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**TOP SECRET**  
ADVANCED RESEARCH PROJECTS AGENCY  
WASHINGTON 25, D. C.



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MEMORANDUM REPORT

**TO: The Director, ARPA  
The Deputy Director, ARPA  
The Chief Scientist, ARPA**

**SUBJECT: Interim Report of ARPA Ad Hoc Group on Project SENTRY  
and Follow-on Program**

**References: (1) USAF-BMD-ARDC Development Plan, dtd 15 Sep 58.  
(2) Memo to DepSecDef dtd 30 July 58.  
(3) Memo to Commander, BMD, ARDC dtd 25 Sep 58.**

INTRODUCTION

The BMD presentations of its development plan for Project SENTRY (reference (1)) to the Advanced Research Projects Agency on 25 September 1958 required a FY 1959 fund of [redacted] exceeding the ARPA [redacted] ceiling previously established in reference (2). The FY 1960 fund of [redacted] as presented in the development plan for Project SENTRY is in excess of what is currently considered a realistic R&D funding level; about [redacted]. Further, it appears from the plan presented by BMD that achievement of major objectives in the program has been delayed substantially in spite of the fact the proposed funding level for FY 1959 has been increased. In order to obtain more intimate knowledge of the technical and budget aspects of the program, and in the light of special security considerations, Mr. Roy W. Johnson, Director of ARPA, established an ARPA Ad Hoc Group on Project SENTRY and the Follow-on Program (reference (3)). The group is charged with the responsibility of investigating, evaluating, and recommending what the ARPA SENTRY program should be and what approach the follow-on program should take. The material to follow represents the group's findings to date and should be considered as an interim progress report. There are, however, several specific actions recommended, some of which have already been initiated and

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OSD and NRO review(s) completed.

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the remainder of which should be undertaken immediately. This report is divided into four basic sections: Section I contains a detailed technical discussion and budget breakdown of the BMD 15 September Development Plan for FY 1959 and 1960, including the project; Section II contains a suggested program reorientation of Project SENTRY and discusses the estimated budget costs; Section III contains a technical discussion and breakdown of items that are considered by the Ad Hoc Group to be properly chargeable as operational items rather than R&D items; Section IV contains: (a) Summary, (b) Interim Conclusions, and (c) Recommendations.

SECTION I

I. Detailed Technical Discussion and Budget Analysis

The SENTRY Development Plan dated 15 September 1958 and associated cost data presented to ARPA on 25 September have been reviewed in detail with the USAF-BMD SENTRY project office. After study and analysis of the supporting data presented, the following comments are submitted.

The basic Development Plan submitted was based on a total FY 1959 expenditure of [ ] rather than [ ] as requested.

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An alternate Development Plan based on a [ ] ceiling on expenditures proposed to delay the first ATLAS/SENTRY launch to January 1961. This represents a delay of 11 months over the basic plan and 19 months over the Development Plan submitted July 1, 1958.

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The proposed schedules as well as those presented on 16 March and 1 July are shown on Figure 2.

To better understand the factors in the program that influenced these proposals, a detailed analysis was made of FY 1959 [ ] and the FY 1960 [ ] budgeted costs.

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A BMD gross breakdown of the funds involved is as follows:

	<u>Table I</u>	
	FY '59	FY '60
Total for THOR Program	[ ]	
Total for ATLAS Program		

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The ground rules used by BMD in preparing Table I were as follows:

- (1) Costs represented by LAC Contract-181 are essentially the THOR program for FY 1959, and on.
- (2) The ratio of this contract to the total LAC budget for FY 1959 is used to pro-rate costs for program management, systems engineering, etc.
- (3) In subsystems A, B, C, and D, best judgment was used in developing costs. Most of the effort in A, B, C, and D for FY 1959 has to be associated with producing vehicles to be launched in the THOR program.
- (4) THOR booster costs, Subsystem "L", support and certain associate contractor costs are all strictly identifiable with the THOR program in FY 1959.
- (5) Best judgment based on above is used in estimating the THOR program for FY 1960.

