful recognition, in the tax code, of the burdens imposed by these government-mandated expenditures.

ANTITRUST ENFORCEMENT PROBLEMS

Introduction

In recent years, Congress has enacted numerous, exceedingly complex statutes that impose upon the Executive Branch broad enforcement powers that demand the highest degree of subjective application of hypothesized standards and goals. Perhaps most respresentative of such legislation is the Clean Air Act Amendments of 1977.[64] Is it any wonder, therefore, that single-purpose agencies having little broad policy authority seek, through regulatory redundancy and executive excess, to achieve social goals enumerated in statute without regard to their impacts on the economic well-being of the industries regulated or the Nation as a whole.

No such claim of overlegislating can be made with regard to antitrust statutes however. The Sherman and Clayton Acts [65] are models of simplicity. These broadly worded enactments allow ample latitude for evolution and adaptation to meeting changing realities. The statutes and the case law interpreting them could easily be applied in ways that would promote, rather than frustrate and discourage, the achievement of significant national goals—while at the same time meeting the very important objective of promoting free and open competition.

Yet, in the area of antitrust enforcement one finds much the same narrow doctrinaire approach, the same tunnel vision, the same open disregard of a national minerals policy as is found in other governmental arenas. It is important, therefore, that the matter of antitrust as it relates to the Nation's minerals be carefully examined, and a revised approach be undertaken.

What are the realities of trade and commerce regarding nonfuel minerals that ought to be taken into account in antitrust policy? They can be summarized as follows:

> United States mineral producers compete in a world market in which the U.S. is no longer the single, predominant market center. At least with regard to minerals, the view of the United States as a "market" for purposes of antitrust analysis is largely obsolete. In relevant world markets, United States firms are facing ever more fierce competition both for access to raw materials and for the sale of refined products.[66]
>
> Among the other nations of the world, mineral production and secure access to mineral supplies are high on their lists of national

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[64] 42 § 7401 et seq.
[65] 15 § 1 et seq. Sherman ; 15 § 12 et seq. Clayton.
[66] For a discussion of increasing global competition for access to copper raw materials, see "The Custom Concentrate Market," Copper Studies. Inc., New York, April 9. 1979. For an analysis of competition in the nonferrous metals industries, see Simon D. Strauss, "Competition in the Nonferrous Metal Markets." Proceedings of the Council of Economics, 106th Annual Meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers, 1977, p. 157.

priorities. Foreign competitors of United States firms often act with the backing and support of their governments.

Outside the United States, a higher value is placed upon price stability than upon the long-range benefits of free competition.

State-owned or state-supported enterprises now account for a large share of the world's mineral production. These enterprises frequently act in ways that do not fit the competitive, private enterprise model upon which U.S. antitrust policy is premised. For example, unprofitable production may be continued despite reduced consumer demand in order to protect foreign exchange earnings or to maintain employment in the face of social unrest.

Even in the industrialized nations, where production is in the hands of nominally private enterprise, the burden of social regulation, especially regarding employment, may cause foreign competitors of United States firms to act in ways that do not fit the competitive model. Again, overproduction in the face of declining demand can often be the result.

In the past decade, capital costs of major new mining and mineral processing ventures have grown faster than the financing capabilities of many independent United States mining concerns. The traditional hostility of United States antitrust policies toward joint ventures hinders United States firms in pursuing one of the most worthwhile financing alternatives open to them.

In the past decade, the ability of United States firms to compete more aggressively by expanding mineral production capacity has been severely hampered by United States regulatory programs. Costs imposed by government regulation, particularly in the environmental and safety and health areas, have burdened United States firms and possibly contributed in several instances to their demise as independent companies.[67]

The evidence strongly suggests that U.S. antitrust policy contains and reflects serious misconceptions about the nature of competition in the world market in which U.S. mining companies must operate. Moreover, the evidence demonstrates that the antitrust agencies have been less than diligent in advancing the cause of free competition in several important respects. Unlike the United States, the European Economic Community and Japan, in their own interest, have significantly and realistically liberalized their antitrust laws.[67a]

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[67] In 1972, Inspiration Consolidated Copper Co., in order to comply with EPA's sulfur dioxide emission contro's, began building a brand-new $62.5 million smelter system. Between 1974–78 the company spent another $60 million trying to work out the kinks in the system. By mid-1978, the previous debt-free company found itself $25.7 million in debt and ripe for acquisition, and in the following December holders of Inspiration voted to merge with two Toronto-based holding companies. (See The Wall Street Journal, Anti-Pollution Costs Drive Firms Into Debt, Make Them Takeover Targets, December 28, 1978, p. 26.)

[67a] Contrasting foreign antitrust policy with United States policy, the General Accounting Office concluded :

"In contrast, antitrust legislation enacted by a number of other countries after World War II recognizes that their economies, for the most part, are no longer closed. In these countries, maintaining competition between domestic firms has become less important than maintaining competition between domestic and foreign industries. As a result, antitrust exemptions in these countries are more liberal than those of the United States. For example, Japan and the European Economic Community permit domestic companies to combine into commodity group cartels in order to improve production and marketing efficiencies and to encourage small, relatively inefficient firms to combine into one large-scale operation. Most of the major metallurgical plants built in Japan and Western Europe in recent years were built as joint ventures under this concept."

Op. Cit. See footnote 38, p. 35.

International Trade and Competition in Minerals

The failure of United States antitrust policy to recognize the changing realities of international trade in minerals is nowhere more apparent than in the record of intervention and selective nonintervention by the Department of Justice in proceedings before other governmental agencies.

The protracted recession in the metals industry from late 1974 through mid-1978, together with the government's response, offer examples of both changing worldwide competition and the attitude of the Justice Department. During that period, both copper and zinc were subjected to massive worldwide overproduction. Overproduction of copper in several developing nations that depend upon metal exports for foreign exchange and domestic employment took place in the face of declining worldwide demand. State-owned and supported enterprises in these countries were capable, as a result of maintaining rates of production unwarranted by market demand, even when price levels had declined to what free market operations found to be unprofitable levels. The result was inventory buildups worldwide which further contributed to depressed sub-economic market prices. European producers of zinc metal similarly continued to produce at rates unwarranted by market demand, apparently in response to social regulations that had, in effect, made labor a fixed rather than a variable cost of production.

In neither case were these foreign producers acting in accordance with the economic model of private enterprise that is essential for traditional antitrust analysis.

Under such circumstances, domestic producers of copper and zinc were faced with the choice of continuing production and absorbing enormous losses, or curtailing production with resultant widespread unemployment and loss of market position. Since the U.S. copper and zinc industries alone remained subject to the full rigors of market discipline, their choice was inevitably to reduce production. Imports of copper and zinc swelled to unprecedented levels.

In 1978, proceedings were commenced before the United States International Trade Commission before which copper and zinc producers sought temporary limits on imports. It is fair to say that, regarding both metals, United States producers were resorting to the only lawful mechanism available to bring market forces to bear upon foreign producers. Yet, in both instances, the Antitrust Division of the Justice Department intervened on behalf of foreign producers. In so doing, the Antitrust Division appears to have been pursuing abstract principles of free access to markets, while ignoring the real threat to continued participation by U.S. firms in world markets, which were and are increasingly dominated by state-owned or state-controlled enterprises. Ironically, the ultimate result of the actions taken on both copper and zinc by the Justice Department was not a fostering of competition in the world market but a further concentration of production in offshore subsidized operations.

Zinc provides an excellent illustration of how such a policy can actually limit competition to foreign suppliers, ultimately affecting the U.S. consumer adversely. During the 1973–74 period of short sup-

plies and tight markets, United States zinc consumers were required to pay up to four times the United States price for imports at a time when domestic facilities had been forced to curtail production. The eventual result of these market conditions was some substitution out of zinc by domestic consumers with resultant adverse impact upon United States processing capacity—at the same time that subsidized production expanded overseas.

Competitive Impact of Regulatory Policies

While the Department of Justice has intervened in cases such as those discussed above, it has declined to participate in numerous instances of Federal regulatory excess that have seriously impaired the competitive abilities of United States mining companies. It would have been wholly appropriate for the Antitrust Division to have participated in such proceedings, in the interest of preserving competitive markets. Unfortunately, it chose not to participate, and by remaining silent, performed a disservice to the national interest.

One example of such regulatory excess regards decisions of the Federal Government restricting access to and use of mineral-rich Federal land, with the resulting adverse impact on the domestic mineral industry.[68] These actions which have hindered exploration and development of mineral deposits, have unquestionably restricted the growth of domestic mine capacity and have prevented new entrants into the field of mineral production. Most of the burden of these actions has particularly restricted the activities of small and independent prospectors and miners, who historically have played a key role in the discovery of new mining properties.[69]

Another instance relates to the acknowledgement by the Environmental Protection Agency and the Occupational Safety and Health Administration that regulations—such as the national ambient air standard for lead—will likely result in the demise of many existing domestic mineral processing competitors. The burden of such regulation, as with land restrictions, inevitably falls more heavily upon small enterprises—in the case of lead, for example, small independent secondary lead producers. Further, since such regulations are often technology-forcing in nature, they have resulted in distortion of the competitive marketplace. The burden of that distortion falls most heavily upon those not in possession of either financial resources or the mandated technological know-how. A secondary and related effect is the diversion of resources into compliance technology and out of

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[68] See testimony of Charles D. Hylander, Deputy Director, International Division, United States Government Accounting Office, Nonfuel Minerals Policy Review, Oversight Hearings, Subcommittee on Mines and Mining, Committee on Interior and Insular Affairs, Serial No. 96–9, Part I, pp. 93–111.

[69] Small miners have been an important national asset throughout the history of the U.S. having discovered most of the existing important mineral deposits that have been mined in the U.S. In a 1976 survey of 41 major mining companies, covering the years 1970–75, 12–18 mines were being planned or brought into production annually from mineral properties submitted to major companies by small miners. (see David W. Delcour, The Role of the Small Miner, paper presented at the American Mining Congress Convention, September 13, 1977) A Bureau of Mines study showed that while 1975 production of small miners amounted to 4.5 percent of total U.S. production, small miners accounted for all production of asbestos, graphite, kyanite, talc, and industrial garnet; more than half of the perlite, dimension stone, barite, and feldspar; 49 percent of the mica; and 24 percent of the gypsum. Small companies can mine small ore bodies and under lease arrangements can recover additional ore in large mines not economically possible by large companies. (Locatable Minerals Produced in the U.S. in 1975 by State and Proportion Produced by Small Miners, Bureau of Mines, June 24, 1975, unpublished report.)

technological development aimed at improving process efficiencies, productivity, and marketability with their obvious beneficial competitive implications. Notwithstanding the long term impacts of such regulations there does not appear to be a single instance in which the Antitrust Division argued, in proceedings of these agencies, for a more balanced regulatory approach so as to increase domestic supply in order to preserve competition.[70]

In the past, U.S. Government trade policy has often been a party to practices that would appear to be in conflict with the goal of encouraging competition in the world minerals market. For example, it has been recognized for at least 20 years that differential tariff structures, such as currently exist in Japan on copper concentrates and refined copper metal, have created artificially protected markets for foreign smelting and refining companies—allowing those companies to bid preemptively in the world market for available mine production. Such structures, by allowing concentrates and other raw materials to enter free of duty while imposing substantial duties on imported refined metal, provide a subsidy to smelters and refineries operating in the home market. The practice permits a premium price to be charged for refined copper to compensate for and to enable smelters and refiners to offer more favorable treatment charges or to pay higher purchase prices to miners who produce for the custom smelting market.[71] Japanese policies encourage trading patterns that make it possible for Japanese processing companies to sell in their home market at premiums over world prices. Such a tariff structure and its evolving trading practice is part of an expressed national policy to assure supplies of raw materials and to encourage value-added production. In the case of copper, such a differential tariff structure by Japan emerged essentially unscathed from the recent Multi-National Trade Negotiations. At the same time, the United States maintained a duty on concentrates and lowered its tariff on refined metal. It does not appear that the Antitrust Division has ever shown any interest in such trade matters notwithstanding the effect of placing United States firms at the substantial disadvantage in competing for raw materials in the world market.

Competitive Impact of United States Pricing Policies

Since 1970, the United States has undergone two episodes of governmentally imposed price controls: a mandatory program from August 1971 until April 1974 and a voluntary program initiated in October 1978 and now continuing in effect today. In both instances the controls had serious adverse impacts upon United States firms dealing in internationally traded commodities. The mandatory controls appear, in fact, to have contributed substantially to the demise of the zinc custom smelting business in the United States. In addition

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[70] In fact, the Justice Department's record in this regard must lead to an opposite conclusion. For example, in an important consent decree, the automotive industry was prohibited from combining research efforts for compliance with automotive emissions requirements on the grounds that the joint effort was aimed at inhibiting technological innovation rather than promoting it. It is an interesting irony, in light of more current developments, that automotive competition is now more concentrated in one major U.S. manufacturer, which possessed the emission control technology, while foreign imports have continued to rise.

[71] Op. Cit. See footnote 66 (Copper Studies).

to the effects upon domestic zinc consumers described above, such controls severely hampered the ability of United States smelters to acquire concentrates, since zinc in such concentrates was being priced in the world marketplace substantially above levels permitted domestically, even for the refined metal. Further, such controls resulted in widespread dislocation in the allocation of commodities with accompanying competitive implications as a result of the distortions created regarding supply, price, long-term capacity expansion, and investment in domestic ventures.

The recent voluntary control program has resulted in serious distortions in the aluminum and molybdenum markets. Until recently, aluminum ingot could be (and was in fact) exported from the United States at prices higher than those that could be charged by the same United States producers to domestic fabricators—thus contributing to the already tight supplies. In the case of molybdenum, higher world demand caused shortages beginning in 1978. U.S. molybdenum producers (60 percent of world production) allocated existing supplies between domestic and foreign consumers, with world prices 30 to 35 percent higher for the latter. Because domestic sales were priced to stay within the controls, incentive was created to export at a time of increasing domestic demand.

