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COMIREX-D-11.1/2
1 July 1968

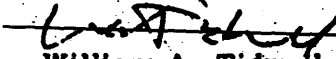
MEMORANDUM FOR: Committee on Imagery Requirements and
Exploitation

SUBJECT : Assessment of the Intelligence Gain Provided
by KH-9 over KH-4 and KH-8

- REFERENCES :
- a. USIB-D-41.14/294, COMOR-D-13/63,
21 June 1966
 - b. USIB-D-46.4/13, COMIREX-D-14.4/1,
27 March 1968, Memo to Holders of
USIB-D-46.4/13, dated 4 April 1968,
BYE-047-68/2
 - c. USIB-D-46.4/3, COMIREX-D-13.7/4,
5 January 1968

I have forwarded the subject paper (copy attached) to the
Chairman, National Intelligence Resources Board, with the following
note attached:

"All members of COMIREX have reviewed and
commented on earlier versions of this paper. Substantial
changes were made incorporating their views and this
version has the final coordination of the CIA member and
the DIA member, who in turn reflected the views of the
three military services. I believe that it reflects the main
views of the intelligence community, but, if any additional
small points emerge that would affect the substance of the
paper, I will let you know."


William A. Tidwell
Chairman

Committee on Imagery Requirements and Exploitation

Attachment

Copies 2, 3	State TCO	13, 14	AFNIN TCO
4	DIA (Mr. Hughes)	15, 16	NSA TCO
5, 6, 7, 8	DIA TCO	17, 18, 19	SAFSS TCO
9, 10	OACSI TCO		BYE-2265-68
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COMIREX-D-11.1/2

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MEMORANDUM FOR: Chairman, National Intelligence
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 - c. USIB-D-46.4/3, COMIREX-D-13.7/4,
5 January 1968

1. COMIREX was requested to assess the significance of the intelligence to be derived by the KH-9 beyond that which could be obtained by the combined use of the KH-8 and KH-4 systems. In summary, it is evident that the KH-9 in combination with an improved KH-8 will provide highly significant intelligence information in support of national needs that cannot be obtained by the combined use of KH-4 and KH-8. Our judgment in this matter is based in large part on a consideration of anticipated needs for reconnaissance in the 1970-75 time frame.

2. Analysis of information derived from current satellite systems has been a significant factor in the determination of Bloc military capabilities and in the development of a sound intelligence basis for the formulation of U.S. national policy and the structuring and deployment of U.S. military forces and weapons systems. We find ourselves in a period in which our high resolution Kri-8 system* is functioning reliably and is

* High resolution coverage in this paper is defined as photography with a resolution range of to five feet.

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permitting the production of a large and increasing volume of excellent quality intelligence. During this same period the KH-4 is producing improved resolution, although this improvement is still far short of the resolution that the KH-9 system is intended to provide. If these current satellite systems are judged against the currently approved collection requirements which were established in the context of current systems capabilities, it is clear that they have performed well and that they have the growth potential to meet a substantial future increase in the same type of requirement. The currently approved statements of requirements, however, have tended to stress intelligence needs for:

- a. Search of large areas with medium resolution and wide swath to detect suspicious activities.
- b. Follow up photography with high resolution, to identify the nature of the activity.
- c. Surveillance coverage of large numbers of specific priority targets by high resolution, narrow swath photography.

In spite of the general adequacy of existing systems in meeting these stated requirements, unanswered intelligence problems exist and we anticipate that important problems will arise in the future which could be better solved, or solved only, by a capability to examine closely, collectively, and nearly simultaneously the entirety of large geographic areas with high resolution coverage. Such a capability would support the assessment of the deployment and inter-relationship of complex military systems and forces. Up to the present time we have not developed detailed requirements for such a system because of the lack of a capability to acquire such imagery by satellite. We recognized the potential need for such a system, however, when we generated the requirement outlined in reference a. above.

3. It is particularly important to emphasize that our current requirements have been developed on the basis of current capabilities and those problems within the range of these capabilities.

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Thus, these requirements have not taken into full account such changes in collection needs as might result from unexpected changes in the military situation or from a skillful effort to employ camouflage or an agreement involving arms control and disarmament inspection. In addition, the Department of Defense, particularly in support of the Unified and Specified Commands, has requirements for high resolution coverage of many areas needed for timely contingency planning. However, current capabilities and national priorities for satellite and airborne systems have generally prevented satisfaction of these requirements.

