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The Department of the Interior is the principal agency of the Government responsible for managing mineral resources and has a major role in formulating mineral policy. Within the Geological Survey, the Computerized Resources Information Bank (CRIB) stores basic data on geology, mines, and commodities and retrieves the information for use in mineral resource analysis. Findings/Conclusions: The CRIB is incomplete, inaccurate, outdated, and lacks data and management support. A viable information system is needed to help officials perform the Survey's most important minerals policy advisory role--analysis of long-term mineral resource availability. Recommendations: To increase the priority and high-level agency support for a computerized resource and decision oriented information bank, the Secretary of the Interior should direct the Assistant Secretary, Energy and Minerals, to clearly formulate written mineral resource information requirements of the CRIB program for submission to the Geological Survey; order that the CRIB system design and information requirements be made fully compatible with the Bureau of Mine's Mineral Availability System for mineral reserves; and require the Director of the Geological Survey to formulate and put in place a survey-wide plan providing internal coordination and input to CRIB from all Geological Survey mineral activities. The Director of the Geological Survey should make the Assistant Director, Energy and Mineral Resources, responsible for developing and coordinating the implementation of an integrated Geological Survey-wide Mineral Resources Program that will utilize a CRIB-like system as the central and/or primary computerized minerals information system. Various forms of support should also be created and assigned to this task. (Author/SC)

7026

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BY THE COMPTROLLER GENERAL

# Report To The Congress

## OF THE UNITED STATES

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### The Department Of The Interior's Computerized Resources Information Bank

The Geological Survey's Computerized Resources Information Bank is incomplete, inaccurate, outdated, and lacks data and management support. A viable information system is needed to help officials perform the Survey's most important minerals policy advisory role, analysis of long-term mineral resource availability.

The Secretary of the Interior should increase the priority and support for such a computerized and decision oriented resource information bank.



EMD-78-17  
JULY 17, 1978



COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

B-118678

To the President of the Senate and the  
Speaker of the House of Representatives

This report concerns the Department of the Interior's Computerized Resources Information Bank, which is managed by the Geological Survey. We found that the Information Bank lacks both basic data and management support. A viable Information Bank system is needed to help officials perform the Survey's most important policy advisory role, analysis of long-term mineral resource availability.

We are recommending that the Secretary of the Interior require the Assistant Secretary, Energy and Minerals, to prepare specific criteria, identifying its requirements for minerals resource information, to guide the data collection activities of the Geological Survey. We also recommend that the Director of the Geological Survey implement specific measures to assure integration of all minerals resources information, possessed by the Survey, within the Computerized Resources Information Bank.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are sending copies of this report to the Director, Office of Management and Budget; the Secretary of the Interior; and the Director, Geological Survey.

A handwritten signature in black ink, appearing to read "James A. Starks".

Comptroller General  
of the United States

D I G E S T

The Department of Interior is the principal agency of the Government responsible for managing mineral resources and has a major role in formulating mineral policy. Within the Geological Survey, the Computerized Resources Information Bank stores basic data on geology, mines and commodities and retrieves the information for use in mineral resource analysis.

Despite the need for better minerals data and its analysis, the Computerized Resources Information Bank is incomplete and inadequate for the Survey's use. It does not fulfill the Survey's commitment to coordinate its other internal data systems in one generally accessible mineral resources data base and it lacks data and management support. A viable system is needed to help officials perform the Survey's most important minerals policy advisory role, analysis of long-term mineral resource availability.

The major problems in the computerized data system are caused by inadequate program emphasis and management's inattention to the development of a Survey-wide information and analysis system. The autonomy of functioning research programs has a retarded development of a Survey-wide information system. As a result, the data bank is underused in policy level management decisions and has evolved solely as a staff-supporting facility.

Management of the Information Bank program has three major flaws.

- There are no agencywide procedures or regulations determining the program's participation and support among Survey divisions, the priority of such cooperation, and the focus of administrative responsibility for program coordination.
- Funding support for developing non-Survey sources of available mineral resources information has been inadequate, ignoring the potential of existing data bases in State geological services as well as other Government agencies and academia.

--Funding for specialized staff functions associated with developing a retrievable aggregate resources data base and associated analytic applications is inadequate.

Resource data in the Information Bank for bauxite, copper, chromium, and platinum was inadequate. The system contained no deposit records for any of the four principal chromium-producing countries despite U.S. dependence on chromium imports and concern about reliability of supplies. The voluntary nature of commodity specialists' participation and data contributions make it impossible to establish mineral resource information priorities.

Foreign data is particularly bad. For example, bauxite data in the Information Bank was less than 20 percent of the aggregate global reserves of the Survey's 1977 published estimates. The Computerized Resources Information Bank's Canadian platinum resource-reserve estimate was 0.1 percent as large as the joint Geological Survey/Bureau of Mines aggregate platinum resource-reserve estimate for Canada. The causes of these deficiencies are the commodity specialists' failure to submit data and management's inattention to program administration.

Although officials believed the bank's copper data was quite good, less than 3 percent of the deposit records had any economic data, and only about half had descriptive geological data. It is difficult to imagine any possible policy relevance of resource data which is devoid of the size and geological characteristics necessary to estimate potential availability.

Not all mineral specialists participate in the Computerized Resources Information Bank data base efforts and only a few commodity specialists in the Geologic Division input data into the system. The Conservation Division has over four times as many deposit records in a separate data base, inaccessible to the Computerized Resources Information Bank. The objective of an agencywide mineral resource information base is thus diminished.

Another of the Survey's data analysis systems, the Decision Oriented Resource Information System, is supposed to provide needed linkage between the computerized data bases of the Survey and policy data analysis. However, it also lacks high-level management and support. In the

absence of needed attention, the Decision Oriented Resource Information System is developing without requirements, work plans, or strategy. There is no measure of progress or influence on other Survey data programs. For 5 years in the case of the Information Bank and 3 years in the case of the Decision Oriented Resource Information System, the programs have been singularly ineffective in influencing the way the Survey develops or thinks about mineral resources information.

To increase the priority and high-level agency support for a computerized resource and decision oriented information bank, the Secretary of the Interior should:

- Direct the Assistant Secretary, Energy and Minerals, to clearly formulate written mineral resource information requirements of the Computerized Resources Information Bank program for submission to the Geological Survey.
- Order that the Computerized Resources Information Bank system design and information requirements be made fully compatible with the Bureau of Mine's Mineral Availability System for mineral reserves.
- Require the Director of the Geological Survey to formulate and put in place a survey-wide plan providing internal coordination and input to the Computerized Resources Information Bank from the Geological Division's Mineral Resources Program, the Conservation Division's Mineral Resource Evaluation Programs and Reserve Inventories, and other Geological Survey mineral activities.

