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BYE-1414-70
SORS 16./32

UNITED STATES INTELLIGENCE BOARD
SIGINT COMMITTEE

SIGINT OVERHEAD RECONNAISSANCE SUBCOMMITTEE

25 June 1970

MEMORANDUM FOR: POPPY MISSION 7105 EVALUATION WORKING GROUP

SUBJECT: Draft Evaluation of POPPY Mission 7105

1. A draft evaluation of POPPY Mission 7105 is attached for your consideration. This draft is the amalgamation of inputs from the respective agencies represented on the SORS and the members of the POPPY 7105 Evaluation Working Group.

2. It is requested that you review the attached draft evaluation for clarity and accuracy. The conclusions appeared to fall out of the provided material. Recommendations are, of course, subject to further consideration in terms of the total NRP program.

3. It is suggested that this draft evaluation not be lengthened so as to become tedious and repetitious. Comments or suggestions by phone will be appreciated. The working group will meet on 7 July 1970, [redacted] CIA Headquarters, at 0930 in order to conclude this evaluation and forward it for SORS consideration.

[redacted]

CHAIRMAN
POPPY EVALUATION WORKING GROUP

5/81-033-77

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EVALUATION OF POPPY MISSION 7105

I. USIB REQUIREMENTS AGAINST WHICH POPPY, MISSION 7105, WAS DEFINED:

POPPY Mission 7105 was designed to provide an on-orbit capability at all times, available for sampling as required, to search the frequency spectrum between 100 and 15,000 MHz. The specific USIB requirements (USIB-D-41.14/246, 15 April 1965) stated objectives for general search SIGINT satellite collection which were to provide the identification of new and unusual signals whose accurate interpretation and analysis will provide information on new Sino-Soviet technological developments and by continued monitoring to detect changes in the electronic environment which could serve as indicators of unusual activity, imminence of hostilities or confirmation of information from other sources. In November 1966, USIB stated the urgent need for SIGINT Satellite collection against Soviet ABM/AES systems (USIB-D-41.14/303). In response to the latter requirement, the NRO modified POPPY Mission 7105 to provide [redacted] coverage of the frequency range from 150-3200 MHz in usable frequency increments in order to provide data for geopositioning purposes using the [redacted] technique. The

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POPPY command system was also modified to permit tasking on every orbit over the USSR; this increased by three or four orbits per day the collection orbits of previous POPPY systems.

II. POPPY MISSION 7105 CAPABILITIES

POPPY Mission 7105 retains the basic system design and functions of predecessor POPPY satellites. The basic design concept provides for the acquisition of gross frequency measurements, excellent PRF and scan rate measurements. Data derived from the intercept of the same radar pulses [redacted] within the same time frame can be utilized by the NSA [redacted] technique to provide some locational data. POPPY 7105 also carried experimental options to acquire some pulse width and pulse amplitude data. In POPPY 7105, the major emphasis was shifted towards optimizing the POPPY units for data collection to provide for ABM and EOB emitter location. POPPY 7105 consists of four independent satellite subsystems each containing 11 crystal video receiving systems; 19 of these frequency bands are duplicated in more than a single subsystem. This increased the operational capability (compared to previous POPPYs) [redacted]

Although the versatility of command was enhanced in Mission 7105 to embrace multiple band tasking, this tasking is limited to a maximum of four bands per unit at one time in order to resolve frequency ambiguities. POPPY Mission 7105 consists of four separate satellite subsystems traversing the same circular earth orbit at an equatorial inclination of approximately 70° and at an altitude of approximately 500 N.M. and spaced 50-150 N.M. apart. These separate satellite subsystems were launched together as a primary payload by an ~~ATLAS~~ THOR-AGENA booster on 31 May 1967 from the Vandenberg Western Missile Range.

III. NOMINAL COLLECTION CAPABILITIES

POPPY Mission 7105 has performed generally according to specifications. There has been intermittent operation of the receiver covering the 920-1855 MHz frequency band in the C unit. The 7105A A unit can be operated only in periods of sunlight because of ~~low~~ battery ~~voltage~~ problem which has rectified itself. The POPPY system is highly reliable and, historically, has proven to operate well beyond its specified life of one year.

