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A History of Satellite Reconnaissance Volume III-B

[redacted]

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A HISTORY OF SATELLITE RECONNAISSANCE

VOLUME IIIB [redacted]

by

Robert Perry

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November 1973

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PREFACE TO VOLUME IIIB

This portion of A History of Satellite Reconnaissance covers the period of [redacted] gestation before April 1966 as well as the development and early operational missions of that system. At the time this preface was written, in November 1973, the agreed terminal point was July 1973. Therefore nothing that relates to [redacted] or subsequent operations is detailed here, and plans for improvements are discussed only as they existed in July 1973. It seems reasonable to assume that at some later time the subsequent flight and developmental history of the system will be completed, but that must for the moment be treated as conjecture rather than promise.

The author's research for this volume was supported by [redacted] at the time of writing a consultant with Technology Service Corporation, of Santa Monica, California. The history was prepared under terms of a contract between the Directorate of Special Projects (Program A) of the National Reconnaissance Office and Technology Service Corporation.

As detailed in the following pages, [redacted] was the outgrowth of effort undertaken in two earlier pseudo-program enterprises [redacted] Both have been treated here in somewhat greater

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detail than might ordinarily be warranted, given that [redacted], as eventually operated, was strikingly different from its apparent predecessors. But the problems that beset [redacted] development from 1966 to 1971 were unmistakably derived, in considerable part, from the assumptions, premises, plans, schedules, and concepts that characterized those predecessor activities. As several principal officials of the sponsoring development agencies later conceded, [redacted] was prematurely advanced from engineering development to system development. Unwittingly, it became at once the most costly and the most lengthy of the several ambitious developments undertaken in the first 10 years of the National Reconnaissance Program. In the end it also became one of the most successful, and that happy outcome largely offset whatever criticisms might have been leveled at its pre-operational phases.

Because [redacted], as a program concept, and the [redacted] camera system as a whole were entirely CIA-managed efforts, a full history of the program should not be prepared without first reviewing CIA records. As written, this account is academically defective in that the author had no access to CIA sources. Nevertheless, the principal aspects of the total program appear to have been thoroughly documented in "Program A" records (kept in the El Segundo,

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California, offices of the NRO's Directorate of Special Projects) and in policy documents filed in the offices of the NRO staff (in suite 4C1000 of the Pentagon). To the author, therefore, it seems unlikely that any subsequent expansion or enlargement of the manuscript will cause significant alteration of either the recorded sequence of events or the interpretations attached to them.

As with earlier program history contained in this set of volumes, there is no reasonable prospect of understanding the course of events in one system program without taking account of developments elsewhere in the National Reconnaissance Program. Thus from time to time it is essential to discuss events in such programs as Corona, [redacted] Samos, and [redacted]--and to consider in the broad the plans and policies adopted by the Director of the National Reconnaissance Program, the Director of the Central Intelligence Agency, the United States Intelligence Board, the Executive Committee for the National Reconnaissance Program, and the several other officials, boards, panels, and agencies which influenced the establishment, growth, and conduct of [redacted] Many of the events so mentioned have been described in greater detail in other volumes of this history: Corona, Samos, and [redacted] for instance, are the subjects of Volumes I, IIA, IIB, and IIIA of this set of reconnaissance program histories. Readers concerned about background

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and detail that involved those programs with [redacted] should consult those other volumes.

In the interests of avoiding repetition, most interactions between [redacted] and other programs have only been summarized here. Such summaries have been included, even if occasionally repetitious of earlier volumes, in the expectation that some readers will want to have within one set of covers reasonably complete information on [redacted] alone. This volume has therefore been constructed so that it will stand alone, without recourse to other sources, although in some instances it will be necessary to consult those other sources in order to acquire a full understanding of incidents and events mentioned casually here.

The close [redacted] is the principal justification for making histories of those programs Volume IIIA and IIIB of the complete set. Keeping them physically separate from one another has an additional advantage: should it later prove feasible and appropriate to do so, each volume can be extended to include the later histories of those programs without forcing revision of these chapters and pages.

Finally, it is essential to acknowledge the very considerable assistance of Colonel Frank S. Buzard in providing detail and background

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information and in clarifying both technical and management matters that for one reason or another were either casually explained or ignored in the voluminous documentation of the [redacted] program. The source notes that follow the text do not adequately credit the comments, additions of detail, and explanations of confusing events that he provided throughout the period of background research for this volume and--most particularly--upon reviewing the initial draft. This acknowledgement must serve as the author's apology for that shortcoming of the manuscript.

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XV [redacted] - ORIGINS AND INITIAL OPERATIONS

Introduction and Background

[redacted] stemmed immediately from a program known as [redacted] which began as [redacted] was preceded by an extended period of technological rummaging about in the requirements for a new search system--a replacement for Corona and for the failed Samos E-6. The conduct of [redacted] and the subsequent emergence of a [redacted] program were marked by two years of variously intense controversies about requirements, schedules, technology, and organizational prerogatives.

Corona, it will be recalled, had never been intended to serve as more than an interim search system, a temporary and presumably inferior predecessor to other and more capable systems to be developed during the late 1950s and early 1960s. But by 1961 several of the planned successor reconnaissance satellite programs were in technical and financial difficulties while Corona was becoming an operationally effective and generally reliable search system with considerable potential for growth. How that potential should be exploited, and to what extent Corona might be utilized in the place of other and less

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attractive reconnaissance satellite systems, had become of considerable interest to the intelligence community by 1962; the composite issue of what system, if any, should eventually replace Corona, involved questions of institutional prerogatives, camera and space vehicle technology, and national requirements for overflight photography that were not acted upon until 1966 and were not fully resolved until 1970.

Once the dual-camera, stereo-capable Corona-Mural system had been proved technically feasible, it was inevitable that a still better system based on Corona concepts and hardware would be proposed. In March 1962, the CIA endorsed an Itek proposal to develop what came to be called the M-2 search system (for Corona-Mural-2). It involved the substitution of a single 40-inch f3.5 lens and a dual-platen film system for the dual-camera Corona-Mural then in use. The estimated cost of design and manufacture seemed acceptable in that the system promised to return broad-area photography with resolution of about four or five feet for considerably less than would be expended in obtaining such performance from alternative systems then proposed or in development.

The M-2 proposal was formally presented for NRO review on 24 July 1962. Six months earlier, in December 1961, the E-5 surveillance system being developed under the aegis of the original Samos

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program had been severely cut back, and in July 1962 a programming error had caused the last of the E-5 recovery capsules to stabilize in a high orbit where it would remain until decay and reentry "somewhere east of Africa" more than a year later. Lanyard, a relatively inexpensive composite of E-5 camera technology and Corona vehicles, was making reasonable progress toward a scheduled first launch in December 1962, but like E-5 and [redacted] Lanyard was predominantly a surveillance system.* [redacted] Lanyard.

Corona, E-5, and Lanyard were Itek camera developments. The need and real potential for Corona improvement was still uncertain. E-5 had been cancelled, and Lanyard was a dubious prospect. Corona, and to some extent Lanyard, represented the only satellite reconnaissance programs under CIA control. The various Samos efforts (by 1963 reduced solely to an E-6 effort with a record of five successive mission failures and a most unpromising future), [redacted] were under the cognizance of the NRO's Directorate of Special Projects, on the West Coast. If E-6 could be

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* E-5 and Lanyard were intended to be surveillance systems, and [redacted] But because only the latter became operationally available, it served as and often was characterized as a [redacted]

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made to work, and [redacted] performed as its developers anticipated, neither Itek nor the CIA could be sure of a continuing direct role in the development and operation of reconnaissance satellites.

That circumstance was well appreciated by the Department of Defense, the CIA, and all of the participating contractors. Although interagency working level relationships had been outstandingly effective during the earlier days of Corona operations, they were less so by 1963; the CIA and DOD participants in Corona were by then engaged in organizational skirmishing that was within two years to become a source of major concern to cabinet-level DOD and CIA officials.

Operating-level difficulties were paralleled by institutional conflicts at the NRO level, where they would contribute to the 1963 resignation of the CIA's designate as deputy director of the NRO (Herbert Scoville) and the later departures of an NRO director (Dr. Brockway McMillan), his CIA opposite (Dr. A. D. Wheelon), and several lesser officials. Although a variety of questions involving funding responsibilities, program management authority, and organizational prerogatives (as well as some personal differences) influenced events, a central theme in the whole period between 1962 and 1966 was the selection of a new search-mode reconnaissance satellite.

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When the M-2 proposal first was formally presented to NRO program reviewers in 1962, the E-6 "successor system" originally intended to provide better search coverage capability than Corona was entering its yet-to-be-acknowledged final decline. E-6, carrying two 36-inch focal length cameras, could in several respects provide nominally better coverage than Corona, but by late 1962 a series of sequentially introduced Corona improvements had made the E-6 relatively less attractive. Then the first two attempts to operate E-6 on orbit ended in recovery failure; perhaps as important, they had been accompanied by serious camera system malfunctions. In July and August 1962, the third and fourth E-6 missions also ended in failure. In October, E-6 seemed so little promising that Major General R. E. Greer (NRO Director of Special Projects) and Dr. J. V. Charyk (then NRO director) decided to suspend plans for the purchase of operationally configured systems. The fifth E-6 sank in the Pacific in November 1962, damaged by reentry heating. Although there were indications of acceptable on-orbit camera operation before the reentry sequence began, by that time the potential advantages of E-6 over Corona-Mural had all but disappeared. The older system was returning film images with resolutions on the order of 13 feet. Even if E-6 could

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do better--still not at all certain--and could provide broader coverage because of greater film capacity, the Corona system had reliability attractions that E-6 seemed to lack. Notwithstanding determined efforts to diagnose and correct the defects E-6 had displayed in five successive mission failures, there was no real assurance that the system could be made to work. In January 1963, therefore, Charyk cancelled the E-6 program.[1]

The still undetermined future of Corona M-2 was clouded, during the late months of 1962, by the emergence of another Corona variant, the dual-capsule Corona-J system. Although not formally approved for development until October of that year, Corona-J had actually entered a phase of engineering design in July, with a first launch scheduled for May of 1963. (Because of problems mostly external to Corona-J, actual first launch did not occur until August 1963.) Another objection to proceeding with M-2 was the proposed development of an "improved" and re-engineered E-6 utilizing proven components in place of many troublesome elements of the original. Yet another was the lack of a stated requirement for a relatively high resolution search system, although the requirements that had warranted a 1961 start on E-6 development still remained to be satisfied.

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Notwithstanding such uncertainties, the Directorate of Special Projects awarded a study contract to Eastman Kodak in January 1963 that called for examination of the high-resolution, [redacted] mission and means of performing it. [redacted] the project quickly focused on a [redacted] system providing resolutions of [redacted] to be placed in orbit by a Titan IIIC booster. The difficulties of providing [redacted] finally caused termination of that part of the study effort. The promising consequences of flying [redacted] led, however, to the development of [redacted] Moreover, research undertaken after cancellation of the original E-6 Samos program together with the search phase studies led toward [redacted] designs of 1964.

In the Spring and early Summer of 1963, CIA reconnaissance specialists had proposed two alternatives to M-2 as candidates for the "next generation" reconnaissance satellite. One was a vehicle that could be flown covertly, that could be represented to be something other than a reconnaissance vehicle. Disagreements about the validity of and need for such a concept had been involved in Scoville's resignation in June 1963.

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The second concept was even more controversial: the agency suggested the need for a system that could perform [redacted] the proposed requirement emerging from a series of studies conducted by CIA system analysts in early 1963. Such requirements uncertainties were passed on to the Purcell Panel, a special reconnaissance study group established by John A. McCone, Director of Central Intelligence, in the Spring of 1963.*

Perhaps surprisingly, the Purcell Panel concluded that [redacted] is becoming more acute. . . as the art advances." [redacted] . . would not be a wise investment of resources," the committee decided. Rather than to focus immediately on development of a new system, the NRO was urged to concentrate on improving the average quality of returns from Corona. The Purcell Panel made a number of specific suggestions for lines of research that promised to lead in that direction. But the panel suggested that

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* The "Purcell Panel," headed by E. M. Purcell, included A. F. Donovan, E. G. Fubini, R. L. Garwin, E. H. Land, D. P. Ling, A. C. Lundahl, J. G. Baker, and H. C. Yutzy--perhaps the most distinguished group of authorities on reconnaissance, space, and photography ever to be collected in one study group. Many of the

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a new system, though ultimately needed, was for the moment a lesser requirement.

The Purcell Panel report had several interesting repercussions, some of them delayed rather than immediate. One that was to become important somewhat later involved interpretation of the qualifications in the "not a wise investment" judgment. The CIA ultimately argued that the panel had endorsed development of [redacted] a modest improvement in resolution. The NRO's special projects directorate tended to emphasize the panel's view that [redacted] But in any event, the panel plainly had refused to accept the findings of an earlier study group organized by Greer, at Charyk's direction, in April 1963. Concerned with the broad issue of what should be developed in the way of a [redacted]

"Purcell Panel" members subsequently became members of the "Land Panel," which between 1965 and 1972 operated as the principal advisor for reconnaissance matters to the President's Scientific Advisory Group and the President's Science Advisor.

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(It is worth recalling that by early 1963 the E-1, E-2, E-5 and E-6 had all been cancelled, Lanyard was in some early difficulty, while [redacted] still untested, was recovering from technical and financial troubles that in October 1962 had led to major program restructuring and the assignment of a new project head. The interest of the "Ad Hoc Group" in sponsoring parallel programs and in delaying a system choice until one or the other had demonstrated its capability for effective orbital operations becomes readily understandable in that light. So does the Purcell Panel conclusion: invest first in improved Corona quality; Corona works now. High-risk technology was in disfavor in the summer of 1963.)

The new NRO director, Dr. Brockway McMillan, ordered cancellation of M-2 work at Itek in July 1963.* Itek's efforts were to be principally focused on improving Corona product quality. To that end, General Greer's directorate made a number of specific suggestions for detail changes. CIA technical specialists in reconnaissance, now concentrated under Dr. Wheelon, concluded that the proposals

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* Nonetheless, the elements of M-2 reappeared, in proposal form, at frequent intervals in later years, not finally disappearing until the availability of an operational [redacted] became reasonably certain in [redacted] In subsequent incarnations the basic M-2 was given several transitory names, Corona J-4 being the best known.

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were inadequate, so in October 1963 Wheelon called into being a new special study group--the Drell-Chapman Committee--"to explore the whole range of engineering and physical limitations on satellite photography. . ." The group, acting under a loose charter proposed by John McCone in conversation with Roswell Gilpatric (Deputy Secretary of Defense), was to be concerned not merely with Corona improvements, but also with standards and needs for new systems.