Whatever can be said for price controls as applied to manufactured goods, it is clear that they seriously impair the competitive position of United States companies that produce internationally traded commodities. Yet, once again, the Antitrust Division has failed to appear at any forum to argue the case for improvements in the ability of United States firms to compete in free and open world markets.

Various forms of "short supply" export restrictions—export restrictions for reasons other than national security—are available to the Secretary of Commerce under authority granted by the Export Administration Act. Under that Act, export quotas are considered in response to petitions to the Congress or the Commerce Department made on behalf of consuming industries—usually during periods of tight supply, increased demand, and higher prices. Although the only case in which such quotas were actually imposed took place with regard to ferrous scrap in 1973–74, there have been petitions for quotas over the past several years for copper, copper scrap, aluminum scrap, lead and lead scrap, molybdenum, and cobalt. At the same time, increasing pressure has been brought to bear upon the Congress with some success, to tighten the statutory requirements by which the Secretary of Commerce may restrict exports. As with the areas noted above, there is no instance in which the Justice Department either intervened in the policy process or provided testimony to the Congress on the competitive effect of any proposed quota.

It is abundantly clear that for most nations of the world, relative price stability for certain commodities is considered an important goal and a feature of national policy. United States preferences for "free and open markets," and the resultant policies adopted in accordance with that objective, no longer command automatic international respect, reflecting the declining importance of the United States in the world economic picture. Under these circumstances it is essential that the United States be more effectively represented in international discussions and negotiations concerning commodity price stabilization.

Nonetheless, the efforts of domestic mining firms to advise U.S. Government agencies involved in such international negotiations do not merit the reaction by the Antitrust Division to the sword-rattling tactics that have so hampered these advisory activities.[72] Guidelines issued in 1978 by the Department of State governing participation by private-sector representatives on United States delegations provide ample evidence of the general antipathy of the antitrust bureaucracy toward private sector participation.[73]

United States Antitrust Policy and Mineral Mergers

Perhaps the most egregious example of misdirected efforts on the part of antitrust officials occurred in connection with the consent agreement entered into in the case of *Federal Trade Commission* vs. *Atlantic Richfield Co.*[74] The Federal Trade Commission initiated this proceeding challenging the acquisition by Atlantic Richfield (ARCO) of The Anaconda Company, alleging anticompetitive effects regarding copper mining in the United States. In August 1979, a proposed consent order terminating the proceeding was published for comment. Under this consent order, eventually modified in several respects, ARCO was required to divest itself of certain domestic copper and molybdenum mining prospects. The proposed consent agreement entailed divestiture of these properties, providing that future FTC acquisition clearance be obtained if a prospective purchaser was any of 11 named firms engaged in copper mining in North America or any other company having more than 5 percent of primary copper production in the United States. These companies were determined "ineligible" purchasers without any further Commission review that might have taken into account the existence of special circumstances.

In addition, four United States copper producing companies were barred from participating with ARCO in any joint venture in the development of copper properties in the State of Alaska. Considerable emphasis was placed by the Federal Trade Commission upon the fact that one of the interests to be divested was that of ARCO in an existing joint venture (with AMAX, Inc.) that was mining copper-molybdenum in Arizona.

In its rationale for the ARCO consent agreement, the Federal Trade Commission applied faulty economic analysis to the minerals marketplace. Basing its decision upon outmoded, inapplicable theories of how markets should be defined, the FTC failed to take into account the changing realities of the minerals market. The principal failure of the FTC's analysis was its inability to consider how the actions of foreign competitors impact the world market. The same faulty analysis, which ascribed little or no competitive significance to activities of foreign copper refiners, was successfully urged on the court in

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[72] See letter from John H. Schenefield, Assistant Attorney General, Antitrust Division, to Jules L. Katz, Deputy Assistant Secretary of State for Economic and Business Affairs in Metals Week, Mar. 13, 1978, p. 7. Also, Schenefield, "Competition and International Trade: A New Role for Antitrust Policy," remarks before the ALI–ABA Course of Study on International Antitrust Law. May 26, 1978.

[73] See "Participation of Private Sector Representatives on U.S. Delegation." Federal Register, vol. 43, No. 165, Aug. 24, 1978; also see Justice Department draft, "Guidance Regarding Participation of Private Sector Representatives on United States Delegation to International Negotiations."

[74] Federal Trade Commission, Docket No. 9089.

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United States vs. *AMAX, Inc.*,[75] and has been proven totally in error by subsequent events.

Further, while barring certain United States copper producers from acquiring the Anaconda properties that were to be divested, the Federal Trade Commission left the door wide open for foreign firms to participate in acquisition. In fact, the consent order treated the potential participation by foreign firms as entirely procompetitive. Although joint ventures by United States firms are considered anticompetitive, joint-venture participations by foreign firms are encouraged—regardless of size of the firms, their interlocking relationships with other forces in the marketplace, market shares, or pricing and raw material acquisition practices.

The Federal Trade Commission's bias against participation by domestic firms in joint ventures, as evidenced by the consent order, is ill considered given the effect of inflation upon development costs of new mining projects and other financial realities which suggest the need for joint ventures to develop additional mining properties. Ironically such activities would increase supply and enhance competition. As well, such joint ventures would not by themselves, restrain competition in the markets for refined metal. The ARCO consent order will likely result in reduced viability of the United States processing industry, reduced production by United States producers, and, ultimately, will result in increased concentration of world production in a few foreign firms. The ultimate irony of this action, by a United States antitrust enforcement agency, is that it gives impetus, through official United States policy, to a condition that already has serious restraint of trade implications affecting U.S. minerals processing plants—that is, the concerted action on the part of foreign smelters and refiners to acquire raw materials, including concentrates produced in the United States, by means of anticompetitive and uneconomic activities.

Conclusion

It is imperative that a reexamination be undertaken regarding the implementation-of statutes enacted to encourage competition. What is clear from an analysis of past action is that agencies of the Federal Government have acted in ignorance or disregard of the realities of the marketplace. If the domestic mining and minerals industry is to survive so as to provide U.S. citizens domestically available minerals, reversal of this counterproductive and myopic approach of the Department of Justice and Federal Trade Commission must become part of broader national goals.

ENVIRONMENTAL AND HEALTH AND SAFETY REGULATIONS

Introduction

During the 91st Congress, two acts of major significance to the country and to its mining and minerals industry, were signed into

[75] 1975–2 CCH Trade Cas. 1160, 590) at pp. 67601–02 (D Conn. 1975).

law. One, the National Environmental Policy Act (NEPA) of 1969, was an expression of legitimate and growing public concern regarding the quality of the environment—an Act which set the tone for what was to become the "environmental decade." The other, the Mining and Minerals Policy Act of 1970, was an expression of a related concern of the American public regarding the matter of natural resources—a concern that increasing dependence on foreign minerals and a general weakening of America's raw materials industries threatened the Nation's economy and defense.

There is no direct conflict between these two important national policies. Clearly, NEPA was a corrective statute, a recognition by Congress that America had in the past ignored important environmental issues. What NEPA was meant to assure was not that environmental concerns become of first importance, but that they be evaluated and considered in any decision by the Federal Government.

The Mining and Minerals Policy Act, on the other hand, was the assertion by the Congress of an important national interest—the fostering and encouraging of the domestic mining and mineral industry. Swept up in the emotion that surrounded the issue of environmental protection during the 1970's, the Congress and the executive broadened and developed NEPA while ignoring the Mining and Minerals Policy Act. Thus, NEPA was expanded and enhanced by the adoption of several more detailed environmental statutes. Each new statute was found in need of detailed and specific environmental standards, statutory layer built upon statutory layer. These statutes, in turn, were further expanded by promulgation of regulations, creation of additional agencies, and development of complex implementing mechanisms. However, most subsequent statutory and administrative expressions of environmental concern failed to recognize the balance that was intended and reflected in NEPA.[76]

Nowhere in the "Findings" or "Purposes" sections of the Clean Air Act or Water Pollution Control Act, for example, does one find mentioned the "economic requirements" of man, as was the case in NEPA. Instead those Acts and others contain such single-purpose objectives such as:

. . . to protect and enhance . . .
. . . to prohibit . . .
. . . to require . . .
. . . to provide for the promulgation of guidelines.

As well, provisions of the Clean Air and Water Pollution Control Acts actually prohibit the incorporation of economic considerations in the establishment of regulatory ceilings or limits.

This trend toward environment enhancement at any cost, regardless of economic impact, has led to excessive and unreasonable regulations which today threaten to stifle private enterprise and to cripple the basic industries of America, particularly the mining and minerals industry. Balance has been lost.

The responsibility for excessive regulation cannot be placed upon any one sector of government. Congress, the courts, the executive and

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[76] Among others, a purpose of NEPA is "to declare a national policy which will encourage productive and enjoyable harmony between man and his environment" under a declared national environmental policy to ". . . create and maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic, and other requirements . . ."

its regulatory agencies all contribute to the morass of laws and regulations that feed inflation and have limited (and continue to threaten) the viability of private investment in the minerals industry. Too often in the past, legislation has been adopted and regulations have been promulgated with little attention to the private sector and its needs to compete for financing in the capital markets and in domestic mineral consuming markets against foreign industries and, too often, against foreign governments. Too often the rationale, both of the legislative and the executive, in the consideration of environmental concerns, is that because the objective is desirable it is thus worth any cost. The burden imposed on industry, it is argued, is irrelevant because the direct cost is merely replacing an indirect cost that was once borne only by society. Regardless, the argument goes, industry will simply pass the cost on to the consumer. However, this pass-through is not possible where prices are set in world markets.

Congress is further to be faulted for its inability and unwillingness to make the difficult decisions demanded by environmental versus development concerns, instead adopting statutory mandates that are frequently expressed in ambiguous, inconsistent terms and phrasing, thus providing fertile ground for the promulgation of regulations by Federal agencies. Environmental protection theories such as "prevention of significant deterioration," "nondegradation," "adequate margin of safety," and "unreasonable risk" fill the body of environmental law, but give little guidance to those who must enforce or live with those mandates.

Regulatory agencies have often contributed to the problem of excessive and unreasonable regulations by adopting an expansive view of their authority and a limited view of their mission. They become single-purpose agencies responsive only to narrow, single-purpose constituencies. Alternative means of achieving substantially the same objective are seldom considered and no effort is made to find the least burdensome, most cost-effective manner of implementing statutory provisions. The process of promulgating regulations, through complex procedures and self-imposed requirements—often terminating in litigation—is itself delaying development, magnifying costs, and discouraging new projects.

Numerous examples of such oppressive regulatory schemes abound in the more than 70,000 annual pages of the Federal Register. Volumes can be written on the regulatory maze confronting American industry (See figure 1 for the cumulative impact of major Federal legislation) including the following few examples:

1. "Prevention of Significant Deterioration," as required by the Clean Air Act Amendments of 1977, has been described by former EPA Deputy Administrator John Quarles as the most confusing, the most restrictive of regulations, consisting of "a world of abstractions and hypothetical assumptions which resemble a realm of fantasy."

2. The proposed EPA "Consolidated Permit Program" has managed to take five separate programs administered by the EPA and turn them into a "consolidated" program which requires 170 Federal Register pages to explain and 350 boxes in a decision flowchart to illustrate. The convoluted thinking leading to this regu-

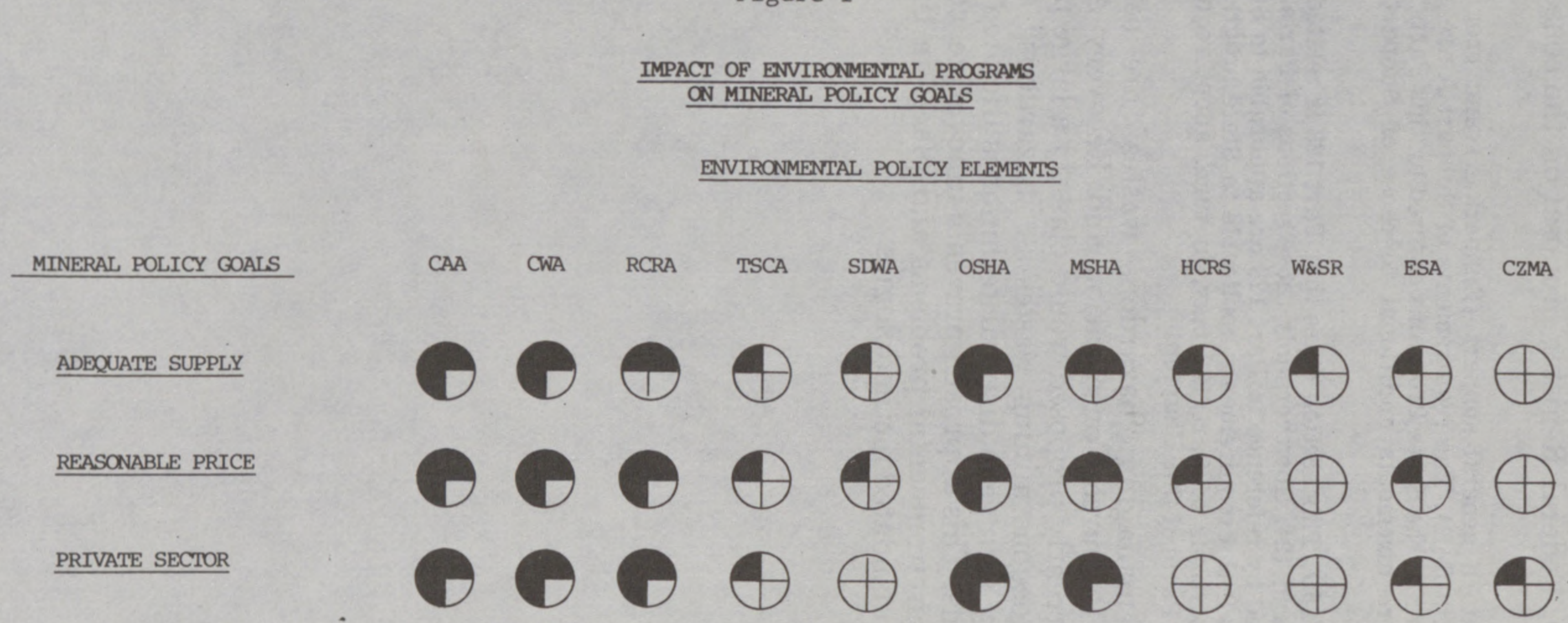
latory "masterpiece" is best illustrated by the following excerpt from the June 6, 1979, Federal Register proposal on the consolidated program:

> Part 123 is divided into a general subpart (Subpart A) and program specific subparts (Subparts B–E). The requirements of Subpart A are generally applicable to all four of the State Programs covered by this Part. The other Subparts provide requirements additional to those of Subpart A.
>
> **Subpart A**
>
> *Purpose and scope* (§ *123.1.* This section notes that Part 123 is related to, among others, Parts 122 and 124. However, only those sections of Parts 122 and 124 which are adopted by reference in Part 123 are applicable to State programs. Part 123 lists all the requirements applicable to State programs. In addition, applicable portions of Part 122 may, in turn, adopt requirements derived from other Parts of this Chapter.

