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GROUP 1
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DEPARTMENT OF THE NAVY
NAVAL SECURITY GROUP COMMAND HEADQUARTERS
3801 NEBRASKA AVENUE, N.W.
WASHINGTON, D.C. 20390

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NSG/G54/bmh
BYE-52,161-71
22 October 1971

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From: Commander, Naval Security Group Command
To: Chief Naval Material Command (PM-16)

Subj: Optimum Site Location for POPPY Tactical Transponder Systems; review of

Ref: (a) CHNAVMAT SECRET msg 171949Z SEP 71

1. Reference (a) forwarded a request from the Director, NRO Program "C" for a comprehensive study by the Naval Security Group to "determine the optimum sites for a tactical transponder type system to provide the coverage desired considering known requirements." In addition, reference (a) requested the development of options for potential site locations, with pros and cons relative to each, and contingency plans to provide for operational continuity in a wartime environment. The attached study was accomplished by the Naval Security Group Command Headquarters Staff and is forwarded in response to this request.

2. This study represents a quantized approach to the various factors which determine a site's relative value including adverse political economic effects, collection ability, communications facilities and Soviet Orders of Battle as they relate to existing POPPY technology. The most salient conclusions and contingency options as developed are:

a. Conclusions

(1) If there are only sufficient funds to maintain one site, this site should be in Europe. [redacted] and [redacted] are almost equal in site value except that one site may offer more or less coverage of a specific target location in terms of data duration than would the other two. In addition, [redacted] has a slight advantage overall due mainly to political and economic considerations being more favorable than on the continent.

(2) The second site should be placed in the [redacted] and [redacted] is the most logical and technically feasible location.

(3) [redacted] is the next best site location if only [redacted] sites can be maintained and if the most essential mission assigned these sites is to be tactically oriented; however, it will be obvious that a site location at [redacted] does not compete with the current [redacted] site from

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a strategic location value and uniqueness of collection opportunity point-of-view. [redacted] present lack of communications and processing capabilities significantly reduces its value in a tactical situation.

[redacted]

(5) [redacted] is an excellent site location for Ocean Surveillance of the North and Central Atlantic and Soviet Northern Fleet operating area and has the inherent advantage of being located in the continental U.S.

(6) Placing a site at [redacted] or some other location in the South Eastern U.S., may have some future strategic value; however, the current value of such a site is minimal due to the fact that geographic area coverage potential in that area offers minimum ocean surveillance and intelligence collection opportunities.

b. Contingency Options

(1) If the site location at [redacted] should become untenable, [redacted] is the best fall back position. [redacted] not only is strategically well situated but also already has adequate supporting communications facilities.

(2) If [redacted] should be closed for any reason, or if it should become untenable as a POPPY site location, [redacted] is the logical fall back location, both in terms of geography (collection opportunity) and supporting facilities.

(3) The sites at [redacted] are not considered to be vulnerable to either military, economic, or political pressures and no alternate site locations are required.

3. Your concern for the physical security and overall vulnerability of the POPPY overseas field stations is fully appreciated and this Headquarters has for some time been planning for and implementing actions to improve the security posture of the stations, particularly the [redacted] site. To date, the following actions have been taken:

a. In accordance with National Policy we are emphasizing on a regular basis the need to hold overseas inventories of SAO classified support/reference documentation to a mission essential minimum. All other SAO classified materials are being destroyed by the field stations as the material is superseded or becomes obsolete.

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b. The on-board inventory of SAO classified magnetic tapes has been reduced by one-half since January 1971. This reduction impacts significantly upon the field station's classified material destruction load in the event of an unforeseen emergency.

c. To further improve the Emergency Destruction capability of the [redacted] site, a Diesel driven Dual-Hammermill device is being purchased for deployment during 4th Qtr FY72. This system will be installed in a soon to be constructed addition to the existing operations building and will facilitate total, rapid destruction of all SAO classified material without the necessity for leaving the building itself. Since the system is self contained, with its own power source, it will not be affected by outages in local power.

d. The recently concluded DOORMAN Project, which reviewed the security posture of all overseas cryptologic activities, recommended that a Marine guard force be deployed to [redacted] Based on this recommendation a proposal to establish a 25 man, four guard station force at [redacted] has been forwarded through channels to the Assistant Secretary of Defense where action is now pending.