Predictably, McMillan had pronounced objections to such proceedings. He did not learn of the committee until after it had been established, he felt that its "charter" was far too broad (USIB and the NRO were nominally responsible for generating and validating requirements), and he preferred to spend NRO study funds elsewhere. McMillan also protested that Wheelon had no official role in the satellite reconnaissance program.

McCone named Wheelon his "monitor for NRO matters" three days later, and Wheelon promptly declared his intention of ". . . get[ting] the CIA into the satellite business in a contributing, not just a bureaucratic way."

The most attractive prospect for new program creation still was in the [redacted]

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[redacted]

[redacted] The Drell-Chapman Committee had been critical of progress in Corona improvement; in time, that criticism was to lead to the modifications incorporated in the Corona J-3 configuration, a remarkable improvement over the original Corona-Mural. But Corona J-3 still was only a proposal, and in any case there was agreement that no Corona redesign with less scope than the M-2 undertaking could substantially improve Corona's resolution capability. Camera specialists then believed that if resolution much better than 7 or 8 feet for about half of the returned film were wanted, refinement of the original Corona would not be sufficient.*

Two events followed in close order. On 18 November 1963, the NRO's West Coast directorate contracted with [redacted]

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* Consistent, rather than occasional, resolution of 7 to 10 feet was the Corona goal defined by the Purcell and Drell-Chapman recommendations and ultimately incorporated in the Corona J-3 program. The assumption that Corona could not generate photography with 4- to 5-foot resolutions, however much the system was modified, later proved to be incorrect. Corona J-3 ultimately provided "best resolution" of 4.5 feet.

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feasibility studies of a [redacted] That action was the somewhat delayed response to the Purcell Panel findings of June 1963. It also represented, indirectly, [redacted] undertaken on the West Coast following the cancellation of Samos E-6, earlier that year. Not quite two months later the CIA separately authorised [redacted] but specified a somewhat more ambitious design goal based on the findings of in-house CIA analyses. The CIA action was a delayed response to the Drell-Chapman Committee findings of late 1963, but it indirectly represented a continuation of the search system research approach embodied in the M-2 studies undertaken by the CIA in an effort to find a feasible improvement mode for Corona-Mural. [redacted]

The CIA's intentions were generally known to the NRO staff in December 1963, somewhat before [redacted] began work. The probability that Greer's NRO group and Wheelon's CIA group would emerge from their respective study programs with competing proposals for a new search system caused some concern among program monitors

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high in Department of Defense ranks. (The NRO charter then in effect included no provision for anything resembling the NRP Executive Committee of later years; the Director of the NRO was responsible directly to the Secretary of Defense, CIA participation being assured by the assignment of individuals to various NRO posts--including that of deputy director.) Earlier in 1963, Dr. Eugene G. Fubini, then serving as a senior technical advisor to the Deputy Secretary of Defense, had begun acting as a defense department spokesman in NRO matters. (In the Charyk era no such intermediary function had existed, Charyk having such an effective relationship with Secretary Robert S. McNamara that it was not needed.) Fubini had by late 1963 assumed the role of a mediator in the increasingly acrimonious contacts between McMillan and Wheelon.* In December, speaking with the implied authority of Cyrus Vance, newly appointed Deputy Secretary of Defense, Fubini proposed to McCone that the CIA assign total Corona responsibility to the NRO in return for a free hand in the

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* The principal source of CIA-NRO contention in 1963 was Corona management responsibility and authority. McMillan wanted to concentrate all Corona authority under a jointly staffed West Coast project office reporting to the Director, Program A (then Greer, later Brigadier General John L. Martin, Jr.). Wheelon, firmly supported by CIA Director John A. McCone, argued that CIA control of Corona should be enlarged rather than curtailed. The issue is discussed in greater detail in the first volume of this history.

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development of a new search system. McMillan apparently was unaware of the offer until McCone indirectly passed it along. He rejected the compromise out of hand, insisting that the NRO had to have full authority to control Corona and that a new search system could not be arbitrarily assigned to any organization. The disagreement thus expressed persisted into 1965. McMillan's efforts to resolve the issue by obtaining directive support either from McNamara or from the White House were unavailing. The President's Foreign Intelligence Advisory Board recommended strengthening McMillan's hand during a May 1964 meeting, but the draft Presidential directive sent forward in consequence of that meeting was never signed. (The 1964 election played some part in delaying a resolution of the several controversies that afflicted the NRO, the search system requirement, and the Corona program from May through November.)

The net effect was that by January 1964 the CIA had undertaken to sponsor studies [redacted] leading toward a [redacted] system called [redacted] and the NRO's Special Projects Directorate (Program A) had begun to support a different set of studies oriented toward a different kind of search system, [redacted] A secondary

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consequence was that the authority of the Director, NRO, either to control or to monitor the program of the CIA-sponsored effort had been successfully denied. McMillan certainly knew of the CIA's internal studies and of their general import. It does not appear that he learned of the existence of the funded studies by [redacted] until the spring of 1964, five months after their inception.[3]

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Evolution of a System

As described by [redacted] in June 1964, [redacted]

[redacted] Although optics, camera mechanism, film transport, boost, and recovery subsystems were all "new," the film transport and recovery systems [redacted] appeared to be the high risk items.*

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* To that time the only film-carrying reentry bodies to be recovered by the United States were variants on the original Corona capsule of 1958 vintage. Both E-5 and E-6 had used "large" capsules intended for recovery from the sea rather than aircatch. E-5 had faults other than in its recovery system, but that too may have been faulty--no capsules were ever recovered for examination. E-6 had been cancelled solely on the evidence of five recovery failures, and two were clearly the consequence of poor capsule design. Mercury and Gemini, NASA's man-carrying orbital systems, provided evidence that bigness was not an impossible constraint; the Mercury capsule was not unlike that tested with the E-5, for instance. But all concerned acknowledged that single "big" recovery bodies were difficult to develop, and recovery was the crucial element in any reconnaissance system of the 1960s.

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While such arrangements were being made, other events occurred that were to have a considerable influence on later developments. For one, Wheelon and McCone separately proposed to McMillan and Vance respectively that CIA responsibility for both development and operation of the [redacted]--be formally confirmed. In the

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meantime, the CIA provided scant data on the status of or plans for [redacted] and forbade [redacted] contractors to release information about their progress to any agency other than the CIA. CIA proposed to establish an internal project office initially composed of [redacted] providing technical support and serving as system integrating contractor; the principal companies concerned with [redacted] in July 1964 were [redacted]

That procedure, and particularly the withholding of [redacted] information from McMillan's staff, was a particular irritant to the NRO. It was not, however, unprecedented. In 1963, while questions about the desirability of starting Corona M-2 development were being considered, Greer and Charyk had attempted and very nearly carried off a similar coup. [redacted] When E-6 was cancelled on 31 January 1963, they very circumspectly let contracts covering the study and initial development phases of [redacted] Scoville, directing CIA

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reconnaissance activities at that time, had harshly questioned both the technical feasibility of a [redacted] and the motives that underlay its proposal. [redacted] In the face of Scoville's opposition, Charyk in mid-February 1963 formally disapproved [redacted]

Whether Scoville and the CIA ever learned the details of the effort remains uncertain. Special precautions were taken to prevent the untimely disclosure of [redacted] activity. All project work on the West Coast was conducted in a suite of offices [redacted] Probably no more than [redacted] people of the [redacted] assigned to the West Coast establishment ([redacted]

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[redacted] were aware of the activity. Even fewer were briefed in the Pentagon. [redacted]

The work continued until July 1963. By that time the contractors had completed the preliminary design of a system [redacted] The replacement of Charyk by McMillan in the Spring of 1963 and the difficulty of obtaining funds to proceed from advanced study to system fabrication were, in combination, sufficient to cause abandonment of the main program in July. [redacted] studies of [redacted] continued and certainly influenced later [redacted][4] In the event, little [redacted] was communicated to the CIA. The Agency's subsequent denial [redacted] information to McMillan and the NRO staff may not have been entirely motivated by the Charyk-Greer ploy of 1963, but there was implied jusitification for Wheelon's actions in the earlier Charyk-Greer maneuver.

By the end of June 1964, when McMillan first was exposed to a full briefing on [redacted] the CIA concluded that preliminary studies

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had been sufficiently exhaustive to confirm the feasibility of the system. The request that Vance confirm the CIA's responsibility for full development of [redacted] had been submitted. There were strong indications that the United States Intelligence Board (USIB) would shortly issue an updated [redacted] requirement to replace those dating from 1960. On 9 July, therefore, Dr. Wheelon proposed that the NRO provide the bulk of the funds needed to support a [redacted] effort during fiscal year 1965. Of that total, only about [redacted] was to be devoted to the camera system; the remainder was to go to spacecraft, booster, and system support work (including preliminary investments in the construction of a launch facility for Titan III-boosted satellites).

The timing was bad. Late in June, Dr. Fubini had been exposed to details of the [redacted] proposal and had concluded that although it had promise it also had problems, [redacted] At Fubini's urging, Vance on 8 July had ruled that although the CIA could perform whatever tests were needed to determine [redacted] feasibility, the NRO's Directorate of Special Projects should conduct comparative studies of alternative search systems. (In effect, Vance was directing continuance of both

[redacted]

but his letter did not reach the CIA until Wheelon's request for full system funding had gone to McMillan.) By January 1965, Vance suggested, enough should have been learned about the various systems to support a rational decision on the desirability of starting full system development and, if appropriate, on the choice of a system to be developed. Given that decision, [redacted] funding was extended at a level of about [redacted] a month, roughly [redacted] of the sum Wheelon had requested.[5]

The various studies of 1963-1964 and the generous investment in pre-design research to that time encouraged the July 1964 statement of a new and formal [redacted] requirement. Issued under the imprimatur of the United States Intelligence Board on 29 July, it called for a [redacted] The requirement was not obviously the product of any single faction in the intelligence community, nor was

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the coincident statement of a [redacted] requirement merely an expression of an effort to provide continuing work for both the CIA and the NRO's Special Projects directorate. The USIB had taken account of such as the Purcell, Drell-Chapman, and Land Panel studies, the comparison of M-2 and [redacted] and several lesser analyses. [redacted] neither of the proposed systems represented a fully satisfactory solution.

While the CIA-managed effort continued, chiefly under contract to [redacted] the West Coast group was devoting equivalent attention to camera system studies being prepared by [redacted] It seemed inevitable that some version of the solid-rocket augmented Titan III would serve as the boost vehicle, whatever the final system configuration.

Of the several contractors involved in some aspect of camera system design, [redacted] program office to have the most promising concept. [redacted]

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The relatively even tenor of development in parallel was rudely disturbed in February 1965; Itek abruptly renounced any intention of continuing [redacted] advising both the CIA and the NRO that the company would forego any further development work on observation satellites [redacted] The decision was motivated by Itek's continuing disagreements with the CIA's technical monitors and the Agency's insistence that Itek defer to Agency specialists in technical matters.

Wheelon concluded that Itek's action had been prompted, or at least supported, by the NRO staff and that Itek had in effect been promised [redacted] in return for withdrawing from CIA-supported [redacted] development. In fact, the NRO staff and McMillan were quite as surprised by Itek's action as were CIA officials; McMillan conscientiously advised Itek that the NRO evaluations of [redacted] to that time showed the [redacted] design to be the most attractive. McMillan had scant knowledge of [redacted] status at the time Itek withdrew, having received no written reports on the program since August 1964 and only sketchy verbal summaries. Nevertheless, because [redacted] seemed to be proceeding nicely and the withdrawal of the chief [redacted] design contractor could not but confuse and delay [redacted] progress, it seemed likely that in any near-term comparison of system proposals leading to a system selection, the [redacted] design would win easily.[7]

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The Itek affair had extensive and unexpected consequences. Perhaps most important, it exacerbated the already disharmonious relationships between the CIA and the NRO and sharpened the existing antagonism between McMillan and Wheelon. [redacted] rather than Itek, became the principal [redacted] system contractor. And, as McMillan had predicted, when the [redacted] was obliged to designate a preferred agent for [redacted] - [redacted] got the nod. But in the end expectations that the development of a new search system would proceed from exploratory development status to system development in 1965 proved optimistic. Although McMillan approved a plan to spend [redacted] in fiscal year 1966, in the event expenditures were limited to a rate [redacted] a year pending a decision on the start of the system selection process. [redacted] funding was concurrently reduced to about the same level.

For practical purposes, the effect of the Itek affair had been to delay any decision on starting development of a new [redacted] system. Approval of that start required the concerted support of the Director of Central Intelligence and the Deputy Secretary of Defense. On 24 June 1965, McMillan advised Brigadier General

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John L. Martin, Greer's successor as Director of Special Projects (Program A) for the NRO, that no agreement on a system approval process had emerged from DOD-CIA meetings and that none could be immediately expected.[8] Vice Admiral W. F. Raborn, who had succeeded McCone as CIA director in April, proposed to Vance in June that no action be taken [redacted] until the basic issue of NRO reorganization had been resolved. The NRO charter of 1963 was by mid-1965 being honored chiefly in the breach. Extensive readjustments of responsibility and authority in program management, funding control, operation of on-orbit satellites, and the program decision process had been proposed in the interim. But however sweeping the reorganization, it was unlikely to result in a working relationship that could accommodate both Wheelon and McMillan. As early as February 1965, a week before the Itek affair, the deputy NRO director had resigned in frustration; a senior CIA employee assigned to the NRO, he found himself so thoroughly distrusted by both staffs that he was almost totally ineffective. [redacted] but they were bitter competitors for funds and held divergent views on how [redacted] requirement should be satisfied.

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Raborn's intransigence on the [redacted] issue, the definition of a new NRO charter without inputs from the NRO, and the virtual collapse of communications between McMillan and Wheelon, the principal managers of the National Reconnaissance Program, had their inevitable effect early in July. McMillan privately advised the NRO staff that he planned to resign his post and return to private industry. His decision apparently was precipitated by the failure of a final effort to force a decision to develop the [redacted] Raborn balked, and was backed by the Land Panel's judgment* that as yet insufficient data were available to support the selection of a [redacted] for intensive development.[9]

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* The Land Panel, headed by Dr. Edwin Land, was created at the direction of the Special Assistant to the President for Science and Technology, Dr. Donald F. Hornig, early in July 1965. Its charter extended to "an overview of the NRP," but initially it was concerned with the technology of, requirements for, and status of search and search-surveillance systems in development or proposed for development. The group first met on 21 July 1965 and continued to meet at irregular intervals until President Nixon abolished the office of science advisor in early 1973. The panel provided specialized technical support to Hornig and his successors, operating in some respects as a counterpart (or counterweight) to the NRO and CIA technical staffs that supported the DOD and CIA members of the NRP Executive Committee. Generally, however, the Land Panel evaluated proposals, studies, and programs rather than generating them, as was the case for the CIA and NRO special staff groups.