The Director of the Geological Survey should:

- Make the Assistant Director, Energy and Minerals Resources, responsible for developing and coordinating the implementation of an integrated Geological Survey-wide Mineral Resources Program that will utilize a Computerized Resources Information Bank-like system as the central and/or primary computerized minerals information system. This program should provide for
  1. ranking identified mineral resources in accordance with their probable commercial significance within a fixed time frame;

2. ranking the most promising ore-forming environments for critically needed but as yet undiscovered mineral resources, as a means of focusing mineral research efforts and land-use planning;
3. assimilating new geoscience research technologies applicable to mineral discovery into all mineral investigations;
4. emphasizing the use of aeromagnetic information and techniques and area mapping overviews in conducting all mineral investigations to facilitate the development of mineral occurrence models; and
5. aggregating mineral resource data in the Computerized Resources Information Bank from all of the Geological Survey's programs regardless of their primary focus under specified significance and reliability criteria.

--Create a Survey-wide minerals information task force representing the major divisions to assist the Assistant Director in this program review and to offer suggestions on the potential contributions of their activities to a comprehensive mineral resource data base.

--Designate staff support for the Assistant Director to review present programs and schedules, and coordinate the development and implementation of a Bureau-wide integrated mineral resources program.

--Increase the Geologic Division, Office of Resources Analysis staff in accordance with its Survey-wide responsibilities of operating and maintaining the Computerized Resources Information Bank developing the Decision Oriented Resource Information System program capabilities.

The Department of the Interior officials said they shared GAO's concern about several problems indicated by this report. However, the tenor of their comments (see app. I) suggests the Department may not attribute as much importance to policy applications of the Computerized Resources Information Bank program as GAO does.

GAO's response to departmental comments are contained in appendix II.

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## ABBREVIATIONS

- CRIB - Computerized Resources Information Bank
- DORIS - Decision Oriented Resource Information System
- GAO - General Accounting Office
- MAPS - Minerals Analysis and Policy System
- MAS - Minerals Availability System
- ORA - Office of Resource Analysis
- USGS - United States Geological Survey

## CHAPTER 1

### COMPUTERIZED RESOURCES INFORMATION IN THE DEPARTMENT OF INTERIOR

#### INTRODUCTION

The Department of the Interior is the principal agency of U.S. Government responsible for managing Federal energy and mineral resources and has a major role in the formulation of energy and mineral policy. Interior also has primary responsibility for managing Federal lands and for providing scientific and technical leadership in national land and mineral decisions.

The U.S. Geological Survey (USGS), in assisting the Department to meet its responsibilities, has three principal resource-directed missions:

- To provide knowledge about the location, extent, and character of the Nation's known and potential mineral, land, and water resources that will assist the executive branch, the Congress, and the public in developing and evaluating alternative resource and land-use policies and decisions.
- To classify the mineral and water potential of Federal lands, evaluate mineral lands offered for lease, and supervise industry activities on mineral leases.
- To obtain knowledge and information about international mineral resources to provide a worldwide mineral resource inventory of the Nation's sources of supply.

Within the USGS the Computerized Resources Information Bank (CRIB) is the primary storage and retrieval system for mineral resource information. CRIB stores basic data on geology, mines, and commodities and through computerized methods retrieves the information for use in mineral resource studies.

Minerals and mineral fuels are the physical sources of most of the necessities and conveniences of life in the United States today.

Most mineral resources are nonrenewable, because the deposits from which they are extracted are not being naturally reformed at the rate we are using them. They are extendable,

however, in the sense that new deposits are discovered by exploration and deposits once considered too poor in quality are being made economical by improved technology.

The development of a minerals policy relies heavily on the use of estimates of the amount of recoverable resources. The accuracy and magnitude of these estimates influence the choice among policy options. In addition, these resources would be recovered at different prices and production costs adding more complexity and possible error to national strategies and the timing of policy actions.

The need to evaluate mineral resources has expanded rapidly with the growth of problems related to domestic mineral resource shortages. These evaluations have created an expanding need for the acquisition and processing of new data and for data manipulation to develop resource quality, quantity, and availability estimates. Changes in resource economics, availability, and demands require that all available data be in a format and system which can provide substantive input to the analyses needed to make ultimate policy decisions.

There is a pressing need for better minerals data and analysis if Government minerals policy is to master the complex social, political, and technological issues affecting minerals availability. For example, various qualitative interpretations of existing data show that we will have anywhere from resource exhaustion to greater materials abundance by the 21st century. Theorists are not only looking at different data, but they are also making radically different economic and technological assumptions, all of which emphasize the need for accurate minerals resource, reserve, and production data.

#### Resource-reserve distinctions and system responsibilities

Much of the confusion in U.S. minerals policy discussion stems from the distinction between mineral resources and mineral reserves and their relationship to existing minerals availability data. Assessing mineral resources is principally the responsibility of the Geological Survey, and is defined as concentrations

"of naturally occurring solid, liquid, or gaseous materials in or on the earth's crust in such form

that economic extraction of a commodity is currently or potentially feasible." 1/

Assessing mineral reserves is principally the responsibility of the Bureau of Mines, and is defined as

"that portion of the identified resource from which a usable mineral and energy commodity can be legally and economically extracted at the time of determination." 2/

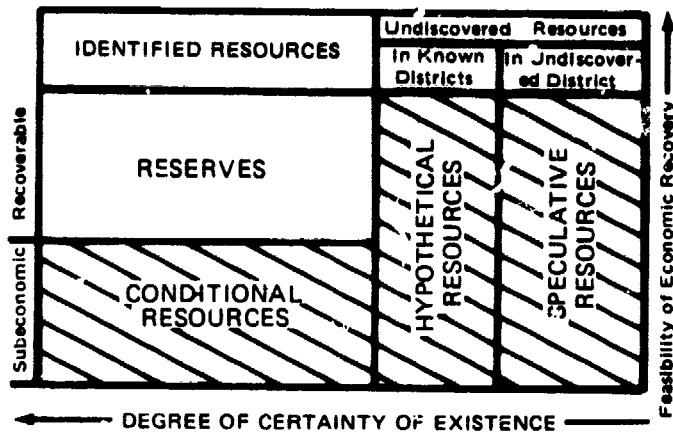
Resources include reserves, but they also include identified mineral deposits, and unidentified deposits that are presumed to exist but have not been discovered. Identified "sub-economic" resources that are not reserves are classified into paramarginal resources and submarginal resources. Unidentified resources are classified into hypothetical resources and speculative resources. (See fig. 1 on the following page.)

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1/U.S. Geological Survey, "Principles of the Mineral Resources Classification System of the U.S. Bureau of Mines and the U.S. Geological Survey," Bulletin 1450-A, Government Printing Office, Washington, D.C., 1976, p. A2.

2/Ibid., p A3.