IV. POPPY MISSION 7105 DATA PROCESSING

The POPPY support stations, on foreign soil, collect a total of about 100 tapes of analog recordings each week. Signals of interest (SOI), as determined by NSA priority listings, are flagged by the field site operators. The tapes are then forwarded to the NSA for processing which includes conversion to digital form for ready computer handling. POPPY support sites at [redacted] have the capability to digitize POPPY intercept data and to accomplish some processing for high priority, perishable and mobile emitter locations. Signals of interest are reported electrically by the POPPY support sites to NSA and tapes are then forwarded to NSA for review and computer processing. Computerized data distribution at NSA programming provides emitter location of [redacted] intercepts; computer printout also indicates the confidence ellipse of the emitter location. In addition, manual scanning of the computer printout permits isolation of signals of interest or new and unusual signals. The analog tapes containing these latter signals can then be manually scanned and analyzed for in-depth signal review. Approximately 40 hours of computer time per week are required for POPPY 7105 data. At a computer operation cost of approximately $300 per hour, this figure is $12,000 weekly

of machine time only. This is only part of the cost of processing inasmuch as approximately 25 hours per week are spent in the AUDICO (analog to digital conversion) procedures to digitize the data for computer handling. Cost figures for this AUDICO processing are not available nor are approximate figures for manual depth analysis time. From launch date to 1 December 1969, the NSA had recorded 2,180,000 separate, although many redundant, intercepts from POPPY Mission 7105. Of this figure, approximately 678,000 intercepts were recently removed from this file and discarded because other EOB data from other satellites had provided better locational data. Approximately 1,400,000 intercepts with no locations have been recorded as a result of computer runs. There are also approximately 98,000 entries in the history file of located signals by POPPY Mission 7105; there are no restrictions on the confidence ellipse of these locations.

V. MISSION GUIDANCE

In consonance with the USIB expressed urgency of collecting data on ABM/AES systems, the SORS has provided guidance which requested that the NRO emphasize collection

operations, using the [redacted] capabilities in all cases wherever possible, against those frequencies which ABM/AES associated emitters were believed to use. Geographical locations for target coverage are generally similar to those expressed in the USIB ABM/AES requirement. As collection operations progressed and data on certain ABM/AES systems such as the [redacted] became more plentiful, the SORS recommended a revision in priorities for collection operations against other frequencies where Soviet technology indicated a search for new/unusual emitters which may be ABM or SAM associated should be made. The mission guidance, while consisting of priority listing of frequency bands for collection to be conducted on a random time basis, considered the basic POPPY system concept of monitoring the Sino-Soviet electronic environment on a continuing basis. Such monitoring is to guard against technological surprises, but mainly to insure the detection of activity in frequency bands during known ABM activities at known locations. Following the North Korean shoot-down of a US Navy EC-121 aircraft, the NRO was requested to task POPPY Mission 7105 against specific emitters in North Korea, particularly for location purposes, but also to monitor any introduction of new Soviet or

[redacted]

Chinese threat weapons systems equipment into North Korea. This tasking continued for approximately three months; locations of prosaic equipments were determined but activity of any weapons systems was not determined. POPPY Mission 7105 has also been tasked for ocean surveillance purposes. Generally the tasking has been on a noninterference with national priority basis and usually involved only a readjustment of priorities for location processing at the POPPY support site. On presently unused orbits over ocean areas, particularly the Mediterranean and the North Atlantic, POPPY Mission 7105 was also tasked aperiodically at the request of the Navy for ocean surveillance purposes. Results of these ocean surveillance exercises permitted to supply ocean surveillance data to theatre commanders on an expeditious basis. This processing has usually been accomplished of intercepts of Soviet

Soviet vessels generally has a distinctive PRF for each emitter; this can be associated with an identifiable Soviet hull. This permits the ready surveillance of certain Soviet naval vessels by POPPY intercept and processing at the POPPY support site

VI. REVIEW OF ACQUIRED DATA

1. POPPY Mission 7105 has successfully collected many of the types of signals for which it was designed and has made contributions to the fields of technical intelligence, general search, and EOB. This mission has been a large contributor of intercepts related to Soviet radars having an ABM/AES association. For example, Mission 7105 has made the only intercept to date of the [redacted] radar signal emanating from the [redacted] Analysis of this intercept caused the intelligence community to estimate that this particular radar possessed greater sector coverage than was previously believed. This estimate indicated a Soviet concern with a missile threat from the southeast (e.g., Communist China).

2. Mission 7105 was the sole source of early intercepts of the Moscow DOG HOUSE [redacted] signal in the summer of 1967. Analyses of Mission 7105 intercepts of this signal have provided certain information about the antenna beam structure and signal format. From these it has been possible to infer that this radar was deployed and designed to detect incoming ICBM warheads from the US.