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Although McMillan did not officially depart until 30 September, his chosen successor, Dr. Alexander H. Flax, Assistant Secretary of the Air Force (Research and Development), began to act as NRO director in July, formally exercising authority in McMillan's absence and informally monitoring NRO affairs throughout the transition period.* On 11 August 1965, the NRO charter of 1963 was supplanted by a new document that significantly altered earlier arrangements. The chief innovation was the creation of a three-member Executive Committee for the National Reconnaissance Program, composed of the Deputy Secretary of Defense, the Director of Central Intelligence, and the President's Science Advisor. The NRO director was to be a non-voting member. The committee acquired much of the executive authority previously assigned to (though not always exercised by) the Director, NRO, including program and budget approval. If the NRO Director had until then nominally possessed the authority to select and fund a new search and surveillance satellite system program, that was no longer the case. The NRP Executive Committee would thereafter make such decisions; the NRO director would oversee their execution.[10]

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* Among other personnel changes in the satellite reconnaissance program in the late months of 1965 were Major General Robert E. Greer's retirement, in July, and Dr. Albert D. Wheelon's resignation, informally announced in October.

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The program proposal that went to the Land Panel late in July from McMillan was paralleled by a program summary prepared by the [redacted] project group. After having weighed the evidence, the Land Panel advised Dr. Hornig that "there is no technical basis for selecting for development at this time one system over the other, nor does the Panel see any urgency for making a selection now rather than, say, three months from now." Hornig advised Vance, therefore, that work on all three systems [redacted] should be continued at about the same rate for at least three additional months "in order to better define the advantages and disadvantages of each system." Thus, Hornig hoped, it might be possible to substantiate the performance claims for the various proposals.[11]

Vance subsequently ruled that in the interim all effort was to be concentrated on the camera systems, which meant cessation of work on satellite vehicles, boosters, reentry capsules, and associated subsystems. That was decidedly awkward for both [redacted] managers, because in the early months of 1965 quite extensive preparations for full-scale development had included letting contracts of one sort or another with [redacted] competition was pending, while for [redacted] had tentatively been selected.[12]

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The NRO-preferred configuration of [redacted] in early August provided for a [redacted] associated with a camera capable of providing [redacted]. The payload would satisfy [redacted] coverage requirements [redacted] The incorporation of a supplemental crisis reconnaissance capabiltiy, as suggested by the Land Panel and the United States Intelligence Board, permitted complete access to [redacted]

Compliance with Vance's instructions meant stopping [redacted] actions that were taken early in September. The difficulties thus created were compounded by a special problem involving [redacted] That concern was then producing [redacted]

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[redacted]

[redacted] Something had to give. McMillan's solution was to propose transfer of [redacted] Although complex, the transfer was not unprecedented, [redacted] camera design having been shifted to [redacted] in the aftermath of the February 1965 dispute between Itek and the CIA.

McMillan's proposal went to Secretary of Defense Robert S. McNamara on 30 August; on 22 September McNamara authorized termination of the [redacted] activity and its [redacted] for

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* The NRO was involved in the Lunar Survey program because the readout camera being carried was a modest improvement of the Samos E-1 camera of 1960. Use of the E-1 camera and readout system was an economical means of performing the survey mission, the alternative being to develop a comparable camera system using NASA funds. In order to keep the nature and capability of earlier reconnaissance camera development secret, however, it was necessary to provide the E-1 through clandestine channels--which meant NRO control of the production process.

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design completion. [redacted] Finally, there emerged a clear understanding that three camera designs were to be competitively evaluated for selection as the new [redacted]

Between February 1965, when the Itek-CIA disagreement suddenly flared, and October of that year, when Flax officially succeeded McMillan as Director of the National Reconnaissance Office, virtually every aspect of the [redacted] program had radically changed. The Land Panel and the NRP Executive Committee had come into being; both were to be dominant influences in the eventual selection of a design and a system contractor. McCone, McMillan, Wheelon, Greer, and several lesser figures in the [redacted] had left government service or moved to assignments remote from satellite reconnaissance. [redacted]

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[redacted] Work on satellite and recovery vehicles, boosters, and supporting subsystems had largely ceased in September after having earlier advanced to the preliminary selection of design and development contractors.

On 6 October 1965, the Executive Committee for the National Reconnaissance Program held its initial meeting. The first order of business was the search [redacted] Colonel David L. Carter, for the NRO, and L. C. Dirks, for the CIA, briefed the committee on the three design proposals then being funded. [redacted] Although both suggested that proposals would be ready for evaluation by December 1965, there were indications that no competition could begin until sometime early in the following year.

Dr. Flax, charged by McNamara and Vance with reconciling the differences among the principals in the search [redacted] controversy, presented to the Committee a comprehensive plan for

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proceeding toward system selection in an orderly fashion, one that would overcome the earlier tendency to use [redacted] as devices in an institutional squabble. Flax had early concluded that the requirement approved by the USIB the preceding year was inappropriate in that it specified technical capability rather than an intelligence objective. He proposed, therefore, to create a technical task group composed of representatives from the CIA [redacted] and Special Projects [redacted] elements of the NRO. The task group, he suggested, would "prepare a statement of system operational requirements, . . . recommend the selection of a system configuration, . . . formulate plans for contractor selection, and . . . recommend a program plan including a schedule." Flax also advised the Committee that he intended to establish a separate task group to "define the project management structure"--which meant, in practical terms, to decide what roles the CIA and Special Projects groups would play in the eventual development of the chosen system.

Flax had prepared his ground carefully. None of the Committee principals was surprised by the carefully constructed proposal for proceeding. All had seen the material beforehand. Without much discussion, the Executive Committee endorsed the Flax plan and for the first time in two years the search [redacted] had reasonable coherence.[15]

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During its second meeting, in mid-November, the Executive Committee turned its chief attention to the many other problems of national reconnaissance. The search system requirement received brief but pointed attention. [redacted] the NRO's Comptroller, reported somewhat ominously that the Bureau of the Budget might well take "an adverse view" of the development proposal on grounds of cost. Cyrus Vance, the chairman, asked for a formal statement of the Bureau's views--particularly relevant because, owing to the various delays in the search system program, it now appeared that Corona operations would have to be extended for at least a year past the point at which the new system had been earlier scheduled to enter service. One of the interactive complications was the necessity of diverting to the procurement of additional Corona systems some of the funds earlier planned for allocation to search system development.[16]

In the meantime, Flax had issued instructions for the deliberative evaluation of search [redacted] proposals. He named the chief of the NRO staff, Brigadier General J. T. Stewart, to chair a management evaluations committee that included John McMahon of the CIA and Colonel Paul Heran of the NRO's Directorate of Special Projects. Carter, Dirks, and Colonel W. G. King (NRO Special Projects) were appointed to a technical task definition group. With interesting

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promptitude, Carter issued a preliminary paper describing the search requirement and the plan for system development. (Both had long been in preparation, of course.) The concept included use of a Titan IIID booster (including two- or three-segment strap-on solid rockets for augmentation) [redacted]

A discussion of the rationale [redacted] provided some insight into the problems the new system would confront on the way to design approval: in the judgment of Carter's group, [redacted] represented the best compromise of reliability and cost, [redacted] In the group's opinion, development [redacted] would prove troublesome; Corona had provided experience in [redacted] operations, [redacted] Finally, Carter's group maintained, [redacted]

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[redacted] argue against compromising the primary mission and configurations for [redacted]."[17]

There was no question in anybody's mind that the camera system would be the pacing item in the development. It was with some dismay, therefore, that Martin and Flax learned late in October [redacted] did not propose to complete a variety of essential tests, calibration efforts, and technical analyses until late July 1966. Until that work was in hand, there would be no fair basis for comparing the [redacted] The transfer [redacted] drawings, tools, and test data appeared to be an easy task; [redacted] was scheduled to continue until at least February 1966, by which time (the principals fervently hoped) [redacted] carrying on independently.

Flax responded, somewhat acidly, that [redacted] for completion of those activities is not compatible with the anticipated decision milestone for the new [redacted] Assuming that [redacted] would tend to favor its original design over the less familiar [redacted] Flax instructed Martin that unless [redacted] "we must . . . consider another course of action in this regard."*

*The [redacted] approaches differed in concept as well as detail. In the judgment of [redacted] managers, the [redacted] was simpler, less risky (in a technical sense), more certain to appear on time, and potentially cheaper.

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General Martin assigned to Colonel Heran the delicate task of inducing [redacted] to agree to complete the work necessary to permit evaluation of the three principal systems by 3 January 1966. After extended discussion with [redacted] officials, Heran obtained the necessary commitment, but he cautioned that owing to the short period left for completion of the scheduled work it was likely that evaluators would have less confidence in [redacted] design proposal than in the [redacted] design proposal. In passing Heran's findings to Flax, Martin urged that an additional period be provided for equalizing the confidence in the [redacted] designs, so that both [redacted] would be honestly competitive with the [redacted]

Flax accepted the altered schedule, [redacted] assurances of conscientious effort on [redacted] designs, but he was in no position to extend the period of preliminary design past that earlier specified. He insisted that by January 1966 the three designs be available for competitive evaluation, promising that evaluators would make the necessary allowances for status differences.[18] [redacted] acceded to the conditions, and on 22 November the formal transfer of the [redacted] received Martin's endorsement.[19]

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In the event, it was April 1966 rather than January before the several [redacted] proposals were eligible for the transition to a formal competition stage. The [redacted] several intervening reviews of camera system design status in December 1965 and January and March 1966 indicated that [redacted] design was developing slowly.

For practical purposes, Colonel Carter's task force spent most of its time working out the details of a Request for Proposal to be issued to [redacted] when all else was ready. The earlier rivalry between [redacted] approaches had not vanished, even though diminished by Flax's skillful assignment of responsibility to special interagency task forces. The CIA draft version of the Request for Proposal, for instance, called for inclusion of what was, in Carter's opinion, "the most optimistic [schedule] which could be envisioned" and provided for holding the formal pre-proposal briefing some two weeks before [redacted] would have completed its effort to become fully conversant with the transferred [redacted] design. But by February [redacted] was capably briefing such groups as the Land Panel on the status and prospects of both designs, and by late March Flax had concluded that nothing was to be gained by further delaying the start of a formal competition.[20]

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The main elements of Flax's proposal were a plan for source selection and a management plan. For the first of those, little that was controversial remained for decision, and in other than a casual way the NRP Executive Committee did not look into its details. The management plan, however, specified the organizational arrangement to be honored during the development of the system and thus encompassed all of the highly controversial aspects of CIA-NRO relationships that had troubled the National Reconnaissance Program for more than three years. Even in its draft form, as circulated for comment, it had evoked strong reactions from both CIA and NRO spokesmen The original proposal, as worked out in advance of the 15 October 1965 establishment of the task group on management, had represented a skillful compromise of organizational prerogatives. There was no longer any doubt that the CIA would exercise responsibility for the development of whatever camera subsystem won the competition. That much had been implied in the compromise arrangements of August 1965. But whether the sensor project office would be located with the main program office on the West Coast, as Martin wanted, or would continue to operate from CIA headquarters in Langley, Virginia, was argued at length, and the scope of sensor project office responsibility continued to be debated for months. (Would it extend to

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the surrounding spacecraft structure, to the whole of the payload-vehicle structure, or be confined merely to optics-plus-film-transport and supporting components?)

General Martin, who had been NRO staff director during much of the period when divided responsibilities and ill-defined command lines had made chaos of Corona management, argued that a combined program office was essential, that co-project-leader arrangements could never be made to work. Supported by most of the NRO staff and his own West Coast group, he held out for assigning system integrating responsibility to the principal program office and limiting the sensor project office to custody over the camera subsystem alone.

Flax eventually concluded that integration of the camera with the payload must be a System Program Office responsibility, the CIA retaining sensor subsystem design responsibility and the Program A group on the West Coast being totally responsible for the main vehicle structures. That Solomonian edict was one of the few of the Flax proposals that occasioned arguments during the Executive Committee meeting of 26 April 1966, where final decisions were confirmed. John J. Crowley, the CIA's principal agent for sensor development, urged the Committee to assign to the CIA full responsibility for the structure enclosing the sensor system as well as responsibility for the development, production, and integration of the [redacted]

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[redacted] Crowley contended, with Admiral Raborn's backing, that so extending the CIA's responsibilities would reduce the amount of interagency interface required for program management "and thereby markedly improve the possibilities of satisfactory performance within the time limits of the program."

Only one other difference of viewpoint surfaced during the Executive Committee meeting. Dr. Flax had provided that both the Special Projects Directorate and the CIA project office were to be authorized to issue program access clearances, and that each would honor without question the need-to-know determinations of the other. The CIA asked for a veto; Flax responded that his object was "to eliminate the use of security as a means of frustrating . . . legitimate access to information. . ."

The three principals of the Executive Committee met privately and alone after the briefings and discussions had ended. Vance, the chairman, advised Flax as soon as the three-man group had completed its deliberations that the program proposal had been approved precisely as submitted.[21]

What had been approved was a detailed plan for conducting competitions for sensor systems and other elements of the reconnaissance satellite and a specification of the relationships that were to

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characterize the subsequent period of development and system operation. What remained for near-term decision was the choice of a camera design and a contractor, after which questions of satellite vehicle design, subsystem design, contractor selection, and booster design and selection might be taken up in order. The plan of April 1966 envisaged completion of development and [redacted] from the date of program approval.

The effort to do away with the institutional rivalry that had marked the preceding three years of [redacted] development extended, finally, to nomenclature. In his 22 April memorandum proposing a structure and schedule for the program, Dr. Flax had noted that the system to be developed would carry the designator [redacted] On 30 April, the CIA assigned a substitute nickname: [redacted] Retroactively, it was introduced into the minutes of the Executive Committee meeting that signaled program approval. The [redacted] that had epitomized the earlier stages of the [redacted] program disappeared. None of the many principals ever expressed regret.[22]

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[redacted] Program Onset to First Flight

The situation of [redacted] and the pattern of program development as anticipated at the time of program go-ahead were fairly represented by the several papers Dr. Flax submitted on 22 April, and which the NRP Executive Committee approved for action during its 26 April meeting.