4. In view of the foregoing, our principal considerations pertinent to assessing the value of the KH-9 included but were not limited to:

- a. The capabilities and limitations of current satellite systems,
- b. The changing dynamics of intelligence requirements, and
- c. The major requirements for photography in support of basic intelligence, scientific and technical intelligence, and mapping, charting, and geodesy.

5. Also considered were the increasing constraints being imposed or considered for various political, economic, or technical reasons on many intelligence collection resources. In the light of this trend, we believe that a satellite reconnaissance capability to cover broad areas with high resolution photography would help us to acquire information formerly collected by other means and in some instances substitute for the diminishing level of airborne reconnaissance being accomplished by high altitude strategic systems today.

6. The evidence supporting the judgments in paragraphs 1 and 2 above is considered in greater detail in annexes to this paper covering the following subjects:

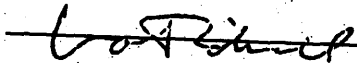
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- Annex A - The Role of Resolution
- Annex B - Quality and Quantity of High Resolution Surveillance
- Annex C - Search for Unknown Targets
- Annex D - Determination of Military Capabilities
- Annex E - Support to Mapping, Charting, and Geodesy
- Annex F - Additional Benefits to be derived from the KH-9



William A. Tidwell
Chairman

Committee on Imagery Requirements and Exploitation

Attachments

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Annex A

The Role of Resolution

1. We have considered the range of intelligence problems which can be satisfied with photography of varying ground resolution, and the fact that the KH-4, KH-8, and KH-9 systems represent overlapping capabilities against some problems. In particular we have noted that the design specifications for the KH-9 system call for high resolution coverage 2.3 feet or better in the 140 mile center segment of the total access swath. This is contrasted to the 6 to 9 feet resolution provided at best across a swath of 115 miles by the KH-4B.

a. For some intelligence problems such as the detection of construction of new ICBM silos or of SA-5 complexes, medium resolution photography acquired by the KH-4 system meets minimum needs, and from a resolution standpoint, of course, would be met by photography from the KH-8 and KH-9 systems.

b. There are problems relating to military capabilities such as those related to tactical aviation, submarine operations, ground forces, and activities at missile support complexes, for which photography having better resolution than the KH-4 is needed, but which generally can be met satisfactorily with photography of about 2 1/2 to 3 foot resolution. Currently the KH-8 is the only satellite system being employed successfully against these particular problems.

c. On the other hand, there are other important target categories and problems for which photography, on the order of the best resolution of the KH-8, is needed and could not be met by the resolution of the KH-9. In general these relate to objects, or technical details of equipment or systems.

2. With respect to the criterion of ground resolution alone, and the question of the relative value of the three systems

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in that regard, we judge that perhaps a third of our minimum needs could be met by the KH-4 alone and that 70 to 80 percent could be met by the KH-9 alone. In addition, 20 to 30 percent require the unique high resolution capabilities of the KH-8 and cannot be satisfied by the other two systems. We recognize the difficulties and uncertainties involved in any attempt to quantify this particular relationship; these judgments provide only orders of magnitude, not precise delineations. ?

3. The essential trade off between the KH-8 and KH-9 system and the one most difficult to measure, of course, is that while the KH-8 provides higher resolution photography of targets in a relatively smaller but nevertheless considerable number, the KH-9 with relatively poorer but nevertheless still high resolution offers a much larger volume of target coverage. At the same time the KH-9 is unaffected by the problems of target conflict in areas of high target density, which is one of the drawbacks of the KH-8 system.

4. If the KH-9 system were operating, it not only would replace the KH-4 in the latter's area coverage role, but would be able to meet a large number of the requirements now specified in the CCRP for the KH-8 system. KH-8 collection could be lessened correspondingly and concentrated more selectively on specialized target problems, particularly those relating to scientific and technical intelligence.

