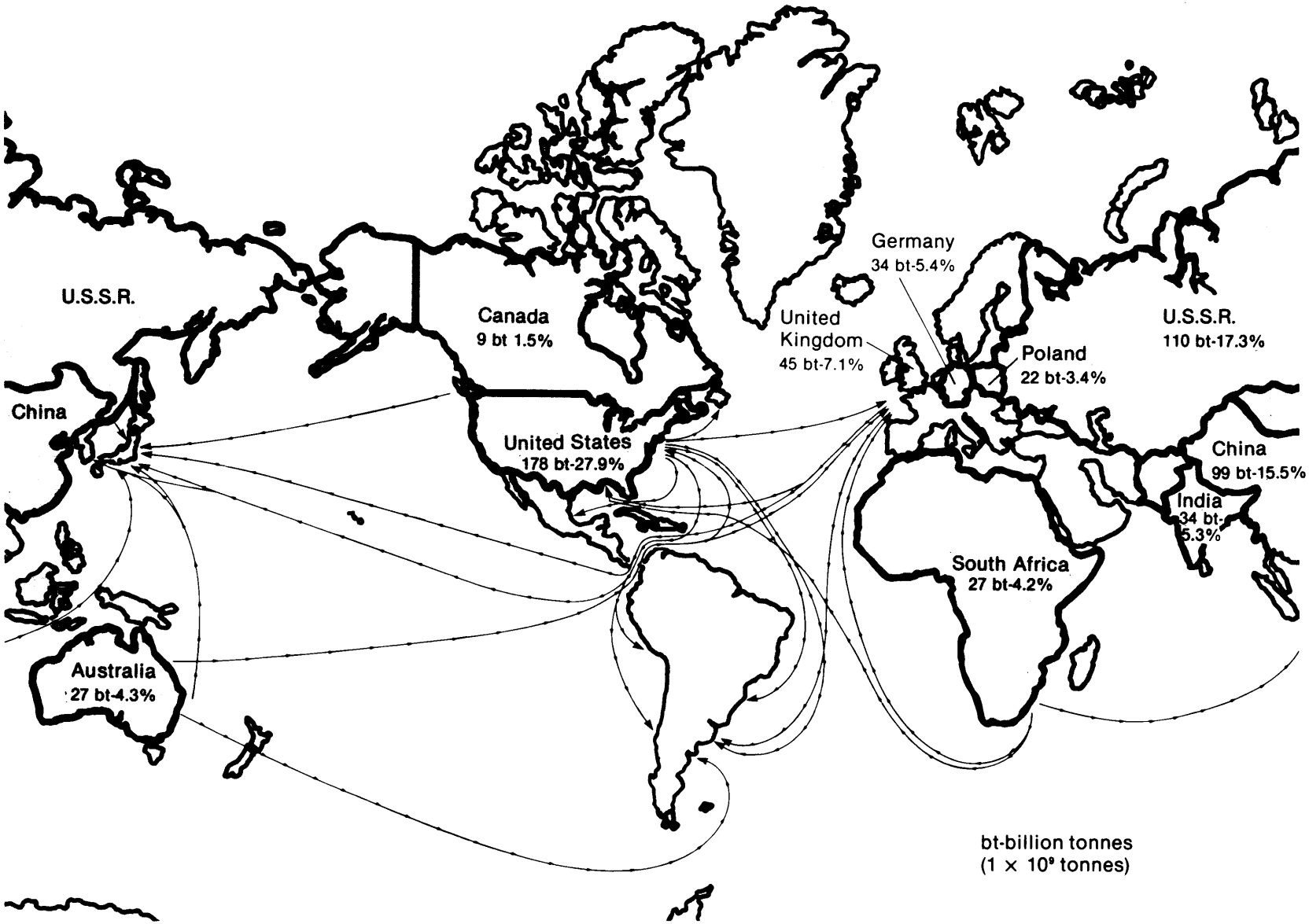
Chapter 1

Summary

World Coal-Recoverable Reserves and Ocean Trade Routes



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Long lines of foreign-flag colliers congregating in Chesapeake Bay to await their turn at overtaxed loading facilities in the Ports of Baltimore and Hampton Roads are dramatic evidence of the current boom in U.S. coal exports. Since early 1980, the number of ships queued up at each of these two major coal terminals has reached 100 or more, with a waiting time of up to 2 months before loading.

