Description of document:	Central Intelligence Agency: (CIA) history: National Photographic Interpretation Center: The Years of Project HTAUTOMAT, 1956-1958, 6 Volumes, Directorate of Science and Technology Historical Services, NPIC-3, 1974
Request date:	25-July-2013
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Source of document:	Information and Privacy Coordinator Central Intelligence Agency Washington, D.C. 20505 Fax: 703-613-3007 File a FOIA Records Request Online

Central Intelligence Agency

Washington, D.C. 20505

31 July 2015

Reference: EOM-2013-02067

This is a final response to your letter of 25 July 2013 wherein you requested an Executive Order 13526 mandatory declassification review of the following document:

"National Photographic Interpretation Center: The Years of Project HTAUTOMAT, 1956-1958, 6 vols. Directorate of Science and Technology Historical Series, NPIC-3. 1974."

We completed a thorough search of our records and located one document, consisting of Volumes I, II, III, IV, V, and VI, responsive to your request. We have determined that the document may be released in sanitized form. We have deleted material that must remain classified on the basis of Sections 3.3(b)(1) and 3.3(b)(6) of the Order. Additional information must be withheld on the basis of Section 3.5(c) of the Order even though the information is unclassified because withholding is authorized and warranted under applicable law. Enclosed is a copy of the document showing our deletions and citing our exemptions.

You may appeal this decision by addressing your appeal to the Agency Release Panel within 45 days from the date of this letter, in my care. Should you choose to do this, please explain the basis of your appeal.

Sincerely,

Michael Lavergne

Michael Lavergne
Information and Privacy Coordinator

Enclosure

Central Intelligence Agency

Washington, D.C. 20505

SEP 18 2015

Reference: F-2015-02399

This is a final response to your 9 August 2015 Freedom of Information Act request, received in the office of the Information and Privacy Coordinator on 18 August 2015, concerning the document **"National Photographic Interpretation Center: The Years of Project HTAUTOMAT, 1956-1958, 6 Volumes, Directorate of Science and Technology Historical Services, NPIC-3, 1974."** Specifically, you request the following "missing" four pages from the following volumes that were provided to you on 31 July 2015 under reference number EOM-2013-02067:

Pages 86 and 137 (from Volume 1)
Page 343 (from Volume 2)
Page 467 (from Volume 3)

We have reviewed the original versions of the three volumes and have determined that the "missing" pages you cite do not exist. The information in the pages preceding and following the skipped page numbers do not appear to be interrupted.

Sincerely,

Michael Lavergne

Michael Lavergne
Information and Privacy Coordinator

EO 13526 3.3(b)(1)>25Yrs
EO 13526 3.5(c)

EO 13526 3.3(b)(6)>25Yrs

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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

THE YEARS OF PROJECT HTAUTOMAT, 1956 - 1958

VOLUME I

by

[redacted] 3.5(c)

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NPIC 3
December 1974
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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

THE YEARS OF PROJECT HTAUTOMAT, 1956 - 1958

VOLUME I

by

[redacted]

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Foreword

This segment of the history of the National Photographic Interpretation Center, covers the years of HTAUTOMAT, the organization devised to exploit photography collected by the U-2 reconnaissance system. HTAUTOMAT consisted of a confederation of ORR photo interpreters and OCR information-handling specialists under a single operating head, the chief of the ORR Photo Intelligence Division. Collocated with CIA personnel in the HTAUTOMAT Steuart Building were the Army, Navy, and, at times, Air Force photo interpreters.

This segment covers the exciting discoveries on photography from the initial group of missions that penetrated western European Russia in July 1956 and the abrupt transition to use of the U-2 to gather indications and tactical information relating to the Suez crisis later that year. It continues with the acquisition, in the summer of 1957, of photography covering nuclear and missile installations in Soviet Central Asia and the spectacular success of JAM SESSION, the unprecedented all-source effort undertaken to exploit that photography. It closes with the termination of Project HTAUTOMAT and the establishment of a permanent organization at the Office level, the CIA Photographic Intelligence Center, to carry on the interpretation of high-resolution photography from the U-2 and from advanced overhead reconnaissance systems then under development.

As in the earlier history, documents such as monthly reports, memorandums, minutes of meetings, and photographic intelligence publications provide most of the basic facts and dates. Recollections of key HTAUTOMAT personnel add the human interest. Unless noted otherwise, references cited in this volume are available in the NPIC Historical Collection, housed in the NPIC Library.

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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER
THE YEARS OF PROJECT HTAUTOMAT, 1956 - 1958

VOLUME I

I. The First Looks Behind the Iron Curtain

With removal of the OCR Statistical Branch* and most of the ORR Photo Intelligence Division to new quarters in the Steuart Building on 9 July 1956, 1/** full-scale implementation of Project HTAUTOMAT*** had begun (Figure 1).**** Here, on the upper floors of a

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* The Statistical Branch was established to provide non-PI support to photo interpreters; its formation is described in DDI history, NPIC-2, *Antecedents and Early Years, 1952-56*, pp. 139-147. See also pp. 3, 12-14, below.

** For serially numbered source references, see Appendix C.

*** It is explained in NPIC-2, cited above, p. 139, that Arthur C. Lundahl who became chief, Project HT-AUTOMAT, chose the name base AUTOMAT because he "envisaged the operation as the Horn and Hardart of the Intelligence Community, with its doors never tightly closed and with customers going in and out, day and night."

**** The figures (photographs) are bound together in Volumes IV, V and VI.

building housing a downtown automobile sales and service organization, photo interpreters from the Office of Research and Reports (ORR) working with collateral and other support personnel from the Office of Central Reference (OCR) joined forces as an all-source photo interpretation and publication unit to exploit U-2 photography (Figure 2) and report the results to the Intelligence Community. Any lingering concern about the ability of the new organization to exploit the photography or cope with the flow of inputs was almost immediately dispelled. HTAUTOMAT (HTA) quickly became the toast of Very Important Persons in the US Government. Others in the Intelligence Community who were witting but lacked the prestige needed to obtain desktop briefings in their own offices or presentations in their own briefing rooms beat a path to the door of 1014 Fifth Street, Northwest, situated between the Steuart Insurance Agency on the one hand and the automobile parts department on the other. There were those, mostly security types, who felt that this arrangement, augmented by an ancient and completely irrelevant directory in the lobby, provided a disguise impenetrable to all save the most aggressively curious, but they either conveniently forgot or were never aware of the sign, "Rented to CIA," that was displayed at the entrance for some days prior to the arrival of the new tenants.

A. The Anatomy of HTA

For the first year of its existence, Project HTAUTOMAT preserved the outward form decreed on the occasion of its approval. Whatever the turn of events, whatever the task to be done, it was accomplished within the framework of an organization based on a hypothetical set of circumstances. Even the name, Project HTAUTOMAT, suggested the measure of uncertainty in the minds of its creators who made no pretense of concealing the fact that it was a pilot operation.

The major element in the organization was the Photo Intelligence Division, D/GP, responsible to [redacted] 3.5(c)
[redacted] chief of the Geographic Research Area, Office 3.5(c)
of Research and Reports. In turn, D/GP was divided into four branches and two staffs (Figure 3). Three of the branches were intended primarily for interpreting the photography and the other for photogrammetric support. A Support Staff was oriented toward exploitation operations, and an Administrative Staff functioned as the housekeeping unit.

The lesser of the two elements of Project HTAUTOMAT, the Statistical Branch of the OCR Special Register, operated under the leadership of the chief of HTAUTOMAT but retained its administrative ties to OCR. This branch provided a wide range of reference and production services not available from the D/GP Support Staff.

Though the T/O for the ORR element provided for 92 persons plus two IAC slots for military personnel, only about half were in place when HTA components moved into the Steuart Building. Moreover, those on duty were very unevenly distributed among the staffs and branches.

1. <u>Office of the Chief</u>

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When the ORR photo interpreters were placed under Project HTAUTOMAT, their chief, Arthur C. Lundahl, became chief of the project. With him went [redacted] 3.5(c)
[redacted] his deputy, and [redacted] 3.5(c)
who had been working with Lundahl to build the new organization since the previous fall. [redacted] was transferred to the D/GP table of organization on 12 August 1956 as an administrative officer-executive. 2/ 3.5(c)

2. <u>Special Projects Branch</u>

During the first year, the Special Projects Branch (SPB) was the largest and most active of the ORR components; in August 1956 this branch consisted of 17

professionals* and one clerical under the dynamic and autocratic leadership of [redacted] 3.5(c)
Initial projections of U-2 operations had envisaged frequent undetected deep penetration flights over the USSR with correspondingly frequent inputs of photography requiring rapid exploitation and immediate reporting to the Intelligence Community. This first phase of the exploitation process would involve plotting and scanning of the photography, communicating the results of exploitation by word of mouth and with the aid of photographic briefing boards if the targets were of national intelligence interest, and feedback to the collectors concerning quality of the imagery and coverage of targets reached. Completion of all these tasks for each mission was planned for six days or less after receipt of the material at HTA. 4/

The level of staffing in SPB reflected the heavy workload expected to result from such an ambitious schedule. Obviously, this involved staffing to meet peak-load requirements; any interruption or irregularity

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[redacted] The last four were graphics personnel. 3.5(c)

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in the receipt of new materials would be bound to create a need for self-initiated work to take up the slack. Though [redacted] was never at a loss to provide productive work whenever it was needed, this arrangement evoked from the other two PI branch chiefs misgivings about the level of their staffing as well as SPB encroachments on their domain and boded ill for the durability of such a solution. 3.5(c)

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3. Industrial and Geographic Branches

The Industrial Branch, headed by [redacted] and the Geographic Branch, led by [redacted] shared the detailed reporting responsibility. Almost immediately, however, the division of work implicit in the branch titles was rendered out of date. The so-called Industrial Branch became heavily committed to the analysis of military and scientific targets in support of OSI, whereas most studies of conventional industries in support of the ORR Economic Research Area were assigned to the Geographic Branch. In any case, the magnitude of the demand for detailed work had been very unclear from the beginning, though it was generally assumed to be large. Even so, the detailed interpretation would have to give way to first-phase exploitation in any competition for staffing, since no delay could be 3.5(c) 3.5(c) tolerated in reporting important intelligence finds to the Community.

These facts of life were reflected in the number of persons assigned to the two detailed interpretation branches. By 15 July 1956, the Geographic Branch had four PIs on board.* 5/ In August 1956, the Industrial Branch had just five interpreters.** 6/ Nor could any of these be called highly trained specialists with reference to the types of targets on which they would be expected to report. Most could be described as competent and experienced PIs reasonably well versed in PI techniques and their application to the interpretation of traditional targets on reconnaissance photography.

For the Geographic Branch which was concerned primarily with area studies and the photo readout of conventional industrial plants, this posed no great problem. Circumstances in the so-called Industrial Branch were entirely different. PIs in this branch would be faced with the identification, description,

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and functional analysis of exotic targets unknown, heretofore unseen, and only vaguely understood, if at all, by US intelligence analysts and even by American scientific and engineering talent involved in the devlopment of advanced US military weapons systems. In this case, the penalties would be delays in fully exploiting the photography, a heavy commitment in orientation and training, and the painful development of complex and productive working relationships, within and outside the Intelligence Community, between organizations and persons, each of whom had some critically needed ability or information to contribute but none of whom alone could provide all the required facts or insights.

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4. Technical Intelligence Branch

Headed [redacted] the Technical Intelligence Branch, which consisted of only four persons for most of the first year,* 7/ faced an exceedingly diverse array of responsibilities and problems that were well beyond its capability to handle. There were critical measurements to be made in support of projects

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in the detailed reporting branches and even occasional jobs of the same type for the Army liaison shop and the Special Projects Branch. More basic to the rapid exploitation of the new photography was the need to compute and publish scale tables for use by the PIs themselves in making routine measurements, a staggering job of computation. [redacted]

With so few people spread over so many demanding tasks, the branch, though officially activated as an organizational entity, was hardly able to function as a cohesive unit. Indeed, the branch chief was absent much of the first two months on TDY in Europe and subsequently faced an extremely heavy schedule of travel in connection with one of the DDP projects. Moreover, the others in the branch also made many similar trips during the first year of HTA operation. Fortunately, three of the four were senior employees and all were capable of working productively on their own initiative

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* Since 1973, the Deputy Director for Operations (DDO).

and without close supervision. Nevertheless, the effect of these absences worked counter to branch development and made more difficult the job of meshing TIB activities with those of other division components.

5. Support Staff

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Coming into existence as a unit with broad responsibilities but ill-defined authority, the Support Staff, under [redacted] struggled to strike a 3.5(c) satisfactory balance between peremptoriness and persuasion in assisting the Chief, HTA, to coordinate and control project work being undertaken by the several different branches. Specific functions included liaison with requesters, researching and assigning requirements, obtaining collateral aerial and ground photography, controlling or monitoring of production, assigning of photo lab priorities, and editing of manuscripts for detailed reports.

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During most of the summer of 1956, professionals on the Support Staff consisted basically of [redacted] 3.5(c) [redacted] both of whom were primarily concerned 3.5(c) with requirements, liaison, and production control. For about two months, the staff also included [redacted] 3.5(c) who transferred to DDP on 14 September 1956. 8/ The editorial function remained dormant until the arrival of [redacted] from Office of Basic Intelligence (OBI) on 17 September. 9/ 3.5(c)

Most significant among the problems was the question of how much authority the staff would have in dealing with the branches. Though a serious attempt was made by the staff to establish itself as a focal point in handling requirements, in coordinating liaison on project work, and in exerting some measure of production control through the assignment of priorities and the monitoring of progress toward the completion of projects, these goals proved too ambitious to realize fully in competition with line managers. The editorial function, a difficult one at best, presented further complications involving the role of the editor, his relation to the analysts, and the extent of his responsibility and authority in revising manuscripts and in preparing copy for publication. As if these problems weren't challenging enough, there was the obvious question as to why the Support Staff should provide collateral photography when the Information Section of the Statistical Branch furnished all other reference materials. Moreover, in any future dispute, the logic implicit in this question would have strong sympathetic support from PI branches annoyed by the inevitable tensions over such matters as requirements, liaison, production controls, and editing.

6. Administrative Staff

The Administrative Staff was responsible for security, personnel matters, and finance, and had no lack of work during the first year of operation, but lagged in its internal development. For the entire first year -- and longer -- it lacked a formally designated chief. 10/ Senior incumbents, in terms of grade, were [redacted] 11/ who were security officers 3.5(c) not permanently assigned to the staff. They had no prime interest in affairs of the staff, other than those involving security, and operated in a semi-autonomous manner. *De facto* leadership was provided by [redacted] 3.5(c) [redacted] who, though slotted in the office of the ch[redacted] EO 13526 3.3(b)(6)>25Yrs had a strong interest in personnel and other administrative matters and assumed many of the duties of the non-existent chief. Within the staff, leadership in the handling of routine work was provided by [redacted] 3.5(c) an administrative assistant occupying a GS-09 slot. 12/

7. Statistical Branch, OCR

With a T/O of 53 persons, the Statistical Branch of OCR was by far the largest branch in HTA. Its mission was to obtain reference materials needed by the

PIs and render documentary support to them in their exploitation activities, provide HTA with an information storage and retrieval capability, index TALENT System reports prepared by other agencies, furnish photo lab and reproduction facilities, and to control, file, and distribute TALENT materials. 13/ At the time of the move to the Steuart Building, the Statistical Branch comprised only 18 persons, but by the end of July 1956 the count was 30 and continuing to rise. 14/

With the growth in size and with the diversity of functions, the Statistical Branch lost little time in developing its internal structure and naming appointees to key positions. As initially planned, there would be three sub-units, now called sections: the Information Section, under Dino Brugioni; the Technical Section, under [redacted] who had just arrived from OCI; and 3.5(c)
the Support Section, under [redacted] All these 3.5(c)
operated under the nominal leadership of [redacted] 3.5(c)
[redacted] of the OCR Special Register, with [redacted] 3.5(c) 3.5(c)
[redacted] chief of the Statistical Branch (Figure 4), 3.5(c)
[redacted] his deputy, functioning as resident managers in the Steuart Building. 15/ 3.5(c)

As part of the glamorous and growing HTA organization, the character of the Statistical Branch was set by a resourceful and ambitious leadership anxious to capitalize on every available opportunity to complement the capability of ORR photo interpreters and to serve interagency committees and boards concerned with the collection and exploitation of U-2 photography. A fiscal-year-end report issued in August 1957 by the Statistical Branch catalogued seven major activities in which it had become involved beyond the original concept of the project. At the same time, attention was called to the urgent need for additional personnel. This was, indeed, a dynamic group, ever pressing forward with imagination and invincible determination. It was a worthy partner for D/GP in their historic joint effort to bring intelligence developed by the exploitation of high-resolution aerial photography against a background of all-source information to bear on the solution of problems of national significance.

8. Military Liaison Components

Though each of the participating services was originally expected to have only two liaison officers, the Army, from the beginning, had decided to join HTA in conducting exploitation activities in the Steuart Building. Known as the HTAUTOMAT Liaison Branch, Collection Division, Office of the Assistant Chief of Staff, Intelligence, the Army group was initially under [redacted] who was soon succeeded by [redacted] By August 1957, the branch had a T/O of 60, with 25 persons on board at HTA. The Navy, slower than the Army to make a commitment to assign PIs to work in the Steuart Building, was represented for several months by [redacted] By early 1957, however, [redacted] a civilian, were assigned to work in the Steuart Building as PIs, and by August of that year the number of Navy personnel had grown to six. 16/ 3.5(c)

The presence of these service PIs had a small but significant impact on HTA operations. During the year ending in July 1957 the effect was felt mainly by support components, such as the Technical Intelligence Branch which provided critical measurements for several Army projects, 17/ the graphics personnel in the Special Projects Branch who produced many illustrations for both the Army and the Navy, 18/ and the Statistical Branch, OCR, which furnished reference materials, photo lab support, and reproduction services. 19/

Though it had no functional relation to the presence of Navy liaison officers in the Steuart Building, until February 1957 20/ the HTA photo lab supplied LogEtronic prints for use by Navy photo interpreters, pending completion of their TALENT-cleared facility. By December 1956 the number of these prints had increased from several hundred to several thousand a month. 21/ To help cope with this increase, the Navy assigned lab personnel to the Steuart Building for the duration of the arrangement. 22/

Beyond the then current impact, the early entry of the Army into the Steuart Building in some force and the later assignment of Navy PIs to work there had profound long-range implications. Lundahl had long advocated, at least as an ideal arrangement, centralization of photo interpretation in support of national intelligence objectives. Though the major thrust of Army work in the Steuart Building during the first year was directed to the answering of departmental requirements, the close association of Army and CIA personnel, as well as the small Navy working presence, set a precedent and established working relationships that constituted first steps toward the realization of a joint National Photographic Interpretation Center (NPIC).

9. <u>Central Branch</u>

Officially, the Central Branch, headed by [redacted] didn't exist. This ad hoc 3.5(c) arrangement created obvious staffing difficulties for the parent organization as well as supervisory problems for the chief, who officially occupied a special assistant slot in the office of the division chief. Nevertheless, it did provide an informal scheme for serving the needs of those not witting of the larger operation in the Steuart Building. Not only did it provide a point of contact for Agency requesters outside the TALENT System, but it also handled the exploitation of non-systems photography, including that from DDP, the planning and operation of the D/GP photo interpretation course, and the housing and temporary employment of HTA/DGP recruits who had been granted their TS clearance but were not yet briefed into the COMINT System.

Initially consisting of four PIs* who were left behind on an indefinite assignment, 23/ the unit was at first alluded to as the "Task Force" until the move from Que Building to new quarters in the Central Building in late September 1956 suggested a more appropriate name (Figure 5). Though the branch had no facilities in the

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[redacted] formed the initial nucleus of the Central Branch. Until early 1957 [redacted] also spent up to several days a week at Central Building, primarily as a personal convenience with respect to his part-time program of study at George Washington University. Late in the summer of 1956, [redacted] who (footnote continued on following page) 3.5(c) 3.5(c) 3.5(c)

Central Building for handling TALENT or COMINT materials, all permanently assigned members were both TALENT and COMINT cleared. The bulk of Central Branch work during the first year of its separate existence involved interpretation of non-systems aerial photography of the Far East, GENETRIX coverage of the Sino-Soviet bloc, and support to DDP in the collection and exploitation of clandestine photography.*

B. The First Eight Missions Dominate Events of July and August

In any given case, a handful of prime targets determined the route of a U-2 mission and, hence, circumscribed the limits of what might be captured on the photography. In July 1956, highest priority targets, all within the USSR and China, fell in seven categories:

(footnote continued from preceding page) entered on duty in D/GP 20 August 1956, joined the initial group. At any given time, this basic work force was augmented by the transients on their way to permanent assignments in the Steuart Building.

* Monthly reports of the Photo Intelligence Division provide the only periodic record on activities of the Central Branch for more than the first year of its existence. Since these reports were held to the SECRET level, by far the larger portion of details under the heading, "Projects and Reports," referred to work done in Central Branch. Entries under other headings, such as "Administra- and Planning," "Coordination," and "Miscellaneous," covered events and personalities both in Steuart Building and Central Building; those assigned to the latter can only be deduced from the persons involved or from the context.

1) long-range bomber bases and program, 2) air defense, 3) atomic energy installations, 4) guided missile installations, 5) naval bases and shipyards, 6) industrial complexes, and 7) disposition and capabilities of military forces. 24/ The somewhat diffuse nature of these targets reflected the paucity of existing intelligence as well as the unrepresentative nature of targets covered by the first eight missions, which had recently been completed.

A second factor important in determining the potential coverage on any single mission was the range of the U-2, approximately 3,400 nautical miles without refueling. 25/ At the time collection operations were initiated, early in the summer of 1956, there was but one base of operations -- Wiesbaden, AFB, Germany. 26/ Thus, missions over the USSR from this base were necessarily confined to western or southern Russia; it was not possible to reach targets in the Urals or Soviet Central Asia from Germany. Moveover, coverage of the Middle East during the Suez crisis in the fall of 1956 proved difficult, or, in some cases, impossible from Germany (Figure 6).

Spurred on by these limitations, a second unit was deployed to [redacted] in August 1956. 27/ From this 3.3(b)(1) 3.3(b)(6)

base, coverage of the entire Middle East could be obtained with little loss of time over lands of transit. In addition, many parts of the Urals and Soviet Central Asia were within reach from [redacted] but almost no attempt 3.5(c)
was made during the first year of operations to realize this potential.

1. The Eight Missions and Their Objectives

Between 20 June and 10 July 1956, eight missions were flown out of Wiesbaden. The first three covered only portions of the European Satellites. The next five penetrated the USSR (Figure 7); of these five, the first two and the last one were the most important. Following the 10 July mission, there was a long stand-down of further penetration flights as a result of official Russian protests charging violations, albeit understated, of Soviet air space. 28/

The first Russian penetration mission was flown, by sheer coincidence, on 4 July 1956. It reached Leningrad and covered portions of the Baltic States, including Poland and Finland, en route. 29/ The chief goal on this mission was the naval shipyards in Leningrad. 30/ It was hoped that coverage of these shipyards would shed light on the construction of submarines, including possible evidence of any that might be nuclear powered or armed with missiles.

The second of these five missions, flown the next day, 5 July 1956, penetrated to Moscow. 31/ The course flown described a loop over the Fili airframe plant, where Bison's, the Russian counterpart of the B-52, were built, and Ramenskoye Airfield, the ultimate fly-away field for Bison's assembled at Fili. It was also expected to provide coverage of the Kaliningrad missile plant and the Khimki rocket engine plant. 32/

The last of the five missions, flown on 10 July 1956, reached the Crimean Peninsula, 33/ where it was hoped coverage could be obtained of naval storage and missile testing facilities.

In addition to the ultimate goals set, each of the missions over the USSR was expected to provide coverage of numerous other targets of intelligence interest, such as the Soviet long-range air bases, 34/ fighter bases in both Russia and the Satellites, other types of military installations, and industrial and urban complexes.

2. Immediate Exploitation of the First Eight Missions

Consistent with the immediate reporting responsibility of HTA, the first products from each mission were large photographic briefing boards depicting high-priority installations in the USSR or the European Satellites. Each briefing board consisted of a photographic enlargement measuring approximately 18 by 20 inches mounted on a piece of drawing board 22 by 30 inches so as to provide space for titling and annotations at the right side of the photographic panel. These were used primarily as adjuncts to an oral presentation of the facts revealed from the photography.

The pattern thus set for the initial dissemination of information from U-2 photography was to continue for years to come. Though the basic approach -- oral presentations with the use of briefing boards -- was neither original with nor unique to HTA, it was a method extremely well suited to the job at hand. Some of the photography was little short of spectacular, and Lundahl, who gave most of the briefings when he was available, had no peer as a dynamic and articulate apostle of photo intelligence.

By the end of August 1956, all the initial exploitation work on the first eight missions had been completed, thanks in part to the stand-down on additional penetration missions. This included not only plotting, scanning, and technical evaluation of the photography, but also the preparation of ELINT plots required by the AQUATONE Project Director, Richard M. Bissell, and the Office of Scientific Intelligence (OSI). 35/

As far as substance was concerned, the greatest immediate impact was obtained from photography of Soviet bomber bases with their associated nuclear weapons loading and storage facilities. The first five Russian penetration missions had covered no less than nine of them. Not only were these airfields of high interest because of their facilities for handling offensive weapons, they were also an object of much speculation because of the aircraft that were *not* found there. At the time of the July 1956 U-2 missions, not one Bison was present at any of the nine long-range airfields. This was a datum that did not go unnoticed by the foes of the Air Force. It was not long before the so-called "Bomber-Gap" was proven a myth, 36/ and information obtained from U-2 photography played a key role in the reassessment.

Of longer range interest was the perplexing installation with the big domed structure, near Mozhaysk. This was reported in a Mission Coverage Summary during the summer of 1956 simply as an unidentified housing and institutional area with one building hemispherical in shape. 37/ Though it would be several months before a crash effort could be undertaken in an attempt to solve the enigma, by the end of August it was already recognized as a target of considerable interest. 38/

3. Detailed Exploitation During July and August 1956

Interesting discoveries during the initial or immediate exploitation phase gave rise to requirements from analysts desiring specific, detailed information concerning installations of special interest to them. Some of these requests resulted from the high-level briefings on targets of the greatest interest, but even more were generated by Mission Coverage Summaries, the index-type publications resulting from scanning the photography. Work on these requirements for detailed exploitation of photography covering selected installations was carried on in the Geographic and Industrial Branches. The level of effort and volume of products were much smaller, however, than those associated with first-phase exploitation in SPB, which had nearly twice as many interpreters as the other two PI branches together.

Production from the two detailed reporting branches during July and August 1956 consisted of two Photo Intelligence Alerts, 14 Photographic Intelligence Briefs, and two Photographic Intelligence Memorandums. All were issued in August. At this early date there was as yet little departure from the traditional approach to PI reporting. Whatever the format, there was, typically, an introductory paragraph or section followed, when details were available, by a list of items explaining annotations made on an accompanying photograph or line drawing.

Subjects covered reflected Community interest in prime targets covered by the first eight missions as well as a number of installations of minor importance. The latter reflected not only the interest of individual analysts in their particular targets, whatever their importance from a national point of view, but also the fact that at this early date there was no clear focus -- indeed, there could be no clear focus -- on the precise type of work that should engage the limited resources of the photo interpreters.

The first Photographic Intelligence Brief issued was dated 8 August 1956 and gave a description, keyed to a line drawing, of major components of Fili Airframe Plant No. 23, 39/ one of the prime targets on the 5 July mission over Moscow. It was done in the Industrial Branch. Between 22 and 24 August, five briefs originating in the Geographic Branch reported on Leningrad shipyards, which had been the ultimate goal of the

4 July mission. 40/ On 28 August, a brief done in the Industrial Branch reported that the 4 July photography revealed no evidence of SAM sites, like those around Moscow, in the Leningrad, Riga, and Kaliningrad areas. 41/ Though negative in thrust, this answered a question of considerable interest to those concerned with problems of penetrating Russian defenses.

In spite of the considerable accomplishments resulting from the exploitation of photography obtained on these early missions, not one of the early publications reported anything of outstanding importance or enduring interest. Ironically, not even a brief was issued during the first two months on the Russian SAC-type airfields. Nor was there any reporting at this time on the installation near Mozhaysk, except the obscure and uninformative item in the Mission Coverage Summary.

In addition to work completed and publications issued during July and August 1956, work was under way in the Geographic and Industrial Branches on many other projects, some of which were of real importance and long-term interest. Potentially most rewarding was work tied up in the Geographic Branch on five Russian bomber bases pending a decision as to whether or not concurrent PI reports emanating from the military services would satisfy the OSI requester. 42/ By the latter part of August several informal PI-analyst conferences had been held concerning the Mozhaysk installation and two requirements had been received in the Industrial Branch, but little work had been accomplished. 43/ There were, in addition, numerous requirements for routine PI reporting on such things as industrial plants, storage facilities, rail line and rail yard studies, and the like. The majority of these were levied by the ORR Economic Research Area and were assigned to the Geographic Branch.

4. Technical Support

During July and August 1956, technical support was focused primarily on matters pertaining to the exploitation of U-2 photography. In August 99% of all Technical Intelligence Branch project time was devoted to this type of work. 44/ Computations were made for grids for the tracker camera and for scale computations for the oblique cameras in the A-2 configuration. Technical Intelligence Branch personnel were also called upon to make critical measurements, particularly in connection with detailed photo analysis. One, among the earliest tasks, was undertaken to support the Army liaison group in their work on the Yo-Yo* guidance facilities at the Moscow SAM sites. 45/

The U-2 collection system was planned as an aerial reconnaissance system, though one that would yield a product of higher quality than any previously known. Since there was no experience factor, it was not possible to project either the volume or the scope of technical intelligence requirements that might be forthcoming, except in a very general way. Consequently, HTA was ill prepared to cope with the volume of requests for precision mensuration evoked by the excellent photography. Not only were analysts asking for more such measurements than they had ever seemed interested in previously, but some of the camera data needed to facilitate accomplishment of the mensuration tasks was also lacking. 46/

By August 1956, recognition of the dimensions of the problems ahead of TIB led to the establishment of two continuing projects to develop ways and means to adapt this reconnaissance photography to precise

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* NPIC-2 (See p. 1, above), footnote p. 166, explains that the term "Yo-Yo" was applied because "the configuration of this radar reminded division [D/GP] photo analysts of a Yo-Yo."

mathematical and geometrical manipulation. 47/ It was these developmental projects that provided a means for charging time that went into such activities as the exploratory work leading to the selection of a computer and preliminary planning for automating the mensuration readout.

