REPORT BY THE

Comptroller General

OF THE UNITED STATES

National Defense Requirements For A Silver Stockpile

The strategic and critical materials stockpile prevents a dangerous and costly dependence on foreign supplies during a national emergency. Presently, the 139.5 million troy ounces of silver included in the stockpile are not required because the probable wartime supply exceeds projected U.S. requirements.

This report describes the methodology the Federal Preparedness Agency used to determine U.S. needs for silver. The report was requested by the Subcommittee on Military Construction and Stockpiles, Senate Committee on Armed Services.

LCD-79-410
APRIL 10, 1979

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

B-125067

The Honorable Gary Hart
Chairman, Subcommittee on Military
Construction and Stockpiles
Committee on Armed Services
United States Senate

Sen 00512

Dear Mr. Chairman:

This report describes the methodology the Federal Preparedness Agency used to determine U.S. needs for silver. Our report was prepared pursuant to your May 25, 1978, request which was cosigned by Senators Strom Thurmond and Jesse Helms and former Senator Paul Hatfield.

You requested that we:

--Examine the current administration's calculations together with underlying assumptions that define the U.S. requirements for silver during a period of national emergency.

--Assess the validity of silver sources available to the United States during a period of national emergency, including validating the quantities of silver available from these sources.

--Show whether or not the United States needs a silver stockpile for national defense purposes, and if so, what size it should be.

--Make an analysis of historical supply and demand statistics, particularly for the World War II and Korean conflict period and relate the analysis to current projections.

--Evaluate projected reserves, production, and consumption data to see if there is a future need for the silver stockpile.

--Evaluate the most sensitive parameters used to compute stockpile requirements, such as worldwide resources and production, import and export expectations, and gross national product without tracing the logic of the Federal Preparedness Agency's requirements model.

--Attempt to obtain data on specific defense needs, such as photographic materials, that can be directly related to silver.

You requested that we not question basic stockpile policy--for instance, whether or not a 3-year contingency was realistic or acquisition priorities were proper.

As arranged with your office, copies of this report are being sent to the cosigners of your May 25, 1978, letter and to the Chairmen, House Committees on Appropriations, on Armed Services, and on Government Operations; the Senate Committees on Appropriations, on Armed Services, and on Governmental Affairs; the Director, Office of Management and Budget; the Administrator of General Services; and the Secretaries of Commerce, Defense, State, and the Interior. Copies will also be available to other interested parties who request them.

Sincerely yours,

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT
TO THE SUBCOMMITTEE ON MILITARY
CONSTRUCTION AND STOCKPILES
COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

NATIONAL DEFENSE REQUIREMENTS FOR A SILVER STOCKPILE

D I G E S T

The United States stockpiles 93 commodities having strategic and critical importance to the national defense. This prevents a dangerous and costly dependence on foreign supply sources during a national emergency. To determine stockpile policy and goals for these commodities, the General Services Administration's Federal Preparedness Agency uses a mathematical "model" to estimate what the requirements of the Nation's wartime economy will be. The basic modeling technique used is widely accepted by academic researchers and corporate planners alike.

The Federal Preparedness Agency modifies the model based on "inputs" from the Departments of Commerce, Defense, State, and the Interior. Inputs are estimates based on both data showing what past experience has been and expert judgment as to what a future situation could be in a time of war or nearness to war. The inputs are vital to the model and the stockpile goals can vary as a result of changes in them.

Through these inputs the Federal Preparedness Agency tries to be sure that model results will more closely reflect the many complex interrelations present in a wartime economy. Although these inputs are subjective, their credibility is enhanced through independent formulation by the separate agencies involved and final review and approval by the Interagency Stockpile Goal Review Committee. Projections of wartime supply are computed separately from the model. However, a like process of agency input and review is followed. The methodology the Federal Preparedness Agency used to determine stockpile goals

is, in GAO's opinion, a reasonable approach representing a variation of the generally accepted state of the art for this type of economic analysis.

On the basis of the above methodology, in 1976 the Federal Preparedness Agency determined that the Nation's silver stockpile (139.5 million troy ounces) exceeds national defense requirements.

The General Services Administration has requested congressional approval for the phased sale of this inventory. The current worth of the silver stockpile is estimated at $0.8 billion as of September 1978.

GAO's analysis of the silver stockpile requirement was primarily on the basis of data used to determine the 1976 stockpile goals. Goals for 1977 were not published because new Presidential stockpile guidance was expected. Additional delays experienced in 1978 deferred the new goal publication until 1979, and figures for the 1979 goals were not yet available.

GAO found inconsistency in the development of Bureau of Mines silver supply estimates. Although the inconsistency substantially lowered silver supply projections, current information indicates that the silver supply exceeds the projected wartime requirements.

According to the Federal Preparedness Agency and various silver authorities, there are several other feasible sources of silver in addition to imports and U.S. production which could be drawn on, if required, in a national emergency. These added sources are not considered by the Federal Preparedness Agency in its supply projections and include about

--39 million troy ounces in the Treasury stocks for coinage,

--7 million troy ounces in Defense Department stocks for contracts with Government-furnished material provisions,

--118 million troy ounces in the Commodity Exchange and Chicago Board of Trade warehouses, and

--20 million troy ounces held by industry.

While GAO did not verify that all these sources could be used, undoubtedly sizable quantities could be diverted for defense uses in emergencies.

New stockpile goals are presently under ~~agency~~ review and official figures are expected to be published in early 1979. These new goals will reflect the Federal Preparedness Agency's use of an enhanced model. The 1979 goals for silver will also reflect lower Bureau of Mines estimates for silver supply. However, Federal Preparedness Agency officials state that the new study has again shown a wartime silver supply exceeding projected wartime requirements, and the stockpile goal for silver remaining at zero. Although it is possible that changes in projected silver requirements and supply relationships could occur in the distant future, no such occurrences are foreseen at this time.

The report was discussed with agency officials and they generally agreed with its contents. Their comments were considered in preparing the report.

Tear Sheet

Contents

ABBREVIATIONS

DOD	Department of Defense
FPA	Federal Preparedness Agency
GAO	General Accounting Office
GSA	General Services Administration
MCR	material consumption ratio
PCE	personal consumption expenditure

CHAPTER 1

INTRODUCTION

The United States cannot produce certain strategic and critical materials 1/ in sufficient amounts to support U.S. military and basic civilian requirements during periods of national emergency. It is partially or, in some cases, totally dependent upon foreign sources for many of these materials.

To prevent what could be a dangerous and costly dependence on foreign supply sources during periods of crisis, the United States stockpiles 93 strategic and critical materials at 117 locations throughout the country. The current stockpile is estimated to be worth $9.4 billion as of September 30, 1978; $0.8 billion of which is silver.

STOCKPILE LEGISLATION

The first major Government program to stockpile strategic and critical materials was authorized and initiated under the Strategic and Critical Materials Stock Piling Act of 1939, as amended in 1946 (50 U.S.C. 98 et seq.). Materials were procured under this act to support U.S. industrial and military needs during an emergency. Most acquisitions were made in the 1950s.

