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ASSISTANT SECRETARY
FOR INTERNATIONAL AFFAIRS

DHS Review Completed.

May 3, 1984

Memorandum for Richard Levine

From: Hazen F. Gale

Subect: Report of the Task Force
and International Supply-Demand Balance

I am sending the revised report of the Task Force which includes the description of a new methodology for estimating the international supply-demand balance for strategic minerals. The report includes a full set of computations for chromium. The attached table to this memo shows the summary of supply, demand, and balance for that metal.

You should note that the chromium example includes an arbitrary demand estimate for the United States since the final estimates of U.S. requirements have not been completed. The other commodities cannot be completed until those requirements are available.

As you know, political reliability has been evaluated for ony 26 countries. I have put the unrated countries' supplies in a separate category and have treated them as unavailable to the United States. When reliability assessments have been made, their supplies can be reallocated to the proper category of reliability. Only a few countries would require evaluation and their supplies are usually not a major factor in the final balance. A list of those countries that need to be rated is attached.

I have revised the format of the tables to make them easier to read and understand.

The report has been revised from the earlier version which was circulated in response to the DOD comments and has been approved by the Task Force. The new shipping loss estimates have been incorporated and allied demand reflects a defense buildup in the war years.

Attachments

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Chromium
(Thousand tons of Chromium)

Item	1982	1983	1984	1985	1986
World supply 1/	1049	1957	1954	2484	3014
Supply available to U.S.					
Highly reliable imports 2/	229 3/	129	163	190	215
Fairly reliable imports 2/		446	499	764	1176
U.S. Production					
Normal	48	60	60	65	70
Concerted Programs	-	-	2	117	237
Total	277	635	724	1136	1698
Net demand					
Rest of the world 4/	1638	1300	1203	1434	1527
U.S. 5/	271	750	750	750	750
Imbalance 6/		-211	-175	-33	0
DOD	-	-211	-175	-33	0
EC	-	0	0	0	0
BI	-	0	0	0	0

1/ Excludes Soviet Bloc, Middle East, unreliable, and war-damaged supplies.

2/ After adjusting for foreign countries' domestic supplies used for their own demands and deleting shipping losses.

3/ Includes imports from all sources.

4/ Total demand less domestic production inmajor allied countries; reflects decreased demand due to higher prices.

5/ Total demand less domestic U.S. production; preliminary estimate and subject to change when macro study is complete.

6/ DOD imbalance based on availability of U.S. domestic supplies and imports from highly reliable sources.

Countries to be Rated

for Political Reliability

Argentina

Colombia

Dominican Republic

Haiti

Honduras

Venezuela

Cameroons

Ghana

Kenya

Madagascar

Mozambique

Morocco

Namibia

Nigeria

Rwanda

Tunisia

Burma

Mongolia

Taiwan

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Methodology for Computing

Stockpile Goals, 1984

Foreign Supply and Demand

The determination of the imbalance between U.S. wartime requirements and available supplies will depend to a large extent on the supplies available from other countries. In the 1979 stockpile study, FEMA assumed that the U.S. would have access to the same proportion of free world supply during wartime as it imported during the prewar period. Those initial estimates of supplies from other countries were reduced as appropriate for shipping losses and politically unreliable sources.

FEMA's procedure was based on questionable assumptions about demand in the rest of the world and about the ability of the U.S. to gain access to foreign supplies. First, during wartime, we could reasonably expect the U.S. to make a determined effort to increase the quantities of materials that would be imported well beyond its traditional shares. This could be done by simply outbidding other importers, by special bilateral supply arrangements or by negotiation among allies on how to allocate supplies. Second, it is highly unlikely that foreign demand would expand to absorb the expected large increase in free world supplies for three reasons: 1) Economic activity within war-zone nations would be sharply reduced; 2) likely rates of economic growth in other countries would not raise demand by large amounts; and 3) the increase in demand can be expected to raise prices significantly, thereby inducing foreign consumers to forego consumption.

Improved Methodology

The working group has adopted a new methodology which provides more reasonable estimates of other countries' likely demand levels due to higher economic growth and offsetting demand reductions in those countries during wartime due to war damage or response to sharply higher prices. Then a comparison of this reduced demand with available world supply would indicate the amount of supply the United States could reasonably expect to import in the war scenario. The supplies available would usually be substantially different for most commodities from those estimated under the old FEMA assumptions.