The camera system, universally acknowledged to be the pacing element in a highly interactive program, then consisted of three potential proposals from two contractors, [redacted] The principal [redacted] design represented that firm's elaboration on and improvement of a [redacted] conceptual approach and engineering construct [redacted] between 1964 and early 1966. [redacted] always been considered less promising than the [redacted] approach and was not really in competition. Itek had two designs in process, the earlier [redacted] design, transferred to [redacted] and the [redacted] design [redacted] which the NRO had earlier considered to be a prime backup to what was by April called [redacted] Flax characterized the [redacted] as "considerably changed and improved from [redacted]" Although Brockway McMillan, Flax's predecessor as NRO director,

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had endorsed and attempted to secure development approval for the [redacted] design while it still was [redacted] program, and the [redacted] design approach was generally favored by NRO special projects people over the [redacted] proposal, Flax wisely ignored all such considerations in his 22 April resume. The major problem of the moment, as Flax saw it, was how to conduct an equitable competition among [redacted] camera designs at different stages of refinement, composed to satisfy somewhat different technical and operational requirements, and representing an amalgam of studies and engineering effort by [redacted] the NRO's Directorate of Special Projects, the NRO's staff, and the CIA's Directorate of Science and Technology). [redacted] There was general agreement among USIB, NRO, and CIA authorities that what was wanted was [redacted] orbital life with [redacted] capability for [redacted] square miles, [redacted] and either [redacted]

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[redacted] The probable launch vehicle was a Titan IIID-class rocket with two 120-inch diameter strap-on three-segment solid rocket accessory boosters, although an alternative five-segment strap-on rocket had determined advocates. [redacted] seemed reasonable, although a slightly greater weight was not unlikely, given the growth tendencies of all previous reconnaissance satellites.

Flax had designed the management mode [redacted] to comply with the provisions of the 11 August 1965 NRO charter and related agreements between the CIA and the Department of Defense. That essentially meant that the CIA would retain responsibility for sensor development and sensor-related activities, and the NRO's Special Projects directorate (in Los Angeles) for all else in the total program. The two agencies would, for each segment of their assigned responsibilities, provide system engineering, system integration, and management.

Given those fundamentals, Flax proposed to distribute a system operational requirement, an RFP (request for proposal) covering the sensor system, a management plan, and a schedule of planned NRO actions. Attached to the submission that went to NRP Executive Committee members on 22 April was a set of five papers that carefully explained the rationale underlying the operational requirement, the RFP, and the management plan.

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Although both the CIA and NRO participants in the [redacted] program had conducted competitions for the spacecraft element of the total system, and both had settled on [redacted] designs, Flax proposed holding a new competition, contending that not all eligible contractors had been offered an opportunity to bid to the same requirements, and noting also that the requirements reflected in his draft system operational requirement differed in some important respects from those earlier specified.* The NRO's director urged that the recovery vehicle contracts should be recompeted for the same reasons. To arguments that recompetition was wasteful of time, Flax responded that even if the most optimistic schedule then suggested proved valid, recompetition would not delay the first launch for more than a few weeks. (He also proposed a competition for the Titan IIID strap-on solid rockets.)[23]

Implementing papers went to the CIA and NRO participants in the program on 28 April, two days after Flax received formal notification that his proposal had been approved as submitted. (Some minor points of disagreement on security arrangements remained for clarification, but that did not constitute a significant problem.) Apart from

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* [redacted]

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the set of papers submitted to the Executive Committee, the 28 April directives included directions for the assembly of a sensor source selection board, preliminary budget guidance, and a memorandum to the Air Force authorizing the start of a competition for the Titan IIID and the preparation of system package plans for both the Titan IIIC and IIID. (As with the spacecraft and recovery vehicles, a final decision on configuration and design of the launch vehicle still had not been made.)

Sensor source selection, the first order of business, was assigned to a board headed by L. C. Dirks of the CIA and composed of four additional members, two from the CIA and two from the Directorate of Special Projects. They were scheduled to receive formal inputs from [redacted] by 22 July.* Booster source selection was entrusted to a similarly constituted board chaired by [redacted] of the Titan III System Program Office. Booster proposals were due by 1 September; Flax expected contract negotiations to be completed by early November 1966.[24]

On 30 April 1966, both the Special Projects Directorate and the CIA officially established [redacted] project offices in their respective organizations. Flax confirmed the nomination of [redacted]

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* The proposals had been in preparation since February and the technical aspects of the [redacted] principal submissions were well known to the evaluators.

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of the CIA to direct sensor development and named Colonel F.S. Buzard to head the [redacted] System Program Office on the West Coast. In what was assumed to be a temporary measure, Buzard arranged to have the [redacted] office physically collocated with the existing Corona program office, sharing command of the composite organization with the Corona chief. The purpose of the arrangement was to permit Buzard to draw on the experienced Corona people to supplement his own relatively small staff resources. With the start of [redacted] development, there seemed little doubt that Corona would cease operations in the reasonably close future. Obvious advantages resided in an orderly transfer of search-system responsibility from the existing system to its successor. In the event, [redacted] became operational [redacted] as had originally been proposed, and the transition was much more gradual than Buzard had anticipated. The consequence was that at the end of [redacted] the core of the [redacted] office was composed of people who had varied earlier experience with Corona but who had also accumulated considerable [redacted] experience.

With the approval of a [redacted] program and assignment of sensor subsystem responsibility to the CIA, [redacted] Colonel Buzard negotiated the essential

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contract agreements [redacted] between 6 May and 23 May 1966, and on the latter date [redacted] began work preliminary to a proposal for [redacted] camera system development. With issuance of the request for proposals on 23 May, [redacted] became contractors to the CIA's newly created Sensor Subsystem Project Office.[25]

The matter of [redacted] became the concern of a special study group on 24 May. The CIA's earlier [redacted] schematic had been organized around the premise [redacted]

On 25 May, Flax authorized the creation of a source selection board for the Satellite Basic Assembly (SBA) under Buzard's direction. The board included four NRO and two CIA members. By 8 June the formal Request for Proposal had received Flax's endorsement and eight days later it went to [redacted] decided against participating in the competition.) Proposals were due by 22 August, one month after the scheduled receipt of sensor system proposals.

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As could have been predicted, a renewed space vehicle competition was not welcomed by [redacted] which had won [redacted] "competitions" of the previous year. [redacted] space program organization, protested to Flax that it was basically unfair [redacted] to be forced to compete [redacted] had originated the concept then being competed, had twice won competitions, had a skilled [redacted] space vehicle team available ([redacted] and represented the only experienced alternative [redacted] Flax, who was aware of the problems created by his decision to recompete the [redacted] could but point out [redacted] that conditions had changed, and that he would give consideration to [redacted] experience when selection board recommendations were submitted.[26]

Although the final report of the recovery vehicle study committee had not yet been prepared, Buzard's people began writing the proposal guidelines for the recovery vehicle in June 1966. [redacted]

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On 21 June Buzard urged Dr. Flax to approve a [redacted] but Flax decided to postpone a final decision until booster configuration and weight budget were better defined. Nonetheless, on 6 July, Flax agreed to the commencement of reviews of recovery vehicle proposals and agreed to issuance of requests for proposals by 19 July. The issuance of a Request for Proposal for the [redacted] in late August completed the formal actions needed to get [redacted] development underway, but hopes that the development itself could proceed as expeditiously were to prove unduly optimistic. Almost two years were to pass before the recovery vehicles were at last put on contract although initial estimates of first launch date for the new system postulated availability of all subsystems within 18 months of program start.[27]

On 30 August--precisely as scheduled--the sensor source selection board reported its findings to Flax. The evaluators unanimously concluded that [redacted] had the better proposal and recommended that sensor development be assigned to that contractor. The preferred design was an outgrowth of the [redacted] approach; the loser was the [redacted]

Proposals had been evaluated in two categories: technical and operational qualities, and management, production, and logistics.

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In a scoring system that permitted a maximum possible score of 100, [redacted] accumulated a total of [redacted] points and [redacted] Although the differences could be accounted for by many details of quality and resources, the board was influenced [redacted]

[redacted]

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[redacted]

Other considerations of sensor system evaluation had a lesser influence on the decision than such fundamentals, but were not ignored. In the opinion of the evaluation group, [redacted] had a "significantly larger" development risk and the production tolerances required to insure proper operation [redacted] would be much more difficult to meet than those of the [redacted]

[redacted]

"Numerous errors" in design and analysis were sufficiently serious to cause the source selection board to question the adequacy of the engineering teams that prepared the [redacted] proposals. Yet in the end there was no reason to believe that [redacted] lacked adequate technical resources. [redacted] was given a better chance of meeting the development schedule [redacted] although both schedules were admittedly tight.

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[redacted] had a very slight lead in the management, production, and logistic aspects of [redacted] proposals, and had proposed a development costing some [redacted] bid, but [redacted] costs promised to be about [redacted] and that offset the attractions of lower development costs.

In the end, [redacted]

Flax approved the findings of the source selection board as submitted. On 10 October 1966, [redacted] signed a contract calling for development of the [redacted] camera subsystem.

Flax received notice of the findings of the source selection board for the satellite assembly on 26 September 1966 and during November reviewed the initial reports of the source selection boards for the recovery vehicles [redacted] He accepted the recommendation that [redacted] develop the satellite but withheld approval of the start of satellite vehicle work until [redacted] In retrospect, that appeared to be an error of judgement because sensor design proceeded throughout that period without needed inputs from satellite vehicle designers. Through much of the intervening time, [redacted] the Sensor Subsystem Program Office apparently

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believed that [redacted] had won the competition. CIA sensor program managers and their principal supporting contractor, [redacted] encouraged a variety of [redacted] design approaches inconsistent with the [redacted] concept, but generally compatible with the [redacted] approach. When Flax formally authorized funded [redacted] work on the satellite vehicle in July 1967, virtually the first and most difficult order of business was to redesign several features of both the satellite vehicle and the camera subsystem which, by that time, had become incompatible. Much of the work [redacted] had completed between October 1966 and July 1967 had to be redone during the last six months of 1967 and the [redacted] interface definition process eventually required ten months of effort instead of the three months the System Program Office had originally allocated to that task. Still, the NRO director's decision to postpone starting work on the satellite vehicle seemed sound at the time; in his role as Assistant Secretary of the Air Force for Research and Development, Flax had recently seen [redacted] He wanted no comparable problems to afflict [redacted]

Proposals for [redacted] were returned for further work, being technically inadequate

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in several respects. [redacted] eventually won the [redacted] competition because of a superior [redacted] but almost another year passed before contracts covering those subsystems became effective.[28]

[redacted]

when the United States Intelligence Board decided to give the question formal consideration. The immediate problem was finances; if [redacted] purchases could be reduced, more money would become available for [redacted] development. [redacted] so the USIB endorsed that course in December 1966.[29]

On the assumption that satellite vehicle development would shortly be approved, and in light of delays in the start of work on other major subsystems, [redacted]

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[redacted] Contract definition for the recovery vehicles, [redacted] solid-fuel augmentation rockets for the Titan booster [redacted] but none was a pacing item in the program. Only about [redacted] spent on [redacted] by the end of 1966 was committed to subsystems other than the sensor, and most of the cost increments associated with major subsystems remained to be defined. Geodesy requirements had yet to be specified.[30] Preliminary mapping, charting, and geodesy system studies were not completed until March 1967 (and remained contentious for another year); [redacted] was not decided until May 1967.

Nevertheless, the camera subsystem continued to pace program schedules. On 3 April 1967, [redacted] advised Colonel Buzard that sensor development schedule slippages [redacted] and that if the camera were installed in the satellite vehicle [redacted] a further delay to [redacted] was likely. (The System Program Office concluded that system test requirements were such as to make camera-vehicle mating under [redacted] auspices inevitable even if not wholly desirable on other grounds.)

Colonel Buzard's organization formally recommended, on 5 May 1967, that [redacted] so contract award was again delayed.

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The first full year of [redacted] development cost [redacted] The fiscal 1968 budget was initially set at [redacted] but that sum increased by [redacted] early in the year to cover additional Titan IIID costs. The approved budget included provisions for a [redacted] an improved engine for the Titan, and the initial procurement of 10 Titan IIID's. It did not provide for development and procurement of a [redacted] deferred pending further study.[31]

Continuing problems with the [redacted] specification were linked to the camera's ability to provide useful mapping data, principally to the Army. During the Spring of 1967, [redacted] proposed a system [redacted] based on the concept of [redacted] for mapping reference. Doubts about the quality [redacted] induced Dr. Flax to convene a joint technical evaluation committee to examine [redacted] proposal. The committee members (from Program A, the CIA, and such other groups as the Army Mapping Service and the National Photographic Interpretation Center) were not impressed. They concluded that [redacted] could not meet the Army's requirement for 1:50,000 scale maps, that it promised to be excessively costly, and that the [redacted]

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[redacted] to an unacceptable degree. The committee's recommendation was to abandon efforts to incorporate mapping capability in the [redacted]

Although the System Program Office had earlier concluded that a [redacted] was needed to satisfy Army mapping requirements, action to that end was not immediately feasible because of CIA objections. But in July Flax finally announced that [redacted] had won the satellite vehicle competition of the previous summer, and contractually covered work formally began. Final contracts were not signed until December 1967, however.

In early August 1967, following the announcement that [redacted] had won the satellite vehicle contract, the [redacted] The working groups subsequently induced major changes in the design of [redacted]

Late in October 1967, [redacted] contracted to deliver [redacted] subsystems adapted for [redacted]

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[redacted] contracts were the first to be signed in the [redacted] program--other than that covering [redacted] The delay between program approval and contractual agreement was nearly 18 months. The basic problem was lack of agreement on detailed system specifications and production quantities. In November, for instance, the NRP Executive Committee reduced the initial [redacted] buy [redacted] and the Directorate of Defense Research and Engineering formally urged that a [redacted] instead of the earlier proposed [redacted] Dr. John Foster, director of the defense engineering agency, argued that no other expedient could satisfy Army needs.* The cost implications were

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* Although the Directorate of Defense Research and Engineering participated in general discussions of the National Reconnaissance Program at the Executive Committee level, Foster had no vote in program decisions and little influence on most. That constraint did not extend to geodesy and cartography, however. The tradition of tri-service participation in the reconnaissance effort generally gave the Navy a major role in passive electronic reconnaissance and assigned to the Army prime responsibility for mapping and charting. When the Argon program first was approved, in 1958, the Directorate of Defense Research and Engineering inherited from the Advanced Research Projects Agency both a sponsorship function and an active voice in mapping program decisions--reflected in the composition of the configuration control board for Argon. Argon had long since passed from the scene, but Army interests still were represented by the Directorate of Defense Research and

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alarming, given that [redacted] was edging toward substantial price increases in several areas, but the additional weight of a [redacted] was yet a larger difficulty. The fundamental objection, nonetheless, was the CIA argument that [redacted] should not carry mapping equipment at all. Again, a final decision was put off.