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Annex B

Quality and Quantity of High Resolution Surveillance

1. On 4 April 1968 the United States Intelligence Board approved reference b which established minimum essential requirements for collection by high resolution photographic satellites. The requirement called for surveillance of a list of approximately 4,900³¹⁵⁷ targets with a total effort amounting to about 4,200 gross target looks per year, about two-thirds of which were to be in stereo and the remaining one-third in mono. We have had time to analyze the KH-8 performance against this statement of requirements and find that with a few exceptions the system performs well against these stated objectives. During the past year, seven successful KH-8 missions produced over 5,500 complete target looks of which 2,800 were in stereo. It is emphasized that not all of these target looks were obtained of priority targets at the time necessary to enable them to contribute to meeting our surveillance requirements. Where requirements were not met for high priority target categories, many of the targets comprising these categories were so located geographically as to cause camera aiming conflicts. The main areas of important conflict are the Moscow and Leningrad complexes and the launch facilities at Tyuratam and Sary Shagan. During the past year, for example, because of our need to concentrate on the highest priority targets in these areas, a substantial number of targets of considerable importance but lesser immediate priority were not covered. The results of target coverage in these four areas during the past year are set out in the accompanying table.

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NRO study

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	Total No. of Targets	No. of Times Covered						Additional Targets Partially Covered							Not Covered	
		One	Two	Three	Four	Five	Six	One	Two	Three	Four	Five	Six	Seven		
MOSCOW		37	10	3	1			11	1							54
LENINGRAD		27	15	7	3	1	6	10	1							40
TYURATAM		13	13	4				0	3	1						7
SARY SHAGAN		7	3	3	2			3	0	0	0	1	1	1		14

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Other target categories against which requirements were not met due to geographic competition were the MR/IRBM deployed sites situated along the western border of the USSR and ground forces and tactical fighter bases located in Eastern Europe and South China. The KH-9, by virtue of its wide swath and longer orbit life, could have obtained repetitive coverage of these complexes and areas and could have satisfied most of the high-resolution requirements. This would have the effect of drastically reducing the number of targets requiring the high resolution coverage of the KH-8.

2. The experience with the KH-8 outlined above was based on single bucket KH-8s with 10-day missions. By 1970, the KH-8 is expected to be a double-bucket system with additional days on orbit which will provide opportunities to cover a substantial number of additional small-area targets. The improved KH-8 with more days on orbit consequently will have more opportunities for access to the regions of camera pointing conflict caused by proximity of high priority targets and therefore should reduce the number of lower priority targets that cannot be acquired because of such conflict. Its coverage, however, will continue to be limited to a narrow swath making it impossible to cover a large number of targets at any one time.

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Annex C

Search for Unknown Targets

I. Although the Soviet Union may be approaching the end of its initial deployment of its major land-based ICBM systems, and the Communist Chinese apparently have not yet begun to deploy missiles, we continue to discover previously unknown installations in substantial numbers with our current satellite reconnaissance systems. During the past twelve months, we found over three hundred previously unknown installations, mostly new ICBM hard sites, surface-to-air deployed sites, and ground force installations. Of these, over two hundred were discovered by KH-4 and over one hundred by the KH-8.

Table 1

Targets first identified in KH-4 photography since 1 June 1967 that have been added to COMIREX high resolution baseline requirements:

ICBM Sites and Facilities	140
MRBM Sites and Facilities	1
SA-2 and SA-3	31
SA-5	17
Other Missile Related	11
Airfields	8
Nuclear Related	2
Naval	1
Other	<u>8</u>
TOTAL	219

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Table 2

Targets first identified in KH-8 photography since 1 June 1967
that have been added to COMIREX surveillance requirements:

ICBM Sites and Facilities	44
SA-2, SA-3 Sites and Support	20
SA-5	2
Other Missile Related	7
Airfields	3
Naval	2
Ground Force	<u>25</u>
TOTAL	103

All would probably have been found eventually by the KH-4, but when they were found by the KH-8 a high resolution baseline was established and corresponding initial unambiguous interpretation as to function was provided simultaneously with their detection. On the other hand, many of the two hundred found by the KH-4 required subsequent programming for the KH-8 in order to derive details not available from the KH-4 coverage. If the newly discovered targets had been covered by the KH-9, their initial discovery might have been expedited. In most cases there would have been no delay in obtaining the unambiguous interpretation, and retargeting for KH-8 coverage probably would not have been required.

2. We expect that countries of the dynamic character of the Soviet Union and Communist China will continue to generate new specific reconnaissance targets of interest to the U.S. In particular we expect there would be a major new phase of target generation in the Soviet Union in the early 1970s as a result of technical progress in both offensive and defensive missile systems. We would also expect a Communist Chinese missile deployment program to occur at about the same time.