It is evident from Table I that the THOR program is absorbing a major portion of the effort available for FY 1959. As the CORONA project is responsible for the major part of the program an attempt was made to place a reasonable estimate on these costs.

The ground rules used by the Ad Hoc Group in this analysis are as follows:

- (1) The cost of the first four development flights will be split equally between CORONA and SENTRY.
- (2) No bio-med costs will be charged to CORONA.
- (3) The cost of boosters charged off in each fiscal year will be distributed in proportion to total number of shots in each program or  $14/19 = .74$  for CORONA.
- (4) No CRC (Cambridge Research Center Geo-Physical) costs will be charged to CORONA.
- (5) All other costs, with the exception of Systems Engineering and Ground Space Communications, will be charged in proportion to the number of shots on each program for the year.

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	<u>CORONA</u>	<u>SENTRY</u>
FY 1959	7	3
FY 1960	7	2

As many items under the Systems Engineering heading, such as specifications, make-up, qualification tests, reliability, systems integration, training, reports, etc., would have been necessary for either project, no charge is made to CORONA for these. As the above items represent 25 percent of the total Systems Engineering cost, only 75 percent of the total cost is used in determining CORONA allocations.

As most of the ground-space communications acquisition, tracking and data handling installation for one THOR program would have been required for SENTRY and Bio Med tests anyway, an arbitrary 25 percent of these costs are allocated to CORONA.

The resulting CORONA costs on the above basis work out to be:

Table II

	FY 59 (millions)		FY 60 (millions)	
	THOR	CORONA	THOR	CORONA
THOR Boosters				
Associate Contractors				
AF "CRC"	1.2	- 1.02		
Others	1.4	- 0		
Support Costs				
Lockheed Costs				
Project Management				
Systems Engineering				
Subsystem A (Airframe)				
B (Propulsion)				
C (Auxiliary Power)				
D (Guidance & Control)				
H (Communications)				
L (Bio-Med & Capsule)				
GSE				
Total THOR Program				
Cost per shot *				
Total CORONA Program				
Cost per shot*				

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\* These costs include all the R&D and other support carried on during FY 59 and FY 60. Does not include facilities. The [redacted] figure used in later sections of the report is based on figures obtained from BMD as representing the cost of additional vehicles (mfg, checkout, firing, no payload, no R&D).

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A breakdown of the ATLAS program costs included in the  FY 1959 budget is as follows:

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Table III

Item	Cost	Totals
ATLAS Boosters & Engrg Costs		
ATLAS GSE		
Associate Contractors		
Guidance, MIT		
Subsystem I (data processing)		
Support Costs		
Lockheed Costs		
Fee		
Systems Engrg & Project Mgt.		
Subsystem E (Visual)		
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Other Lockheed Cost		
Facilities		
Individual facilities		
ATLAS launch & support at Cooke		
NE, NW, Central Tracking & Acquisition		
Intelligence & Development Control Centers		
Facilities Planning		
Grand Total		

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To reduce the program from  BMD assumed that the THOR program as presented, including CORONA and Bio-Med, could not be reduced and that facilities could not be reduced. This led to reducing the remainder of the program as follows to obtain a  reduction. A breakdown of the ATLAS program cost included in the  budget is as follows:

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Table IV

Item	Cost	Totals
ATLAS Boosters & Engrg Costs		
ATLAS GSE		
Associate Contractors		
Guidance, MIT		
Subsystem I (Data Processing, R-W)		
Lockheed Costs		
Fee		
Systems Engrg & Mgt		
Subsystem E (Visual)		
Subsystem <span style="border: 1px solid black; display: inline-block; width: 200px; height: 15px;"></span>		
Subsystem <span style="border: 1px solid black; display: inline-block; width: 200px; height: 15px;"></span>		
Others		
Facilities		
Total		