The procedure for estimating the reduction in wartime demand by non-defense sectors will not guarantee that requirements in foreign countries will be predicted precisely: no procedure can do that. If foreign demands are larger than projected, then the U.S. may have to make extra efforts to acquire the supply by bidding for the amount available. For other materials, foreign demand may be smaller than projected

and there will be less need for stockpiles. Although the reductions in demand have been applied to a country's total external demand, it is very likely that a larger burden will fall on the less essential sectors and a smaller burden will be borne by the defense and other essential sectors.

The attached step-by-step explanation illustrates the working group's procedure for chromite.

Outline of Procedure

The general assumptions underlying the new procedure are:

-- Initial basic (or potential) demands in the war years by the non-communist foreign countries are estimated by exptapolating demand from the 1982 base by the rates of increase in U.S. GNP growth in defense and non-defense sectors.

-- This initial basic demand was reduced by war damage in war zones because reduced overall industrial capacity would reduce demand proportionately to obtain foreign potential net demand.

-- When this foreign potential net demand is added to U.S. demands, the sum greatly exceeds the total supply available. The shortage was assumed to be allocated by price among all non-communist nations.

-- Thus, foreign potential net demand was further reduced estimating the cutback in consumption, due to higher prices which is necessary to equate demand with projected supplies (reflecting substitutions and various austerity measures). The result is foreign net demand.

-- This reduction in foreign demand was estimated by allocating the total world reduction to foreign countries based on assumed elasticities weighted by the shares of each area in world demand.

-- The foreign supply available to the U.S. (or imported supply) is then the difference: total available foreign free-world supply less the foreign net demand. The difference between U.S. requirements and total supply (U.S. domestic production plus imports) is the imbalance to be met from the stockpile.

Adjustments for political reliability

The report by Task Force on political reliability presented some problems in adjusting supply available.

The Task Force only evaluated 26 countries, albeit the most important commodity suppliers. Thus, suppliers such as Iran, Finland, Turkey, and Madagascar were not rated as to reliability.

Of course the Soviet Bloc (including Cuba and Viet Nam) was considered unreliable (U.R.). We decided that Finland should be included in Eastern Europe, so its supply would be unavailable to the West. All supplies from the Middle East were considered unavailable because that area is in the war zone. Supplies from Zaire, Zambia, Zimbabwe, China and India were considered unreliable according to the Task Forces, criteria, thus making their supplies unabailable. Supplies from the group of fairly reliable suppliers were considered available to meet all U.S. and foreign demands except the U.S./DOD tier. Highly reliable supplies were available to all. Supplies from unrated countries were considered available to the rest of the world, but unreliable for the United States. When political reliability assestments are completed for these unrated countries, their supplies can be reassigned. For most commodities, supplies from unrated countries are not important enough to have a major effect on U.S. supplies.

Strategic Stockpile Goals: Estimation of Foreign Supply and Demand During Mobilization and War

Purpose

A major consideration in determining stockpile goals for strategic materials is the availability to the U.S. of materials from world markets which in turn depends on demand and supply conditions in other countries. Although the U.S. undoubtedly could by various means gain access to a very large portion of the total supply from allied and other friendly countries, those countries will also need supplies of these materials to enable effective operation of their economies. Consequently, some method needs to be developed to determine how available supply will be shared. This paper describes a procedure for estimating an equitable demand reduction among countries, taking into account a probable response to high prices, which would then determine the supply available to meet U.S. needs.

Procedure

The general procedure is to adjust the Bureau of Mines' world production estimates in (table A) to exclude Soviet Bloc supplies, politically unreliable supples, loss of supplies in war zones, and shipping losses.

Estimated consumption in the U.S. will come from the domestic requirements task group. These estimates reflect price/scarcity induced substitutions and austerity; all U.S. requirements will be met from imports, stockpiles, or domestic production. The potential consumption in war time for the major allies (in table B) is estimated by extrapolating the 1982 consumption by the rate of growth in GNP for the defense and non-defense sectors. For other countries, demand in the war period has been set at the pre-war peak. The latter is adjusted to exclude lost demand due to war damage in certain war zones. Domestic supply in each country is deducted from this demand estimate to obtain an estimate of each country's external demand on the supply in the rest of the world. This external demand estimate is further reduced, in response to high prices. This last calculation is critical in determining how the burden of adjusting to the supply constraint is spread among the U.S. and other non-communist consumers. In general, it is assumed that the burden is shared in proportion to weighted elasticities among the U.S. and foreign nations. Finally, the quantity available to the U.S. from allies and other non-communist areas is the difference between the supply and demand estimates for ROW shown in tables C and D.