3. Regulations for managing "hazardous wastes" are being developed under the Resource Conservation and Recovery Act. The regulations as currently proposed would classify a large portion of relatively innocuous mining wastes as "hazardous" and subject them to overly stringent disposal techniques dictated by government regulations. This approach prevents innovative, cost-effective solutions to environmental problems and places in their stead governmentally mandated methodologies.

Figure 1

IMPACT OF ENVIRONMENTAL PROGRAMS
ON MINERAL POLICY GOALS



KEY

NEPA - National Environmental Policy Act
CAA - Clean Air Act
CWA - Clean Water Act
RCRA - Resource Conservation & Recovery Act
TSCA - Toxic Substances Control Act
SDWA - Safe Drinking Water Act
OSHA - Occupational Safety & Health Act
MSHA - Mine Safety & Health Act
HCRS - Heritage, Conservation, & Recreation Service
W&SR - Wild & Scenic Rivers Act
ESA - Endangered Species Act
CZMA - Coastal Zone Management Act

No Impact

Minimal Impact

Significant Impact, causing delays and additional costs

Severe Impact, causing major disruption, cost & delay

Severe Impact, causing foreclosure, inability to operate

"Hazardous" Substances Control

Perhaps the most illustrative example of environmental control run rampant is the recent fervor for controlling "toxic" materials, which has permeated government regulatory agencies at all levels and has become the battle cry for zealous dynasty builders. The current thinking is best summed up by a statement made by the EPA Assistant Administrator for the Office of Pesticides and Toxic Substances. He candidly stated, "In a few years, we will be the largest national organization in EPA and we could justify a building of our own." Such a statement is more than mere hyperbole.

Over 30 laws (13 of them impacting directly on the minerals industry) that deal with "toxic or hazardous" materials are administered by 18 Federal agencies. Superimposed on this are uncounted "strategy," "advisory," and "liaison" committees; planning groups; and policies. Hazardous substances are controlled under such regulatory programs for:

§ 311 Clean Water Act Hazardous Substances;
§ 307 Clean Water Act Toxic Pollutants;
§ 3001 Resource Conservation and Recovery Act Hazardous Wastes;
§ 112 Clean Air Act Hazardous Pollutants;
Department of Transportation Hazardous Materials;
OSHA Toxic and Hazardous Substances;
Toxic Substances Control Act Priority List, Preliminary Assessment List, Substantial Risk List.

Despite the statutory and regulatory redundancy regarding this particular issue, the matter is complicated by scientifically disputed exposure thresholds and control technologies, and by inconceivable statutory timetables. In addition, the "turf battles" (jurisdictional conflicts within government among regulatory agencies for the biggest piece of the budgetary pie and the public relations prize) for controlling "toxics" is, in itself, a major cause of confusion.

The minerals industry has not yet calculated or begun to feel the full impact of scores of as yet unannounced "toxic" control regulatory schemes that are currently mandated by existing statutes. Premonitions of what is to come are found in such irrational actions as the listing by EPA of "Iron Sulfide"—a common, naturally occurring mineral, pyrite—on a list of chemicals subject to priority assessment under the Toxic Substances Control Act.

Thus, environmental, health and safety goals conflict with the objectives of national minerals policy not by their nature, nor their desirable objectives but through uncertainty, delay, excessive costs and the snuffing out of innovative approach to problem solving—which has been a hallmark of the U.S. free enterprise system.

Cost of Regulations

The issue of increased costs is probably the most complex and controversial.[77] However, despite the wide variance in cost estimates, one

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[77] The "Report on the Issues" (p. 38) recognizes that regulatory costs are large and that regulatory agencies actually have little idea of costs versus benefits: "As more commodity-specific information becomes available, the known economic impacts are likely to increase. Incomplete data and time constraints hinder vigorous analysis of cost-effectiveness of existing regulations and their incremental costs and benefits. Such analysis

fact clearly stands out. Increasing costs for environmental control are expensive and are rendering United States industry incapable of competing in world markets. For instance, a 1978 study performed for the American Iron and Steel Institute by Arthur D. Little, Inc. determined that environmental control equipment, as of 1976, represented an investment by the American steel industry of $4.9 billion; achieving near-term compliance with regulations through 1978 would increase that total to $6 billion; and, achieving long-term compliance through 1985 would increase the total to $9.8 billion (all in 1978 dollars). Operating costs, in addition were estimated at $3.6 billion per year (1976 dollars).[78]

The Department of Commerce estimates that if compliance with Federal air and water pollution control standards and land use requirements are fully enforced, it will cost the U.S. copper industry over $1.4 billion (1974 dollars) in capital expenditures during 1978–87. The addition to operating costs will be $1 billion.[79] From 1974 to 1978, domestic copper producers spent an estimated $695 million for sulfur dioxide emission controls alone. According to a report prepared in 1978 for EPA by Arthur D. Little, Inc., producers may have to spend as much as an additional $953.5 million through 1978 (1974 dollars). The magnitude of these costs is such that as of January 1979, EPA believed that anticipated future expenditures for sulfur dioxide control may prove to be beyond the means of a large portion of the copper smelting industry.

Other Federal environmental regulations are evolving with similar effects in much of the domestic mining and mineral-processing industry. For example, EPA has proposed new air quality standards for lead. A study for the Lead Industries Association by Charles River Associates, Inc., showed that meeting these standards will require substantial capital expenditures and could force the closure of 80 percent of United States lead smelting and refining capacity, with a resulting increase in imports of a metal for which the United States is essentially self-sufficient. One Missouri lead smelter estimates its cost of compliance with this standard at more than $50 million.

Innovation

The recent trend of the Federal Government is to dictate how the industry is to attain environmental, health and safety goals. This approach is in sharp contrast to earlier legal and regulatory schemes which established goals and allowed the industry affected to apply its own organizational and technical skills to attain them.

For example, EPA in describing how to prevent contamination of ground water proposed regulations under subtitle C (the Hazard Waste Section) of the Resource Conservation and Recovery Act that laid out detailed design criteria on exactly how to build a disposal

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is necessary to determine whether nonfuel minerals industries face unduly costly regulations." One must question what impact the Report suggests by the use of the word "unduly." Certainly, given the Arthur D. Little, Inc. study, the Department of Commerce estimates, Charles River Associates studies, the Harbridge House study, to name but a few, it would appear that the regulations have already become "unduly costly."

[78] Arthur D. Little, Inc., Steel and the Environment: A Cost Impact Analysis, May 1978.

[79] Op. Cit., see footnote 50.

site—how deep an impoundment, the slope of impoundment banks, how many feet of clay for liner, the sizing of sand and gravel, and so forth.

Thus, the skills and experience of the private sector are not utilized. Instead, government academics with little real-world experience attempt to lock-in a cookbook-styled regulatory approach. Thus, incentives to find new and better methods are destroyed, and the likelihood that the fixed EPA instructions are infeasible, in some particular situations, is obscured.

Uncertainty

Bringing in a new mine requires huge capital investment and, even in the best of circumstances, takes from 5 to 10 years of planning, evaluation, and development after the discovery of an economically recoverable ore body. If environmental rules and standards are continually changed by regulators, or are made too difficult to comply with, financial advisers and experts become reluctant to commit investment capital, because they fear that the project may be delayed or even stopped completely after the expenditure of substantial sums of money. During times of scarce dollars and high interest rates such pressures become even more intense and threaten the availability of investment capital for any "doubtful" project.

For example, the regulatory process which has evolved under the Clean Air Act Amendment of 1977 for the implementation of the "Prevention of Significant Deterioration" (PSD) section has turned into a nightmare of abstract reasoning. The costly process of performing air pollution dispersion modelling, compiling mathematical computations and determining potential impacts necessary to comply with "PSD" are based upon hypothetical data and hypothetical assumptions. A mining company may find it cannot develop a new mine or mineral processing facility simply because of the make-believe air emissions adverse impact on the make-believe designated air quality control region in the model. The mining company cannot move its operations elsewhere—it must work where it finds the minerals. So new jobs, new minerals, and a whole chain of benefits to the economy are lost. The only alternative left for U.S. mining companies is to invest in foreign countries.[80] In view of all of the Nation's economic problems, for the United States Government to adopt policies that tend to drive its industry offshore or weaken it so that it can no longer compete, raises serious doubts as to the thought given to the problem.

Conclusions

Probably the most difficult concept for this Committee to grasp is the expectation by government regulators that they will settle for no less than perfection.[81] The whole world recognizes intuitively that

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[80] GAO reviewed the movement of U.S. investment abroad because of regulatory costs: "Shifts in mineral sector investment due to regulatory constraint could benefit countries whose approaches to regulations are more flexible or willingness to support the additional costs may project cost advantages. For example, several countries, including Australia, the Philippines, Brazil, Venezuela, Sweden, West Germany, and Ireland give high priorities to the costs and practical consequences of environmental standards in determining the extent to which they will be enforced. Norway, Sweden, and West Germany also provide financial support for new equipment needed by firms, including equipment needed for environmental protection." Op. Cit. See footnote 38, p. 28.

[81] See G. A. Jewett, Future Trends in Policy Development Toward Mining, an article written for the Canadian Mining Journal, Mar. 26, 1979.

perfection is rarely attained in anything, but environmental and health and safety regulators refuse to even consider the alternative of "an acceptable risk." Perfection, therefore, becomes a safe refuge within the bureaucratic process, raising the expectations of the public that the only safe standard is one of "zero risk," and that it is attainable. Once locked into such a standard, there can be no turning back regardless of substantive evidence that might be presented to the contrary because bureaucratic reputation is at stake. The inevitable result is continuing and costly confrontation between government and industry.

Environmental controls, regardless of the desirability of their objectives, cannot long continue to operate in total disregard of the economic feasibility of their attainment. The Federal Government, as a fundamental aspect of national minerals policy, must seek balance between the environmental, health and safety statutes and regulations on the one hand, and the need to ensure the reliable availability of strategic and critical minerals on the other. The flaw most obvious in the executive mechanism, once again, lies in the total absence of a responsible official to advocate balance, or, at a minimum, one who understands and shows an interest in the essential need for a strong U.S. minerals posture.

PUBLIC LAND ACCESS PROBLEMS

Introduction

The occurrence of economic concentrations of nonfuel minerals is a relatively rare natural phenomenon. This can be appreciated by the fact that between 1,150 and 1,200 mines supply about 90 percent of the free world's mineral requirements. The geologic uniqueness of mineral deposits is even better exemplified by a rule-of-thumb that the average mining company can stay in business if it makes one significant discovery every 20 to 30 years. However, to make that discovery, the company must continue searching for new deposits.

Given the anomalous nature of economic nonfuel minerals deposits and the continuing need for domestic supplies of minerals, it would seem natural that the government would encourage new exploration in the United States. Instead, government policies have proved to be counterproductive to their discovery and development.

In the past, when analysts predicted mineral scarcities, incorrect conclusions were often drawn because mineral reserves at any one time do not include resources undiscovered. As history has shown, and as all exploration geologists would agree, the U.S. still knows little about the total mineral resource potential of its land. However, the discovery of mineral deposits is no longer a matter of relying on the abilities of exploration crews to find such deposits. The most precious asset and the most fundamental requirement, access to land—primarily the mineral-rich public land—in which to search could well become the scarcest component in the Nation's domestic mineral supply future.

Every national commission that has made a comprehensive study of domestic minerals policy or public land management has called

for encouraging mineral production from public lands.[82] Yet, despite these repeated recommendations and the long-recognized fact that public lands of the West and Alaska continue to hold the greatest promise for mineral discoveries, government continues to restrict or prohibit their use for this economic and strategic national good. The most deplorable aspect of this shortsightedness is that it is being done without any real knowledge of the losses involved, without any attempt to understand the long-term impacts, and without any government accountability for the consequences.

Over the last 10 years the United States has made grave, fundamental errors in administering the public lands with respect to minerals, despite the provision in the organic acts of the principal land managing agencies of adequate authority for mineral development. The National Environmental Policy Act, as developed by the courts, has become the principal weapon of environmental pressures to manage public land for non-mineral uses. The existing body of public land law is being rapidly subsumed into an ever-expanding body of environmental law.[83]

When Congress passed the Federal Land Policy and Management Act of 1976, it did so in order to achieve the maximum benefits accruing to the application of the principles of multiple use and sustained yield. Instead, land managers have utilized administrative planning policies or misinterpretation of statute to administer the lands on an ad hoc decision basis, prohibiting mineral exploration and development or inhibiting such use through time consuming and costly regulations.