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SECTION II

As neither of the programs presented by USAF-BMD would meet both the broad program objectives and the cost limitations, the Ad Hoc Group directed its attention toward developing an alternate plan that would more nearly meet the requirements and still stay within the [redacted] ARPA funding limitations. Items considered in developing this plan were as follows:

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It was agreed by the Ad Hoc Group that the Bio-Med portion of the program could not be justified as a part of the SENTRY program and should be eliminated or be separately justified and financed. An estimate of the cost of the three Bio-Med payloads is approximately [redacted]. The cost of three THOR boosters as explained in footnote to Table II and associated SENTRY vehicle costs would be [redacted].

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It was also agreed that the firing schedule proposed for the THOR program was very optimistic and could not likely be met. Rather than arbitrarily delay other important elements of the program for an effort with low probability of accomplishment, a more conservative and less expensive THOR program was considered as follows:

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Remove flights one and two from the SENTRY program as such and request the Air Force to conduct the THOR portion of these flights as a facility range-proofing operation. The SENTRY vehicles would be launched as an incidental payload and data obtained, if any, along with crew training, would be a bonus return.

Delay the initiation of a two per month launch rate from April 1959 until July 1959. This will permit time to initiate any mandatory changes in the early part of the program and will delay the date when dual launching crews and GSE are required. This will reduce the launching costs in the FY 1959 portion of the program and will also reduce the hardware costs involved.

Our best engineering judgment on a schedule that this approach could support is as follows:

CY 59												CY 60													
D	J	F	M	A	M	J	J	A	S	O	N	D	D	J	F	M	A	M	J	J	A	S	O	N	D
1	1	1	1	1	1	1	1	1	1	1	1	1	1												

The changes in hardware costs associated with such a schedule are as follows:

FY 1959 costs would decrease

Two less CORONA shots  
Two less THORs

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FY 1960 costs would increase

Add two CORONA shots

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The Development Plan presented on 1 July 1958 provided for the first Pioneer visual reconnaissance flight with full tactical equipment aboard to be launched in September 1960. Although the 15 September Development Plan did not specifically confirm this date it is assumed that such a flight could not be made at an earlier date since five of the nine flights originally programmed ahead of this flight were eliminated. The ground acquisition tracking and visual readout equipment currently programmed to be available on this date consists of a single prototype installation located at Camp Cooke. This equipment would only be capable of contacting the vehicle in a maximum of two passes per day and would thus permit readout of less than 1/4 of the stored data if the camera were operated at all times while over USSR territory.

Although a full three ground station readout system is contemplated in the 15 September basic Development Plan, detailed analysis indicates that, even without budgetary limitations, these stations would not be fully equipped and operational before April 1961.

The data provided by two Pioneer visual flights in the last quarter of CY 1960, reading out a small fraction of the total vehicle capacity to a single prototype ground station, can hardly be considered to fulfill a tactical operational requirement for this time period.

Possible methods of improving this situation would be to (1) expedite the presently programmed visual system, and (2) extend CORONA operation to fill the gap between the present CY 1959 program and the availability of a tactically useful Pioneer electronic readout system.

To be effective method (1) would require advancing the proposed schedule for the Pioneer vehicle by 5 months and the ground readout system by at least one year to an availability date of April 1960. This would mean a 25 percent reduction in total time from now until the time that the vehicle becomes available for the vehicle and a similar 40 percent reduction in time for the ground system.

In considering extending CORONA type of operation through CY 1960 consideration must be given to the limited orbital life and film supply of the existing system and the marginal weight situation that exists in accomplishing these limited objectives.

The two-day film supply available, if all is clear, is sufficient to photograph the whole of the USSR; however, the odds of clear weather are such that this is not likely to happen. Additional film supply and available orbital life would both be very valuable in increasing the amount of useful data obtained per shot and, thus, the cost per unit of data.