Supply estimates (table A) were developed for each major producer and for the world by the Bureau of Mines. These represent capacity that could be brought on stream at significantly higher prices (about 50% over 1978-82 average prices for common materials). Production is the only source of supply; commercial stock drawdowns have been ignored here but they might be an important source in the U.S. for some materials, especially in the early stages of war. The added supply that could be generated in the U.S. due to extraordinary measures is shown in table D as a separate source of U.S. supply, presumably dedicated to defense requirements.

In estimating availabilities to the U.S. and the rest of the world (ROW), the supply estimates were adjusted to exclude production by the Soviet bloc (including Cuba and Viet Nam) and Eastern Europe, since those supplies would not be available to the West. Also, supplies from the Mid East and other war zones were deducted. U.S. supplies were assumed to be unavailable to the rest of the world only if they exceeded U.S. demands.

Political reliability. World supplies are further reduced to exclude those supplies which would probably not be available to western countries during war time. The Task Force on Reliability determined supplies from Zaire, Zambia, Zimbabwe, China and India should not be counted on to meet U.S. requirements. We have assumed they also cannot be counted on to meet other countries' needs.

Supplies from those countries which are rated highly reliable (including major allies) and fairly reliable plus those from unrated countries make up the pool of supplies available to satisfy external demand of non-communist countries. Only high reliable supplies will be considered available for U.S. direct defense needs.

Shipping losses. These were deducted from the total in determining the supply available to the U.S. and ROW. They are consistent with estimates used by other task groups. The assumption is that shipping losses will average 0.5% in the first war year, 0.1% in the second year, and no losses in the third year. There is no differentiation of shipping losses from available supplies destined for the U.S. as opposed to ROW. Canada's supplies were assumed to suffer no shipping loss.

Energy availability and international trade considerations. No adjustments were made to supply to cover the possibility of curtailed output because of energy shortages or inadequate shipping capacity. It is assumed that mineral production would get an allocation of oil or other energy sources sufficient to maintain output at capacity levels and that adequate shipping would be available to transport the materials from sources of supply to the markets.

Demand estimates (table B). Potential demand for each major allied country in the war period has been projected from the 1982 base year based on the growth rates in U.S. defense and non-defense sectors of the GNP accounts. The projection factors are described in more detail in part E. For other countries (mainly LDCs), consumption in the war years was set at prewar peaks.

Domestic supplies have been deducted from each ally's consumption under the presumption that they will be used first in meeting that country's needs, thus reducing external demands on supplies from the rest of the world.

War damage to demand is an estimate of reduced demand in certain countries because of damage to industries from military activities in the war zones. Industrial capacity is presumed to be completely cut off in some countries in some years and reduced significantly in others. The proportional reductions are the same for all materials and roughly consistent with the estimates for individual materials could not be made because necessary information is not readily available.

Net demand -- after war damage and unreliable supplies are deducted -- reflects the amount of material that would be consumed at the base period price if the supply were available. Next domestic supply was deducted from this demand in the U.S. and major allies to obtain external demand which was combined with the total demand by "other countries."

Since supply in the rest of the world will usually be less than this external demand, price will have to rise to ration the supply. The necessary cutback in demand is the difference between the supply available to the U.S. and ROW and the net demand after war damage. This difference is shown in the line item "supply less demand."

Demand impact is an estimate of the reduction in demand in response to thigh prices that are expected to accompany the high demand and limited supply situation during wartime. The following illustrates the procedure:

Weighted elasticities were used to develop a percentage distribution of the demand reduction among major areas (U.S. major allies, and other non communist countries) to bring consumption into balance with available supplies. Price elasticities for each of these areas were assumed to be -0.2, -0.2, and -0.4 respectively and the weights were the external demands described above. In the example below, about 38 percent of the reduction was allocated to major allies and 33 percent to "other countries," the remainder would be accounted for by the U.S., primarily by the non essential civilian sector.