**FIGURE 1  
MINERAL RESOURCE/RESERVE  
CLASSIFICATION SYSTEM**



**EXPLANATION**

 **POTENTIAL RESOURCES = CONDITIONAL + HYPOTHETICAL + SPECULATIVE**

The increasing complexity of minerals development and the consequences of minerals resource-reserve distinctions for Government policies prompted Interior to introduce a systems approach to mineral information collection and analysis in 1975. A Minerals Analysis and Policy System (MAPS) was announced to

"intensify analysis of critical imported minerals, stimulate expanded data collection, expand forecasting capabilities, and ensure appropriate coverage of infrastructural requirements."

In describing the rationale and interaction of the separate resources and reserves data base agencies in 1975, the Assistant Secretary for Energy and Minerals called attention

to the problems of traditional methods of data collection, exchange, and analysis in the Geological Survey and the Bureau of Mines. He said automatic data processing could bridge the gap between the two Bureaus' responsibilities and improve compatibility of resource-reserve data bases.

Specifically, the Geological Survey's CRIB and the Bureau of Mine's Minerals Availability System (MAS) have been cited as demonstrating minerals data coordination in collecting, analyzing, and exchanging the data necessary for policy analysis. Each system represents a sequential development of data, evaluation, and analysis leading to the development of minerals policy. Each system is supposed to complement the other while servicing its own Bureau's needs.

CRIB's most important use is supposed to be for analysis of long term mineral resource availability and mineral exploration. It should respond to policy questions typically related to identifying alternative resources of critical commodities. In 1975, the Geological Survey was said to be internally coordinating its other data systems with CRIB so that its entire mineral resources data base would be accessible through one system.

To more effectively use CRIB and other data, the Survey is developing a Decision Oriented Resources Information System (DORIS). DORIS is intended to provide estimates of the quantity and quality of resources available as a result of different policy options.

#### SCOPE OF REVIEW

The review was conducted at the Geological Survey's headquarters in Reston, Virginia, and at the Western Minerals Resources Branch in Menlo Park, California, and covered fiscal years 1972 (the inception of CRIB) through 1977.

Our review was limited to Geologic Division computer applications, particularly those related to nonenergy related minerals. We reviewed the operations of CRIB and DORIS and assorted other data base activities in the Office of Resources Analysis (ORA). Our examination of these data activities pertained to bauxite, chromium, copper, and platinum. The review also included the organization, procedure, and controls exercised by ORA for the data files and discussions with commodity specialists for the minerals mentioned.

## CHAPTER 2

### CRIB DATA BASE

#### CRIB OPERATIONS

CRIB is one function of the Office of Resource Analysis, a component of the Office of Mineral Resources in the Geological Survey's Geologic Division, headquartered in Reston, Virginia. Additional CRIB operations are conducted at Survey centers in Denver, Colorado, and Menlo Park, California.

The CRIB file is comprised of a master file, which is available to the public, and several holding files maintained for backup, editing, and special project uses by the three operating locations. In January 1977, the CRIB working file contained approximately 75,500 records on 90 commodities. As of that time, however, only about 36,500 records (48 percent) were in the master file available for public use.

As of March 1977, three full-time employees were assigned to CRIB, two in Reston and one in Denver. At the Menlo Park center, one employee is assigned part-time to CRIB activities. During the period fiscal year 1973 through December 1976, expenditures for CRIB totaled approximately \$1.5 million. An additional \$155,000 in CRIB grants to three States for data raised total CRIB expenditures to approximately \$1.7 million since its inception in fiscal year 1973.

#### Sources of CRIB information

One of the most accurate and reliable sources of data for CRIB should be individual commodity specialists within the Survey. These specialists, responsible for specific minerals, derive their data from a variety of sources, including publications, personal research, and contact with industry representatives and counterparts in other domestic and international agencies. In practice, however, only a select few of the commodity specialists in the Geologic Division have contributed data to the CRIB file. A large block of preliminary and incomplete data (some 26,000 records) was provided from the files of the Geological Survey's Conservation Division.

Other important sources of data for the CRIB files are derived from Government agencies through cooperative agreements with the Survey. These include the Tennessee Valley Authority, the Forest Service, the Department of Agriculture, the Bureau

of Land Management, and the Bureau of Mines. Grant arrangements also are, or have been, in effect with Idaho, Montana, South Dakota, and Minnesota.

Additional foreign data is being obtained from a pilot program for CRIB applications with the American Embassy in South Africa through a State Department/Interior Department mineral attache program. In addition, a general agreement for sharing mineral resource data has been developed with the German Geological Survey.

CRIB DATA IS INCOMPLETE,  
INACCURATE, AND OUTDATED

Despite the potential of receiving data from several good sources, the CRIB effort does not include comprehensive data from all major sources. For example, the Survey's commodity specialists provide information only on a voluntary basis, after individually determining the nature and extent of data they wish to input. As noted above, these specialists obtain data from a variety of sources, including industry and other Government agencies. We were told that since this data is sometimes provided in an informal, confidential manner, specialists, in order to maintain sound working relationships with their counterparts, usually do not include this data in CRIB. However, there is no reason such data could not be entered in working files and remain confidential.

The Survey still has no central data collection activity for CRIB in its other programs. Pertinent publications data, for example, is not extracted for deposit in CRIB. Resource information from industry and State geologic activities is generally not added to CRIB.

With the exception of a few instances where the Survey and individual States had grant arrangements to provide CRIB data, the Survey has undertaken no active effort to capitalize on this potentially valuable source of data. A Survey official said that most States do not presently have the resources to provide CRIB with data and the Survey has not made funding available for that purpose. The official believes that at least half the States would be willing to provide such data if grant agreements could be implemented.

CRIB data on foreign mineral deposits is also incomplete. Of the 36,530 records in the CRIB master files in January 1977, only 3,768 (10.3 percent) pertained to foreign deposits. For



example, chromium is one of the minerals we reviewed on which the United States relies heavily on foreign sources, primarily Rhodesia, South Africa, Turkey, and the Soviet Union. Although the CRIB master file contained 441 chromium records in March 1977, only 36 of these were for foreign sources and none of them were for any of the four principal supplying nations cited above. Working files were similarly deficient.

As with industry and State data, foreign mineral data is generally provided informally to commodity specialists who determine what data, if any, will go into CRIB master and working files.

According to CRIB officials, there is some data for almost every known commodity and a considerable amount of data for a few commodities. Our review of bauxite, copper, chromium, and platinum commodities identified cases of incomplete, inaccurate, and outdated information. Specific examples follow:

Bauxite--No effort has been taken to update CRIB records since 1973. Since that time total resource estimates have increased considerably and new deposits have been identified. For example, CRIB records reflect three world bauxite reserve estimates (3.2, 5.2, and 5.8 billion tons, respectively). In a 1977 Bureau of Mines/Geological Survey publication, bauxite reserves were estimated to be 24 billion tons. Thus, the highest estimate in CRIB (5.8 billion tons) is about 18.2 billion tons, or 80 percent less than the 1977 published estimates.