The Government has also acquired stockpile materials under two other acts. Section 303 of the Defense Production Act of 1950, as amended (50 U.S.C. App. 2093) authorized the Government purchase of metals and minerals to stimulate defense-related expansion of production capacity. Section 104(b) of the Agricultural Trade Development and Assistance Act of 1954 (68 Stat. 454, 456) authorized the acquisition of strategic and critical materials with foreign currencies obtained from the sale of surplus food commodities. This provision was subsequently eliminated under section 2 of the Food for Peace Act of 1966 (80 Stat. 1526).

1/"Strategic" refers to the relative availability of materials, while "critical" refers to their essentiality.

STOCKPILE POLICY CHANGES

Numerous changes have occurred in U.S. defense preparedness assumptions since World War II which have affected stockpile policy and caused changes in the types and amounts of materials stockpiled. Initially, the types and amounts of materials stockpiled were to support the United States in a 5-year conflict requiring 10 million men. In 1958 these assumptions were changed to reflect planning for a 3-year conflict involving 5 million men. In April 1973 under the Nixon administration, the length of conflict was further reduced to 1 year. Other assumptions were that foreign imports would remain available from all but Communist and combatant countries and that U.S. defense needs could be met through increased civilian austerity and the use of substitute materials. In effect, the 1958 and 1973 changes reduced the quantities of materials required for the stockpile and many were sold as excess.

In March 1975 the Subcommittee on Seapower and Strategic and Critical Materials, House Committee on Armed Services, voted to authorize no further disposals of stockpile material until a new policy study was conducted and the planning period was increased to 3 years.

In August 1975 the National Security Council directed that such a reevaluation be conducted by an interagency committee. This reevaluation was completed in July 1976 and basic stockpile assumptions and policy options were submitted to the President.

President Ford's policy decision and new stockpile goals were announced on October 1, 1976. The new policy called for a stockpile capable of supporting U.S. defense requirements for the first 3 years of a major war, assuming large-scale industrial mobilization. It also provided for the support of a wide range of basic economic needs to insure the health, welfare, morale, and productivity of the civilian sector during wartime. Quantities to be stockpiled represented the estimated material needs for the first 3 years of a war over and above those which could be provided from domestic production and reliable imports.

An Interagency Steering Committee was also established to develop an Annual Materials Plan showing proposals for the acquisition of needed materials and disposal of excess

materials on a fiscal year basis. This Annual Materials Plan Steering Committee includes representatives from the Departments of Commerce, Defense, the Interior, State, and the Treasury and the Office of Management and Budget. The Steering Committee is under the leadership of the Federal Preparedness Agency (FPA), an agency within the General Services Administration (GSA).

The new decision and planning assumptions increased goals for 72 of the 93 stockpiled materials. President Carter announced a moratorium on stockpile acquisitions and disposals on February 22, 1977, pending a review of the recent Ford policy. After additional review, the President reaffirmed the 1976 policy and its underlying assumptions. However, acquiring stockpile materials that will increase U.S. readiness posture for the first year of an emergency have been given the highest priority.

GSA has initiated a procedure to fully implement the new stockpile policy objectives. The procedure includes an annual schedule of major acquisitions and disposals to aline the stockpile with the new goals. GSA plans to acquire and dispose of stockpile materials at constrained rates to preclude disrupting the market. Achieving the new goals will therefore be a long-term proposition.

All stockpile disposals must be approved by the Congress.

SILVER

In June 1968, 165 million troy ounces 1/ of silver were transferred from the Treasury and introduced into the Strategic and Critical Materials Stockpile in accordance with the provisions of the act adopted in 1967, authorizing adjustments in the amounts of outstanding silver certificates (Public Law 90-29). Subsequently, 25.5 million troy ounces were transferred back to the Treasury for use in the Eisenhower coin program in accordance with section 202 of the Bank Holding Company Act amendments of 1970 (84 Stat. 1768). This transaction reduced the silver stockpile to its present 139.5 million troy ounce level. The silver stockpile is located at two locations: West Point, New York, with 49.4 million troy ounces and San Francisco, California, with 90.1 million troy ounces.

1/troy ounces - a series of units of weight based on a pound of 12 ounces and the ounce of 20 pennyweights or 480 grains.

FPA has determined that no stockpile goal exists for the silver and would like to dispose of it through phased sales. Information regarding the number and individual sizes of these sales and the number of years over which they will take place is not yet available. However, the sales will be designed to preclude market disruption.

MANAGEMENT OF THE STOCKPILE

FPA is responsible for planning, programing, and reporting on the stockpile. The President, through the National Security Council, gives FPA guidance for developing stockpile policy. GSA's Federal Property Resources Service is responsible for purchasing, storing, maintaining, transferring, rotating, distributing, and protecting the materials.

Although FPA determines stockpile policy and goals, it relies upon information from other Federal agencies for supply and capacity projections, probable effects on foreign relations, special defense requirements for materials, probability of access to world sources of materials during wartime, and domestic mineral reserves. The major advising agencies are the Departments of Commerce, State, Defense, and the Interior.

SCOPE OF REVIEW

Our examination of the national defense requirements for a silver stockpile included

- --review of the legislative history authorizing the stockpiling program;
- --analysis of the defense requirement for the present silver stockpile and agency inputs used by FPA in arriving at the current silver goal;
- --review of the modeling technique used by FPA to determine the stockpile goal for silver, including a sensitivity analysis of selected inputs to the model; and
- --conversations with officials of FPA and the Departments of State, Commerce, the Interior, and Defense regarding their role in stockpile goal formulation.

Previously issued reports and testimony are listed in appendix II. Also, our other work in process will address some of the assumption issues not discussed here.

CHAPTER 2

ASSESSING THE NEED FOR A SILVER STOCKPILE

Silver is very important to any war effort. Its essentiality in photography and electrical applications requires that the United States ensure its availability in case of national emergencies. However, the available supply of silver, even under wartime conditions, has been determined as more than adequate to supply all the requirements of the United States. Accordingly, in 1976 FPA set the Nation's silver stockpile goal at zero. New stockpile goals are presently under interagency review and official figures are expected to be published in early 1979. However, FPA officials have informed us that the new study has again shown a wartime silver supply exceeding projected wartime requirements and the stockpile goal for silver remaining at zero.

In our opinion, the methodology FPA used to determine stockpile goals is a reasonable approach representing a variation of the generally accepted state of the art for this type of economic analysis. The basic modeling technique used to determine requirements is widely accepted by academic researchers and corporate planners alike.

Judgmental inputs to the model and modifications to model results are made by FPA in order to more closely approximate the many complex interrelations that would be present in a wartime economy. Although these inputs are subjective, their credibility is enhanced through independent formulation by the separate agencies involved and final review and approval by the Interagency Stockpile Goal Review Committee. Like the Annual Materials Plan Steering Committee, this Committee is also comprised of members from FPA, the Office of Management and Budget, and the Departments of Defense, the Treasury, Commerce, State, and the Interior.

Although projections of wartime supply are computed separately from the model, a like process of agency input and review is followed. Also, basic supply and input data used is partly based on past actual experience. Finally, all resulting goals are reviewed and approved by the above Committee. For further discussion on requirements development and supply resource computations see chapters 3 and 4.