	Elasticities	Distribution of external demand, chrome		Weighted elasticities	
		Thous. Tons	%		%
U.S.	-.2	750	34	0.69	29
Other allies	-.2	989	46	0.91	38
Other non communist	-.4	431	20	0.80	33
TOTAL		2170	100	-.240	100

The assumed elasticities are critical to the sharing of the burden of demand reduction because the selection will determine whether the U.S. bears the full burden (when non-U.S. elasticities are zero) or none of it (when the U.S. elasticity is zero). The procedure used in table B uses an elasticity of -0.2 for the U.S. and its allies and -0.4 for other non-communist consumers.

The rationale for the elasticities was as follows:

a. The U.S. demand elasticity (-0.2) was assumed to be quite low because the U.S. demand requirements derived from the macro analysis will already reflect the response to higher prices, considerable substitution, and explicit conservation efforts.

b. Elasticities for our major industrial allies are also assumed to be low (-0.2) since they will need to fulfill some defense needs and their elasticities for strategic materials for nondefense needs are similar to those of the United States.

c. Elasticities for other foreign countries (-0.4) were assumed to be double those for the U.S. and for major industrial allies. Those countries were judged to be more flexible in cutting back consumption when prices rise.

It should be noted that the ratios of the elasticities are the important elements in the allocation of the demand reduction. The absolute elasticities are important in determining the necessary increase in price, a step which has been omitted here.

Net external demand on ROW supplies. This estimate is derived by deducting the foreign demand reduction from net demand after war damage. This includes U.S. demands plus those from allies and other non-communist areas. This total overstates actual demand because U.S. imports will be smaller by the amount of withdrawals from its stockpiles or commercial inventories.

Finally, the supply-demand balance (table C) in ROW is simply the excess or ROW supplies over ROW demand. This balance (from highly reliable, fairly reliable and major allies) is the amount available for U.S. imports. These imports together with U.S. production will be used to meet the U.S. war time defense, essential civilian, and industrial requirements. Any remaining imbalance would be met from stockpiled materials. Note that only highly reliable imports would be used to meet U.S. direct defense requirments.

Supply and Demand for Chromium
(Thousand tons)

Part A
SUPPLY 1/

Item	1980	1982	1983	1984	1985	1986
Soviet Bloc + EE (Group 1)	1191	1221	1445	1645	1947	2248
Group 4 (Mid East)	175	156	235	235	246	262
Group 2 (Unreliable)	220	192	495	495	580	690
Group 7 (Not rated)	57	33	70	70	76	83
Group 5 (Fairly reliable)	1125	731	1500	1500	2000	2500
Group 6 (Highly reliable)	241	221	305	305	321	336
FRG*	-	-	-	-	-	-
Group 3 (Other WE)*	11	11	15	15	16	17
Canada	-	-	-	-	-	-
Australia	-	-	-	-	-	-
Japan*	4	5	7	7	8	9
Korea*	-	-	-	-	-	-
United States	53	48	60	60	65	70
Total supply	3077	2618	4132	4332	5259	6215
Reliable supply less war damage* 2/						
Fairly reliable (Gr. 5)	1125	731	1500	1500	2000	2500
Highly reliable (Gr. 6)	241	221	305	305	321	336
FRG	-	-	-	-	-	-
Group 3	11	11	15	13	14	16
Canada	-	-	-	-	-	-
Australia	-	-	-	-	-	-
Japan	4	5	7	6	8	9
Korea	-	-	-	-	-	-
United States	53	48	60	60	65	70
Group 7	57	33	70	70	76	83
Total	1491	1049	1957	1954	2484	3014

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Supply and Demand for Chromium
(Thousand tons)

Part A
SUPPLY

Item	1980	1982	1983	1984	1985	1986
Less domestic demand 3/						
FRG	298	197	197	0	0	49
Group 3	615	742	742	641	656	694
Canada	28	8	8	8	8	8
Australia	17	8	8	8	8	9
Japan	471	387	382	351	352	359
Korea	6	3	3	3	3	3
U.S.	532	271	810	810	810	810
Net supply for export 3/						
Group 5	1125	731	1500	1500	2000	2500
Group 6	241	221	305	305	321	336
Group 7	57	33	70	70	76	83
FRG	0	0	0	0	0	0
Group 3	0	0	0	0	0	0
Canada	0	0	0	0	0	0
Australia	0	0	0	0	0	0
Japan	0	0	0	0	0	0
Korea	0	0	0	0	0	0
U.S.	0	0	0	0	0	0
Total	1423	985	1875	1875	2397	2919
Less shipping loss 4/						
Group 5 (.5, .1, 0)	-	-	-	8	2	0
Group 6	-	-	-	2	1	0
Group 7	-	-	-	0	0	0
Australia & N.Z.	-	-	-	0	0	0
Japan	-	-	-	0	0	0
Korea	-	-	-	0	0	0

