 Copy 4

~~TOP SECRET~~

HANDLED VIA BYEMAN/TALENT/KEYHOLE/
COMINT CONTROL CHANNELS JOINTLY

12 November 1969

Recommendations for Mr. Helms' Use at 26 Nov ExCom Meeting

On the basis of our analysis in Bye 158-69, 26 November ExCom Issues, 10 November 1969, we propose that the following three recommendations be suggested to Mr. Helms for presentation at the 26 November ExCom meeting. These recommendations stem from the conclusions and alternative proposals of the referenced paper (pages 1 and 2).

1. Because appropriate modification of either [redacted] appears to offer a lower cost alternative to [redacted] it is recommended that D/NRO be requested to assess modifications of [redacted] with regard to associated capabilities, costs and schedules.

2. Because the projected capabilities of [redacted] (and of modified [redacted] would duplicate many of the capabilities of current ELINT collection systems, it is recommended that it be suggested to Mr. Packard that [redacted] furnish proposals for eliminating a number of the current ground, sea, and air ELINT collectors, and

DD/S&T
FILE COPY

BYE 159-69
Copy 7

HANDLED VIA BYEMAN/TALENT/KEYHOLE/
COMINT CONTROL CHANNELS JOINTLY

~~TOP SECRET~~

that these proposals include the associated reductions in capabilities and the savings to be expected (which might be a source of funds for [redacted]

[redacted]

3. Because of the significance of the above evaluations to possible cost reductions, it is recommended that further commitments t[redacted] be minimized until the results of the evaluations are available.

It is suggested that the proposed evaluations be completed within 30 days.

~~TOP SECRET~~ Com-4

HANDLED VIA BYEMAN/TALENT/KEYHOLE/
COMINT CONTROL CHANNELS JOINTLY

26 November ExCom Issues

(Ref. [redacted] Letter)

DCI/NIPE/SAG
BYE 158-69
Copy # 7

HANDLED VIA BYEMAN/TALENT/KEYHOLE/
COMINT CONTROL CHANNELS JOINTLY

~~TOP SECRET~~

10 November 1969

26 November ExCom Issues

(Ref. DuBridge Letter)

Our preliminary analysis of the issues raised in Dr. DuBridge's letter leads us to conclude:

1. that there would be a real loss if either EOI or [redacted] were to be cancelled;

2. but that if a choice must be made between these two systems, EOI is to be preferred. Photography makes a bigger contribution to overall intelligence needs than does ELINT and this advantage is reinforced when the projected capabilities to meet indications [redacted] needs are taken into account.

However, if possible, it would be preferable to meet cost reductions from a broader selection of alternatives, for example:

1. by dropping some current ELINT collectors (air, sea, ground, [redacted] rather than [redacted] and/or

BYE 158-69
Copy #____

2. by incorporating the projected capabilities of [redacted] into [redacted] If our preliminary technical assessment is correct, there would be essentially no loss of intelligence if [redacted] were so modified.

Discussion

These conclusions are based on our judgment of the overall capabilities of photographic and ELINT collectors to meet needs for search, surveillance, EOB, and technical intelligence. The Pilot ELINT Study and the recently completed ABM Study provided data from which we were able to do some extrapolation to overall needs and capabilities. Nevertheless, this analysis has perforce been gross in nature and significance should be attached only to substantial differences.

Figure 1 shows a network of intelligence needs against which photographic and ELINT collectors operate. Column 5 (Unacquired Value) shows the value of the needs exceeding the expected productivity of other collectors, hence it is the value against which EOI and [redacted] can make a unique contribution. Columns 6 and 7 show the amount of such contribution to be expected from EOI and [redacted]

Figure 1

Relative Values of Needs and Capabilities of Collectors

		Total Value (1)	Capability a/ EOI (2)	Capability a/ [redacted] (3)	Capability a/ All Other Collectors (4)	Unacquired Values b/ (5)	Expected Acq. of Unacquired Value by EOI (6)	Expected Acq. of Unacquired Value by [redacted] (7)
V_1 — Photo	General Search	3	.20	---	.75	.75	.15	---
	Directed Search	2	.75	---	.85	.3	.23	---
	Surveillance	5	.80	---	.90	.5	.43	---
							.81	---
V_2 — ELI	EOB	3	.05	.65	.80	.6	.03	.39
	Technical Intelligence	3	.05	.60	.95	.15	.01	.09
	General Search	4	.10	.20	.20	3.2	.32	.64
							.36	1.12
V_3 — Indications	Strategic Warning	5	.60	.05	.50	2.5	1.50	.13
	Tactical Warning	1	.25	.05	.30	.7	.18	.04
	Current Intelligence	4	.90	.10	.90	.4	.36	.04
							2.04	.21

Effectiveness (G)

$$G_{EOI} = 0.81\ V_1 + 0.36\ V_2 + 2.04\ V_3$$

$$G_{[redacted]} = 0.0\ V_1 + 1.12\ V_2 + 0.21\ V_3$$

a/ Probability of acquisition

b/ Value against which no other collectors have a capability [Total value minus (the capability of all other collectors x total value)].

Note that the assigned values in Figure 1 are for the subentries -- that is, for General Search, Directed Search, and so forth. No values are included for the relative importance of Photographic, ELINT, and Indications intelligence, the most critical of the values. Instead, ranges of values were used so that the relative merits of EOI and [redacted] could be more broadly examined.

