~~TOP SECRET~~ SCHEDULE

HANDLE VIA BYEMAN CONTROL SYSTEM

~~(S)~~ NATIONAL RECONNAISSANCE OFFICE

WASHINGTON, D.C.

EQUIPMENT CONFIRMATION

THE NRO STAFF

2 February 1972

MEMORANDUM FOR COLONEL BRADBURN/DR. NAKA

SUBJECT: KENNEN Program Field Trip

During the period 20-25 January 1972, we (Captain Draim and Major Alser) visited the principal KENNEN program contractors. The purpose of these visits was to review the status of this new program in the areas of funding, schedule, technical, facilities/hardware, and management interfaces. Captain Draim and Major Alser were accompanied by Mr. [redacted] from the KENNEN Project Office (KPO).

A summary of each contractor visit is provided below:

a. [redacted]

(1) [redacted] has responsibility for systems integration, the receiving facility, and operations facility. [redacted] and his staff provided a very comprehensive review of all program segments. They appear to be off to a good start in setting up the various contractor interfaces, security measures, software documentation, and program control rooms. They are using residual MOL program facilities wherever possible.

(2) [redacted] and all other contractors are currently working against a schedule dictated by the NRP funding constraint which projects a first launch in October 1976 (a nine-month slip from their end Phase II proposal). They are planning for management interface definition and contract negotiations in March with contract definitization in April 1972. Weekly reports in a common format will be furnished by all program contractors, and system integration meetings will be scheduled every six weeks.

(3) [redacted] is following a concept of minimum and simplified reporting and the use of "White" unclassified controls wherever possible. However, there is indication that they may be getting too deeply involved in the "nuts and bolts" aspects of the other associate and subcontractor

KENNEN HANDLE VIA BYEMAN CONTROL SYSTEM

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responsibilities. A better assessment of this will be available in late spring when their documentation controls and CCB have been established.

(4) Because of security implications, [redacted] now plans to build two 60' receiving antennas located 500' apart and a distance of about one mile from the O/F - P/F. Both antenna systems will have 6' acquisition antennas with 93' radomes. The wide-band receiving hardware is the pacing item, but no problems are expected based upon brass board development progress.

(5) The O/F development is by far [redacted] biggest and most difficult task. The creation of software models, CPAT, and interfaces with all system segments will require considerable diligence if KENNEN is to effectively satisfy the [redacted] imagery requirement on a continuing basis. The R/F - O/F - P/F is now planned as a split-level facility— 253' x 275' with 70,000 square ft in the upper working level and 30,000 square ft in the lower equipment level. About 30,000 ft has been allowed for the P/F NPIC functions. Recent [redacted] studies show that the imaging satellite can be tasked for a complete pass normally in 30 minutes from the time a target request is made. However, three minutes is sufficient for special target request cases (non-optimum targeting). [redacted] has provided for a 30% growth factor in their O/F software design and is planning on using 150 off-the-shelf items out of 300 equipment subassemblies (one of the reasons favoring their selection for the KENNEN program). The O/F - P/F will be using three 370/155 computers as the heart of the control system. There seems to be some problems in the procurement of these items for which apparently [redacted] is now responsible. We will talk with Mr. Roth (KPO) to see if a potential procurement/security problem exists.

b. [redacted]

(1) [redacted] is responsible for development of the complete imaging satellite spacecraft. [redacted] provided an excellent review of all parts of the KENNEN program except software which was covered fairly well by [redacted] earlier. The spacecraft systems engineering is showing good progress and indicates good planning on the part of [redacted] to ensure low risk in all subsystem areas.

(2) Recent design work predicts a best nadir resolution of [redacted] (perigee) and [redacted] (apogee) in the framing mode and [redacted] (perigee) and 31.5" (apogee) in the stripping mode.

The range of perigee altitudes is now shown as 145 to 300 NM with the nominal still at 188 NM. The lower altitude could provide some periodic accesses at about [redacted] GSD. Apparently, the imaging satellite can be operated down to 100-110 NM altitude by adjusting the corrector lens only. OSP is now studying the effects of the lower altitude capability on other system imagery requirements such as imaging satellite life and daily access. We will keep a close tab on this study to assess the utility of this low-altitude capability for NRP mix projections.

(3) The imaging satellite payload will be employing a shroud similar to that of [redacted] The current payload design dimensions are:

Booster Interface to Shroud Tip	~53'
Shroud Length	~42'
Outer Barrel Length	~25'
Barrel Diameter	~10'
Equipment Section Length	~10'
Aft Antenna Extension	3.5-7.5'

The imaging satellite on-orbit initial weight has grown to 17,000 pounds. Total payload and adapter weight is 20,695 pounds which allows for an additional 2,600 pounds margin into the 145 x 188 NM orbit. The single propellant tank design has been changed to three small tanks near the center of gravity and offers growth potential for more propellant should mission requirements dictate. [redacted] has simplified the imaging satellite design by eliminating complex gimbals for the sun-shade door and star trackers. They have also made provisions in the design for an on-board recorder and crypto device when these components become available.

[redacted]

[redacted]

d. [redacted]

(1) [redacted] is responsible for development of the processing facility in the KENNEN system. [redacted] and his staff provided an excellent review of all aspects of the processing facility. They are currently concentrating their efforts on defining the software and designs which will best exploit the imagery data stream. They have created a "Slim Line" readout system which demonstrates all major functions and subsystems in the processing cycle. Some of the design features which have recently been established and affect the processing facility design are:

Transducer	Framing	Stripping
Total Length (Inches)	[redacted]	
Detectors/Chip		
Chips/Module		
Modules/Array		
Detectors/Array		
Number of Arrays		
Integration Times		

(2) The contrast dynamic range is 7:1 to 200:1 at a laser image reproducer (LIR) readout of 33 and 15 ll/mm for the framing and stripping modes respectively. Calibration of detectors (4-minute period) is planned prior to every imaging satellite pass using reflected sunlight and vehicle control orientation. Recorder storage is planned for 150,000 frames or about 30M ft tape/year, and provisions have been made for off-site reproduction of magnetic tapes containing processed imagery/header data. Film width has been established at 9.5".

(3) The most critical technology in the P/F is the digital-to-analog convertor, but brass boards have demonstrated good progress such that we do not believe this technology to be of high risk any longer. On the other hand, the LIR is pushing the state of the art in requiring 1,000/5,000 scan lines/sec for the framing/stripping modes respectively. This requires a close tolerance film drive and data input/feedback synchronous spinner in the shape of a pyramid with 4 or 6 faces rotating at 75,000 rpm. [redacted] has been the prime subcontractor for this component, but the criticality of the design has recently caused [redacted] to review the [redacted] efforts as well. This will preclude contractor selection until July 1972 and will certainly require our close surveillance during the next year.

(4) Considerable work is still needed to define the P/F - O/F concept of operation and control, maintenance, and display consoles. Mid-72 is the time when better visibility in this area can be expected.

In summary, we believe KENNEN is off to a good start technology and management-wise. In the near future, we plan to visit [redacted] image chain analysis, and LIR), [redacted] (transducers), and [redacted] (LIR and on-board recorder) to complete our status review of the principal segments of the KENNEN program. In addition, we plan to discuss with OSP and the [redacted] the following areas:

a. Ground Facility Computers

b. IR Sensor Technology Effort

c. Laser Transmission of Wide Band Data

d. Imaging Satellite Altitude Limits Study

e. [redacted]

f. Privacy/Recorder Studies

g. DRS System Functions/Configuration

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