5. Support Staff Activities

With but two experienced professionals for most of the summer of 1956, the Support Staff struggled to process a deluge of requirements and assign them to the branches. By the end of September, when statistics were first compiled, a total of 173 requirements had been received in HTA since its inception, 114 from ORR and 59 from OSI. Of this total, 143 were assigned or about to be assigned to the branches and 30 more were returned to the requester because of inadequate photo coverage and inadequate or incorrect background information. 48/ Certain others were challenged on the basis that the requirements were satisfied by reports done by the Air Force or the Navy. 49/

The Support Staff also maintained a heavy program of coordination, particularly with requesters about requirements. Conferences were held with representatives of other Offices, including [redacted] of OSI, and 3.5(c) [redacted] of ORR, relative to 3.5(c) the screening and levying of requirements. 50/

Though procurement of collateral photography, particularly World War II German coverage of targets of interest in the USSR and Satellites, was kept current with PI needs, the bigger job of expanding contacts with the several major sources of aerial photography in the Washington, D.C., area would have to await the arrival of additional personnel who were under recruitment. Moreover, the Support Staff and HTA were without an editor throughout the summer of 1956.

6. OCR Statistical Branch Charges Forward

From the beginning of operations in the Steuart Building, the OCR contingent vied with the PIs for recognition as a "can do" organization. Just as [redacted] 3.5(c)
[redacted] Director of the Office of Central Reference, 3.5(c)
had been forthcoming in designating some of his best people to staff the Statistical Branch, these same people now threw themselves with gusto into the task of supporting the ORR photo interpreters. Though it might be said that many of their actions bore the stamp of enlightened self interest, they also demonstrated unmistakably that the Statistical Branch would work in harmony with the ORR PIs and respond without reservation to Lundahl's leadership.

Among Statistical Branch components, the Information Section, [redacted] was most intimately involved with the PI exploitation effort. Analysts in this section assembled the maps and charts for each mission and made them available to the PIs in the Special Projects Branch for use in plotting missions and in scanning photography. In addition, packets of collateral information -- documents, books, manuals, clippings, attache photographs, intellofax runs, and the like -- were provided not only to D/GP photo interpreters but also to those in the military liaison groups for background use in the preparation of all types of PI reports. 51/ During the first two months a major effort was made to work out procedures for bringing these materials and the expertise of the intelligence officers from OCR to bear on the job of exploiting the photography.

Classification and coding of PI reports emanating from or received by HTA for entry in the Minicard system* was begun in the summer of 1956, almost as soon as the reports were produced, even though Minicard processing

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* For additional information on the Minicard system, see pp. 128-129, and its ultimate fate, pp. 337-338.

equipment was not yet available. 52/ This task also was one of the functions of the Information Section.

The Technical Section, under [redacted] was a vital cog in the HTA operation from the outset. As far as the official T/O was concerned, this section consisted of two units, the photo lab and the Minicard. 53/ In reality, however, the Minicard unit was rendered inoperative for lack of equipment far beyond the summer of 1956 and personnel earmarked for it were used to extremely good advantage in the photo lab and to assist in the reproduction of publications. 54/ Without this opportune circumstance, it is difficult to imagine how the photo lab could have met its heavy commitments during these difficult early days. 3.5(c)

Not only was HTA dependent on the photo lab for the spectacular enlargements used on briefing boards, but PIs in the Steuart Building, whether attached to ORR or the Army liaison group, were also dependent on the lab for all kinds of special orders for photography to be used in their interpretations. In fact, the HTA photo lab was the source of all photography over and above the mission film and prints obtained on routine distribution from the processing site. When reports began to flow, the photo lab was also the producer of prints used as illustrations in early PI reports.

At this point in history, before PIs had turned to the use of positive transparencies, LogEtronic prints produced by the HTA photo lab were much in demand. The LogEtronic printer eliminated conventional methods of dodging* and constituted a real technical breakthrough. Through 31 August 1956, the lab produced 1,299 of these prints, nearly half of them for the Navy. 55/

During the summer of 1956, photo lab personnel demonstrated again and again that they were truly cast in the mold of the HTA elite. In spite of delays in receipt of equipment and inconveniences caused by its installation, the photo lab met its commitments. Even the potential impasse resulting from delays, due to the steel strike, in delivery of a large chiller unit -- for temperature controlled water -- and a dilution tank, was deftly averted when lab personnel got the facility into operation by improvising a temporary hookup of equipment. 56/

Though the reproduction function was officially recognized in the T/O as one belonging to the photo lab, it was quickly, though officially, treated as the responsibility of a separate unit of the Technical Section.

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* For further information on "dodging" see p. 335, below.

EO 13526 3.3(b)(6)>25Yrs

Doubtlessly, the inactive status of the Minicard unit invited this bit of improvisation. At any rate, reproduction of the many different types of PI products soon became a very lively business. In July and August 1956 alone, more than 33,000 pages were duplicated. 57/

The huge task of controlling documents and classified materials of all kinds, including those within the TALENT system, as well as filing the film, disseminating HTA products, and providing courier services fell to the Support Section, [redacted] possessor of one 3.5(c)
of the most flamboyant and uninhibited personalities in HTA. At the beginning, a Chevrolet carryall was purchased 58/ to carry classified materials between HTA and TALENT centers in the Agency and the Department of Defense. From 16 July 1956, armed couriers made two daily runs between the Steuart Building and these centers, leaving HTA at 0900 and 1400 hours. 59/

7. [redacted] <u>Task Force: Headquarters Outpost</u> 3.5(c)

During the summer of 1956, the stay-behind 3.5(c)
unit, under [redacted] and known at that time as the "Task Force," still occupied space in Que Building and continued to carry on the traditional task of exploiting non-systems photography.

Among the 17 Photographic Intelligence Memorandums issued at the SECRET level in July and August 1956, there was a crash report for OCI and ORR on MIG aircraft shipping crates at Chu-hsien airfield, in southeast China. 60/ Also, two projects for the DDP were completed and two publications relating to them issued: one, entitled "Project PEGMATITE," reported on the training of clandestine personnel in ground photography and in the analysis of aerial photography; 61/ the other was a memorandum, subject: "Amateur Photography from Commercial Aircraft." 62/ Information in the body of this eminently practical publication was prepared in such a manner that it could be separated and handled without security controls.

The Task Force under [redacted] was also involved in 3.5(c)
the evaluation of Clandestine Services reports using photography. In August 1956 information provided the Far East Division in DDP enabled a reporting officer to stop distribution of inaccurate reports on at least six occasions. 63/ [redacted] a former DDP case officer 3.5(c)
himself, was the leading proponent in the work on these so-called CS evaluations.

8. Return from Europe

As the exploitation activity on the first eight operational missions was approaching a peak, Arthur C.

Lundahl, chief of Project HTAUTOMAT, returned from Europe, on 2 August 1956. 64/ [redacted] chief, Technical Intelligence Branch, followed eight days later. 65/ 3.5(c)

The main goal of both travelers had been the VIII International Congress of Photogrammetry held in Stockholm, Sweden, from 17 to 26 July 1956. Both spent several days in England prior to the Congress and a few to several days elsewhere on the Continent after it was over. 66/

At the Congress, Lundahl had an opportunity to renew many earlier acquaintances as well as meet many people he had never known, particularly in the Soviet delegation. When meeting the Russians, Lundahl was curious to see how they might react to an American in view of the recent penetrations of Soviet airspace by the U-2's, but they displayed not the slighest hint that they even knew of the incidents. On the contrary, they were very gracious to Lundahl and openly pleased to meet an American who could exchange the usual civilities with them in their mother tongue. 67/

Apart from the technical papers, which Lundahl and [redacted] were able to cover very well individually in spite of their being scheduled in concurrent sessions, the most important benefit to HTA from the Congress was the 3.5(c) information gained from the wide range of photogrammetric equipment displayed by manufacturers from all over Europe. Several pieces of equipment of potential interest to HTA were either unobtainable in the United States or inferior in design or performance to those 3.5(c) manufactured in Europe, particularly in Germany, Italy, and Switzerland. When the Congress was over, [redacted] and 3.5(c) Lundahl shipped some 20 pounds of technical papers and brochures back to Washington, where it would be available in D/GP for future reference. 68/

The post-Congress travel was mainly a follow-up on contacts made during the meetings, particularly to obtain more information about equipment potentially useful to HTA. Lundahl's sojourn on the Continent was brief. He visited the Zeiss plant in Munich, where he identified three instruments having immediate application to HTA work and assigned detailed follow-up inves- 3.5(c) tigation to [redacted] and he established liaison with the 3.5(c) TALENT Control Officer at USAFE Headquarters in Wiesbaden, Germany. 69/

[redacted] visit on the Continent was longer and 3.5(c) covered more territory. After a stop at the Zeiss headquarters office in Munich [redacted] 3.3(b)(1)

EO 13526 3.3(b)(6)>25Yrs

[redacted] he visited the Oberkochen plant and paid particular attention to the Radial Secator, a two-level slot cutter; the SEG V Rectifier, an autofocusing rectifier for use with photographs up to 9 by 9 inches; and the Stereoplanigraph, a first-order, high-precision plotting instrument for use with vertical, oblique, or terrestrial photo pairs. 70/ Though Zeiss photogrammetric equipment was among the finest, it was primarily designed for mapping and ultimately proved to have but limited application to HTA needs. 3.3(b)(1) 3.5(c) EO 13526 3.3(b)(6)>25Yrs

Following his visit to the Zeiss Plant, [redacted] went on to Wild at Heerbrugg, Switzerland. At this factory he saw the VG 1 Enlarger, which was capable of producing essentially distortion-free 7X enlargements; the STK 1 Stereocomparator, a precision mensuration device so new that it was neither displayed nor mentioned at the Congress in Stockholm, and a great many smaller instruments used in the technical exploitation of photography. 71/ Wild equipment, particularly the VG 1 Enlarger, proved adaptable to HTA needs and several were procured later. 3.5(c)

[redacted] 3.3(b)(1)

EO 13526 3.3(b)(6)>25Yrs

3.5(c)

[redacted] next stop was in EO 13526 3.3(b)(6)>25Yrs Meccanica Italiana plant headed by a former Italin Senator, Umberto Nistri. The dirt and disorder of this plant, as contrasted with the antiseptic cleanliness of the Zeiss and Wild plants, were almost overwhelming. Nevertheless, the Italians managed somehow to produce some very fine equipment which was noteworthy for the number and type of innovations featured. 72/ Among the instruments that [redacted] inspected were the Photostereograph Model Beta/2, a first-order, high-precision stereo plotter featuring electrically operated servo-motors instead of the usual hand cranks, a single "steering-wheel" guidance of the flotation mark, and a speed control lever analogous to the gearshift in an automobile. The Photocartograph Model V was similar in function to the Kelsh plotter that HTA had on order, but, again, it was operated by servo-motors. The Stereographometer Model 90 by Nistri was similar in capability to the Zeiss Stereotope but featured an unusual pantograph that yielded orthographic positioning of the plotted detail. 3.5(c)

[redacted]

3.3(b)(1)
EO 13526 3.3(b)(6)>25Yrs

EO 13526 3.3(b)(6)>25Yrs

In view of the innovative approach of Nistri designers and engineers, it is not surprising that HTA turned to this manufacturer when ordering the first automated, precision stereocomparator a few years later.

After the Congress, [redacted] also visited the Old Delft Instrument Co. and the International Training Center for Survey in the Netherlands. D/GP had earlier obtained one or more Old Delft scanning stereoscopes, and a pending contract was under negotiation by the Air Force for a number of 9-inch by 18-inch scanning stereoscopes for the benefit of both the Air Force and CIA. The International Training Center offered a wide variety of courses in five different fields of photo interpretation and photogrammetry and was widely regarded as the best in the world. Courses were open to students seeking no degree at all or degrees up through the doctorate. [redacted] strongly urged consideration be given to sending a limited number of HTA personnel to the Training Center, as work loads might permit. 74/ In later years, HTA successor organizations did, in fact, send several trainees to this school.

3.5(c)
3.5(c)
3.5(c)

[redacted]

3.3(b)(1)
3.3(b)(6)

EO 13526 3.3(b)(6)>25Yrs

[redacted] and also execute an errand for Bissell. [redacted] spent his time in England visiting the Williamson Manufacturing Co., Ltd., where he examined several aerial cameras in production, ar 3.3(b)(1) 3.3(b)(6) the Royal Aircraft establishment at Farnborough, where he met personnel in the night photography department. 75/ At this point in time [redacted] and some of his coworkers were already deeply involved in support to Project OSTIARY, the night photography system under develop- 3.3(b)(1) 3.3(b)(6) ment by DDP.

3.5(c)

3.5(c)

[redacted]

3.3(b)(1)
3.3(b)(6)

[redacted]

3.3(b)(1)
3.3(b)(6)

Lundahl's return to the United States on 2 August projected him into a maelstrom of activity. The discoveries resulting from the photographs taken on the first eight missions were still red hot news, the move into the Steuart Building was still recent enough to invite expressions of concern from above and generate problems from below, and, in spite of the initial successes in coping with the work, there were lingering apprehensions that something could still go wrong. By the middle of the month Lundahl was getting his feet on the ground and settling down to a steady round of briefings with senior CIA officials. 78/ A pattern was emerging that would provide Lundahl and HTA and its products excellent exposure before important decision makers. And both were destined to take full advantage of the opportunity. But, first, there would be some last minute changes in the script.

II. The Middle East Crisis

Just as HTA was settling down after the move into the Steuart Building and the best show in the Community appeared to be headed for a long and successful run, the USSR lost its major supporting role to a pushy little upstart. In retaliation for the decision by Western nations to withdraw offers to help finance the Nile River project, Egyptian President Nasser on 26 July 1956 proclaimed the nationalization of the Suez Canal Company. 79/ Following this announcement, relations between Egypt on the one hand, and Israel, France, and England on the other, deteriorated rapidly. The United States, with whom the three Western powers in the dispute were less than forthright, needed good intelligence on events that might lead to some kind of military action.

A. U-2's Assume a Tactical Role

At a time when U-2 photography of the Soviet Union had captivated the attention of those in the highest echelons of government, at least one solution to the problem of obtaining information was obvious. The U-2, which had been conceived as a high-flying strategic reconnaissance vehicle, would now be used in a tactical role, albeit still a passive and surreptitious one.

At least until such time as hostilities might erupt, it would seek indications of military preparations, and, in particular, evidence of any dramatic increase in British or French forces in the area. It would monitor ship movements in harbors such as Toulon, Valetta, and Rhodi; aircraft deployment in Cyprus, Israel, and Egypt; and troop concentrations and military installations in Cyprus, Israel, and Egypt. 80/

Once the decision was made, no time was lost in initiating the surveillance, even though some of the more distant areas of interest in the Middle East were beyond reach of U-2's based in Germany. The first two missions were flown on 29 August and covered parts of Egypt, Libya, Syria, Lebanon, Jordan and Israel. 81/ Two more followed the next day and repeated coverage of the same countries. 82/ When flights took off from Incirlik Air Base, at Adana, Turkey, in September, the entire Middle East was brought within easy flying range and increased substantially the time available over target areas.

As the fall wore on, it became apparent that a serious crisis was brewing. Consequently, the number of missions flown increased in September and again in October. When the 10-day war finally broke out on 29 October, 83/ U-2 reconnaissance was used to provide information on the course of military events. Aerial reconnaissance reached a peak in November when 14 missions were flown, all out of Adana. Following the 7 November cease fire, 84/ U-2 photography provided information for damage assessment, for identification of refuges used by fleeing Egyptian aircraft, for pinpointing acts of sabotage, and for surveillance of other possible military buildups in the area. 85/

B. HTA and the PARAMOUNT Committee

The need of policymakers and the White House was for finished intelligence based on all available sources. HTAUTOMAT had the only capability in the Agency for adequately exploiting U-2 photography, but lacked the expertise and broadly based representation to do the all-source evaluation. The problem was solved on 12 September 1956, when the Intelligence Advisory Committee (IAC) created the PARAMOUNT Committee to handle the all-source reporting. 86/

The committee was chaired by Frederick A. (Fritz) Voigt and included representatives from CIA, Air Force, Army, Navy, NSA, and Department of State. 87/ Among the CIA representatives was Enno H. (Hank) Knoche, who functioned as executive secretary. Bringing the expertise of HTA photo interpreters to bear on the work of the committee and providing secure handling of TALENT system materials were accomplished with a single stroke: the committee would meet in the Steuart Building.

Pursuant to this decision, a specially cleared and secured room thenceforth called the PARAMOUNT room, was provided on the seventh floor of the Steuart Building, in the Special Projects Branch work area. Here HTAUTOMAT photo interpreters and collateral support specialists serving in an advisory capacity attended all committee meetings, along with the regular members. In addition, one or more PIs were customarily posted outside the door of the PARAMOUNT room, where they were available to respond immediately to spot requests for information supposedly available from the photography. HTA also provided support to the committee in compilation of a comprehensive list of requirements for photo-based information; in the preparation of numerous graphics; and in the typing, reproduction, and dissemination of committee materials and reports.

Since the PARAMOUNT Committee would be working in the field of indications intelligence, it was imperative that the information available be as current as possible. Whereas information other than photography could be made available in a matter of hours, that from U-2 photography would be many days old if it followed established handling procedures, which called for processing at the Eastman Kodak plant in Rochester, N.Y. Something had to be done to speed up PI reporting. The obvious solution was to process the film and read it out at, or close to, the base of operations and cable the information to Washington.

On 12 September 1956, the same day the IAC established the PARAMOUNT Committee, Lundahl and James Q. Reber, the latter in his capacity as CIA TALENT Control Officer, arrived in Frankfurt, Germany. 88/ [redacted] the chief of SPB, had departed Washington for Wiesbaden two days earlier, 89/ and was there when Lundahl and Reber arrived in Frankfurt. 90/ Negotiations were carried on at two levels. Policy matters and arrangements were discussed with the Commander in Chief, US Army, Europe, and the Commander in Chief, US Air Force, Europe, both of whom, with their intelligence chiefs, were briefed by Reber. Technical and procedural problems

3.5(c)

EO 13526 3.3(b)(6)>25Yrs

involved in the development, duplication, and exploitation of the photography were discussed with service liaison officers and personnel already present, as well as with [redacted] 91/ 3.5(c)

Equipment was judged inadequate. It was reluctantly, if somewhat hopefully, decided that [redacted] 3.5(c) and [redacted] chief of the HTA photo lab, working 3.5(c) with their Air Force counterparts, could jury-rig a lab facility that would admit of processing the film at the base, without an unacceptably high risk that it would be irreparably damaged. A major concern was to ensure beyond reasonable doubt that processing the original negative in the field would not significantly degrade it for future, more exacting, exploitation in Washington. 92/

Security was another worrisome problem. [redacted] 3.5(c) EO 13526 3.3(b)(6)>25Yrs the CIA/HTA TALENT security officer, participated in the survey of facilities from this point of view. Conditions were far from ideal and required substantial improvement to permit the handling of TALENT system materials. Not only did physical facilities and equipment require upgrading, but better control had to be exercised over foreign nationals employed on the base in areas where codeword system materials were to be handled. 93/ More difficult to cope with were the potential hazards presented by the Valhalla, a local night spot favored by base personnel. Though no security problems involving HTA personnel at the Valhalla ever arose, the vulnerability to Communist blackmail of the unattached females who frequented the place was a source of continuing concern to those responsible for safeguarding knowledge of TALENT operations.

Deliberations concerning the organization, who should be in charge, and the staffing were not immediately conclusive. The Air Force, having lost the controlling interest in the U-2 program, was understandably reluctant to acquiesce to any proposal that overseas processing and interpretation centers be managed by HTA personnel. Yet, initially, HTA possessed the technical expertise needed to establish and operate the centers. The political climate was, thus, less than favorable for initiating operations, but the Middle East crisis couldn't be halted until this problem was resolved.

With an egotistical perfectionist like [redacted] as 3.5(c)
the senior HTA representative, the undertaking was predictably a stormy but successful one. It was not until the end of October that the thorny question of who would give the orders was settled by a CIA-Air Force agreement. The Air Force would henceforth name the

EO 13526 3.3(b)(6)>25Yrs

commanding officer. His deputy, for technical and substantive intelligence matters only, would be designated by CIA. 94/ Instead of running the show, [redacted] 3.5(c) became the deputy to [redacted] USAF. 3.5(c)

Assignment of HTA photo interpreters on normal 90-day tours of duty was begun just a few days after [redacted] departed in September. First to go were [redacted] 3.5(c) 3.5(c) [redacted] who had long been identified with the U-2 program, and [redacted] a more recent recruit. 9 EO 13526 3.3(b)(6)>25Yrs 3.5(c) 3.5(c) Both were on the Special Projects Branch, T/O.

Strong support was provided by the Statistical Branch, OCR, in supplying reference materials and in setting up the photo lab. Prior to the departure of the first group of PIs, a sizeable number of reference materials were assembled to accompany the team. 96/ The Chief of the Photo Lab, [redacted] spent some time in Germany assisting in the setting up and activation of the processing facility. 3.5(c)

Later, fast moving developments called for an augmentation in the number of HTA photo interpreters overseas. At the same time, with the shift of Middle East operations from Germany to Turkey, the PIs in Germany were scarcely better situated to provide current information to the PARAMOUNT Committee than they had been at the outset, when the base of operations was in Germany and they were in Washington. On 19 November 1956, at a special meeting attended by General Cabell, Bissell, Reber, General Lewis of the USAF, Lundahl, and others, the decision was made to establish a second processing and interpretation center on Adana AFB and shift the PIs to Turkey. 97/

In response to these evolving requirements, nine more PIs were sent overseas by the end of November,* three from each of the three PI branches; one returned. 98/ The Statistical Branch also responded with an October shipment of three crates containing over 1,350 reference items. 99/ In addition, [redacted] once again found 3.5(c)
himself reluctantly overseas, this time in Adana for Thanksgiving, scrounging construction materials and overseeing Turkish carpenters equipped with simple tools like the saw, adz, and knife, construct counters, shelves, and sink stands to measurements and mitering gauged by the eyeball. 100/ Further assistance as well as moral

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* It is not practicable to indicate the place of assignment of each PI. Suffice to note that most spent at least part of the time at both bases, and there was some short-term rotation between bases. Spartan conditions, including lack of attractive off-base recreational facilities, made assignment in Adana too confining to satisfy typically venturesome personnel.

support was provided by [redacted] 3.5(c)
deputy chief, Statistical Branch, and [redacted], a special assistant occupying an IAC slot in Lundahl's office. Both of the latter were sent overseas to troubleshoot the inevitable problems and to procure lab equipment. In spite of animated efforts by HTA personnel to get the Adana facility into operation during November, it was a month later, thanks to a lack of photo processing materials, before the first mission was read out by HTA and service PIs on the base. By that time the Middle East crisis of 1956 was virtually over.

C. <u>Functioning of the PARAMOUNT Committee</u>

PARAMOUNT Committee inputs consisted of three types of material: information derived from U-2 coverage of the Middle East and Mediterranean; [redacted] 3.3(b)(1) 3.3(b)(6)

Committee members were on 24-hour standby duty. Whenever a new cable arrived, the committee convened again, sometimes for the third or fourth time in a single day and at any time of the day or night. 102/ Facilities and support at HTA were also available on an around-the-clock basis. By 13 November when the IAC deactivated the committee, there had been 64 meetings; 63 reports and 13 supplements had been issued. 103/

With a PI complement that did not exceed 50, including supervisors, at any time during the fall of 1956, work at Headquarters and overseas in support of the PARAMOUNT Committee constituted a substantial diversion of manpower from other tasks. In the Special Projects Branch, the group most directly involved in the operation, nearly 50% of all man-hours worked in the months of September through November 1956 were charged to the project established to support intelligence activities related to the PARAMOUNT Committee. 104/ The two detailed-reporting PI branches also felt the pinch of

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crisis work. In October, the Geographic Branch predicted a drastic decline in production in the next few months, and gave as one reason the overseas assignment of one of its PIs [redacted] 105/ A month later 3.5(c) the same branch noted that production had in fact declined and ascribed it in part to the continued absence of [redacted] overseas and to the departure, during November, 3.5(c) of both [redacted] for similar duty. 106/ 3.5(c) Though the Industrial Branch also had three PIs overseas by November, its plaint was couched in different terms. Both the October and November IB monthly reports claimed that branch problems arose mainly from "lack of personnel." 107/

The work of the PARAMOUNT Committee, with a big assist from HTA, was a great success. The Watch Committee and the President were kept well posted on the military buildup and had advance warning about the impending military action. In just a matter of months, HTA had again scored high marks for its resourcefulness and accomplishments.

[redacted]

3.3(b)(1)
3.3(b)(6)

3.3(b)(1)
3.3(b)(6)
3.5(c)

[redacted]

E. HTA Continues Work on the First Eight Missions

In spite of the extraordinary effort in support of the PARAMOUNT Committee, HTA continued detailed exploitation work begun but not completed during the summer. New projects were also established in response to requirements received during the fall, and work on them was undertaken as time and staffing permitted.

The Geographic Branch turned out a steady stream of conventional plant studies plus a scattering of other publications dealing with such subjects as rail yards, train movements, and new highway and powerline construction. Most of these were briefs and all were

3.3(b)(1)
3.3(b)(6)
3.5(c)

indistinguishable in format and mode of presentation from those of a few months earlier. Though of minor importance from a national point of view, they did provide ORR analysts with a continuing flow of information in response to their requests.

The Industrial Branch, on the other hand, was preoccupied with a more limited volume of military and scientific reporting of much higher interest and of greater significance to national security. Because this work was more analytical in nature and dealt largely with imperfectly understood and previously unknown facilities, progress in reporting was slow. On 7 September, a PI Alert was issued to inform the Intelligence Community that the unidentified installation under construction near Mozhaysk might be for nuclear reactors. 113/ Nothing further was issued during the fall on this perplexing riddle. On 21 September, another Alert was issued, again on the basis of July photography, calling attention to a pair of large circular pads on a bluff overlooking the Black Sea, just south of Sevastopol. The Alert speculated, with some success, that this installation was probably for the flight testing of missiles. 114/ Throughout the fall work continued on the analysis of two different types of special weapons storage and loading facilities at Soviet long-range bomber bases. Though discovery of these had excited the Community during early weeks of the summer, November passed without the issuance of a formal publication.

F. A Stirring Giant

Though Lundahl arrived in CIA with a keen interest in research and development and with a head full of fresh ideas, the organizational climate and the exploitation requirements were hardly conducive to big thinking. The advent of Project AQUATONE,* however, not only invited but demanded sharply increased R&D activity. Nor was it merely a question, and a very challenging one at that, of shifting into a higher gear. The heavy cloak of secrecy surrounding AQUATONE severely restricted the options for organizing the effort and staffing to get the job done. The short-term solution was an ad hoc one, with [redacted] and his small task force doing much of the 3.5(c)
early work, and with [redacted] and others cleared in only as 3.5(c)
evolving developments permitted. As a result of this pragmatic approach, research and development had no well

* For the creation of Project AQUATONE see NPIC-2, footnote p. 1, above, p. 112.

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defined home even after Project HTAUTOMAT came into being in the summer of 1956.

Though it was to be some years before an independent component would be charged exclusively with responsibility for research and development, the locus of such activity in the fall of 1956 began to shift from [redacted] and SPB to [redacted] and TIB. At the same time, Lundahl's high personal interest and guiding hand in R&D were retained and augmented in the person of [redacted] who spent most of his time on these matters and operated out of the office of the division chief. 3.5(c) 3.5(c)

Interestingly enough, the stirring that took place in the fall of 1956 stemmed only in part from Project AQUATONE. October of that year was the first in a succession of months during which more than 40% of all project time logged in the Technical Intelligence Branch was charged against two DDP projects. Only a minor part of the effort was devoted to augmenting the existing capability to exploit TALENT photography.

One of the two DDP projects was calibration of the MM 50 surveying camera, an instrument that had been produced for the Clandestine Services by Photogrammetry, Inc., of Silver Spring, Maryland. In its development, the Photo Intelligence Division had provided technical support to DDP as well as some liaison with the manufacturer. This instrument was the first photo theodolite ever made in America (Figure 8). It was designed to establish latitude and longitude to five arc seconds, and azimuths to two arc seconds.

Now, in the fall of 1956, D/GP was called upon to calibrate the camera. The task, to which [redacted] 3.5(c) fell heir, was a demanding one, particularly with respect to the amount of computation involved. The theodolite utilized a technique of stellar observation developed by [redacted] of Photogrammetry, Inc., where- 3.5(c) by direct and reverse observations could be made of the zenith without disturbing the level bubbles. Each exposure -- and the direct and reverse images were double exposed on the same frame of photography -- provided data for several dozen observational equations. These were reduced to the normal to solve for the directional cosines of the true zenith, which could be determined to five arc seconds. Though weather caused some delays in taking observations, they were completed in three or four nights. Hand reduction of the data, however, took approximately two months.

The second of the two DDP projects, though not as demanding of time in the fall of 1956 as work on the MM 50 surveying camera, had much more serious long-range implications. It involved Project OSTIARY, a DDP undertaking to equip the P2V-7U aircraft for taking low-level night photography over denied areas.