The results of this examination, and the ranges of values used, are shown in Figure 2. The independent variable is the ratio of the value of V_1 (intelligence needs fulfilled by photography) to the value of V_2 (intelligence needs fulfilled largely by ELINT). The dependent variable is the relative goodness (G) or effectiveness of EOI to [redacted] Each of the curves is for a constant value of V_3. Thus, the bottom curve, for which V_3 (the value of intelligence indications) equals 0, reflects the relative effectiveness of EOI and [redacted] when the value of all the needs (represented by 10 points) is apportioned between V_1 and V_2 in different combinations. Alternatively, when $V_3 = 7$, there are 3 points to be apportioned between V_1 and V_2. With such choices of values for V_1, V_2, and V_3 the relative effectiveness of the two systems was determined with the equations shown on the bottom of Figure 1. The curves are the plotted results.

The series of curves makes clear that for almost all values of V_1,

V_2 and V_3 the more effective system is EOI.* The only time [redacted] is more effective is for a small range of values for V_1 and V_2 when V_3 is 2 or less. If V_3 is 3 or more, EOI is more effective regardless of the values for V_1 and V_2. If V_3 is 2, then for [redacted] to be more effective ELINT intelligence must have more than four times the value of photographic intelligence ($V_1/V_2 = 0.25$); if V_3 is 1, for [redacted] to be more effective ELINT must have roughly twice the value of photography; if V_3 is 0, then ELINT must have only more value than photography.

The results of the ELINT Study and the ABM Study and the data in Tables 1 and 2 illustrate that [redacted] would make a real contribution to the collection of ELINT. Table 2 illustrates the size of the unique contribution to be expected from [redacted] which is more than twice that of any other form of ELINT collection. It also shows what would be lost if, for example, ships were dropped as ELINT collectors -- less than 3 percent. [redacted] alone could be expected to obtain about 55 percent of what all systems, including [redacted] could obtain. Moreover, data from the Pilot ELINT Study indicates that within each of the subgroups of ELINT collectors there is substantial redundancy. Therefore, it appears that a significant number of current ELINT collectors could be dropped with

---

* In the case of the ABM Study, however, where ELINT plays a much more important role and no credit is given for timeliness, the detailed analysis shows [redacted] to be more effective.

Table 1

Characteristics of ELINT Collectors

ELINT Functions	Total Value (1)	Collector Capability a/ [redacted] (2)	Ground ELINT (3)	Air (4)	Ships (5)	[redacted] (6)	Expected Acquisition of Value b/ [redacted] (7)	Ground ELINT (8)	Air (9)	Ships (10)	[redacted] (11)
EOB	0.3	.65	.05	.10	.02	.40	.195	.015	.030	.006	.120
Technical Characteristics	0.3	.60	.80	.70	.40	.40	.180	.240	.210	.120	.120
General Search	0.4	.20	.02	.03	.01	.05	.080	.008	.012	.004	.020
	1.0						.455	.263	.252	.130	.260

a/ Probability of Acquisition
b/ Columns 7 through 11 equal Column 1 times Columns 2 through 6, respectively.

Table 2

Unique and Total Acquisition* of ELINT Collectors[a/]

Systems	Total Value	Unique
All	.807	.807
Ground	.263	.069
Air	.252	.066
Ships	.130	.029

* Effectiveness

a/ Against total ELINT needs

much less effect on total performance than would be the case if [redacted] were to be cancelled. Whether the savings from such action would approximate those that would result from cancelling [redacted] needs to be ascertained.

Another alternative, which could be used in tandem with the aforementioned, would be to modify [redacted] (hopefully at substantial cost savings) so that the projected [redacted] functions would not be lost. We have examined some modifications which look technically feasible to us; they are described in the Attachment. Figure 3 illustrates the results of analysis of these modified systems. This analysis (which is comparable to that done above for EOI and [redacted] suggests that were [redacted] so modified, there would be no apparent loss from dropping [redacted] Superficially it appears that the costs of such modifications would be less than the full cost of [redacted] however, these costs have still to be determined.

~~TOP SECRET~~

HANDLED VIA BYEMAN/TALENT/KEYHOLE/
COMINT CONTROL CHANNELS JOINTLY

ATTACHMENT

TO

BYE 158-69

HANDLED VIA BYEMAN/TALENT/KEYHOLE/
COMINT CONTROL CHANNELS JOINTLY

~~TOP SECRET~~

Approved for Release: 2021/04/08 C05104972

HANDLE VIA BYEMAN/TALENT/
KEYHOLE CONTROL SYSTEMS

Near-Real-Time Imagery Satellite System

Concept:

The EOI System design incorporates the use of advanced electro-optical technology. Light rays that define target images pass through optics on board a satellite to a transducer where they are transformed into electrical signals. This energy either is stored for later transmission or is transmitted to one or more ground stations or synchronous communication satellites. Ultimately, ground processing (probably near [redacted] transforms the electrical energy into an image similar to a photograph.

Operating Characteristics: (Typical)

Altitude
Swath width
Agility
Coverage of Eurasia

Image Characteristics:

Resolution
Image Format
Total time required for image transmission
Data capacity

[redacted]

HANDLE VIA BYEMAN/TALENT/
KEYHOLE CONTROL SYSTEMS