The recent surge in U.S. exports is due primarily to disruptions in production experienced by two of the other primary suppliers of coal to Europe and Japan—Poland and Australia. Mines in both countries have been shut down by extended strikes, forcing coal-consuming nations to obtain supplies elsewhere, principally in the United States.

Photo Credit: Office of Technology Assessment.

Ships lined up below the Chesapeake Bay Bridge waiting to enter the Port of Baltimore, Md.

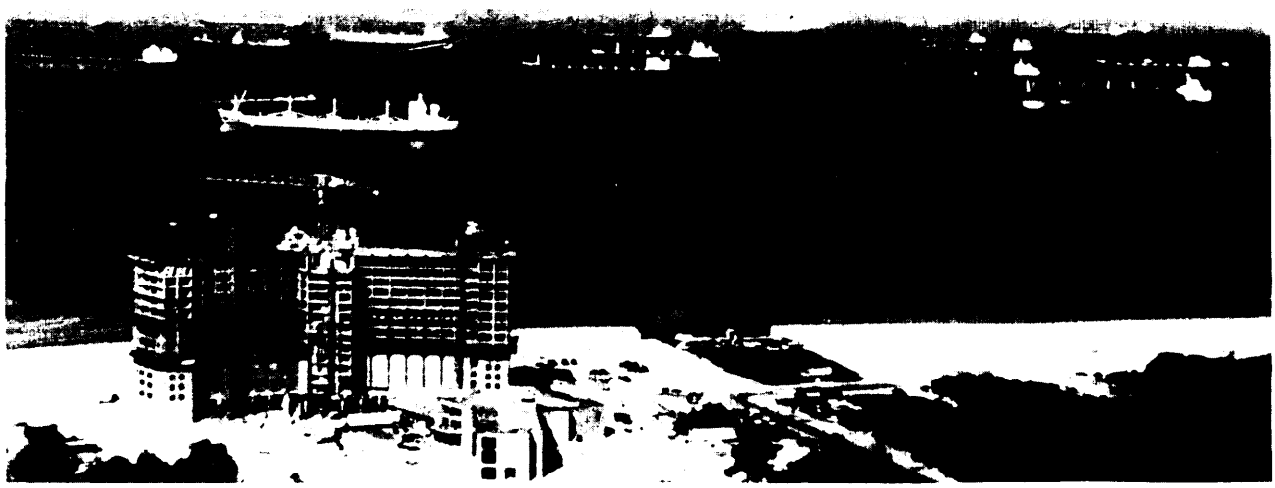


Photo Credit U S. Army Corps of Engineers.

Ship traffic backed up at Hampton Roads, Va.

The new demand for U.S. coal helped push total exports to a record 90 million tonnes (mmt) in 1980–a 39-percent leap over 1979. It also has touched off a major expansion of U.S. coal port facilities to reduce the present congestion and to handle anticipated growth, which some project to be as high as 255 mmt by the year 2000.

One factor contributing to expectations of a large future demand abroad is the recent increase in the number of utilities which are converting electric generating plants from oil to lower cost steam coal. This conversion is occurring among industrial nations, seeking to reduce their dependence on oil supplies from the politically unstable Middle East, and their exposure to spiraling oil prices.

A higher demand for metallurgical coal, which is used in the steelmaking process, also contributed to the 1980 U.S. export total. However, demand for this commodity is expected to remain relatively constant over the next several years.

Over the next two decades, it is widely anticipated that the foreign and domestic shift to steam coal will accelerate because recoverable coal reserves are many times greater than oil and gas and able to meet increasing energy demands far into the future. At present, coal is supplying approximately 25 percent of the world's energy needs. The Massachusetts Institute of Technology's (MIT) World Coal Study estimates coal will have to supply one-half to two-thirds of the additional energy required by the world over the next 20 years,

The United States and other nations have been encouraging both industrialized and less developed countries to put greater reliance on coal for their energy requirements. This stems in part from a 1978 International Energy Agency review recommending the wholesale substitution of coal for oil. The Agency's report concluded that in order to bring this about through immensely expanded world trade in coal, it would be necessary for coal-producing and importing nations to adopt policies facilitating coal development and usage.