OUR ANALYSIS

Our analysis of the requirement for a silver stockpile was primarily on the basis of relationships presented in data used to determine 1976 stockpile goals. Our work indicates that an excess of silver supply exists over the projected U.S. wartime requirements. Goals for 1977 were not published because new stockpile guidance was expected from the President. Because of delays experienced in 1978, new goals will not be published until early 1979. However, FPA officials have told us that preliminary unapproved figures indicate an excess of supply under the 1979 goals as well.

The purpose of the stockpile is to provide the basic materials necessary to support defense and essential civilian needs in times of national emergency. FPA accordingly has incorporated in the model a structure whereby wartime estimates of supplies and materials requirements are broken down by defense, essential civilian, and general civilian tiers. National security priorities can therefore be taken into account in the model by giving greater priority to meeting defense rather than essential civilian needs for strategic and critical materials and lesser priority to general civilian needs. Although the total stockpile requirement is considered important, the most reliable sources of supply are designated for the defense tier and less reliable sources are designated for the essential and general civilian tiers. The tiers are defined below:

Defense tier - represents all production necessary to obtain weapons, manpower, and support, including production necessary to support suppliers of defense contractors. Only small degrees of substitute materials are tolerated for defense tier goods.

Essential civilian tier - those expenditures judged necessary to maintain health, safety, morale, and productivity to support a strong civilian wartime economy. Products in the essential civilian tier must be made without substantial reduction in their content of strategic and critical materials.

General civilian tier - products in this tier can be made in varying degrees from noncritical substitute materials with no significant degradation in performance if less than their full material content is achieved.

We found that the silver supply estimates provided to FPA for the 1979 goals were significantly lower than those provided for the 1976 goals. This discrepancy arose from basic differences in estimating procedures. The lower estimates have tracked much closer to recent import experience. The most significant differences in supply occurred in import projections for Canada and Mexico. Differences were also noted in production estimates for the United States. The resulting decrease in supply from these three sources amounted to 142.3 million troy ounces for the 3-year planning period. We decreased supply figures used in the 1976 goals by this amount and compared it to the corresponding requirements to see if it affected the silver goal. Although only a rough estimate, the results showed that defense tier requirements could be met by U.S. production alone. The majority of the remaining requirements could be filled with imports from Canada and Mexico as shown in the chart on page 8.

Silver authorities and FPA officials feel that in addition to imports and U.S. production many other feasible sources of silver exist and could be drawn on, if required, in a national emergency. These sources are not considered in the above-mentioned supply projections and include approximately

--39 million troy ounces in the Treasury stocks for coinage,

--7 million troy ounces in the Department of Defense (DOD) stocks for contracts with Government-furnished material provisions,

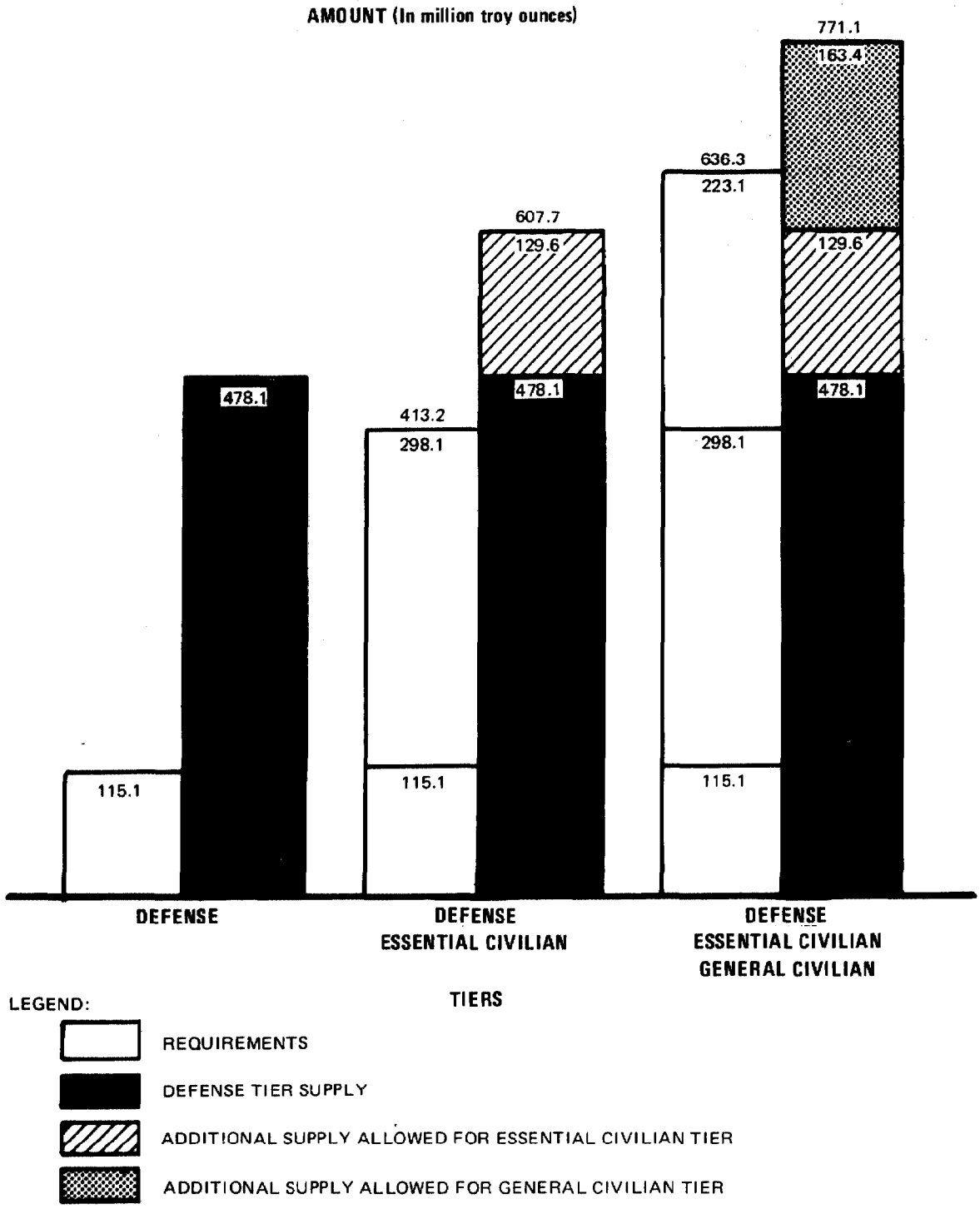
--118 million troy ounces in Commodity Exchange and Chicago Board of Trade warehouses, and

--20 million troy ounces held by industry.

While we did not verify that all these assets would be available to the Government in an emergency, in view of the sizable sources some diversion should be possible. See chapter 4 for further details.

Although it is possible that changes in projected silver requirements and supply relationships could occur in the distant future, no such occurrences are foreseen at this time. Therefore, on the basis of our analysis, the 139.5 million troy ounces currently stored in the stockpile are not needed to support estimated national defense requirements.