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Supply and Demand for Chromium
(Thousand tons)

Part A
SUPPLY

Item	1980	1982	1983	1984	1985	1986
Net deliverable supply to ROW 5/						
a. Rest of world (ROW)						
Fairly reliable (Grp. 5)	1125	731	1500	1492	1998	2500
Highly reliable (Grp. 6)	241	221	305	303	320	336
b. Major allies						
FRG	-	-	0	0	0	0
Group 3	-	-	0	0	0	0
Canada	-	-	0	0	0	0
Australia	-	-	0	0	0	0
Japan	-	-	0	0	0	0
Korea	-	-	0	0	0	0
Total			0	0	0	0
c. Group 7	57	33	70	70	76	83
d. U.S.	-	-	0	0	0	0
Total	1423	985	1875	1865	2388	2919
Percent distribution						
Group 5				80.0	83.7	85.6
Group 6				16.2	13.4	11.5
Group 7				3.8	2.9	2.8

Footnotes

Part A -- Supply

1/ Supply estimates are derived from Bureau of Mines capacity numbers based on substantial increase in prices during war years: 1984, 1985, and 1986; the warning year is 1983. The country groupings are based on the categories shown in Part E as follows: Group 1, Soviet Bloc (including Cuba, Vietnam, and No. Korea) and Eastern Europe; Group 2, politically unreliable suppliers, Group 3, Western Europe excluding FRG; Group 4, Middle East; Group 5, fairly reliable suppliers; Group 6, highly reliable suppliers; Group 7, suppliers not rated as to political reliability; the itemized countries (Canada, Australia, FRG, Japan, Korea) are not included in any of the above groups; together with Group 3, they will be referred to as major allies.

2/ Excludes Group 1, 4, 2, and war damage to those areas marked by (*). Deductions for war damage are as follows: FRG, 100% in 1984 and 1985, 75% in 1986; Group 3, 15% in 1984 13% in 1985 and 8% in 1986; Japan and Korea, 7% in 1984, 6% in 1985, and 5% in 1986.

3/ Domestic demand in major allied countries is deducted from the countries' supplies to determine the amount available for export. Domestic demand for each is estimated in Part B and includes adjustment for war damage losses. If domestic demand exceeds domestic supply, then the net supply available for export is set at zero.

4/ Deductions for shipping losses are based on the shipping Task Force's report and are applied uniformly across all countries (except Canada) and all commodities 0.5% for 1984; 0.1% in 1985; and 0 in 1986. Canada was assumed to have no shipping losses.

5/ Net deliverable supply is the supply available to meet the external demand from the U.S. and major allies plus total demand from other non-communist countries.

Supply and Demand for Chromium
(Thousand tons)

Part B
DEMAND

Item	1980	1982	1983	1984	1985	1986
World demand 1/						
Soviet Bloc	568	687	NA	NA	NA	NA
FRG	298	197	197	0	0	49
Group 3 (Other West Eur.)	615	742	742	641	656	694
Canada	28	8	8	8	8	8
Australia	17	8	8	8	8	9
Japan	471	387	382	351	352	359
Korea	6	3	3	3	3	3
All other (ROW)	431	309	431	431	431	431
Total, exc. Soviets	1866	1654	1771	1442	1458	1553
U.S.	532	271	810	810	815	820
Grand Total, exc. Soviets	2298	1925	2581	2252	2273	2373
" " inc. Soviets	2966	2612	NA	NA	NA	NA
Less domestic supply 2/						
FRG	-	-	-	-	-	-
Group 3	11	11	15	15	16	17
Canada	-	-	-	-	-	-
Australia	-	-	-	-	-	-
Japan	4	5	7	7	8	9
Korea	-	-	-	-	-	-
U.S.	53	48	60	60	65	70
External Demand ROW supply 2/						
FRG		197	197	0	0	49
Group 3		731	727	626	640	677
Canada		8	8	8	8	8
Australia		8	8	8	8	9
Japan		382	375	344	344	350
Korea		3	3	3	3	3
Total major allies		1329	1318	989	1003	1096
Other, ROW		309	431	431	431	431
U.S.		271	750	750	750	750
DOD		-	340	340	340	340
EC		-	200	200	200	200
I		-	150	150	150	150
All other		-	60	60	60	60
Total external demand		1909	2499	2170	2184	2277