C. G. PHILLIPS

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OPTIMUM SITES FOR POPPY TACTICAL TRANSPONDERS
REVIEW OF

1. Purpose: Reference (a) requested that COMNAVSECGRU (in coordination with NRL and PM-16) study the optimum sites for tactical transponder systems. In response to reference (a), this report will quantize site values under varying situations.

2. Assumptions: For the purpose of this report it is assumed that:

a. Political economic considerations will be for the time frame 1971 through 1975.

b. Space and site equipment requirements are as now envisioned through mission 7107.

3. Situation: Presently there are [redacted] operational SISS ZULU sites: [redacted] These sites collect, process, and disseminate data from five operational satellites. Four of these satellites (mission 7105) were launched in June 1967 and may continue to produce usable tactical intelligence for one or more years. The fifth satellite was launched in October 1969 as a intergral part of a series of four (mission 7106). The other three satellites launched in this mission have failed; therefore, the remaining satellite is unable to geolocate emitters by the [redacted] negating the satellite's tactical value. Four additional satellites (mission 7107) are scheduled to be launched in December of this year. This will provide us with a total of 9 operating satellites. A new SISS ZULU site is under construction at [redacted] scheduled to be completed in early FY73. A site at [redacted] is under consideration but will probably not be installed prior to FY75 if then.

4. Logic: In order to meaningfully determine a POPPY site's potential importance, it is essential that the study be done in a quantitative manner. To this end every factor involved must be identified and assigned a objective relative value. The results of this approach will present the decision maker with a tractable number of variables within a set logic upon which decisions can be made.

Any systematic site location plan would obviously not place sites so that they would have significantly overlapping coverage (i.e. [redacted]). This study will, therefore, endeavor to determine which site in an area is optimum assuming that each site's geographic coverage is unique.

Those factors involved in this study which are purely subjective in nature (i.e. probability of Nuclear War) are derived by conducting a survey within Naval Security Group Command and applying the Delphi Technique to compute the most accurate figures.

a. A site's value, under any given strategic scenario is affected only by its collection opportunity and dissemination capability. Collection opportunity is delineated by target availability (EOB, NOB) and reception ability. For this study figures from one to ten will be used only, with ten indicating highest value. Collection opportunity is computed for each site in appendix A. Dissemination ability is equal to communication facilities and for all fixed sites discussed will be considered as one except for [redacted] which has very limited communications. In the event a site is moved to a new location, communications are certainly germane and should be considered.

SITE VALUE = (Collection opportunity)X(Dissemination Capability)

b. A strategic scenario's relative value is directly proportional to the magnitude of the scenario and the probability of its occurrence. The magnitude of the scenario is a figure from one to ten and the probability of occurrence is expressed as a decimal. Both figures were obtained for each scenario by the study conducted within Headquarters Naval Security Group and computed using the Delphi Technique.

SCENARIO VALUE = (Magnitude of Scenario)X(Probability of occurrence)

c. A sites value per scenario is proportional to site value per para 4a, scenario value para 4b, and station survivability during the scenario. Survivability of course is a deleterious value and will be expressed as a per cent of scenario duration only.

SITE VALUE PER SCENARIO = (Site Value)X(Scenario Value)X(Survivability)

d. In order to obtain the overall value of any site relative to other sites, it is then necessary to construct all possible scenarios and compute the "total site value per all scenarios." The overall site value is, therefore, equal to the summation of "site values per scenario." The deleterious effect of adverse political economics situations will be computed as a negative scenario and will significantly detract from a site's overall value as applicable. The figures obtained will be a relative figure of merit per station.