The Photo Intelligence Division had been introduced to the project early in 1956 when TIB representatives had been asked by [redacted] of DDP/FI to make recommendations concerning a camera system for the project. 115/ An abortive recommendation followed. 116/ By the end of March, D/GP involvement grew to a point where [redacted] were participating with DDP representatives in negotiations with the camera manufacturer. At this late date, they discovered that the amount of light available for photographic exposures would be on the order of only two lumens per square meter. A revised camera recommendation, the one finally adopted, followed on the spot. It was made as a sort of last resort, and with full realization that the available light was very probably submarginal at best. 117/

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The system envisaged would utilize a P2V-7U aircraft manufactured by Lockheed, a CAX-12 camera manufactured by Fairchild, a camera mount produced by Aeroflex

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Laboratories, lenses fabricated by the Grimes Manufacturing Co., and lighting equipment by Air Research, a subsidiary of the Garrett Corp. Lockheed would be the prime contractor. 118/

During the summer and fall of 1956, TIB personnel, chiefly [redacted] participated very actively with 3.5(c)
DDP representatives in monitoring progress in the fabrication of the several component parts of the camera system and in providing technical guidance to the contractors. By the end of October, the photographic system had been tested at the Fairchild and Aeroflex plants and accepted for delivery to Lockheed and installation in the aircraft. 119/ A month later, [redacted] made 3.5(c)
a trip to the air proving ground at Eglin Air Force Base, Florida, to participate in the formulation of a program to field test the photographic system. This completed plans for the test flights which were scheduled to begin the latter part of January. 120/

The lesser part of the TIB research and development effort during the fall of 1956 was devoted to the exploitation of TALENT photography and involved a consideration of alternatives for solving photogrammetric computational problems. As early as September, Lundahl and [redacted] called these mounting problems to the attention 3.5(c) [redacted] and Bissell. It was hoped that the latter might be able to offer some assistance in the form of project funds to help in their solution. 121/ 3.5(c)

Basically, the problems stemmed from the fact that the unique nature of TALENT photography rendered inadequate many of the orthodox photogrammetric solutions then used in the metrical exploitation of aerial photography. In his memo, [redacted] suggested three alternatives: 3.5(c) EO 13526 3.3(b)(6)>25Yrs
1) early acquisition of more photogrammetrists, 2) contracting some of the extensive computations to private industry; and 3) lease or purchase by D/GP of a small digital computer. 122/

The first alternative was deemed impractical because of the scarcity of trained photogrammetrists and the long lead time that would be needed to get them on board. With a T/O of seven professionals, the branch was already experiencing great difficulty in filling the three remaining vacancies. The second alternative offered some attractions. At least one firm, Spica, Inc.,* had a computer and had personnel cleared for

[redacted] 3.5(c)
He was a member of the CIA Scientific Advisory Board and had been intimately involved in the design of the B camera for the AQUATONE collection system. The performance of the B camera is described pp. 124 and 263, below.

handling the data. 123/ Adoption of this alternative would provide a relatively simple solution to short-term computational problems without committing D/GP to the lease or purchase of a computer. The third alternative, though extremely desirable, was generally judged to be beyond the grasp of D/GP, primarily, because of cost. Nevertheless, its attractions were such that [redacted] authorized [redacted] who initially 3.5(c)
suggested this solution, to investigate the range of 3.5(c)
computer capability required to satisfy D/GP computational requirements, and to determine which, if any, of the small computers then just coming on the market would satisfy those needs. 124/ It was this matter of computers that engaged a considerable amount of [redacted] attention 3.5(c)
during the fall of 1956.

In addition to defining the scope of computations involved in D/GP work, [redacted] investigations included 3.5(c)
the examination of brochures issued by manufacturing firms and attendance at conferences and expositions. During the fall of 1956, [redacted] made at least three 3.5(c)
trips to New York, where he heard papers, viewed exhibits, and participated in "clinics" devoted to discussions of specific pieces of equipment on display. 125/ At the suggestion of [redacted] also established contact with 3.5(c)

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[redacted] of the Management Staff, who provided some assistance in establishing contacts with manufacturers representatives and with computer users in the Washington area. 126/ Though no serious attempt was made to order a computer, the spadework done by [redacted] at this time provided basic terms of reference that could be used, with a minimum of updating, by D/GP to capitalize on any unexpected opportunity to procure one. 3.5(c) 3.5(c) 3.5(c)

Thus it was that in the fall of 1956, of four professionals in the Technical Intelligence Branch, two were heavily engaged in support of DDP research-and-development activities, and a third was spending a significant amount of his time on questions related to the possible procurement by D/GP of a digital computer. This left only one man, [redacted] more or less free of other commitments to provide mensuration support for photo interpretation projects. The burden of R&D work was definitely shifting to the Technical Intelligence Branch. 3.5(c)

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G. PI Training

During the first few hectic months of HTA operations, photo interpreters were given virtually no training, technical or otherwise. Nor had D/GP been able to justify a resumption of the in-house course in photo interpretation which had been offered several times during the previous year. It had already become apparent, however, that short-run improvisation to respond to new situations and to answer requirements could not be justified as a continuing method of operation at the expense of the professional growth and development of the very people on whom the success of the operation depended.

The influx of new recruits which had assumed large proportions in the spring of 1956 and continued into the summer and fall of that year had included many young PIs with limited experience. Though possessed of a basic competence in PI, their training and experience were such as to admit of room for further development of their basic skills. The plan adopted at this time was to send these junior PIs, a few at a time, to the first half of a course given at the Navy Photo Interpretation Center, Anacostia. Following some initial difficulties posed by the request for training at a non-CIA facility, 127/ two PIs -- [redacted] 3.5(c)
[redacted] -- were enrolled in the course 3.5(c)
beginning 19 November 1956 and ending 1 February 1957. 128/ These two were but the first of a number of professionals who took this course over the next few years.

The fall of 1956 also marked a brief resumption of the D/GP course in Basic Industrial Photographic Interpretation. The ninth presentation, which was given in the new Central Building quarters of [redacted] 3.5(c) "Task Force," began on 30 October. 129/ When this offering of the course was completed in December, further presentations were again temporarily suspended because of the pressure of other work. 130/

H. Looking Back

HTAUTOMAT instituted operations in the Steuart Building in July 1956 with confidence, but with the expectation of a challenging and exciting future. And no one was disappointed. The Middle East crisis had even added a new dimension and further demands beyond those expected from the exploitation of TALENT coverage of the USSR.

Now, late in the fall of 1956, though the momentum of the Middle East crisis was still producing ground swells resulting from the imminent establishment and activation of the film processing and photo interpretation center at Adana AFB, Turkey, the generation of new demands seemed to have subsided. HTA had confronted and succeeded in the initial exploitation of the Russian penetration missions. Then, in the ensuing months, there had been no more such coverage. Lundahl and [redacted] had returned from their TDY in Europe with enough information on the latest exploitation equipment fabricated by European manufacturers to satisfy most of the immediate needs not capable of being met by the products of domestic manufacturers. The unexpected test of the Middle East crisis had been faced and passed with flying colors. Overseas processing and interpretation sites had been established. Even though the struggle to manage them had been won by the Air Force, HTA had the satisfaction of knowing that it was they who had set them up and would pass them on to their new managers in operating condition. [redacted]

Though it could only be regarded as a figure of speech to say that things were about to return to normal, when no norm had yet been established for such an unprecedented operation, things were beginning to calm down. There would be a respite from the repeated call for immediate reaction to a succession of crises and problems. There would be time to reflect on internal operations and to initiate constructive action.

III. Back on Course

By December 1956 HTA operations were reverting to what might be regarded as a more normal condition and changes were instituted to adjust to the new circumstances. First and foremost was the status of detailed reporting, particularly in the Industrial Branch. Though many publications had been issued during the summer and fall, the majority were one-page briefs. Indeed, the first HTA Photo Intelligence Report was yet to be issued. There had been, for example, no detailed reporting on the Soviet long-range bomber bases. Though PI Alerts had called attention to the installation near Mozhaysk and the supposed missile-launching site south of Sevastopol, further written details were lacking. When new photographic inputs arrived, when a world crisis loomed, or when higher authority levied a new requirement, the manpower needed to provide a typically expeditious HTA response had been provided at the expense of detailed reporting. Moreover, in-depth reporting on exotic military and scientific installations and equipment was further hampered by lack of expertise both inside and outside HTA. Nevertheless, relaxation of the dizzy pace set during the summer and fall was bound to improve the milieu for detailed reporting, even if it didn't automatically solve all the procedural and substantive problems.

There were other potential beneficiaries of the easing crises. HTA had experienced a meteoric rise in importance. There was as yet, however, no tangible expression of just what had been accomplished. If intelligent plans were to be made for the future, the first step would be to assess accomplishments of the recent past.

The continuing stand-down in deep Russian penetration flights was proving to be a mixed blessing. It had given HTA a chance to cope with the ramifications of the Middle East crisis without fighting for its existence on a second front. It also afforded the Technical Intelligence Branch, which largely escaped involvement in the Middle East crisis, an opportunity to proceed with plans for testing photographic components for the P2V night reconnaissance system. At the same time, the suspension of missions over the USSR, coupled with the fading Middle East crisis, was about to create severe internal problems relative to the level of staffing in the Special Projects Branch and the means used to keep personnel in that component busy.

One reminder of the heady experiences of the fall, when the Middle East crisis held sway, was the continuing overseas commitment that resulted from the activation of the processing and interpretation center at Adana and its orderly transfer to Air Force control. Moreover, the Wiesbaden facility would need time to adjust to the shift of collection and exploitation activity to the Middle East. Thus, several months would pass before most of the PIs assigned overseas returned to their regular Headquarters assignments.

A. The URPICs

By December the initial procurement and logistical impasses that had marred attempts to expedite activation of URPIC-1, the processing and interpretation center at Adana, had been overcome. Both Middle East missions flown in December were processed and initially exploited there. 131/ With the successful activation of the facility, [redacted] returned to Headquarters. The 3.5(c)
PIs, under the leadership of [redacted] remained to man and 3.5(c)
run it, pending the arrival in February 1957, of the new Air Force Commander, [redacted]. 132/
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As the Adana facility became active, URPIC-W, in Wiesbaden, declined in importance and gradually assumed the role of an administrative center for both URPICs. 133/ Much of the momentum generated in the fall of 1956, however, carried through the winter. [redacted]

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In spite of the passing of overseas centers into the hands of the Air Force, the role of HTA in their operation remained significant. The designation of the senior HTA representative as deputy commander proved to be more than an empty gesture. Service PIs were prone to assume that their efforts should be directed to answering requirements for their own parent services, and to leave the answering of Headquarters requirements to HTA interpreters. Thus, it was frequently the awkward task of the CIA deputy commander, in the person of the senior HTA representative, to attempt to convince service PIs that requirements from Headquarters reflected co-ordinated national needs for information by the whole Intelligence Community. 134/

B. Organizational Incongruity

The easing of the Middle East crisis was felt more rapidly at home than it was in the field. Whereas the backup scanning of Middle East missions had kept stateside members of the Special Projects Branch very busy during the crisis, the waning of mission activity was marked by a declining work load. This situation was aggravated by the continuing stand-down in deep penetrations of the USSR.* In a branch initially staffed to handle voluminous inputs, other work had to be found.

The decline in mission exploitation activity and the consequent search for other work brought into play another very significant factor. Even at this early date, it was apparent that mission scanning was a deadly business. Not only was the routine scanning of hundreds of feet of film day after day a tedious task, it was also one offering little opportunity to maintain and improve the technical capability of the PIs assigned to the job. To a man, photo interpreters worth their salt longed for the opportunity to do work that would challenge them and improve their PI skills.

It is not surprising, therefore, that one solution chosen should have been detailed or summary-type reporting.

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* Between 10 July 1956 and 19 June 1957 only one U-2 mission penetrated Russian airspace. Mission 4016, flown out of Adana on 20 November 1956, reached Baku and covered parts of the Caucasus region. 135/

The first such project undertaken by SPB was an investigation of Soviet and Satellite ammunition and unidentified storage installations having both maximum security and some form of blast protection. In response to requirements from OSI and OCI, 136/ three SPB photo interpreters undertook work on this project, under the leadership of [redacted] on 3 December 1956. 137/ 3.5(c)
By the time the study was completed and the results published in the summer of 1957, the report covered 87 installations and had an appendix identifying 72 others which met only some of the stated criteria. 138/

Projects such as this met the objections raised by ambitious PIs who desired work more challenging than routine scanning. It also provided productive employment between missions. On the other hand, it invited questions as to why SPB should continue to be the largest PI branch at a time when the two detailed-reporting branches were struggling under heavy backlogs of work. Though it was premature to expect any showdown at this time, the dimensions of the problem were destined to grow to critical proportions by the following summer.

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C. Briefing-Aid Books

In December 1956, Lundahl, [redacted] and [redacted] 3.5(c)
met to plan a set of books for use in briefing high-level

government officials inside and outside the Agency on the accomplishments of HTA during the first six months of its existence. 139/ Such briefings would be useful in summing up at one time and place the succession of achievements to which many such officials had been exposed in piecemeal fashion. The briefing-aid books would also be useful in justifying continued support of HTA operation. Internally, the information compiled would serve to sum up and quantify HTA accomplishments and to provide a point of departure for planning over the next several months.

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The first planning session was followed almost immediately by a second meeting to develop working details. The latter meeting was attended by [redacted] under whose general direction the work would be accomplished; [redacted] under whose direction much of the compilation and writing would be done; and [redacted] who would be the focal point for providing information on PI material to be included.

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Six books were originally planned, but only four were completed: one book gave a statistical summation of U-2 inputs and of HTA products and accomplishments, another was directed to HTA work on the Middle East crisis, and two examined the results of the first eight missions over the USSR and Satellites. Work was begun almost immediately on the first of the USSR books. 140/

Measuring 20 by 19 inches, these books were an impressive example of institutional advertising and a demonstration of the alertness and aggressiveness with which HTA capitalized on its opportunities. Photographs were all glossy prints, many of them page-size save for the space needed for titles, captions, and small inset maps. Lettering, including the text was done with a Leroy guide, providing large, easy-to-read material. All reproduction, including text, was done photographically, with successive pages dry-mounted back to back.

The product that resulted was extremely attractive and had great visual impact. Produced at first in a few copies for desktop briefings of a few key officials, the volumes almost immediately became a prestige item, and many additional copies had to be produced to satisfy the demand.

Production work on these books was largely a graphics job, done in the Special Projects Branch. From December 1956 through March 1957, 50% of all the time logged in the branch on graphics jobs was charged to this project. 141/ Indeed, 10% of all SPB time, including that spent on graphics, was so charged. As in the case of summary-type projects like the one on secure storage areas in the USSR and Satellites, the availability of so much time, albeit much of it overtime, for a project not directly concerned with the immediate reporting responsibilities of the branch highlighted the broad guage functions assumed by the branch and raised additional questions, particularly in the minds of those in the two detailed-reporting divisions, concerning the high level of staffing in SPB.

Notwithstanding the obvious questions of cost and manpower utilization, these books constituted the most impressive historical record of any series of episodes in the history of NPIC or any of its predecessor organizations. They were used by Lundahl to brief key Agency officials, including the DCI, Allen Dulles, as well as high-ranking military officers. They are also reported to have been used to brief selected members of Congress.

D. Soviet Long-Range Airfields

The winter of 1956-57 marked the first noteworthy reporting by HTA on Soviet SAC-type airbases covered by U-2 photography the previous July. In part, this delay was caused by the generally high level of first- and second-phase exploitation at HTA and, more specifically, the diversion of PI effort in support of the Middle East crisis both at Headquarters and at overseas sites. It was also a reflection of the lack of knowledge by the PIs and by intelligence analysts in general of Russian offensive weapons and airborne delivery systems. Two milestone reports on this subject were issued in the form of PI memorandums, one in December 1956 and the other less than three months later. Both were products of the Industrial Branch.

The first of the two was entitled, "Probable Special Weapons Storage and Loading Installations," dealt with facilities at Baranovichi, Bobruysk, Bykhov, Orsha, and Siauliai Airfields. 142/ The weapons storage areas associated with these airfields were located four-to-six miles away. Hard-surfaced roads connected the airfields and storage areas. The weapons loading areas were adjacent to the airfields and served by taxiways from the runways (Figure 9). When these airfields were photographed in July 1956, all were in varying stages of construction, suggesting that they were to utilize a newly developed or recently modified weapons system.

The second of the two publications, also a PI memorandum entitled, "Special Weapons Loading and Storage Installations (Stryy Type)" 143/ dealt with facilities at Karankut, Minsk/Machulishe, Soltsy, and Stryy Airfields. At these fields both the storage and the loading facilities were situated adjacent to the airfields (Figure 10). All were complete at the time of photo coverage in July 1956.

The obvious evolution that had taken place in PI confidence and capability in a period of less than three months was indicative of the learning process in which PIs in the Industrial Branch were engaged. The first memorandum spoke of "probable" special weapons storage and loading installations. In the second, no qualifier was used. Moreover, in the second, the qualifier was dropped in alluding to sites covered in the earlier publication. Similarly, by the time of the second publication, the differences between the two types of sites had been recognized as significant enough to merit the application of special designators. The group treated in the February memorandum was called the Stryy type; those reported in December were belatedly dubbed the Orsha type.

Though the precise function of the facilities was not definitely settled at this time, it was believed that they were used to store and load nuclear bombs or airborne missiles because of their design and construction as well as the heavy security associated with them. The loading pits at the newer Orsha-type facilities and the largest one of four at each of the older Stryy-type sites were of similar size. They were thought intended for use by large aircraft, such as the Badger. The smaller pits at the Stryy-type were believed to be for servicing smaller aircraft like the Beagle. Interestingly, details of the loading pit configuration and widths of the loading ramps and taxiways at both sites, as revealed by U-2 photography, raised serious doubt whether they could be used by Bison's, with their main landing gear directly below the fuselage and with outriggers extending from the wingtips.

Neither of these types of Soviet loading and storage installations was previously known to US intelligence. At a time when intercontinental missiles were still in the R&D stage and airborne systems for the delivery of nuclear weapons were the immediate threat, this information was of high intelligence interest. Quite apart from the information itself, these reports helped further to dramatize the unique capability of the U-2 and interpreters of U-2 photography to breach the curtain of Soviet secrecy and spread before US planners and decision makers painstakingly detailed information concerning some of the most closely guarded Russian military installations.

E. Mozhaysk

Determination of the purpose and functioning of the perplexing installation under construction near Mozhaysk, USSR, was a much more difficult task than reporting on the long-range airfields. Interest in this installation rose sharply during the winter of 1956-57 in those quarters of the Intelligence Community witting of the TALENT coverage.

The installation was located in rural surroundings, about 75 miles west-southwest of Moscow (Figure 11). Within the site, which covered about three square miles, attention was centered on a large earth-covered dome 190 feet in diameter and 85 feet high, with a cap on top measuring 54 feet in diameter and 18 feet in thickness (Figure 12). A second structure, the mirror image of the first, was situated one kilometer to the north (Figure 13). This second one was still under construction at the time of photography, revealing, among other internal details, a vertical shaft 24 feet in diameter under the position of the cap in the earth-covered dome (Figure 14).

The operational part of the site contained many other buildings, some with massive walls up to 10 feet thick. Four major structures were buried or about to be buried to a depth of 20 feet or more (Figure 15).

The entire site was surrounded by a double fence separated by a cleared strip 10 feet wide. Access was limited to one entrance provided with a guard post. All housing, which, it was estimated, would accommodate up to a few thousand persons, was within the security fence, but separated by another fence from the operational area. Some 10 miles of hard-surfaced roads with wide-angle turns connected the housing areas and facilities within the operational area. Many of the latter were individually fenced.

Access from the outside was by first-class road; there was no direct rail service. There was likewise no evidence of unusually large sources of water or electricity, or of large-capacity facilities to dissipate heat from industrial processes. 144/

On 20 December 1956, the Assistant to the DDI for Planning sent a memo to the Army, Navy, and Air Force designating 3 January 1957 as the date for the first

There is no page 86

general meeting on the Mozhaysk problem. On the latter date, 49 persons, about half from the military services and half from CIA, plus three from NSA and two from the AEC, met at the Steuart Building. Four days later, on 7 January, a second general meeting attended by 30 persons representing the same organizations was also held at HTA. On 9 January, HTA received a new requirement from OSI/GMD to study the Mozhaysk installation. 145/

During the next week military intelligence and Agency personnel briefed USAF, US Army, and USN consultants on the installation and sought their uninhibited speculations about its possible uses. 146/ Persons briefed included Dr. Werner von Braun, Dr. Herbert York, Dr. Edward Teller, Dr. Mark Mills, Dr. Louis Alvarez, and Rear Admiral Hyman Rickover. During the same period, OSI representatives briefed [redacted] 3.5(c)
[redacted] then serving as consultants to that 3.5(c)
Office. The eminence of the scientists involved and the dispatch with which the Army, Air Force, Navy, and CIA arranged and accomplished the briefings emphasized the importance that the Intelligence Community attached to the problem.

The insights and ideas obtained from this series of interviews were stimulating, even foreboding, but bore little resemblance to the final solution. Von Braun thought the installation might be intended to launch long-range nuclear-powered missiles. Teller and Mills also entertained the same idea, but regarded its probability as being no higher than 10%. Alvarez also speculated that it might be for launching ICBM's, but conventionally powered ones. He ruled out the use of nuclear power because of the radiation hazard to which the large housing area, less than a mile away, would be exposed. Rickover confined his comments to possible nuclear applications of the site. He ruled out consideration of the facility as a nuclear-fueled electrical power plant for lack of cooling towers or apparent sources of water, but he seemed intrigued by the possibility that it might be used for testing of nuclear equipment, including nuclear rocket propulsion motors. [redacted] speculated more 3.5(c) cautiously. They discounted the possibility that the site might be for launching missiles, but suggested that it was probably related to the Soviet nuclear program. 147/ In coming to this conclusion [redacted] 3.5(c) neatly avoided the difficulties inherent in trying to imagine how missiles could be assembled, checked out, fueled, and launched from such an installation, while at the same time accounting for the thick concrete walls and general impression of hardness conveyed by the nature of construction at the site. These speculations, particularly the ones envisaging use of the facility for launching missiles, caused considerable agitation in the small circle of persons witting of their content and import. At a time when overhead reconnaissance had yet to provide evidence indicating whether or not the USSR might have achieved a spectacular breakthrough in the development of missile systems, the result was to conjure up, in the minds of those concerned, a vision of clouds of Russian missiles raining down on Western Europe and/or the United States following any refusal by Western powers to submit to Russian blackmail.

Further action involving HTA followed swiftly on the heels of the consultant briefings. As of 18 January 1957, the OSI/GMD requirement carried a triple-A priority, and HTA was asked to provide support to [redacted] 3.5(c)
of OSI/GMD and [redacted] of AFOIN, as representatives 3.5(c)
of GMIC and JAEIC, respectively, in connection with a forthcoming joint assessment of the Mozhaysk installation. 148/ Even if the purpose of the facility was still an enigma, it was evident that the Intelligence Community

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thought it was either a missile-launching enigma, a nuclear enigma, or both.

Between 18 and 31 January, when the desired information was issued in hard copy form, 149/* the Industrial Branch, which was responsible for HTA substantive work, engaged in a crash effort that took precedence over every other project in the branch. For the month of January as a whole, nearly 41% of all Industrial Branch project time was charged against the Mozhaysk problem; one-half of all branch overtime was spent on just one phase of Mozhaysk, namely, the special study done in support of the joint JAEIC-GMIC assessment. 151/ Nor was this the total, in all probability, of even the major portion of the HTA commitment on this phase of the Mozhaysk study. The OCR collateral researchers, the photo lab, and reproduction personnel were all very heavily involved, and the Technical Intelligence Branch provided critical measurements. 152/ In January 1957, and for the next two months, Mozhaysk was the biggest thing in the world of HTA.

Not surprisingly, results of the joint JAEIC-GMIC

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* Essentially the same interpretive material in revised form -- plus a stunning volume of photographs, line drawings, and perspective sketches, prepared for use by consultants, and comparable to the four HTA briefing-aid books -- was issued as HTA/R-1/57, the first Photographic Intelligence Report produced by HTA. 150/

assessment were inconclusive. They did, however, represent some progress toward the ultimate solution. The assessment substantially discounted the possibility that this was to be a missile launching site, though it did not end such speculation. On the other hand, it suggested somewhat vaguely that the site was probably an atomic energy installation, 153/ an hypothesis that was more compatible with the observable facts, and one that was elastic enough to cover the ultimate solution. But the solution was still a few years away.*

The assessment did one more thing. It pointed out the lack of COMINT information or other source material that would clarify the intended function of the Mozhaysk installation. In all this Community-wide, high-level deliberation one fact was obvious, namely, that without TALENT photography and without the keen eyes of the photointerpreters in identifying the Mozhaysk site as something of potential intelligence interest, nothing about this ominous installation would have been known to US intelligence. The dependence on photography was further emphasized by the recommendation that additional

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* For the solution, see p. 97, below.

TALENT coverage of the installation be obtained on a priority basis. 154/

This recommendation touched on a subject already begging attention. Nearly a week earlier, on 24 January, a group of analysts had met to discuss possible need for new photographic coverage of the Mozhaysk installation. 155/ Their verdict was, predictably, in the affirmative. Location of the installation north of 56° N, however, prompted questions about sun angle, snow cover, and their effects on the interpretability and information content of aerial photography taken at such high latitudes during the winter season. HTA was assigned the task of trying to arrange for an early test flight over high latitude portions of North America, and of examining World War II German photography taken at the latitude of Mozhaysk in the winter to determine the significance of snow and shadow factors at various times of day. 156/ In spite of animated interest by analysts in obtaining new photographic coverage of the Mozhaysk site, the proposal was not adopted. For the time being, analysts would still have to struggle to determine the purpose of the installation without comparative coverage and on the basis of just two frames of photography taken on 5 July 1956.

Even if new photo coverage was not forthcoming immediately, the Intelligence Community was as yet unwilling to settle for the inconclusive findings stemming from the information on hand. In a further effort to achieve a breakthrough, the Agency arranged a conference at Headquarters that would bring together at one place and at one time a cross-section of the country's best scientific talent representing disciplines that might be involved in matters analogous to those likely to be carried on in the Mozhaysk installation. Consistent with the key importance of photography, HTA would play an important role in the presentation of the photographic evidence.

On 25 February 1957, an invitation was issued over the signature of [redacted] the Assistant 3.5(c) Director, Scientific Intelligence, to eight eminent scientists, representing government, private industry, and research facilities managed by institutions of higher learning. 157/ These men were invited to meet with key intelligence officers and photo interpreters to discuss "certain new intelligence information."

On Thursday, 7 March 1957, the panel was convened at 0915 hours in the DCI conference room in the old Administration Building for a day-long session. 158/

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[redacted]

The conference was to consist of a morning and an afternoon session interrupted only by lunch in the Director's dining room. Both morning and afternoon sessions would be opened with presentations of the evidence. Appropriately, in view of the key role of photography, Lundahl made the initial presentation of evidence at the morning meeting. 159/

Leaders of the conference and conference members were especially interested in getting first-hand Werner von Braun's ideas about the installation. His earlier speculation that nuclear-powered intercontinental missiles might be launched from Mozhaysk was the most exciting and ominous of all the hypotheses. On the other hand, they were reluctant to reveal the true nature or source of the photography because of von Braun's former Nazi connection. He had previously been shown no TALENT photography as such, and it was decided in March 1957 to continue the deception. Accordingly, a calculatedly degraded photograph was prepared to back up the elaborate engineering-type drawings and perspective sketches prepared for the consultants, all of whom were TALENT-cleared. When Lundahl dutifully showed von Braun the photograph and explained it was taken with a 35-millimeter camera surreptitiously from an aircraft von Braun exclaimed, "You get all this information from one picture like this? You must have the world's greatest photo interpreters. I never saw anybody who could do such a thing as this. How you all do that?" 160/

Von Braun had waited outside the conference room until it was time to hear his interpretations and observations. When the consultants had finished with his testimony he left, and the conference continued without him. 161/ This shabby treatment of one of the great figures in missile technology struck a discordant note in an otherwise memorable meeting.

[redacted] concluded the afternoon session by leading a recapitulation of ideas developed during the presentations and discussion. No formal conclusions were drawn up, but the summation indicated: 3.5(c)

1. That the installation might be for the launching of IRBMs, but not ICBMs, and that, in any case, it would not be used to launch nuclear-powered missiles.

2. That the installation was not intended as a nuclear power plant, but that it could conceivably be used for the testing of prototype nuclear reactors.

3. That more effort should be devoted to studying the installation from an applied engineering point of view, with particular reference to the scheduling of construction in the light of research developments two or three years prior to early 1957. 162/

Within the next several days, the consultants came to the Steuart Building to see HTA and to talk with photo interpreters about the Mozhaysk installation. Even this additional chance to think and talk about Mozhaysk provided no further insights or opinions on the purpose of the installation, however.

Though HTA photo interpreters stuck to the task of extracting as much information as possible from the photography and presenting it to intelligence analysts and consulting engineers so that they could form their judgments, the long hours the PIs spent poring over the two frames of photography could scarcely have left them without their own speculations. And it didn't. To a man, the HTA photo interpreters gave little credence to the supposition that the Mozhaysk installation was a missile launch site. Their strongly held opinion was that it was somehow nuclear related, but, like others more expert in such matters, they were unable to identify the function precisely.

Having failed once again to achieve a breakthrough in solving the Mozhaysk riddle, Community effort devoted to the achievement of this objective waned in the ensuing months. Though there were to be further limited efforts during the spring and early summer of 1957, it

In spite of the unique role played so successfully by photography and photo interpreters in revealing and stimulating discussion about the Mozhaysk installation, the incident also demonstrated the fact that without collateral information or knowledge, photography alone may be insufficient to identify and determine the functioning of an unfamiliar installation. The Mozhaysk experience thus provided dramatic confirmation of the philosophy of operation espoused by Lundahl and others in the founding and development of the CIA Photo Intelligence Division. From the beginning, they had emphasized the need for all-source information as an adjunct to the successful exploitation of photography.