We also noted instances of inaccuracies in deposit locations. Of 192 records with latitude and longitude included, 11 cited locations (5.7 percent) that did not coincide with the country or State attributed to the record.

Additionally, we noted examples of possible duplicate records pertaining to the same deposit but submitted by different individuals. In some cases, two or more records on the same deposit are necessary where different interpretations of the data are made. CRIB officials acknowledge that duplication and inaccuracies probably exist not only in bauxite records but also with other commodities. They attribute such deficiencies to a lack of CRIB staff to properly edit the records.

Copper--CRIB has a large number of copper records on U.S. deposits. However, CRIB lacks information on many foreign

deposits. Also, many records, both domestic and foreign, lack information on many data elements. For example, the CRIB master file contains 6,625 records, 5,661 domestic (85.4 percent) and 946 foreign (14.6 percent). Economic data on these deposits appears in very few records (2.5 percent). The records are somewhat better for deposit description data, with deposit type information being included 52.8 percent of the time. Very few records contained information on production or on reserves and potential resources estimates.

For analytical purposes, the CRIB master file on copper is presently being used to only a limited extent because a separate copper working file has been established to organize the resource data. Company "confidential" information from private industry is stored on the separate copper working file. However, this file only contains data on 80 major domestic deposits (some of which have been depleted) and lacks CRIB capabilities for presenting data in the form of a report, tables, and maps.

Chromium--In 1974 chromium was 1 of 19 critical imported materials identified by the Council on International Economic Policy. There has been only limited domestic production since 1961. The United States has no known chromium reserves, and estimated domestic resources are considered insignificant.

While there are several CRIB files, both master and work, related to chromium, the majority pertain to the major U.S. deposits. However, the primary world reserves are concentrated in two African countries, South Africa possessing 63 percent of the total and Rhodesia 33 percent. CRIB records for these nations are incomplete and do not contain chromium resource estimates. The CRIB master file contains no chromium records for the major suppliers of chromium to the United States--South Africa, Rhodesia, Turkey, or the Soviet Union.

The CRIB chromium records are incomplete in other ways. For example, only 3 of 441 chromium records have any mineral economic information. Chromium records also have very little information on production variables. Potential resource estimates were given for only two domestic deposits and one foreign deposit.

A review of the CRIB working files revealed only limited data on major chromite-producing countries, such as South Africa and Rhodesia. No reserve or resource estimates were given. Survey personnel were aware of the shortcomings in the CRIB chromium

data and acknowledged that it would have little application outside the Survey.

The Survey has other data files on chromium dealing with U.S. chromite imports, production, and consumption. The files were created specifically to demonstrate U.S. dependence on a small and shrinking number of chromite-producing countries and to identify the type of deposits from which most of the world's chromite will come. These files include data on the imports of chromite and ferrochromium to the United States from various countries and U.S. production and consumption of various types of chromite and ferrochromium. However, the files do not contain information on mineral economics, deposit description, or reserves and potential resource estimates.

Platinum--Officials believed that the platinum files are the most complete CRIB data base files and were anxious for us to include platinum in the review. The platinum specialist generally agreed, but acknowledged that even the platinum file is not yet complete and that revisions and additions are still in process. He attributed the more complete data for platinum records to a concerted effort by several individuals to input worldwide data. He also believed in placing as much data into CRIB as possible, in contrast to other specialists who excluded data because they did not personally consider CRIB important. Consequently, although only about 100 deposits are in the master file, platinum working files contain over 1,400 records.

The specialist considered CRIB resource estimates for South Africa, the world's leading source, to be accurate; however, additional data on specific South African deposits needed to be added. For example, none of the records contain mineral economic data, and only limited data describing the deposit and production factors. Other foreign platinum sources, such as Australia, Canada, and the Soviet Union, need to be updated. For example, CRIB Canadian records reflected reserves and potential resources of approximately 570,000 troy ounces, compared to a recent USGS/USBM estimate of approximately 30 to 40 million troy ounces. CRIB contains no resource and reserve estimates for the Soviet Union, although the joint USGS/USBM study indicated resources and reserves of approximately 450 to 600 million troy ounces. Data for many other nations is not available.

## INADEQUATE ORGANIZATIONAL AUTHORITY AFFECTS DATA

There are no formal regulations, policies, or procedures governing participation in the CRIB program. With the lack of such criteria and the lack of an official agency mandate directing support of CRIB, the decision of whether to participate in CRIB rests with each individual Survey employee.

Organizationally, ORA has immediate responsibility for CRIB but has no direct line of authority over the primary in-house data sources, the commodity specialists. Thus, the office can only request assistance from potential contributors.

In discussions with selected commodity specialists, we noted varying degrees of participation in the CRIB effort, both in terms of input as well as in use of the data base. One commodity specialist put data into CRIB and used the system to help in research studies and analyses. Other commodity specialists frequently cited reasons for limited or no participation as insufficient time and lack of help to compile large amounts of data for CRIB. Some were involved with various research efforts which they believed had priority over completion of lengthy CRIB input documents. Some also expressed confusion as to the purpose of CRIB and how it could help them, and some felt the input data elements did not satisfactorily meet the peculiarities of their individual commodities. As a result, some were using separate data bases they believed satisfied their individual requirements.

### Usage of CRIB data base

Outside of the Geological Survey, two types of user services are available: (1) Government, or official, services linking users directly to all CRIB files by computer remote terminals and (2) public services through a commercial information services network.

Over 35 Government computer remote terminals permit the Bureau of Mines, the Tennessee Valley Authority, the Forest Service, the Bureau of Land Management, and Idaho direct access to CRIB data. In each case, the user agency has entered into a data sharing agreement with the Geological Survey, making data available for deposit in CRIB.

Since inception of the system, over 195 subscribers have purchased CRIB data through a commercial data sharing network.

Over 70 percent of these subscribers are oil companies, but users include all major mining companies. In 1976, however, there were only 17 commercial CRIB users. According to one user pursuing lead and zinc data, the file format the commercial vendor used was exceedingly expensive. A single computer run for a listing of deposit locations for one mineral required a complete file search of all minerals worldwide. He felt only institutions could afford to use the system, particularly since only the master file data was accessible to the public and this was known to be inadequate.

Internally, CRIB has been used for data retrievals and map preparation in conjunction with selected resources studies. In discussions with individuals who had used CRIB for data retrievals, most told us that the requested data was usually incomplete and consequently of minimal value other than as a reference point. Recognizing the shortcomings, these individuals worked around the situation, supplementing CRIB data with information from other sources. In some instances, data from these studies was subsequently input to CRIB.