Additional payload capability from a THOR launched system is not likely in the time period under consideration. In fact, the present quoted capability is quite marginal. The weight available for true payload (40 lb of film) is so small that minor variations in such items as vehicle burn-out weight, propellant utilization, or specific impulse, could completely eliminate this payload; or if these variations are disregarded, they would prevent the vehicle from going into a satisfactory orbit.

The obvious method of increasing the data acquisition capability and increasing the chances of success by widening the payload margins for vehicles launched in the CY 1960 period would be to switch to the ATLAS booster and modify the CORONA payload to take advantage of the added load carrying ability of this vehicle combination. ATLAS boosters can be made available in June 1959. Launch facilities for ATLAS at Camp Cooke are presently programmed to be available in February 1960, which is marginal to support an April 1960 tactical capability.

The CORONA type payload has been reviewed and appears to be capable of appreciable growth with reasonable modifications. Space presently exists for doubling the film load in the recovery package. A small increase in altitude (10-15 miles) should adequately increase the orbital life from a drag standpoint. As the present gas stabilization supply is only 45 lb and this primarily for the launch phase, this system could be extended to longer orbital life with little penalty. The small change in altitude will not seriously affect the resolution.

The ability to carry added weight will also make it possible to improve the retro-rocket installation. This will reduce the dispersion to a point where the cost of the recovery system can be materially reduced.



If a decision is made that it is important to obtain visual reconnaissance data in CY 1960, this appears to be a logical approach to the problem.

To improve the chances of success, the ATLAS launch capability at Cooke should be moved forward as far as possible. An improvement of two months in this date should be possible if appropriate action is taken promptly. This would permit at least 3 to 4 development firings with this facility, vehicle, payload combination prior to the April 1960 assigned date.

If such a project is undertaken, a possible program would be as follows:

	59												60												61											
	D	J	F	M	A	M	J	A	S	O	N	D	D	J	F	M	A	M	J	A	S	O	N	D	D	J	F	M	A	M	J	A	S	O		
THOR Project	1	1	1	1	1	1	1	1	1	1	1	1	1																							
ATLAS Project													1	1	1	1	1	1	1	1	1	1	1	1												
PIONEER Project													1		1		1		1		1		1		1	1	1	1	1	1	1	1	1	1	1	1

This program provides a continuous flow of visual reconnaissance data with an accelerated rate of accomplishment in the summer months and a uniform utilization of launch crews and ground support equipment. In addition this more uniform firing schedule will permit economies by smoothing out the workload in vehicle manufacture and test. Development work on growth systems is accomplished in the winter months when the weather is least desirable for visual reconnaissance work. The presently planned Pioneer system capability date is still met when facilities for ground read-out and data handling first become available in April 1961.

Such a program is obviously going to require more dollars than currently programmed or planned. A method of providing this money and remaining within the FY 1959 and FY 1960 fund ceiling by removing operational funds from the R&D budget will be treated in the next section.

SECTION III

Analysis of the 15 September 1958 USAF-BMD Development Plan, made on the basis of budget estimates, is presented to show how funding requirements can be met in FY 1959 and FY 1960. A realistic appraisal of the programs, from an over-all scheduling viewpoint and for satisfying both R&D and operational requirements, indicates the need for a funding division into the following categories from the agency sources indicated:

1. Industrial Facilities and Military Construction - by Air Force as Operational Agency.
2. Operational Equipment - by Air Force as Operational Agency.
3. Operational Support - by Air Force as Operational Agency.
4. Research and Development - by ARPA.

A discussion and evaluation of the items within these categories follows.