Any assessment of the significance to HTA of work on the Mozhaysk installation would certainly reveal that it was an important milestone. This importance transcended mere considerations of time expended, number of PIs involved, or acceptance of around-the-clock work as a periodic necessity, although these were all noteworthy. As the first major unidentified Russian installation, Mozhaysk introduced HTA to the glamour, apprehensions, and frustrations that were typically associated with the discovery and interpretation of such targets. The Mozhaysk problem provided further opportunities for HTA personnel to develop and elaborate their working contacts with intelligence analysts in CIA and elsewhere in the Intelligence Community. Indeed, it demanded them. More important still, it projected HTA and its personnel into a position of national prominence, albeit a carefully guarded one, among selected leaders in the American scientific community, particularly in the fields of guided missiles and nuclear energy. Work on Mozhaysk brought with it the AEC Q clearance for a few HTA photo interpreters, giving them access to "Restricted Data." The effect of these growing contacts and burgeoning knowledge would be reflected in rapidly increasing opportunities for training and on-site trips, with a consequent increase in the ability of the PIs to deal effectively with exotic targets in the military and scientific fields.

The fall-out from the Mozhaysk project was not without its detrimental effects, however. The advantages thus gained by PIs in the Industrial Branch further widened the gap between them and their fellow workers in the Geographic Branch. The latter, doomed to unexciting work on more conventional geographic and industrial targets and without an opportunity to share in all the glamour and advantages deriving from work on the highest-priority targets in the Intelligence Community, began to feel that they were being neglected. Industrial Branch PIs, not those in the Geographic Branch, met and worked with high-ranking Agency and military personnel, and with renowned scientists. When on-site trips were planned to US missile and nuclear installations and related manufacturing facilities, it was PIs from the Industrial Branch, not Geographic Branch, who did the traveling. When Q-clearances were first obtained for HTA photo interpreters, it was PIs from the Industrial Branch who were first cleared, not those in the Geographic Branch. Though the morale problem did not become a serious one at this early date, circumstances were inexorably defining and widening the differences between the two types of assignment. Unless something unexpected intervened, the day would come when something would have to be done about the situation.

F. Testing. . . Testing

With the arrival of 1957, D/GP support of the OSTIARY* program entered a new phase. Preparations for testing the system at Eglin Air Force Base were proceeding right on schedule. Photo Intelligence Division personnel, particularly [redacted] had already spent a substantial amount of time in support of development and contract work. Now they would be called upon

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* For further information on the OSTIARY program, see pp. 41 and 63, above, and p. 175, below.

to spend even more time during tests, a prospect made all the more likely by the marginal nature of the lighting system. Obviously, such a situation called for the exercise of some prudence, and D/GP gave evidence of having diagnosed the potentially extraordinary demands that might be levied on limited division resources.

EO 13526 3.3(b)(6)>25Yrs

Indeed, as early as the previous fall reports of trips to contractors' plants were being directed all the way up to Otto Guthe, Assistant Director, ORR. 164/ Now, in January 1957, Guthe was being tied into the commitment for testing the equipment. In a memo prepared for Guthe's signature by [redacted] the chief, Psychological 3.5(c)
and Paramilitary Staff, DDP, was promised that [redacted] 3.5(c)
[redacted] and [redacted] would be available for dut[redacted] EO 13526 3.5(c) 3.5(c)
the testing phase at both Eglin AFB and Headquarters, and that they would prepare interim as well as comprehensive reports of photographic testing for the Air Maritime Division, DDP. 165/ All was now in readiness for D/GP participation (Figure 16).

On 29 January 1957, [redacted] departed 3.5(c)
Washington bound for Pensacola, Florida, and Eglin AFB to begin tests on the photographic system. Four times between that date and the end of March, [redacted] 3.5(c)

made the trip, spending all or parts of 37 days in transit or at Eglin field. 166/ On two occasions they were also accompanied by [redacted] who provided technical support with reference to the projected use of radar sensors in the P2V aircraft. Though several more trips were made later in the spring and in the summer of 1957, the peak of D/GP participation was reached in March. 3.5(c)

Field testing at Eglin field involved three items: 1) calibration of the CAX camera; 2) checking of the altitude of the aircraft, and 3) monitoring the lighting efficiency of the Garrett pods, each of which contained 16 ultraviolet lights.

The test range featured a number of survey points, each of which was marked with a stake. A battery with a flashlight bulb on top was taped to each stake prior to test runs. Since the precise location of each of these survey points was known, this network of points could be used to calibrate the camera. It was also possible to use these points to calculate the height of the aircraft from photographs taken as it passed over them.

To check the effectiveness of the lighting pods, as well as to provide another check on the altitude of the aircraft, [redacted] took photographs lying 3.5(c) flat on their backs on the ground as the airplane passed directly above them. These photographs would reveal how many of the lights were functioning. Because the distance between the pods was known, they could also be used to calculate the altitude of the aircraft. 167/

Prolonged testing was ensured by a whole host of problems that developed almost immediately. Some were so serious as to cast doubt that they could ever be solved successfully. Most fundamental was the persistent failure of the lighting pods to meet specifications. Designed so that they were powered by propeller-driven air turbines, the speed of the aircraft while operating on its two reciprocating engines was insufficient for the air turbines to generate enough power to light all the bulbs. When the small jet motors under the wings were cut in, the increase in air speed was adequate to light all the bulbs, but the increase in fuel consumption then reduced the range of the aircraft by a factor of about seven. 168/

Malfunctioning of the lighting pods created or exacerbated other problems. Insufficient light called for compensating measures, such as use of a faster film, increase of exposure time, lower flying altitudes, and increased speed to keep the lights on. Faster film increased processing problems and degraded the image. Longer exposures, lower altitudes, and increased speed aggravated image motion compensation problems. Lower flying altitudes were difficult to achieve and, in any case, hazardous. The dangers inherent in flight down to an altitude of 150 feet at night over unfamiliar terrain virtually precluded operational use of the photographic system.

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D/GP personnel also frequently flew with crews on test flights to check operation of the cameras. The arduous regime of flight testing at night, developing film and performing rudimentary measurements in the wee hours of the morning, and then briefings at 0700 hours for those in charge of the program were sometimes relieved by unexpected diversions. On one such occasion, with [redacted] aboard, the sensing system failed to operate. On the spur of the moment, the crew decided to fly to Andrews Air Force Base for a short visit home. The unanticipated arrival of an Agency-owned, Navy plane with Air Force markings was calculated at best to create some difficulties in communications. The fact that a rain and hail storm through which they had passed washed off the identifying Air Force decals virtually precluded satisfactory communications. When the tower 3.5(c) operator at Andrews AFB saw the big, black, unmarked P2V on the ground, he ordered it parked out of sight of the operations building. He wanted no questions asked about that bird. 169/

In spite of months of effort, attempts to bring flight testing of the photographic systems to a successful conclusion ended in failure. The basic problem of providing sufficient light remained unsolved, and the night photographic system was never used operationally. The "Warthog," as this reconnaissance version of the P2V was appropriately known because of the many protuberances on its surface, did, however, fly operationally in the Far East at a later date using other sensing systems. 170/

G. Signs of Drought

As March 1957 drew to a close, activity at HTA was showing signs of easing. In an organization that had scarcely known a tranquil moment since its inception, these signs were something new. Heretofore, in spite of the arrival on board of many new and willing hands, the backlog of requirements seemed to increase, and the number of tasks seemed to grow. Now, for the first time, there was reason to wonder what the future might hold.

It was not as though there was widespread unemployment. Rather, the change in mood was based on a number of different indicators. Chief among them was the fact that there were as yet no more deep U-2 penetrations of Russian airspace. Most of the jobs under way -- and there were many, chief among them the current excitement about Mozhaysk -- were based on photography obtained the previous July. Many in HTA were aware, moreover, of the pilot-type operation that was HTAUTOMAT. If there were no more penetration flights because of Russian protests, what would the future hold? And then there was the unresolved question as to whether CIA would continue to control the TALENT program, or whether it would be turned over to the Air Force.

In a closely knit organization like HTA, where togetherness was emphasized by stringent security controls and compartmentation, there were no signs of unrest or undue concern. No one, from the lowest-paid clerk to the most knowledgeable PI, was without some appreciation of the importance of HTA accomplishments and contributions to national intelligence. All seemed to have an abiding faith that there would be no curtailment in the strategic photographic reconnaissance capability that had been developed so brilliantly.

Their faith was, indeed, well placed. Though not generally known in HTA, work was already under way by March 1957 to bring into sharper focus the highest-priority strategic targets against which collection efforts should be directed at such time as the stand-down in U-2 flights ended. On 27 March 1957, James Q. Reber, as chairman, Ad Hoc Requirements Committee, prepared a memo for Bissell giving guidance concerning the "highest" and the "high" priority targets in western USSR, the Soviet Far East, and the European Satellites. 171/ The main object of this memo was to identify 35 highest-priority targets, on which information was needed to fill gaps about the Soviet guided missile capability against the United States, the Soviet long-range bomber capability, and the Soviet nuclear production capability. The seven categories of targets aginst which the U-2 collection effort had been directed in July 1956 was now narrowed to three of paramount interest. Clearly the concern now was to learn about the Russian nuclear capability and the Soviet ability to deliver nuclear weapons against targets in the United States. It was hardly likely that the United States or the US Intelligence Community would permit the impairment of the only good means for collecting and exploiting materials yielding this vitally important information.

On the other hand, if there were a temporary drought in work, HTA would be provided a welcomed opportunity to take count of stock and to prepare for vitally important tasks that were almost certain to come. Above all there would be an opportunity to modify the organization and reassign personnel on the basis of lessons learned over the previous nine months. There would also be a chance to provide additional training for HTA photo interpreters and to familiarize them with scientific and technical targets for which they would be searching in the USSR by exposing them to on-site inspection of analogues in this country. These were among concerns that would dominate the thinking and the work in HTA during the next several months.

IV. Reorganization and Renewal

Experience during the first nine months under HTA proved different in many respects from initial expectations. Management of the operation, ever alert and adaptable, undertook to assess the situation and prescribe the indicated changes. As early as 1 February 1957, Lundahl had noted that the mission under which HTA was operating was obsolete and he called for a revision of mission, functions, and operating procedures with a view to HTA becoming a ". . . separate office or PI center in CIA." 172/

In addition to organizational changes, it soon became apparent that there should be improvement in the efficiency and effectiveness with which D/GP personnel performed their tasks. Expanded PI training would be sought for the younger recruits to ensure a thorough understanding of fundamentals, including those having a bearing on mensuration techniques. Broader contacts would be cultivated with other intelligence analysts and organizations in the Community through conferences, attendance at briefings, and joint work on problems and targets. On-site trips would be arranged to acquaint PIs, senior as well as junior grade, with exotic US military and industrial installations. Finally, efforts would be redoubled to develop key equipment needed to maximize the exploitation of photography for scientific and technical purposes.

In spite of all these plans and programs, photo interpreters and production personnel persevered with the exploitation tasks on hand in an attempt to bring them to completion as soon as possible. HTA managers who knew of Reber's memo on revised targets for collection were only too well aware of the impact the receipt of the first photographic coverage of Soviet missile launching and nuclear production facilities would have. They wanted to clear away as much of the backlog as possible before any such inputs were received.

A. Training and Orientation

Most significant of the several facets of the professional development program was the inauguration of on-site trips to US missile and nuclear installations. Though conceived as necessary the previous summer, 173/ little progress had been realized toward getting the trips under way, chiefly because it was difficult to justify interruption of project work in favor of training, however desirable the ultimate objective.

Arrangements for the on-site trips required support from intelligence analysts and supervisors in components for whom the PIs were providing information. Work done over the first three months of 1957 by HTA on Mozhaysk did much to dramatize the need and enlist additional support from supervisors and managers in other intelligence components for these trips, particularly in OSI and in the military services. The main impetus came from the Industrial Branch where supervisors and photo interpreters were struggling to identify and explain the functioning of installations with which they were quite unfamiliar. Thus it was that personnel chosen for the first several trips, including all those in the spring of 1957, came from the Industrial Branch.

On the first such trip, as in the case of many subsequent ones, several HTA photo interpreters joined their counterparts in OSI. On 3 April 1957, [redacted] 3.5(c)
[redacted] left Washington for a trip to south- 3.5(c)
eastern United States missile and nuclear installations.
[redacted] of OSI/GMD and [redacted] of OSI/NED 3.5(c)
accompanied them throughout the trip [redacted] DAD/OSI, 3.5(c)
joined the others briefly for the tour of Cape Canaveral.

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The first stop was at Cape Canaveral where, among other things, they saw the first Atlas missile in place for a scheduled firing later that month. In addition, the second Atlas brought to the Cape was still on its cross-country trailer in the hangar. Members of the group also examined several completed Atlas launching sites as well as Titan sites in early stages of construction. They observed servicing towers, handling vehicles, LOX and nitric acid storage facilities, control blockhouses, underground cable and water lines, and water pumping stations. To PIs who would be expected to identify and interpret such items on photography of Russian missile testing centers at such time as the anticipated coverage should be obtained, this opportunity to examine these observable features of the landscape and to have their functioning explained was a revelation. For the first time, they would be aware of what to look for.

Following a two-day stay at Cape Canaveral, they moved on to the Army Ballistic Missile Agency at Huntsville, Alabama. Here, the vistors were introduced to the entire Redstone and Jupiter programs, from blueprints to the static testing of engines. The next day they saw some of the smaller tactical weapons at nearby Redstone Arsenal.

a construction engineer, [redacted] a boyhood friend 3.5(c)
of [redacted] who pointed out to him how advantageous it 3.5(c)
would be to identify and study the relationships of key facilities from the air, and arranged a helicopter flight. This was the highlight of the trip from a PI point of view. Here at last, was an opportunity to view those things that the PI would be called upon to identify and explain on photography, and to see them from overhead as the camera would record them.

At all installations, of course, there were illustrated briefings as well as tours. HTA members in the party saw many slides, models, pictures, and movie films. As time permitted, they selected slides and pictures, copies of which were deemed desirable for use at the Steuart Building. They also noted sources where movie films could be obtained, with the intention of borrowing them for showing at HTAUTOMAT. From the models and from the briefing rooms and displays, they brought back ideas which were subsequently used by HTA in its presentations. In closing his trip report, [redacted] 3.5(c)
[redacted] pronounced the value of all they had seen and learned 3.5(c)
"inestimable."

[redacted] made three recommendations based on the 3.5(c)
experiences of this first trip:

1. All Industrial Branch personnel should have a "Q" clearance.

2. The photo files at each of these and similar installations should be exploited by HTA personnel for the purpose of procuring copies of those pertinent to the HTAUTOMAT operation.

3. Regardless of work load and staffing, more such on-site trips should be scheduled, and Industrial Branch PIs should attend available courses of instruction in atomic energy, guided missiles, electronics, and related fields. 174/

With the benefit of historical perspective, this on-site inspection trip proved to be notable for reasons far more important than the fact that it was the first. This trip not only demonstrated the way to fill a conspicuous void in the capability of HTA photo interpreters, but also expanded the horizons of their supervisors by introducing them to a whole new world, of whose existence and dimensions they were only vaguely aware. Moreover, the close association of PIs and intelligence analysts on the trip served to demonstrate, with examples, the types of things in which PIs were interested and needed to get their jobs done. This, in turn, enhanced the intiatives that intelligence analysts and their supervisors might take in making suggestions for PI participation in additional trips and courses. Indeed, this trip, together with the consultant contacts begun a month earlier during the Mozhaysk exercise, marked the first steps in the development of a broad-gauge PI capability in HTAUTOMAT and successor organizations that were to set HTA photo interpreters apart from others in the Intelligence Community. Before many years, it would be established clearly that HTA PIs excelled all others in dealing with critical targets of national intelligence interest. EO 13526 3.3(b)(6)>25Yrs

The second, and only other, on-site trip during the spring and early summer of 1957 took place between 10 and 21 June when [redacted] of the Industrial 3.5(c) Branch, accompanied by [redacted] 3.5(c) of ORR/S/GM visited several US guided missile research and production facilities. Among the sites visited were the Air Technical Intelligence Center and Wright Air Development Center at Wright-Patterson AFB, Dayton, Ohio; the Soviet Missile Technical Intelligence Group at Kelly AFB, San Antonio, Texas; White Sands Proving Ground, Sandia, New Mexico; North American Aviation facilities at Downey, California; Hughes

Aircraft Corporation at Culver City, California; Douglas Aircraft Company at Santa Monica, California; and Convair Aircraft Corporation facilities at Pomona and San Diego, California.

Like the earlier trip, this one involved the usual briefings and ground tours at each site visited. [redacted] also had an opportunity to fly over, but not 3.5(c) hover above, the missile range at White Sands at low altitude in a light conventional aircraft. Unlike the earlier trip, this one was confined to just one type of target, namely, to guided missiles and associated electronics. Moreover, considering the number of sites visited and the distances involved, the pace was faster and afforded little opportunity to do more than look, listen, and then hasten to the next stop. Even so, it provided a valuable introduction to a wide range of installations and information not previously familiar to HTA personnel. It was also the first trip to some of the very important installations in the West.

In his trip report, [redacted] made just two recom- 3.5(c) mendations. He echoed and refined [redacted] plea for 3.5(c) more such trips by suggesting that all PIs should visit facilities falling within their own spheres of specialization. He also urged that, in planning future trips, time be allowed for searching photo files at installations visited so as to facilitate selecting items that should be copied and forwarded to HTA. On his trip, [redacted] had been frustrated by a lack of time to peruse such files. As was the case with [redacted] felt that these photo files held much information of vital importance to photo interpreters who would be called upon to interpret similar Russian installations. 175/

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Apart from the on-site trips, HTA stepped up training in photo interpretation techniques. During the spring of 1957, eight PIs completed the 10-week portion of the course at Navy PIC. 176/ In July 1957, five more enrolled in the next offering of the same course. 177/ In this PI training, there was no distinction between PIs in any of the branches; IB, GB, SPB, and Central Branch were all represented.

Central Branch, with its traditionally oriented PI tasks, chose still another way to augment the composite skills of its personnel. In May 1957, [redacted] completed the Agency report-writing workshop. 178/ A month later, [redacted] chief of the branch, and one of his photo interpreters, [redacted] completed the course in report writing. 179/ This concern for writing reports revealed an uncommon appreciation by

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[redacted] of the need for effective communications to complete the reporting cycle. In a technical field, such as photo interpretation, where the primary capability and interest of the person was in the extraction of information from the photography, the careful preparation of the written report frequently required more than routine attention on the part of the supervisor plus an above-average capability and interest on the part of the PI. Moreover, under circumstances where PIs were laboring on a sizable backlog of high-priority items, information on which was initially disseminated by word of mouth, this chronic deficiency was aggravated by the pressure of work. In Central Branch, where there was more time to reflect and then act, something was being done to correct the deficiency. 3.5(c)

Nor were those in PI positions the only ones whose capability and career development became the objects of interest to HTA managers and supervisors. From 15 through 26 July 1957, [redacted] of the Technical Intelligence Branch and [redacted] of the Special Projects Branch were sent to a two-week summer course in photogrammetry at the Massachusetts Institute of Technology. 180/ 3.5(c) 3.5(c)

Internal training of a non-technical nature was also provided HTA personnel, at least selectively. Though key managers and supervisors were, generally speaking, still too busy to be spared from their duties, the pervasive conviction that D/GP and HTA were headed for bigger things argued for developing further the managerial and supervisory talents possessed by those immediately under them. Thus, prior to his going on the first major on-site trip in April 1957, [redacted] completed the Agency course in Basic Management. 181/ In May, [redacted] the acting deputy to [redacted] in the Support Staff, finished the Agency course in Basic Supervision. 182/

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Finally, though several newcomers had been sent to the CIA Intelligence Orientation Course over previous months, attempts were now made to respond more freely to the Agency requirement that new employees get their basic orientation as soon as possible. Thus, during the spring of 1957 many of the older hands, who had previously been withheld from such training on the plea of crash work such as the preparation for and receipt of early U-2 inputs, were now scheduled for this course. Thus, some of the PIs who had been on board from several months to a year or more joined newcomers in the IOC. 183/

B. <u>Training and Orientation Offered by HTA</u>

In turn, training was offered by HTA for others in the Agency. The spring of 1957 also marked a resumption of the D/GP photo interpretation course, which had been suspended the previous fall after one offering. On 5 June 1957, the course was offered in Room 206 Central Building, under the immediate direction of [redacted] 184/ Though some lectures were presented by Central Branch personnel, many others, such as the one on mensuration by [redacted] of the Technical Intelligence Branch, were given by specialists from other D/GP branches.

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This offering of the course, in which the number of sessions was increased from 11 to 18 by the incorporation of material on landforms, vegetation, land use, urban development, military installations and weapons, and electronics facilities, 185/ was regarded as the first in a new series of courses and was alluded to as Basic Photographic Interpretation Course No. 1. 186/ The course featured another and more exciting departure from previous custom, namely, the addition of an overflight in an Agency aircraft of industrial facilities along the Middle Atlantic seabord. 187/ Because of the expansion of the scope of the course, it was agreed that it would soon be followed by a special course designed to provide those who had taken earlier PI courses with an opportunity to cover the newly added material. 188/

During the spring and early summer of 1957, HTA continued to provide exhibits and briefing personnel, as in the recent past, for the Intelligence Products Exhibit. 189/ Lecturers were also provided for the Intelligence Orientation Course. 190/ In both cases, however, the exhibits, discussions, and lectures had to be restricted to the SECRET level, precluding any inkling of exciting developments in connection with the exploitation of U-2 photography. Partly because of this restriction as well as the fact that Central Branch was the focal point for training in the division, support for the Intelligence Products Exhibit and IOC was provided by personnel in that branch.

C. New Tools for Eager Hands

In spite of the lead time needed to define requirements and obtain equipment, and the even longer lead time needed to develop specialized devices, by the spring of 1957 HTA was beginning to make progress away from the traditional pocket stereoscope, tube magnifier, PI slide rule, and desk calculator toward a more sophisticated and higher capacity type of operation. And it was none too soon. Even with the exploitation tasks provided by a meager eight missions -- those over the Middle East were primarily tactical and provided little challenge -- PIs and Photogrammetrists were taxed severely at time to get the job done.

One of the most critical areas was technical exploitation of the photography. Once analysts saw the high quality of the photography, they began to ask questions of a type and in a volume that had not been anticipated. Indeed, many requirements dealt with matters beyond the ken of interpreters whose previous experience was bounded by tactical military reporting, work in the earth sciences, and mapping.

To provide better quantitative information, during the first year of operation HTA acquired two comparators. One was a Mann borrowed from Navy PIC, the other a machine developed by Photogrammetry, Inc., of Silver Spring, Maryland (Figure 17). Both instruments, which were probably accurate to two microns, were dial read. To reduce possibility of error in recording information, each value was read twice by the operator before being recorded by a second person (Figure 18). Data, consisting of x and y coordinate measurements, were reduced with aid of a desk calculator. 191/ This was the general extent of automation and sophistication of the mensuration capability at HTA at the close of the first year of operation. If it seems unimpressive, at least the trials and frustrations to which it was exposing TIB personnel were surely pointing to the obvious solutions that lay beyond the terra incognita yet to be transversed.

May 1957 witnessed the arrival of the so-called Reed rectifier and Reed transforming printer (Figures 19 and 20). 192/ These pieces of equipment, which had been modified for use at HTA from similar rectifying printers developed under auspices of the Wright Air Development Center for use at ACIC, 193/ were made necessary by the advent of the B camera,* which was capable of photographing from horizon to horizon. When the rectifier was installed, it was the only one in the United States capable of handling photography with tilts up to 75 degrees, but it could not accomplish as much as this in one step. Common practice was to perform the first step on the transforming printer, a

* For further information on the B camera, see p. 65, above, and 263, below.

fairly rapid operation, and the second and final step on the rectifier, a much slower and more tedious operation. The greatest use for these two pieces of rectifying equipment at HTA was in the production of matched prints for use in laying photo mosaics.

With the end of the fiscal year approaching, HTA was confronted with the perennial problem of what to do with unexpended funds. One day [redacted], who functioned mainly as spokesman for the office of the chief in matters involving R&D and equipment procurement, burst into [redacted] office with the words, "Hey, John, 3.5(c) what computer do you want? We'll get it for you." 194/ There was a residue of $50,000 in the budget which had not yet been committed to other uses. The painstaking investigation that [redacted] had conducted the previous fall 3.5(c) of available small computers and their adaptability for use in HTA was about to pay off.

In his investigation [redacted] had considered the 3.5(c) computer as part of a complete system for achieving the maximum exploitation of U-2 photography to serve Community needs. In May 1957, there were over 110,000 frames of photography in the HTA library, two-thirds of which were oblique photography requiring rectification for precise exploitation. The system conceived would consist of comparators with flexowriter readout, the Reed rectifier and transforming printer, and the small digital computer. Requirements for rectification to provide services not only for CIA but also for the military [redacted] were estimated to total 3,020 cases per year. The system was designed to handle up to 3,480 rectifications per year. 3.3(b)(1) 3.3(b)(6)

HTAUTOMAT estimated that without the proposed computer it would take nearly 14 man-years of desk computation each year to provide the minimum estimated services mentioned above. On the other hand, the computer was expected to require only 1/6 to 1/3 years of computer time to handle the capacity output of 3,480 rectifications per year. This would leave 2/3 to 5/6 years of computer time each year for handling other exploitation problems.

In addition to the expected on-going computer load for rectification work, an estimated 11-year backlog had already accumulated. This could be materially reduced by preparing scale number tables for use by the PIs in situations where non-critical measurements were needed. Whereas the time required to produce each such table for a given camera orientation was estimated at 16 to 20 man-hours using a desk calculator, it was estimated that the computer could do the same job in 15 minutes or less. Such tasks as these would utilize some of the computer capability not needed to fulfill minimum rectification requirements.

Beyond these straightforward, basic jobs, there were others that promised rich rewards but were so complex as to preclude even considering with a desk calculator, such as analytical bridging or cantilever extension to determine camera orientation for areas where no control information was available and the accomplishment of computer-assisted analytical stereo-photogrammetric measurements with least squares adjustment in cases where maximum obtainable accuracy was imperative. 195/

The decision to buy rather than lease the computer and the choice of brand and model were quickly made by HTA and concurred in by [redacted] of the Management 3.5(c)
Staff. 196/ The choice was an ALWAC (for Axel L. Wenner Gren, the Swedish industrialist), Model III-E, costing just under $50,000. 197/ Of the small digital computers then becoming available, the ALWAC was the only one having a combination of word length, memory capacity, and flexibility of command structure judged necessary to perform the tasks envisaged at HTA. 198/ This judgment and the degree of confidence with which it was

made were materially enhanced by a visit to Arlington Hall where [redacted] saw the NSA ALWAC-III in operation. 3.5(c) 199/ After this visit, during which the capabilities and functioning of the machine were discussed with NSA personnel, the formal justification for purchase was prepared and the computer was ordered. It was some months, however, before it was delivered.

Though Minicard equipment which had been expected in the fall of 1956 was still lacking in the spring of 1957, hopes were rising again that the date of arrival was not many months away. Accordingly, plans were already being made to provide orientation and training for those who would supervise the operation as well as those who would use the equipment. By May 1957, it was optimistically predicted that this orientation and training would begin almost immediately. Plans called for [redacted] the deputy chief of the Statistical 3.5(c) Branch, along with [redacted] 3.5(c) of the Technical Section of that branch, to go to the Eastman Kodak Plant at Rochester, N. Y. Later, [redacted] 3.5(c) [redacted] was to join them. [redacted] was to stay long 3.5(c) enough to participate in setting up the training 3.5(c) exercises. [redacted] were to spend a month or 3.5(c) more in learning to operate all components of the system.

[redacted] whose duties and responsibilities were to be much more specialized, was to get a complete indoctrination on the operation and maintenance of the Minicard camera. 200/ 3.5(c)

Even at this late date, in the spring of 1957, Statistical Branch managers had not yet abandoned hope of using Minicard to store, recall, and reproduce TALENT photography. The trials and tests at Eastman were to feature use of live U-2 photography from Mission 2024, one of the five that penetrated the USSR in July 1956. Photography from this mission was chosen because of the excellent range in quality that it afforded. 201/

Though the choice of personnel remained firm, the orientation and testing did not begin until the summer of 1957. Moreover, when it did take place it consisted of several trips of short duration that continued into the fall. It did, however, provide HTA personnel with the capability to operate the equipment at such time as it should arrive.

Not all the changes in techniques and equipment took place in the support elements of the organization. The summer of 1957 marked the start of a general retreat by photo interpreters from their traditional preference for photographic prints, as opposed to positive transparencies, for use in doing interpretive work.

For the first several months of the HTA operation, virtually all the interpretation, including scanning, was still done from prints. Though the loss of exploitable detail on prints -- generally believed to be on the order of 30% -- was not unknown to technical people and technically oriented PIs in HTA, prints were the first type of material provided for exploitation. For one thing, experienced photo interpreters were accustomed to using them, and they fitted into their habits of work. For example, PIs had an ingrained habit of marking notations on the prints with a grease pencil. The same pencil used inadvertently on the emulsion side of the film -- a not unusual occurrence at first -- was attended by results that caused PIs to shy away from use of transparencies.

In spite of PI reactions that ran the gamut from enthusiastic support in the case of a few imaginative souls, through indifference, to outright opposition, there were several influences at work that gradually tipped the scales in favor of transparencies. Whereas the quality of the photographic prints, compared with that of the original negative, was generally less than had been anticipated, the quality of the duplicate positives had generally met expectations. This was recognized by the keener and more adaptable PIs, who demonstrated in some of their work the greater potential of the transparencies. Other PIs, observing their success, began to realize the advantages. Much impetus was added to the use of transparencies when the Special Projects Branch, beginning in January 1957, used duplicate positives with great success in their major effort to resolve previously conflicting and incomplete reports on the number and type of aircraft reported from U-2 coverage of Soviet airfields. 202/ Later, when SPB photo interpreters were assigned to other branches and faced difficult and critical interpretation problems, they turned to transparencies. This was particularly true in the Industrial Branch where targets and projects covered many high-priority installations about which critically important questions were asked.