Although a contract covering the initial lot of 10 Titan IIID boosters became effective in December 1967 [redacted] had performed since July), problems created by the delay in starting work on the [redacted] satellite vehicle negated any progress thus implied. By the time [redacted] was legally entitled to start final design, much of the [redacted] had been configured to conform to the losing [redacted] In particular, the [redacted] design had to be changed so that the [redacted] Reconciling other aspects of the [redacted] system with the satellite vehicle forced redesign of both in December. However, the program office was finally able to let contracts for computer software, recovery parachute design and development, and communications equipment. The effect of all that was to drive budget levels from the [redacted]

Engineering whenever mapping programs were considered. Thus Foster was in one sense a spokesman for Army viewpoints. His access to and influence with the upper echelons of the Department of Defense made that an important consideration in decisions on new stellar-indexing and mapping systems.

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annual rate of September to a [redacted] rate by December 1967.* Most of the increase reflected booster purchase costs, but program changes of various sorts were important contributors.

Late in 1967, the [redacted] issue again surfaced. Deputy Secretary of Defense Paul Nitze, Chairman of the NRP Executive Committee, had become receptive to John Foster's advocacy of a [redacted] Cost-factor objections to the proposal had been countered by an Army offer to contribute [redacted] toward development. Even though no new camera could be readied in time for the first flight of [redacted] and only the Army mapping agency maintained that [redacted] was essential to the satisfaction of national requirements for maps and charts, the Army's arguments, and their sponsors, proved compelling. The Executive Committee had to accept Flax's assurances that no [redacted] could be incorporated in early [redacted] but development of that system continued and eventually the Committee agreed that it should be used in the [redacted] No formal contract was to be signed for another year--until November 1968--[redacted] continued preliminary development activities in the interim.[32]

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* [redacted]

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Eighteen months after program approval, [redacted] still was making only slow progress toward operational readiness. The difficulties of proceeding from conceptual design to engineering development had been sadly understated--as had the costs of that transition. Most delays had origins in delayed decisions and management disputes, but that did not diminish their effect. The CIA's reluctance to agree to software specifications and CIA efforts to acquire control of software programs caused delays in that area, for instance. Similar difficulties occurred elsewhere: a formal system performance requirements statement appeared in January 1968, after having survived a strenuous informal review the previous November, but immediately became a matter of contention between the CIA's sensor specialists and the main [redacted] program office. [redacted] finally signed a definitive contract for space vehicle development in January but was immediately obliged to propose a major vehicle redesign in order to accommodate camera-system changes made since [redacted] design had first been submitted, some 14 months earlier. Whether the camera subsystem would be [redacted] for installation had not yet been decided. For that matter, still unresolved questions of camera design included decisions on the film path, the kinds and quantities of test equipment, and the scope of camera system testing to be performed

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once the camera section had finally been passed on [redacted] That [redacted] would include [redacted] was certain, but whether the product of [redacted] was a study question as late as April 1968. Because of design uncertainties, no recovery vehicle contractor had yet been chosen. [redacted] had an attractive proposal in a technical sense, but the cost was unacceptably higher than for [redacted] Costs were rising, schedules were slipping, essential test articles remained undefined, and disagreements over management responsibilities repeatedly disrupted routine. Nevertheless, in April 1968 program managers agreed that [redacted] the new program goal.

Resolution of [redacted] uncertainties* early in 1968 permitted the issuance of "go-ahead" letter contracts for recovery

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* [redacted]

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vehicle development [redacted] late in May and for [redacted] camera development a month later [redacted] Formal contracts appeared on 30 September and 15 November 1968, respectively. In May, Dr. Flax settled the who-does-what argument over camera-vehicle integration responsibilities by accepting the CIA's contention that [redacted] could do the job of installing the camera system in the vehicle assembly more effectively than could [redacted] thus permitting disposition of several lesser questions still hinging on that fundamental issue.[33]

[redacted] the 1963 proposal that eventually led to [redacted] had initially been conceived as a [redacted] to replace Corona. Eventual approval of [redacted] development expanded that concept to [redacted] by incorporating the 1964 "Corona coverage at [redacted]" statement. Between 1964 and 1968, considerable advances in reconnaissance technology had affected [redacted] Corona [redacted] the former had become a highly cost-effective search system with remarkably good reliability, [redacted]

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[redacted] Several proposed unmanned camera systems with at least that resolution potential were beginning to demand attention by 1968. Further, some of the more optimistic participants in the satellite reconnaissance effort had by that time concluded that it was now feasible to undertake development of a high-resolution readout system with near-real-time capability. In the growing national uproar over the costly IndoChina War, defense budgets were becoming tighter; one consequence was that the development of expensive new satellite reconnaissance systems was becoming increasingly dependent on finding the necessary money within ceiling-limited NRP budgets. [redacted]

Starting in mid-1968, therefore, and continuing for a full year, proposals for reorientation, cutback, or cancellation of [redacted] were frequent, serious, and loud. They began routinely enough in budget bureau suggestions that [redacted] program costs were excessive and that the mission [redacted] had been designed to perform could be as well performed by other, less costly systems. That entirely legitimate issue tended to get submerged in the subsequent advocacy of particular "other" systems, partly because the McNamara tradition of proposing

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"alternatives" had become a fixture of the system evaluation process, partly because various groups within the satellite reconnaissance community had taken to sponsoring one particular system, and partly because any decision to cancel or reduce expenditures on [redacted] could not but enhance the prospects of some other proposal for reconnaissance satellite development and operations.

The opening of Strategic Arms Limitations Talks (SALT) with the Soviet Union further complicated orderly consideration of the future of [redacted] Progress in the arts of satellite reconnaissance had been so rapid in the mid-1960s that it was no longer essential to couple arms limitations to the on-site inspection of strategic weapons stockpiles and installations. The Soviet Union had consistently refused that concession; pre-1968 efforts to agree on means of verifying compliance with arms limitations agreements had grounded on the inspection issue. Although neither the Soviets nor the Americans was fully prepared to specify that all needed verification and inspection could be performed by means of cameras in orbit, de facto acceptance of that premise was evident after 1968.

Once the means had been agreed upon, however informally, the details became all important. On the American side (and conceivably on the Soviet side as well), the scope and detail of coverage required to

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confirm compliance with arms agreements were contentious issues.

[redacted]

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[redacted] could make, and [redacted] costs, thus became factors in deliberations on the long-term composition of the National Reconnaissance Program.

Such issues began to concern the NRP Executive Committee during the summer of 1968. Late in that summer, Deputy Secretary of Defense Paul Nitze, alert to the increasing costs of the [redacted] program, the remarkable new capabilities being demonstrated by other reconnaissance satellites, and the potential value of [redacted] in a SALT-agreement verification setting, instructed Dr. John Foster, Director of Defense Research and Engineering, to undertake a comprehensive evaluation of [redacted] Similar studies had been completed and reported to the Executive Committee at intervals since 1964 (although only lately had SALT been of real concern), but most had been undertaken by one or another of the several participants in the satellite reconnaissance effort (the CIA, the NRO, NPIC, DIA, and the NSA had all participated or contributed at one time or another), and Nitze wanted a fresh and entirely independent viewpoint.[34]

Cost was in no wise a new issue. But during the summer and fall of 1968 it became apparent that substantial reductions in prospective NRP budgets for fiscal years 1969 through 1973 were inevitable and that one way of offsetting them would be to cancel [redacted] The

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objection, of course, was that [redacted] returns seemed essential to satisfaction of approved NRP objectives for the post-1972 period. At that point in the discussions, the Bureau of the Budget revived an earlier suggestion that the combination of [redacted] and an improved Corona (presumably some variant of what was generally known as the Corona J-4 proposal) would satisfy the requirement at a cost perhaps [redacted] below that anticipated for [redacted] The CIA, DIA, NPIC, and NRO responded in concert that without a complete redesign (with costs then estimated to be equal to those of completing [redacted] development), Corona could never provide search resolutions much better than about 4.5 feet--and all those agencies were agreed that search resolutions better than 3.0 feet were essential to verification of arms limitations agreements. The Bureau of the Budget rejoinder that a 1.5-foot difference in resolution could not possibly be worth the [redacted] it would surely cost by 1973 had no evident effect.[35]

In November 1968 the American electorate chose Richard M. Nixon to succeed Lyndon B. Johnson as President. Nixon appointees took office in January 1969. Foster and Richard Helms, Director of Central Intelligence, were among the few senior officials to carry over from one administration to the other. Nitze was succeeded by David Packard as Deputy Secretary of Defense, and Clark Clifford,

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President Johnson's last Secretary of Defense, by Melvin Laird. Clifford had delegated responsibility for virtually all matters concerned with the National Reconnaissance Program to Nitze; Laird did the same for Packard, but kept closer tabs on NRP policy decisions than had Clifford. Laird's instructions from President Nixon were to reduce defense expenditures below the levels proposed by the Johnson Administration, and he did not propose to exempt the NRP from funding cutbacks. The new Director of the Bureau of the Budget, Robert P. Mayo, had received similar instructions: he found a ready advocacy of NRP funding cuts embedded in the permanent staff of the bureau.

Very shortly after taking over the budget bureau, Mayo proposed cancelling [redacted] Packard saw little merit in the idea (he had concluded that if any major reconnaissance program were to be cancelled it should be [redacted] a measure that would have about the same financial effect as a [redacted] cancellation), and for the moment Mayo received no support from the White House.[36]

Late in March, Mayo again marshalled budget bureau arguments against [redacted] and carried them to the President. On 9 April 1969, President Nixon ordered [redacted] to be cancelled and approved carrying [redacted] to completion.

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The rationale of the decision was extremely complex, but in essentials it derived from the evident necessity of eliminating [redacted] if the fiscal 1970-71 budget was to remain in balance, the apparent overlap of capability [redacted] in SALT terms, the impossibility of cancelling [redacted] until a replacement was operational, and the lack of any other obvious reconnaissance program candidates for cancellation. Corona was so inexpensive as compared to [redacted] that its continuation into an indefinite future would have no appreciable effect on NRP budget levels, although the development of an improved Corona to serve in lieu of [redacted] might cost from [redacted]

Both the President and his Secretary of Defense had earlier gone on record in support of the [redacted] and both had been outspoken in their criticism of the major Air Force program cancellations that marked the early years of the McNamara incumbency. That too probably was a factor in the decision; a [redacted] cancellation would go unnoticed outside the relatively small community of satellite reconnaissance specialists (and actually found favor with some in that group), while [redacted] cancellation seemed certain to stir up protests in the Pentagon, in Congress, and throughout the aerospace industry.

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Whatever the reasoning behind the 9 April decision, reconsideration was immediate. At Helms' urging, the President delayed action on [redacted] cancellation for two weeks. In that interval Helms and Packard made their objections known to the President, and on 21 April Mayo reversed his original stand. The three brought Laird to their way of thinking by late April. The fundamental argument they settled on (eventually presented by Mayo) was that [redacted] would provide a much better capability for validating any arms limitation agreement [redacted] John Foster did not fully agree, but his reservations about [redacted] (derived partly from the inconclusive study he had undertaken at Nitze's urging six months earlier) and his reaffirmation [redacted] were both offset and counterbalanced by growing evidence of large impending cost overruns [redacted] and by the surprisingly modest support [redacted] provided by influential members of the House and Senate. Given the apparent temper of the Congress, it was entirely conceivable that a cutback [redacted] funding would follow disclosure of imminent cost overruns in that program. [redacted]

What may have been a clinching argument [redacted] appeared as an independent recommendation of the Land Panel which reached the President on 6 May 1969. Dr. Land and his group favored cancelling

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[redacted]

President Nixon was sufficiently intrigued by the potential of the readout system Dr. Land advocated to make that capability the principal reconnaissance satellite objective of his administration. To implement that decision he reversed his earlier verdict on [redacted] and ordered cancellation of [redacted]

[redacted] To have cancelled [redacted] would have decimated the national capability for [redacted] operations. Proposals for extending Corona production and even for stockpiling Coronas against some future need (which presumably could have included the failure of the [redacted] development program) gained an occasional hearing thereafter, but never again did they have high-level support. The National Aeronautics and Space Administration wanted Corona for possible use in Earth Resources Survey assignments and the Department of State urged retention of Corona

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capability against crisis reconnaissance needs, but NASA was unable to finance continued Corona production and State could not overcome arguments that [redacted] would outperform Corona in a crisis reconnaissance assignment. Enough Corona systems had been ordered to protect against a serious gap in coverage should [redacted] be delayed in development--which proved notably wise--and the development of a reasonably effective and not too costly [redacted] represented another hedge against delayed [redacted] availability. Both were stopgap measures, of course; by 1969 successful [redacted] operations in 1972 had become an integral of national reconnaissance policy.[38]

During the first two years after [redacted] program approval, incurred delays had largely arisen in uncertainties of program definition and design. Their effect had been to cause a significant slippage in program schedules. Although their advocates had represented [redacted] to be fit for full system development by late 1965, not until the Spring of 1966 had a development start been approved, and not until 1968 were all of the essential elements of the [redacted] system under contract. Decisions [redacted] had been delayed far longer than could

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reasonably have been anticipated. Long after, the chief CIA manager of reconnaissance program matters concluded that insufficient background research had been performed on [redacted] in advance of the decision to proceed with full-scale system development.*

After system definition had finally been completed, an event that was difficult to date but could most accurately be assigned to mid-1968, [redacted] began to encounter the sorts of engineering and test problems that had marked the development of all earlier photographic satellites. [redacted] had come closer than any other photo-satellite to meeting its schedule, and even [redacted] had demonstrated disturbing operational shortcomings during its first year of operation. Corona had nearly been cancelled after a first year of flight experience dominated by mission failures, and all other photo-satellites of the 1960s had eventually succumbed to one or another of several

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* Carl Duckett, the CIA's Deputy Director, Science and Technology, suggested in a 15 July 1971 discussion of probable cost growth in a proposed new system that ". . . in the case of [redacted] . . we had spent little money and knew very little what we were trying to do" at the time of program approval. Although only Dr. Flax and his immediate staff seem to have expressed such misgivings while [redacted] were being roundly endorsed [redacted] in 1965-1966, that retrospective judgment seems sound. Only the camera subsystem design seems to have been reasonably well defined at the time of [redacted] approval in April 1966, and once engineering development got well underway even that changed significantly.[39]

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major flaws. Although the [redacted] program schedule made some allowances for slippages caused by unforeseen engineering difficulties, in the end they proved to be insufficient.