We noted examples where CRIB was used in conjunction with the preparation of maps, primarily in relation to platinum, a commodity with working files considered relatively complete. These maps included, for example, a U.S. platinum map depicting the location of deposits throughout the Nation, a map of platinum deposits and occurrences in a specific section of Oregon, and a map of Russian platinum deposits which is to be used in a study on the Soviet Union's platinum resources. CRIB data has also been used to generate other international-scale resource location maps.

CRIB's stated purpose includes input to policymakers and responses to Governmental and public inquiries. Comprehensive records of CRIB's use in responding to external inquiries are not maintained by the Survey. In our review of the response files, we noted only limited use of CRIB data in responding to such requests. As noted earlier, only about one-half of the CRIB file is accessible by the public through a time-sharing service.

Survey officials stated, however, that CRIB had been used in a few instances to respond to external requests. For example, detailed information and map plots of mineral distributions were prepared as basic background documentation in land classification decisions as part of the Alaska Native Claims Settlement Act.

## CHAPTER 3

### MINERALS INFORMATION SYSTEM MANAGEMENT

#### STATUS OF THE DEVELOPMENT OF A MINERAL INFORMATION SYSTEM

In 1974, the Geological Survey undertook development of DORIS. DORIS is intended to provide estimates of the quantity and quality of resources that will be available as a result of different policy options. Capabilities will be developed to reflect four major factors which affect the availability of resources: geologic, technological, economic availability, and alternative sources of supply.

#### Need for a mineral information system

In conjunction with the growth of problems associated with domestic mineral resource shortages, there is a need to evaluate the mineral resources of the conterminous United States within wilderness areas, Government lands generally, and internationally. The increasing complexity, magnitude, and range of the data generated in these evaluations have created a rapidly expanding need for computer support for the acquisition and processing of new data, for data manipulation to develop resource quality, quantity, and availability estimates, and for the application of computer graphics to provide charts and derivative maps. Resource assessment programs have also required the development of resource data bases for storage, retrieval, and manipulation of domestic and international resource information.

The rapid changes in resource economics, availability, and demand require that all available data be in a format and system which can provide substantive input to analysis needed to make policy decisions. Thus, development of a mineral information system is necessary to use existing data more effectively, provide input for short- and long-term planning, and develop means of providing information to a larger user community.

Policy development relies heavily on the use of estimates about the amount of resources that are recoverable in the future. Since availability is subject to a variety of influences--geologic, technical, economic, and legal-political--some means are necessary to measure the impact of these

influences on the availability of resources. Such a means could be provided by a mineral information system, assuming the system had complete, accurate data bases and realistic analytical models.

### Composition of mineral information system

Several data bases serve as the basic source of information for the system. These data bases include the CRIB file, major-working-deposits-of-the-world file, critical-commodities-of-the-world file, and others.

CRIB is intended as the national mineral resource inventory file. Other files are used as special purpose files. In some cases, CRIB data is used as the basic starting material for the special files; in other cases, the special files are created first and the data added to the CRIB file later.

These data bases have CRIB-related data elements and are intended to provide information for CRIB mineral resources. However, as of the date of our review, these files did not contain adequate data to provide sufficient estimates of the quantity and quality of mineral resources.

CRIB shortcomings were discussed in chapter 2 of this report.

The major-working-deposits-of-the-world file is intended to provide resource, production, and basic geologic information on major mines in an effort to portray world distribution of various mineral ores and determine their longevity. This file is presently in a development phase.

The critical-commodities-of-the-world file, in addition to providing resource and production data, is to provide import, export, and consumption information on about 20 commodities. This file is also in a development phase and, at present, does not contain enough data to provide estimates of the quantity and quality of mineral resources.

### Developmental programs of mineral information system

The DORIS program is still in the development process under the auspices of ORA within the Geologic Division. The Chief of the office informed us that the DORIS concept was

originally conceived in 1974 by the Survey and sanctioned by the Department of the Interior as an effort to meet the Department's information needs. We were told that the Department has not provided specific guidance to the Survey regarding the composition and functions of DORIS, and thus the Survey has proceeded in developing a system it perceives as meeting the Department's needs, as well as its own.

The Survey's effort, however, while undertaken with specific objectives and a systems design, lacked a formalized feasibility study, work plans, or a program strategy for implementing DORIS. Further, no milestones have been established against which to measure current and future efforts.

A 1975 study by ORA proposed a comprehensive mineral resource program. The objectives of the program were to identify the nature and magnitude of potential mineral problems and to provide the analysis necessary to define Government policy actions.

The proposal identified five resource areas considered inadequate for mineral policy analysis and Government action and in need of upgrading. These areas were: inventory of worldwide resources, research and development of advanced methods of resource appraisal, resource information storage and retrieval system, models for predicting the location of minerals, and analytical models for assisting in mineral policy/decisionmaking. The proposal noted that the program needed to be closely coordinated and that one part of it could not succeed without the other.

The proposal identified various levels of funding and the respective impact on achieving solutions to mineral problems. Under optimum funding, the proposal estimated reaching information and program levels sufficient to respond effectively to external mineral policy related inquiries in 5 years. Medium range funding could stretch out program completion to 10 or more years, while with low level funding, at approximately the fiscal year 1975 level, the Survey could only achieve and sustain only a demonstration level incapable of reaching the objective.

A comparison of actual versus proposed optimum funding and staffing required to attain the mineral information system portion of the proposed program is depicted as follows:



Comparison of Actual Versus Proposed Optimum  
Funding/Staffing Required to Attain  
Mineral Information System

	<u>Funding required</u>		<u>Additional staff required</u>	
	<u>Optimum number needed under proposal</u>	<u>Actual budget</u>	<u>Optimum number needed under proposal</u>	<u>Actual gains</u>
	(millions)			
FY 1976	\$ 3.6	\$1.5	16	3
FY 1977	4.3	1.5	7	3
FY 1978	<u>4.9</u>	<u>1.5</u>	<u>9</u>	<u>3</u>
Total	<u>\$13.3</u>	<u>\$4.5</u> (33.8% of optimum)	<u>32</u>	<u>9</u> (28% of optimum)

Using the Office of Minerals Resources' assumption that funding and staffing levels below the optimum level will delay the program, completion of even a model program extending 10 years or more will require more funds than are being allocated to the program now.

POSSIBLE CONTRACTS TO IMPROVE  
THE MINERAL INFORMATION SYSTEM

The Department of the Interior recognized shortcomings in its mineral information system and began efforts in early 1977 to award a contract, costing approximately \$300,000 to \$500,000, to study the system and to develop recommendations for implementing improvements. Interior officials envisioned the study to encompass: a review of the types of data and analyses needed by the Department to fulfill its responsibilities; existing and developmental mineral information systems and data bases in each Bureau in terms of their unique and common purposes, characteristics, deficiencies, and advantages; and the organizational arrangement leading to the most effective means for data collection, data analysis, and policy analysis.