SILVER SUPPLY AND REQUIREMENTS–1976 GOALS (ADJUSTED)



NOTES: ALL THREE YEARS OF SUPPLY AND REQUIREMENTS ARE INCLUDED FOR EACH TIER. THE DEFENSE TIER IS SUPPLIED BY THE UNITED STATES, CANADA, AND MEXICO. UNITED STATES PRODUCTION ALONE ACCOUNTS FOR ABOUT 324 MILLION TROY OUNCES OF THIS EXPECTED SUPPLY.

In addition to evaluating whether or not the silver stockpile is required for additional defense purposes and the basis for such determination, other specific information requested is presented in the following chapters:

--Examination of the methodology and assumptions used to calculate silver requirements. (See p. 11.)

--Evaluation of the most sensitive parameters used in the computation of stockpile requirements. (See p. 16.)

--Assessment of the sources and quantities of silver available to the United States during national emergencies. (See p. 19.)

--Analysis of historical supply and demand for silver during past wars. (See p. 26.)

CHAPTER 3

METHODOLOGY FOR DETERMINING SILVER REQUIREMENTS

In 1973 FPA implemented a new methodology to aid in establishing national stockpile goals. The methodology uses a computer-modeling technique to estimate the Nation's wartime strategic and critical materials requirements. The model takes into consideration many complex interactions that occur in the economy. The model can be thought of as an analytical device for simultaneously interrelating and quantifying the results of many judgmental inputs concerning a wartime economy. Before 1973 a series of interagency committee meetings staffed by experts determined stockpile objectives. However, the major drawback of the prior system was that the many considerations regarding a wartime economy could not be simultaneously interrelated and quantified through discussion or even manual analysis. The set of final stockpile objectives, therefore, did not reflect the U.S. economy at any one point in time.

Although modeling techniques have their limitations, it is widely recognized that they often represent the best analytical tools available for making economic projections which, because of their complexity, cannot be approached using other techniques. The general technique used by FPA is widely accepted and used by academic researchers and corporate planners alike. In addition, FPA's model is not stagnant. FPA continues to refine the methodology used in the model and update it with the latest data as soon as it becomes available--although substantial timelags still exist before this data can be obtained from published sources.

The methodology employed in the FPA model is a reasonable approach which represents a variation of the generally accepted state of the art for this type of analysis.

OVERVIEW OF THE FPA METHODOLOGY

FPA determines how much of each of the 93 critical and strategic materials should be stored in the stockpile by estimating what the requirements and supply for those materials will be for the first 3 years of a war of indeterminate duration. An estimate of the desired stockpile level for a given material is obtained by totaling the excess of requirements over supply for each of the 3 war years, for each stockpile tier. FPA computer modeling methodology

primarily estimates wartime requirements for materials. Materials supply estimates, which are compared against these requirements to set stockpile goals, essentially are calculated apart from the model using virtually manual techniques. Determining supply projections is discussed in chapter 4 of this report.

The most important segment of FPA's modeling technique is determining what the estimated gross industrial dollar output (production) will be for 109 major categories of industrial sectors for each tier in each of the first 3 war years. These estimates are then multiplied by forecasts of corresponding material consumption ratios (MCR) to obtain strategic and critical materials requirements by industrial sector, which are then added to obtain the total materials requirements for each tier in each year of the 3-year planning period. MCRs are forecasted for each material by industrial sector for each year. The ratios represent the physical quantity of a material required per dollar of an industrial sector's gross output. MCR forecasts are primarily based on 15 years of historical data provided by the Department of Commerce.

The FPA model's estimates of wartime gross industrial output by sector reflect the level of the economy's mobilization effort required to support a given war scenario. The war scenario is reflected by estimates for 30 major categories of defense expenditures which are supplied directly by the Department of Defense Defense (DOD) and input to the FPA model.

DOD provides estimates to represent two different war scenarios. Each scenario differs in terms of participants, war fronts, and type of war to be waged. The intensity of economic mobilization required to support a given war scenario consists of two major components:

--An "unconstrained" economic scenario.

--An economic scenario altered by Government mobilization planning policy.

The unconstrained economic scenario is generated to provide a base for estimating the war's impact on the economy. It represents how the economy would react to support a war in the absence of Government policy to influence the economy's war mobilization effort.

Unconstrained economic scenarios are reflected in the FPA model through the judgmental inputs of the Interagency

Goal Review Committee regarding the war's impact on several key macroeconomic variables such as unemployment, interest and tax rates, plant capacity utilization, and household formations. The Committee also determines values for "planning factors" which are superimposed on the unconstrained wartime economy to reflect the effects of Government policy influencing the industrial mobilization effort supporting the war. These effects consist of varying levels of

--austerity imposed on civilian sectors,

--shifts in personal consumption patterns,

--shifts in investment patterns, and

--changes in imports and exports of manufactured goods.

The Government policy assumes that adjustments might be implemented through rationing, increased personal income taxes, accelerated writeoffs on war-related investment in plant and equipment, and enforced personal savings.

As previously discussed in chapter 2, the FPA model breaks down the estimated wartime materials requirements into three separate stockpile tiers. This is done to better reflect the priorities of different needs in a wartime economy. The wartime silver requirements, and therefore stockpile goals, estimated by the FPA model cannot be meaningfully interpreted without having some idea of the intensity of the war scenario and corresponding economic mobilization scenario which are hypothesized.

STRENGTHS OF THE FPA METHODOLOGY

The modeling methodology FPA used to estimate wartime requirements for strategic and critical materials recognizes the complexity of the economy and the many interactions between its economic sectors. Materials requirements estimates can therefore be more accurate, provided the methodology is properly applied. The model is also flexible because it allows for several adjustments to be made to better quantify expert judgment regarding the war's probable impact on the economy and the effects of Government policy to influence economic mobilization.

FPA's methodology also attempts to quantify the recognition that different sectors of the economy have different priorities during wartime for claims on strategic and critical materials.

LIMITATIONS OF THE FPA METHODOLOGY

Although modeling techniques such as FPA's are recognized as the best analytical tool the current state of the art has to offer for long-range economic projections, there are inherent shortcomings in their use. For instance, assumptions made in such models reflect a stability and proportionality in the relationships they quantify (linear relationships) which are not always present in the real world. However, these assumptions must be made because of shortcomings in available data that is necessary for input to the model. Key assumptions are similarly made in the FPA model because the detail, content, and availability of updated published data is limited. Generally, the FPA model implicitly assumes a proportionality and a stability over time and over a range of output levels of (1) interindustry transactions, (2) intermediate and end product mixes, and (3) price movements between products and between industries.

FPA emphasizes that the credibility of its materials requirements does not depend upon the existence of a strong theoretical validity to these assumptions of stability and proportionality. Rather, it depends, in its judgment, upon the assumptions being "close enough" to reality to provide a basis for deriving answers to economic problems which do not lend themselves to other analytical techniques.

Much of the internal structure of FPA's model is currently based on data that reflects the 1967 industrial technology. Gathering this data is a complex and resource-consuming task which cannot be undertaken very frequently. Published data reflecting the 1972 economy will not be available to FPA until mid-1979.

The FPA model provides estimates which essentially reflect nothing more than judgment. The model can be thought of as a device for simultaneously interrelating and quantifying the results of several inputs of judgment. Therefore, the results do not have a greater degree of quality than the judgments upon which they are based.