1. Industrial Facilities for FY 1959 require [redacted] for Lockheed in-house equipment for laboratory and SENTRY vehicle tests. This equipment is considered to be part of a production facility and, thus, should be charged to an operational agency. Lockheed is financing the building for the facility created. Similar facilities for FY 1960 amount to [redacted]

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Military Construction Facilities for FY 1959 require [redacted] for the construction of three (3) U. S. Tracking and Acquisition Stations and [redacted] for one (1) Development Center at Palo Alto and two (2) Data-Processing Centers at Offutt Air Force Base and Wright Air Development Center, totaling [redacted]. These facilities are a part of the permanent operational system; they are not needed for BMD until October 1960, unless the development of Pioneer visual [redacted] reconnaissance capabilities are accelerated over those dates shown in the 15 September Development Plan. Construction lead-time of one (1) year puts beginning of construction in September 1959, which is within FY 1960. Thus, this item can be deferred from FY 1959 to FY 1960 and should be funded by the operational agency. Similarly, in FY 1960, facilities also considered to be operational are one (1) additional ATLAS launch complex, consisting of two (2) pads and one (1) blockhouse for [redacted] and additional funding for the two (2) Data-Processing Centers at Offutt Air Force Base and Wright Air Development Center, in the amount of [redacted].

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2. Operational Equipment in FY 1959, consisting of two (2) THOR/SENTRY vehicles appearing at the beginning of the THOR Program, is needed for range and facility-proofing experience. It is understood that only one (1) THOR missile will be fired from Cooke Air Force Base pads prior to the commencement of the THOR Program. It is not considered justifiable for an R&D program to provide range-firing experience for a missile range established for training purposes. Thus, an amount of [ ] for these two (2) vehicles should be funded by the Air Force as an additional training exercise. In FY 1960, operational equipment for the permanent U. S. Tracking and Acquisition Stations and Data-Processing Centers will be required in the amount of [ ] which should be funded by the operational agency. An additional amount of [ ] should be provided for data-processing equipment to handle a greater number of satellites in orbit according to the reoriented program schedule and should be supported by the operational agency. Ground support equipment for the additional ATLAS launch complex will be provided for the benefit of the operational program. Thus, this equipment, in the amount of [ ] should be funded by the operational agency in FY 1960.

3. Operational Support. A total of [ ] has been budgeted for support of the 15 September program. This estimate is a maximum figure based on strict interpretation of the Comptroller's directive of These costs are being reviewed within the Air Force with a view to reducing the total. Some recovery in this area is expected. On a similar basis, some [ ] is allocated for FY 1960.

In order to summarize the items not to be funded as part of the ARPA SENTRY program as discussed in Sections I, II, and III of this report, Table VII for FY 1959 and Table VIII for FY 1960 are presented. The items in these tables fall into the following three categories:

(1) Items to be funded by the Air Force as operational budget support items. These items are not to be cancelled but should be supported by the Air Force outside of the ARPA R&D budget as Project SENTRY.

(2) Items to be dropped by ARPA as having no direct relation to the SENTRY program. These items should be brought to the attention of the Air Force so they can support them if desired; however, in any case their support or non-support has no relation to the ARPA SENTRY program.

(3) Items the exact recoverability of which is in doubt and the figures shown are a maximum.

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Table VII

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Budget Deletion Summary

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FY 1959

<u>Item</u>	<u>Category</u>	<u>Funds Involved</u>
(a) Industrial Production Facility	(1)	
(b) Geo-physics	(2)	
(c) Support funds	(1), (3)	
(d) Bio-Medical Payloads	(2), (3)	
(e) Three THOR/SENTRY vehicles for Bio-Medical Payloads	(2), (3)	
(f) Cancel the two THOR boosters needed for range firing testing (SENTRY stage to be supplied by ARPA)	(1)	
(g) Slow down of R-W's visual data handling program to be consistent with the program schedule	(3)	
(h) Systems Engineering reduced by deletion of three THOR/SENTRY vehicles	(3)	
SUB-TOTAL		
<u>Facilities</u>		
(i) Three tracking and data acquisition stations	(1)	
(j) Two Intelligence Centers	(1), (3)	
SUB-TOTAL		
GRAND TOTAL		