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Annex D

Determination of Military Capabilities

Accurate and authoritative assessments of the nature and scope of the constantly changing military posture of potential enemies must be based upon current and comprehensive knowledge of force deployment, levels of activity in major military activity and training areas, and changes in the quantity and type of associated weapons and equipment. Broad area, high resolution, concurrent coverage of geographically separated installations which are part of the same target system is ideally suited for these problems. Repetitive coverage of large segments of the target system is also required to establish adequate confidence in our estimate of certain organizational and procedural aspects of the military target systems under review.

1. Ground Forces

a. The assessment of Bloc ground force capabilities is not only important currently but will continue to be an important problem in the post-1970 period. It is also representative of the demands for resolution and breadth of coverage typical of many other intelligence problems. Installations involved in Bloc ground force capabilities comprise 42 percent of all the high resolution targets contained in reference b. Minimum coverage requirements were generally met during the past twelve months by seven KH-8 missions with the exception of some of the categories located in western USSR, the Eastern European area, and South China--a number of which are of great current importance. The KH-4 obtained extensive coverage of these installations but even the resolution provided by its improved camera system was not sufficient to enable the installations to be unambiguously categorized as belonging to artillery, armor, or infantry. The resolution of about two and one-half feet forecast for the KH-9 is judged by photo

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interpreters to be necessary to support accurate assessments of military capabilities.

b. In the preparation of the DIA/CIA reinforcement study, high resolution area coverage of several military districts was required. The KH-8 provided excellent selective coverage of important garrison areas but has not permitted the early establishment of a comprehensive high resolution base upon which to complete the assessments required. The absence of a high resolution area coverage system has limited our capability to judge the precise extent of Soviet ground force capabilities. In addition, concurrent high resolution coverage of Soviet ground force garrisons and activities might have permitted the confirmation of major movements of large Soviet units reflected by other types of intelligence, particularly COMINT. To accurately evaluate such movements, near simultaneous coverage is required of all installations in the new area of deployment as well as of the installation vacated.

c. The area coverage capability of the KH-9 would be great enough to obtain high quality high resolution coverage of extensive training and maneuver areas which could be used to deduce Soviet or Chinese ground force deployment doctrine and, above all, to allow comprehensive evaluations of operational capabilities, including reinforcement, support and mobilization.

d. In the assessment of Soviet ground force units which will continue into the period of the 1970s, it is suspected that many are maintained at cadre strength and are fully manned only during periods of limited duration. The ultimate validity and accuracy of our estimates of Soviet ground force capabilities is contingent upon information relating to the category classification and manning levels of the units involved. The availability of only selected KH-7 and KH-8 coverage has restricted our ability to estimate the manning status of certain units. We believe that this inability would be largely eliminated with acquisition of high resolution broad area concurrent coverage of units within specified military districts.

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e. By mid-1970 we expect to have completed our initial assessment of nearly all Soviet and Chinese ground force installations. Thereafter we will be in a better position to deal with the dynamic aspects of military capabilities. We expect that by 1973 we will have produced Phase III Basic Support Exploitation reports on nearly all these installations. The KH-9 should permit us to support this production program and improve our ability to deal in a timely manner with dynamic factors such as manpower and equipment levels, reinforcement, and combat capabilities.

2. Soviet ICBM Deployment

Significant advances in the level of our understanding of Soviet systems, concepts and procedures for ICBM deployment as well as in the timeliness and confidence of our contributions on this subject to NIE's and other special studies, would be possible with the acquisition of high resolution, concurrent and broad area coverage of the 26 complexes and their logistical support networks. At the present time we are evaluating available information in preparation for NIE 11-8 and find that certain information is required if we are to judge the potentiality for Soviet expansion beyond the current 1000 plus silos completed or under construction. If we were to have high resolution, near simultaneous and repetitive coverage of all complex support facilities, we would be able to judge more confidently the storage and distribution of silo construction materials and the Soviet potential for expanding its ICBM deployment during the next 12 to 18 months. In the absence of such information, the range of our estimate will be broadened significantly.