The orientation of the Department of the Interior, the Department solely responsible for the development of the mineral resources of the public lands, has been one of fundamental skepticism if not outright opposition to mineral exploration and development. Whether in the promulgation of surface management regulations,[84] the fulfillment of inventory responsibilities, the interpretation of withdrawal restrictions, or the enforcement of provisions permitting mineral exploration,[85] the Department has demonstrated an unwillingness to

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[82] The most comprehensive study of public land issues was that by the Public Land Law Review Commission (see footnote 2, p. 122). The background material in review of 5,000 statutes affecting public land use and the 400 sweeping recommendations of the PLLRC's report, "One Third of the Nation's Lands," were unprecedented in scope. In calling for an overriding national policy that encourages and supports the discovery and development of domestic sources of minerals, it stated: ". . . a decision to exclude mineral activity from any public land area should never be made casually or without adequate information concerning the mineral potential . . . Mineral exploration and development should have preference over some or all other uses on much of the public lands . . . development of a productive mineral deposit is ordinarily the highest economic use of land."

[83] Raymond A. Peck, Jr., "And Then There Were None" Evolving Federal Restraints on the Availability of Public Lands for Minerals Development, Rocky Mountain Law Institute, vol. 25, 1979.

[84] BLM's recently proposed Surface Management Regulations (30 CFR Subpart 3809) lack any practical understanding of mineral exploration and development, the balance Congress intended in the Federal Land Management and Policy Act, or the Secretary's responsibility under the Mining and Minerals Policy Act. Unlike the balanced approach of Forest Service in its surface management regulations, BLM's regulation continues to assume that it may legislate where Congress does not.

[85] The Congress, in adoption of Section 603 of FLPMA, attempted to ensure that mineral exploration and development would continue on lands being reviewed for wilderness classification in the same "manner and degree" as prior to the initiation of the review. The Solicitor of the Department has interpreted "manner and degree" so as to prohibit the continuation of any mineral activity. That interpretation was so egregious as to draw the objection of the Chairman of the Public Lands Subcommittee of the House of Representatives, in addition to others.

allow the use of the public lands to develop the mineral resources vital to the nation. These actions which have stalled development for years—even in the case of highly significant ore deposits—are diminishing the role that America's public lands can play in its economy.[86]

There has been little effort in the Congress and certainly none in the executive to relate this restrictive approach to Federal land to the larger perspective of assuring mineral supplies. Once again, the United States, because of its inability to plan for its long-term interests and because of an inadequate policy coordinating mechanism within the executive, appears to be purposely promoting continued and growing mineral dependence.

Availability of Federal Lands for Mineral Exploration

Perhaps the best study of public lands removed from mineral development is the Department of the Interior's 1977 report "Task Force on the Availability of Federally Owned Mineral Lands.[87] That study indicates that 42 percent of public lands of the U.S. have been closed to hard rock mineral activity, 16 percent have been severely restricted, and another 10 percent moderately restricted (See Table 3). Although no update has been made, 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—both BLM and Forest Service-administered lands—under the BLM's new "Areas of Critical Environmental Concern," and under other restrictions, withdrawals, classifications, and designations yet to be developed.[88]

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[86] The search for and development of mineral deposits is profoundly affected by public attitudes regarding access to public lands. Rather than acquainting the public with the importance of minerals, the Department of the Interior, through its principal clients, the preservation groups, has worked to halt development. An interesting account of viewpoints concerning the development of a major molybdenum deposit in Colorado was presented in the June 6, 1979, edition of the *Denver Post* under the title "Profit and Hypocracy." The press account of a hearing read. "Questions from the audience centered around whether the molybdenum to be mined is a national priority, or is being developed for corporate profit," and that "exports go to Germany, Japan and some even finds its way to Czechoslovakia." Interestingly, the exports of molybdenum, valued at nearly $1 million, offset a growing trade deficit in other minerals.

[87] Final report of the Task Force on the Availability of Federally Owned Mineral Lands, Department of the Interior, 1977, p. 48. (A disclaimer added to this report by the present Secretary reads: ". . . its findings and recommendations do not represent the official views or policy of the Department of the Interior.")

[88] Proponents of land withdrawals have asserted that such action merely preserves the minerals for times of crisis and future use. The fact that it is uncertain what minerals and in what quality and quantity occur in such lands and that the time from the initial discovery to the start of production can be 10–20 years, such minerals would have no value in case of a national crisis. Moreover, the public-interest argument for "resource conservation" has been decisively disputed. (See G. Anders, W. P. Gramm, S. C. Maurice in "Does Resource Conservation Pay," International Institute for Economic Research, Paper 14, Department of Economics, UCLA, Los Angeles, July 1978, 42 pp.)

In the Introduction to this analysis, Hendric S. Houthakker (Professor of Economics, Harvard) said: "The most important implications, perhaps, is that in the past the price mechanism has, on the whole, given more or less correct signals to guide the optimal use over time of exhaustible resources, a performance that the political process would find hard to match. In the United States, the belief is widespread that government intervention . . . is needed to prevent wasteful dissipation of finite resources. . . . (T)he market has done the job reasonably well, and presumably will do it well in the future, if left reasonably free. . . . (It) does not favor the present generation at the expense of posterity. The burden is now on those who consider government action indispensable; they will have to show how laws and regulations, administered and enforced by a largely unaccountable bureaucracy, can do a better job than the market. Since most members of the latter group have only the vaguest notion of the specifics of optimal allocation over time, they may find it difficult to make a case."

TABLE 3.—RESTRICTIONS ON FEDERAL LANDS TO MINERAL DEVELOPMENT STATUS AS OF 1975

[In percent]

	Formerly restricted	Highly restricted	Moderately restricted
Hardrock minerals:			
Department of the Interior [1]	41.9	16.2	10.4
Office of Technology Assessment [2]	39.9	6.5	19.6
Leasable minerals:			
Department of the Interior [1]	38.6	22.7	6.6
Office of Technology Assessment [2]	38.3	10.3	13.7

[1] Final report of the task force on the Availability of Federally Owned Mineral Lands, Department of the Interior, 1976, U.S. Government Printing Office, Washington, D.C.

[2] Interim report, Management of Fuel and Nonfuel Minerals in Federal Lands, Office of Technology Assessment. (Final report shows wilderness areas, power withdrawals, etc., as moderate withdrawals and combines moderately and slightly restricted categories.)

This growing denial of access for mineral exploration and development is aggravated by the total lack of interest within the executive for specifically determining the availability of public lands for mineral development.[89] In effect, the owner of one-third of the Nation's lands has not yet even considered a title search of its property to learn the extent of the non-development liens it has placed against it.[90]

The United States Government, unlike other developed nations,[91] has further increased dependence on foreign sources by demonstrating a total lack of commitment to the understanding of the importance of the mineral-rich public lands to domestic production. There is excellent potential, for example, within the United States for the production of some strategic minerals not currently being produced domestically such as cobalt and platinum group metals.[92] Alaska has a number of favor-

[89] In testimony before the Mines and Mining Subcommittee during its Nonfuel Minerals Policy Review oversight hearings in 1979, the Assistant Secretary for Energy and Minerals, Department of the Interior, repeatedly showed little knowledge of or concern for the amount of public land removed from mineral development.

[90] Concerning the availability of public lands, the General Accounting Office concluded: "We found that there is no single source of cumulative withdrawal statistics. No one federal agency maintains records on all the withdrawals on public lands, and no cumulative records are maintained by any agency for the lands under its jurisdiction. And, since withdrawal actions can originate in a number of ways, there is no single public document from which withdrawal statistics can be derived. While BLM has the responsibility for disposing of minerals on most public lands, it does not maintain a comprehensive set of records showing what lands are available for mineral entry and what lands are not. Each land-managing federal agency keeps its own records and, to some extent, sets its own requirements for mineral exploration and development within the lands under its jurisdiction. In some cases, these conditions vary with an individual ranger or district manager." See Mining Law Reform and Balanced Resource Management, General Accounting Office report 1979, p. 16.

[91] The attitudes in France and Japan concerning minerals and land use is revealing. With land areas only 6 and 4 percent as large, respectively, as the U.S. and much higher population densities and intense land use, both governments under a variety of incentives and programs have been carrying out intensive domestic exploration. Since 1975, France has discovered 16 deposits of lead, zinc, silver, fluorspar, barite and tungsten and hopes to raise the domestic share of its nonfuel mineral requirements from 14 to 20 percent by the late 1980's. Japan has proved the existence of about 135 million tons of copper, lead and zinc with additional reserves of gold, silver, and manganese since the middle 1960's. See P. C. F. Crowson, footnote 49.

[92] Ongoing exploration of the Blackbird cobalt deposit, Idaho, has proved about 30,000 tons of cobalt with excellent geologic potential for additional reserves. If development is possible in 1984, the Blackbird deposit could provide 20 percent of U.S. cobalt needs. Large reserves of platinum group metals (PGM) in Montana's Stillwater Complex, (the richest PGM deposit in the world), could provide 25–30 percent of U.S. palladium and 9 percent of U.S. platinum consumption at a minimum level of production. It has a probable 1986 startup.

Characteristically, no recommendations in support of mining of these deposits were made by the Assistant Secretary of Energy and Minerals in the last 3 years when both areas were considered for wilderness. With U.S. imports of these strategic metals exceeding 90 percent, it is ironic that the "Report on the Issues," which identified the problem of security of southern African sources and the U.S.S.R. as the alternatve supplier, did not point to the need of production from the Blackbird and Stillwater deposits.

An interesting sidelight to the Stillwater Complex question was a December 5, 1977, Director, Bureau of Mines, memo on a Forest Service environmental impact statement on management of the Beartooth Face Planning Unit in which the Stillwater Complex deposits occur. Because about one-half of the planning unit was classified as "roadless" for consideration as Rare II Wilderness, the memo read: "In view of the excellent potential for chromite,

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able but complex geologic terrains for these metals as well as for chromium, yet the government made no effort to evaluate these potential mineral areas before adopting or recommending restrictive land use classifications. Instead of placing barriers before mineral exploration, a sensible domestic policy would take every possible step to stimulate the private sector in its search for such minerals.

The U.S. remains a mineral-rich country.[93] Known reserves and resources and their relation to Federal versus non-Federal lands are shown in table 4. New discoveries will continue to be made primarily as the result of sophisticated exploration techniques, new geologic concepts, and refinements in geochemistry and geophysics. All have contributed to a relative explosion of techniques in the minerals exploration field.

TABLE 4.—RESERVES, RESOURCES OF SELECTED MINERAL COMMODITIES, AND POTENTIAL FEDERAL LAND CONTRIBUTION

Mineral commodities	Reserves at current prices [1]	Hypothetical resources [2]	Potential Federal versus non-Federal [3]	Imports exceed 50 percent of 1976 domestic consumption*
Aluminum (million short tons)	10	Very large	Major	(*)
Antimony (thousand short tons)	120	Small	Major	
Berylium (thousand short tons)	28	Huge	Major	
Bismuth (million pounds)	26	NA	Major	(*)
Cadmium (million pounds)	220	NA	Major	(*)
Chromium (milllon short tons)	NA	Insignificant	Major	(*)
Coal (billion short tons)	[4] 437	Huge	Major	
Cobalt (million pounds)	540	NA	Major	(*)
Copper (million short tons)	93	Large	Major	
Fluroine (million short tons)	16	Small	Major	(*)
Gold (million troy ounces)	100	NA	Major	(*)
Graphite (million short tons)	NA	Very large	Minor	
Gypsum (million short tons)	350	Huge	Major	
Iron (billion short tons)	4	Huge	Medium	
Lead (million short tons)	59	Moderate	Major	
Manganese (million short tons)	NA	NA	Major	(*)
Mercury (thousand flasks)	430	NA	Major	(*)
Molybdenum (billion pounds)	7	Huge	Major	
Natural gas (trillion cubic feet)	228	Large	Medium (onshore)	
Nickel (million pounds)	400	Moderate	Major	(*)
Petroleum (million barrels)	33	Large	Medium (onshore)	
Phosphate rock (million short tons)	2, 500	Very large	Major	
Potash (K20eq.) (million short tons)	200	Huge	Medium	
Soda ash (billion short tons)	30	Huge	Major	
Silver (million troy ounces)	1, 500	Moderate	Major	
Titanium (million short tons)	32	Very large	Medium	(*)
Tungsten (million pounds)	240	Moderate	Major	(*)
Uranium, (U308) (thousand short tons)	[5] 640	Large	Major	
Vanadium (thousand short tons)	115	NA	Major	
Zinc (million short tons)	30	Very large	Medium	

[1] USBM estimate 1973.

[2] Resource appraisal terms: Huge—domestic resources are greater than 10 times the minimum anticipated cumulative demand (MACD) between 1971 and 2000; very large—domestic resources are 2 to 10 times the MACD; large—domestic resources are approximately 75 percent to twice the MACD; moderate—domestic resources are approximately 35 to 75 percent of the MACD; small—domestic resources are approximately 10 to 35 percent of the MACD.

[3] Hypothetical resources. They are undiscovered but geologically predictable deposits of materials which are essentially well known as to location, extent and grade and which may be exploitable in the future under more favorable economic conditions or with improvements in technology.

[4] Reserve base.

[5] At $30 per pound.

Source: Final Report of the Task Force on the Availability of Federally Owned Mineral Lands, U.S. Department of the Interior, 1977, p. 39.

(Continued)

platinum, copper, nickel, uranium, coal, and petroleum in this area, we would hope that whatever plan is finally adopted will allow sufficient latitude for mineral recovery in this highly, perhaps uniquely mineralized area." That memo was returned by the Assistant Secretary of the Bureau of Mines for deletion of this statement.