TOTAL SITE VALUE = Summation of all site values per scenario minus Adverse Political/Economic effects

Strategic Scenarios: The scenarios listed cover all situations which are presently envisioned as at all feasible. If in the future any other scenario becomes a valid consideration it can be included and a sites new relative value can easily be recomputed. The following is the listing of strategic scenarios considered:

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SCENARIOS

A.	Cold War	60%
B.	Total War	12%
C.	War at Sea only	6%
D.	Hot War between large countries in which U.S. is not directly involved	9%
E.	Limited War contingent to but not in same country as site	10%
F.	Limited War in same country as site	3%
G.	Adverse Political situation which causes the closing of the site. (This is a negative figure only)	

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COLD WAR

The Cold War scenario is considered to be the most important in that it provides the background intelligence, tactical situation at the outset of any hostilities, and is presently occuring.

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SCENARIO VALUE = (MAGNITUDE OF SCENARIO) x (PROBABILITY OF OCCURANCE)	SITE VALUE = (COLLECTION OPPORTUNITY) x (DISSEMINATION ABILITY)	SITE VALUE PER SCENARIO = (SITE VALUE) x (SCENARIO VALUE) (SURVIVABILITY)
10 x 1= 10	6.44 x 1= 6.44	64.4
10 x 1= 10	3.57 x 1= 3.57	35.7
10 x 1= 10	2.04 x 1= 2.04	20.4
10 x 1= 10	2.31 x 1= 2.31	23.1
10 x 1= 10	1.76 x 1= 1.76	17.6
10 x 1= 10	2.04 x 1= 2.04	20.4
10 x 1= 10	4.85x 1= 4.85	48.5
10 x 1= 10	.8 x 1= .8	8.0
10 x 1= 10	6.3 x 1=6.3	63.0
10 x 1= 10	6.51 x 1= 6.51	65.1
10 x 1= 10	5.00 x .2= 1.0	10.0

NOTES: 1. SCENARIO VALUE FOR ALL SITES ARE EQUAL IN COLD WAR
2. SURVIVABILITY IS ONE IN ALL CASES

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TOTAL WORLD WAR

Total World War is defined as nuclear holocaust in which no area or target is inviolate. The issue of survivability is crucial under this scenario. It is assumed, however, that the first 30 minutes of conflict are the most critical and that in this day of advanced rocketry that no site on earth is safe from destruction, negating to a large degree any survival comparisons. The scenario is of course considered extremely important and unfortunately the likelihood of occurrence must be considered as possible if remote. Because a total hot war is so very important its magnitude is considered as twice that of cold war.

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TOTAL WORLD WAR

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SCENARIO VALUE = (MAGNITUDE OF SCENARIO) x (PROBABILITY OF OCCURANCE)	SITE VALUE = (COLLECTION OPPORTUNITY) x (DISSEMINATION ABILITY)	SITE VALUE PER SCENAR (SITE VALUE) x (SCENARIO VALUE (SURVIVABILITY)
20 x .2= 4	3.15 x 1= 3.15	12.6
20 x .2= 4	1.4 x 1= 1.4	5.6
20 x .2= 4	.76 x 1=.76	3.04
20 x .2= 4	2.1 x 1= 2.1	8.4
20 x .2= 4	.16 x 1= .16	.64
20 x .2= 4	.96 x 1= .96	3.84
20 x .2= 4	2.25 x 1= 2.25	9.0
20 x .2= 4	.8 x 1= .8	3.2
20 x .2= 4	3.15 x 1= 3.15	12.60
20 x .2= 4	3.15 x 1= 3.15	12.60
20 x .2= 4	2.75 x .2= .550	2.2

NOTES: SCENARIO VALUE IS EQUAL FOR SITES IN HOT WAR.

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WAR AT SEA

In this scenario it is envisioned that a situation such as the blockade of Cuba results in a major conflict geographically confined to the sea only. In these computations the site value will be the same as that of hot war. The scenario is very important to the Navy but only moderately likely to occur.