[redacted]

[redacted] Colonel Busard later summed up the program office viewpoint with the phrase, "if a thing is not worth doing at all, why do it well?" Nevertheless, such problems hinted at real slippages to come.

The first unrecoverable slippage of any kind was acknowledged early in 1969 [redacted] spent an unprogrammed two and one-half months of additional work in completing and testing the first qualification model of the [redacted] The disclosure of that misadventure had been preceded by a rather unsettling special review

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of [redacted] engineering work undertaken to the end of 1968; the review report highlighted [redacted] that required prompt attention. Camera subsystem development costs increased by nearly [redacted] in the first quarter of calendar 1969--a foretaste of much larger cost growth to come--and various slippages and redesign requirements forced the allocation of [redacted] in additional funds to [redacted] 40

The CIA's Sensor Subsystem Program Office initially reacted to word of potential slippages in camera development schedules by proposing to compress and abbreviate elements of the [redacted] testing program, [redacted]

Although to that time only about two months of unrecoverable slippages in the total [redacted] program had been positively identified, and schedules had been designed to accommodate at least that much slack, in June 1969 Dr. McLucas* assigned to his principal deputy, Dr. F. Robert Naka, the task of determining the viability of the [redacted] launch schedule (which then called for first flight no later than [redacted]

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* Dr. J. L. McLucas succeeded Flax as Director, National Reconnaissance Office, in April 1969.

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[redacted] Naka's evaluation,* forwarded to members of the NRP Executive Committee on 20 June, contained carefully qualified expressions of caution.

In addition to evaluating the probability that [redacted] would be launched as scheduled, Naka estimated the degree of confidence the NRO should have that the first [redacted] mission would be successful, and looked at various ways of optimizing search mission products at least possible cost. An unavoidable parallel issue was whether Corona vehicles additional to those then on order should be purchased as a safeguard against a lapse in [redacted] coverage that might occur if [redacted] operations began appreciably later than [redacted]

Naka [redacted]

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* Dr. Naka signed and reported the findings as spokesman for a committee that included [redacted] of the CIA's sensor project office and Colonel [redacted] of the NRO's Directorate of Special Projects. Although preliminary findings were forwarded to the Executive Committee in June, formal reports seem not to have been prepared until September 1969.

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[redacted] that at least one of the first three missions would be successful. Given those odds, he suggested that the 12 Coronas programmed for launch at about two-month intervals between June 1970 and July 1971 should be rescheduled to allow for at least two missions [redacted] thus insuring a minimum overlap of Corona [redacted] and providing some search coverage in the event of either a [redacted] slippage [redacted] or mission failure. Given the existing uncertainties of [redacted] scheduling, Naka also cautioned that the need for more Coronas should be reassessed in December 1969.[41]

The Naka report, standing alone, was cause for mild uneasiness. Taken together with revised estimates of [redacted] costs in fiscal 1970, however, it prompted a serious Executive Committee discussion of the future of [redacted] as a system. [redacted] had advised program managers of potentially massive [redacted] cost growth--a particularly disheartening development at a time when other elements of the National Reconnaissance Program were also in financial distress. Part of the difficulty arose from the necessity of diverting defense dollars to the increasingly costly IndoChina War; another part derived from President Nixon's assignment of a high priority to the

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effort to develop a near-real-time readout system for reconnaissance satellite applications--the target date being 1976. [redacted] David Packard, chairman of the Executive Committee, asked flatly on 8 August 1969 whether there was agreement in the Committee that [redacted] development should be continued. The vote was in favor of proceeding; there was no real alternative, although various substitute means for providing [redacted] in the 1970s still were being examined. CIA's Carl Duckett assured Packard that costs had been brought under control and that [redacted] the chief offender, had promised to be attentive to the need for careful control of costs. Although the system was somewhat behind schedule, the quality of systems then in test seemed quite good, Duckett added.

In the end, the Executive Committee approved the [redacted] budget for fiscal 1970 about as submitted, merely adding a caution that the National Reconnaissance Office must keep a sharp eye and a tight hand on costs.[42]

Costs were not unrelated to schedules, of course, and in the late months of 1969 schedules were becoming almost as worrisome as costs. To maintain the required pace of progress, several

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contractors had resorted to double and triple shifts and the extensive use of overtime. Conduct of that sort was somewhat out of fashion by late 1969, at least for most defense procurements, but for [redacted] there seemed to be no useful alternative. In the development and production of many weapon systems, the schedule urgency attached to programs was largely artificial. Major systems had characteristically been delivered from one to three years late without significantly lessening total defense effectiveness. The customary response to development delays was to slip delivery schedules and to extend the in-service life of whatever was currently in the inventory rather than to trade money for time. Aircraft program schedules, for instance, could be restructured to offset cost increases in a given fiscal period and the worst consequence was to delay the availability of some system that probably need not meet whatever schedule had originally been established. Thus overtime generally was not encouraged for normal defense procurements, and multiple shifts usually were permitted only when some critical item like ammunition was in dangerously short supply.

But the [redacted] case was in quite another category. Satellite reconnaissance systems did not stay quietly in the weapons inventory; they were expended, regularly and inevitably. If [redacted] did not appear as scheduled, some provision would have to be made for

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obtaining substitute coverage of target areas--and in late 1969 the alternatives were alarmingly few. [redacted] overtime and multiple-shift work was necessary to meet schedules that were based on the planned expenditure of existing stocks of reconnaissance satellites, chiefly Corona systems. Corona J-3 could not offset [redacted] requirements, and by 1969 there was no reasonable possibility of developing an improved Corona in time to substitute it for [redacted] Indeed, within a few months it would become impossible to order additional Corona J-3 systems in time to offset a major delay in [redacted] availability: the lead time for Corona was 18 to 24 months, which meant that systems ordered in December 1969 could not be delivered sooner than June 1971. The question of whether to spend money for [redacted] overtime and multi-shift operations or to keep [redacted] on a normal schedule and buy Corona vehicles (or the only other feasible option, [redacted] was more academic than real. The Executive Committee had little choice.

Concern did not vanish, nor did the Committee lose sight of the problem. In October 1969, Dr. Naka again reviewed [redacted] status, and although an indicated additional slippage of at least one month had appeared since August, he recommended that the decision

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on an additional Corona buy be postponed until January 1970. By January there had been no significant change, so the Committee somewhat reluctantly decided to forego the option of ordering more Corona vehicles.[43]

Dr. Naka's report did not stand alone and unsupported--or supported only by classical contractor and program office optimism. In December 1969, Brigadier General W. G. King (who in August 1969 had succeeded Major General John L. Martin, Jr., as NRO head of Program A, the Directorate of Special Projects) convened a special meeting of [redacted] principals from the program office, the sensor project office, and the major contractors to reevaluate the prospect of meeting the scheduled [redacted]*

All agreed that although the schedule was getting tighter with the gradual disappearance of slack time that had earlier been provided to accommodate inevitable engineering and test difficulties, the [redacted] was reasonable--but staying on schedule would require "vigorous action" by all concerned.[44]

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* [redacted]

A decade still earlier, he had been called on to rescue the Snark missile system after it had experienced a 300 percent cost overrun, a five-year availability slippage, and a succession of incredible technical shortfalls. He had performed admirably in both assignments. (NB: General Martin's departure was a routine reassignment after seven years with the NRO.)

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[redacted]

[redacted] Re-calibration and rework problems disarranged the [redacted] tests [redacted] in February and March 1970, causing [redacted] to substitute available satellite vehicle test sections for those originally scheduled to be so tested, but by adroit shifting about of test sections both contractors managed to stay reasonably close to the milestone schedule imposed by the [redacted] But that sort of test rescheduling caused expenditure of very nearly the last remaining reserves of slack time in the pre-launch test program. In early July 1970, Dr. McLucas was able to report to the NRP Executive Committee that notwithstanding ". . . the normal difficulties one can expect with major development programs," [redacted] still seemed achievable.[45]

Unhappily, even while Dr. McLucas was assembling his report to the Executive Committee the validity of his cautious optimism

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was eroded by events at the [redacted]

[redacted] On 10 July, therefore, the sensor program office confirmed the contractor's judgment that the second sensor system [redacted] originally scheduled for 5 September shipment, had to be substituted in first-flight schedules. It was conceivable that [redacted] could be qualified and shipped by 26 August, but given the earlier disappearance of virtually all remaining slack time in the flight readiness schedule, there was slight prospect of meeting the [redacted] Indeed, Dr. Naka reported to McLucas that [redacted] confidence in meeting the new flight schedule would remain low. By adopting a seven-day, three-shift operation, [redacted] conceivably could complete qualification and calibration of the [redacted] assembly late in September, after which arrangements for a [redacted] still might possibly be made, but the effort would cost from [redacted] in additional funds for [redacted] efforts, [redacted]

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Although the full extent of the problem was not known at the time the NRP Executive Committee met on 17 July, the implications were plain. J. R. Schlesinger, then acting Deputy Director of the Office of Manpower and Budget, promptly resurrected the proposal to buy Corona systems to fill the [redacted] gap that seemed certain to develop if the [redacted] failure was symptomatic of a major defect. Dr. Naka, whose committee had recommended bypassing that option six months earlier, explained that the last chance to order Corona systems had lapsed the previous February. If [redacted] failed, and Corona launches continued at their planned rate, there would occur a lapse of about six months before new Corona systems could be delivered. At that time [redacted] overlap still existed--assuming that [redacted] could meet a [redacted] the worst possible contingency previously examined in detail. [redacted] The decision that had to be made, Naka explained, was whether to push for an early launch so as to learn promptly what on-orbit problems [redacted] faced, or to complete a thorough sequence of tests in order to generate high confidence in flight success and accept the resulting schedule slippage.[47]

Although on the surface the potential for [redacted] looked hopeless, the sensor project office held stubbornly to that

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goal for nearly a month after the failure of [redacted] The chosen course had been to opt for an early launch rather than extended testing. [redacted] overtime costs were accepted as the price of the effort. But following arrival of the second camera payload [redacted] major problems with the [redacted] again stalled the test program. [redacted] The situation having degenerated so completely, the sensor project office conceded ". . . that they don't have a prayer of meeting [redacted][48]

[redacted] overtime authorization had been revoked a week earlier. King believed that if the various camera and film tracking problems encountered at [redacted] were promptly solved, a [redacted] first flight might still be possible. Not until he heard King's opinion did Dr. McLucas officially advise the United States Intelligence Board that the [redacted] schedule had come thoroughly unstuck.[49]

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Most of the problems proved to be [redacted] rather than [redacted] which may have made long-term prospects seem brighter, but that did not lessen the immediate gravity of the situation. Late in September, King named select teams of specialists to review the status of sensor subsystem work and once their preliminary findings had been received sent off additional "tiger teams" to look into the state of affairs at the space vehicle and recovery vehicle plants. Their reports reinforced King's preliminary judgment: if ". . . no additional significant problems occur. . [redacted] Four months had been allocated for systems integration and checkout at [redacted][50]

Although nothing resembling the major testing failures of July and August marred the [redacted] development program for the [redacted]--although in private session the Executive Committee received advice from Dr. Naka that [redacted] was a better estimate. Somewhat less inclined than in the past to accept schedule assurances at their face value, the NRP Executive Committee endorsed

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Dr. McLucas' action in providing additional insurance against extended [redacted] troubles by authorizing work on a [redacted] that would permit [redacted] to operate as a [redacted] of Corona, [redacted] as no more than Corona [redacted] Corona [redacted] They represented, at best, a means of offsetting the consequences of a temporary loss of [redacted] capability through an extended delay in [redacted] availability. [redacted] was an expensive but expedient means for providing Corona-scope search capability, with perhaps somewhat better resolution than Corona (small lots of Coronas would cost about $20 million a system), but in no sense could [redacted] be [redacted][51]

Dr. Naka's cautious appraisal of the worth of "official" [redacted] proved sound almost immediately. By the end of March, problems encountered in acoustic and thermal tests of the first payload-vehicle assembly caused program managers [redacted] and by April it had

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become apparent that the four-month allowance for payload integration and checkout should have been seven months. Late in April new delays intervened, [redacted] Then on 26 April the program office learned that extended testing [redacted] had disclosed that failure was liable to occur after [redacted] Colonel Buzard sadly advised Brigadier General Lew Allen, new Program A director, that because the [redacted] The design, he said flatly, was marginal. He therefore proposed [redacted]

Allen reacted immediately. Categorizing the possibility of on-orbit failure as "unacceptable," he halted [redacted]

The problem, when diagnosed, was almost simplistic. [redacted]

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[redacted]

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[redacted]

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[redacted] Initial Operations

[redacted] as anticipated, [redacted] operations, when they began, conformed in other respects to careful plans designed to meet that deadline. Operation of [redacted] would be as complex as the management and hardware and software problems that had proved so troublesome [redacted] The functional and organizational interrelationships of [redacted] operations would have astonished reconnaissance program managers of the early 1960s, when verbal agreements and informal memoranda constituted the bulk of operational program documentation.

The list of organizations participating in [redacted] operations was awesome--even if only principals were counted. It included COMIREX* (the United States Intelligence Board--USIB--Committee on Imagery Requirements and Exploitations); [redacted] the

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*(Acronyms and organizational abbreviations generally have not been used on these pages, except for such often-used sets of initials as NRO, NRP, USAF, and CIA. The following brief summary of operational program participants and their responsibilities is so dominated by organizations known almost exclusively by their abbreviations that it is not feasible to continue that felicitous practice, however desirable. Some acronyms are so well entrenched in conversational usage in the intelligence community that even constant users have to stop and rummage through their memories when asked to provide the full titles of such as COMIREX, SPPF, and ICRS. The reader baffled or infuriated by bureaucratic fondness for acronyms and their verbalization may pass by this section without appreciably weakening

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[redacted]

[redacted] The acronyms alone were enough to engage the attention of a trained philologist.

[redacted]

his understanding of the [redacted] program. The section has been included in deference to the canons of historiography: some muddled scholar may some day need to know what element of jargonese referred to what organization. R.P.)