[93] There are numerous examples of significant domestic mineral discoveries in recent years that dispute the gloomy assumption that the United States has only subeconomic resources left to develop. At least 35 proven ore deposits (gross in-place value over $100 billion) were discovered in the U.S. in the last 10 years. Those on public lands were made before the land could be withdrawn. Development of some is being contested by environmental groups. Regulations, especially for the Clean Air Act Amendments and land use, will stall or stop some from being developed. High development costs and inadequate metal prices may forestall the development of others.

Geologic theory (such as plate tectonics) developed in the past 10 years has played a significant role in searching for volcanogenic massive sulfide ores of zinc and copper such as major new discoveries in Maine and Alaska. Geochemistry, in its infancy in 1950, played a significant role in molybdenum discoveries in Colorado, Idaho, Utah, Washington and Alaska; widespread stratabound copper-zinc-silver occurrences in Montana; volcanogenic occurrences in New Mexico and Wyoming; a significant platinum deposit in Montana; and a potentially important extension of a cobalt deposit in Idaho.

Better geophysical methods found three new copper-lead-zinc deposits beneath thick covers of glacial gravels in Wisconsin, one of which is considered among the 10 largest massive sulfide deposits ever found in the United States. Better geologic inference will play an ever increasing role in mineral discoveries such as those in the Viburnum Trend lead deposits in Missouri and the new zinc district in central Tennessee. Over 200 new deposits or important mineralized areas containing at least 20 important minerals have been drilled or sampled in Alaska, a State whose enormous potential has only been scratched. However, in Alaska, recent and planned land use decisions will greatly diminish this potential. The following typify important discoveries:

Mount Emmons molybdenum deposit, Crested Butte, Colorado: During the past 25 years at least six different mining companies explored the Keystone lead-zinc-silver mine on Mount Emmons. The most recent of these was Amax, whose geologists recognized that the base-metal veins occurred within a large alteration zone of a type associated with molybdenum deposits. In August 1977, Amax announced its discovery of what is now the world's fourth largest deposit of molybdenum, valued at more than $7.5 billion. The outer edge of this deposit is less than 200 feet beyond the workings of the old base-metal mine.

Carlin gold, Tuscarora Mountains, Nevada: During the late 1800's, and early 1900's, placer and vein deposits provided virtually all of this country's gold production. Declining economics (federally controlled price) and depletion of high-grade ores removed most of these sources from the market prior to World War II. The Homestake mine became the only significant domestic producer of gold. In 1961, two geologists working for Newmont Mining Corp. began exploring for gold in Nevada using totally new geologic concepts. The results of their efforts is the Carlin mine which produced its first bullion in 1965. The original ore reserve of 11,000,000 tons containing an average 0.32 ounce gold per ton, was expected to be mined out in 1980, but the mine continues to operate in August of that year.

So unique was the Carlin discovery that it lends its name to a special class of newer discoveries which now includes the Pinson, Preble, Alligator Ridge, Jerritt Canyon, Cortez, and Gold Acres deposits. Significantly, the key chemical indicator for Carlin deposits is not gold, but a combination of arsenic, antimony, thallium and molybdenum.

Troy Area copper-silver province, northwestern Montana: Prior to discovery of the Troy (Spar Lake) copper-silver deposit by Bear Creek Mining Company geologists in 1963, the area

has been studied by both State and Federal geologic teams with no apparent recognition of its mineral potential. Two additional copper-silver deposits, one located within sight of a paved road, have since been discovered in the same area. Not only had two competent geologic survey agencies failed to locate these subtle shows of mineralization, but so had several other major exploration companies.

McDermitt mercury deposit, Humboldt County, Nevada: Following closure of the Cordero mine, which produced 115,000 flasks (76 pounds per flask) of mercury from 1941 to 1970 the U.S. had no major domestic source of mercury. In 1972, geologists of Placer Amax began searching for mercury in fossil lake beds adjacent to veins of the abandoned Cordero mine. Their work involved the totally new concept of sub-lacustrine hot-spring-related mineralization. Placer's McDermitt mine is the largest producer of mercury on the entire continent of North America. More than 400,000 flasks will eventually be extracted from that deposit.

Porphyry Copper Province, Tucson, Arizona: In 1922, the Commissioner of the General Land Office, based upon a report by the Geological Survey on an area south of Tucson, classified the area as "nonmineral in character." An aerial photograph made in 1937 showed no evidence of mining activity on some 525 square miles of land measuring 15 miles across and 35 miles long. Today, that area contains six major copper mines that in 1979 produced 230,000 tons of copper worth $425 million.

Notwithstanding the Nation's mineral wealth and in spite of significant advances in the field of mineral exploration, such wealth and such technology will be irrelevant if the land where the minerals are located is off limits to mineral exploration or so highly restricted as to render exploration and development uneconomic. Without the availability of lands, all other discussions of domestic mineral supply is rendered moot.

Perhaps one of the most self-serving statements in the "Report on the Issues" was the "Principal Issue" regarding minerals and Federal land management:

> Federal land managers and decisionmakers at both the national and field levels do not have effective tools for managing the mineral resources potentially found on the public lands. Inadequate mineral information, insufficient analytical capability and lack of appropriate legal authority and policy guidance contribute to the inability to integrate mineral concerns into multiple land use planning, withdrawals, and land use designations.

Although the report acknowledges that the mineral potential of public lands is "believed to be substantial," no mention is made of the future importance of that potential to national security and the economy, of the need to keep public lands accessible to prove that potential, or of the statutory responsibilities of the Department of the Interior to encourage the long-range search. The review attempts to sidestep the issue of withdrawals by asserting that decisionmakers, without adequate information of undiscovered resources, cannot integrate mineral concerns into land use decisions. In fact, the scarcity

of information of mineral resources has been used by the Department of the Interior—the Nation's chief manager of Federal minerals—as a reason for not considering minerals. Yet, the fact that mineral deposits are difficult to find should be the most persuasive argument for managing public lands in a way that permits and encourages the collection of information regarding these resources. Moreover, the conclusion of the report, that "lack of appropriate legal authority and policy guidance" has contributed to the inability of the Department to integrate mineral concerns into land use decisions is legally incorrect.

The Department has minerals management duties over all public lands,[94] in addition to its supervision and control regarding all aspects of over 70 percent of those lands. The Department of the Interior has both the responsibility and the authority for development of America's mineral wealth under the broad mandate of the Mining and Minerals Policy Act of 1970, as well as the mineral directives of the Federal Land Policy and Management Act of 1976.

Conclusion

The public lands of the United States constitute one of the Nation's greatest natural resources. Public lands provide the United States the opportunity to significantly offset foreign mineral dependence to decrease a growing balance of trade deficit, to create jobs and to play a role in the reindustrialization of the Nation. Yet that will only take place if these lands are available for mineral exploration, development and production. It is therefore critical that the Department of the Interior put to an end its opposition to mineral use of the public's land.

TECHNOLOGICAL INNOVATION PROBLEMS

America's ability to turn innovative ideas into productive reality has always been its greatest asset. Americans have been committed to innovation that maintained national leadership in creating new ideas, in converting technology into markets, and in yielding greater productivity. There is frightening evidence, however, that United States industry, as a whole, is losing its edge in technology and, as a result, in productivity. This is due in large part to the cumulative impact of government's regulatory, tax, and antitrust policies and, more generally, to the absence of a reasonably stable investment future as a result of the uncertainties of inflation. The consequence has been a decline in the competitiveness of American industry in general and of the mining industry in particular, which in turn has discouraged capital formation and prevented the profits necessary for investments in innovation.[95]

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[94] The Secretary of the Interior's minerals management responsibilites regarding National Forest System lands is acknowledged by regulation issued by the Secretary of Agriculture in 36 CFR 252.1: "It is not the purpose of these regulations to provide for the management of mineral resources; the responsibility for managing such resources is in the Secretary of the Interior."

[95] The broad issues that are impeding the competitiveness of American industry generally are well covered in the article, Revitalizing the United States Economy, Business Week, June 30, 1980, pp. 56–142. See also the article, An Economic Dream in Peril, The Productivity Crisis, Newsweek, September 8, 1980, pp. 50–69.

The Committee does not propose, in this report, to address the various highly technical areas of the minerals industry where technological innovation might improve productivity, mineral recovery, and the discovery of mineral deposits or which might reduce production cost and energy consumption or resolve tough environmental problems. The complexity of these problems is all too well known to those working in the appropriate fields and is clearly beyond the scope of this report. Neither is it necessary to theoretically assess the adequacy of R&D investments in order to ascertain what analysts call a "socially optimum level." However, sufficient information is available to conclude without question that technological innovation in the minerals industry is not only inadequate but that, for more than a decade, government has failed to provide the assistance necessary.[96]

The actual decrease in federally supported mineral supply R&D becomes more (or less) difficult to grasp in light of increasing offshore dependence that is being promoted by Federal actions and by policy decisions that accept such dependence as necessary for world order interdependence. The lack of a Federal commitment to do what is best for the citizens of this country in the way of supporting domestic minerals development—including U.S. indecision on ocean mining—in turn works against industrial R&D.

Until the 1979 Battelle-Columbus Laboratory analysis,[97] considerable confusion had existed in the executive as to the amount of R&D that has been specifically directed toward nonfuel mineral supply—mineral exploration, mining, primary materials processing, and recycling—as opposed to the much more encompassing R&D in the area of materials utilization. The Battelle study indicates a cause for real Congressional concern (see Table 5) : First, Federal expenditures for R&D in mineral supply constituted only 9 percent of total Federal R&D expenditures of which most were devoted to materials utilization, evaluation of material properties, and development of special material substances derived from nonfuel minerals. Second, Federal expenditures for R&D were expended mainly for fuel minerals and renewable resources rather than for nonfuel minerals. Third, although the estimated expenditures by the private sector on materials R&D were nearly double those of the Federal Government, like Federal expenditures the focus was on materials utilization rather than on basic resource development.[97a] This fact notwithstanding, private sector R&D expenditures on mineral supply problems exceeded Federal ex-

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[96] In more precise language, the National Academy of Sciences stated in 1969 : "The state of mineral technology in the United States is wretched . . . The position of the United States in mineral technology is declining . . . The role of the federal government in advancing technology has been unsatisfactory." See National Academy of Sciences/ National Academy of Engineering, "Mineral Science and Technology—Needs, Challenges, and Opportunities", Washington, D.C., 1969, p. 20.

[97] Battelle-Columbus Laboratory, The Problem Analysis Phase : Task 8—Assessing the Adequacy of R&D, Report to the National Science Foundation, February 23, 1979, 315 p.

[97a] See William H. Dresher's testimony before the Senate Committee on Commerce, Science and Transportation regarding H.R. 2743, The Materials Policy, Research and Development Act of 1979 ; hearing in Albuquerque, N. Mex., June 30, 1980. Dr. Dresher observed : "Plainly spoken, a company in the mineral industry, or in any other industry for that matter, does not plan for and take the steps to create technological change unless it knows that the capital will be available to implement the change and that the increased return on the investment resulting from the change will be sufficient to make both the process and the adoption of the innovation worthwhile. Today, unfortunately, the debit-to-equity ratio of America's mineral industries is nearly double that of all other American industry. This debit overhanging the industry effectively precludes any realistic plans for technological change and capital investment. The atmosphere for technological innovation must provide for capital formation and a degree of economic stability which minimizes the uncertainty of long-term, high-cost investment.

penditures by more than 3 to 1.[97b] More important, as much as 90 percent of all mineral/material R&D in the United States—both federally and industrially funded—is devoted to material utilization.

TABLE 5.—SUMMARY OF ESTIMATED FUNDING OF NONFUEL MINERALS/ MATERIALS R&D IN THE UNITED STATES, 1976-77

Sector of the cycle	Federally funded		Industrially funded	
	Annually (millions)	Percent	Annually (millions)	Percent
Exploration	$19	3	$2	0.1
Mining	14	2	54	3.0
Minerals processing				
Primary material processing	17	3	116	7.0
Utilization of materials devoted explicitly to alleviating supply problems	5	1	(1)	(1)
All other utilization	490	74	1,564	88.0
Recycling	9	1	34	2.0
Unspecified	109	1=		
Total	6.3		1,770	

[1] No data are available. There is probably very little devoted to the purpose of conserving materials.

Reference: Final report "Assessing the Adequacy of R. & D." National Science Foundation, Battelle-Columbus Laboratories, Feb. 23, 1979.

These findings clearly show that mineral supply R&D is not being emphasized in the United States to the degree that it must. Moreover, even though the period of Battelle's study was only 2 years after the severe mineral shortages of 1973–74, there was no shift in government goals and priorities in the allocation of R&D funds to mineral supply problems. Instead, government has continued to devote its primary efforts to material utilization.[98]

Despite the need for technological innovation in mining and mineral processing, there are inherent barriers as a result of the uniqueness of the various operating conditions and the built-in uncertainties of long-term investment risk. Unlike most technological innovation where operating conditions or use design can be selected or predetermined, each mining and mineral processing installation must surmount a unique set of conditions peculiar to each deposit. Innovation in the minerals industry has become more the optimum use of all applicable and proven technologies for the simple imperative of minimizing risk.

The special nature of commodity markets, the unknowns of future supply and demand forces, and uncertainty of prices that are determined in international markets have all acted as constraints upon innovation in the minerals industry. Large investments in existing capacity and the long life necessarily designed into that capacity—which seldom can be replaced with existing cash flows—mean that innovation spreads slowly within the industry. Perhaps the major

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[97b] Kennecott Copper Corp.'s Ledgemont laboratory in Massachusetts was the only major industrial facility in the 1960's and 1970's that was looking for major technological breakthroughs in nonferrous mineral development. Primarily for metallurgical R. & D., the major emphasis in the 1970's was in process R. & D. for ocean mining and underground leaching. However, the high cost to meet environmental goals and the depressed copper market essentially stopped R. & D. at Ledgemont in 1978.