Following up on this recommendation, the heads of state of the United States, Canada, Federal Republic of Germany, France, Italy, Japan, and the United Kingdom conferred at their economic summit meeting in Tokyo in June 1979. They pledged to increase as far as possible coal use, production, and trade without damage to the environment.

A year later, this pledge was strengthened at the Venice economic summit meeting. The seven nations pledged to double coal production and use by 1990 and take other steps to increase coal trade and utilization.

During the spring of 1980, the previous administration formed the Interagency Coal Export (ICE) Task Force to study world coal supply and demand projections and make recommendations to guide U.S. export policy and overall international efforts.

This technical memorandum relates to policy issues confronting the Federal Government that relate to the expansion of U.S. coal exports in the near term and the prospects for continued growth over the coming decades. This OTA analysis explores four major issues which may be summarized as follows:

- How realistic are projections that world demand for coal can induce U.S. exports to grow from the present 90 mmt level to 255 mmt annually by 2000? What are the constraints on growth?
- Is there a requirement for Federal involvement at the foreign policy level to promote long-term commitments from purchaser nations, and to provide assurance of stability of price and supply, to attain coal export goals?
- What are the alternatives to the traditional Federal role in dredging harbors so they may be deepened to accommodate larger coal-carrying ships?
- What alternative technologies for coal handling and transport may-be available to enhance the capabilities and efficiency of future exports?

The analysis of these issues has drawn on a number of recent studies. A discussion of the first three issues is found in chapter 2 and a discussion of the fourth is in chapter 3.

ESTIMATING THE POTENTIAL U.S. EXPORT MARKET

In a report issued January 20, 1981, the ICE Task Force projected world trade by 2000 of some 500 mmt of steam coal. The ICE estimated the U.S. share of the steam coal total would be about 200 mmt, or 40 percent, assuming that U.S. suppliers would be able to keep their prices in a competitive range with other exporters and that foreign buyers would find the United States a dependable source of coal. Several experts have told OTA that world trade of 174 mmt of metallurgical coal will remain roughly constant through 2000. The U.S. share of the export metallurgical coal market should remain near 55 mmt annually.

The National Coal Association estimates roughly parallel those of ICE. It expects total coal export volume to grow to 142 mmt by 1990, as compared to the ICE estimate (with metallurgical coal added), of 120 mmt. The combination of the switch to coal by industrial nations and new demand for U.S. coal are real. U.S. coal export forecast of 255 mmt, * by 2000 is achievable (see figure 1)—but probably only if both the Federal Government and private industry work closely together to encourage these exports, and if present trends are not drastically altered by developments in other exporting and importing countries.

Two dominant factors will affect growth in U.S. coal exports: price and security of supply. Currently, U.S. prices for coal delivered in Europe and Japan are 20- to 30-percent higher than Australian and South African coal. (See table 1.) Some of this differential is likely to remain as a result of such factors as higher labor costs, longer distances from mines to ports, and longer transportation routes from the United States to some overseas markets. The differential could be reduced if the United States developed more modern and efficient ports, harbors, and shipping systems.

There is a possibility of more competition. Canadian exports, not presently a significant factor, could grow in the future. Other countries that could enter the field and perhaps widen the present U.S. price differential, include Colombia, Indonesia, and the People's Republic of China.