3. Naval and Air Capabilities

In the continuing assessment and refinement of Bloc naval and air capabilities, knowledge of operating cycles, equipment changes, and deployment is required for an accurate and timely assessment of combat capabilities. In most cases, the validity of our

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estimates in these areas is directly contingent upon the periodicity and simultaneity of our coverage and on the adequacy of detail provided. Consequently, we have depended upon other limited sources for a determination of "TO&E yardsticks," construction procedures and timing, and equipment changes. In the naval category, such information is required to determine the duration, nature and frequency of overhaul periods, the disposition and cycling of naval vessels from established bases, and the indices of activity from which can be estimated the lengths of time and relative effectiveness of units in commission and their capability for rapid deployment. The assessment of air capabilities requires comparable information.

4. Correlation of SIGINT and Photographic Data

SIGINT satellites do not provide precise locations for electronic emitters, but rather express locational accuracy within a radius of several miles. Establishment of precise locations, and determination of image-derivable characteristics of electronic emitters is dependent upon a high resolution coverage as most emitters are too small to be located, much less analyzed, on KH-4 coverage. Currently, less than one percent of all EOB sites and 1/2 percent of all sets, on a worldwide basis, have been identified through the KH-8 system. This lack of coverage is due to the limited swath width of the KH-8, the inability to provide accurate locations in order to point the KH-8 camera system and the competition for coverage posed by higher priority and more precisely located targets. Currently, there are many radars carried in the ELINT order of battle (EOB) which have not been seen on photography and therefore are not precisely located. Some radar sites may in fact not exist within the presently defined general area locations. ELINT order of battle may well continue to be an important problem to U.S. intelligence during the 1970 era. The resolution and swath provided by the KH-9 would enable a far more complete and meaningful correlation of photography and SIGINT information to produce a refined and more accurate EOB. At the least, this capability would permit greater utilization of the SIGINT input to EOB production. In addition, this should make it possible to reduce some of the SIGINT satellite effort now directed against the EOB problem.

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5. Detection of Soviet Camouflage and Deception Efforts

During the past year, we have detected new and sophisticated Soviet efforts to camouflage specific targets or to experiment with camouflage and deception measures. While some of these efforts have been discernible in KH-4 photography, KH-8 coverage indicates that resolution far better than that provided by the KH-4 will be necessary to give us a high confidence in our ability to detect camouflage. We would expect that the KH-9 would significantly improve our chances of detecting a widespread and skillful camouflage program if the Soviets were to undertake such an activity.

6. Compilation of Regional Logistic and Transportation Studies

At various times in the past we have attempted to use photography from overhead sources to analyze rail, road, coastal, inland waterway and port traffic reflecting dynamic activities within large denied areas. We have found, however, that none of our sources has been able to provide photography with sufficient resolution and covering a sufficiently large area within a reasonable period of time to provide us with data for such analysis. The KH-9, with its broad swath and high resolution, would provide adequate coverage to permit us to attack a variety of these traffic analysis problems.

7. Current Intelligence and Warning/Indications

During the past year there were three crises in which current satellite photography would have been useful--the recent

On the first two of these occasions a satellite was on orbit, but photo interpretation of the areas of interest was not possible for several days after the photography had been acquired. Moreover, because the mission on orbit during the crisis was a KH-4, the resolution obtained did not contribute significantly to establishing whether

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but readout was not accomplished until after most of the fighting had concluded. No reconnaissance vehicle was on orbit when the crisis occurred. In order to obtain photographic coverage of that area, a special BLACK SHIELD mission was flown.

The performance against these three crises is illustrative of the lack of responsiveness of re-coverable satellites in crisis situations. The longer on-orbit life of the KH-9 and its multiple recovery packages are expected to provide greater possibilities of obtaining timely crisis coverage if the crisis were to occur while it was on orbit. Even so, three or more days would elapse before the photography would be available for interpretation. USIB has forwarded a recommendation for a solution to this problem to the NRO for study. See reference c.

While the KH-9 system will have only limited capabilities to deal with crisis situations in terms of timeliness of recovery and processing, it nevertheless combines two important elements--high resolution and general search capability. A common characteristic of the three crises mentioned above is that the community lacked specific information on precisely where to look, in order to observe critical events. In these and comparable future crisis situations, the ability to observe a broad geographic area at KH-9 resolution should enable one to identify with confidence significant events in a rapidly developing situation.