[98] Battelle-Columbus Laboratories began with the 1976–77 inventory of Federal *materials* R&D expenditures compiled by the Committee on Materials (COMAT) of the Federal Council for Science and Technology. COMAT's compliation, however, was for "material life cycle" R&D, which covered a much wider range of R&D for materials generally. The COMAT study showed that 36.5% of Federal nonfuel mineral R&D was by ERDA, which was clearly not for minerals supply.

deterrent to innovation is simply the cost and time needed to prove new technology on scales large enough to be meaningful. The uncertainty of outcome and the high risks involved in demonstrating large scale innovative concepts has discouraged efforts by individual companies. This is at least one responsibility that must be shared between the public and private sectors.[99]

A major shortcoming of some of what has been written on mineral or commodity policy, often by political scientists, international economists, and sometime by academic researchers—sometimes in support of other policy goals—is that major shifts in U.S. mineral supply, such as caused by foreign supply interruptions, can be largely overcome by substitution, conservation, and recycling. While R&D—along with price changes and other measures—can assist along those lines, to assume that in peacetime conditions such remedies will be in place, or that sufficient time will be available to put them in place when needed, is a gross oversimplification of what is workable.

In considering R&D, two outstanding needs must be recognized and met: (1) the provision of increased levels of support to colleges and universities engaged in the extractive technologies, and (2) the provision of mechanisms for more effective Federal contributions for demonstrating new technology applicable to the domestic minerals industry. Existing institutions, both private and public, could periodically provide the necessary technical base for reestablishing American leadership in world technology. The research functions in the United States Bureau of Mines should be strengthened as part of this.

The Bureau of Mines, in the past, had a strong, active research program of considerable value to the mineral sector of the economy. In the last several years, however, the ability of the Bureau to carry out basic supply-oriented metallurgical and mining research has been critically restricted. Its research efforts are now split between health and safety technology (about 50 percent), environmental technology (about 30 percent), and resources technology (about 20 percent), the last covering both metallurgical and mining research. Although health and safety and environmental improvement are important areas of research, the dilution of research efforts in the mineral supply area is reflective of the Department of the Interior's changing orientation and apparent lack of concern regarding the importance of supply R&D. For example, the Bureau's metallurgical research program of about $20 million has remained relatively constant in the last 10 years, which means that the effort in terms of real dollars has been essentially cut in half.

Bureau of Mines mineral supply research must be strengthened to seek long-range goals to improved recovery and productivity. More than ever, the Bureau must initiate a joint program with researchers in other sectors of the minerals economy to identify the direction of Bureau research, to carry out jointly sponsored cost-effective programs, and to assure technology transfer. An essential step in this direction is to transfer to the Bureau of Mines the 31 Mineral Institutes, recently

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[99] See Technological Innovation and Forces for Changes in the Minerals Industry, Committee on Materials Technology, National Academy of Science/National Academy of Engineers, Washington, D.C., 1978, 62 pp.

established by the Department of the Interior (administered by the Office of Surface Mining) at major centers of learning, at some of which the Bureau has long maintained research stations.

In addition, policies which inhibit cooperative government and industry R&D programs should be revised and modified where necessary. Among such inhibiting factors are: (1) United States patent policies with respect to contract R&D, (2) Justice Department interpretation of antitrust laws to preclude cooperative government and industry R&D, and (3) policies that affect the availability of capital to industry.

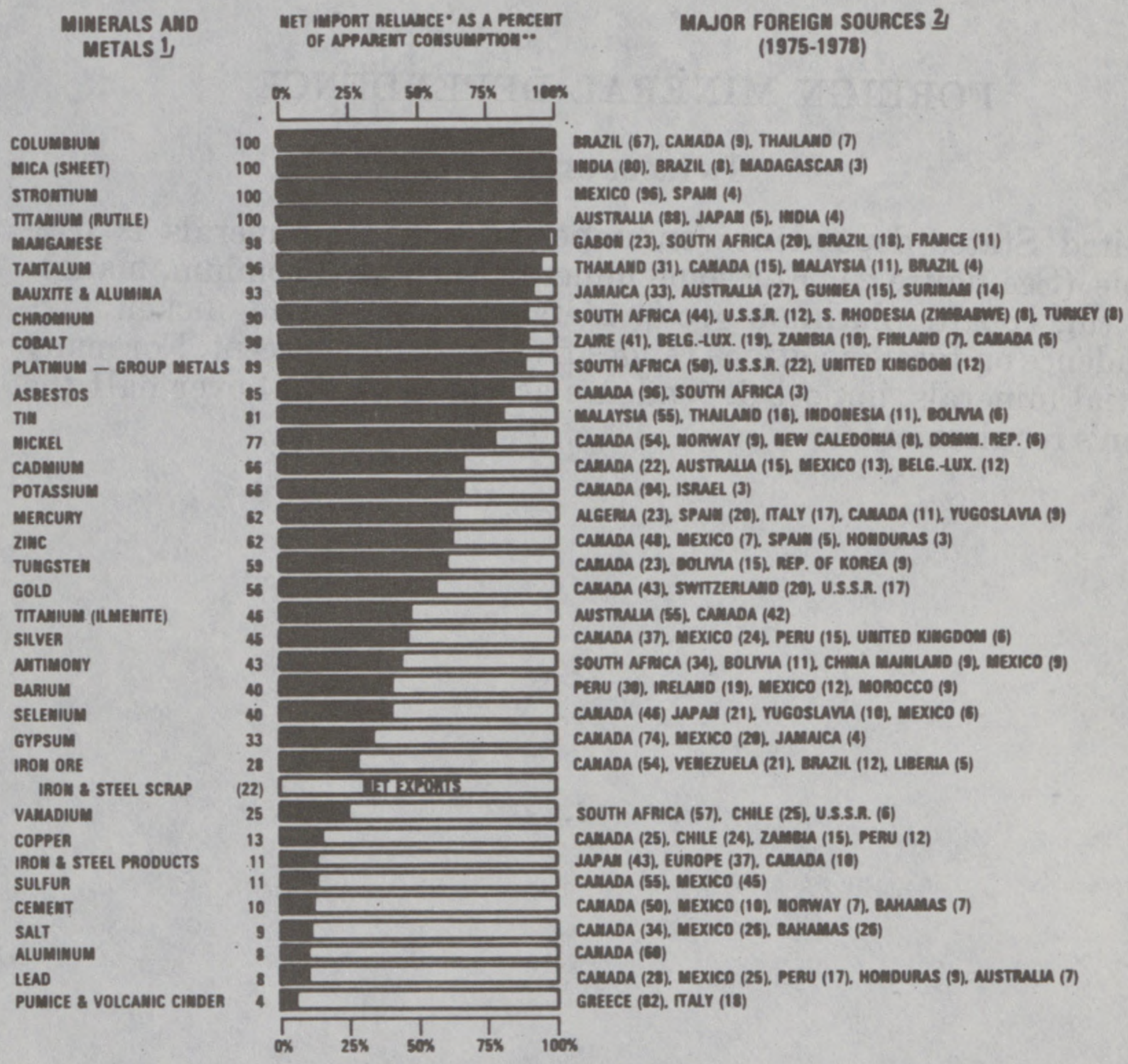
FOREIGN MINERAL DEPENDENCE

Introduction

United States dependence on imported nonfuel minerals is irrefutable (See figure 2). For some minerals such as chromium, manganese, tin, cobalt, platinum-group metals, asbestos, and nickel, U.S. dependence on foreign nations ranges from 80 to 100 percent. For many essential minerals, import dependence accounts for well over half the Nation's requirements.

Figure 2

U.S. NET IMPORT RELIANCE OF SELECTED MINERALS AND METALS AS A PERCENT OF CONSUMPTION IN 1979



*NET IMPORT RELIANCE = IMPORTS-EXPORTS +ADJUSTMENTS FOR GOV'T AND INDUSTRY STOCK CHANGES.

**APPARENT CONSUMPTION = U.S. PRIMARY +SECONDARY PRODUCTION + NET IMPORT RELIANCE.

APRIL-1980

1/ SUBSTANTIAL QUANTITIES ARE IMPORTED FOR FLUORSPAR, GRAPHITE, RHENIUM AND ZIRCON. DATA WITHHELD TO AVOID DISCLOSING COMPANY PROPRIETARY DATA.

2/ SOURCES SHOWN ARE POINTS OF SHIPMENT TO THE U.S. AND ARE NOT NECESSARILY THE INITIAL SOURCES OF THE MATERIAL

BUREAU OF MINES, U.S. DEPARTMENT OF THE INTERIOR
(IMPORT-EXPORT DATA FROM BUREAU OF THE CENSUS)

Minerals such as manganese—essential to the production and properties of steel (import dependence 98 percent); cobalt—vital for providing high heat- and wear-resistance to superalloys and cutting steels (import dependence 95 percent); and chromium—the least substitutable of all ferroalloys, and indispensible for corrosion-resistant alloys and stainless steels (import dependence 92 percent)—reveal a vulnerability that may be even more serious, more pervasive, than that of foreign oil.[99a] For, while America may develop its own alternative energy resources, in many nonfuel minerals there are no effective substitutes, no alternatives to foreign sources.

Dependence on foreign sources for nonfuel minerals is not a new phenomenon. While concern is justified regarding the recent growth in size and nature of that dependence, its existence alone has not in the past ignited national distress. What now necessitates renewed attention to strategic and critical mineral dependency is a matter of historical perspective: 1980's and the decades ahead are not the 1950's nor even the 1960's; the future the U. S. faces is one filled with new circumstances, challenges, and potential crises:

> It is an OPEC world where international oil supplies and prices are managed by a few nations in a way that experts called impossible a few years ago.
>
> It is a post-Iran, hostage-terrorist world where a nation may undertake self-destructive behavior that is contrary to what the Western World may perceive as being in accordance with that nation's own best interest.
>
> It is a "New International Economic Order" world, in which developing countries have nationalized foreign interests and have threatened to deny raw materials if their economic demands are not met.
>
> It is a "resource nationalism" world, where the flow of raw materials will become increasingly a part of foreign relations.
>
> It is a world in which the Soviet Union, no longer self-sufficient in some minerals or capable of maintaining supplies to its COMECON partners, can be expected to secure some share of world resources by rules other than those of the market system.

A dependence upon foreign sources for strategic and critical minerals in the decades ahead is thus more complex, more troublesome, and potentially more dangerous than a similar dependence of 20 or 30 years ago. The position of some supplier countries is shown by their membership in producer associations that have stated a desire to control prices, opportunity for which will be provided in times of short supply. The demands of some producer countries for more raw-material processing and basic fabrication, which is being furthered by U.S. domestic policies and promoted by world interdependence advocates, will weaken U.S. ability to act as the responsible leader of the free world.

Notwithstanding the reasonable contention of the "Report on the Issues" that source nations will continue to export minerals because of their need for hard currency, actions in Iran reveal that the receipt

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[99a] The National Academy of Sciences in its report, "Contingency Plans for Chromium Utilization", said: "... the fact that the United States is strategically more vulnerable to a long-term chrome embargo than to an embargo of any other natural resource, including petroleum, has not been recognized." See footnote 22.

of U.S. dollars for exported resources may not be the highest of their national priorities, whether dictated from within or without. In addition, increasing demands of producer countries for renegotiation of mineral investment contracts—the concept of the "obsolescent bargain"—is inhibiting such private investments.

Superimposed on all this are the actions of the Soviet Union, which heretofore has operated under a "self-sufficiency at any price policy." Now, apparently facing serious problems in maintaining this self-sufficiency, Soviet and East European mineral needs may necessitate not only free-market competition but acquisition by means outside the market system.

Thus, this new world in which the United States must acquire minerals that are critical to its survival, in large part by reason of a self-imposed denial of its own minerals, is one in which the certainty of some sources may well become extremely tenuous.

In terms of U.S. employment, the result of increasing dependence on foreign minerals may not seem large, but what is overlooked is that past growth in the Nation's economy should have resulted in a substantial increase in employment in the minerals industry. Thus, while employment in U.S. mining shows only a 6 percent increase since 1950, population and GNP growth in the last 30 years combined with a healthy nonfuel minerals industry—allowing for some improvement in productivity—should have shown a healthy increase in employment. Such limited growth adversely affects not merely the minerals sector of the economy but many industries that directly and indirectly provide service to mining and mineral processing. One Arizona construction firm, for example, was forced to lay off 1,160 employees when its contract services at local copper mines were reduced as a result of mine closures and production curtailments.[1]

In recent years, the effect of this dependence has been compounded by the increasing importation of minerals in processed form rather than as raw materials. Using zinc as an example, for many years more than half of the country's primary zinc requirements were imported. In 1970, two-thirds to three-quarters of such imports were in the form of concentrates to be smelted in United States plants. Today that same percentage of imports enter the country as refined metal—smelted elsewhere. In 1970, there were 14 zinc smelters operating in the United States. Today there are only six—and the largest of all United States zinc smelters closed permanently in December 1979.

In just 6 years, from 1973 to 1978, America's trade deficit in nonfuel minerals rose from $2 to $8 billion. In 1979, as a result of heavy sales of gold by the United States Treasury—most of which was exported—the nonfuel minerals trade deficit decreased. However, if trade in gold is excluded, the 1979 deficit was not materially different from that for 1978.