Planned definition of the scope of work, timespan of the contract, cost-sharing arrangements, and other details were to

be accomplished in early May 1977. However, as of mid-August 1977, this effort had not been completed. Officials did not envision awarding the contract until after the start of fiscal year 1978. We see little need for such an expensive study when the Survey has made so little effort to administratively coordinate its information gathering and analysis activities. We see the problem as one of management's willingness to alter program administration, rather than the development of additional technical capabilities.

### POTENTIAL APPLICATIONS

We believe that a DORIS system could usefully contribute to decisionmaking in such areas as mineral resource inventory, evaluation and distribution studies, land use planning, geological correlations and associations, and in management decisions relating to these areas. For example, DORIS could be used in analyses similar to a present Survey effort to evaluate the possibility that undiscovered resources deposits exist in a region. The analysis could provide maps showing how much of a region has been explored and estimates of the undiscovered resources in the region.

DORIS could also provide mineral resource information for land-use planning. Before making decisions on the use of certain tracts of land, the Government could obtain data on the actual or potential resources available under various conditions for use in arriving at a final land use decision. This information might be used, for example, to assess land before it is designated as a wilderness area and removed from the inventory of Federal land available for exploration and development or to assess lands that are currently withdrawn to determine if they should be reclassified.

Furthermore, DORIS could potentially be used in studies related to geologic correlations and associations, such as the Geological Survey Professional Paper 907-A, "Grade and Tonnage Relationships Among Copper Deposits."

That statistical study indicated low-grade porphyry type copper deposits are unlikely to provide larger tonnages of contained metal in the future than high-grade deposits. This contradicts conventional mineral economic resource supply models which assume low-grade deposits will increasingly provide larger contained metal tonnages than higher grade deposits because they are more common. Thus, as prices increase, technological solutions do not make more copper available from

larger low-grade deposits because the probability of discovering such deposits is no greater. This lack of correlation between ore grade and discovery could lead to adverse effects for mineral supplies if very large-tonnage, low-grade deposits are not awaiting discovery. Through analyses such as this, DORIS could contribute significantly to identifying further problems in geologic correlations and associations, which in turn could lead to new policies addressing such areas as the need for further exploration.

## CHAPTER 4

### CONCLUSIONS, RECOMMENDATIONS, AND AGENCY COMMENTS

#### CONCLUSIONS

Despite the need for better minerals data and analysis, our review disclosed that CRIB is incomplete and inadequate. CRIB does not even fulfill the Survey's commitment to coordinate its other internal data systems in one generally accessible mineral resources data base. Moreover, the system lacks data and management support. A viable CRIB system is needed to help officials perform the Survey's most important minerals policy advisory role, the analysis of long-term mineral resource availability.

Major deficiencies in the Geological Survey's CRIB system are caused by inadequate program emphasis and management abdication of responsibility. Also, research program autonomy, based along geoscience disciplinary lines of effort, has retarded coordination of a Survey-wide minerals resource information system.

CRIB is an underutilized policy analytic device, largely ignored by policy levels of management. This inattention has eliminated the demand for an adequate CRIB data base capability within the Survey.

Management of the CRIB program in the Geological Survey is deficient in three respects:

- There are no agencywide procedures or regulations determining participation and support for the program among Survey divisions, the priority of such intra-Survey cooperation, and the focus of administrative responsibility for program coordination.
- Funding support for developing non-Survey sources of mineral resources information has been grossly inadequate, ignoring the potential of existing data bases in State geological services as well as other Government agencies and academia.
- Funding for specialized staff functions associated with developing a retrievable aggregate resources data base and associated analytic applications are inadequate

to achieve a resource policy information system in the foreseeable future.

Resource data in CRIB is inadequate. For example, the system contained no deposit records for any of the four principal chromium producing countries despite U.S dependence on chromium imports and concern about reliability of suppliers. The voluntary nature of commodity specialists' participation and data contributions make it impossible to establish mineral resource information priorities.

Foreign data is particularly bad. For example, bauxite data in CRIB was less than 80 percent of the aggregated global reserves of the Survey's 1977 published estimate. CRIB's Canadian platinum resource-reserve estimate was 0.1 percent as large as the joint USGS/USBM resource reserve estimate for Canada. These deficiencies are caused by the commodity specialists' failure to submit data and management's inattention to program administration.

Although officials believed CRIB copper data was quite good, less than 3 percent of the deposit records had any economic data and only about half had descriptive geologic data. It is difficult to imagine any possible policy relevance of resource data which is devoid of the size and geologic characteristics necessary to estimate potential availability.

The discretionary nature of participation in CRIB data base efforts undermines the objective of an agencywide mineral resource data base. Available Survey data are not entered in the system and only a few commodity specialists in the Geologic Division participate. The Survey's Conservation Division has, in a separate data base, over four times as many deposit records as CRIB does. Even the Geological Survey's publication resource data is not submitted for entry in CRIB.

Needed linkage between the computerized data bases of the Survey and policy data analysis, provided by DORIS, suffers from the same high level management neglect as CRIB. Necessary support for the program or demonstrated awareness of its potential applications seems almost totally lacking. In the absence of needed attention, DORIS is developing without requirements, work plans, or strategy. No milestones have been created to measure progress or influence on other Survey data programs.

For 5 years in the case of CRIB and 3 years in the case of DORIS, the Survey has simultaneously promised much and done little. While accorded the research autonomy of developmental programs, CRIB and DORIS have been singularly ineffective in influencing the way the Survey develops or thinks about mineral resources information.

### RECOMMENDATIONS

Accordingly, we make the following recommendations to enhance the priority and high-level agency support for CRIB.

We recommend that the Secretary of the Interior:

- Direct the Assistant Secretary, Energy and Minerals, to clearly formulate written mineral resource information requirements for specific minerals for submission to the Geological Survey.
- Order that the CRIB system design and information requirements be made fully compatible with the Bureau of Mine's Minerals Availability System for mineral reserves.
- Require the Director of the Geological Survey to formulate and put in place a Survey-wide plan providing internal coordination and input to CRIB from the Geologic Division's Mineral Resources Program, the Conservation Division's Mineral Resource Evaluation Programs and Reserve Inventories, and other Geological Survey mineral activities.