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Supply and Demand for Chromium
(Thousand tons)

Part B
DEMAND

Item	1980	1982	1983	1984	1985	1986
Net deliverable supply 3/						
Fairly reliable			1500	1492	1998	2500
Highly reliable			305	303	320	336
Major allies			0	0	0	0
Group 7			70	70	70	83
U.S.			0	0	0	0
Total			1875	1865	2388	2919
Supply less demand 4/			-624	-305	+204	+642
Percent reduction			-25.0	-14.1	-	-
Demand reductions 4/						
Major allies			237	116	-	-
ROW			206	101	-	-
Total			443	217	-	-
Net external demand on ROW 5/						
Major allies			1081	873	1003	1096
ROW			219	330	431	431
U.S.						
DOD			340	340	340	340
EC			200	200	200	200
I			150	150	150	150
Other			60	60	60	60
Total			750	750	750	750

Footnotes

Part B -- Demand

1/ Demand for specific geographic areas during 1983-86 was estimated as follows:

-- Soviet Bloc, not available.

-- FRG, other western Europe, Canada, Australia, Japan and Korea extrapolated from 1982 based on rate of growth in GNP for the United States. See part F for detailed estimates.

-- U.S., derived from macro economic task group report.

-- All other, peak demand in the prewar years (usually 1980) was used in all war years.

2/ Domestic supply was deducted to arrive at the countries' demands on supply from the rest of the world. No deduction was made for "all other". If domestic supply exceeds domestic demand, then external demand is set at zero.

3/ Net deliverable supply is from Part A.

4/ Supply less demand is the excess demand that must be eliminated to bring about a balance in world supply and demand. Major consuming areas will share the burden of reduction by foregoing consumption at higher prices in proportion to their weighted price elasticities as computed in Part G. The elasticities were -0.2 for the U.S. and major allies, and -0.4 for all other foreign consumers; the weights were the external demand quantities computed under 2/ above.

5/ Net external demand is the residual demand for each area on the rest of the world (mainly LDCs) after deducting the negative response to higher prices. It also reflects the use of domestic supplies in the major allied countries to meet part of their own requirements.

Supply and Demand for Chromium
(Thousand tons)

Part C
Foreign supply available 1/

Item	1980	1982	1983	%	1984	%	1985	%	1986	%
Net Deliverable supply 2/										
Major allies			0	-	0	-	0	-	0	-
Group 5			1500	80	1492	80	1998	84	2500	86
Group 6			305	16	303	16	320	13	336	11
Group 7			70	4	70	4	70	3	83	3
U.S.			0	-	0	-	0	-	0	-
Total			1875	100	1865	100	2388	100	2919	100
Net external demand 3/										
Major allies filled by:			1081		873		1003		1096	
Major allies			0		0		0		0	
Group 5			865		698		843		943	
Group 6			176		140		130		121	
Group 7			40		35		30		23	
U.S.			0		0		0		0	
ROW filled by: 4/			219		330		431		431	
Major allies			0		0		0		0	
Group 5			189		295		391		381	
Group 6			0		0		0		0	
Group 7			30		35		40		50	
U.S.			0		0		0		0	
Net available to U.S. 5/										
Major allies			0		0		0		0	
Group 6			129		163		190		215	
Group 5			446		499		764		1176	
Group 7			0		0		0		0	
Total			575		662		954		1391	

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Footnotes

Part C -- Foreign Supply Available

1/ Estimation of supply available from the rest of the world to meet the external demand of the U.S., major allies, and other non-communist countries. The balance remaining after the rest of the world's demands have been met would be available for import by the U.S. Group 5 are fairly reliable suppliers; Group 6, highly reliable; and Group 7, not rated.

2/ From Part A, Supply. Supplies from major allies and the U.S. are the supplies remaining after deducting domestic requirements. The percentages represent the distribution of total supply by origin; these percentages will be used below to compute the amount of supply from each origin which will go to major allies.

3/ The percentage mentioned in 2/ have been applied to major allies' total demand to determine the origin of the supply to meet their external demand.