VALIDITY TESTING OF THE FPA MODEL

Validity testing of the FPA model's peacetime materials requirements estimates showed most of these estimates to be within ± 25 percent of what the past actual requirements were for the items tested. Specific results for silver showed the model estimates to be within 10.5 percent of past actual requirements. FPA performed this validity check by comparing actual requirements data for various stockpile materials published from 1973 through 1975, with corresponding peacetime requirements estimates developed by its model. FPA used only data that would have been available as of 1972 to develop its estimates so that the full effect of forecast error would be present in the comparison. The results of this validity testing are summarized below:

	1973	1974	1975
Number of strategic and critical materials for which FPA estimated peacetime requirements.	57	57	36
Number of strategic and critical materials for which FPA's estimates are within ± 10 percent of corresponding published values.	23	24	11
Number of strategic and critical materials for which FPA's estimates differed by more than ± 25 percent from published values.	14	14	17

Specific validation test results for silver were as follows:

	FPA's estimate of peacetime total silver requirement	Published actual total silver requirement	Percent difference of estimate from actual
	(troy ounces)	(troy ounces)	
1973	176,131,000	196,800,000	10.5
1974	167,860,000	178,000,000	5.7
1975	151,402,000	156,200,000	3.1

It should be noted that the error percentages shown in the tables above reflect estimates made under peacetime assumptions. The FPA model understated total peacetime silver requirements by approximately 3 percent to 10 percent. Determining requirements under wartime assumptions is a much more speculative process and associated error rates are likely to be greater. However, FPA officials conjecture that wartime estimates for silver would be accurate within ± 10 percent.

OUR SENSITIVITY ANALYSIS WITH RESPECT TO SILVER REQUIREMENTS

We determined that the FPA model's estimates of wartime silver requirements are sensitive to three major areas of inputs to the model: (1) wartime economic mobilization scenarios unconstrained by Government policy, (2) choice of war scenario option, and (3) various values for wartime planning factor parameters which reflect different levels of policy, risk, and substitution. Our estimates were made by calculations apart from FPA's computer hardware. Time constraints and resource limitations of FPA personnel precluded running the FPA model for the specific purpose of determining silver requirements sensitivities. However, our estimates are based on sound methodology and they compare favorably with results FPA previously obtained in actual computer runs where the stockpile dollar volume sensitivity was tested for all materials.

Unconstrained wartime economic mobilization

The hypothesized level of "unconstrained" mobilization of the wartime economy has the largest impact in determining total silver requirements for each war year. FPA generates this unconstrained economic scenario to provide a base for estimating the war scenario's impact on the economy. It represents the economy's war mobilization level, absent of Government influence. Unconstrained economic scenarios are determined by the Interagency Stockpile Goal Review Committee's judgment regarding the war's impact on several key macroeconomic variables such as interest rates, unemployment rates, plant capacity utilization, tax rates, and household formations.

Various alternative unconstrained mobilization bases are simulated by FPA in test runs, although only one is chosen for each war scenario option for the purpose of determining stockpile goals. The total silver requirement estimate can vary significantly depending on the set of values chosen. For example, we estimated the difference in impact on the

total silver requirement for two alternative unconstrained mobilization bases for the same war scenario option. The difference for the three war years was approximately 6, 15, and 20 percent, respectively.

War scenario option

Two sets of defense expenditure estimates for each of 30 major categories of weapons systems, equipment, ammunition, support, and personnel are provided for each war year by DOD as direct inputs to the FPA model. Each of the two sets of estimates reflects the military effort required to wage a war hypothesized in terms of participants, war fronts, and type of military action. A 10-percent-across-the-board change in DOD inputs to the FPA model would result in a maximum change of about 2 percent in the total silver requirement for each war year.

Wartime planning factors

Economic planning factors are used in the FPA model to represent implementation of Government policy to influence the industrial mobilization effort supporting the war. Other planning factors are used to substitute materials and to assign risk of stockpile shortfalls for each tier. The total effect of the planning factors is to shift emphasis on the usage of a given material from the personal civilian to the defense-related sector of the economy. Although the individual effect for each of these factors may be small, cumulatively they can be significant.

The impact of each planning factor or wartime silver requirements is classified information. To avoid having to classify this report, we instead based our analysis on unclassified documentation and estimated the difference in maximum impact on the silver requirement for each war year as a function of alternative values for each planning factor. The planning factor values evaluated were those recommended by the Interagency Stockpile Goal Review Committee as compared with alternative sets of values similar to those previously used by FPA in determining the sensitivity of the stockpile aggregate dollar volume for all materials to changes in planning factor values.

Wartime planning factor values selected by the Committee are those which in almost all cases result in the more conservative (higher) estimate of total silver requirements for each war year as compared with alternative sets of values

tested. Nevertheless, the total effect of all the planning factor inputs serves to decrease the silver requirement estimate for each war year. Our analysis of each of these planning factors is included in appendix I.

CHAPTER 4

SILVER SUPPLY AND DEMAND

Only one-third of the world's silver is produced as the primary end product of mining operations. The remaining two-thirds is derived as a byproduct of copper, lead, and zinc mining. Programs to recover silver from scrap metal, photographic film, and developing solution annually add about 50 million troy ounces to the world's yearly silver production.

In 1977, 325 million troy ounces of silver were produced worldwide. Mexico was the leading producer followed by the U.S.S.R., Canada, the United States, Peru, and Australia. The U.S. peacetime silver production in 1977 was 38.2 million troy ounces. Another 47.9 million troy ounces were added to this total by recovery programs. Imports of 90.2 million troy ounces filled the remaining national demand. Mexico and Canada supplied the majority of these imports. U.S. silver imports for 1977 and the supplier countries appear below:

U.S. Silver Imports - 1977

Country	Million troy ounces
Canada	44.9
Mexico	20.1
Peru	16.0
Other	9.2
Total silver imports	90.2

ESTIMATE OF WARTIME SILVER SUPPLY

FPA's projection of wartime supply constitutes the second half of the process by which it determines stockpile goals. Supply projections are determined apart from the econometric model discussed in the previous chapter. Computing wartime supply is largely a manual process of integrating the various judgmental supply inputs provided by the various contributing agencies.

To determine the probable wartime silver supply, FPA combines the Department of the Interior's Bureau of Mines projected silver production and import estimates with judgmental factors provided by DOD and the Department of State.

These factors include proximity of supplier nations to the war zone, supplier nation political reliability, and probable wartime shipping losses.

Bureau of Mines silver estimates

Commodity experts at the Bureau of Mines formulate projections of future peacetime silver production for domestic and foreign producers and the expected levels of silver imports that will occur for those years. Bureau of Mines silver supply estimates include both a high and low range of silver production for each country to allow for increased production levels. These estimates are supplied to FPA for use in formulating the silver stockpile goal.

Despite the fact that unforeseen events and other factors can cause significant differences between projections and actual experience, estimates are an essential part of any planning exercise. Information provided by estimates can be made more useful if it is derived from a consistently applied, credible method of estimate formulation. This enhances the comparability of results from year to year and generally assists in the formulation of more accurate future estimates.