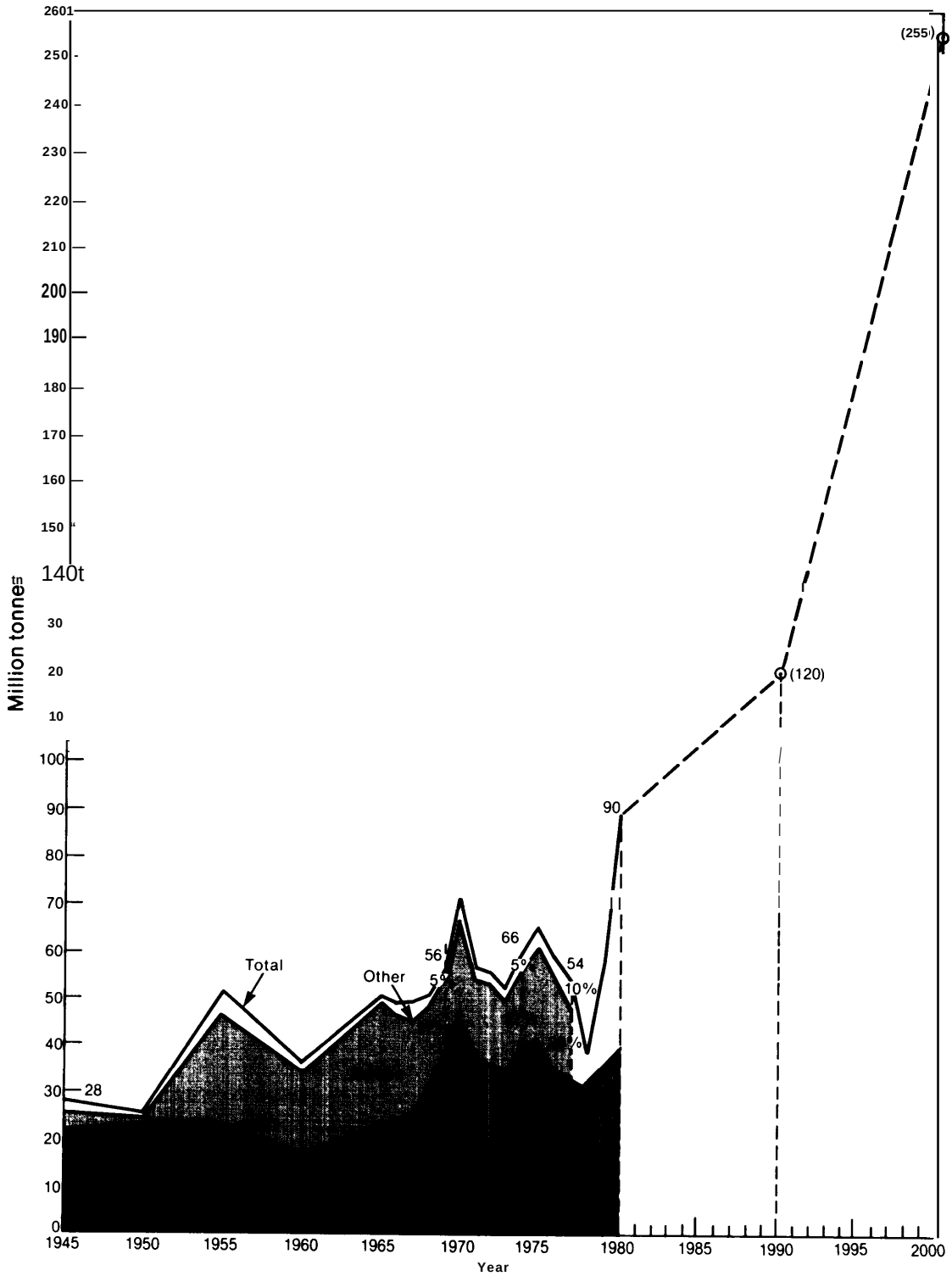
European nations and Japan are concerned about maintaining the reliability of their supplies as they become more dependent on coal. One of their criteria for making purchases on a long-term basis is the susceptibility to interruption of exports from a given country. Importers also are interested in fostering a diversity of suppliers in order to cope with interruptions and to stimulate competition.

The U.S. share of the world market depends partly on the potential or real difficulties being experienced by competitor nations. South Africa is subject to boycotts by some importing nations because of its racial policies. Australia could experience a recurrence of the 1980 labor difficulties which reduced production. Poland, even if its labor unrest is quieted, still must cope with the fact that its coal reserves are not as abundant or easily mined as those of other countries. Polish exports to Western Europe may be further restricted by the need to meet domestic requirements and demand for coal from other Soviet bloc nations.