8. Support to Scientific and Technical Intelligence

For scientific and technical intelligence, the high resolution systems such as the KH-8 are required to provide the essential detail on foreign high-threat

In addition to the primacy of the role played by the KH-8 in support of scientific and technical intelligence, the KH-9 would have a unique capability for obtaining valuable information on certain higher priority scientific and technical intelligence problems. For example, repetitive high resolution coverage of priority R&D facilities and test range construction is deemed essential. Included would be coverage of the entire Sary Shagan Complex during a suspect ABM test. Such coverage should provide sufficient detail to correlate

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test activities and to assist in the formulation of systems concepts relating to the technical capabilities and limitations of the Soviet ABM. Similarly, [REDACTED] in China it is necessary to cover not only the current ground zero but also other installations in the area such as the main support base. Additional targets requiring similar repetitive "full area" high resolution coverage include the Moscow Defense Missile Complex, the Chinese Missile Test Rangehead, and the Tyuratam Rangehead. Such coverage would provide the basis for identification and correlation of major systems and components as well as the detection [REDACTED]

[REDACTED] Such coverage also would provide the basis for earlier detection and identification of specific new weapons and weapons systems located at test ranges and production facilities.

9. Policing of Arms Control and Disarmament Agreements

There are at least four functions relating to the intelligence problem inherent in a possible arms control and disarmament agreement toward which high resolution satellite reconnaissance can contribute. These are:

- a. Preparation of a comprehensive inventory of excluded items prior to scheduled reduction;
- b. Confirmation that arms reduction is occurring at the rate agreed;
- c. Identification of suspicious sites or buildings at which evasion might occur and which should be designated for on-site inspection; and
- d. Detection of actual evasion attempts.

The high resolution, wide swath, and long on-orbit capabilities inherent in the KH-9 reconnaissance system undoubtedly would be extremely advantageous in preparing for and monitoring an arms agreement. Supporting this conclusion is a recently completed ACDA study which indicates that the search/surveillance capability of the KH-9 might make it possible to reduce greatly the number of on-site inspectors below:

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that required if the present KH-4/KH-8 mix were the only available satellite reconnaissance. Even so, there would still be occasions when the two and one-half to three foot resolution of the KH-9 would not provide sufficient detail to enable a determination that excluded types of equipment were in fact being withdrawn on schedule or, conversely, that they were not being re-introduced. In these cases ACDA believes that either KH-8 high resolution photography would be required or that on-site inspection would be needed. Should sources other than reconnaissance indicate that evasion were being attempted, the problem for reconnaissance would closely parallel the needs for warning/indications collection since it would be necessary to photograph the installations involved in alleged evasion before concealment of equipment could occur. Even if a KH-9 were on orbit, timely collection and readout of the alleged evasion site probably could not be effected. For this task, a reconnaissance system capable of responding in near real time would be needed.

10. Detection of a Mobile Land Based ICBM System

There are certain intelligence problems which may emerge in the 1970s for which a broad area high resolution coverage capability such as the KH-9 would provide the best and possibly the only opportunity to resolve.



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Annex E

Support to Mapping, Charting, and Geodesy

1. We have been employing the KH-4 to obtain photography for high priority production of medium and small scale maps and charts world-wide and for a data bank to enable rapid response to urgent MC&G requirements in almost any contingency situation. The use of satellite photography has made it possible for the United States to obtain a strategic advantage never previously held by any country in the world, i.e., we have been producing accurate target materials (Series 20 charts) for our strike forces over the Sino-Soviet and are now undertaking production of accurate medium scale Joint Operations Graphics to cover almost any point on the earth's surface of potential military concern. This would bring obvious advantages in the event of military operations, and will provide an improved capability in those other areas of economic and engineering operations for which maps and charts are needed.

2. In addition to the medium and small scale maps and charts, however, the DoD has a strong requirement for the capability to produce a 1:50,000 series of large scale maps covering large portions of the world. These maps have the specific primary purpose of enabling the field Army artillery to obtain a first round hit using accurate map information to achieve surprise and forestall a severe loss in effectiveness, as well as the increased costs and delays inherent in the use of spotting artillery rounds. Also, we are advised that the DoD is considering other MC&G requirements which could not be met with existing systems, including even tighter positioning requirements for long-range missile and possibly tactical all-weather non-nuclear strike aircraft. In addition, there are applications in the fields of economics and engineering world-wide, domestic topo mapping of the U.S. and to support advanced weaponry that could be derived from improved satellite data.