SCENARIO VALUE = (MAGNITUDE OF SCENARIO) x (PROBABILITY OF OCCURANCE)	SITE VALUE = (COLLECTION OPPORTUNITY) x (DISSEMINATION ABILITY)	SITE VALUE PER SCENAR (SITE VALUE) x (SCENARIO VALUE) (SURVIVABILITY)
10 x .2= 2	3.15 x 1= 3.15	6.30
10 x .2= 2	1.4 x 1= 1.4	2.8
10 x .2= 2	.76 x 1= .76	1.52
10 x .2= 2	2.1 x 1= 2.1	4.2
10 x .2= 2	.16 x 1= .16	.32
10 x .2= 2	.96 x 1= .96	1.92
10 x .2= 2	2.25 x 1= 2.25	4.5
10 x .2= 2	.8 x 1= .8	1.6
10 x .2= 2	3.15 x 1= 3.15	6.30
10 x .2= 2	3.15 x 1= 3.15	6.30
10 x .2= 2	2.75 x .2=.550	1.10

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HOT WAR U.S. NOT INVOLVED

Hot war between major world powers in which the U.S. is not involved (i.e. Russia versus China or Japan versus China). This type of conflict is becoming more likely to happen as the world becomes divided into many small power centers rather than just two predominating blocks. Site value in this scenario would be the same as for cold war and site survivability is considered as one.

HOT WAR U.S. NOT INVOLVED

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SCENARIO VALUE = (MAGNITUDE OF SCENARIO) x (PROBABILITY OF OCCURANCE)	SITE VALUE = (COLLECTION OPPORTUNITY) x (DISSEMINATION ABILITY)	SITE VALUE PER SCENAR (SITE VALUE) x (SCENARIO VALUE) (SURVIVABILITY)
5 x .3= 1.5	6.44	9.66
5 x .3= 1.5	3.57	5.35
5 x .3= 1.5	2.04	3.06
5 x .3= 1.5	2.31	3.47
5 x .3= 1.5	1.76	2.64
5 x .3= 1.5	2.04	3.06
5 x .3= 1.5	4.85	7.27
5 x .3= 1.5	.8	1.20
5 x .3= 1.5	6.3	9.45
5 x .3= 1.5	6.51	9.76
5 x .3= 1.5	1	1.5

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CONTINGENT LIMITED WAR

Limited War contingent to but not in same country as site. In these computations it is assumed that a site's collection opportunity is optimized and survival factor is one. The site value per scenario is therefore computed by multiplying a constant site value by the geographically scenario value.

CONTINGENT LIMITED WAR SCENARIO VALUE = (MAGNITUDE OF SCENARIO) x (PROBABILITY OF OCCURANCE)	SITE VALUE = (COLLECTION OPPORTUNITY) x (DISSEMINATION ABILITY)	SITE VALUE PER SCENAR (SITE VALUE) x (SCENARIO VALUE (SURVIVABILITY)
1.5 x .6= .9	10 x 1= 10	9.0
1.5 x .1= .15	10 x 1= 10	1.5
1.5 x .7= 1.05	10 x 1= 10	10.5
1.5 x 0= 0	10 x 1= 10	0
1.5 x .4= .6	10 x 1= 10	6.0
1.5 x 0= 0	10 x 1- 10	0
1.5 x .6= .9	10 x 1= 10	9.0
1.5 x .5= .75	10 x 1= 10	7.5
1.5 x .5= .75	10 x 1= 10	7.5
1.5 x .6= .9	10 x 1= 10	9.0
1.5 x .6= .9	10 x .2= 2	1.8

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LIMITED WAR IN SAME COUNTRY

Limited war in same country as site. In this event the sites collection opportunity will be optimized but the survivability will also be significantly reduced. Under this scenario every site's scenario value, and site value per scenario will be figured separately. Collection opportunity, however, can be considered maximum or 10 in every case.