In sum, there are many uncertainties in estimating the potential U.S. share of the world steam-coal market over the next 20 years. However, one thing does become evident from this OTA analysis. If the United States does not develop and pursue a coherent, positive policy on coal exports, it runs the risk of losing a large share of the market to other coal-producing nations.

● This figure is based on the ICE estimated of 200 mmt of steam coal and adding 55 mmt of metallurgical coal.

Figure 1 .—History and Projection of U.S. Coal Exports



Note: Steam coal at 30 percent of total in 1980 is expected to grow to 78 percent by 2000.

SOURCES: History-Coal data book. Projection-ICE Task Force with constant 1960 metallurgical coal added.

Table 1.—Selected Current International Steam Coal and Shipping Prices (averaged, U.S. 1981 dollars/tonne)

	Price FOB port	Ocean freight[a]	Delivered price	$/MBtu
U.S. east coast to NW Europe	$50	$18	$68	$2.60
Poland to West Europe	54	8	62	2.45
South Africa to Europe	43	13	56	2.05
Australia to Europe	44	26	70	2.66
U.S. east coast to Japan	50	28	78	2.95
South Africa to Japan	43	22	68	2.49
Australia to Japan	44	16	60	2.28

[a]This freight cost does not include additions of $6 to $10/tonne now charged as demurrage for those ships waiting to load at Baltimore and Hampton Roads

SOURCE: *Coal* Week International, Mar 18 and 25, 1981

FOREIGN TRADE POLICY CONSIDERATIONS

Principally because of its abundant coal supplies and overall political stability, the United States is viewed as an attractive trading partner by many coal-importing nations. However, it does not appear that these factors alone will assure that the United States will capture a major share of the world steam coal market in the years ahead. Coal trading partners are concerned about a number of factors in dealing with the United States including:

- The absence of an articulated coal export policy by the new administration. (It is not yet clear whether coal export initiatives started and/or suggested during the previous administration will be carried forward by the present one.)
- The possibility of future coal industry strikes. A major strike by the United Mine Workers would have a serious impact on potential coal export contracts.
- Lack of east coast deep-draft harbors to accommodate larger and more competitive coal carriers. Because larger vessels are expected to take over much of the world coal trade in this decade, U.S. exports will be at a disadvantage if these ships cannot be accommodated in U.S. harbors.
- Limitations on present U.S. port and ship-handling capacity, loading facilities, and high costs of mine-to-port transportation.

The coal-importing nations are sensitive to official U.S. policies which affect priorities for exports. E.g., a law passed by the 96th Congress allows domestic coal ships supplying New England and other sections of the country to be loaded at U.S. terminals ahead of foreign ships. So far the effect of the law appears to be slight but it has great symbolic importance to foreign buyers.

Foreign buyers also are mindful of how the Federal Government has occasionally intervened in the sale of various commodities to other countries—notably grain to the Soviet Union and soybeans to Japan. They want guarantees of noninterference with coal exports. Recent U.S. statements on coal guarantees have been general in nature and contain language stating the United States will honor commitments except in cases of national emergency—exactly when foreign buyers might need coal the most.

No explicit Government-backed *guarantees* for coal exports are now in effect. Coal sales are conducted by private corporations; the Federal Government cannot enforce contract compliance.

The ICE Task Force and others have suggested a number of specific mechanisms to enhance trade with other nations. These include:

- creation of a special Federal office to monitor the development of the U.S. coal trade;
- establishment of bilateral and multilateral consultations with major coal trade partners to exchange technical and other information and improve contacts with the U.S. coal industry;
- establishment of a permanent U.S. inter-

national coal trade delegation to act as a catalyst in the completion of new coal transactions and aid the implementation of existing ones; and
- formation of a U.S. Coal Export Trade Association, which would include producers and other elements of the domestic industry, to represent their international interest.

These proposals are only initial examples of a range of Federal policy initiatives which could be pursued. However, if the administration and Congress wish to promote U.S. exports of coal, an important step would be to reaffirm the U.S. commitment to increase domestic coal production, improve the necessary infrastructure, and increase-exports. This would establish a political climate that would be reassuring to importing nations in assessing the reliability of the United States as a future coal trade partner.