As PIs began to acquiesce, the chief deterrent to wider use of duplicate positives was lack of equipment adequate to realize the full potential of transparencies in detailed exploitation work. The sought-for break-through came as a result of the interest, initiative, and technical competence of [redacted] a photo 3.5(c)
interpreter who jury-rigged a microstereoscope by
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gluing a pair of prisms to a cardboard mount which, in turn, was taped to a binocular microscope (Figure 21). This instrument was so successful that it was avidly sought by other PIs making critical, detailed interpretations (Figure 22). In response to the growing demand as well as to provide a buffer against his own needs, [redacted] modified at least two other binocular 3.5(c) microscopes for stereo viewing.

The Machine Division of OCR was requested, as early as 6 March 1957, to construct a microstereoscope to [redacted] specifications, 203/ but no such instrument 3.5(c) was yet available early in the summer of 1957. Later the [redacted] design would form the basis of an instrument 3.5(c) produced by a commercial firm (Figure 21).

D. Familiar Tasks

In spite of the ferment caused by travel, training, the acquisition or anticipated arrival of new equipment, and new exploitation techniques, the bread-and-butter work of interpretation, coordination, and consultation proceeded during the spring and early summer of 1957. The pace, however, was noticeably slower than at any time since the inception of HTA.

Reflecting the lack of new photographic coverage of strategic targets, the number of requirements and proportion of PI time spent on projects declined sharply compared with figures for the previous fall and winter. The nadir point in receipt of new requirements was reached in June 1957 when only eight new ones were logged into the Support Staff, compared with an average of 26 a month for the previous eight months. Five of the eight new requirements originated in D/GP itself. 204/ As work continued on old requirements and projects, the backlog began to shrink, particularly in the Geographic Branch, which had but five projects on the books by July. 205/

The decline in new requirements gave release to pent-up pressures for travel, training, and leave taking. The proportion of available time spent on projects in the Industrial Branch plunged from 89% in February to 37% in April, 206/ primarily as a result of a heavy schedule of on-site orientation trips and other more formal training. The comparable decline in the Geographic Branch, which saw the proportion of time spent on projects drop from 67% in April to 42% in June, 207/ was both later and less precipitous. In the latter case the primary cause was an unusual amount of leave taking, both annual and military, as well as a heavy program of training. By July, however, time spent on projects in the Industrial Branch had rebounded to

79% of the total; 208/ for the Geographic Branch the comparable figure was 56%. 209/

Though long-deferred training and leave-taking did much to ameliorate adverse effects of the shrinking workload, the continuous arrival of new employees, selected months earlier, complicated the situation. Concern over the vanishing backlog, greatest in the Geographic Branch, was reflected in attempts to generate new requirements. On 30 April 1957, [redacted] chief of the Geographic Branch, met with [redacted] chief of the Cartography Division, concerning the possibility of providing PI support for work in that division, but without positive results. 210/ In July, Geographic Branch representatives met with [redacted] of ORR concerning requirements for PI studies of certain USSR rail lines. Response from ORR was more encouraging and, with the low ebb of projects in the branch, work was begun on several rail-line studies in anticipation of forthcoming requirements. 211/ Even the Support Staff got into the act. In June, [redacted] conferred with [redacted] of D/GG concerning possible future requirements from that division. 212/

3.5(c)
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3.5(c)

At a time when all of the strategic coverage and a majority of the requirements dated back many months,

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project work and reports published during the spring and early summer of 1957 had a familiar ring to them. The unidentified installation near Mozhaysk was one such project. After lying dormant for several weeks as far as HTA was concerned, it came to life again in May when OSI sponsored a two-day meeting for nuclear-energy consultants on the problem. [redacted] of HTA attended the 3.5(c) meeting. 213/ Mozhaysk was active again in June when [redacted] attended three more meetings, one held by the 3.5(c) IAC and two in Barton Hall. 214/

The 28 June meeting in Barton Hall was devoted to 3.5(c) a recently issued Air Technical Intelligence Center (ATIC) report which supported the theory that the Mozhaysk installation was an operational IRBM launch site. In a memo dated 21 May 1957, [redacted] had cogently questioned 3.5(c) some of the key interpretations given in this report and, in a reasoned summation, expressed serious doubt as to the validity of the theory. 215/ As time went by, HTA doubts were completely vindicated. HTAUTOMAT was displaying early signs of the astuteness and the expertise that were eventually to earn its PIs the reputation of being the most able in the Community.

The critical examination of this ATIC report in HTA also revealed that analysts at ATIC had access to technical information concerning US missile systems that was not available to HTAUTOMAT photo interpreters. HTA requested that it be made available. 216/ On 19 June 1957, 22 such reports were forwarded on loan from ATIC to CIA for use by HTA and OSI analysts. 217/ Slowly but surely, HTA was taking its place as a full fledged partner in the analysis of high-priority targets of national intelligence interest.

Preoccupation with the Mozhaysk problem at this time was not to end with the stir over the questionable ATIC contribution to the solution. In July, nuclear energy analysts were back in the running with an OSI consultant meeting dealing with the nuclear aspects of the installation. This meeting was attended by [redacted] 3.5(c) of HTA. 218/ The struggle to explain the function of this puzzling installation was continuing, but preoccupation with Mozhaysk was soon to be eclipsed by a flood of new photography on highly important identifiable installations.

The spring of 1957 was also marked by interest in two Crimean installations covered by 10 July 1956 photography and thought to be related to the Russian missile program. April 1957 saw publication of a report on "Twin Eyes," an installation that had been the subject

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of a PI Alert the previous September. 219/ This heavily secured installation was situated on the Black Sea coast, five miles south of Sevastopol. It comprised what were called two probable missile launching pads, a probable control facility, three probable storage or assembly areas, and a probable electronics site (Figure 23). With benefit of hindsight, this proved to have been in the right ballpark; it was a cruise missile test site.

The second, which was under construction in July 1956, was located farther east, on the Black Sea coast of the Kerch Peninsula near the former village of Karangit. It featured what was called a main operational area with a huge concrete pad and several associated buildings situated near the foot of a hill, a nearby facility occupying a commanding position on the hill, a support area, and several possibly related sites along the nearby coast (Figure 24). Characterized as an unidentified installation in a report issued late in the summer, 220/ the clear implication of the description and interpretation was that the site was missile related. This carefully hedged interpretation also proved to be in the right ballpark.

Another familiar activity, meetings of the PARAMOUNT Committee, had been resumed in March and continued at weekly intervals during the spring. This revival coincided with the declaration of the "Eisenhower Doctrine," in a Joint Congressional Resolution approving and supporting the integrity of Middle East nations against Communist aggression. 221/ After a low-key effort compared with the tumult of the previous fall, the PARAMOUNT Committee was permanently disbanded following the meeting of 20 June 1957. 222/ Thus ended an early and highly successful experiment in the production of all-source intelligence involving close and continuous collaboration between photo interpreters and other analysts.

In addition to work on PI projects as such, HTA engaged in a busy round of activity in support of Project AQUATONE during the spring and early summer of 1957. At the request of Richard M. Bissell, James Q. Reber sought from HTA an evaluation of the comparative quality of film processed in the field and at Eastman Kodak. The conclusion reached by HTA was that the image quality of the film processed overseas was, unexpectedly, better than that done in Rochester, whereas the chemical quality of the latter was superior. 223/ Included with the HTA findings were recommendations for correcting the chemical deficiency in field processing. The greatest significance of the findings, perhaps, was the fact that a capability had been developed to process film in the field without degradation that might affect its subsequent usefulness. Additional washing could be accomplished, if necessary, once it arrived in the United States.

The results of the film-processing study provoked a reassessment of the million-dollar-a-year contract with Eastman Kodak for the processing of film. If field processing units turned out a product with a higher quality image, was there a need for the much-vaunted expertise of Eastman? In a memo dated 28 June 1957, Bissell directed Reber to proceed promptly with an assessment of the situation and to respond with recommendations concerning three alternatives; (1) continue the contract with Eastman, (2) assign certain processing functions to HTAUTOMAT or the Air Force, or (3) a general request for any other alternatives. In undertaking this assessment, Bissell requested that Lundahl as well as certain operations people be included in the study group and authorized them to visit the Eastman plant in the course of their investigations. HTA was, thus, intimately involved in fact-finding and recommendations concerning the film processing. 224/

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On 24 July 1957, a select group, under the leadership of Reber and including [redacted] 3.5(c) [redacted] from HTA, but not Lundahl, visited the Eastman 3.5(c) Kodak facility in Rochester. It is apparent from the Memo for the Record prepared by Reber that Eastman representatives managed to grasp the initiative and deflect much of the discussion to their own proposals and problems. At the same time, the record shows that Eastman was the benefactor of many appreciative remarks from HTA representatives. Indeed, in his concluding comments Reber noted the apparent hurt feelings of Eastman representatives over the displeasure of "Washington" with their work, and that, as a result of the constructive approach taken by the select group in assuring them that they could expect a sympathetic response to their proposals and complaints, their feelings were "assuaged." Reber made just one recommendation, namely, that there be, in the very near future, a discussion of the contents of the Memo for the Record, and that the discussants include Bissell. 225/

Insofar as HTA participation in the conference at Eastman was concerned, their testimony was clearly in favor of maintaining the status quo. As an exploitation organization, HTA would have little or no interest in assuming any substantial burden of film processing or reproduction. Nor could HTA be expected to view with anything but apprehension the possible involvement of the Air Force in the stateside processing and distribution of the film. D/GP managers and interpreters still had many scars from the struggle to gain access to SENSINT materials. Moreover, the prospect of having the Air Force get its hands on the film first was enough to frighten any prescient Agency PI. Clearly, the arrangement that established Eastman as a competent, neutral middleman with primary allegiance to CIA was one that couldn't be beat.

In still another way, HTA provided significant support to Project AQUATONE early in the summer of 1957. With planning under way for a series of highly significant penetration missions into the Urals and Soviet Central Asia, HTAUTOMAT was asked by [redacted] of AQUATONE for an opinion concerning the relative merits of using the A-2 and B* cameras for photographic missions in the immediate future. In spite of the larger scale of B-camera photography, HTA expressed a

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* For further information on A and B cameras, see p. 124, above, and p. 210, below.

strong preference for the A-2 because of its alleged greater "reliability." 226/ Perhaps HTA was considering not merely reliability, as such, but also quality of the product. For many months after its introduction the B camera was plagued by severe vibration problems. The minutes of the Ad Hoc Requirements Committee meeting held on 16 August 1957 reveal that the unanimous opinion of those present was also in favor of the A-2 camera because of its reliability and the increasing quality of "its product." 227/ All USSR penetration missions flown for the next several months subsequent to the 16 August ARC meeting utilized the A-2 camera. Cooperation between collectors and exploiters was continuing productively, and HTA was leading the way.

Easing pressure in consequence of the shrinking backlog of projects provided opportunity for increased contacts between HTA and the analytical world at a time when emerging problems, like Mozhaysk, demonstrated the need for greatly improved PI familiarity with highly technical subjects as well as for closer collaboration between HTA photo interpreters and analysts in other components in the Intelligence Community. This situation only confirmed the wisdom of the philosophy that HTA and D/GP had embraced over the years. From the initial proposal by [redacted] throughout the Lundahl years, access to and use of all-source information, including COMINT, by the PIs had been a cornerstone on which the success of the organization was postulated. 3.5(c)

Moreover, as early as 1954 Lundahl had called attention to the need for Community-wide coordination and control in the planning of collection activities, the storage and retrieval of photography, the interpretation of photography, and the training of PIs. To achieve overall coordination and control, he had suggested establishment of a reconnaissance board with representation from all pertinent organizations in the Intelligence Community. 228/ When asked, however, about implementation of the suggestion to create the board, Lundahl deemed the time not propitious to press for its formation. 229/ Now, nearly three years later, Guthe, the Assistant Director for the Office of Research and Reports, with the advice and strong support from Lundahl, was reporting to Lyman Kirkpatrick and General Lucien Truscott, Jr., who were working on a revision of the NSCID's, that existing coordination in matters related to photo intelligence was inadequate to meet national requirements. He indicated that the precise nature of the necessary arrangements was as yet unknown, but said it would be the subject of a forthcoming staff study. From the context, it seemed clear that the recommended solution could well be the establishment of a subcommittee on photographic intelligence at the IAC level. 230/ Movement toward such a potentially controversial proposal was taking place very slowly, but the problem had not dissolved nor had it been forgotten. Though it was yet to be revealed whether CIA and HTA were ready to challenge the military services in a field where they had been pre-eminent, it was clear that HTA plus U-2 photography added up to considerably more muscle than a handful of PIs in D/GP three years earlier.

Despite the deficiencies noted in coordination of photo intelligence activities, Guthe conceded there had been some limited successes, particularly the work of the Committee for Coordination and Standardization of Intelligence Ground Photographic Procedures and Equipment, chartered under the Joint Chiefs of Staff but nominally chaired by Lundahl; and the Graphics Research Coordinating Group, which provided a forum for joint mutual assistance on problems of exploitation and requirements. 231/ Both had broad representation from Community PI organizations. Though the time had come when Lundahl was no longer able to attend or chair many of the meetings of the former, the

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committee was kept functioning smoothly and working productively by [redacted] who had long served as an 3.5(c) executive secretary and now, alternating with [redacted] 3.5(c) chaired the meetings in Lundahl's absence. HTA representation on the Graphics Research Coordinating 3.5(c) Group, an informally organized committee chaired by the Air Force, consisted of [redacted] of the 3.5(c) Support Staff, representing D/GP, and any of several representatives from the Statistical Branch, representing the OCR contingent. In the affairs of this committee, HTA played a more passive role.

Simultaneously with the reawakening interest in coordination at the highest levels, HTA increased the tempo of coordination with organizations in the US Intelligence Community [redacted] Thus, HTA personnel, in- 3.3(b)(1) cluding representatives from the office of the chief, 3.3(b)(6) the Industrial Branch, and the OCR Statistical Branch were regularly attending meetings of the Ad Hoc Requirements Committee, chaired by Reber, as observers. Indeed, in April 1957, Reber wrote a memo to Guthe expressing great pleasure over his dealings with Lundahl and with HTA. In addition, he commented very favorably on the competence and dedication of HTA personnel. 232/

Moreover, Reber pointed out that the remarkable cooperation and support he had received was achieved without a chain-of-command relationship. Here was one of the many precincts in which HTA and its chief were held in high esteem.

On 25 and 26 June 1957, in response to a request from the Assistant to the DDI for Planning, 11 hours of briefings were provided for [redacted] 3.3(b)(1) 3.3(b)(6)
part of Reber, was given a tour of all HTA components, including the OCR Statistical Branch. He was briefed on Sovbloc TALENT materials and intelligence products derived from them, plus selected Middle East materials. Two days later, also at HTA, [redacted] met Army representa- 3.3(b)(1) 3.3(b)(6)
tives on the Ad Hoc Requirements Committee to discuss his own particular service interests. Among materials provided [redacted] in response to his expressed interests 3.3(b)(1) 3.3(b)(6)
were an organization chart for HTA, with the names of key managers and supervisors, and a summary of R&D items, with pictures and brochures. Though not the only [redacted] 3.3(b)(1) 3.3(b)(6)
visitor to HTA during the spring and early summer of 1957, [redacted] visit was particularly noteworthy because 3.3(b)(1) 3.3(b)(6)
of the wide scope, and great detail of the briefings as well as the precision of his inquiries. The

searching nature of the latter was reflected in the careful rein kept on him. At all times he was accompanied by [redacted] who recorded questions and requests and 3.5(c)
maintained custody of [redacted] notes. 233/ 3.3(b)(1) 3.3(b)(6)

With the widening of HTA horizons resulting from the multiplying external contacts with organizations and individuals, Lundahl's renown as a briefer and news of the exciting work being done in the Steuart Building spread fast throughout the Community. More and more, he was being called upon to brief high-level military and civilian personnel on the TALENT system and its products. In June alone, over 100 individuals from various agencies of the US Government were briefed and escorted through HTAUTOMAT. Some 64 of these, including 10 admirals, were from the Navy; nine others were from the Army and three from the Air Force. 234/ This was but one evidence of the growing rapport between the Agency PI element and the military services. As such, it represented a significant milestone on the road to a joint national PI center.

E. Reorganization and Reassignment

If there was one word that best characterized the nature of HTA and the organizations that preceded it and followed it, perhaps it was the word "change."

Change in the case of HTA was both purposeful and constructive. At one time or another it meant growth, or exploitation of dramatically different photography, or the arrival of major new equipment, or changes in PI techniques, or any of a host of significant events or developments. Just now, early in the summer of 1957, it meant changes in the initial HTA organization and in the assignment of personnel to increase the effectiveness with which existing manpower could be utilized. It did not involve any increase in the 92 CIA slots that had been allocated to D/GP more than a year earlier. Also, it did not involve any change in the functional and administrative relationships between D/GP and the OCR Statistical Branch.

By July 1957, HTA had 74 professionals on board compared with 40 the year before. However, the manner in which these people were organized and assigned, was a result of decisions that had been made more than a year earlier, before receipt of the first operational inputs of TALENT photography, when the problem of how to realign and staff the organization to cope effectively with TALENT inputs and the resulting requirements was first considered.

The first documented reference to plans for change was recorded in the minutes of an HTA staff meeting held on Friday, 1 February 1957. 235/ At this meeting, Lundahl stated that the mission and functions under which HTA was operating were already out of date and pointed up the need to revise the concept of operations to fit the situation as it currently existed. He sought the comments and suggested revisions of branch chiefs, who would be given copies of the current mission and functions for review.

Plans and suggestions for changes passed back and forth between the branches and [redacted] the executive officer, during the spring of 1957. By the end of June there was a reasonable consensus on the problems, and possible solutions were already under study. Needless to say, not all branch chiefs were in complete agreement with the context in which any given problem was considered, particularly when it boded ill for the future growth and development of the branch as envisaged by its incumbent chief. Similar exceptions applied to the emerging solutions.

First and foremost were the problems of the Special Projects Branch; the functions to be retained by the branch, the number of persons needed to accomplish the new and more limited tasks, the position of the branch in the organization, and the question of who should manage it. The SPB view, which was closely identified with the strong personal convictions of [redacted] was that scanners and plotters had to have 3.5(c) project work that would maintain and increase their proficiency as PIs as well as keep them busy between missions and compensate for the boredom of their routine assignments. To accomplish all this, [redacted] 3.5(c) estimated he would need 21 professionals. 236/ To keep the record straight, however, it should be pointed out that even the chief, SPB, was alluding to the needs of the new "Operations Support Branch," thus recognizing as an accomplished fact a change that was not as yet made public. Obviously, by this time, much of the SPB empire had already been lost, and prospects for what was left were at best uncertain.

The chief, Geographic Branch, who, with the chief, Industrial Branch, was most directly affected by the size and uninhibited approach to work that had become the hallmark of the Special Projects Branch, somewhat arbitrarily set the manpower requirement of the new Operations Support Branch at not more than 15 professionals. He added, moreover, that he seriously doubted that legitimate needs exceeded nine, and suggested dividing the six positions comprising the difference between the two totals between the Geographic and Industrial Branches. [redacted] chief, Geographic Branch, said his proposal had the concurrence of all branch and staff chiefs except the chief, SPB, whose concurrence he had, with some foresight, not sought. 237/ 3.5(c)

A second problem, neither as urgent nor as well defined as the first, was the question of functions and authority vested in the Support Staff, whose responsibilities encompassed several potent and controversial functions, such as research on requirements, production control, and editing. All these impinged on the substantive interests and responsibilities of the PI branches and, unlike them, the Support Staff had no line authority. The situation in the staff was complicated somewhat by its leadership which consisted of a conciliatory member of the original PI group paired with an aggressive deputy who had a propensity for making command decisions. Though there was no discord between the two leaders or within the staff, differences in viewpoint made more difficult the setting of firm goals and a single-minded pursuit of them. In any event, in the summer of 1957, the Support Staff initiated no evasive action and, in effect, chose to stand pat on the existing arrangement.

Opposition was led by the chief, Industrial Branch. Without attacking the Support Staff directly, he called for leaving "OCR functions to OCR," and for direct dealings between D/GP branches and OCR/SB. 238/ In the complex and uncharted areas of military and scientific interpretation requirements and projects, the procedures and controls instituted by the Support Staff were more confining than those established for the routine handling of requirements for industrial and geographic studies. In addition, the chief, IB, animatedly supported proposals to establish an enhanced graphics unit, a development that involved some curtailment of editorial responsibilities. At the same time, he expressed dissatisfaction with the responsiveness and speed of editorial services. 239/ Under the circumstances, it was obvious that the Support Staff was the object of concern that could cause trouble in the future, if not in the present.

A third problem, dramatized and presented by [redacted] 3.5(c)
[redacted] an ambitious PI with capability as an illustrator, 3.5(c)
and strongly endorsed by the chief, IB, 240/ was the production of graphics. Though SPB had no less than six graphics personnel, among whom was [redacted] an ac- 3.5(c)
complished illustrator, the emphasis was on mission plotting and briefing board preparation rather than on

support for detailed reporting. Discovery of installations like Mozhaysk and "Twin Eyes" emphasized the need for a first-class graphics shop geared to the preparation of drawings of all types in support of PI analysis and reporting, and, in particular, of high-priority work on military and scientific targets.

Plans for the establishment of the graphics shop created jurisdictional problems with the editors. Whereas the editors had previously, if briefly, controlled the publication following preparation of the manuscript, the prospective leaders of the new graphics shop were proposing to take over the planning, preparation, and production of PI reports, leaving to the editors the task of doing a copy edit of a manuscript in otherwise final form for reproduction.

Heretofore HTA reports had been strictly utilitarian, lacking visual appeal. The new proposals would impose controls and discipline in the determination of format; in the selection, sizing, and preparation of graphics, and in the presentation of text and graphics. Professional quality would be achieved by replacing Leroy lettering guides with Headliners, by use of a Varityper for composing annotations and tables, and by the use of a Justowriter in typing the text. Multilith mats would be superseded by camera-ready copy typed on bond paper. Management and control by graphics personnel would reduce the role of editors to one of support in the refinement and correction of text and illustrative materials already essentially in final form. The editors demurred, thus initiating a long game of cat-and-mouse which continued as long as editors and graphics personnel were administered by separate components.

A fourth problem or change was proposals for revisions to the mission and functions of the Industrial Branch, and the adoption of a new branch name to reflect the evolution of branch responsibilities in the direction of military and scientific targets. In his comments on the reorganization dated 21 June 1957, [redacted] was already calling his organization the Military Scientific Branch and proposing a new set of functions. He said that these proposed changes had the concurrence of [redacted] chief of the Geographic Branch. 241/ 3.5(c)

A final problem was one raised discreetly in a memo from [redacted] as TALENT Security Officer, 3.5(c)
CIA, [redacted] who had been carried in the HTA 3.5(c)
organization as a member of the Administrative Staff, pointed out his far-ranging responsibilities as well as the fact that his office was, in effect, headquarters

for the entire TALENT Control System, not just HTA. He added that both [redacted] the administrative assistant, and Lundahl had agreed that the Security office should be separate from the Administrative Staff and that it should report directly to the chief, HTA, or to the executive officer. Not to overlook the value of the right name dropped, [redacted] closed with the observation that Lundahl had requested that this information be communicated to [redacted] 242/ 3.5(c) 3.5(c) 3.5(c)

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At the HTA staff meeting on 12 July 1957, [redacted] announced the organizational changes and new allocation of personnel. The Special Projects Branch, with its broad charter of operation, was dissolved and replaced by an Operations Support Branch having 15 slots. For the time being, at least, [redacted] would still be chief. The Geographic Branch, temporarily alluded to as the Sov Bloc Branch, and the newly named Military Scientific Branch would also have 15 slots each. The Central Branch, which had no official existence and would continue to be staffed informally out of the Geographic and Military Scientific Branches, was allocated eight slots. The former Technical Intelligence Branch, now called the Technical Intelligence Services Branch, would be increased in size to 17 positions with the acquisition of 3.5(c) 3.5(c) the graphics unit, which was to be transferred from SPB as soon as possible. The Support Staff would have slots for 10 persons. 243/ There would be no change in the organization or responsibilities of the Support Staff (Figure 25).

The first changes resulting from the announced decisions took place on 15 July 1957 when graphics personnel moved to their new quarters in the TISB work area on the sixth floor of the Steuart Building. 244/ [redacted] became chief of the new Graphics Section and [redacted] his deputy. During the same month, six persons transferred from SPB to the new Military Scientific Branch and five from SPB to the Geographic Branch. Though [redacted] announced at an HTA staff meeting on 26 July that all transfers were then completed, 245/ the last documented transfer took place on the last day of the month. 246/

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With the reorganization an accomplished fact, HTA was ready for the next big challenge, the arrival of photography covering Russian missile test centers and nuclear production facilities. HTAUTOMAT now had a component, the Military Scientific Branch, organized and staffed to handle just such targets. Moveover, key personnel in the branch had made a very small but highly significant start in familiarizing themselves with nuclear- and missile-related installations in the United States. Moreover, the inadvertent mistake of a year earlier that had led to the creation of an overly large immediate exploitation unit, the Special Projects Branch, had been rectified, and, in the process, the capability to do detailed exploitation, particularly of highest-priority targets, had been enhanced. And, with the benefit of hindsight, this proved to have been accomplished none too soon.

V. On to Greater Accomplishments

By August 1957, jurisdictional questions between the Air Force and CIA over control of the U-2 program had been acceded to once again, setting the stage for stepped-up collection efforts under the aegis of CIA. Minutes for the AQUATONE staff meeting on 22 July 1957 noted that, thanks to the accepted interpretation of Presidential opinion, General Cabell's case for civilian control of the U-2 program had prevailed over General LeMay's contention that SAC should control all aerial reconnaissance. 247/ Once again, attempts by the Air Force to take over the U-2 photo reconnaissance effort had been thwarted; the Agency would continue to manage the program that it had been handling with such signal success.

A. First Aerial Coverage of Russian Scientific and Technical Installations

August 1957 marked the beginning of the most active and most productive period of photographic collection by the U-2 over the Soviet Union. Ten Russian penetration missions flew between early August and mid-September 1957.

One more was accomplished before mid-October.* 248/ It was not, moreover, just a question of frequency. These missions, which were planned in response to sharpened requirements for coverage of targets of the highest scientific and technical interest, gave the US Intelligence Community its first look at Russian missile test centers, nuclear energy production plants, and suspected biological warfare manufacturing and test facilities.

A majority of the targets were in Central Asia, far beyond the range of U-2's operating out of Germany. Indeed, most were also out of range of the base at Adana. This problem was solved temporarily by basing U-2's [redacted] 3.3(b)(1) 3.3(b)(6) flights could reach urban and industrial complexes in the valleys of Central Asia and along the Trans-Siberian railroad as well as range over sensitive Russian installations hidden in the empty lands of Kazakhstan.

The results of these Central Asian missions, known as Operation SOFT TOUCH, were sensational. Unlike the

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* In the 46 months between July 1956 and May 1960, the beginning and end of the U-2 collection program over the USSR, 27 penetration missions were flown for the collection of intelligence information by photography. 249/

first series of missions over European Russia more than a year earlier, these produced a veritable bonanza of scientific and technical information that kept scores of PIs and other analysts in the Intelligence Community busy for more than a year. Indeed, there was but one U-2 mission over the USSR in 1958, and only five more after that before the ill-fated Gary Powers flight of 1 May 1960. Thus, these Central Asian missions, along with others flown in the late summer and fall of 1957, constituted the bulk of strategic coverage on which HTA photo interpreters and many others in the Intelligence Community kept themselves productively engaged for the next three years, until the receipt of photography from the first successful satellite mission.

Aside from the SOFT TOUCH missions over Central Asia, one of the sought-for targets was the Kapustin Yar Missile Test Center situated in the lower Volga basin. The far-flung facilities of this huge installation were covered by a mission out of Adana. 250/ Another cluster of targets to which the Intelligence Community assigned a high priority consisted of the submarine bases and fabrication shops in the Murmansk area. These were covered from Germany. 251/

A mission flown from Fairbanks, Alaska, photographed military targets in the Soviet Far East. 252/ Thus, during the last half of 1957, U-2's were crossing the Russian border with impunity all the way from Finland to the Pacific coast of Siberia (Figure 26). This was to be the high-water mark, however; never again would so many U-2's fly over so many different parts of the Russian homeland.

B. Rejuvenation and Resumption of Discoveries

The hectic pace set by a rejuvenated HTA organization in the initial exploitation of the new Russian photography in August and much of September 1957 ushered in a dramatic change from the somewhat relaxed air earlier in the summer. It also banished thoughts of uncertainty concerning the future viability of the organization and its work. Not since the summer and fall of 1956 had HTA witnessed anything even faintly resembling the scope of photography covering strategic Russian targets, and never before had they seen anything like the vast array of super-secret Soviet military and industrial facilities spread before their eyes in painstaking detail.

For everyone in HTA, this was a new lease on life. Each of those most intimately concerned with exploitation of the photography and dissemination of the product -- Military-Scientific Branch PIs, Information Section collateral support personnel, photo lab technicians, visual-aid producers, and document control clerks and couriers -- could imagine himself personally a player in the historic drama that was being enacted for a very select and important audience.

1. <u>Changing Faces and Responsibilities</u>

As HTA regrouped for this new action, changes in the organization that had been announced in July 1957 <u>253</u>/ proceeded at an uneven pace. Though announced personnel reassignments took place almost immediately, major changes affecting established functions and organizational units were accomplished gradually.

One personnel change not announced but made almost inevitable by the reorganization was the reassignment or resignation of [redacted] Action on this matter was not 3.5(c)
long delayed, however. On 30 September [redacted] was 3.5(c)
relieved of his duties as chief of the former Special Projects Branch "because of performance deficiencies."
[redacted] requested and was granted annual leave and 3.5(c)
leave without pay through 13 December 1957. <u>254</u>/ While on leave he made plans to go into the aerial surveying

business in Iowa.* On 16 December he reported for duty as an analyst "on a temporary basis" in the Geographic Branch. 256/ He resigned from the Agency on 31 January 1958. 257/

When [redacted] was relieved of his responsibilities 3.5(c) as branch chief, he was replaced by [redacted] who 3.5(c) had served in a similar capacity several times previously when [redacted] was on TDY. [redacted] was named acting 3.5(c) chief, a title that reflected not merely doubt as to 3.5(c) who the permanent chief should be but also uncertainty concerning the organizational fate of the component itself.