LIMITED WAR IN SAME COUNTRY	SCENARIO VALUE = (MAGNITUDE OF SCENARIO) x (PROBABILITY OF OCCURANCE)	SITE VALUE = (COLLECTION OPPORTUNITY) x (DISSEMINATION ABILITY)	SITE VALUE PER SCENAR (SITE VALUE) x (SCENARIO VALUE (SURVIVABILITY)
	7 x .1= .7	10 x 1= 10	.7 x 10 x .2= 1.
	10 x 0= 0	10 x 1- 10	0
	5 x .4= 2	10 x 1= 10	2 x 10 x .3= 6.0
	10 x 0= 0	10 x 1=10	0
	10 x 0= 0	10 x 1= 10	0
	10 x 0= 0	10 x 1= 10	0
	7 x .2= 1.4	10 x 1= 10	1.4 x 10 x.3= 4
	5 x .2= 1.0	10 x 1= 10	1.0 x 10 x .3= 3
	10 x 0= 0	10 x 1= 10	0
	7 x .1= .7	10 x 1= 10	.7 x 10 x .2= 1
	5 x .1= .5	10 x .2= 2	.5 x 2 x .5= .5

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ADVERSE POLITICAL/ECONOMIC SITUATION

The likelihood that a station will have to be abandoned because of adverse political or economic situations certainly has a deleterious effect on the site's overall value. To compute the degree of value lost we have determined a degree of susceptibility and will multiply this times the sum of the site values per scenario times 50%. This figure as stated previously was determined by an internal Naval Security Group study and the Delphi Technique was used to derive most accurate results.

ADVERSE POLITICAL/ECONOMIC SITUATION

SITE	SUSCEPTIBILITY	DEGREE SCENARIO (EFFECTS SITE VALUE)	TOTAL OF SITES (VALUE PER SCENARIO)	TOTAL ADVERSE EFFECT
	.4	(.5)	103.36	20.67
	0	(.5)	50.96	0
	.8	(.5)	44.52	17.80
	0	(.5)	39.17	0
	.3	(.5)	27.2	4.08
	0	(.5)	29.22	0
	.5	(.5)	78.15	19.54
	.4	(.5)	24.5	4.90
	.2	(.5)	98.85	9.88
	.4	(.5)	104.17	20.83
	.5	(.5)	17.1	4.28

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SUMMATION MATRIX

SCENARIOS											
A. COLD WAR	64.4	35.7	20.4	23.1	17.6	20.4	45.0	8.0	63.0	65.1	10.0
B. TOTAL WAR	12.6	5.6	3.04	8.4	.64	3.84	9.0	3.2	12.6	12.60	2.2
C. WAR AT SEA	6.3	2.8	1.52	4.2	.32	1.92	4.5	1.6	6.30	6.30	1.1
D. WAR BETWEEN MAJOR COUNTRIES U.S. NOT INVOLVED	9.66	5.36	3.06	3.47	2.64	3.06	6.45	1.20	9.45	9.77	1.5
E. LIMITED WAR CONTINGENT TO BUT NOT IN SAME COUNTRY AS SITE	9.0	1.5	10.5	0	6.0	0	9.0	7.5	7.5	9.0	1.8
F. LIMITED WAR IN SAME COUNTRY	1.4	0	6.0	0	0	0	4.2	3.0	0	1.4	.5
TOTAL	103.36	50.97	44.52	39.17	27.2	29.22	78.15	24.5	98.85	104.17	17.1
(A MINUS VALUE) G. ADVERSE POLITICAL/ ECONOMIC SITUATION	-20.67	0	-17.80	0	-4.08	0	-19.54	-4.90	-9.88	-20.83	-4.28
TOTAL SITE VALUE	82.69	50.96	26.72	39.17	23.12	29.22	58.61	19.60	88.97	83.34	12.82

THE SCENARIOS EFFECT ON THE OVERALL SITE VALUE ARE AS FOLLOWS:

COLD WAR	60%
TOTAL WAR	12%
WAR AT SEA	6%
WAR BWTWEEN	9%
LIMITED-OTHER COUNTRY	10%
LIMITED-SAME	3%

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COLLECTION OPPORTUNITY

I. Rationale: Collection opportunity, for purposes of this analysis, has been determined by computing the relative weight of the specific geographic area tactical environment values as a function of ground station collection/processing capability to produce meaningful tactical intelligence relative to that environment. Current POPPY system technology has been used as the basis for establishing this ground station-to-tactical environment relationship.