DREDGING: THE FEDERAL ROLE

Within the coal industry there is widespread agreement that the United States export market will not expand to its full potential unless harbors are deepened to permit the entry of the new generation of very large colliers now coming into service. The reason: much of the flexibility in steam coal prices lies in ocean transportation costs. Dredging proponents claim that the costs could be significantly reduced by deepening channels to handle larger ships, however, they do not include the cost of dredging in many of their arguments.

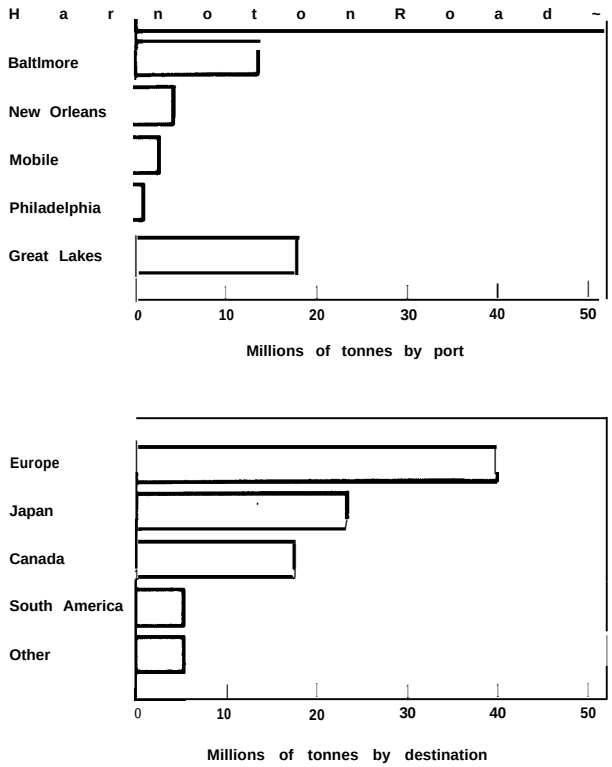
New colliers of 150,000 tonnes are expected to offer a 30- to 50-percent transportation cost advantage over older 60,000-tonne ships now transporting U.S. coal to Europe. None of the major U.S. coal ports can now fully load ships over *80,000* tonnes, and larger ships now entering these ports must depart with a partial load. Newer ships are tending toward the larger sizes because most of the rest of the world's major coal ports are deep-draft. Coal now represents about 10 percent of the total import and export tonnage through all U.S. ports. Therefore, while modern deep harbors would assist the coal trade at selected ports, it would also assist future trade in numerous other commodities carried on deep-draft ships.

Under an arrangement dating from the early 1800's, the U.S. Army Corps of Engineers has responsibility for maintaining the Nations's waterways and harbors, including dredging. In a lengthy, multistage process, dredging projects are studied by the Corps and authorized and funded by Congress on a case-by-case basis. Many parties have urged that a reexamination be made of the Federal role in dredging harbors and the process by which dredging projects are initiated and carried out.

Federal spending for dredging projects is under scrutiny by the administration and Congress, and several proposals have been put forward for sharing dredging costs with local and private entities benefiting from deepened harbors. The sums involved in dredging are substantial: the cost of current dredging operations at seaports average about $200 million per year, and numerous proposals have been made to deepen ports that, if implemented, would greatly increase this cost. At four major coal ports alone—Hampton Roads, Baltimore, Mobile, and New Orleans/Baton Rouge—the capital costs of deepening channels for large ships is estimated to be $1.5 billion in 1980 dollars. Annual operation and maintenance (O&M) costs for these four ports currently range from $4 million for Baltimore to $19.5 million for New Orleans. Projected additional annual O&M costs resulting from the proposed channel-deepening projects range from *$800,000* for Baltimore to $75 million for New Orleans.