"Free Trade"

Foreign import dependence for minerals should be a matter of substantial concern to the average citizen. Yet many traditional econ-

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[1] The layoff occurred by May 1978 because foreign government-controlled copper producers maintained production in the face of the severely depressed prices of 1975–78, culminating in the surge of imports in 1977–78 even from African producers whose markets are principally in Europe. See footnote 38, p. 57.

omists, supporting the free trade concept, that the most efficient producer should prevail, argue that if this leads to importing rather than producing at home, so be it. While U.S. commodity policy will continue to be one of free trade—noninterference by Government in minerals markets—what is being brushed aside is how many foreign governments play a large hand in the international flow of raw materials, each in support of its own economic, political, and strategic interests. Unlike the policies of the United States, which cumulatively promote use of imports, other governments actively encourage and support mineral development through any number of devices from tax incentives, risk-sharing, and guarantees, through flexibility in the application of regulations, to more liberal antitrust policies.[2]

The events affecting the security of foreign oil supplies since 1974 have demonstrated that the matter of assured resource supply is very complex and not resolved by simple reference to free international trade. To the extent that a country is dependent on import sources for its basic raw materials, its economy can be held at ransom by an association of exporting countries—whether instituted by political or economic concerns—determined to manipulate supplies and prices to their advantage. Although foreign nonfuel mineral associations have not yet been successful, it must be noted that OPEC was unsuccessful for some years after its formation in 1960, and that as late as 1976, some experts continued to assert that the oil cartel could not possibly work.[2a]

It is of no small significance that a majority of the various mineral producer associations, made up largely of governments of developing countries, were formed after the 1973 success of OPEC, that they have the support of the United Nations under the "Charter of Economic Rights and Duties of States," and that price control remains their objective.[3] In fact, a 1974 United Nations report on permanent sovereignty of resources references the "success" of the petroleum-exporting countries as "spectacular," and stresses that "parallel strategies between producer associations may be essential to forestall consumer defection into substitutes." [4]

While conventional economic thinking assumes that a freely

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[2] For an excellent paper on the assistance provided their mineral industry by three developed countries see: P. C. F. Crowson, the National Mineral Policies of Germany, France, and Japan, Mining Magazine, London, June 1980, pp. 537–549. Also see GAO's report, ID–80–04 (footnote 38), for examples of the possible approach taken by many foreign governments, both developing and developed, supportive of domestic mineral development as opposed to the negative approach taken by the U.S. Government.

[2a] The 1973–74 oil embargo took the concerted effort of six Persian Gulf oil producers to have a major impact on the world's oil market. The 1979 collapse of only one producer (Iran; production reduced from 6 to 1.5 million barrels/day) had a similar effect, doubling prices and causing shortages. More important, political disruptions are much more possible with control of production and marketing now in the hands of producer governments.

[3] Under the influence of the developing countries, the United Nations Economic and Social Council's 1973 resolution on permanent sovereignty of natural resources (embodied in the U.N. Charter of the Economic Rights and Duties of States) favored collective action to exploit market forces to their advantage. More specifically, the resolution "recognizes that one of the most effective ways in which the developing countries can protect their natural resources is to promote or strengthen machinery for cooperation among them to concert pricing policies, to improve conditions to access to markets, to coordinate production policies, and thus, to guarantee the full exercise of sovereignty of developing countries over their natural resources." The Charter of Economic Rights and Duties of States" asserted the rights of the developing producer countries to preferential and nonreciprocal treatment and to expropriate foreign assets without compensation.

[4] Permanent Sovereignty Over Natural Resources; Report of the Secretary-General, Economic and Social Council, United Nations General Assembly, A/9716, September 20 1974.

functioning market acts against supply controls, developing countries object to the market system as fundamentally unfair. They reason that the market alone cannot resolve such issues as international distribution of gains, economic expansion, and trade stability to the satisfaction of developing countries.[5]

The Septemper 1979 threat of Nigeria—second largest supplier of oil to the United States—to terminate that supply if the United States recognized another government in Africa illustrates that the leverage of raw materials to produce chronic shortfalls will increasingly be part of international relations. The reluctance by the United States to purchase crude oil for the Strategic Petroleum Reserve (SPR)—only about 10 percent complete—after Saudi Arabia warned that that nation would reduce supplies if the U.S. bought for the SPR, further demonstrates how political circumstances affect raw material supply decisions even between countries with a mutual interest in strategic defense.

Most economists assert that "commodity control by the developing countries begins and ends with oil." Control, in the full sense of a cartel—an organization with the ability to artificially maintain high prices or deny supplies over a long period of time—is unlikely except possibly for chromium and platinum group metals. Nevertheless, producer associations, particularly during periods of short supply and rising prices, will increasingly be capable of exacting higher prices.[5a] In addition, they may well be willing and able to restrict supplies to certain consuming nations for political purposes. The ability to undertake collective action is enhanced by the shift in world ownership patterns of several important nonfuel minerals whereby governments themselves, with their own particular goals and objectives not necessarily involving profit, have assumed ownership of important parts of the mineral sector.[6]

Moreover, U.S. failure to fully appreciate the growing sophistication of producer country strategies, and the dangers they pose, renders impotent U.S. ability to alter and correct past mistakes and to develop answers. The prospects are particularly troublesome in light of the

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[5] M. S. Wionczek, the Wider Contest of Bilateral Resource Exploitation Agreements Between the LDC's and the DC's, Papers and Proceedings of the Ninth Pacific Trade and Development Conference, San Francisco, Aug. 22–26, 1977, published by Federal Reserve Bank of San Francisco, 1978, pp. 335–570.

[5a] The Congressional Budget Office in its December 26, 1976, report, "U.S. Raw Material Policy: Problems and Possible Solutions," (page 24) said: "Unilateral actions by supplying countries against consumers must also be expected. While the market power of individual nations may be limited in the long run, short-term gains can be realized by exploiting what amounts to near monopoly positions in some markets. Morocco was able unilaterally to increase taxes on exported phosphate rock in 1975, although there are other suppliers of phosphates (including the United States), because Morocco supplied almost the entire European market and time would be required for European customers to establish new sources of supply. Similarly, Jamaica exploited the position of large multinational firms in 1974 to raise the taxes on exported bauxite. The multinationals had invested heavily in Jamaican production and had no alternative in the near term but to pay the higher taxes and pass the cost increases to their customers."

[6] See Raymond F. Mikesell, New Patterns for World Mineral Development, British-North American Committee, 1979, pp. 16–23. Ownership has changed dramatically over the last 30 years, particularly during the last decade, to government-owned industries. In 1977, about 60 percent of the primary copper and well over half of the iron ore production of the developing countries was being produced by majority-owned government enterprises; in 1974 about two-thirds of the world's bauxite producers were government-controlled. (These percentages, of course, have changed or are in the process of changing, especially for bauxite, where new developments in Guinea, Australia, and Brazil, among others, are underway or are planned.)

realization that, as the U.S. learned with oil, economic dislocations may occur without major shifts in the supply-demand relationship.[7]

Opportunities to manipulate supplies and prices will increase as production and marketing by developing countries move further from existing international rules and institutions. Investment protection under international law, for example, has been weakened by a United Nations resolution that supports the concept of "sovereign takes all." Growing diversification of producer-country economies, international availability of technical and marketing expertise, and increasing awareness that gain of individual countries is enhanced by collective action will strengthen the market power of these producers.

No agency or department within the U.S. Government is today weighing the worldwide lag in new mineral development, the growing lead time for development, and the effect of inflation on such developments [8] against increasing world demands and, most importantly, U.S. Government policies that are, in effect, promoting offshore reliance. The only possible conclusion is that the executive is simply not planning for the long-term mineral needs of the United States economy and its defense. It would certainly appear that the responsibility for the assurance of long-term foreign supplies is too important an objective to lie solely within the Department of State whose foreign policy interests appear to subordinate national interest in this area.

The foreign policy of the United States Government has failed to evidence a basic responsibility for the adequacy or cost of mineral imports. U.S. foreign policy has disregarded both its legitimate mineral interests abroad and the security of mineral access—even in the subarea of economic policy. Ironically, the roots of this indifference, which is not characteristic of the behavior of other industrial countries, lie historically in reliance on U.S. industry to supply our markets.[9]

Although U.S. foreign mineral investment policy, as defined by the State Department, embodies the free market principle, the governments of other developed countries engage in a pragmatic mix of national interests, with supportive policies that further foreign invest-

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[7] According to the National Academy of Sciences, a "sudden mandatory chrome conservation program would result in severe economic dislocations even if needed development work (for substitution) would be completed." See National Materials Advisory Board's report "Contingency Plans for Chromium Utilization," National Research Council, National Academy of Science, Washington, D.C., 1978, p. 3. Steven J. Warnecke's report "Stockpiling of Critical Raw Materials" (No. 5 Chatham House Papers, the Royal Institute of International Affairs, London, 1980), reports on the 1978 West Germany study for the State Secretaries which concludes that without taking into account emergency substitution or recycling, a 30 percent shortfall of chromium would cause a 25 percent fall in the West German GDP. Warnecke: "These assumptions are theoretical but they raise the issue of how to judge the risk to industries from supply disruptions. It is impossible to see the length of supply disruptions, its immediate cause or which minerals will be affected."

[8] See Charles F. Barber, Mineral Investments in an Anxious World, National and International Management of Mineral Resources Conference, London, Paper 32, May 1980, for an example of the harsh consequences of inflation on major foreign mineral developments. The Cuajone porphyry copper project in Peru throws a good deal of light on why there have been no new major copper developments in the last 8 years other than those that were already in the planning process. The cost of the Cuajone project, constructed by four American companies during the period of 1970–77, was $4,033 per annual ton of capacity. In 1977 dollars, the year it was completed, the cost would have been $6,700 per ton capacity, requiring an average copper price of $1.35 per pound in 1977 dollars for a 15-percent return. If started in 1980 and completed in 1986, project cost in 1980 dollars was estimated at $10,800 per annual ton of capacity, requiring copper prices between $2.35 and $2.70 per pound in current dollars for a 15-percent return (average price in first half of 1980 was $0.98 per pound).

[9] See Raw Materials and Foreign Policy, International Economic Studies Institute, Washington, D.C., 1976, 416 p.

ment.[10] Notwithstanding the fact that these countries are much more dependent upon foreign mineral supplies than is the United States, the comparatively insignificant economic incentive provided U.S. investors against "creeping expropriation" is revealing.

Diversification—No Answer

The alternative of diversification of foreign supplies, confidently recommended by some as a means of avoiding foreign supply disruptions or price manipulations, is becoming much less of an alternative. Diversification as a reliable solution is not reflective of an international setting that is becoming much more intense and complex. The world is a far different place than it was during past emergencies when the United States, in the interest of national security, actively pursued a broad policy of alternative mineral source development. Moreover, much of that diversification was accomplished by the United States Government under Title III of the Defense Production Act of 1950. Nonetheless, some policy writers apparently presume that diversification can and will be accomplished solely by the private sector at its own risk.

If diversification does not include development of new deposits but a spreading of risk, its limitation is that of simultaneous diversification of other consumers acting independently. In this case, the appropriate question is whether diversification augments availability; otherwise it merely reflects a different mix of existing supplies.

Other factors, not the least of which is the Soviet Union's expanded ability and willingness to project its military power—which is affecting political realinements—cast shadows over the longer term probability of source diversification. Further complicating supply patterns is the anticipated increase in purchases by East European countries as they are forced, in the face of U.S.S.R. mineral difficulties, to turn more to outside suppliers. There are as well, increasing domestic mineral demands on the part of some supplier nations and evidence that some will choose to stretch out the production time of limited resources.[11]

Just as the worldwide shortages of 1973–74 were, in part, the result of insufficient mineral capacity, it is clear that if the lag in new developments continues in combination with growth in the economies of the Western World during the 1980's, severe shortages could once again occur.

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[10] State Department's reference to its "least interventionist" position masks its arms-length attitude relative to the climate and security of American foreign investments. For an analysis of other developed country policies, see P. C. F. Crowson, the National Mineral Policies of Germany, France, and Japan, Mining Magazine, London, June 1980, pp. 537–549. Also see L. Nahai, Mineral Policies of Developed Countries, Mineral Economic Symposium on Materials and Society, American Institute of Mining, Metallurgical and Petroleum Engineers, Nov. 13–14, 1979. Washington, D.C., pp. 11–13.

[11] Brazil, which the Department of the Interior has reported as an alternative supplier of manganese ore in the event of an African cutoff (Brazil currently provides about 25 percent of U.S. manganese ore imports), has announced that expansion of its steelmaking will require cutting back exports beginning in 1983. By 1987, it will export only 20 percent of its production.

India, which provided about 50 percent of U.S. manganese ore imports in the 1950's—during the Soviet embargo—has banned high-grade manganese ore exports because of future steel requirements and dwindling reserves. India's alinement with the Soviet Union (Mrs. Gandhi endorsed the Soviet invasion of Afghanistan) would further discount it as an alternative source in the event of an East-West confrontation.

While mineral policy experts assert that the United States must not allow unreasonable resource dependence to deprive this country of the freedom to make the political and economic decisions essential to its own interests, the "Report on the Issues", in answer to what motivates the world's "new managers", looked only at the over-supply conditions of 1975–78—a period of economic downturn. What was clearly ignored by the report, other than for minerals originating in southern Africa, was the potential for long-range dislocations or price manipulations during a period of increasing growth in association with increasing resource nationalism.

Extremely serious security implications are currently being ignored in the Federal Government's inconsistent approach to mineral adequacy.[11a] Minerals, essential to the production of military hardware, and its industrial base, are of vital importance to the Nation not merely in times of international tension but at all times so as to minimize existing vulnerabilities and forestall crisis provocation. This is particularly true if the source nations for such materials are either potential adversaries or politically unstable. The United States will be incapable of fulfilling mutual security commitments if a significant part of its energies must be expended to guarantee the flow of critical mineral resources essential to mere national survival.[12] Distressingly, vulnerability and strategic uncertainties can only increase in the face of much larger foreign mineral dependence caused by domestic policies.