The ultimate disposition of the former Special Projects Branch as an organization took longer than the departure of [redacted] The clear intent was to subordinate the new Operations Support Branch to the Technical 3.5(c) Intelligence Services Branch. This was not yet feasible on paper, however, since both were officially branches under the chief, D/GP.

For the time being, the importance of OSB compared with its predecessor organization was much reduced.

[redacted] 3.5(c)

The reassignment of 11 former SPB photo interpreters, six to the Military-Scientific Branch and five to the Geographic Branch 258/ effectively curtailed latent tendencies to transgress very far beyond the bounds set by the necessity of plotting the new missions, scanning them and preparing mission coverage summaries, and evaluating the photography and accomplishing other technical tasks in support of operations. The transfer of the immediate-reporting function for Russian penetration missions (preparation of the ODE report) to a task force under the control of the chief of the Military-Scientific Branch constituted a further erosion of the power formerly enjoyed by SPB. Lastly, establishment of the graphics shop in the newly named Technical Intelligence Services Branch and the reassignment to that component of four former SPB graphics personnel, 259/ including the only talented illustrator, likewise degraded the capability of the Operations Support Branch compared with SPB.

These changes in functions and personnel had several significant implications for HTA as a whole as well as for the organizational units involved. Most important was the vesting of responsibility for production of the ODEs in the Military-Scientific Branch. The July reorganization had recognized the evolutionary changes that had resulted in the transformation of the former Industrial Branch into a component responsible for exploitation of military and scientific targets so lacking in precedence that no adequate provision had been made for them in the initial HTA organization. Now, the first-phase exploitation of Russian penetration missions, whose primary collection objectives were just such targets, would be in the hands of the emerging experts in these matters. Such a move not only brought a maximum of expertise to bear from the outset on the exploitation of these newly covered targets but, because in many cases one and the same PI would be handling both the immediate and detailed reporting on a given target, it substantially eliminated the potential for contradictions in initial and subsequent reporting. Moreover, at such future time as additional coverage might be obtained, the advantage of continuity in reporting by PIs familiar with individual targets would be further enhanced.

2. New Discoveries Dominate Work at HTA

As photography from the renewed collection effort flowed into HTA in August and September 1957, its exploitation tested the mettle of the rejuvenated organization. Main focus of this initial effort was in the newly refurbished Military-Scientific Branch. This was the hub of around-the-clock work producing ODEs, the initial hard-copy report disseminated in cabled and printed form, on targets of the highest national interest. The ten ODEs produced in August and September 1957 reported, among other things, the first PI information on the Tyura Tam Missile Test Center, the Kapustin Yar Missile Test Center, the Tomsk Atomic Energy Installation, the Semipalantinsk [redacted] and the Vozrozhdeniya [redacted] 260/ Though most of the photo interpreters involved in exploitation of the photography had much to learn about the analysis of these exotic targets, their morale was high and they were working under supervisors who had recently been introduced to many similar installations through trips to their domestic counterparts.

With the August and September 1957 missions, ODEs became a joint product of CIA, Army, Navy, and Air Force PIs working at HTA under the immediate supervision of the chief, Military-Scientific Branch. 261/ Most noteworthy was the agreement by the Air Force to join with the other services and CIA in this exploitation effort.* Agreement on the joint first-phase exploitation of photography covering targets of the highest national interest and on the procedures for accomplishing it had been reached at a meeting in August attended by [redacted] 3.5(c) 262/ Circumstances prompting this meeting as well as the expeditious manner in which decisions were reached were most fortunate in view of the extraordinarily important information on targets of the highest national interest that was about to be spread before key members of the Intelligence Community.

The intense exploitation activity in the Military-Scientific Branch spilled over into supporting components as well. The Information Section of the OCR Statistical Branch which provided collateral information to assist the photo interpreters in identifying and analyzing targets, was virtually as busy as the PIs themselves. In August 1957, the Information Section provided over 28,000 items of information, 263/ the

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* The level of military participation varied with the success of the mission and the volume of information expected. On the more important and productive missions, service representatives were many, and they worked with CIA PIs on many of the exploitation teams. In the case of less productive missions, a token one or two PIs might represent each military service.

largest monthly volume to that date. The photo lab in the OCR element was also a key support facility. In August it produced more than 8,000 prints, including over 1,000 enlargements. 264/ OCR couriers also felt the impact of accelerated exploitation in the same month, as both the number of pouches prepared at HTA for delivery throughout the Community and the number of miles traveled hit new peaks. 265/

The newly established graphics shop in the Technical Intelligence Services Branch was another component that experienced the effects of the new information explosion. Top priority was given to the preparation of briefing boards for use by Lundahl. Considerable preliminary work was also done, however, on line drawings and illustrations of selected facilities within these installations. In August, the first month of the new inputs, five of the six persons in the new graphics shop logged 291 hours of overtime. 266/

During both August and September 1957, Lundahl engaged in a busy round of briefings to bring word of the new discoveries to key officials at the highest levels in the national security establishment. Initial presentations were for upper-echelon Agency officials -- Bissell, the director of AQUATONE, Cabell, the DDCI, and sometimes to Dulles himself. In short order, key DOD officials, especially from the Army and Navy were treated to Lundahl's animated and impressive recitation of Russian scientific, technical, and military achievements. In September alone, military personnel briefed included nine admirals and generals as well as members of their staffs. 267/ Though HTA relations with the military were especially close, not all those from outside CIA who were briefed by Lundahl came from the Department of Defense. The Secretary of State, John Foster Dulles, whose counsel was sought by President Eisenhower prior to approval of U-2 missions, was one. On Friday, 6 September 1956, Lundahl was called out of his own staff meeting to participate with Cabell and Reber in briefing the Secretary of State. 268/

For Lundahl, the high point in the summer briefing cycle was reached on the afternoon of Saturday, 7 September, when he briefed President Eisenhower at the White House. One purpose was to support General Cabell in a request for Presidential approval for a proposed mission to cover the Kapustin Yar Missile Test Center. Another related objective was to brief the President on the successes of some of the recent missions, including the spectacular photography of the Tomsk Atomic Energy Installation. 269/

C. Other Mouths to Feed

Though first-phase work on the new Russian missions overshadowed all other activity in HTA during the late summer of 1957, life went on more prosaically in some quarters, such as the Geographic Branch, the Operations Support Branch, the Central Branch, the Support Staff and, at first, the greater part of the Technical Intelligence Services Branch.

Coverage of the Soviet Arctic and Far East by the U-2 was extremely limited at this point in history. On the other hand, rather more Air Force photography had been collected over these areas, but its availability was seriously limited by the reluctance of its proprietors to share it with other agencies in the Government. At the same time, numerous requirements existed. There was, for example, much concern about the nature of any potential Soviet military threat from these regions as well as considerable interest in economic development in the Russian Arctic.

During August 1957, [redacted] of the Support Staff 3.5(c)
met with [redacted] of 3.5(c)
OSI concerning the use of SENSINT photography to satisfy some of their requirements. 270/ A month earlier [redacted] 3.5(c)
had discussed with [redacted] 3.5(c)

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[redacted] the possible use of SENSINT coverage to answer ORR requirements. 271/ Though previous experiences in working with SENSINT photography had been frustrating, the expanding number of analysts cleared into the system coupled with the urgency they attached to the acquisition of information about certain targets led to the establishment in HTA of projects requiring the exploitation of SENSINT photography. These projects were assigned to the Geographic Branch. 3.5(c)

In August 1957, for the first time since the move to the Steuart Building, the Geographic Branch reported substantial work on non-TALENT projects. 272/ Coverage of Norilsk, USSR, was used to support an urban study undertaken by the ORR Geographic Division as well as work on the copper and nickel refineries by ORR economic analysts. Documentation of two rail transfer points on the USSR-China border was undertaken for ORR economic analysts. For OSI, three briefs were issued in response to requirements asking about special weapons storage at Soviet Arctic airfields. A study of Pevek, in the Soviet Arctic, was also begun. In addition, work was well along on a shipping count and shipyard facilities in the Vladivostok area. 273/ Exploitation of this SENSINT photography yielded no very important intelligence information, certainly nothing that could begin to compare with the exciting discoveries obtained from the current U-2 missions.

In August, the Utilization Advisory Board (UAB) discussed the problem of getting certain information out of the TALENT system by means of "simulated" intelligence reports. The immediate item under consideration was the unidentified installation near Mozhaysk. Since the function of the installation and its significance were still debatable points, it was desirable that as many avenues of information as possible be opened up, in the hope that one might lead to a solution of the problem. At the 5 August meeting of the UAB, the DDP representative disseminated a proposed simulated report on the Mozhaysk site with a special photographic attachment. The proposal was approved with the stipulation that controls on the final report permit dissemination [redacted] 3.5(c)
[redacted] 274/ 3.5(c)

The draft of this fabricated Mozhaysk report was prepared by the DDP with the cooperation of HTA analysts. It was written in the HTA Support Staff working area. The record shows that, in August 1957, [redacted] 3.5(c)
[redacted] met with [redacted] of the DDP and [redacted] of 3.5(c) 3.5(c)
the DDI office to discuss the content and handling of

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3.5(c)

this report, which was to be distributed through the DDP. 275/ This report set the pattern for subsequent simulated reports issued to provide a wider dissemination of TALENT information on selected high-priority targets than was possible within the TALENT system.

During the early stage of exploitation of the new Russian photography in August and September 1957, the chief commitment of the Technical Intelligence Services Branch was in the support rendered by the newly acquired graphics section. Though photogrammetrists in the branch were engaged to some extent in mensuration support for first-phase reporting, their main tasks in connection with these missions would come later when the major emphasis shifted to detailed exploitation of the newly photographed targets. Thus it was, in mid- and late-summer of 1957, that many of the older TIB hands were engaged in activities having no close relationship to the hectic first-phase exploitation going on elsewhere in HTA.

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Early August, for example, found [redacted] 3.5(c)
in New York City taking a course of instruction 3.5(c)
on programing for the ALWAC III-E computer.* 276/ This

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* See pp. 127, 128, above.

course was scheduled to last two weeks, but [redacted] as 3.5(c)
branch chief, took only the introductory portion. [redacted] 3.5(c)
[redacted] who would be personally responsible for 3.5(c)
programing, took the full course. At this early date, thinking about the computer and its utilization was not big enough to envisage the hiring of programers as such or the letting of contracts for programing. Having been pleasantly surprised by the success of the proposal to purchase the computer, HTA was regarding everything short of maintenance as a do-it-yourself proposition. No stone was being left unturned, however, in preparations for bringing the computer capability to bear on the mounting computational problems as soon as possible after delivery of the equipment.

In spite of discouraging prospects for the Project OSTIARY* photographic system, contingent plans for operational deployment of the aircraft and its collection systems were still being formulated. Doubtlessly, the fact that sensors other than cameras were involved kept the program moving forward. In August 1957, [redacted] 3.5(c)
made another trip to Eglin Air Force Base to provide technical support. 277/ During the previous year Pearse

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* See pp. 104, 105, above.

had developed considerable expertise in the interpretation of radar photography, and it was in connection with that type of sensor system that he was now sent to Florida. In early September, [redacted] spent a week at 3.5(c) Air Force installations in Germany, briefing and on 3.5(c) standby for briefings on the OSTIARY photographic system. 278/ This trip was the outgrowth of contingent plans for deployment of the P2-V for collection over East Germany.

The Central Branch, far removed from the excitement in the Steuart Building, was also setting a few precedents of its own. One resulted from the requirement levied by the Agency Building Planning Staff and the Physical Security Office for periodic reporting on security and work progress, based on aerial photography, at the Langley site. 279/ Whereas the earlier ad hoc coverage had provided support in selection of the site and in planning, these new aerial inspection flights provided information on site security and progress of the construction. Formal work on this reporting began in August 1957. 280/

The conclusion in early August of Basic Photographic Interpretation Course No. 1, with the expanded treatment of landforms, vegetation, land use, and urban development, gave new impetus to demands for training in the interpretation of these non-industrial subjects of interest to those who had taken the earlier PI course. In response to these demands, a special PI course covering just these subjects was offered on 27 August. 281/ Generally alluded to as the "Geographic Photographic Interpretation Course," this was a one-shot offering tailored primarily to meet the needs of geographers who had taken the earlier industrial course. 282/ Like the new Basic PI course, this one was taught in Central Building under the administrative control of the Central Branch.

September 1957 marked completion in the Central Branch of a collection guide on ground photography in response to a DDP requirement. 283/ Entitled "A Guide to the Collection of Ground Intelligence Photography on Ports and Harbors," this publication was intended to assist in the selection of intelligence targets suitable for photographic collection as well as to provide details on the choice of equipment, techniques for using it, and the recording of essential photo data. 284/ In addition to contributing toward the satisfaction of a specific need, this publication might be considered another down payment on the eventual production of a comprehensive ground photography handbook that DDP had requested from D/GP soon after Lundahl's arrival in CIA. 285/ EO 13526 3.3(b)(6)>25Yrs

D. New Administrative Procedures

Research and development activity in HTA was continuing, with three major participants. Within HTA, [redacted] a loyal and imaginative Naval liaison officer with a somewhat uninhibited approach to R&D, still spoke for the office of the chief. At this time, [redacted] was rapidly expanding his contacts with other Government agencies and industry. 286/ [redacted] 3.5(c)
[redacted] who had inherited the mantle formerly worn by 3.5(c)
[redacted] as head of the HTA component providing the 3.5(c)
principal support in such matters, was the other. Outside HTA, the DDP Technical Services Staff provided funds and technical support in the development and procurement of some equipment.

The increasing size of the R&D account, coupled with growing problems of control, accountability, and, within HTA, need for greater coordination between the developers and the potential users of equipment, called for better organization of the effort. The solution adopted was creation of the HTA Research and Development

Board. Chaired by [redacted] the board included a member from each branch and staff. 287/ The secretary was [redacted] of the Administrative Staff. Minutes kept 3.5(c) by [redacted] provided an orderly and coherent record of the 3.5(c) R&D proposals and work in progress; they paved the way for better communications in R&D matters and, as a faithful record of business transacted, set the stage for improved accountability; and, also, by no means least in importance, they gave [redacted] who was functioning 3.5(c) more and more as plant manager for Project HTAUTOMAT, a useful tool for coping with this somewhat exotic and elusive activity.

The first meeting of the board was held on 9 September 1957. 288/ Subsequent meetings followed at intervals of approximately one month.

In a parallel development, on the initiative of HTA, a joint working group consisting of Army, Navy, and CIA -- but not Air Force -- representatives, was organized to consider items of mutual interest for technical development. 289/ Considerable joint procurement of equipment was already under way, even including the Air Force. This small step in the direction of earlier and more active coordination in the development and procurement process was an important milestone on the road to more effective Community-wide exploitation of photography and a wiser expenditure of tax dollars.

A second administrative change involved project control. There was, in HTA, no lack of appreciation of the requester's needs, and no lack of desire to provide him all available information as quickly as possible. The chief question was how to attain the desired objectives, whether by centralized control or by delegating the responsibility for the speedy completion of each project to the chief of the branch to which it was assigned.

If left to a vote by the branch chiefs, there would be little doubt about the choice of method. The question was not merely one of competence and good faith, however. Even at this early date, the HTA organization provided for a substantial division of labor with a consequent need for much coordination, not merely bilateral but multilateral in nature. Some workable system of priorities or agreed-upon deadlines was essential to establish the order of work, and a monitoring system was needed to detect whether or not work was progressing according to plan.

This difficult job of middleman had been vested in the Support Staff, which had already managed to establish a reasonable degree of order in the handling of requirements and in monitoring production. The struggle was an endless one, however, and required constant adjustment to meet the needs of an organization whose production commitments fluctuated as widely as those of HTA.

On 29 August 1957, the office of the chief, HTA, announced that thenceforth each branch would submit a weekly report, by the close of business on Friday, on the status of each project undertaken in response to a specific requirement. 290/ Projects in support of other HTA components and those of a continuing nature were excluded.

This commendable demonstration of interest in production control soon revealed the almost insurmountable difficulties inherent in any attempt to codify HTA production procedures. In less than a month, the inauguration of full-scale detailed exploitation of photography of the highest-priority targets covered by the new Russian missions would begin under unprecedented circumstances. The result would be the creation of exceptions so broad in scope as to permit this activity, by far the most crucial in HTA at that time, to operate outside the system.

E. The Specter of a Job Freeze

On 8 August 1957, just as the spectacular series of missions over the Soviet Union was getting under way, Lundahl was advised that the HTA/ORR Table of Organization was to be reduced by 12 positions. 291/ A cut of eight positions for the OCR contingent in HTA was also announced in the same month. 292/ These reductions were the HTA share of an overall reduction in the Agency's personnel ceiling. 293/ The timing couldn't have been worse. From an HTA point of view, the announcement came when the workload was on the threshhold of a quantum jump. From an Agency-wide point of view, if the AQUATONE collection effort then getting under way were as successful as CIA hoped, the announced cut in the HTA personnel ceiling could only be a futile gesture.

HTAUTOMAT managers were dismayed but bided their time. Lundahl agreed to make every effort to carry out the mission of the organization with his on-duty staff of 85 persons. He curtailed some services, extended deadlines, and restricted the use of overtime for high-priority work only on the basis of the health and personal well-being of his people. 294/ The OCR Statistical Branch revealed the cut only to key supervisors and hoped for reconsideration of the decision. 295/ Twice before, once in 1953 and once in 1955, the PI component had been caught in a job freeze. 296/ Though the result in the first case had been to arrest development of the fledgling division, the ill-effects of the second were substantially avoided by staffing increases required for the onrushing U-2 program. If historical precedent was any indication of the probable outcome this time, the prospect of emerging unscathed from this encounter was excellent. This untimely decision to impose a freeze on unfilled HTA slots provided a strange backdrop against which to begin exploitation of the most exciting and important photography yet obtained over the Soviet Union.

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VI. JAM SESSION Steals the Show

Detailed exploitation of the SOFT TOUCH materials followed production of ODE reports, without a pause. The photographic smorgasbord of scientific and technical targets invited chaos, however, if left to unbridled intelligence interests and appetites. Something had to be done to establish some priority of work and to provide for orderly and imaginative exploitation of the photography.

A. Establishment of JAM SESSION

The solution adopted was called Project JAM SESSION. A more appropriate name could scarcely have been chosen. Plans called for the convening of experts -- PIs, intelligence analysts, engineers, and scientists -- in working sessions where each could bring his particular brand of expertise to bear on the solution of exploitation problems. Though the experience gained the previous March with Mozhaysk consultants proved useful in conceiving JAM SESSION and setting it up, at least as far as HTA was concerned, the depth and breadth of the undertaking were unprecedented.

As of Monday, 23 September 1957, all projects in HTA relating to guided missiles were combined as P-74 and all those dealing with nuclear energy as P-101. 297/ At the same time, exploitation teams consisting of Army, Navy, and CIA photo interpreters were named to work on each of the major high-priority targets. Each team had an appointed leader who was designated chairman. Some of the latter were Army employees, some Navy, and some CIA. 298/ All this high-priority photo interpretation work was placed under the direction of [redacted] 3.5(c) chief of the HTA Military-Scientific Branch. Within HTA, all work on these projects, whether photo interpretation or support services, was given top priority. 299/

Support personnel, though not under the direct control of the chief, MSB, worked closely with photo interpreters and their supervisors, but not all support elements were equally involved in JAM SESSION. Those most concerned were personnel engaged in collateral support, mensuration, graphics, and the photo lab. The US Army, whose commitment in the joint effort was second only to that of CIA, contributed a few personnel to augment the mensuration and graphics capability. Aside from these, support personnel were all Agency employees.

Work on Project JAM SESSION was located in the Steuart Building. At this early date TALENT-cleared areas were few and security controls were tight and restrictive. Moreover, HTA was the prime recipient of the photography. In addition, the HTA drive for more and better equipment, though limited in accomplishment at this point in history, provided the best capability for in-depth exploitation of the photography. That this required others with greater professional pestige than PIs to beat a path to the door of the photo interpreters was not inappropriate. After all, it was the extraordinary nature of the photography that triggered the whole exercise. Though there would be future consultant meetings in the Steuart Building, this was a situation that would not be repeated to the same degree again, as TALENT and subsequent overhead photography became more widely dispersed, as PIs became more knowledgeable, and as analysts outside HTA and its successor organizations sought to reassert their prerogatives as producers of intelligence.

To inform participants of ground rules according to which JAM SESSION would be conducted, on 24 September 1957 a memo was issued over the signature of Lundahl. This memo listed representatives from OSI,

Army, Navy, Air Force, and the AEC who had been appointed to work with joint Army-Navy-CIA photo interpretation teams on nuclear targets, and representatives from OSI, Army, and Navy who were to be their counterparts in exploiting guided-missile targets. Perhaps the most important feature of the memo, from the HTA point of view, was announcement of a schedule setting hours for work and hours for consultations. From 0830 to 1430 each day, photo interpreters were to work uninterruptedly, except for urgent consultations which were to be requested and cleared through [redacted] chief, 3.5(c)
MSB. The hours between 1430 and 1700 were reserved for 3.5(c)
consultations when any of the designated representatives from Intelligence Community agencies could come to HTA without special appointment and discuss with PIs the findings on targets of interest to them and their organizations. Provision was also made for consultations on the initiative of PIs needing assistance at any time during working hours. 300/

In addition to representatives from the Intelligence Community, plans were made to bring engineers and scientists from Government and industry into the Steuart Building, either in a special capacity or to participate in seminar-type discussions of the evidence from all available sources bearing on major facilities at each of the Soviet installations being examined. In most cases, consultations would extend over a few days; in the case of the two Russian missile test centers, however, outside consultants worked in parallel and shoulder-to-shoulder in the Steuart Building with HTA photo interpreters for several successive weeks. In this manner, the full knowledge of those best versed in guided missiles and nuclear energy and weaponry was brought to bear, along with the talents of skilled intelligence analysts and photo interpreters, on the problems of exploitation.

Even given the overall plan for JAM SESSION, much further planning and, in HTA, a great deal of preparation was required. Photo interpreters had to familiarize themselves with details of the installations for which they were responsible, countless measurements had to be made to provide intelligence analysts and industry consultants with information on the size, shape, and height of key facilities, and graphics in the form of annotated photos and mosaics, line drawings, and perspectives had to be prepared to portray the information as vividly as possible for those not skilled in the interpretation of overhead photography.

B. The Tomsk Atomic Energy Installation

Though GMIC targets ultimately were accorded highest-priority treatment, preparation for some of the JAEIC targets moved along more rapidly at first. Before the end of September, two meetings were held by a JAEIC subcommittee to organize exploitation of the photography covering nuclear energy targets. The distinction of being first among JAM SESSION targets to be spread before consultants fell to the atomic energy installation near Tomsk, USSR. On 8 and 9 October 1957, consultants met in the Steuart Building to study all available information dealing with the gaseous diffusion plant. Two weeks later, on 22 and 23 October, the subject was the reactor area and chemical separation plant under construction at the same installation. 301/

An extensive body of collateral was available to JAM SESSION participants indicating the construction of a large atomic installation north of Tomsk on the east bank of the Tom River, beginning as early as March 1949. Construction of a gaseous diffusion isotope separation plant was begun, according to collateral evidence, the following summer, when the first stages of the production facilities apparently went in operation about mid-1953. One of the more interesting pieces of evidence was a fur-trimmed hat worn in the Tomsk area during the winter of 1954-55 and last worn there in June 1955.* Analysis of the hat for radioactive materials revealed a U-235 content in the fur and outer cloth that was well above the percentage in normal uranium. The atom percent in the inner lining was, on the other hand, comparable to that in normal uranium. The differences found were well beyond any error of measurement and indicated the presence, in the Tomsk area in the period from October 1954 to June 1955, of a uranium isotope separation plant, an enriched fuel fabrication plant, a weapons fabrication shop, or some combination of the three types of facilities. On the other hand, a lack of U-236 indicated that none of the radioactive material in the hat had been through a reactor, and the lack of plutonium or fission product activity made the operation of a plant for separating plutonium from reactor fuels at the installation in question unlikely between October 1954 and June 1955. 302/

U-2 photography taken on 21 August 1957 confirmed the location of the installation on the east side

* [redacted] in his article "Miss EO 13526 3.5(c) Woods," in *Studies in Intelligence*, Vol. 12, No. 4, Fall 1968, gives additional detail on how the hat helped determine the location of the Tomsk installation.

EO 13526 3.3(b)(6)>25Yrs

of the Tom River, about six miles north of Tomsk. Results of the photographic interpretation and, insofar as related to the photography, judgments of the intelligence analysts and consultants were published by HTA early in 1958. 303/ It is of passing interest to note that not only was the Tomsk team the first of JAM SESSION panels to complete its work, but the PI team was the first to make ready for publication a PI report on a JAM SESSION target. The PI team was chaired by [redacted], US Navy. The descriptive and interpretive material that follows is based on that PI report. Illustrations from the report are the same as those used in presenting PI information to the intelligence analysts and outside consultants during JAM SESSION.

The scope and variety of facilities came as a complete surprise to the Intelligence Community. The installation, which was surrounded by a wooden perimeter fence, covered more than 40 square miles (Figure 27). Included in this huge and complex industrial operation was a large gaseous diffusion plant, which confirmed the deductions based on collateral information. In addition, photography revealed the presence of a reactor facility. There was, moreover, a chemical separation plant still under construction (Figure 28). Throughout the installation large-scale construction was under way in most key areas. At the time of JAM SESSION, there was no single atomic energy installation in the free world that encompassed the range of processes completed and under construction at Tomsk.

What JAM SESSION participants called the "isotope separation area," consisted of a large gaseous diffusion plant and two facilities designated "feed processing plants" (Figure 29). The main structures in the gaseous diffusion plant were four large buildings, apparently built in pairs at different dates (Figure 30). The two longest ones were over 1,500 feet in length and the shortest was about 300 feet less (Figures 31 and 32). Serving these two pairs of buildings were two separate power stations. Six 100 KV lines appeared to enter the larger station and two to enter the smaller one. Several ancillary buildings housing controls, maintenance facilities, stored equipment, and laboratory work were situated near the main buildings. All the gaseous diffusion facilities, which occupied an area about 3,100 by 2,900 feet, were enclosed by a double fence. Just west of this fenced area was a new and larger gaseous diffusion building under construction. Beyond it, land clearing and initial preparations for construction suggested that the gaseous diffusion building already under construction, like those already completed, would be one of a pair (Figure 33).

Farther west, between the gaseous diffusion area and the thermal power plant, were two adjacent, individually fenced plants, each rail served and consisting of several dozen structures (Figures 27 and 34). Although the nature of operations carried on in these plants was less clear to JAM SESSION workers than the functions of the gaseous diffusion plant, it was regarded as certain that their prime purpose was the preparation of feed materials for the gaseous diffusion plant. Consultants and others felt that the plant farthest west was a feed preparation facility. Discolorations on the roof of one of the largest buildings, indicated by tonal changes on the photography, and pipelines connecting the five major production buildings all indicated that a chemical process was being carried on in the area. Evidence suggesting foliage discoloration nearby offered further corroboration of this hypothesis.

In the other of the two adjacent feed processing plants, the dominant buildings were of two types: metal fabrication and storage. The largest building, which measured 390 by 178 feet, had a monitor roof and was probably used for heavy machine work. A smaller building, less than half as large, had a concrete apron adjoining it on which were spread out several pieces of unidentified equipment. It was apparently used for repair work and metal fabrication.

Consultants and other JAM SESSION participants believed that, in addition to the preparation of feed materials for the gaseous diffusion plant, these two plants might be engaged in canning slugs for the reactor. They thought that the large size of the plants and their rail and road connections with other parts of the installation was a further confirmation of this possiblity. As if to demonstrate the uncertainty about precisely what went on in this part of the isotope separation area, the JAM SESSION team observed that preparation of barrier material for the gaseous diffusion plant or the fabrication of weapons cores might also be carried on in these two facilities.

U-2 photography of the Tomsk installation revealed a reactor area northeast of the gaseous diffusion plant. This was one of the surprises; collateral had provided no clues to the existence of this type of facility. The reactor area was situated on the highest ground in the entire installation. It comprised more than 20 significant buildings and facilities, including two reactors (Figures 35 and 36). One of the reactors was believed to have been critical for about two years -- soon after the man with the hat left the locality. The other was in the final stage of construction. In addition, an excavation near the latter contained what appeared to be the foundation for a third reactor. Among related facilities were buildings housing slug-handling facilities, exhaust fans and stacks for the reactors, fuel preparation and fuel storage facilities, and water purification and storage. The substation for the initial reactor had two transformers; three 110 KV lines entered it. Breaking-and-switching equipment being installed in a transformer yard under construction in the northwestern part of the reactor area indicated that this facility would serve the new reactor and would contain five transformers.

The new reactor had associated with it a partially completed turbogenerator hall, situated between the reactor and the transformer yard. On the east side of this building were several bays, still unroofed, which would probably house steam generators or heat exchangers. Water for the power station would apparently be recycled through six cooling towers under construction just beyond a valve house and auxiliary pumping station.

There was no facility similar to this power plant associated with the original reactor. It was apparently used only for the production of plutonium. The power generating capacity associated with the newer reactor -- and probably the one on which construction was just beginning -- indicated an attempt to utilize the heat from the reactor as an additional source of power for the expanding installation.

The chemical separation area, situated in the far northeast corner of the installation, was dominated by a large chemical separation (CANYON) building under construction (Figure 37). With just a small portion under cover of a roof, the two parallel processing sections were laid open to inspection and study on the photography. This building measured 1,100 by 160 feet (Figure 38). Although equal in length, the two processing sections had different relationships with other parts of the building. JAM SESSION participants speculated that they might have been designed to handle uranium and enriched uranium or uranium and thorium.

East of the CANYON Building were four rail-served buildings, three of which were completely roofed over.

The fourth building, still under construction, had six tanks 27 feet in diameter. Elevated conveyors or pipe galleries extended from the three completed buildings to the near end of the building with the six tanks. It was believed that the function of the three completed buildings was initial reception and storage of slugs from the reactor area and/or chemical makeup. It was even more obvious that the partially completed building with the six tanks would handle large quantities of liquids destined for the CANYON Building. Excavations on either side of the road between this building and the CANYON Building suggested that the process flow would be underground to the CANYON Building.