However, we found that the computations used at the Bureau of Mines to formulate silver import projections had varied with the commodity experts performing the estimates. These variances had resulted in large differences in the figures used by FPA to formulate the 1976 and 1979 silver stockpile goals. Specifically, the silver import estimates used for the 1976 goals were based on one year's experience which has since proved unusually high. These projections were formulated in 1974 based on actual import experience in 1973. It was the commodity expert's opinion that the 1973 level of imports would continue. Although his estimates projected that level through future years, actual imports have fallen far short of these projections.

In 1976 another commodity expert was assigned to formulate silver projections. This expert used an averaging method of past years experience to arrive at a base import figure. The base figure was inflated by a small percentage growth factor for each succeeding year on the basis of his knowledge of what was taking place in the silver production

area. These estimates were significantly lower than previous projections and have tracked closely to subsequent import experience. The 1979 goals were formulated with the same base figure used in these projections. The most significant differences in projected supply occurred in import estimates for Canada and Mexico. There were also differences in projections for U.S. silver production. The total decrease in projected wartime supply for these three sources amounted to 142.3 million troy ounces over the 3-year planning period, as is shown in the table below:

Differences in Silver Supply Estimates
For the 3-Year Period

(in million troy ounces)

Estimate	United States (production)	Canada (imports)	Mexico (imports)	Total
Original	344.9	114.9	160.5	620.3
Revised	324.1	86.9	67.0	478.0
Difference	20.8	28.0	93.5	142.3

In an effort to determine what effect the 142.3 million troy ounce reduction in projected silver supply would have on stockpile goals, we reduced supply figures used in the 1976 goals by this difference and compared the adjusted supply to the corresponding requirements. Even with the reduction ample supply remained to support U.S. requirements, as shown below:

1976 Goals With Revised Supply Estimates for U.S. Production and Imports From Canada and Mexico

(in million troy ounces)

Stockpile tier	3-year requirements	3-year supply	Excess
Defense	115.1	478.1	363.0
Essential civilian	298.1	a/363.0 b/129.6	194.5
		492.6	
General civilian	223.1	a/194.5 b/163.4	134.8
		357.9	

a/Excess supply from previous tier.

b/Additional supply allowed for tier.

Figures for the 1979 goals were not available for our review. However, FPA informed us that the reduced silver supply projections only decreased the amount of excess supply available over the projected demand and that there is still no stockpile goal for silver.

It would be difficult to assess how much of the decrease in excess supply is due to the lower supply figures alone. A new econometric model was used to formulate the 1979 goals and requirements data and some planning data input to it have also been modified.

Although an inconsistency was noted in Bureau of Mines estimating procedures for silver supply, we do not know if such inconsistency is present in the supply computations for other commodities. Our work was limited to only one commodity.

War zone considerations

The feasibility of receiving supplies from a nation can be significantly impaired by that nation's close proximity to the war. FPA uses this factor to eliminate expected supply from nations that are included within the current scenarios. However, with respect to silver, the majority of the required supply is expected from U.S. production and imports from Canada and Mexico.

Political reliability factors

The Department of State provides FPA with political reliability assessments for foreign suppliers in wartime. This information is developed by individual country experts (country desk officers), subject to review by senior regional foreign service officers, and represents their expert judgment as to each specific country's dependability as a supplier of strategic and critical materials to the United States in terms of the current war scenarios. Subfactors evaluated during this process are:

--A country's political orientation towards the United States.

--Ability to sustain materials industry exports in wartime.

--Dependability of labor force in materials and related industry.

--Vulnerability to sabotage of materials industry.

Each of these subfactors is broken down further into technical indicators which are rated on a scale of 1 to 5 (with 5 indicating a high reliability). The indicators are weighted from 0 to 100 to express their relative importance within a particular subfactor. FPA uses risk assessments both to reduce supply figures and to designate supply sources for each particular stockpile tier. Supply from the most politically reliable countries would be applied against defense tier requirements. For instance, only the expected supply from the United States, Canada, and Mexico is used to offset defense tier requirements. Remaining countries and their expected supply are assigned to the remaining two stockpile tiers in a like manner.

Shipping losses

Projections of expected silver supply are also reduced by those amounts that are expected to be lost during shipment in a wartime environment. FPA accomplishes this by applying shipping loss probability rates supplied by DOD for each war zone according to current scenarios.

The total amount of expected supply remaining after evaluating war zones, political reliability, and shipping

losses represents the probable wartime supply. This supply is then compared with wartime requirements, as determined by the model for each stockpile tier, for each war year. Any shortfall between a tier's designated supply and its requirements would constitute a stockpile goal for that tier. The total shortfall for all tiers during the 3-year period would constitute the stockpile goal for the commodity.

On the basis of the 1976 silver goals and using the more conservative supply figures for the United States, Canada, and Mexico, U.S. production alone could supply the total needs of the defense tier. The addition of expected wartime supply from Canada and Mexico would fill all requirements of the essential civilian tier and part of the general civilian tier as well. The remaining silver requirement could be more than filled by remaining supply sources.

It should be noted that the "earmarking" of supply by tier is only a planning device. In actuality, during a national emergency any silver received would be allocated to the highest priorities first, regardless of where they might fall within the tier structure. In general, the majority of highest priority needs could be expected to fall within the defense tier.

POSSIBLE ADDITIONAL SILVER SOURCES

The United States uses only projections of domestic production and expected import levels from foreign suppliers to determine the silver supply available to meet the needs of its wartime economy. However, additional sources of silver do in fact exist and have, in the past, supplied silver to meet the needs of the United States.

Foreign silver stores

Some nations supplying silver to the United States are thought to have silver stocks of their own. Although only partial information is available, foreign silver stocks were estimated at 77 million troy ounces during 1977. In the past, nations have provided silver to the United States in amounts that exceeded their yearly production capability. For instance, in 1973 the United States imported 55.9 million troy ounces from Mexico. Existing production capacity for the country at that time was an estimated 38.8 million troy ounces. In 1977 Canada supplied the United States with

what amounted to 104 percent of its silver production for that year. The additional amounts provided may have come from these foreign stores. Countries would most probably ship silver to the United States from in-country stores as long as it was economically advantageous for them to do so.

Additional silver stores in the United States

According to FPA and various silver experts, there are several other sources of silver onhand that could be used, if needed in a national emergency, in addition to the 139.5 million troy ounces of silver in storage in the Strategic and Critical Materials Stockpile. DOD silver stocks to be provided to contractors as Government-furnished material amounted to about 7 million troy ounces at the end of 1978. The Treasury retained approximately 39 million troy ounces for coinage. Approximately 138 million troy ounces were held in industry, Commodity Exchange, and Chicago Board of Trade stocks at the end of 1978. The peacetime economy of the United States has occasionally depended on these stocks to meet fluctuations in its demand and export needs. For instance, the increased demand for silver during the Vietnam conflict from 1964 to 1972 was met by Treasury silver sales to industry. The Strategic Stockpile of silver was not affected.

Another less feasible source of silver would include silver bullion, jewelry, tableware, and coins privately held by U.S. citizens.