Table VIII

Budget Deletion Summary

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FY 1960

<u>Item</u>	<u>Category</u>	<u>Funds Involved</u>
(a) Equipment for Operational Ground base systems (NE, NW, & central, plus data center)	(1)	NRO
(b) Geo-physics	(2)	
(c) Advanced Propulsion	(2)	
(d) Support	(1), (3)	
(e) Additional Processing Equipment to handle greater number of satellites in orbit	(1)	
(f) Additional launcher @ Cooke AFB for tactical use	(1)	
(g) GSE for item (g)	(1), (3)	
SUB-TOTAL		
<u>Facilities</u>		
(h) Two Intelligence Centers	(1), (3)	
GRAND TOTAL		

To carry out the reoriented program suggested in Section II of this report the funding support can be arrived at in the following manner:

(1) The [redacted] level programmed in the 15 September Development Plan for FY 1959 would be reduced by [redacted] obtained from a redirection of fund support responsibility as outlined in Table VII. This action would reduce the original [redacted] figure to [redacted]. To this must be added the [redacted] to restore the five ATLAS/SENTRY vehicles originally planned for firing out of Patrick AFB but under the reoriented program would be fired out of Cooke AFB. This brings the initial funding required up to [redacted]. Subtracting this amount from the [redacted] FY 1959 ceiling will leave approximately [redacted] for reallocation to carry out the required engineering support, vehicle support, payload support, etc., for the reoriented program and still live within the FY 1959 ceiling.

For FY 1960, starting with the figure of [redacted] as stated in the 15 September Development Plan and subtracting [redacted] the figure obtained from a redirection of funding responsibility as outlined in Table VIII, would reduce the original [redacted] figure to [redacted]. Subtracting [redacted] from the FY 1960 [redacted] ceiling would leave approximately [redacted] to be allocated to meet the reoriented program needs and again stay within the [redacted] ceiling for FY 1960.

SECTION IV

BACKGROUND

The USAF-BMD 1 July 1958 development plan contained the following:

(1) Five ATLAS/SENTRY vehicle firings scheduled for launch at Patrick AFB beginning in June 1959 and firing every other month. The first two flights were for general component development. The third for partial component development of the visual subsystem. The fourth for system and vehicle component development. The fifth flight was with an infrared payload or a subsystem "G" test.

(2) Ten THOR/SENTRY flights were scheduled for launch at Cooke AFB beginning in November 1958 and firing at the rate of one a month.

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(3) Eleven ATLAS/SENTRY vehicles were scheduled for launch at Cooke AFB beginning in March 1960 and firing at the rate of one every other month. The first prototype [redacted] Pioneer was scheduled for launch in September 1960.

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(4) Ten ATLAS/SENTRY vehicles for [redacted] Program were scheduled for launch at Cooke AFB beginning in August 1960 at a rate of one every three months for the first three vehicles and one every other month for the remaining vehicles thereafter. The first firing was to be used for component subsystem development [redacted] The second firing in November 1960 was the first complete [redacted] system.

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The USAF-BMD 15 September 1958 development plan for [redacted] [redacted] contained the following:

(1) Adds nine THOR/SENTRY vehicles to the original 1 July 1958 plan and increases the firing rate to two a month from April 1959 through October 1959.

(2) Drops the five ATLAS firings at Patrick AFB contained in the previous development plan.

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(3) The basic visual Pioneer [redacted] schedule remains essentially the same as that shown for the 1 July 1958 plan except one additional ATLAS is fired out of Cooke AFB. The first ATLAS firing occurs in February 1960.

The USAF-BMD presentation to ARPA on 25 September 1958 revealed how the 15 September 1958 development plan for [redacted] would be affected by reducing funding to a [redacted] ceiling. The plan presented is as follows:

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(1) The THOR/SENTRY program remains unchanged.

(2) There would be no firings of ATLAS/SENTRY or THOR/SENTRY occurring during the entire period of December 1959 through December 1960. Seven ATLAS/SENTRY vehicles have been dropped in CY 1960, and one ATLAS has been dropped out of CY 1961. It appeared from the dates that there would be no Pioneer readout capability existing until March or June of 1961.