The overall weight obtained by a particular geographic environment is a simple aggregate factor achieved by totalling the relative value factors assigned targets and/or target areas within the environment; i.e., [redacted] environment includes such important potential collection targets as SARY SHAGAN, the Moscow complex, the Mediterranean Sea, the Northern Fleet operating areas, and the Middle East to name only a few. The relative value weights assigned these potential targets is obviously subjective and is heavily dependent upon the conditions prevailing; however, since the relative value factors have no fixed reference other than their relationship to each other, it is possible to establish their relative importance in broad terms such as exist generally in a cold war or total war scenario.

II. Methodology: Initially it is necessary to establish the identity of potential targets of importance from an overhead ELINT collector perspective, and to fix the relative value of these targets world-wide. This has been done for both cold war and total war scenarios as represented by figures 12 and 13. Using the same geographic scales, the total area of meaningful coverage potential for possible ground station locations has been computed on the basis of circular, 500NM altitude, 71 degree inclination orbital parameters and are shown in figures 1 thru 11. For purposes of this analysis, meaningful coverage is defined as greater than 20 minutes per day of coverage potential. The geographic weight of a given ground station location is determined by totalling the relative target weights within that station's area of meaningful coverage. To further define collection opportunity, the number of environment observation opportunities available to a given ground station location (orbital passes per day) has been used as a factor. Therefore, the aggregate geographic weight for a given ground station location, multiplied by that ground station's number of environmental observation opportunities per unit day yields the collection opportunity from that location. Using this method, the following relative collection opportunity factors are derived:

LOCATION	ENVIRONMENT VALUE COLD WAR	ENVIRONMENT VALUE TOTAL WAR	OBSERVATION OPPORTUNITIES /DAY (AVG)	COLLECTION OPPORTUNITY COLD WAR	COLLECTION OPPORTUNITY TOTAL WAR
[redacted]	.92	.47	7	6.44	3.15
	.51	.20	7	3.57	1.4
	.51	.19	4	2.04	.76
	.33	.30	7	2.31	2.10
	.44	.04	4	1.76	.16
	.51	.24	4	2.04	.96
	.97	.45	5	4.85	2.25

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LOCATION	ENVIRONMENT VALUE COLD WAR	TOTAL WAR	OBSERVATION OPPORTUNITIES /DAY (AVG)	COLLECTION OPPORTUNITY COLD WAR	TOTAL WAR
	.20	.20	4	.80	.80
	.90	.45	7	6.3	3.15
	.93	.45	7	6.51	3.15
	1.00	.55	5	5.00	2.75

III. Exceptions: From the collection opportunity factors derived above it becomes apparent that certain tentative conclusions may be reached regarding the relative merit of a given location's net value in a cold war or total war scenerio. There are, however, a number of other important aspects which are not immediately recognizable in a generalized analysis such as has been presented here. These points should receive an appropriate amount of consideration in any decision making process and are therefore, delineated as follows:

a. Ground site local radiation environment (RFI) must necessarily be an essential prerequisite to effective operations. Environmental RFI considerations have not been determined for any of the potential site locations discussed in this analysis with the exception of the existing POPPY sites.

b. The amount of coverage, in terms of units of data collection time against a given target or target area, has not been considered in this analysis. When considering only geographic coverage potential and observation opportunity it is apparent that [redacted] and [redacted] are near equals; however, it is obvious that if the existing [redacted] site were moved to either of the other two locations, the duration of coverage available against a specific target would be varied. A move from [redacted] would reduce the data durations obtainable from the SARY SHAGAN and Moscow areas. Likewise, a move to [redacted] would entail some loss of coverage against the Northern Fleet operating areas and the Northeastern USSR, but would increase coverage of the Mediterranean Sea, the Middle East and the South Eastern USSR. There are similar trade-offs involved in relocation of [redacted] existing sites.

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