3. Other Soviet ABM/AES associated radar signals intercepted by Mission 7105 include those from [redacted] DOG HOUSE. The first intercept of a signal believed to be a candidate [redacted] emission was acquired by Mission 7105 on 22 December 1967. Technical characteristics of [redacted] signals derived from Mission 7105 intercepts have permitted the intelligence community to understand better the capability of this radar to handle multiple targets. Mission 7105 intercepts also established the location of two [redacted] in the Moscow area. The first intercept of the [redacted] at Sary Shagan, believed to be the prototype of the [redacted] was made by POPPY 7105. Mission 7105 provided the first indication of intrapulse modulation on the [redacted] signals.

4. Mission 7105 has also intercepted signals from SAM-associated, air surveillance and new Soviet shipborne radars. Analysis of intercepts aided in identifying the target tracking signal of the [redacted] engagement radar. Mission 7105 made the first intercept of signals from the Soviet [redacted] air surveillance radar in the Gorkiy area.

5. Mission 7105 provided the first data on the frequencies associated with various beams of the [redacted] radar aboard the Soviet helicopter carrier MOSKVA and thus permitted an improved intelligence assessment of its function and capabilities as an air surveillance/target acquisition radar.

6. Mission 7105 intercepts have provided the first indications of Soviet ground K-band emitters with scan characteristics of a fire control nature. These intercepts suggest a new frequency band used by radars which may have applications for missile guidance and fire control.

7. Although Mission 7105 was not designed primarily to provide EOB data, its intercepts have been processed for this purpose because of problems which developed with STRAWMAN II in the fall of 1969. POPPY EOB data are currently included with those from other satellite sources in the weekly NSA EOB report to the Strategic Air Command.

8. In 1969 and 1970, POPPY data were processed by the POPPY support site, [redacted] to provide theater commanders with locations of Soviet naval vessels in the Norwegian and Mediterranean Seas. Locations of naval vessels were achieved to an accuracy of [redacted]

Reports from [redacted] were supplied directly to theater commanders within hours of intercept.

9. In summary, analysis of POPPY 7105 intercept data has provided the intelligence community with the following intelligence information:

a. Additional understanding of some of the functions and capabilities of Soviet ABM/AES and SAM associated radars.

b. Indications of Soviet usage of K-band for certain weapon system applications.

c. Timely location information on Soviet naval vessels of importance to US tactical fleet commanders.

d. Adjunctive EOB data on an expeditious basis from specific crisis areas in support of theater commanders.

V. CONCLUSIONS

1. POPPY systems have produced some significant data over the eight-year period of this program. POPPY systems have provided reliable and useful general search capabilities in oribt to monitor certain technological advances in Soviet

[redacted]

and CHICOM electronic technology which may be acquired through radar intercepts. The inherent basic design of POPPY precludes accurate frequency measurement and the acquisition of certain other signal characteristics necessary for detailed signal analysis. The use of the POPPY systems for locational purposes, providing accurate EOB, has not made a significant addition to EOB data. This latter fault apparently stems from both the difficulty in maintaining subsystem positions to provide time of arrival data and the low priority emphasis which is placed on providing EOB from these data by NSA. Data for military EOB purposes acquired by STRAWMAN/REAPER systems are processed more rapidly, at less cost and are much more voluminous and accurate than the relatively small amount of EOB data derived from POPPY intercepts. The main attribute of POPPY, at the present time, appears to be coverage of certain K-band signals which may or may not be of significant intelligence importance. POPPY intercepts historically have been of "unknown or unidentified" emitters of which both the technical characteristics and the location are generally lacking. It is anticipated that the programmed

[redacted]

[redacted] It is also anticipated that programmed P-11s can be utilized for more complete search of the K-bands, which POPPY now covers; these P-11s should provide more detailed signal technical characteristics and locational data.

[redacted]

costly processing of redundant POPPY data. It would appear that certain NSA resources could thus be freed for application to the processing of other higher priority SIGINT satellite data. Further, the increasing possibility that the required POPPY support sites on foreign soil may be lost requires immediate consideration of options to replace the POPPY collection system and its necessary ground support sites.

VI. RECOMMENDATION

In view of the foregoing conclusions, it is recommended that the POPPY program be phased out after the launch of the next POPPY, Mission 7107. This recommendation is predicated

[redacted]

[redacted] the availability of P-11 or other payloads to monitor frequency bands from 12,000-18,000 MHz and upward. In any event, required experience factors should be achieved with other programmed systems in sufficient time to make a final decision regarding the termination of the POPPY program for national intelligence collection within the next year.

[redacted]

I. USIB REQUIREMENTS AGAINST WHICH POPPY MISSION 7105,WAS DEFINED:

A- USIB-D-41.14/246 of 15 April 1965.

1- Idendification of New and Unusual for technilogical alert.

2- Continued monitoring to detect changes in use patterns etc.