3. In view of the value of accurate large scale map coverage, COMIREX expressed a requirement for the KH-9 system to provide geometric accuracy sufficient to enable the relative positioning accuracy necessary to support ground force artillery

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techniques and similar demanding operations. Some of us hoped at the time this requirement was developed that it could be satisfied by the main camera in the KH-9 system. However, it was later clearly established that this was not possible. This in turn led to the planned development of the 12" stellar index camera which was approved after extensive study and review. To enable rapid response to an urgent requirement for accurate large scale maps, priority collection over contingency areas, something comparable to the data bank concept approved for the KH-9, will be needed to permit the prompt or pre-planned geometric determinations of positioning and contouring which are so critical to mass production on an emergency basis. Part of the justification of the 12" SI is that mass production of large and medium scale maps and charts will be much more efficient and responsive as well as less expensive when using the product of the 12" SI camera. Where the KH-4 photography has been more efficient and less expensive in medium and small scale map production than using aircraft systems data, the KH-9 photography with its 12" SI will be even more efficient and economical. Moreover, it would make possible the production of accurate large scale maps, which could not be made from photography available from current satellite systems.

4. Those members of the intelligence community responsible for map and chart production have estimated that about 90 percent of the cultural and terrain detail needed in large scale maps can be obtained from the KH-4 photography. The main element that is missing in the KH-4 data is the geometric accuracy. The KH-9 system would provide both the geometric accuracy through the stellar index camera and the additional needed cultural and terrain detail from its main panoramic camera. If the KH-9 system, including the 12" SI camera were not flown, the U.S. would be faced with the alternative of considering a separate satellite photographic system capable of obtaining the required local geometry. While this presumably could be done as a separate project under the NRP, coverage would still be needed by panoramic systems to provide the critical fine details not available from the frame camera. The possibility of combining the 12" SI with a NASA Earth Resource Project has been mentioned. Not only do the established limitations on resolution for NASA projects preclude this as an alternative in meeting the more stringent MC&G detail requirements, but more significantly the incompatibility of mission objectives, production schedules, and

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security factors weigh heavily against such a possibility. Clearly, the timing and details required for MC&G are much more nearly aligned with military necessities and general intelligence needs.

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Annex F

Additional Benefits to be Derived from the KH-9

The KH-9, by providing both area coverage and high resolution, would answer some important future intelligence problems more expeditiously and more efficiently than can be done with present systems. Such problems include the following:

1. [REDACTED] Communications System

NSA reports that there is a growing need for exact locations and identification of [REDACTED] communication installations in the Bloc in support of SIGINT collection planning. The current resolution of the KH-4 has proven generally inadequate to locate and identify unambiguously the elements of such systems. The interrelationships of these communication facilities with each other and with military, space, and civil installations is an important requirement. In the instances where new installations in these systems have been found under optimum conditions, the KH-4 resolution was such that re-targeting by KH-8 was necessary. As mentioned above, the resolution of the KH-9 photography, together with the broad swath width provided, would make it an ideal search vehicle for the initial discovery positive identification of unlocated installations and would diminish the necessity for re-targeting of most of them for KH-8.

2. Planning and Engineering

For a number of years the U. S. Army Corps of Engineers has been developing techniques to employ satellite photography to make preliminary engineering and economic assessments of foreign areas in support of the Department of Defense and the Agency for International Development. They have achieved such success that other agencies of the U. S. Government in Project ARGO undertook to analyze possible uses of satellite photography in problems of concern to those agencies. As a result of their analysis, they determined that KH-4 photography could be used to assist in population and crop estimates and possibly

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other scientific studies needed by the Departments of Agriculture, AID, and the Departments of Interior, Commerce, and Transportation. Throughout the work undertaken by the Army in Project APEX and in Project ARGO, it has been clear that the same objectives could be obtained more efficiently and with greater confidence from photography such as that which would be provided by the KH-9. It also appears likely that some of the objectives of the Corps of Engineers and the other agencies could be refined in the light of the improved resolution of the KH-9. Some of the same problems considered by the Army's Project APEX and Project ARGO are of considerable potential interest to the intelligence community. CIA is already working with the Department of Agriculture, for example, to test the feasibility of using satellite photography to estimate crop production in denied areas.

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