4/ The amount of supply by origin to meet the rest of the world demand was computed as a residual: (1) the remainder from Group 7 (not rated) after deducting the supply taken by major allies, went entirely to ROW (mainly LDCs); (2) next, the remaining ROW demand was filled by Group 5, to the extent available; (3) any remaining ROW demand would be taken on a proportional basis from Group 6, major allies, and the U.S.

5/ Net available to the U.S. is the remaining deliverable supply (see 2/ above) after demand by major allies and ROW have been met (see 3/ and 4/).

Supply and Demand for Chromium
(Thousand tons)

Part D
U.S. balance 1/

Item	1980	1982	1983	1984	1985	1986
Net available to U.S. 2/						
U.S. Production			60	60	65	70
USCP			0	2	117	237
Major allies			0	0	0	0
Group 6			129	163	190	215
Group 5			446	499	764	1176
Group 7			0	0	0	0
Total			635	724	1136	1698
U.S. requirements 3/						
DOD			400	400	405	410
EC			200	200	200	200
I			150	150	150	150
All other			60	60	60	60
Total			810	810	815	820
Imbalance 4/						
DOD			-211	-175	-33	0 (+112)
EC			0 (+246)	0 (+299)	0 (+564)	0 (+1098)
I			0 (+96)	0 (+149)	0 (+414)	0 (+948)

Footnotes

Part D -- U.S. balance

1/ The net deficits remaining after available U.S. production and imports have been used to meet U.S. requirements.

2/ From Part C. USCP is the production under a concerted program.

3/ From the domestic requirements task group.

4/ Computed separately for each tier. DOD requirement can be satisfied only from U.S. production, USCP, major allies, and Group 6 (highly reliable suppliers). The EC (essential civilian) tier requirements are satisfied by any remaining supply from U.S. production, major allies and Group 6, and additional supplies from Group 5. The I (industrial) tier is satisfied by any remaining supply from U.S. production, major allies, Group 6, and Group 5. The "all other" tier is not considered to have a deficit; it would compete with the rest of the world for available supplies.

Supply-Demand for Minerals

PART E: Special Supply Groupings

Group 1

Soviet Bloc and Eastern Europe

Cuba
North Korea
Viet Nam
Laos
Albania
Bulgaria
Czechoslovakia
Finland
Germany, Democratic R.
Hungary
Poland
Romania
USSR
Yugoslavia

Group 2 (U.R.)

Zaire
Zambia
Zimbabwe
China
India

Group 3

Other Western Europe (excl. W. Germany)

Austria
Belgium
Denmark
France
Greece
Iceland
Ireland
Italy
Lumxemburg
Malta
Netherlands
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom

Group 4

Middle East

Afghanistan
Bahrain
Egypt
Iran
Iraq
Israel
Jordan
Kuwait
Lebanon
Oman
Pakistan
Qatar
Saudia Arabia
Syria
Turkey
United Arab Emirates
Yemen Arab Republic

Group 5 (F.R.)

Bolivia
Chile
Guyana
Peru
Bostwana
So. Africa
Sri Lanka

Group 6 (H.R.)

Brazil
Jamaica
Mexico
Surinam
Gabon
Guinea
Indonesia
Malaysia
New Caledonia
Philippines
Thailand

Group 7 (N.R.)

Argentina
Bahamas
Barbados
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
Guatemala
Haiti
Honduras
Nicaragua
Panama
Paraguay
Surmame
Trinidad Tobago
Uruguay
Venezuela
Algeria
Angola
Benin
Cameroon
Central African Rep.
Chad
Congo
Cyprus
Djibouti
Equatorial Guinea
Gambia
Ghana
Guinea-Bissau
Ivory Coast
Kenya
Lesotho
Liberia
Libya
Madagascar
Malawi
Mali
Mauritania
Morocco
Mozambique
Namibia
Niger
Nigeria
Reunion
Rwanda

Group 7 (continued)

Sao Tome/Principe
Senegal
Seychelles
Sierra Leone
Somalia
Sudan
Swaziland
Tanzanaia
Togo
Tunisia
Uganda
Upper Volta
Bangladesh
Brunei
Burma
Fiji
Hong Kong
Kiribati
Mongolia
Nepal
Singapore
Taiwan
Other, not specified

Group 8 (other)

Canada
Australia
New Zealand
Japan
Korea
FRG

Group 9

USA (primary secondary)

Grand total

Supply-Demand for Minerals

Part F: Procedure for estimating basic foreign wartime demand.