With respect to the program deficiencies discussed in our report, we recommend that the Director of the Geological Survey:

- Make the Assistant Director for Energy and Mineral Resources responsible for developing and coordinating the implementation of an integrated Geological Survey-wide Mineral Resources Program that will utilize a CRIB-like system as the central and/or primary computerized minerals information system. The integrated Geological Survey Minerals Resources Program should provide for
  1. ranking identified mineral resources in accordance with their probable commercial significance within a fixed time frame;

2. ranking the most promising ore-forming environments for critically needed but undiscovered mineral resources, as a means of focusing mineral research efforts and land-use planning;
  3. assimilating new geoscience research technologies applicable to minerals discovery into all mineral investigations;
  4. emphasizing the use of aeromagnetic information and techniques and area mapping overviews in conducting all mineral investigations to facilitate the development of mineral occurrence models; and
  5. aggregating mineral resource data in CRIB from all Geological Survey's programs regardless of their primary focus under specified significance and reliability criteria.
- Create a Survey-wide minerals information task force representing the major divisions to assist the Assistant Director for Energy and Mineral Resources Programs in this program review and to offer suggestions on the potential contributions of their activities to a comprehensive mineral resources data base.
- Designate staff support to assist the Assistant Director in reviewing present programs and schedule, and coordinating the development and implementation of a Survey-wide integrated mineral resources program.
- Increase the Geologic Division, Office of Resources Analysis staff in accordance with its Survey-wide responsibilities of operating and maintaining the CRIB and developing DCRIS program capabilities.

#### AGENCY COMMENTS

The Department of the Interior officials said they shared our concern about several problems indicated by this report. However, the tenor of their comments suggests the Department may not attribute as much importance to policy applications of the CRIB program as we do.

For example, highlight comment number 6 says the report misunderstands how CRIB fits in the resource program of the

Geological Survey. The Department claims CRIB is a library-like tool for the use of commodity specialists.

However, in its letter the Department endorsed the importance of a sound minerals information system to formulate policy options. It said:

"The central idea that led to the establishment of MAS and CPIB is still valid and we believe the type of information which the systems can provide when their potential is realized is indispensable [sic] to an efficient minerals information system."

This departmental endorsement seems contrary to the highlighted assertion that we misunderstood the proper role of CRIB in the Geological Survey.

Each of the highlighted departmental comments on the MAS and CRIB reports and our response are included as appendix II.





# United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

JAN 1 1978

Mr. Monte Canfield, Jr.  
Director, Energy and Minerals Division  
United States General Accounting Office  
Washington, DC 20548

Dear Mr. Canfield:

Thank you for the opportunity to review your draft reports "The Department of Interior's Computerized Resources Information Bank" and "The Department of Interior's Minerals Availability System." These reports point out a number of problems which concern us, too.

As you have recognized, minerals policy goals and criteria need to be established before the systems are developed much further. We agree that the data coverage on minerals in both systems varies and that there are data the commodity specialists could contribute to help build these files to a more uniform coverage. We will explore this and the other recommendations for improved program efficiencies with the two Bureau Directors to see what progress can be made soon. In addition, as you are probably aware, a review of Federal non-fuel minerals policy has been announced by the White House recently. Within the scope of that review, we expect that the existing Federal minerals information systems will be examined to better define the role and coverage of such systems as MAS and CRIB in terms of our own information needs and as parts of a more general Federal minerals information system. At that time, your concerns and recommendations will be more thoroughly considered along with suggestions made by the National Commission on Supplies and Shortages and other recent reports.

Your reference to the cooperation and coordination with other agencies, and particularly between the Bureau of Mines and the Geological Survey is a point of concern to us. As in any working relationship even though it is as good as the one existing between the Bureau and the Survey, there is always room for improvement. We shall explore with the Directors of the two agencies what additional steps could be taken to increase both cooperation and coordination.

Equally, the fact that MAS and CRIB are only part of the overall "Minerals Information System" existing within the Department and within the Federal Government presents special concerns. They continually must compete with other important programs in the Department and accept the realities of budgetary constraints and changing priorities. Complex trade-offs among widely divergent programs usually occur and the establishment of priorities becomes extremely important. You can be assured that the Department as well as the agencies of the Department vigilantly and at least annually review these priorities.

We agree that a sound minerals information system is essential to the development and formulation of consistent minerals policy options and recognition of their implications. The central idea that led to the establishment of MAS and CRIB is still valid and we believe that the type of information which the systems can provide when their potential is realized is indispensable to an efficient minerals information system. We will keep you informed on the progress of the Federal non-fuel minerals policy review and would welcome the opportunity to discuss with you your recommendations on the two systems in the context of that review.

Although we had difficulty in understanding some of the findings of the investigators because of the absence of topical organization and precise phrasing, we have addressed a number of specific points. Our comments are enclosed.

Sincerely,



Larry E. Meierotto  
Deputy Assistant Secretary  
Policy, Budget and Administration

Enclosures

## Highlights of our response:

### 1. Use of Grant Authority

The entire question of the proper use of contract and grant authority is receiving considerable attention by Congress. GAO has raised concern about the Bureau of Mines' use of these authorities. The Bureau has land use grants to achieve multiple objectives but has recently shifted toward more use of contracts in the MAS program. It appears appropriate however that the Department and the Bureau review and specify what conditions should currently exist for the application of either authority within any Department program.

### 2. Alumina pilot plant

The GAO states that in some way MAS supply curves kept the Bureau from deciding to proceed with the alumina pilot plant. There is no connection between these matters, and, because the alumina program is a matter of considerable current interest, a detailed paper describing it is provided as Enclosure 2.

### 3. BIA coal study

Deleted comments refer to matters not discussed in the final report.

### 4. Credibility of Data

The GAO cites alleged lack of agreement in mineral data. There is no doubt that data in different files and in different stages of processing within the Bureau may not always be in complete agreement. In considering such an arcane subject as reserve determination, it would be surprising if all data from various specialists agreed precisely. Indeed, it is in the reconciliation of differences in data that acceptable estimates are derived. Nevertheless, some of the GAO criticism appears to be based on errors which the GAO auditors made in application of mineral conversion factors as discussed in detail in Enclosure 4.

### 5. Company confidential information

The GAO alleges that information from public sources is classified as confidential by the Bureau of Mines. The Bureau's Organic Act prohibits issuing "any report as to the valuation or the management of any mine or private mineral property" (Paragraph 6, Title 30, USCA). A more detailed discussion is included in Enclosure 5.

## 6. CRIB's relationship to other programs

The report shows some lack of understanding about how CRIB fits into the overall mineral resource program of the Geological Survey. CRIB is a data bank--a tool analogous to a library to be used by those conducting mineral resource appraisals and those advising policymaking officials.

## 7. Priorities

The suggestion in the report that researchers should put more of their effort into entering data into CRIB is accepted but it must be stressed that the same researchers are involved in other priority programs.

## 8. Data completeness

Incompleteness of CRIB is noted in a number of places in the report. As with most dynamic data files CRIB is not now and never will be complete; it does not contain data for many deposits and the data for some deposits already entered into CRIB are being augmented or updated as funds and personnel permit. To establish a file of this magnitude in a short period of time requires a very large expenditure of dollars and personnel. More and more data are being entered into CRIB each year, and new and ongoing programs have and will continue to provide data for the bank. Consequently, no file of this type is ever complete. In short, CRIB will require constant updating as new information becomes available.