PEACETIME SILVER DEMAND

The national peacetime demand for silver averages about 162 million troy ounces per year. The Bureau of Mines projects a 2.5 percent annual increase in silver demand through the year 2000. The largest peacetime usage of silver in the United States is for the manufacture of silverware and photographic supplies. Additional major categories of peacetime silver usage include jewelry and arts, refrigeration, coinage, appliances, batteries, electrical equipment, electronics components, medallions and commemorative objects, and other miscellaneous uses. The actual U.S. silver demand for 1977 was 153.7 million troy ounces.

Defense silver usage for the past 3 fiscal years, 1976, 1977, and 1978, was approximately 4.7, 3.2, and 2.7 million troy ounces, respectively. Primary defense usage

categories during this period included batteries, brazing alloy, X-ray and photographic film, and medical uses (excluding X-ray). The single largest defense use of silver during the period was in batteries, accounting for over 7 million troy ounces of the approximate 10.6 million troy ounces used. The Navy was the single largest defense user of silver, accounting for about 5.9 million troy ounces of the approximate 10.6 million troy ounce total.

The silver demand under a projected wartime situation is greater than under peacetime conditions due to the increase in defense expenditures. In the past 3 fiscal years, defense silver use has averaged about 3.5 million troy ounces a year. In comparison, the defense wartime silver requirement, based on the 1976 goals, averages about 38.4 million ounces a year; an increase of 34.9 million troy ounces a year over peacetime consumption.

PAST WARTIME SUPPLY AND DEMAND RELATIONSHIPS

Historically, the United States has always been able to supply its wartime silver requirements without having to draw on amounts stored in the Strategic and Critical Materials Stockpile. Available data shows that silver supply actually exceeded wartime demand during World War II and the Korean conflict. Although this data also shows silver requirements exceeding available supply during the Vietnam conflict, there was in fact no shortage of silver. Historical supply data only show silver amounts obtained from domestic production and imports. However, throughout the Vietnam era the Treasury was selling off large amounts of silver and the industry's increased need for silver was easily filled from these Treasury sales. Because the increased wartime demand was filled in this manner, domestic production and import levels were unaffected and remained at peacetime levels. Therefore, figures for the Vietnam era reflect a shift in supply source rather than a wartime supply shortage.

The average yearly silver usage during the Vietnam conflict was slightly higher than it was during World War II and the Korean conflict. Two factors that contributed to these higher usage levels were:

--The degree to which air reconnaissance was used during the Vietnam conflict.

--Austerity actions were not imposed on the civilian sector during the Vietnam conflict.

Specific figures regarding silver supply and demand for these periods are as follows:

Silver Wartime Suppy and Demand

(in million troy ounces)

War/conflict	Number of years covered	Supply	Yearly average	Demand	Yearly average	Excess or deficit(-)
World War II	6	870.5	145.0	621.0	103.5	249.5
Korean conflict	4	505.4	126.4	430.0	107.5	75.4
Vietnam conflict	9	894.9	99.4	1250.0	138.9	-355.1

Silver requirements and supply relationships shown in the 1976 stockpile computations reflect the World War II and Korean conflict experience because an excess of supply over requirements is projected. In fact, even by using the lower supply figures for expected U.S. production and imports from Canada and Mexico, all defense tier requirements for silver can be met from U.S. production alone. The addition of probable imports from Canada and Mexico fills all but a small portion of the total U.S. requirement. The small portion of remaining general civilian tier needs are more than offset by expected supply from more than nine additional sources. Figures for the 1979 stockpile goals are now in the process of interagency review. These figures reflect lower silver supply estimates than those used in the formulation of the 1976 silver stockpile goal. Although these figures were not available for our review, FPA officials inform us that silver supply is still exceeding projected requirements and the silver stockpile is not needed.

SUBSTITUTION

Depending on the individual application, it may be possible to partially meet the demand for a critical or

strategic commodity by using substitute materials. Substitution factors affect about half of the materials stockpiled. However, little substitution is technically feasible for the other materials in the short run (1-to-3-year time frames). Silver is among those materials for which only an insignificant amount of substitution over peacetime levels can be assumed. Changes in silver substitution planning factor values will therefore have only small effects on wartime silver requirements.

Some substitutes for silver are widely used today. For instance, stainless steel flatware is commonly used in place of silver utensils. Other possible candidates for substitution with silver include

--aluminum and rhodium as reflecting surfaces in mirrors and other devices;

--tantalum for use in surgical plates, pins, and sutures; and

--cupronickel, cuprozinc, nickel, and aluminum for use in coinage.

To determine the amount of substitution possible, the strategic and critical importance of the proposed substitute material must also be considered. Also, for some applications there may be no substitute. For instance, in spite of the millions of dollars spent to find a substitute material, silver remains indispensable to photographic applications.

Substituting lithium thionyl chloride for silver in MX missile system batteries virtually eliminated the systems requirement for approximately 35 million troy ounces of silver. System silver requirements are now estimated to be about 1 million troy ounces maximum. However, it should be noted that requirements of the MX system and the substitution previously mentioned never affected the silver stockpile. Essentially, commodities are stockpiled by the United States to meet projected requirements for the first 3 years of a conventional war. The requirements of the nuclear MX would not be reflected in stockpile goals and objectives.

The short time frames associated with nuclear war would not allow enough time to build additional systems once the war had begun. Such systems would therefore have to be in place prior to the war, and the silver required to build them would have to come from the open market.

EFFECTS OF ALTERNATIVE PLANNING FACTOR VALVES ON THE TOTAL WARTIME SILVER REQUIREMENT

AUSTERITY PLANNING FACTOR

The degree of austerity (reduced standard of living) implemented for each war year is measured by comparing per capita personal consumption expenditure (PCE) levels, existing in the year prior to the start of the war, with levels expected in each of the 3 war years. The set of austerity planning factors currently implemented is 98, 95, and 90 percent for war years one, two, and three, respectively. For example, it is assumed that Government policy will restrict per capita PCE in the first year of the war to 98 percent of what it was in the last non-war year.

The maximum change in wartime silver requirement resulting from substituting two different sets of austerity planning factor values is estimated below:

Alternative sets of austerity planning factor values			Estimated maximum percentage change in total silver requirement		
War year one	War year two	War year three	War year one	War year two	War year three
1.00	1.00	1.00			
to	to	to	-0.9	-2.1	-4.0
.98	.95	.90			
.98	.95	.90			
to	to	to	-3.5	-2.2	0
.90	.90	.90			

PCE shift planning factor

The PCE shift planning factor represents the effect of Government policy to restrict purchases of consumer durables in order to conserve raw materials and free production facilities for war-related activities. It is assumed in the FPA model that unsatisfied demand for consumer durables would

be channeled toward and evenly divided between consumer nondurables and services.

The set of values for the PCE shift currently implemented by FPA is 25, 50, and 50 percent for war years one, two, and three, respectively. For example in war year one, although consumer demand is already constrained by austerity, that which is allowed is further modified to restrict demand for durables by 25 percent.