SUMMARY

It was apparent from the data presented by the BMD that an immediate review must take place of the entire SENTRY Program if ARPA was to obtain a realistic program within the funds allotted.

The facts obtained to date by the Ad Hoc Project SENTRY Group clearly indicate the need for a program reorientation. This reorientation has been discussed in detail in the text of this report. The reoriented program calls for a stretch-out in the THOR/SENTRY firing schedule and an acceleration of the ATLAS/SENTRY firing schedule so that 13 ATLAS/SENTRY vehicles with payloads either recoverable or not, depending on the need, are fired during CY 1960 with the first firing occurring in December 1959. It is felt by the group that the revised program can be obtained within the FY 1959 ceiling of [redacted] providing the funding adjustments identified in the text are made. Twelve ATLAS/SENTRY Pioneer [redacted] are scheduled in CY 1961.

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To carry out the re-oriented program it is suggested the funding be arrived at in the following manner:

(1) The [redacted] level programmed in the 15 September Development Plan for FY 1959 would be reduced by [redacted] obtained from a redirection of fund support responsibility. This would reduce the original [redacted] figure to [redacted]. To this must be added the [redacted] to restore the five ATLAS/SENTRY vehicles originally planned for firing out of Patrick but under the reoriented program would be fired out of Cooke. This brings the funding required up to [redacted]. Subtracting this amount from the [redacted] FY 1959 ceiling will leave approximately [redacted] to be used for the required re-engineering, vehicle support, etc., to carry out the reoriented program and still live within the FY 1959 [redacted] ceiling.

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(2) For FY 1960 starting with the figure of [redacted] as stated in the 15 September Development Plan and subtracting [redacted] the figure obtained from a redirection of funding responsibility, this would reduce the original [redacted] figure to [redacted]. Subtracting [redacted] from the FY 1960 [redacted] ceiling would leave approximately [redacted] to be allocated to meet the reoriented program needs and again stay within the [redacted] ceiling for FY 1960.

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INTERIM CONCLUSIONS

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(1) The FY 1959 ceiling of [redacted] and the FY 1960 ceiling of [redacted] is adequate to carry out the ARPA Project SENTRY Program providing the project is reoriented along the lines discussed in the report, including the changes in funding recommended.

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(2) The cost of CORONA for FY 1959 is established at about [redacted] including support charges of [redacted]. The cost of CORONA for FY 1960 is established at about [redacted]. The total cost of CORONA (FY 1959 plus FY 1960) is about [redacted].

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(3) The Air Force's proposal in the 15 September 1958 Development Plan based on [redacted] ceiling to delay the first ATLAS shot 19 months is not acceptable. The plan does not provide for any reconnaissance capability in CY 1960. The plan is not realistic in its THOR/SENTRY firing schedule. Program reorientation must be accomplished to provide visual reconnaissance data in CY 1960.

(4) An expanded CORONA program is essential if visual reconnaissance data is to be available in CY 1960.

(5) Many of the items charged to the ARPA Project SENTRY Program are not required for the research and development phase of the program but rather are items required to support an operational weapon system capability. These items should be dropped from the ARPA budget and shifted to the Air Force's operational budget.

(6) Some items charged to the ARPA Project SENTRY are not required for either the R&D program nor the operational weapon systems program. These items should be dropped from the ARPA Project SENTRY budget.

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(7) The combined cost of items referred to in conclusions 5 and 6 above are estimated to amount to approximately [redacted] in FY 1959 and [redacted] in FY 1960.

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(8) The reorientation of Project SENTRY including an expanded CORONA program can be accomplished within the FY 1959 ceiling of [redacted] and the FY 1960 ceiling of [redacted] providing the funding responsibility identified in this report is assumed by the Air Force.

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(9) The ARPA Project SENTRY Program is now rapidly moving concurrently in both a research and development direction and an operational weapon system direction.