Other apparent key facilities in the area included a large building thought to house controls; two thick-walled buildings under construction on either side of the CANYON Building and possibly intended for processing of the final products; a building beside the CANYON Building, with a stack under construction, that might house forced-draft blowers for the chemical separation process; a possible concentration and/or isolation building for radioactive materials northwest of the CANYON Building and adjacent to an excavation extending westward from the end of the CANYON Building to a point beyond the perimeter wall and fence; and a facility with 18 tanks under construction adjacent to the above excavation. Consultants thought it likely that these tanks would be used for storage of radioactive waste materials. At the same time, they felt that the storage capacity was improbably small if waste fission products were to include uranium. Accordingly, they concluded that the tanks might indicate plans for a uranium recovery process.

Power and steam were provided for facilities throughout the Tomsk installation by the large thermal power plant situated near the west end of the fenced area (Figure 27). It was initially estimated that this plant had a capacity of 400 MW. A new section under construction at the time of photography was estimated to provide an additional 300 MW when completed. The estimated 210 MW of nuclear power from the two new reactors plus the 700 MW expected from the thermal power plant would thus provide 910 MW of on-site power. A transmission network reaching out from the thermal power plant to serve the entire installation was already in place or under construction. A power-transmission line from GRES II, the state regional power plant in Tomsk, also entered the atomic installation. GRES II itself was also undergoing expansion in August 1957.

In addition to the foregoing sources, an indeterminate amount of power was also available from the Kuzbas grid, to which GRES II was tied.

Water for the installation was obtained from the Tom River (Figure 27). From the main intake, situated near the southwest corner of the housing and administration area, water was conducted to most parts of the installation by a series of canals. Pump houses located at strategic points forced the water through the system. Only the chemical separation area lacked visible connection with the system. JAM SESSION participants thought it possible that water for that area might be supplied by on-site wells. Water released from the gaseous diffusion plant was fed into the intake canal leading to the thermal power plant, where it apparently provided additional coolant. Water from the thermal power plant drained into swampy land along the Tom River. Effluent from the reactor area was discharged into a holding basin created by a barrier across the valley of a small stream north of the thermal power plant.

A liquid dump, given the name "Mud Lake," was situated outside the northern boundary of the installation (Figure 28). Two underground pipelines, one a few years old and the other just completed, led from the reactor area to Mud Lake. JAM SESSION analysts and consultants believed that these were emergency disposal lines for contaminated waste in the event of a slug rupture in one of the reactors. They also believed that the considerable pipeline construction activity in the vicinity of the chemical separation area would ultimately result in a pipeline to Mud Lake for disposal of non-contaminated water.

An extensive construction equipment and maintenance area was situated north of the gaseous diffusion plant (Figure 28). The presence of four separate road- and rail-served concrete mixing and hopper storage facilities, large areas for storage of aggregate, elaborate systems for handling it, numerous shop and storage buildings completed or under construction, and several gantry cranes all attested to the enormous effort being expended in the expansion of the installation.

The amount of housing in being or under construction also confirmed the high level of activity both in the operation of the installation itself and in the expansion of facilities. There were four separate housing areas, three for workers and one for professional and managerial personnel and their families. The latter type of housing was still under construction in August

1957; the former was essentially completed at that time. The main workers housing was centrally located adjacent to the construction equipment and maintenance area (Figure 28). It consisted primarily of barracks-like structures and provided accommodations for an estimated 22,000 persons. A second workers housing area, situated southeast of the gaseous diffusion area, provided space for an estimated 7,900 more persons. Additional housing for workers at the Tomsk Atomic Energy Installation was located within the perimeter fence in the riverside village of Iglakovo. Where some 45 barracks-like buildings were judged adequate for another 5,000 workers. Thus, withing the confines of the Tomsk Atomic Energy Installation, was living space for nearly 35,000 workers, assuming 60 square feet for each individual.

Housing for managers and professionals working at the installation was situated south of the gaseous diffusion area (Figure 28). Here, multistory garden apartments and single-family dwellings were judged able to accommodate about 18,000 persons.

Though the installation occupied an isolated site well north of the main east-west lines of communications across Siberia, adequate transportation was available for personnel, supplies and equipment. A new single-track rail line running north-northwest from the Tomsk-Asino line provided service to all key components of the installation. Generally paralleling the rail line from Tomsk, a new road, 30-feet wide and probably concrete, connected with a network of hard-surfaced roads that reached all major and minor facilities in the installation. Air transportation was available at three sod airfields around Tomsk, the largest of which was capable of handling medium-size aircraft.

The foregoing summation of information obtained from photography covering just one target on a single mission illustrates vividly the tremendous volume of facts -- very hard facts -- available from the photography. Whereas collateral played an important role in illuminating the purpose and functioning of what was represented on the photography, it was the latter that made possible virtually all the descriptions, the quantifications, and the interpretation of the installation as it existed. Moreover, it was the photography that placed the industrial complex in its total physical setting. The photography was likewise without equal in displaying and explaining the installation and what was learned about it to high-level decision makers.

It was not merely the photography, however, that excited the select group of officials cleared to see it. There was even more significance in the extraordinary detail that HTA photo interpreters and photogrammetrists wrung out of the photography, the competent interpretations that they made, and the lucid analyses and evaluations made by intelligence analysts and consultants who worked with the PIs in the Steuart Building. And the Tomsk Atomic Energy Installation was only the first of several comparably exciting Russian scientific and technical targets that would be given similar treatment with equally astonishing results in late 1957 and early 1958.

C. GMIC Targets

Assignment of the JAM SESSION photo interpretation teams accomplished one objective, at least in the Military-Scientific Branch, that had eluded the grasp of D/GP for several years. The scope of work on JAM SESSION targets coupled with the unremitting pressure to complete work on each of the targets rapidly resulted in a degree of specialization not previously feasible. Whether by choice or accident -- and both were a factor in the initial assignments -- PIs found themselves working exclusively on either nuclear- or missile-related targets. The effective specialization was even greater; most were beginning to become acknowledged authorities on the interpretation of a particular target, such as the Tomsk Atomic Energy Installation or the Tyura Tam Missile Test Center. Granted their degree of expertise was decidedly limited as yet, they were, nevertheless, cultivating it daily.

Even while consultations on the Tomsk installation were in progress, PIs and support personnel were working at a feverish pace to prepare for consultations on GMIC targets. Thus, completion of consultations on the Tomsk installation coincided with the virtual completion of preparations for an even greater effort to interpret the photography and evaluate the significance of the Tyura Tam and Kapustin Yar Missile Test Centers. The OCR Statistical Branch monthly report for October 1957 noted that because of the "extreme urgency" of intelligence on guided missiles, GMIC requirements were being given priority over those already scheduled for JAEIC. It added that, during the last half of October, 25 copies of one book of graphics on the Tyura Tam Missile Test Center was prepared for intelligence analysts and consultants as well as an equal number of each of two other books of graphics on the Kapustin Yar Missile Test

Center for the same purpose. 304/ These were impressive volumes in a 20 by 24 inch format, with perspective sketches, and with annotated line drawings and photographs.

The overriding importance thus attached to work on Russian missile test facilities was not surprising. Earlier in the same month, on 4 October, the USSR had stunned the world by launching the first earth satellite. 305/ The political repercussions resulting from the success of this venture greatly enhanced the already urgent interest stimulated by acquisition of photography of both the Kapustin Yar and the newly established Tyura Tam Missile Test Centers. PIs and intelligence analysts were cautious in preliminary interpretations and assessments, but collateral evidence and the photography left little doubt in their minds that the launch point for Sputnik I was in the Tyura Tam installation. Though there was little concern that a satellite such as this could deliver nuclear or other weapons to targets outside the Soviet Union in the then foreseeable future, there was animated concern about what parts of the United States might be within range of ICBMs launched from pads in these test centers.

By early November all was in readiness for across-the-board exploitation of photography and collateral intelligence on GMIC targets. Essentially, this meant the Kapustin Yar and Tyura Tam Test Centers. Three more 20 by 24 inch books of graphics were printed in 25 copies each, completing the presentation for KY, as it became familiarly known. All available collateral for which need could be anticipated was assembled. The Minicard room, which was still without the equipment for which it was named, was made ready for use by members of the Special Engineering Analysis Group. These experts from Government and industry were to be based in the Steuart Building -- working and consulting with the PIs, as appropriate, as well as doing their own analysis and evaluation -- until they produced a detailed all-source report on their findings. This work, in turn, would be used by the GMIC Scientific Advisory Panel to produce a brief report consisting of major conclusions and recommendations.

Members of the GMIC Special Engineering Analysis Group arrived in the Steuart Building on Monday, 4 November 1957. Though outranked by the GMIC Scientific Advisory Panel, the members of this group were eminent authorities in their own specialized fields. They included the following:

[redacted] 3.5(c)

These consultants worked continuously at HTA through Friday, 29 November 1957. From the distribution of personnel by category of specialization, it is clear where the muscle was concentrated -- in the investigation of surface-to-surface missile (SSM) facilities.

Results of their work were published on 27 November, just two days short of four work weeks after they began, in a report consisting of 141 legal-size pages of text and 14 figures which included photos, line drawings, and charts. 306/ Extensive reference was made in this report to graphics in the Tyura Tam (TT) and KY workbooks prepared by HTA for the consultants. In addition to the photography, the other main source of information used was COMINT. Availability of the photography provided an opportunity to breathe structural reality into the ghostlike facilities whose presence was indicated by electronic intercepts.

1. The Tyura Tam Missile Test Center and Test Range

The Tyura Tam* facilities, though neither as extensive nor as long developed as those at Kapustin Yar, provided the greatest excitement. After all, how could an installation apparently devoted primarily to the testing of intermediate and medium-range missiles,

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* More commonly written as one word, Tyuratam, in subsequent years, Tyura Tam it was to those who first named the test center and exploited the early photography.

surface-to-air missiles, and air-launched missiles compete for top attention with a facility from which Sputnik I had in all probability been launched and which had a launch platform from which ICBMs could undeniably be launched, either in anger or for testing purposes? Moreover, on 3 November, the day before the Special Engineering Analysis Group convened, the Soviets successfully launched Sputnik II, a whopping 1,120-pound package including a dog, in contrast to the mere 184-pound package of Sputnik I. 307/ The ability of the Russians to put into earth orbit an object weighing over half-a-ton in little more than a month after the first one galvanized the exploitation team and the Intelligence Community into action and threw Tyura Tam facility into bolder relief.

Located in a barren and isolated part of Kazakhstan served by the Aralsk-Tashkent rail line, this installation, with its heavily secured operational components, was obviously the first step in the construction of a permanent Soviet center for the launching of large ballistic missiles with intercontinental, earth-satellite, and space-flight capabilities (Figure 39). Prior to the convening of JAM SESSION consultants, the installation had been covered twice. The first photographic mission, flown on 5 August 1957, was planned on the basis of information obtained from [redacted] other sources. 3.3(b)(1) On this mission the range head appeared well out on the oblique, making interpretation difficult. 308/ On 28 August, a mission planned with the benefit of information gathered on the earlier flight covered the whole installation with vertical and near-vertical photography.* It was the latter photography, of much better interpretability, that was the chief source of information on Tyura Tam produced by PIs engaged in JAM SESSION.**

HTA photo interpreters liked to point out that the installation had roughly the shape of a dumbbell. The support base situated around the rail town of Tyura Tam outlined one bell. The range head, 15 miles to the north, outlined the other. Between the two were a rail line and parallel power and water lines (Figure 40).

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* The 5 August mission, planned before HTA had recommended use of the A-2 camera in SOFT TOUCH missions, utilized the B camera, which was not yet functioning without problems. For further information on the A-2 camera, see NPIC-2, referred to in footnote, p. 1, above, p. 174; and p. 262, below. For the B camera, see p. 124, above, and p. 263, below.

** Unless otherwise noted, factual information on the Tyura Tam Missile Test Center and all the graphics used in this description are from JR-4-58, the PI report issued by HTA following JAM SESSION. 309/ Illustrations in this report are virtually the same, however, as those prepared for the consultants months earlier.

Chief interest in the range head, and indeed the whole installation, was centered on a massive rail-served concrete launching platform overhanging a huge pear-shaped pit (Figure 41). This facility, including related structures, was designated "Launch Area A." The launching platform measured 155 by 133 feet; the top of the platform rose 133 feet above the level of the flame deflector plate, at its foot. The pit in front of the platform measured 880 by 550 feet, and at its deepest level, was 106 feet below the surrounding terrain (Figure 42). A servicing tower and two possible collimation towers were identified on the platform. At least nine instrumentation and observation positions were situated around the rim of the pit.

Within a mile or two of the launching platform there was a wide range of servicing facilities and equipment, including unusual rail cars believed used for transporting missiles and missile propellants, rail-served assembly and checkout facilities, a concrete control bunker, an interferometer-type instrumentation site and adjacent range control center, a power substation, and a water supply system believed capable of supplying quickly three to four million gallons of water during missile firings (Figures 43 and 44).

The support base, along the through rail line and adjacent to the Syr Darya (River) provided services not immediately involved in the preparation and launching of missiles. Facilities at this location included buildings to house personnel and administrative activities, a plant for water treatment and storage, a power plant, rail transloading and storage facilities, and a small natural-surface airfield (Figure 45). A communications receiving station (Communications Area B) was also situated in the support base area (Figures 46 and 47). It was obvious that the test center was dependent on the railroad for transporting all materials and heavy equipment brought in from outside the area as well as for delivering live missiles from the assembly and checkout facilities to the launching structure.

There were just two important facilities along the rail spur connecting the support base and the range head. One was Communications Area A, the transmitting station for the Tyura Tam installation. The other, which was under construction, was believed to be a propellant production and storage facility (Figure 48). These facilities, along with those at the range head and the support base, constituted the key components of the Tyura Tam Missile Test Center as distinguished from those farther down range.

In August 1957 there was major construction in virtually all parts of the test center. Since there were two missions over the installation during that month, it was possible to make judgments about the pace of construction, particularly in the support base where the coverage of 5 August had been better than that of the range head. The observations were almost unbelievable. For example, at Communications Area B on the support base, on 5 August there were one double rhombic antenna array, one two-bay fishbone antenna, and one row of three stick masts. On 28 August, there were nine double rhombics, two fishbones, one three-mast array, one four-mast array, and three single masts. In those 23 calendar days, 92 masts had been erected, an astonishing accomplishment.

The feverish pace of construction indicated a crash effort to achieve operational readiness for the Center at the earliest possible date. Though the object of all this haste, whether for military advantage or some spectacular space event, was not apparent late in the summer of 1957, the reason became crystal clear in the next several weeks. By the uninhibited use of a military booster, the Soviets were able to launch the first earth satellite while Werner von Braun and his team at Huntsville were removed from the competition by ideological constraints imposed by the US Government in favor of the floundering non-military Vanguard program.

Though photography of the presumed test range was limited, instrumentation facilities were covered for approximately 70 miles north and northeast of Launch Area A. The two largest, Sites 28 and 29, were located between 60 and 70 miles to the north and east of the launch point. Their positions were such that a line bisecting the angle formed by imaginary lines passing through each of the sites and the range control center had an azimuth of 40 degrees (Figure 49). This was regarded as the probable primary direction of fire from Launch Area A.

Further photographic evidence supporting this hypothesis, was provided by the discovery of probable terminal range facilities 3,400 miles to the northeast, on the Kamchatka Peninsula. Photography of 19 June 1957 and much better coverage three months later, on 16 September, revealed five apparent terminal-range instrumentation sites near the settlements of Uka and Yelovka (Items A through E, Figure 50). Three of these sites were situated along the Bering Sea coast, suggesting the possible extension of the test range into the Pacific Ocean.

Many months after JAM SESSION was over, an installation under construction was discovered on the September 1957 photography of the Kamchatka Peninsula in the vicinity of Klyuchi. It was belatedly identified as a high-frequency, long-range communications center (Figure 51). Two double rhombic antenna arrays were under construction (Items A and B, Figure 51) and clearing was under way for what were expected to be at least two more (Items C and D, Figure 51). The size and configuration of the two under construction were nearly identical to several in Communications Area B, in the support base at the Tyura Tam installation. Moreover, the azimuth of the great circle defined by the orientation of the two under construction at Klyuchi passed through Tyura Tam. It was believed, therefore, that the Klyuchi communications center was a key component in the Tyura Tam Missile Test Range.

The impressive nature of the Tyura Tam installation, coupled with Russian success in launching the first earth satellite and following it a month later with a much heavier one, caused much speculation and not a little uneasiness about the status of the Soviet ICBM program and possible deployment of operational ICBM launch sites in the USSR. With so little of the Russian heartland covered by up-to-date photography, there was serious concern that operational launching sites might already be under construction or even completed, with missiles available for launching against US targets at the whim of Russian leaders.

The problem, therefore, was to develop guidelines for use in searching existing photography and in planning further collection efforts. Out of the welter of information and speculation stemming from JAM SESSION, one criterion seemed to have unusual potential for narrowing down the possibilities. It was the fact that Russian long-range missile systems seemed dependent on rail transportation and rail servicing.

This assumption led, during the next several years, to the levying of requirements on HTA and successor organizations to undertake rail searches of all photography covering a broad spectrum of geographic areas in the USSR for evidence of rail spurs servicing possible launch sites completed or under construction. These requirements also involved a search along thousands of miles of the Russian rail net for evidence of sites that might be prepared for use by a rail-mobile missile system.

These searches were productive of little more than the conscious satisfaction of learning that HTA photo interpreters had done the job requested and found no detectable evidence of the presence of deployed ICBM launch sites in the areas examined. The task was a dreary one from the point of view of the PIs and was spread out among photo interpreters in both the Geographic and Military-Scientific Branches. This division of responsibility resulted not only in the dubious consolation of spreading out the dog work but also produced occasional embarrassment to the parent organization when differences in interpretation arose between missile specialists in the Military-Scientific Branch and other PIs pressed into service to share the work load.

2. The Kapustin Yar Missile Test Center and Test Range

Concurrently with work on the Tyura Tam installation, the Special Engineering Analysis Group and Military-Scientific Branch PIs were applying the same all-source approach to the exploitation of photography of the Kapustin Yar Missile Test Center. Though Tyura Tam had top billing because of the Sputniks and the impressive nature of Launch Area A, it was but a small upstart compared with the staggering array of facilities at Kapustin Yar, many of which were of much longer standing.

The range head for the Kapustin Yar installation*

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* At first, the place-name reference for this installation was only the settlement of Kapustin Yar, and, indeed, this place name or the initials KY continued to be the most familiar usage. As exploitation of photography proceeded, however, (footnote continued on next page)

sprawled across approximately 1,600 square miles of Russian steppeland, an area greater than the total for all range heads at US missile test centers in 1957. 310/ At Kapustin Yar, where there was no single facility to compare with the launching platform and huge pit at Tyura Tam, the chief impression was the vastness of the installation, the far-flung arrangement of the facilities, their diverse nature and the breadth of technical development, the long period of growth, and the continuing expansion, presumably to accommodate the testing of new and bigger missiles (Figure 52).

During HTA days, photographic coverage of the Kapustin Yar installation was achieved for the first time on 10 September 1957, by a mission out of Adana. 311/ The flight proceeded from the east, uprange, toward the northern end of the test center, photographing a strip of the downrange area approximately 200 miles long. When the pilot got one good look at the herringbone SAM complex, with its presumed 60 launch points, he banked the U-2 and veered southwestward and crossed the Volga.

(footnote continued from preceding page) JAM SESSION participants were impressed by evidence that some of the facilities around and tributary to the city of Vladimirovka were distinctly different. In recognition of this distinction, the name Kapustin Yar-Vladimirovka Missile Test Center later became the one used when circumstances seemed to require the most precise terminology.

This maneuver produced only oblique monoscopic coverage of the SAM facilities and nearby SSM complexes. Coverage of most other parts of the test center, which included the most important SSM facilities, yielded coverage of better interpretability, some of it stereoscopic.

There was a substantial amount of collateral information on missile testing in the area around Kapustin Yar, beginning in 1946 or 1947. In addition, there was a large body of information about testing derived from COMINT and RADINT. 312/ All these sources pointed to an impressive growth in the number of programs, in the size and range of missiles being tested, and in the sophistication of range facilities. It was these data, correlated with visible evidence of the numerous testing sites and support facilities captured on U-2 photography, that enhanced the significance of what the PIs were seeing and gave perspective to the development of the test center.

The most extensive and most numerous facilities in the range head were those for testing surface-to-surface missiles, probably in ranges up to 950 nautical miles.*

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* Unless otherwise indicated, the source of analytical and descriptive information dealing with the KY Missile Test Center is the report of the Special Engineering Analysis Group and the book of graphics prepared by HTA for the consultants. 313/

U-2 photography revealed that complexes for testing this type of missile were positioned along a broad arc some 15 miles in length and lying northeast, east, and southeast of Kapustin Yar. Generally speaking, the SSM facilities to the northeast were for smaller, earlier missile systems, whereas those to the east and southeast were designed for successively newer systems involving progressively longer-range missiles. Moveover, further major construction was under way in the complexes east and southeast of Kapustin Yar, indicating modifications to existing systems and/or the development of still newer systems. Even though the pace of construction could not be estimated because of lack of comparative photographic coverage, it was apparent that the Soviets were pressing ahead vigorously in the field of missile technology.

For purposes of identification and communication, PIs arbitrarily divided the KY range head into areas called zones. In defining the zones associated with operations, an attempt was made to include in each zone all facilities, and only those facilities, common to the preparation and/or launching of one missile system. Each zone was designated by an Arabic number. Zone 6, less than 10 miles from Kapustin Yar, was obviously the oldest launch site in the range head and, by 1957, seemed inactive. Moreover, the deployment of later complexes in the line of fire from Zone 6 also suggested that the latter was no longer operable (Figure 52). It was believed that Zone 6 was the site used for launching Russian A-4 rockets reportedly tested on the range as early as 1947.

Zones 4 and 5, somewhat north of the line of fire from Zone 6 and probably added while Zone 6 was still active, were regarded as a logical extension of systems testing initiated at Zone 6 (Figure 53). At all three facilities the launch pads were similar. Moreover, Zones 4 and 5 were road-served from the same support base, suggesting a close relationship between the two. It was thought by JAM SESSION consultants that Zone 4 might be a site for engineering-user tests of the A-4 missile system. On the other hand, Zone 5, which featured three launch pads in a linear pattern, was believed used for training troops in use of the same missile system.

Zone 7, which appeared to have been the next SSM facility constructed at the range head was believed to have been the first site designed specifically for early research and development. The launch area had two main pads served by good paved roads plus up to five small pads with several associated revetments. The support area was situated about one-half mile from the launch area (Figure 54).

Turn radii on access roads leading to the main launch pads in Zone 7 as well as the size of the pads indicated a capability to handle missiles up to 60 to 70 feet in length. Distance of the support area from the launch area also suggested that the site was designed to handle missiles larger than the A-4. Since no permanent launch tower was present, it appeared that the system tested would be fully mobile.

Candidates for systems employed were provided by photographs of missiles displayed in the Moscow parade. A trailer-mounted MRBM was the choice for firing from the two main pads (Figure 55). Tank-mounted short-range ballistic missiles exhibited in the same parade were favored by JAM SESSION consultants for firings from the smaller pads at Zone 7 (Figure 56).

Whatever the systems, whether these or some others, the size and complexity of the support facility were judged adequate to handle a major R&D project. Moreover, comparison of Zone 7 with similar US missile testing facilities led analysts to conclude that Zone 7 was capable of accommodating a high rate of firing for either a single system or a combination of systems.

Zone 8, situated just over a mile south of Zone 7, appeared from the photography to be an R&D launching facility added after the construction of Zone 7. A distinctive feature of Zone 8 was location of the support area right next to the launch area (Figure 57). Indeed, the distance from the main launch pad to the nearest large building was only 600 feet (Figure 54). Though the lay-out and turn radii on the roads serving the launch pads would permit handling of trailers 60 to 70 feet long, the approach roads to the launch area, which were un-improved, and the closeness of buildings in the support area to the launch pads suggested the testing of small, rather than large, missiles.

Construction in Zone 9, almost due east of Kapustin Yar, was believed to have been started shortly after completion of Zone 8. Compared with earlier facilities in Zones 4 through 8, those in Zone 9 were much more elaborate and clearly intended for launching larger missiles. Indeed, at the time of the photography there was a Thor/Jupiter-size missile erected on one of the pads. The day following the U-2 overflight, a missile was fired from the Kapustin Yar Missile Test Center to the 650-nautical-mile impact area. It was the opinion of those working on JAM SESSION that the missile seen on the photography was the one fired the next day.

Facilities at Zone 9 were layed out in the shape of a Y, with the road forming the stem oriented approximately east-west. A large pad was situated at the end of each of the two roads forming the arms of the Y (Figure 58). Separation of the two launch facilities, arbitrarily designated "Launch Area North" and "Launch Area South," was just over two miles (Figure 59). Launch Area South was undergoing modifications at the time of photography; two large hexagonal pads had been added at the ends of service roads leading off the northeast and southwest corners of the original pad. Each of the new hexagonal pads was about 1,000 feet from the original pad, center to center. It was on the original pad at Launch Area South that the Thor/Jupiter-size missile was discovered on the photography (Figure 60).

A missile checkout facility was situated along each arm of the Y, nearly one-half mile behind the launch pads. Two missile assembly facilities, presumably one for each launch area, were located along the stem of the Y. What was thought to be the control center for Zone 9 was located adjacent to the point where the road forming the stem of the Y bifurcated to head out to the launch areas. Administrative offices for Zone 9 were located where the road to Zone 9 turned off the main road to Kapustin Yar (Figure 59).

The reason for duplication of facilities at Zone 9 was not immediately apparent. If then current US practices were being followed, the two complete launching and support complexes would be provided to achieve a higher rate of test firing with a given system. An alternative possibility was also considered, namely, that the Russians were engaged in developing and testing two different medium- or intermediate-range missile systems simultaneously. It was generally supposed, therefore, that Zone 9 could be engaged in the launching of 950-mile as well as 650-mile missiles.

Evidence available to JAM SESSION participants led them to conclude that surface-to-surface missile activity was tied to Kapustin Yar, whereas wholly independent facilities for testing cruise missiles, air-to-surface missiles and, possibly, manned space flight were associated with Vladimirovka. Zone 10, which was situated nearly 10 miles south of Zone 9, had all the external appearances of a ballistic missile facility. This created a distinct predisposition in the minds of those analyzing the available evidence to associate Zone 10 with the other surface-to-surface missile facilities at Zones 4 through 9.

The case was not clear, however. Proximity to Vladimirovka, less than 15 miles to the southwest, as well as the rail connection to that city left room for speculation that the activity at Zone 10 might be administered from Vladimirovka and, in some manner, be associated with space flight. There were, on the other hand, contrary indications that Zone 10 was but another SSM complex in the family of such facilities associated with Kapustin Yar. Thus, Zone 10 was reached from Kapustin Yar by the same road that served Zone 9, and that road was being improved south of Zone 9 at the time of photography. Moreover, assuming that Zones 7, 8, and 9 existed before construction on Zone 10 started, there were just two places to locate the latter, if they were to be placed as close as possible to Kapustin Yar and utilize the existing test range. One place was north of Zone 7 and the other was south of Zone 9 (Figure 52). Placing it south of Zone 9 provided easy access by rail to Vladimirovka. Consultants believed that the manner in which the track terminated in the pad area indicated a rail launch facility as opposed to one simply served by rail.

It was apparent from the photography that Zone 10 would have two launch sites (Figure 61). At the time of the U-2 overflight, one of the launch sites was cleaned up, though it was not believed to have been completed. The other was in an early stage of construction. The nearly completed site had a rail-mounted crane or service tower. It also had a control bunker similar to the one at Tyura Tam. Within the launch area were two towers 63 feet high, each with a 10-foot object at the top. It was thought possible that these were collimation poles (Figure 62).

If there was one facility at the test center that could be said to have more than a broad generic resemblance to the launch area at Tyura Tam, it was the launch area at Zone 10. Both were rail-launch facilities. Moreover, Zone 10 had the only launch area at Kapustin Yar with structures resembling the probable collimation towers at Tyura Tam. It was not believed, however, that the Zone 10 missile system -- if it was that -- was the only one at Kapustin Yar that might employ inertial guidance. Likewise, the Tyura Tam-type control bunker was not the only one at the Kapustin Yar Missile Test Center, yet it was another point of resemblance. Then, too, Zone 10, like the launch site at Tyura Tam was judged capable of launching an ICBM; but so was Zone 9.* In

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* It was not seriously considered by the consultants, however, that Zone 9 was primarily engaged in test firing ICBMs.

spite of these points of resemblance between the launch areas at Zone 10 and at Tyura Tam, the degree of similarity was far short of striking. The launch facility at Zone 10 was by no means as complex, and there was nothing to compare with the huge pad at Tyura Tam.

It must be clear, from the foregoing considerations, that the primary function of Zone 10 seemed, in the minds of those working on JAM SESSION, much less certain than that of any of the other presumed surface-to-surface launch facilities. Perhaps the leading candidate at this point in history, when JAM SESSION was just concluding, was the 950-mile surface-to-surface missile, but the testing of that system could easily have been carried on at Zone 9. Indeed, if the 950-mile range were to have been achieved by reducing the payload of the 650-mile missile from 6,600 pounds to 2,000 pounds, which was regarded by consultants as a distinct possibility, it was believed that the more probable launching area would be Zone 9.

If conclusions about the specific function seemed elusive, even confusing, this was precisely the situation at the close of JAM SESSION. In matching data on missile testing and firings obtained from collateral sources, including electronics and communications intelligence, consultants were able to provide plausible candidate missile systems for each of the SSM launch facilities from Zone 4 through Zone 9. At that point, they had exhausted the potential of the supporting information. Moreover, the uncertain administrative subordination of activity at Zone 10, whether to the base at Kapustin Yar or the one at Vladimirovka, added another element of uncertainty. The result was a degreee of ambivalence in assigning a possible function to Zone 10 that was not equalled in dealing with any of the acknowledged SSM facilities at Kapustin Yar.