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[redacted]

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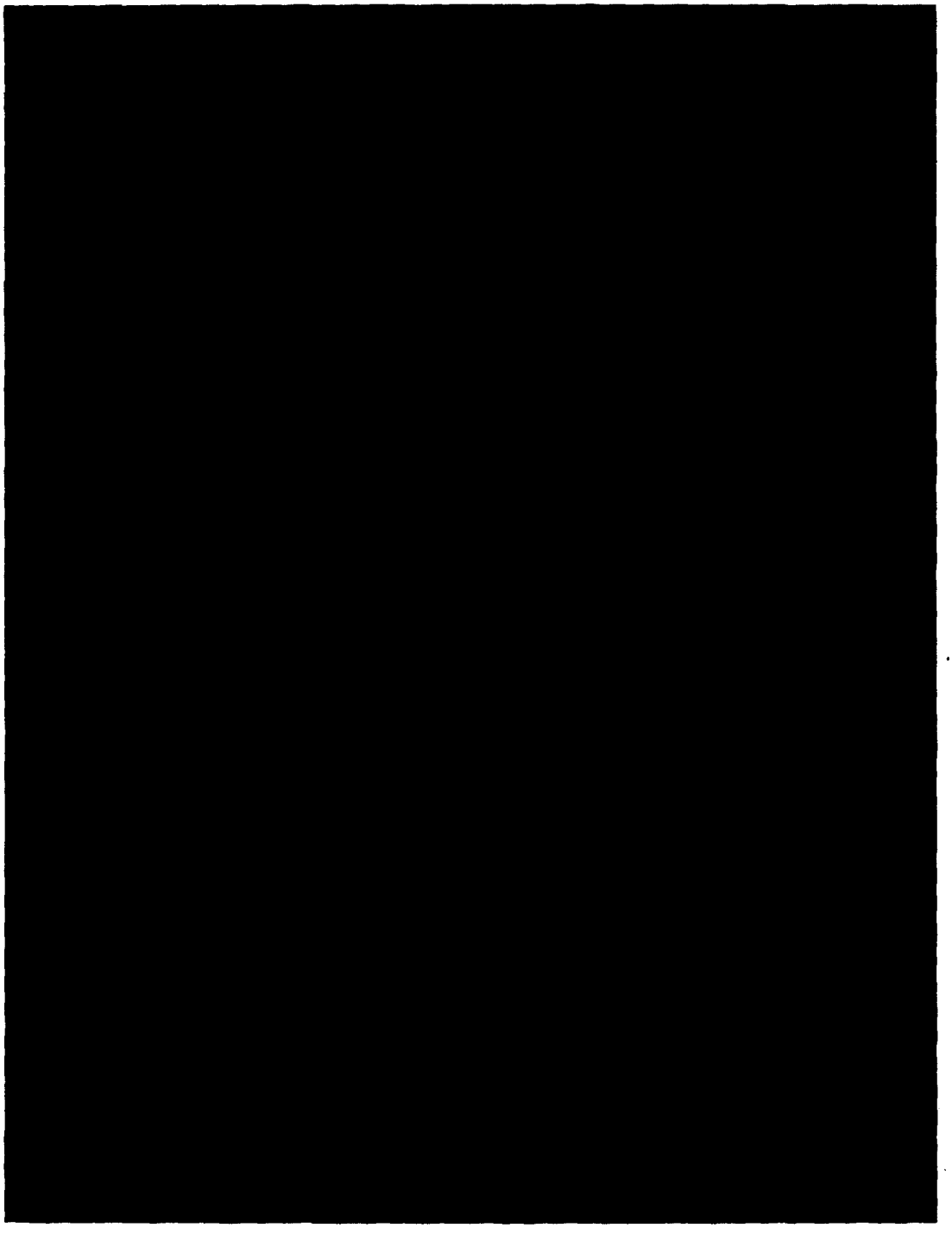

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[redacted]

[redacted] by launch

of the last Corona in May [redacted]

[redacted]

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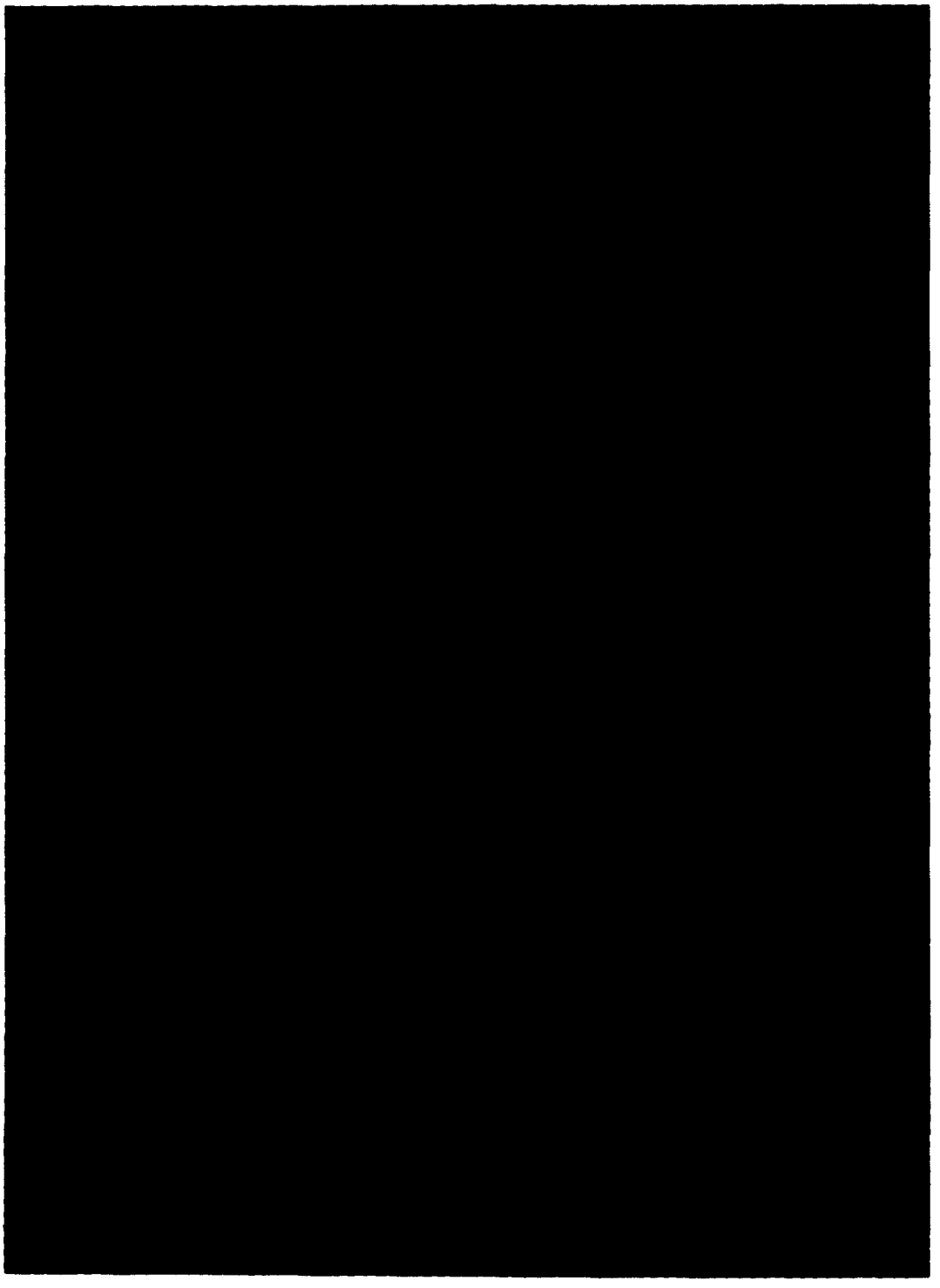

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After considering the proposal in detail and insuring that its approval would not create major funding problems, Dr. McLucas on [redacted] approved starting the study. (Dr. J. R. Schlesinger, newly-installed CIA director, had informally approved the approach in the course of a [redacted] discussion of [redacted] improvement potential.)[71]

A second development of [redacted] that had considerable significance for the future of [redacted] was the transfer of camera subsystem responsibility from the CIA's Sensor Subsystem Program Office to the NRO's Program A, the West Coast Directorate of Special Projects. Proposals for that shift of authority had been informally considered two years earlier and had reached the stage of a formal plan by [redacted]

The motivation for the transfer was not obscure. On 23 September 1971, President Nixon approved a plan to develop [redacted]* a highly ambitious near-real-time readout reconnaissance satellite,

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* Then known as [redacted] but generally referred to as "the EOI system," for electro-optical imaging.

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on a schedule that called for initial operations during 1976. Most of [redacted] was to be a CIA responsibility. With limited resources for managing reconnaissance satellite development, the CIA faced a future that encompassed both the most costly and complex of ongoing reconnaissance satellites [redacted] and a yet more costly and complex future system [redacted] In the circumstances, handing over [redacted] to the NRO's West Coast establishment seemed a wholly sensible course.

The plan for transferring [redacted] sensor responsibility reached Dr. McLucas on [redacted] the only point of residual disagreement being whether responsibility for [redacted] should be reassigned on [redacted] the CIA's principal spokesman holding out for the later date.* There was no controversy about the transfer of responsibility for [redacted] or the still undefined [redacted] all were agreed that action should be completed as rapidly as possible so that orderly planning for an improved [redacted] might proceed.[72]

Dr. McLucas chose to accept the argument for transitory CIA retention of responsibility for systems [redacted] On [redacted] he assigned immediate responsibility for [redacted] and later

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* Participants in the preparation of the transfer plan were General Allen, Harold Brownman (CIA), Dr. Naka, [redacted] (NRO Comptroller), and then-Colonel Bradburn (Director of the NRO Staff).

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systems to General Allen and expressed to the director of the CIA's reconnaissance programs his wish that arrangements be made for the timely transfer of systems [redacted] (Only the contracts with [redacted] were at issue; all other CIA-managed [redacted] contracts were shifted to Allen's custody at once.) Dr. McLucas hoped to complete all actions essential to the reassignment by the summer of [redacted] exempting only those functions (like mission simulation and statistical prediction studies) in which the CIA had an unduplicated competence.

The formal transition plan, completed and forwarded for NRO and CIA approval in [redacted] provided very largely what Dr. McLucas had suggested in response to the initial plan the preceding October. [redacted] would be transferred (to the Director, Program A--the West Coast group) effective [redacted] in accordance with contractual agreements with [redacted] which were to be formalized no later than [redacted] Certain specialized [redacted] activities of the CIA were exempted [redacted] and the CIA would retain full responsibility for [redacted]* but virtually all

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*

[redacted]

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else would be captured by the shift. The CIA agreed to provide full engineering support to Program A during the transition period. Interestingly, in light of the strong feelings that had existed at the time [redacted] working relationships were first established in 1966, the transfer agreement explicitly provided for "a free exchange of information between CIA/OSP and SAFSP on all elements of the [redacted] Program to be transferred."[73]

The Program A contract with [redacted] actually became effective on [redacted] rather than [redacted], as earlier planned, but other aspects of the transfer proceeded very nearly on schedule. The overlap of CIA-Program A efforts was generally smooth and effective. The only substantial change in procedures that resulted from the transition was a shift of acceptance point for the camera systems from the [redacted] The original justification for accepting camera systems at the [redacted] site had been the need for the contractor to deal directly with chamber test problems, part and component failures, and similar events, and the desire on the part of the [redacted] program office to make test qualification rather than extreme schedule urgency the

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prime contract incentive. As [redacted] became more familiar with space program operations, the need for the special arrangement [redacted] disappeared.*

[redacted] official, advised General Bradburn that effective [redacted] all responsibility for the camera systems for [redacted] was transferred to his organization. The Agency would continue to monitor the delivery and operation of [redacted] but funds transfer would be complete by [redacted] and that would effectively end the CIA role in [redacted] development and operations.

On the following day, General Bradburn notified Dr. McLucas of his formal acceptance of the assignment and sent a final message to [redacted] "I congratulate you on the success of the program under your leadership and I assure you we will do our very best to continue that proud record."[74]

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* It will be recalled that the CIA arrangement [redacted] was also influenced in some part by the residual distrust of the Program A staff by CIA satellite specialists, a consequence of the factionalism that had marked CIA-NRO relationships in 1964 and 1965.

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NOTES ON SOURCES

1. Details of the E-5, E-6, and Corona-Mural programs are to be found in the chapters devoted to those topics.

2. See ltr, B. McMillan, DNRO, to V/Adm W. F. Raborn, Dir CIA, 3 May 65, no subj, in DNRO files.

3. Additional details of relevant Corona, E-5, E-6, M-2, J-3, and Lanyard developments are included in chapters dealing with Corona and Samos programs. The management controversies of 1963-1966 are described in Volume V, this study. See also: Memo, E.M. Purcell, Chm, Recon Panel, to DCI, Jul 63, subj: Panel for Future Satellite Reconnaissance Operations; memo, M/Gen R.E. Greer, Dir/Progm A, to DNRO, 15 Apr 63, subj: Comparison Evaluation, and encl, Report of the Findings of the Ad Hoc Group Appointed to Evaluate Potential Systems for an Improved Search Type Satellite Reconnaissance System, Apr 63; memo, E.G. Fubini, DDR&E, to USecAF, 30 Jun 64, subj: Broad Coverage System; MFR, E. Fubini, "Dictated in Mr. McCone's Presence," 13 Jan 64; memo, C.B. Clifford, Chm, FIAB, to the President, 2 May 64, subj: National Reconnaissance Program; memo, B. McMillan, DNRO, to D/SoD, 12 Jun 64, no subj, all in DNRO files.

4. Memo, A.D. Wheelon, D/Dir S&T, CIA, to DCI, 31 Aug 64, subj: Conduct of the [redacted] Program; memo, E.G. Fubini, DDR&E, to SAFUS, 3 Jul 64, subj: Broad Coverage System; MFR, B. McMillan, DNRO, 7 Jul 64, subj: CIA Management of Satellite Projects. The [redacted]

5. Ltr, C.R. Vance, D/SOD, to DCI, DNRO, 8 Jul 64, no subj; memo, A.D. Wheelon, D/Dir (S&T), CIA, to DNRO, 9 Jul 64, subj: Funding for Project [redacted] memo, Col J. C. Ledford, Dir/Progm B, to DNRO, 10 Jul 64, subj: Addendum to Pgm B's FY 65 Budget.

6. See ltr, McMillan to Raborn, 3 May 65; SOR Description and Preliminary Plan for a New Photographic [redacted] quoting USIB Reqmts Stmts of 27 Jul and 31 Jul 64; see also SAFSP Quarterly Program Review, 31 Dec 64 (hereafter cited as QPR with date).