RECOMMENDATIONS

(1) It is recommended that the items listed in Tables VII and VIII in Section III of this report not be funded as part of the ARPA SENTRY Program.

(2) It is recommended that the Director, ARPA contact the Secretary or Assistant Secretary of the Air Force to immediately determine the specific dispensations of the items involved in recommendation (1) above; and, further obtain a written commitment of the specific funding responsibilities to be assumed by the Air Force on these items.

(3) It is recommended that the Director, ARPA approve in general the suggested reorientation of the SENTRY program as described in the revised firing schedule contained in Section II of this report. The final specific rearrangement to be defined later following additional discussions with the Air Force on the adequacy or inadequacy of the program suggested, including the funding of such a program.

(4) It is recommended that for the present the Director, ARPA continue to maintain a FY 1959 ceiling of [ ] and a FY 1960 ceiling of [ ] for project SENTRY.

(5) It is recommended that the Director, ARPA, take appropriate action in pointing out to the Secretary of Defense that the ARPA project SENTRY program is now rapidly moving concurrently in both a research and development direction and in an operational weapon systems direction; therefore, a decision should be made soon on the assignment of operational responsibility. This is one of the reasons for the rapid increase in costs for this project.

(6) It is recommended that since firings of the five ATLAS's out of Patrick AFB cannot be supported within the SENTRY program ceiling, these launches be cancelled. This however does not mean the five ATLAS vehicles should be cancelled for they are needed in the suggested revised program for firing out of Cooke AFB.

(7) It is recommended that funds be released to BMD to proceed with the following facilities:

(a) Launch complex, Cooke AFB (ATLAS complex No. 1)

(b) Missile Assembly Building, Cooke AFB, [ ]

25X1  
NRO

25X1  
NRO

NRO  
25X1

NRO  
25X1

Further, due to the delay in the ATLAS program capability resulting from the cancellation of all Patrick launch operations (recommendation number 6) every effort should be made to expedite the completion date of the above facilities. BMD should be requested to submit plans and cost increases, if any, for expediting these facilities by a minimum of two months.

(8) After minimum reconnaissance requirements for CY 1960 have been met by an extension of the CORONA operation, any remaining funds should be used to accelerate the Pioneer visual capability.

ARPA SENTRY Ad Hoc Project Group

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Richard S. Cesaro, Chairman

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Jack Irvine

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Lambert L. Lind

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Robert C. Truax, Capt., USN

EYES ONLY  
Mr. Johnson  
Adm Clark  
Dr. York  
Mr. Young  
Mr. Gise  
Mr. Cesaro  
Mr. Irvine  
Mr. Lind  
Capt Truax

BMD PROPOSED SENTRY PROGRAM SCHEDULES

		CY'59					CY'60					CY'61													
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Dev. Plan	15 Mar 1958																								
	AFMTC - Atlas - R & D					1	1	1	1	1	1	1													
	Cooke - Thor - R & D	1	1	1	1	1	1	1	1	1	1														
	Cooke - Atlas - Pioneer								1	1	1	1	1	1	1	1	1	1							
	Cooke - Atlas - Advanced												1	1	1	1	1	1	1	1	1	1	1		
Dev. Plan	1 July 1958																								
	AFMTC - Atlas - R & D					1	1	1	1	1	1														
	Cooke - Thor - R & D	1	1	1	1	1	1	1	1	1															
	Cooke - Atlas - Pioneer								1	1	1	1	2	1											
	Cooke - Atlas - Advanced												1	1	1	1	1	1	1	1	1	1	1		
Dev. Plan	15 Sept 1958																								
	Cooke - Thor	1	1	1	2	2	2	2	2	2	2	1													
	Cooke - Atlas								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Alternate Plan	15 Sept 1958																								
	Cooke - Thor	1	1	1	2	2	2	2	2	2	2	1													
	Cooke - Atlas												1	1	1	1	1	1	1	1	1	1	1		

FIGURE 1