## 9. CRIB's role

The authors of this report have misinterpreted the basic role and primary function of CRIB. CRIB was created for the purpose of providing basic resource data in support of the Geological Survey's mineral resources program. It was designed for use by those involved in mineral resource investigations. As the report indicates, CRIB has been successful in part in achieving this goal.

GAO RESPONSE TO AGENCY COMMENTS

The agency comments, included in appendix I, cover both reports, MAS and CRIB. Therefore, our response to agency comments on both programs will be included in each report, as follows:

COMMENTS ON MAS

Department of the Interior Comment Highlight Number

1. The subject of contracts and grants is under review in the Department of the Interior, including the conditions in which one or the other is most appropriately used.

GAO response. MAS program grants are used to fulfill objectives which have little or nothing to do with the development and analysis of priority mineral data. Sound selection criteria are not followed in the Bureau's rush to obligate grant funds before the end of the fiscal year and avoid the 30-day congressional notice requirement for contracts in excess of \$25,000. Many of these small grants are repeatedly modified for additional funding, creating renewable, noncompetitive grants extending over several years and obligating substantial amounts of money.

Most MAS grants are merely literature searches for deposit data on specified minerals of a particular region. Because the product of these grants is known and performance criteria can be specified, they are more like noncompetitive service contracts than research proposals. But they are administered as research grants, as if the potential product and research procedures were unknown.

Even if administrative and policy considerations should preclude the use of contracts for developing MAS deposit data, MAS could use a performance-based, contingent funding approach to grant management. Nothing presently prevents the coordinator of MAS from reducing grantee payments for inadequate performance or withholding a fixed percentage of the grant pending satisfactory completion of the work. These measures could be implemented by administrative procedures, and they would greatly reduce the use of MAS grants to achieve other unrelated objectives.

2. There is no connection between MAS supply curves of alumina available from domestic resources and decisions whether or

not to proceed with construction of an alumina-clays refining pilot plant.

GAO response. The purpose of our report is to realize the potential of MAS for aiding policy decisionmaking. The amounts of alumina available at identified costs from various resources should have a major impact on all Government-supported alumina research decisions. The real issue is not the finite accuracy of MAS mining cost elements but the magnitude and implications of these resources for national policy. By identifying the relative costs of different resources and different deposits of the same resource in a consistent fashion, MAS offers a variety of very suggestive options with national policy implications.

3. Deleted comments refer to matters not discussed in the final report.
4. Reconciling data differences is the accepted process for deriving mineral reserve estimates. It would be surprising if all specialists agreed on such an "arcane" subject. Moreover, some of GAO's criticism seems to be based on auditor errors applying mineral conversion factors.

GAO response. One of the accepted attributes of assigning confidence levels to data is the degree of certainty that thereby attaches to the data. A 90-percent confidence level for mineral reserves implies a high degree of data reliability. When such data for the same major mines and identical time periods, from two sections of the same bureau, differ so widely as to suggest there is no communication, much less efforts to reconcile data difference, it is surprising and noteworthy.

There are no auditor errors of curve interpretation in this report, nor in the draft reviewed by the Department of the Interior. In the course of our review, GAO regional staff asked for a conference with MAS Systems Operations Group personnel to discuss tentative findings and ask prepared questions. At this meeting apparent discrepancies between MAS supply curves and printout values were discussed.

Bureau personnel reviewed GAO submissions and agreed to review their data for an explanation. They subsequently attributed the discrepancies to a process for determining conversion factors which was not part of the MAS computer program. None of these curves were discussed in the report.

5. The Bureau of Mines' Organic Act prohibits issuing any report dealing with the valuation or management of a specific mine or property.

GAO response. Information which is otherwise public, such as shareholders' reports, technical journals, or trade press reports, is maintained by the Bureau without references to its original source. Without attribution, the Bureau invokes its Organic Act's prohibition against release of "any report as to the valuation or the management of any mine or other mineral property." 30 U.S.C. §6. The Geological Survey has been unable to obtain access to MAS data and the Organic Act has been consistently invoked as the legal basis for the restriction.

The use of the Act in this manner is costly, counter-productive, and hinders development of compatible mineral resources and reserve data programs. Our review demonstrated that most MAS deposit data were derived from public references and were coded as such in the computerized MAS data base. We see no reason why such public source data could not be retrieved by the program and provided to other Government agencies with the explicit caveat that they do not represent Bureau of Mines valuations. Therefore, it is our belief that a much greater quantity of MAS data could be released without violating the Act.

#### COMMENTS ON CRIB

6. The report shows a lack of understanding of how CRIB fits into the overall mineral resources program of the Geological Survey. CRIB is a data bank, analogous to a library.

GAO response. The report shows that the Geological Survey has accorded CRIB no greater priority than that of just another library tool used by those conducting mineral resource appraisals. As a result, its potential applications as a policy-analytic device are not being realized. The "library" data base of CRIB does not even reflect the deposit data from current USGS publications.

7. Researchers should put more effort into entering data into CRIB, but are frequently involved with other priority work.

GAO response. Neither the importance of the CRIB data base nor the priority of researcher's time will ever be

recognized as long as the program is considered analogous to a library tool. CRIB is supposed to be a process for structuring and managing data generation and analysis.

8. CRIB will never be complete because it is a dynamic system. Data files are being augmented and updated as funds permit. New programs will provide more new data for the bank, but the program will require constant updating.

GAO response. Participating in CRIB by commodity specialists is voluntary and not part of their job responsibilities. When they do participate in CRIB it is usually to create small, personally accessible working files which are not part of a general data base accessible to other specialists. Thousands of deposits in other division's data banks are not entered in CRIB. Not even the mineral deposit data in USGS publications is routinely entered in CRIB.

To call such a system dynamic is semantic. Nowhere are decisions made establishing data priorities and their linkage to operating, data-generating Geological Survey programs; nowhere are programs modified to meet policy information needs or individual responsibilities redefined. By any standard of either management or data priorities, CRIB data is incomplete and inadequate.

9. The authors misunderstand the basic role and function of CRIB. It was created to provide basic resource data in the Survey's mineral resources program to those involved in the program.

GAO response. The Survey says it created CRIB to help commodity specialists and others perform their established missions. Survey and Interior officials have told the Congress CRIB is much more than a research aid. CRIB was cited in 1975 by an Assistant Secretary of Interior as demonstrating the available means for collecting, analyzing, and exchanging the data necessary for policy analysis as part of the Minerals Analysis and Policy System. GAO used the program descriptions and capabilities the Assistant Secretary said he wanted CRIB to provide as the criteria for measuring CRIB's performance.