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# Chapter <sup>1</sup>

## INTRODUCTION

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The compatibility of man with his environment is fundamentally linked to his use of materials. Recent materials scarcities, growing concern with environmental degradation, and changing patterns in international supply and demand are among a host of factors which are creating new materials-related problems for which Congress and the executive branch of Government must fashion effective responses. These factors are inducing an historic shift in national industrial priorities away from energy-intensive, inefficient technologies toward conservation and more efficient use of materials and energy. To accommodate these changes, knowledge of the technological, economic, and social effects of materials management and usage is becoming increasingly important. Achieving a smooth flow of materials information from the laboratory to the designer and manufacturing engineer, developing prudent principles of materials management, establishing sound materials policies in the face of changing priorities—all of these require information services encompassing all functional aspects of materials utilization.

### A. DISCUSSION OF MAJOR ISSUES

The current nationwide materials information “system” which has developed over a period of 200 years in response to evolved needs comprises thousands of disparate, loosely connected elements within industry, Government, and academic institutions. Given

recent changes, as those cited above, several questions merit detailed consideration:

- Are information systems which currently support Federal materials policymaking adequate to address complex materials

problems? In particular, are the systems able to project with sufficient accuracy whether a scarcity or shortage-related problem is likely to occur, estimate its consequences, and evaluate possible Government actions to avert or alleviate the problem?

- If the systems cannot provide these capabilities, what kind of improvements are required?
- How might these improvements be achieved?—by what organizational authority and under what kinds of institutional arrangements?
- What impacts (institutional, economic, social, international, and legal) might result from implementing such improvements?
- Finally, what public policy issues might attend such improvements?

These are among the issues examined in this assessment.

The central question is whether Congress and the executive departments can significantly improve the quality of their decisions and their approach to setting national objectives by improving the existing materials information systems. The emphasis of the assessment is on information systems that would permit Federal policy makers to anticipate and deal more effectively with problems raised by materials shortages, either those arising in the near term, often with little warning, or those that may occur many years in the future. As developed during the assessment,

the kind of information and analysis needed to deal with shortage-related situations is also applicable to a spectrum of other materials policy issues.

It was recognized at the outset of the assessment that a demonstration of the need for substantial changes in existing information systems rests upon a balanced consideration of both the likely benefits and potential costs, where benefits and costs are reckoned not only in technical and economic terms, but also in terms of their potential social, political, and legal impacts. For example, the exclusive right of data ownership of individual firms and the protection thereof must be considered against the needs of the executive departments for statistical information. It is not the intent of this assessment to resolve such issues, but rather, to examine the benefits and costs of available technical alternatives and associated issues,

Conceptually, several outcomes of such an examination can be foreseen. If it became obvious that the benefits associated with a particular upgrading approach greatly outweighed the possible disbenefits, the analysis would have demonstrated the “need” for change. Or, the converse could be demonstrated. Likely, the “need” for change would be found to turn on sensitive trade-offs among the technical, social, political, and legal issues. By revealing these issues and, to the extent possible within the resource constraints of the study, by assessing the benefits and disbenefits of alternative actions, the assessment attempts to develop a factual basis for congressional deliberations.

## B. CONGRESSIONAL CONCERN FOR MATERIALS INFORMATION

An insight into the growing concern of Congress for improved materials information is illustrated by the bills on this subject introduced in the 93rd and 94th Congresses. Table I-1 compares the recent House and Senate bills with information needs indicated. The

bills suggest problem areas in data acquisition, data handling, data analysis, data reporting, data duplication, data completeness, both foreign and domestic, data standardization, and data reliability. They generally call for improved institutional capabilities.

**Table 1-1.—Needs Identified in Major Materials-Related Legislation**

Information Management Needs	93rd Congress							94th Congress																				
	Senate							Senate							House													
	S 424	S 1283	S 2296	S 2782	S 2806	S 2966	S 3528-3467	HR 15781	HR 16008	HR 907	HR 1014	HR 9597	HR 598	S 26	S 32-S 79	S 1410	S 1415	S 1795	S 1864	Misc	HR 968	HR 1668	HR 1847	HR 2363	HR 2385	HR 9212	H Res 31	
New or improved institutional arrangements		x		x		x	x			x		x	x	x	x	x	x	x	x	x	x	x					x	x
New or Improved system																												
Data acquisition	x	x		x				x	x				x			x	x	x	x	x		x		x	x	x		
Data handling		x		x		x	x															x						
Data analysis	x		x			x	x									x	x	x	x	x		x						
Reporting		x				x	x	x								x	x	x	x			x						
Duplication of data													x				x	x	x									
Completeness of domestic data					x				x							x	x		x			x		x				
Completeness of foreign data						x										x	x		x			x						
Standardization of data reports							x									x	x	x	x			x					x	
Reliability accuracy of data									x								x	x		x								

Examination of the bills further indicates that such materials information problems as coordination, compatibility, and dissemination limited the analysis of materials shortages and related environmental problems and imbalances. Furthermore, because materials data collected by various Federal agencies were considered incomplete, incompatible, and inaccurate, the proposed legislation included recommendations for improving the regular collection, standardization, analysis, and reporting of such data. Attention was called to the long-term availability of critical products, materials, and resources essential to industry and commerce, as well as to the serious problems associated with the alleviation of short-term dislocations.

Most recently in the second session of the

94th Congress, hearings were held by the Senate Interior and Insular Affairs Committee to discuss the Energy Information Act, S. 1864. The bill, if passed, would assure the United States of accurate energy data with which to make decisions. Although the bill deals with fuel minerals, the materials information problems were similar to those of the nonfuel minerals discussed in this report.

Inherent in the proposed legislation was the implication that automatic data processing technology will contribute to improving the existing materials information system. However, there was uncertainty regarding the selection of the functions requiring improvements and mechanisms for improvement of automation.

### C. ASSESSMENT APPROACH

The primary focus of the assessment is on materials information systems capabilities that could permit Federal policymakers to deal more effectively with non-food materials-related problems. Toward this objective the

assessment is structured to achieve the following tasks:

1. Examination of existing materials information systems,

2. Analysis of the capability of the current Federal information systems to support materials policymaking;
3. If required, development of improved capabilities to support Federal materials policymakers:
4. Review selected Federal information systems to examine which of the improved capabilities are either now being achieved or planned:
5. Examination of alternative approaches and institutional arrangements for implementing the improved capabilities;
6. Analysis of the possible impacts of implementing the improved capabilities: and

7. Discussion of the major public policy issues concerned with improving the Federal materials information systems.

The study draws extensively on prior studies, particularly the Paley report, Resources for Freedom, 1952; the report of the National Commission on Materials Policy. Materials needs and the Environment. Today and Tomorrow, 1973; and the General Accounting Office report, U.S. Actions Needed to Cope with Commodity Shortages, 1974 The Committee on the Survey of Materials Science and Engineering Report, 1974; as well as many conference summaries and reports dealing with specific materials,

The analyses also reflects the results of a series of over 300 interviews with information specialists and policymakers responsible for making materials-related decisions,