B- USIB-D-41.14/303 of Nov 66:

1- Collection against Soviet ABM/AES systems.

Tasking changes instigated by use of delayed command.

Satellite collection systems modified to provide [redacted] coverage for emitter location capability in ABM Spectrum

II. POPPY MISSION 7105 CAPABILITIES:

A- Parameters which were available in POPPY data.

Gross RF Frequency, Excellent Antenna Scan and PRFMeasurements.

Emitter Location by [redacted]

[redacted] throughout 7105ALPHA and SLX throughout 7105 BRAVO.

Multiple Collection moverage through 44 discretex bands.

19 of them duplicated in more than a single spacecraft.

Simultaneous use of only 4 bands per satellite at a time.

III. NOMINAL COLLECTION CAPABILITIES:

A- Problems Identified: = 920 to 1800 Mhz intermittency,

and Day-lite only use of 7105ALPHA, which no longer is true.

IV. POPPY MISSION 7105 DATA PROCESSING.

A- Sites

Analog

Digital

B- Functions

SOI Alerts

A-to-D data conversion

C- NSA Processing

40 hours/week of computer time @$300/hr = $12K/Week $684K/yr.

AUDICO time @25 hr/wk

Date of Launch Until 1 Dec 1969 2,180K signals recorded from 7105.

but of these [redacted] discarded.

V. MISSION GUIDANCE: Priority listing of bands by frequency for collection on a random time basis.

Ocean Surveillance Tasking = Not to Interfere basis only.

VI. Review of ACQUIRED DATA:

1. Large contributor of ABM data such as 13 Aug 69 Mishelevka sig.
2. 7105 = sole source of early intercepts of DOG HOUSE
3. Other Soviet ABM/AES associated signals = [redacted]

DOG HOUSE

[redacted]

4. SAM Associated Air Surveillance and New Soviet shipborne siganls.
5. [redacted]
6. K*BAND EMITTERS WITH FIRE CONTROL NATURE.
7. Since the Fall of 69 POPPY exploited for EOB use.
8. Ocean Surveillance from [redacted]

[redacted]

9. In summary...

VII. CONCLUSIONS:

Some significant data over the 8 year period of this program...

Reliable useful general search capbilities to monitor certain technological advances in Sovietand CHICOM

Precludes accurate frequency measurement

No significant addition to EOB data.

Apparently stems from difficulty in maintaining satellite positions.

& low NSA priority given to EOB.processing.of this data

Main attribute of POPPY at present is coverage of certain K-band signals which may or may not have significant intelligence importance.

Historic POPPY New & Unusuals with Tech characteristics and locations generally lacking.

[redacted]

SUMMARY FOR MR. LORENZEN: 30 June 1970:

1. "PACKARD" letter endorsed by DIA [redacted] wrote the endorsement). Therefore it would seem that Gen Bene[redacted]t's visit to NRL may be somewhat anticlimatic relative to the Ocean Surveillance aspects of Program "C". The "Packard Letter" has now gone to Sec. Packard and he in turn sent to NSA with a recommendation that they seek a "NO COST ALTERNATIVE". Ray POTTS group is preparing NSA response, w, what ever it is.

2. [redacted]..You remember the meeting of 22 May where [redacted] Cram's replacement) presented NSA's view on both [redacted]...It seems that the pressure for the reduction in sites is extremely heavy in the SCA and CCP areas, equating to some $60 Million this year and another $40 Million nexx year. NSA's mind was made-up and completely closed on any testimony about the merits of a collection site remaining in the vacinity of [redacted] but because we had submitted a paper whichx showed the significant potential of a site in this area they called a hasty meeting for last Friday morning and then fillibustered all the facts we had presented with plattitudes about [redacted] P-11 programs which could cover the Sino-Soviet border target areas instead of using Program "C". [redacted] John Libbert, Potts, 2 new Naval officers from the NRO [redacted] relief, and a Lcdr in the Operations Analysis group under [redacted] and [redacted] besides Lee and myself. They even admitted that no matter how strong the facts were in support of continued collection from any site near [redacted] the matter was closed as far as NSA was concerned. It iss probably up to McLucas's team to make a fight of it and from those present it doesn't seem likely. We were most concerned that their language would imply "No Confidence" in the program at time when CIA has recommended that it be phased out after Mission 7107. This recommendation is based on some unknown testimony which was offered by the agencies represented on SORS and by members of the 7105 Evaluation Working Group (PEWG) with [redacted] as the Chairman. They have seemingly overstepped their bounds by this recommendation and only the Tuesday AM meeting at Hoffman Bld will determine how serious this recommendation is being taken.

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