Figure 3 lists the requirements and U.S. imports dependency for the metals presently used in the F–100 turbofan engine. Research and development on new alloys and fabrication processes can reduce requirements for certain metals like cobalt, but the time required takes 5 to 10 years even with major Federal backing. Because the technology of weapons systems, like everything else, is always to increase performance, capacity, reliability, and productivity, use of metals that best provide the required characteristics should overall increase, not decrease. Large-scale substitutions, often cited, sometimes glibly, as a solution to major interruptions of foreign mineral supplies, could

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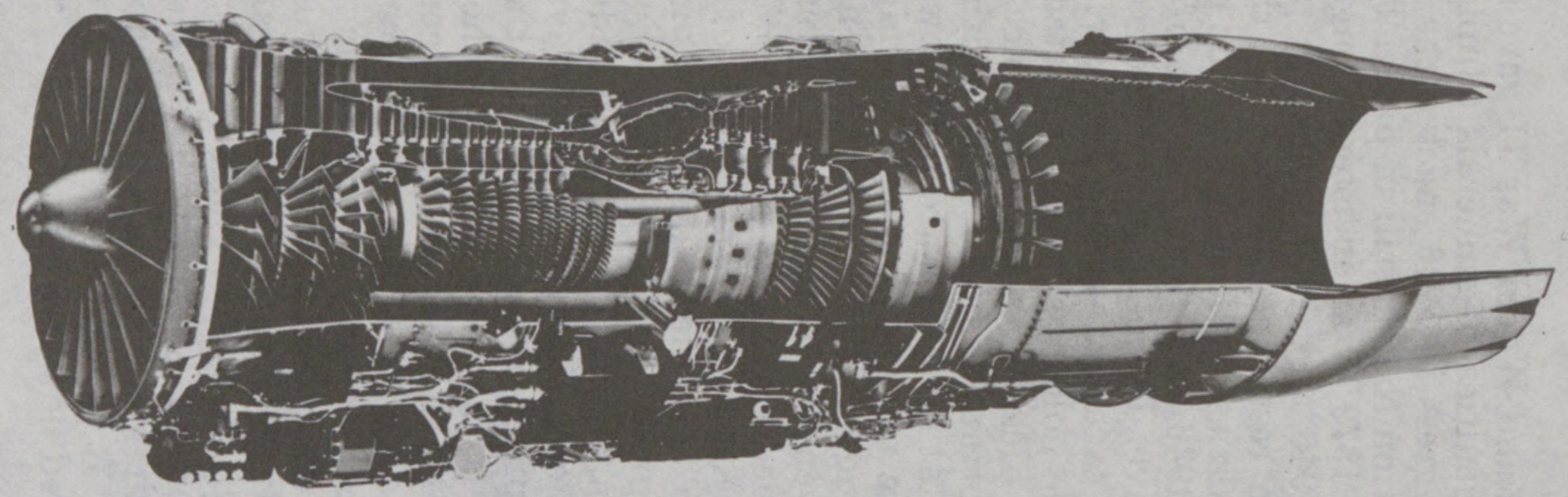
[11a] The conclusions of the Defense Science Board (Department of Defense) task force on industrial responsiveness reported to the House Armed Services Committee on September 17, 1980, that the ability of the U.S. industrial base to increase production quickly in time of war is "extremely limited" and may be nonexistent without major investments in production facilities and critical materials. Members of the Board stated that the surge capability of the defense industry is a matter of "grave concern", that there is serious doubt that the United States "could mobilize its industrial base in time to make an appreciable difference in sustaining a war effort," and that the United States must develop and implement a national minerals policy that will decrease U.S. dependence on non-U.S. sources. See "Production Capability Termed Limited," Aviation Week and Space Technology, September 29, 1980, p. 69. See also W. Williams, "Shortages and Inefficiencies Plague Industrial Base of U.S. Military", the New York Times, September 27, 1980, pp. 1–7; "Why the U.S. Can't Rearm Fast", Business Week, February 4, 1980, pp. 80–86; "Now the Squeeze on Metals", Business Week, July 2, 1979, pp. 46–51; "Availability of Strategic Materials Debated", Aviation Week and Space Technology, May 5, 1980, pp. 42–67.

[12] An example of wartime shipping problems is that for chromite during World War II. Shipping lanes from southern Africa were severely harassed by the German navy in the early years of the war during which African chromite producers increased their production to supply 28 percent of U.S. imports. By 1943, the attacks practically ceased but by that time there was a severe shortage of vessels to transport the chromite. Tantalum and columbium became so critical in World War II and the intense enemy submarine campaign off the U.S. east coast so severe, that columbium-tantalum *ore* had to be flown to the United States from Brazil. See Columbium and Tantalum, a Minerals Survey, Bureau of Mines, I.C. 8120, 1962, p. 104. (The present price of tantalum, because of its short supply is about $115 per pound having risen from about $18 per pound 5 years ago.) It is worthy of note that it still takes 4 to 6 weeks of sea time to ship raw materials to the United States from Africa.

result in major dislocations of the economy and could only be accomplished through an allocation process under Government control. Moreover, seldom can the availability of substitutes in sufficient quantities be guaranteed, or can it be fully known how decreased performance through their use affect such things as productivity.

Figure 3

MINERAL REQUIREMENTS FOR THE F 100 TURBOFAN FIGHTER ENGINE



Mineral Requirements

Metal	Pounds	U.S. 1979 dependence on foreign supplies, percent
Titanium	5366	100 (primary raw material)
Nickel	5204	77
Chromium	1656	90
Cobalt	910	90
Aluminum	720	10
Columbium	171	100
Tantalum	3	96

Strategic Stockpiles and Relation to Domestic Mineral Supply

World War I highlighted and World War II gave still more convincing evidence of the difficulties of minerals supply during wartime. As a consequence, Congress in 1946 enacted the basic strategic and critical stockpile legislation that is still in place. That legislation was further strengthened in 1979 by an insistent Congress.

Unfortunately, between 1946 and 1979, stockpile policy changed direction many times with a resultant alteration in the goals established for individual commodities. Following a period of active stockpile accumulation between 1946 and 1962, the size of the stockpiles was characterized as excessive. In the ensuing years large amounts of materials, judged to be in excess of revised goals, were sold.

In some cases, all stockpile holdings were liquidated such as those for aluminum, copper and nickel. As a consequence, the stockpile holdings today of some important commodities is neither adequate in quality or quantity; some vital materials are far below present objectives, and for some there are no holdings at all. Budget constraints prevent the provision of funds to buy the amounts necessary to fill these gaps, particularly given the sharp price increases that have occurred for some badly needed materials. Cobalt (48% of objective), platinum (35% of objective), and tantalum (33% of objective) are prime examples. Funds have been unavailable to upgrade others to acceptable forms or required grades.[13]

Under these circumstances, the U.S. security mandates that every effort be made to promote domestic production of available nonfuel minerals in which the stockpile is currently deficient and is likely to remain so for many years. It is noteworthy that the new stockpile goals announced by the Federal Emergency Management Administration in its Annual Materials Plan of May 2, 1980, contain increases for seven commodities as a result of reduced domestic primary or secondary capacity or increased national requirements without compensating capacity. Interestingly, only two goals were reduced because of increased domestic capacity. Such revisions demonstrate the recent relative decline of U.S. productive capacity as compared with national security requirements. The decline cannot be blamed wholly on the marketplace. It is primarily a factor of government policies that have discouraged new capacity.[14]

RECOMMENDATIONS

The United States must begin today to put an end to the self-defeating nonfuel minerals non-policy that is crippling the United

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[13] The Strategic and Critical Materials Stockpile Will Be Deficient for Years, General Accounting Office, EMD–78–72, July 27, 1978. Many stockpile materials have to be upgraded or reprocessed before they can be used even in limited applications; many do not meet modern specifications for current technological needs; many are not of the grades reported.

[14] The most logical way to make up for stockpile shortages is to increase U.S. productive capacity because each ton of capacity reduces a stockpile goal by 3 tons.

Despite the $6 billion shortfall of the stockpile, adequate funding for stockpile purchases has not been provided. In fiscal year 1981, the administration cut its original $170 million budget request to $149 million, which was subsequently cut to $100 million in the House and then $50 million in the Senate. At this equivalent rate, it will take 120 years to complete the stockpile to meet emergency goals.

States mineral industry, increasing national dependence on foreign sources, and placing in jeopardy the Nation's economy, defense and world stature. The very first step, however, is to develop a commitment on the part of the United States Government and its leaders for an effective national minerals policy.

National Minerals Policy

The Nonfuel Minerals Policy Review, initiated in December 1977, should be revised and completed, culminating in a Presidential decision document.

The Mining and Minerals Policy Act of 1970 has not been an integral part of national policies and goals and should be fully implemented as intended.

The Assistant Secretary for Energy and Minerals, Department of the Interior should faithfully fulfill the responsibilities as the energy and minerals advocate within the Department of the Interior and the executive.

The President should create, within the Office of Management and Budget or the Executive Office of the President, an Office of Energy and Minerals (OEM). This office should be provided with the same stature, power, and oversight responsibilities as the Council on Environmental Quality (CEQ). This office should ensure that the Nation's mineral needs and resources are adequately considered in all actions and decisions of Federal agencies and departments.

Federal Lands

The Congress should recognize and consider in the adoption of public land classifications, which would prohibit or restrict mineral exploration and development, the essential role of those lands in assuring domestic supplies of minerals, the relatively low state of knowledge regarding their mineral potential, and the ever changing characterization of mineral potential given technological advances. The Congress should therefore exercise extreme caution in the passage of such legislation.

The Department of the Interior, as a general policy, should make public lands more accessible for mineral exploration and development.

The Department of the Interior should make a full review of all Federal actions relative to public lands to determine the status of those lands with respect to their availability for mineral search and development. The review should be completed within 3 years and be independent of the withdrawal review mandated by the Federal Land Policy and Management Act. Such information is vital in order that Congress may make fully informed decisions with respect to the public lands.

The Department of the Interior should take fully into account in the development of restrictive land classification recommendations and decisions the mineral resource data and estimates of potential made available by the Bureau of Mines and United States Geologic Survey recognizing that government surveys lead to few discoveries and thus do not constitute exploration in its truest sense.

The Department of the Interior should implement the mineral assessment provisions of the Federal Land Policy and Management Act of 1976, the Strategic and Critical Stockpiling Act of 1946, and the Wilderness Act of 1964.

The Wilderness Act of 1964 should be enforced to permit full exploration and development of nonfuel minerals in accordance with the intent of 4(d)(3).

The Wilderness Act of 1964 should be amended to permit mineral exploration upon wilderness lands through the year 2000, and for wilderness created after 1980, for a period of 20 years.

Mineral values of public lands should be placed on a priority at least equal to the environmental concept of "areas of critical environmental concern" and other similar classifications. The rarity of a mineral occurrence necessitates the adoption of a concept of "areas of strategic mineral potential" whereby mineral areas would be so designated and hence protected from restrictive classification.

Capital Requirements

Low-cost pollution control financing should be made more available by permitting eligibility despite incidental recovery of mineral by-products.

Industrial revenue bond financing should be made available for mineral activities costing more than $10 million.

Percentage depletion allowances and expensing of exploration and development costs should be continued.

Investment tax credit should be extended to include all buildings used in mining and manufacturing and made refundable or at least fully creditable against a company's entire tax liability.

Realistic, flexible capital cost recovery allowances for plant and equipment investments should be adopted in lieu of present depreciation allowances.

The costs of environmental and other government mandated requirements should be permitted to be written off over any period selected by the taxpayer including the year of expenditure.

Tax-exempt municipal bond financing should be available for nonproductive pollution control equipment as well as for other government-mandated expenditures.

Antitrust

The Executive should undertake a re-examination of the manner in which antitrust laws have been implemented recognizing that the adversarial relationship between the Executive and the minerals industry must end.

The Executive should revise and modify antitrust policy as necessary to promote cooperative government and industry research and development and informed participation at international minerals forums.

Environmental Standards

The Congress should more definitively specify the objectives of environmental legislation because broadly written, ambiguous goals pro-

vide little real direction while allowing for administrative misinterpretation or abuse of legislative intent.

The Congress should, in the adoption of environmental legislation, link the goals sought with the costs involved to provide that standards will be economically attainable.

The Executive should place a moratorium on the issuance of additional regulations in order to ascertain the cumulative impact of such regulations on the minerals industry and ensure that such regulations require the attainment of reasonable standards based on provable data.

The Executive, in the preparation, creation and promulgation of environmental standards should balance the environmental objectives sought with the cost involved. As well, the Executive should enforce performance rather than design standards so as to fully utilize the innovative potential of America's private enterprise.

Research and Development

Federal mineral supply research and development should be significantly increased to reestablish United States leadership in technological innovation and to improve recovery and productivity in the minerals sector.

Increased levels of support should be provided colleges and universities engaged in extractive technologies research.

A program should be devised for government to more effectively contribute to demonstration projects to prove new technologies.

The 31 Mineral Institutes established by the Department of the Interior at colleges and universities should be transferred to the Bureau of Mines to improve mineral supply research and development cooperation.

Foreign Policy

Foreign policy should include the legitimate economic interests of the United States as a significant element of its national security interests.

An economic strategy relative to foreign nations should be developed to give higher priority to mineral resource aspects, of foreign relations as a means to manage and limit resource vulnerability.

Foreign policy should have as a goal reliable access for United States mineral investments for national economic security. Foreign aid as an aspect of foreign policy should be directed toward this goal.

The United States should work to reestablish traditional economic concepts under international law.

The United States should exercise care when imposing U.S. environmental prerequisites on foreign mineral investments if imposition of standards will result in the loss of economic benefits to the developing country.

National Defense

The Department of Defense can no longer act as a consuming bystander regarding national minerals policy. Instead, the Department of Defense should become involved within the Executive so as to ensure secure and stable sources for the mineral needs of the Nation's defense systems. The surest source of minerals in times of crisis is a domestic source.

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