Funds for dredging have not been appropriated by Congress for any of the major coal-port dredging projects. Authorization of channel deepening has been approved for Baltimore. In addition, Corps studies have been completed and approved for the Hampton Roads harbors of Norfolk and Newport News. Studies of the

1980 U.S. Coal Export Trade



SOURCE Off Ice of Technology Assessment.

Mobile harbor have been completed by the Mobile district and are under review by the Corps. A draft report has been prepared for New Orleans that has yet to be reviewed. The Corps of Engineers has estimated that, if new, expedited procedures are adopted, all of these projects could be completed by the mid to late-1980's (see appendix A).

Major new dredging projects presently take an average of over two decades to progress through the various stages from project proposal to completion. This lengthy time period has tended to discourage the promotion of bulk trades such as coal which are switching to large, deep-draft ships. A variety of legislative proposals have been made to expedite dredging projects at U.S. coal ports. Because of budget limitations and a long-standing need to select among a multitude of proposals, it may well be necessary to establish priorities among ports for Federal funding. Although addressed by several congressional bills, there is currently *no* mechanism in place for establishing priorities for harbor dredging on a national level.

OTA analysis suggests there is general agreement among the private and public sector that some changes in current practices are needed. The notion of sharing Federal dredging costs in some form of user fees for those who directly benefit is gaining acceptance partly because of concerns that principal beneficiaries do not pay their share of the cost. Selecting certain ports for dredging first may be the only way to initiate some dredging for any ports. Lastly, streamlining the process, so long as environmental safeguards are maintained, may be necessary to assure timely attention to developing the U.S. coal export trade.

Due to the limited scope of this study, this technical memorandum has not addressed certain other issues relating to the dredging question:

- Opponents of dredging argue that the environmental costs of dredging could be substantial, while proponents of dredging contend that environmental damage will be minimal, given proper safeguards. No analysis was done during this study on this issue.
- Benefit-to-cost ratios ascertained in studies by the Corps of Engineers for major coal ports have ranged from 2:1 to 9:1. If these ratios are correct, the cost of dredging would be small compared to savings resulting from dredging. The savings that are considered are for reduced transportation costs for all deep-draft ships (of which coal colliers are only one group) that would use the port after it is dredged. However, past Corps' analyses have been criticized by some as biased in favor of water development projects. This study has not attempted to investigate the Corps' process *or* studies of specific ports.

ALTERNATIVE TECHNOLOGIES–THE OUTLOOK

The need for new technologies to handle coal for export will depend, in the long run, on the volume of exports and the efficiency of existing systems. Industrial developers may be forced to introduce new systems if expansion of existing facilities and transportation networks are unable to cope with the demand. There are a number of options including coal slurry pipelines, midstream transfer of barges or ships, barge-carrying ships, pneumatic pipelines, and shallow-draft, wide-beam ships.

During the preparation of this technical memorandum, OTA identified the most important of these alternative technologies, but has not analyzed or compared them. It is possible that one or more new approaches to transporting coal overseas could offer economic benefits that might outweigh those of more conventional systems now in use. However, economic comparisons have not been made and it is premature to judge their relative worth.

The Federal Government is not in a good position, compared with the private sector, to either evaluate or promote new technologies, Those that have been proposed are in the private sector and information about them is only partially available to the public. The coal transport business includes an enormous variety of private and public organizations that are not always motivated by the same concerns.

Some brief comments about future possibilities for coal transport may be useful. E.g., if new mines are opened in the Western United States strictly for export, some may find it efficient to create a complete mine-to-ship system dedicated to this purpose. Or, if large volume, long-term export contracts are negotiated for Eastern U.S. mines, it may make sense for others to build offshore, deep-water, coal-loading terminals. The Federal role in such cases might be to encourage development when the timing appears appropriate, but not necessarily to become directly involved.

While most of the research to develop alternative systems is being conducted by the private sector, certain Federal actions could help or hinder a decision to proceed to actual development. E.g., some have stated that if harbors are not dredged, it could force the development of alternative systems for offshore loading.

Alternative technologies will probably be approached with caution by established industries because they are perceived as long-term options. Many of the technologies still have to be developed. Moreover, foreign buyers, terminal operators, and shippers will have to agree when—and how—they should be adopted.