The estimated maximum change in the wartime silver requirements resulting from a change to a more severe set of values for the PCE shift planning factor is shown below:

PCE shift planning factor values			Estimated maximum percentage change in total silver requirement		
War year one	War year two	War year three	War year one	War year two	War year three
0.25 to .50	0.50 to .75	0.50 to .75	-5.6	-5.5	-5.4

Investment shift planning factor

The investment shift planning factor represents the effects of Government policy to restrict wartime investment in commercial and residential structures. The resulting unsatisfied investment capital is assumed to be channeled into investment in industrial equipment to increase production capacity in support of the war. We determined that the fractional change in the impact of the investment shift planning factor on the total silver requirement is precisely equal to the fractional change in the planning factor values. For example, if the values shown for war year one in the table below were reduced by half (25 and 12-1/2 percent for residences and other structures, respectively), the impact of the investment shift planning factor on the total silver requirements would be half as much.

The set of values currently used in the FPA model for the investment shift planning factor is:

	Percentages		
	War year one	War year two	War year three
Residences	50	62.5	75
Other structures	25	25.0	25

Thus, investment in other structures is assumed to be restricted an additional 25 percent for each year and investment in residences is restricted by an additional 75 percent in the third war year.

Import-export planning factor

We estimate that a 10-percent-across-the-board decrease in total exports of manufactured goods (not materials) will result in about a 1.7-percent decrease in the total silver requirement for each war year. A 10-percent-across-the-board decrease in imports of manufactured goods (not materials) will increase the total silver requirement for each war year by about 1.5 percent.

The import-export planning factor effectively assumes a 36-percent decrease in imports of goods with respect to the amount the economy would demand during each war year. This reflects decreased wartime availability of supply from foreign sources and shipping losses. Exports of essential civilian goods are assumed to remain between 93 percent and 99 percent. All resulting exports and about 75 percent to 80 percent of the resulting imports are assumed to be essential civilian goods.

We determined that planning factor values which further cut essential civilian imports (not materials) in half would increase the total silver requirement by about 4 percent for each war year. However, if planning factor values were also changed to cut essential civilian exports (not materials) in half, the net result would be a decrease in the total silver requirement of about 4 percent each year.

Substitution planning factor

Substitution planning factor values are used to reflect the rates at which industry may be expected to approach maximum feasible substitution of noncritical for critical materials. However, substitution factors affect slightly less than half of the stockpile materials. Little substitution is technically feasible for the other materials in the short range (1 to 3 years) time period. Thus, since silver is among those materials for which only an insignificant amount of substitution can be assumed, the impact of changing substitution planning factor values will be small with respect to wartime silver requirements.

Material consumption planning factor

The FPA model determines wartime materials requirements by (1) estimating gross dollar volume output for each of 109 major industry sectors, (2) forecasting the physical quantity of each material consumed per dollar of gross output for each industry sector, and (3) multiplying the two and summing over all sectors to obtain materials requirements estimates in physical units.

MCR forecasts are subject to a forecast error band. The upper end of this error band is used to estimate MCRs which will be applied to gross industrial outputs for the defense tier. This results in a more conservative estimate of defense materials requirements. Accordingly, this tends to decrease the risk, when setting stockpile goals, of not meeting wartime defense materials requirements. The lower end of the forecast band is used to estimate MCRs which are applied to gross industrial outputs for the general civilian tier, thus reflecting a willingness to accept more risk in not meeting general civilian wartime materials requirements.

We estimate that (1) the maximum impact of using the upper estimate (versus the midrange estimate) for the defense tier is an increase in total silver requirements of about 1.9, 2.5, and 2.6 percent for each war year, respectively and (2) the maximum impact of using the lower estimate (versus the midrange estimate) for the general civilian tier is a decrease in total silver requirements of about 6.7, 6.1, and 5.8 percent for each war year, respectively.

OUR PRIOR TESTIMONY AND REPORTS

CONCERNING STOCKPILE MATTERS

TESTIMONY

Statement of Elmer B. Staats before the Joint Committee on Defense Production on Comments on the National Stockpile - November 24, 1976.

FORMAL REPORTS

"U.S. Actions Needed To Cope With Commodity Shortages - Multiagency" (B-114824, Apr. 29, 1974).

"Stockpile Objectives of Strategic and Critical Materials Should be Reconsidered Because of Shortages" (LCD-74-440, Mar. 11, 1975).

"Additional Precious Metals Can Be Recovered" (LCD-77-228, Dec. 28, 1977).

"The Department of Interior's Minerals Availability System" (EMD-78-16, July 17, 1978).

"The Department of Interiors Computerized Resources Information Bank" (EMD-78-17, July 17, 1978).

"Management of Federal Materials Research Should Be Improved" (EMD-78-41, July 27, 1978).

"The Strategic and Critical Materials Stockpile Will Be Deficient for Many Years" (EMD-78-82, July 27, 1978).

"Interior Programs for Assessing Mineral Resources on Federal Lands Need Improvements and Acceleration" (EMD-78-83, July 27, 1978).

LETTER REPORTS

July 9, 1974 - Addressing Disposal of Excess Copper From the National Stockpile of Strategic and Critical Materials (B-124103).

August 5, 1974 - Questions Concerning the Guidelines and Assumptions Which the Department of Defense and the General Services Administration Used To Make Their Calculations for Disposing of the Chromite Stockpile (B-159161).

APPENDIX II

December 10, 1976 - Information on the Sale of Metallurgical Grade Chromite From the Stockpile at Nye, Montana (B-159161).

March 11, 1977 - Discussion of Israel's Purchase of Excess Industrial Diamonds From the Strategic and Critical Materials Stockpile (B-118623).

September 9, 1977 - Observations on Selected Matters Concerning the Strategic and Critical Materials Stockpile (B-125067).

APPENDIX III

United States Senate
COMMITTEE ON ARMED SERVICES
WASHINGTON, D.C. 20510

May 25, 1978

Honorable Elmer B. Staats
Comptroller General of the
United States
Washington, D. C. 20548

Dear Mr. Staats:

The purpose of this letter is to request that you undertake a study for the Senate Armed Services Subcommittee on Military Construction and Stockpiles concerning the national defense requirements for a silver stockpile.

Specifically I would ask that you:

1. Examine the current Administration calculations, together with underlying assumptions, that define the U.S. requirements for silver during a period of national emergency.

2. Assess the validity of estimated silver sources available to the United States during a period of national emergency. Such assessment should include a validation of the quantity of silver available from the various sources during a period of national emergency.

I do not expect you to include in this study an evaluation of stockpile policy -- for instance, is a three year contingency realistic?, are priorities for acquisitions proper?, etc. You may start with the assumption that basic stockpile policy is not in question.

I would like for your study to show whether or not the U.S. needs a silver stockpile for national defense purposes, and if a stockpile is needed, what size should it be?

I am suggesting a schedule below that fits our hearing plans for Fiscal Year 1980. This schedule is, however, flexible and I would be willing to work out a compromise if you desire.

APPENDIX III

Study Plan - September 1, 1978
Progress Report - December 1, 1978
Final Report - February 1, 1979

The staff contact on this matter is Jim Smith of the Senate Armed Services Committee staff, extention 224-3871.

Sincerely,

Strom Thurmond

Gary Hart, Chairman
Subcommittee on Military
Construction and Stockpiles

Jesse Helms

Paul Hatfield

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