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7. For the Itek affair, see MFR, Col P.E. Worthman, 24 Feb 65; MFR, Worthman, 25 Feb 65; MFR, [redacted] n/d (prob 25 Feb 65); MFR, B. McMillan, 25 Feb 65; and memo, McMillan to C. Vance, D/SOD, 25 Feb 65, no subj, all in NRO files.

8. Msg, B. McMillan, DNRO, to BGen J.L. Martin, Dir/SP, 24 Jun 65; QPR 30 Jun 65; ltr, McMillan to V/Adm W.F. Raborn, Dir CIA, 3 May 65; ltr, Raborn to C. Vance, D/SOD, 25 May 65, no subj.

9. Memo, B. McMillan, DNRO, to D/SOD and Dir/CIA, 13 Jul 65, subj: New Satellite [redacted] System; memo, W.F. Raborn, DCI, to C.R. Vance, D/SOD, 20 Jul 65, no subj.

10. Agreement for Reorganization of the National Reconnaissance Program, signed by C.R. Vance, D/SOD, and W.F. Raborn, DCI, 11 Aug 65.

11. Memo, D.F. Hornig, Spec Asst to the Pres for Sci and Techn, to C.R. Vance, D/SOD, 30 Jul 65, no subj, in DNRO files. See also msg [redacted] 3335, BGen J.T. Stewart, Dir NRO Staff, to BGen J.L. Martin, Dir Prog A, 9 Jul 65.

12. Msg [redacted] 3589, B. McMillan, DNRO, to BGen J.L. Martin, Dir Progm A, 23 Aug 65.

13. Msg [redacted] 8568, SAFSP to SAFSM, 12 Aug 65.

14. Msg [redacted] 0001, B. McMillan, DNRO, to BGen J.L. Martin, Dir/SP, 22 Sep 65; msg, [redacted] 0004, McMillan to Martin, 29 Sep 65.

15. Minutes, Meeting of the NRP Executive Committee (hereafter cited as NRP ExCom) on 6 Oct 65.

16. Minutes, NRP ExCom Mtg of 16 Nov 65.

17. DNRO Action Memo No. 1, 15 Oct 65 (signed by A.H. Flax, DNRO): Terms of Reference for the Project Management Task Group for the New Photographic Satellite [redacted] System; NRO Actn Memo No. 2, 15 Oct 65:

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Terms of Reference for the Technical Task Group. . . (as above); System Operational Requirement, Description, and Preliminary Plan for a New Satellite Photographic Search and Surveillance System, 15 Oct 56 (signed by [redacted]

18. Msg, [redacted] 9174, BGen J.L. Martin, Dir/SP, to Dr A.H. Flax, DNRO, 27 Oct 65; msg, [redacted] 4061, Flax to Martin, 5 Nov 65; msg, [redacted] 9273, Martin to Flax, 7 Nov 65; msg, [redacted] 4170, Flax to Martin, 15 Nov 65.

19. Msg, [redacted] 9416, BGen J.L. Martin, Dir/SP, to EK, 22 Nov 65.

20. Msg, [redacted] 4441, BGen J.T. Stewart, Dir/NRO Staff, to BGen J.L. Martin, Dir/SP, 7 Dec 65; msg, [redacted] 4454, Stewart to Martin, 8 Dec 65; DNRO Actn Memo No 6, 7 Dec 65; memo, [redacted] to A.H. Flax, DNRO, 28 Jan 66, subj: RFP for the Photographic Subsystem for a [redacted] QPR, 31 Mar 66.

21. Minutes, NRP ExCom Mtg of 26 Apr 66; memo, BGen J.L. Martin, Jr, Dir/SP, to DNRO, 4 Nov 65, subj: Comments on Alternative Management Arrangements [redacted]

22. Memo, A.H. Flax, DNRO, to D/Sec Def, DCI, Spec Asst to Pres for Sci and Techn, 22 Apr 66, subj: [redacted]; memo, Flax to BGen J.L. Martin, Dir/SP, 30 Apr 66, subj: Implementation of [redacted] Program.

23. See memo, Flax to D/Sec Def et al, 22 Apr 66, and incls, DNRO files.

24. QPR, 30 Jun 66.

25. QPR, 30 Jun 66; msg, [redacted] 1968, BGen J.L. Martin, Dir/SP to A.H. Flax, DNRO, 6 May 66; msg, [redacted] 5274, Flax to Martin, 13 May 66; msg, [redacted] 5280, Flax to Martin, 3 May 66.

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26. Ltr, [redacted] Co, to A.H. Flax, ASAF (R&D), 14 Jun 67, no subj (reviewing "points made last year"); ltr, Flax to [redacted] 29 Jun 67, both in DNRO files.

27. QPR, 30 Jun 66, memo, A.H. Flax, DNRO, to [redacted] System Project Office, 25 May 66, subj: Instructions for Satellite Basic Assembly Source Selection; memo, BGen J.L. Martin, Dir/SP to Flax, 16 Jun 66, subj: Re-entry Vehicle Study for the [redacted] System: msg, [redacted] 5469, Flax to Martin, 6 Jul 66; memo, Flax to Re-Entry Vehicle Source Selection Advisory Council, 6 Jul 66, subj: Instructions for Re-Entry Vehicle Source Selection Study.

28. QPR 30 Sep 66; memo, L.C. Dirks, Chmn, Sensor Subsystem Source Selection Board to DNRO, 30 Aug 66, subj: [redacted] Sensor System Source Selection Board Recommendations; msg, DNRO to BGen J.L. Martin, Dir/SP, 11 Oct 66.

29. NRP ExCom Minutes, 17 Aug 66, 23 Nov 66, 16 Dec 66, 17 Nov 67.

30. QPR's of 30 Sep 66 and 31 Dec 66; minutes, NRP ExCom mtg of 23 Nov 66; memo, J.Q. Reber, Secy, NRP ExCom, to NRP ExCom, 9 Dec 66, subj: Agenda for NRP ExCom Meeting of 16 Dec 66.

31. QPR, 31 Mar 67; msg, A.H. Flax, DNRO to BGen J.L. Martin, Dir/SP, 21 Feb 67; QPR, 30 Jun 67; msg, Flax to Martin, 8 May 67.

32. Msg, A.H. Flax, DNRO, to BGen J.L. Martin, Dir/SP, 14 Jul 67; msg, Flax to Martin, 19 Jul 67; QPR, 30 Sep 67, 31 Dec 67, 31 Dec 68; minutes, NRP ExCom, mtgs, 17 Nov 67 and 20 Dec 67.

33. QPR, 31 Mar 68 and 30 Jun 68; msg, A.H. Flax, DNRO, to BGen J.L. Martin, Dir/SP, 20 May 68; msg, [redacted] SP, 10 Jun 68.

34. Minutes, NRP ExCom mtg of 20 Aug 68.

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35. BoB Position Paper, "The Need for the [redacted] Photographic Satellite," Nov 68, in NRP ExCom files. (Holograph notes by A.H. Flax, DNRO, on margins of file copy.)

36. Ltr, R.P. Mayo, Dir/BoB, to R. Helms, DCI, 22 Mar 69, no subj; ltr, [redacted] CIA, to J.L. McLucas, DNRO, 4 Apr 69; ltr, Mayo to R.M. Nixon, Pres, US, 21 Apr 69, subj: FY 1970 Intelligence Program Savings, with incls. See also memo, BGen R.A. Berg, Dir NRO Staff, to McLucas, 28 Apr 69, subj: BoB Paper on [redacted] (All in NRO files)

37. [redacted]

38. See Ch III, Vol I, this history for an account of the final Corona program extension proposals (1970-1971).

39. Minutes, NRP ExCom Mtg of 15 Jul 71.

40. QPRs, 30 Sep 68, 31 Dec 68, 31 Mar 69; minutes, NRP ExCom mtg of 20 Aug 68 and 13 Nov 68. The engineering review was conducted by a special committee headed by [redacted] see rpt, 15 Jan 69.

41. Memo, F.R. Naka (D/Dir NRO) to J.L. McLucas, DNRO, 4 Sep 69, subj: Report of [redacted] Review Committee, with atchd rpt, 20 Jun 69.

42. Minutes, NRP ExCom Mtg of 8 Aug 69.

43. Rpt, Second Report of [redacted] Review Committee, 4 Nov 69; minutes, NRP ExCom Mtg of 25 Nov 69; Third Report of [redacted] Review Committee, 22 Jan 70; memo, F.R. Naka,

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D/DNRO, to DNRO, 28 Jan 70, subj: 2nd and 3rd Reports of the [redacted] Committee; memo, J.L. McLucas, DNRO, to NRP ExCom, 2 Feb 70, subj: Adequacy of the CORONA/ [redacted] Overlap.

44. QPR, 31 Dec 69.

45. Rpt, Director's Report to the NRP Executive Committee on FY 1970 Status, FY 1971 Program, by J.L. McLucas, DNRO, 15 Jul 70; QPRs 31 Dec 69, 31 Mar 70, 30 Jun 70.

46. Memo, F.R. Naka (D/DNRO) to J.L. McLucas, DNRO, 31 Jul 70, subj: [redacted]

47. Minutes, NRP ExCom Mtg of 17 Jul 70.

48. Memo, [redacted] NRO Staff, to [redacted] Dir NRO Staff, 31 Aug 70, subj: [redacted].

49. Msg, [redacted] 7104, BGen W.G. King, Dir/SP, to J.L. McLucas, DNRO, 15 Sep 70; memo, McLucas to USIB, 18 Sep 70, subj: [redacted] Status.

50. QPR, 30 Sep 70, 31 Dec 70; msg, [redacted] 7104, King to McLucas, 15 Sep 70.

51. Minutes, NRP ExCom Mtg of 29 Jan 71.

52. Msg, [redacted] 7494, [redacted] progm mgr, to BGen L. Allen, Dir/SP, 26 Apr 71; msg, [redacted] 2478, Allen to F.R. Naka, D/DNRO, et al, 27 Apr 71; [redacted]

53. See Minutes, NRP ExCom Mtg of 13 Jul 71.

54. For details of operational responsibilities and related matters, see Rpt, [redacted] Concept of Operations, prep by SOC and publ by NPIC, Sep 70.

55. San Jose News, 20 Mar 71.

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56. See, for example, [redacted] msg, [redacted] 3085, Dir/SP to NRO staff, [redacted] ltr, J.L. McLucas, DNRO, to R. Helms, DCI, [redacted], no subj.

57. Msg, [redacted] 0834, J.L. McLucas, DNRO, to Dir/SP, et al, [redacted] rpt, Report [of the DNRO] to the President's Foreign Intelligence Advisory Board on the National Reconnaissance Program, [redacted] prep by NRO staff, [redacted]

58. Msg, [redacted] 5457, [redacted] SPO, to [redacted] CIA, [redacted] ltr, A. Lundahl, NPIC, to J.L. McLucas, DNRO (holograph ltr), [redacted] (incorrectly dated 1970 on original), no subj; QPRs, [redacted] memo, LtGen D.V. Bennett, Dir DIA, to DNRO, [redacted] subj: Photographic Satellite Launch Schedule.

59. Memo, Bennett to McLucas, [redacted], QPR, [redacted]

60. MFR, [redacted] memo, [redacted] (USArmy), to J.L. McLucas, DNRO, [redacted]

61. [redacted]

62. MFR, [redacted] Sat Ops Center, [redacted] subj: Trip Report- [redacted] Critique; msgs, [redacted] 9064, [redacted] 9155, [redacted] 9206, all [redacted] Progm Ofc et al, [redacted]

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[redacted] minutes, NRP ExCom Mtg, [redacted] memo, Bennett to DNRO, [redacted] rpt, Director's Report to the NRP Executive Committee on Current Status and FY [redacted] Fiscal Program, prep by NRO Staff, [redacted] QPRs, [redacted]

63. Memo, [redacted] NRO Staff, to J.L. McLucas, DNRO, [redacted] QPRS, [redacted]

64. QPRs, [redacted] MFR, [redacted] NRO Staff, [redacted] subj: [redacted] Program Review- [redacted]

65. QPRs, [redacted] memo, LtCol F.L. Hofmann, NRO Staff to Col J. Shields, 22 Jan 73, no subj.

66. Minutes, NRP ExCom Meetings of 23 Nov 71, 19 Jul 72, 27 Sep 72; memo, R.E. Williamson, Lockheed, to Col L.G. Stange, Ofc Dir/Spec Proj, 16 Nov 71, subj: Dr. Sorrels Briefing on 12 Nov.

67. MFR, no sig, [redacted] subj: [redacted] atchd to note, [redacted] no subj.

68. MFR, [redacted] note, [redacted] NRO Staff, [redacted] no subj.

69. Informal note, [redacted] NRO Staff, to [redacted] subj: [redacted]

70. Msgs, [redacted] 6963, BGen L. Allen, Jr, Dir/SP, to J.L. McLucas, DNRO, [redacted] and [redacted] 3746, CIA SSPO to Dir/SP, [redacted]

71. Msg, [redacted] 2357, BGen D.D. Bradburn, Dir/SP, to J.L. McLucas, DNRO, [redacted] msg, [redacted] 0557, McLucas to Bradburn, [redacted] memo, Col J.E. Kulpa, Dir NRO Staff, to McLucas, [redacted] subj: [redacted]

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72. Memo, M.R. Laird, SecDef, to Pres U.S., [redacted] subj: Readout Satellites; memo, H.A. Kissinger, Spec Asst to Pres, to Sec Def, et al, [redacted] no subj; memo, Col D.D. Bradburn, Dir NRO Staff, to J.L. McLucas, DNRO, [redacted] subj: Transfer of [redacted] Sensor Subsystem Contracts from OSP to SAFSP; memo, F.R. Naka, Dep/DNRO to McLucas, [redacted] subj: [redacted]

73. Rpt, [redacted] Transition Plan, [redacted] prep by [redacted] (CIA), [redacted] (CIA/SSPO), [redacted] (Prog A), with concurrence of [redacted] (CIA/Dir Rec Progms) and approval of BGen L. Allen, Jr (Dir/Prog A); msg, [redacted] 1565, DNRO to Dir/CIA Recce Progms and Dir/Prog A, [redacted]

74. Msgs, [redacted] 3049, L.C. Dirks, CIA, to BGen D.D. Bradburn, Dir/Prog A and J.L. McLucas, DNRO; [redacted] 3846, Bradburn to Dirks and McLucas, [redacted].

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