1. Estimate the proportion of GNP allocated to defense and "all other" in 1982, based on OECD data, as follows:

-- Japan: defense, 0.85%; all other, 99.15%.

-- Australia: defense, 2.60%; all other, 97.40%.

-- Canada: defense 1.65%, all other, 98.65%.

-- FRG: defense, 2.80%; all other, 97.20%.

-- Other Western Europe: defense, 2.75%; all other 97.25%.

-- Korea: defense, 6.00%; all other 94.00% (estimate by desk officer).

Note that the "Other Western Europe" estimate reflects a central tendency for all countries other than Germany; estimates of the portion of GNP allocated to defense for these major countries in this group ranged from a low of 1.7% for Spain and Italy to 3.0% for Sweden and 4.5% for the U.K. As a point of reference, the U.S. devoted about 5.4% of GNP to defense in 1982 according to the estimates generated by the Macroeconomic Task Group.

2. These 1982 percentages were extrapolated to 1986 and the intervening years by the rates of growth in U.S. defense and all other sectors:

	1982	1983	1984	1985	1986
United States					
GNP ($1972, bil)	1485	1510	1592	1683	1744
Defense "	80	131	246	310	338
All other "	1405	1379	1346	1373	1406
Defense/GNP (%)	5.40	8.68	15.45	18.42	19.38
Growth rates					
Total GNP (%)	-	+1.68	+5.43	+5.72	+3.62
Defense "	-	+63.75	+87.79	+26.02	+9.03
All other "	-	-1.85	-2.39	+2.01	+2.40
Extrapolations					
Japan					
Total GNP (%)	100.00	98.71	90.77	91.74	92.72
Defense "	.85	1.39	2.43	2.45	2.48
All other "	99.15	97.32	88.34	89.29	90.24
Growth in GNP (%)	-	-1.29	-9.00	+1.07	+1.07

	1982	1983	1984	1985	1986
Australia					
Total GNP (%)	100.00	99.86	101.31	105.27	108.46
Defense "	2.60	4.26	8.00	10.08	10.99
All other "	97.40	95.60	93.31	95.19	97.47
Growth in GNP (%)	-	-.14	+1.45	+3.91	+3.03
Canada					
Total GNP (%)	100.00	99.23	99.29	102.50	105.39
Defense "	1.65	2.70	5.07	6.39	6.97
All other "	98.35	96.53	94.22	96.11	98.42
Growth in GNP (%)	-	-0.77	+.06	+3.23	+2.82
Germany					
Total GNP (%)	100.00	100.00	0	0	25.00
Defense "	2.80	4.59	0	0	1.15
All other "	97.20	95.41	0	0	23.85
Growth in GNP (%)	-	0	-100.00	-	N.A.
Other Western Europe					
Total GNP (%)	100.00	99.95	86.38	88.42	93.50
Defense "	2.75	4.50	7.19	7.36	7.78
All other "	97.25	95.45	79.19	81.06	85.72
Growth in GNP (%)	-	-.05	-13.58	+2.36	+5.74
Korea					
Total GNP (%)	100.00	102.79	100.91	102.00	103.09
Defense "	6.00	9.83	17.16	17.34	17.53
All other "	94.00	92.96	83.75	84.66	85.56
Growth in GNP (%)	-	+2.79	-1.83	+1.08	+1.07

Note that the war damage adjustments were applied in 1984, 1985, and 1986 to Japan and Korea (-7%, -6%, -5%), Western Europe (-15%, -13%, -8%), and Germany (-100%, -100%, and -75%). The percentage reductions were applied to the 1984 extrapolated estimate (1983 for Germany); thus the only growth in those countries in 1985 and 1986 comes from partial repair of the war damage.

The percentage increases in GNP derived above will be applied to 1982 demand for each commodity for each country or area to obtain demand for the particular commodity (adjusted for war damage) for the warning year and the 3 war years for that country.

Supply-Demand for Chromium

Part G: Weighted Elasticities

	Elasticity	External Demand		wtd Elas.	%
		Tons	%		
U.S.	-0.2	750	34.5	.0688	29
Major allies	-0.2	989	45.6	.0912	38
Other rest of world (ROW)	-0.4	431	19.9	.0796	33
		2710	100.0	.2396	100