In addition to Zone 10, with its rail connection to Vladimirovka, there were five other zones of activity closer to Vladimirovka that engaged the interest of JAM SESSION participants. Two were along the road and rail line serving Zone 10. A third, near Vladimirovka Airfield, also had rail and road connections with the launch facility at Zone 10.

Zone 11, about 10 miles out of Vladimirovka along the road and rail line to Zone 10, was thought to be some type of missile component manufacturing and test facility. It was rail served (Figure 63). The other facility along the road and railroad serving Zone 10 was closer to Vladimirovka. At the time of overflight, it was under construction. Designated Zone 12, it featured a large rail-through building covering an area of nearly 35,000 square feet (Figure 64). JAM SESSION workers thought this might be intended as an assembly and support facility. The third area, Zone 14, was made conspicuous by the presence of a rail-through building, believed, at least by the PIs, to be for assembling missiles. Covering nearly 85,000 square feet, it was the largest building in the Vladimirovka area (Figure 65). It was generally assumed that these three Zones -- 11, 12, and 14 -- supported whatever type of system and vehicle were being tested at Zone 10.

Of the other two areas near Vladimirovka, one, Zone 15, was thought possibly to be a cruise-missile test complex (Figure 66). The other, Zone 13, was much more interesting and revealing. It was an airborne-missile assembly and loading complex connected with Vladimirovka Airfield by concrete taxiways (Figure 65).

The airborne-missile assembly and loading complex was divided into two sections, within each section there was a hangar-type building and a nearby smaller drive-through building (Figure 67). Each section also had what was believed to be a loading pit. The larger pit was in the section with the larger hangar-type building and the

larger drive-through building (Figure 68). It was apparent from the dimensions of the larger pit that it would accommodate the 37-foot main landing gear separation on Badger aircraft and permit loading an airborne missile or drone aircraft below the fuselage. The two sections of the airborne-missile assembly and loading complex were separated by a board fence, suggesting a desire to inhibit casual observation of operations as- 3.3(b)(1)
sociated with two different airborne missile systems.

[redacted] The U-2 coverage of the Vladimirovka area, particularly of Vladimirovka Airfield and Zone 13, provided considerable information on the base of operations. Unfortunately, the limited available coverage of areas to the east yielded no information on the supposed associated test range.

In a more speculative vein, the extent of construction and of facilities in the Vladimirovka area considered in the light of comparable projects then under study in the United States suggested that various stages of research leading to manned satellite and space flight could be carried out from these facilities. There was informed guessing among JAM SESSION consultants and others that manned vehicles like the US X-1, X-2, and X-15, launched from bomber-type aircraft, could be supported from the airborne-missile assembly and loading complex and Vladimirovka Airfield. It was further speculated that in a later phase of development a missile booster with a manned final stage might be fired from Zone 10, which had a logistical association with Vladimirovka.

The activity at the other end of the range head, roughly north of Kapustin Yar, was much more obvious. Even though the oblique monoscopic photography severely limited the potential for detailed exploitation, it was clear that this was an area devoted to research and development for the Moscow SA-1 sites. Moreover, JAM SESSION participants were able to state with confidence that the elaborate support and missile fabrication facilities would undoubtedly be used in the future to test new SAM systems.

Photo interpreters divided the SAM facilities imaged on the photography into three zones. Zone 1 consisted of the launch area and close-in operational support facilities (Figure 69). Included were a complete herringbone site with Yo-Yo guidance facility,* a heavily

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* See p. 28, above.

secured area probably used for storage of warheads, and an administration and housing area. Zone 1 also had two smaller launch sites, two probable electronics-type facilities, and unidentified installation thought to be for storage, and a probable test stand for surface-to-air missiles.

Instrumentation and guidance facilities associated with the SAM launch areas were designated Zone 2, though there was necessarily some overlap between Zones 1 and 2 in the vicinity of the launch areas (Figure 70). The success of the PIs and analysts in pinning down these electronics sites with a fair degree of certainty was more a tribute to their familiarity with the Moscow SAM sites and to the completeness of coverage of this small test range than to the interpretability of the photography. The SAM test range was instrumented to a distance of 11 miles from the Yo-Yo radar behind the herringbone. It was believed that good flight data could be obtained for 25 miles downrange, assuming target and missile altitudes above 20,000 feet. Furthermore, the high density of close-in instrumentation sites indicated high interest in obtaining accurate data during the early part of the missile trajectory.

Zone 3, situated just a few miles outside Kapustin Yar, had a missile assembly and fabrication facility where hand-tooled prototypes could be manufactured, reworked, and checked (Figure 52). Nearby were several static test stands. A small airport, suitable for use by liaison planes, but not by large drone aircraft, was also close at hand. It was believed by those working in JAM SESSION that drones for use in test firings were probably based at Vladimirovka Airfield, where at least 38 Beagle aircraft were counted on the September 1957 photography.

As in the case of the SSM testing facilities, candidates for surface-to-air missiles tested at the SAM area were provided by photographs from the Moscow parade (Figure 71). One was a single-stage missile, another a boosted version. In either case, facilities at Kapustin Yar were judged adequate to handle the testing.

Guidance facilities and range instrumentation for the SSM facilities at Kapustin Yar were difficult -- in some cases impossible -- to identify on U-2 photography. No positive identification of pieces of instrumentation equipment was possible because of the scale of the photography. With the use of other intelligence information sources, such as COMINT, ELINT and RADINT, it was possible, however, to identify some instrumentation and guidance sites and to establish some patterns of instrumentation with a reasonable degree of confidence.

The Kapustin Yar range head had the heaviest concentration of instrumentation observed on any photography covering the two Russian missile test centers and their ranges. Indeed, it appeared to JAM SESSION consultants to be as heavily instrumented as any of the US missile test ranges. The pattern of instrumentation facilities observed on photography of the Kapustin Yar installation indicated that each launching area had its own network, located so as to provide optimum coverage for collecting data on the missile system undergoing testing. Many large, permanent structures were built to house instrumentation equipment. In addition, the system of roads through the range head, the small cleared areas along them, the many cable scars connecting these cleared areas, and the large number of van-type vehicles in the motor pools at launch support areas all pointed to use of mobile instrumentation to augment the permanent systems.

Though it was possible to identify some instrumentation or guidance sites associated with most of the SSM launch areas, the obliquity of photography covering Zone 4, which was adjacent to the SAM area, was so severe as to preclude indentification of any guidance or instrumentation sites associated with it. Unlike facilities in the nearby SAM area, where obliquity was also a limiting factor, this was a missile system with which the PIs had no previous experience.

At Zone 7, the photographic evidence was better. What was described as a "trailerized" installation was located 3,300 feet west of the launch pads (Figure 54). A partially cleared area in front of a "major" trailer provided clear line of sight to both main pads. It was believed that this installation served as a single-point radio guidance station designed for a range on the order of 300 miles. Consultants compared it with that used with the US Corporal system. Forward instrumentation for Zone 7 was set up along two legs 58,000 feet long, with the junction at the Zone 7 support area. Possible instrumentation sites were located at the ends of the legs and near the middle (Figure 72). Orientation of the presumed direction of fire was on an azimuth of 100 degrees.

At Zone 8, buildings in the support area, which immediately adjoined the launch area, blocked any clear line of sight to the rear. Moreover, drive-in roads serving some of the support buildings suggested that they were used as clean rooms for testing precision instruments, such as gyroscopes and accelerometers. This evidence, coupled with the closeness of the support facility to the launch area suggested the testing of inertially guided short-range missiles.

At Zone 9, with its larger, long-range missiles, probably in the first generation of development, instrumentation was more elaborate. The launch control center was connected by cable to forward instrumentation stations in a V-pattern, 58,000 feet on a side (Figure 73). Domed buildings were present at some stations. It was believed by JAM SESSION consultants that a single-point radio guidance was probably provided by "trailerized" sites located 5,260 feet behind each launch area with clear line of sight to the pads. There was some indication from ELINT, however, that a radio-inertial system might be used, with inertial instruments in the missile as part of the guidance system.

Compared with the guidance and instrumentation at any other existing launch site at the Kapustin Yar Missile Test Center or even at Tyura Tam, those at Zone 10 were unique. At the latter, there were two L-shaped instrumentation patterns. One, with the longer baseline, was situated just over 100,000 feet forward from the launch site, and the other more than 38,000 feet to the rear of the launch site (Figure 74).

The L to the rear had legs approximately 18,500 feet long. It was oriented with one leg on an azimuth of 100 degrees and the other on an azimuth of 10 degrees. A fenced instrumentation site was located at the vertex of the L, and unfenced instrumentation sites were positioned at the extremities of the legs. Cable scars connected the instrumentation sites forming the L. Other cable scars reached from the L to the vicinity of a radar site in Zone 11 and to two other electronics sites.

The L-shaped instrumentation pattern downrange from the launch site had legs approximately 66,000 feet long, with one leg extending north and the other east from the vertex. Instrumentation sites were located at the vertex and at the ends of the legs. The site at the vertex and the one at the end of the north leg each had three buildings with domes. There was a 34,000-foot extension on the east leg, at the end of which there was another instrumentation site. The presumed direction of firing for the launch sites at Zone 10 bisected the north-south leg. Cable scars extended between the instrumentation sites and reached back to the launch area.

Aside from the L-shaped instrumentation patterns, there were the two 63-foot poles with 10-foot objects at the top in the nearly completed launch site in Zone 10. The more easterly of the poles had an azimuth of 110 degrees from the launch point and the other an azimuth of 20 degrees. The great circle thus defined passed through Guryev and south of Tashkent. If these were, in fact, collimation poles, an inertial guidance system was indicated. Failing that, and since no radio guidance sites were identified, it was believed that radio guidance aboard a rail car might be planned for Zone 10.

If the foregoing account of the highlights of intelligence resulting from all-source exploitation of September 1957 photography covering the Kapustin Yar installation seems lengthy, it should be observed that the length is a reflection of the vastness and complexity of the test center. There was, of course, much more information available from the photography. In addition, there were further details from collateral sources, particularly data obtained by electronic means, that could not be correlated with what was revealed by the photography. Considering the mass of material that was screened and exploited, the accomplishments of the PIs, intelligence analysts, and consultants over a period of a few months was extremely impressive.

Though the results and recommendations based on the all-source exploitation were completed and published, attempts to refine and publish the results of the photo interpretation, as such, were not so successful. After the initial effort was over, competition with other commitments coupled with the massive effort needed to assemble and prepare for publication in smooth form such a large body of material first delayed and then precluded publication. No detailed PI report dealing with the Kapustin Yar Missile Test Center, based on the September 1957 photography alone, was ever published by HTA.*

3. Good-Bye to GMIC Consultants

From 2 to 5 December 1957, soon after the publication of the findings of the Special Engineering

* Intermittent efforts to complete the job and publish what would have been the most voluminous detailed HTA PI report ever issued, probably over one hundred 14 by 18 inch pages, resulted in an edited manuscript, complete with graphics, and ready for production work. This manuscript was at last completed and approved for publication by representatives of the Army, Navy, and CIA several days after the Kapustin Yar installation was covered a second time by U-2 photography. Though the latter accomplishment made publication of the manuscript inopportune, the agreed-upon facts and interpretations were indispensable as baseline information.

Analysis Group, the GMIC Scientific Advisory Panel met at HTA to examine the evidence and to draft a brief statement of their conclusions and recommendations. 314/ On 2 December, Allen Dulles visited HTA to greet these distinguished visitors and, incidentally, to meet JAEIC consultants who were also in the building at that time. 315/ This occasion is still remembered by senior NPIC personnel as the only time that Dulles came to the Steuart Building.

The interpretations of the PIs, which in general had met with the enthusiastic approval of the engineering consultants, were also endorsed by members of the Scientific Advisory Panel. Every aspect of the work done by HTA photo interpreters and support personnel was warmly praised by all outside participants in JAM SESSION. 316/ [redacted] writing to Lundahl on 3.5(c) 6 December 1957 on behalf of the Special Engineering Analysis Group, emphasized the excellence of the information and responsiveness of the support provided by HTA. 317/ A few weeks later, [redacted] EO 13526 3.5(c) Lundahl in a similar vein, commenting on the excellence of the information and materials produced by HTA and to express his "deep appreciation for the truly superb job you and your people have done." 318/ Some months later, [redacted] chairman of GMIC, wrote belatedly 3.5(c) to Lundahl to thank him for the "splendid assistance" rendered by him and his organization in the exploitation of GMIC targets. 319/

These were euphoric days in HTA. At least those most actively engaged in JAM SESSION were filled with a sense of accomplishment, of having played a vitally important role in the production of intelligence of the greatest significance to their country. The eager reception given the photography and intelligence derived from it at the highest levels within the government enhanced this sense of accomplishment and gave impetus to plans for establishing permanently the capability represented in pilot form by Project HTAUTOMAT. Though JAM SESSION was far from over, at least as far as HTA was concerned, these days, late in the fall of 1957, saw the peak of accomplishment and eminence achieved by the CIA PI component up to that time, and one not to be equalled for another five years.

D. Show and Tell

The cycle of briefings based on SOFT TOUCH, initiated late in the summer, continued unabated through the fall. As more top level government officials whose positions entitled them to know about these important and fascinating discoveries heard the news, they joined in beating a path to the Steuart Building. Not only was the information electrifying and the photography stunning, but Lundahl, who was rapidly gaining a reputation as one of the most dynamic briefers in the Intelligence Community, regularly left his audience virtually spellbound.

Among the more memorable of these briefings in the Steuart Building were those presented to Adm. Arleigh Burke, USN, then Chief of Naval Operations, and members of his staff and guests on Saturday, 21 September 1957; to Gen. James Doolittle on 17 October; to Adm. Arthur W. Radford, USN, a special Presidential advisor on 29 October 1957; and to Gen. Nathan Twining, USAF, then chairman of the Joint Chiefs of Staff, and his staff assistants on 26 November 1957. In each instance, Lundahl received responses that were far more than perfunctorily polite in expressing appreciation for the briefing and in stressing the highly stimulating nature of the presentation. A letter of appreciation written on behalf of the Chief of Naval Operations after his briefing in September commented at some length on the "superb presentation." 320/

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contribution to the furtherance of the mission of this Agency." 326/

Though the Dulles memo was dated nearly a week after the GMIC Scientific Advisory Panel completed its work and brought to a close the initial phase of JAM SESSION, it was a fitting postscript. Never had the name of Lundahl been known so favorably by so many important persons in the US [redacted] and never had the work of HTA photo interpreters and support personnel been held in such high esteem.

3.3(b)(1) 3.3(b)(6)

There were, on the other hand, several European briefings for which some preparations were made but which were never given. In a memorandum to General Cabell dated 31 October 1957, James Q. Reber reported that in response to oral instructions given to him that morning by the general, the Army, Navy and Air Force had agreed ". . . to transmit notification on the arrival at the appointed time of Art Lundahl for presentation of photographs resulting from the recent missions along with an oral briefing." This carefully worded statement was followed by the announcement that representatives of the Army, Navy, and Air Force would meet at HTA the next morning, 1 November, to aid in selecting briefing materials of the greatest interest to their respective

3.3(b)(1)
3.3(b)(6)

offices. Reber proposed an itinerary for Lundahl that would include stops in Paris to brief key officials at SHAPE and EUCOM, in Heidelberg, Frankfurt, and Wiesbaden to brief the principals at CINCUSAREUR, [redacted] and USAFE, and finally in London to include CINCNELM, [redacted] Force liaison officers [redacted] The memo noted that Lundahl should be instructed to provide technical facts but should avoid making estimates or drawing conclusions from the material displayed. 327/

HTA lost no time in preparing for this ambitious tour [redacted] The October 1957 monthly report for the OCR Statistical Branch said that numerous slides and 20 by 24 inch briefing books had been prepared in anticipation of the projected briefings by Lundahl of key officials in "SHAPE, EUCOM, USAFE, USAREUR, [redacted], CINCNELM, CINCSOUTH, [redacted] The Statistical Branch monthly reported in a matter of fact manner that after weighing "political considerations," the IAC ruled against the tour. 328/

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Minutes of the meeting of the Ad Hoc Requirements Committee on Project AQUATONE held on 7 November 1957 noted that the Chairman, James Q. Reber, reported that General Cabell had informed him subsequent to the IAC meeting on 5 November that the projected European briefing tour of Lundahl had been cancelled. Reber gave no reason. 329/

Though the historical significance of these non-briefings, as such, was virtually nil, the elusive reasons for aborting the attempt to carry them out were symptomatic of future problems that would plague HTA, PIC, and NPIC. The admonition, in Reber's 31 October memo, that Lundahl be instructed to stick to the facts and avoid conclusions or estimates was revealing. Similarly, the initial reaction of the military services, who agreed to notify their principals overseas of the appointed time of Lundahl's arrival, was far short of enthusiastic concurrence in the proposal.

At the time when HTA stock was at its zenith, when HTA PIs were working harmoniously and successfully with analysts and others from elsewhere in CIA and from the military services, and when Lundahl was repeatedly briefing VIPs from many parts of the government, there was, nevertheless, a reluctance to permit HTA to encroach too far beyond established areas of responsibility. Much of the U-2 photography covering critically important installations was so good that information just popped out of it. Moreover, the dramatic overhead view of an installation with its array of interrelated parts invited informed speculation concerning the functions of the various facilities or the significance and purpose of the overall complex. These were the elements that made the difference between a dull recitation of facts and an animated and stimulating presentation that excited people in the audience and prompted thinking. It also raised questions of responsibilities, competence, and, in the case of HTA's competitors, even survival.

An incident in December 1957 gave further evidence of such concern. In a "Dear Art" letter of 20 December 1957 referring to a briefing given by Lundahl eight days earlier [redacted] of OSI challenged several hypotheses 3.5(c) advanced in the course of the briefing on the grounds that they were different from those currently held in OSI. On the TALENT cover sheet for the [redacted] memo, Lun- 3.5(c) dahl noted that he had called [redacted] and thanked him for 3.5(c) his constructive suggestions. He stated further that he would add the appropriate qualifying words or phrases to make his remarks "even more conservative." 330/

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He added, somewhat ruefully, that it was his custom to indicate in his briefings that final judgments and conclusions rested ultimately on the decisions of the "substantive experts." This competition between PI and intelligence analyst was something that would ebb and flow over future years and would be an important consideration in making decisions concerning the responsibilities and functioning of NPIC.

E. <u>Other PI Exploitation and Reporting</u>

While PIs in the Military-Scientific Branch were heavily involved in JAM SESSION during the fall of 1957, those in other branches, such as the Geographic Branch, the Central Branch, and the newly named Operations Support Branch were busy on a variety of lower priority tasks.

The Operations Support Branch,* now without [redacted] was informally structured into three functional 3.5(c) groups. One group plotted the photography, another evaluated its quality, and the third performed a variety of more conventional photo interpretation tasks. The latter

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* In spite of organizational changes in the summer of 1957 that resulted in reduced staffing and a new name, branch monthly reports continued to bear the name "Special Projects Branch" until it was officially subordinated to the Technical Services Division with the creation of the CIA Photographic Intelligence Center.

group, consisting in the fall of 1957 of [redacted] constituted the photo interpreters who, though oriented to photo interpretation as such, had not attempted to abandon the foundering Special Projects Branch by seeking transfer to one of the two detailed-reporting PI divisions. 3.5(c) 3.5(c)

A fortunate development, beginning in the fall of 1957 and continuing for several months, provided these interpreters with some very interesting photography for exploitation. The DDP had just succeeded in establishing a channel for obtaining 35-millimeter photography taken with a hand-held camera from an Iranian passenger aircraft flying periodically into the Transcaucasus region of the USSR. When [redacted] of the DDP received the photography, he sought the assistance of HTA in exploiting the material and publishing the results. The task of interpretation fell to OSB and the group of four PIs just named, with [redacted] the senior man, as leader. 3.5(c) 3.5(c)

For each mission, the PIs prepared a list of targets of intelligence interest captured on the film. When coverage of important targets was of good quality, individual, detailed reports were prepared. These were essentially DDP reports on which the editing and production work was done by HTA and differed from other HTA reports in format, in cover used, and in the manner in which they were bound. Moreover, the distribution and dissemination of the reports was controlled by DDP. This special arrangement not only enabled DDP to enjoy the convenience of having both exploitation of the photography and production of the PI reports done by an organization with competence in handling such tasks, but it also kept the entire exploitation and production operation, which involved very sensitive materials, in one place and under exceptionally tight security.

There was another bonus that was not publicized. The existence of U-2 coverage over many of the targets exploited on the 35-millimeter photography permitted utilization of the former to confirm details and thus enhance the value of the small format material. It goes without saying, however, that only information plausibly obtainable from the 35-millimeter photography -- albeit through the efforts of exceptionally gifted PIs -- was included in the DDP reports, which were published at the TOP SECRET non-codeword level.

Most significant among things discovered from this photography were several FISHBED, delta-wing, aircraft lined up at the Tblisi Airframe Plant, ready for flyaway. This was the first recorded sighting of the Model B

FISHBED. This lucky find -- on 35-millimeter photography and without any backstopping by U-2 coverage -- enabled HTA photo interpreters to produce the first detailed description of the aircraft, including measurements. 331/

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The fruits of this working arrangement between HTA and the DDP evoked at least one unenthusiastic response. At the Geographic Research Area staff meeting on 25 February 1958 [redacted] chief of the GRA, commented on the lack of compatibility between one of these DDP reports that came to his attention and other HTA publications. He recommended that D/GP establish "a method of production control over these projects." 332/ Perhaps this critical comment was inspired by tensions engendered by the widening rift that was developing between D/GP components at HTA and its nominal overseers in the Geographic Research Area and in ORR. Though there were no open clashes, D/GP, as the key component in HTA, was functioning in a progressively more independent manner as it proceeded to burst through bonds that had been fashioned in pre-HTA years. The glamour and success of JAM SESSION were significantly accelerating the process already under way.

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During the fall of 1957, work in the Geographic Branch continued the pattern established in the middle and late summer. By the end of October, PI work on projects utilizing SENSINT photography of the Soviet Arctic and Far East was essentially complete, though several reports were yet to be edited and published. All were disseminated, however, before the end of the calendar year. As in the case of similar reports completed several weeks earlier, the results were of minor significance. Accordingly, analysts lost interest in this source of information and, to some extent, in the geographic areas themselves, with the notable exception of parts of the Soviet Far East.

The brief spate of interest in SENSINT photography during the summer of 1957 begot changes in the system. In a memorandum dated 6 September to General Cabell, Gen. Millard Lewis, Assistant Chief of Staff, Intelligence, USAF, observed that there was continuing increase in the number of persons cleared for SENSINT throughout the Intelligence Community to the point where it threatened to defeat the very purpose of the system. He added that he had taken action in the Air Force to stem the increase, and he requested that Cabell take similar action in CIA. 333/

In a response dated 29 October 1957, Cabell said that, although the Agency had always implemented SENSINT directives faithfully, he concurred in the expressed desire to curb further expansion of the system. At the same time, he advised Lewis that he was designating Arthur C. Lundahl CIA SENSINT Intelligence Officer. He added that Lundahl had instructions to review personally all future requests for expansion of the system and to make periodic reviews of those authorized access to it, with a view to reducing the number wherever practicable. 334/ On a covering memo attached to a draft of the memo to Lewis prepared for his signature, Cabell added in his own hand a "Memo for Mr. Lundahl: Be very rigid in your implementation. In case of any doubt, consult me." 335/

With the transfer of the center in CIA for authorizing access to the SENSINT system from OCI, where it had previously resided, to HTA, the stage was set for more direct control within the Agency by HTA of this photography. The change was only of minor functional significance, however, because of the rapidly declining interest in SENSINT photography as a source of intelligence information. Success of SOFT TOUCH missions in the summer of 1957 left SENSINT with but a minor supporting role in future photographic intelligence production.

Geographic Branch PIs were also engaged in the exploitation of U-2 photography during the fall of 1957. Typically, their work consisted of "documenting" the components of numerous Soviet industrial plants for ORR analysts, but they also did a few studies of communications sites and the flow of traffic on selected Russian rail lines. In October they initiated a series of escape and evasion studies based on U-2 photography for areas in Eastern Europe at the request of the ORR Geographic Division. As these projects were drawing to a close in November, work was getting under way on a comprehensive review of available recent photo coverage to correct and update, wherever possible, information being compiled by D/GG to serve as a basis for the preparation of a map of the entire rail net of the USSR. 336/

This mixed bag of work, TALENT and SENSINT, kept Geographic Branch PIs busy through the fall of 1957. The type of targets with which they were dealing and the manner in which they did their work produced a fairly rapid flow of PI facts which were passed on to intelligence analysts either orally or in the form of PI publications. Very little of the information with which they dealt came even close to being esoteric. There was very little analysis or evaluation, and there were no prolonged deliberations or conferences with consultants. One result of this mode of operation was a fairly expeditious clearing of the backlog of work. With the virtual stand-down in Russian penetration missions following the brilliant achievements of late summer, the Geographic Branch, by early December 1957, was rapidly approaching the time when some new requirements would be welcome.

As usual, Central Branch was involved in a variety of tasks involving materials and activities outside code-word channels. There was one task, however, that deserved special mention as a harbinger of things to come. In November 1957, Central Branch completed and sent to DDP a memorandum entitled, "Analysis of Four Selected Areas of Indonesia." 337/ The information conveyed to the DDP in the report generated another request for supplemental information on the Sibolga area, situated on a bay on the west coast of Sumatra. 338/ This was but the beginning of D/GP support for the DDP operation in Indonesia.

F. Making Equipment Function Better and Getting Better Equipment

In spite of preoccupation with JAM SESSION during the fall of 1957, HTA personnel found time for making contributions to the solution of technical problems as well as for the acceptance and debugging of new equipment. The latter consisted largely of off-the-shelf items; the pace of research and development, which was not yet the sole responsibility of any single organizational component of HTA, was too slow to have produced any great accomplishments at this early date. The technical problems involved the quality and exploitability of photographic inputs and how to improve them.

In order to review and evaluate the performance of collection systems and take corrective action so as to achieve the maximum capability possible for the next collection season, Project HTAUTOMAT headquarters scheduled a "photographic suppliers" meeting at Boston, Massachusetts, on 9 October 1957. In preparation for that meeting, a preliminary conference was planned at HTAUTOMAT a week earlier, on 2 October.

The conference at HTA actually took place a day late, with participants from Project AQUATONE, manufacturers, and HTA -- the same organizations that would be represented later at the Boston meeting. At this preparatory session, held in the Steuart Building, emphasis was placed on the quality of the photography obtained from each of the camera systems. Bausch and Lomb stereo viewers and light tables were set up in the PARAMOUNT room on the seventh floor of the Steuart Building, and samples of photography were made available for study and discussion. 339/

The meeting in Boston six days later included representatives from Project AQUATONE, led by Bissell himself, as well as from Eastman Kodak, Hycon, Perkin-Elmer, and Lockheed. Also present were [redacted] 3.5(c)
designer of the B camera. 3.5(c)
As might be expected, the range of topics covered the whole gamut of the collection effort, including many items of no more than peripheral or passing interest to HTA. Among the latter was the observation by Bissell, who chaired the meeting, that the program would continue ". . . at least one more season and possibly longer." Even as late as the fall of 1957, the duration of the program on whose inputs the survival of HTA depended was still uncertain, though hopeful.

Among topics of greatest interest of HTA were the functioning of the camera systems, processing of the film, and, ultimately, quality of the U-2 photography the PIs were exploiting. Each of the three major systems in use, the tracker, the A-2, and the B, was discussed in detail, with special reference to the quality of photography produced by each and malfunctions typical of the system. In all these discussions, data produced on a continuing basis by photo evaluation personnel under [redacted] in the former HTA Special Projects Branch -- then the Operations Support Branch -- as well as the sample evidence displayed at the preliminary conference nearly a week earlier in the Steuart Building constituted the source of the information. As a result of the discussions, an action was agreed upon for each specific problem and the responsible person and organization designated. 3.5(c)c)

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In the case of the tracker, banding and loss of definition toward the horizon, with a complete loss of the horizon line, were the chief problems. [redacted] 3.5(c)
[redacted] of Perkin-Elmer suggested that the banding might 3.5(c)
result from a clutch problem. He also added that most of the tracker material displayed at HTA seemed overexposed. It was agreed that all tracker cameras would be overhauled by the manufacturer, Perkin-Elmer Corp.
[redacted] of Eastman Kodak suggested that his company under- 3.5(c)
take tests to see if a change in processing techniques and methods in the field might improve the quality of tracker photography. To this end, arrangements were made to provide Eastman with an "appreciable amount" of exposed but unprocessed tracker film.

Other problems involving the tracker camera system included suggestions for a better clock and removal of the level bubble, which obscured part of the format. The HTA representative concurred in both these proposals. He also pressed for consideration of what HTA claimed was excessive scratching, dirt, and grease pencil markings on original tracker negatives received from overseas detachments. [redacted] deputy to 3.5(c)c)
Bissell and under whose parent service overseas detachments were run, directed that units be told to revert to the use of duplicate positive film at the sacrifice of a few hours in the timeliness of reporting.

The A-2 camera produced very good quality photography -- the best obtained from any of the systems at this point in history -- but the quality was not consistent. Main problems involved "soft spots" and blurred fans and frames. [redacted] of Hycon thought 3.5(c)
these might be caused by vacuum pulsing. It was also suggested that they might result from image displacement caused by auto pilot fluctuation. [redacted] of Lock- 3.5(c)
heed agreed that his company and Hycon, manufacturer of the camera, would investigate this problem. [redacted] 3.5(c)
also stated that there was a focus problem at Detachment C, in Japan. He thought it possible that faulty

collimation techniques might be used and/or the length of focus posts was incorrect. Hycon was assigned the task of investigating this problem.

Though the B camera had already been in limited operational use for nearly a year, the photographic results left much to be desired. According to design criteria, the photography should have been much better than that obtained with the A-2. With a foot longer focal length, the nominal scale of vertical photography obtained with the B camera was on the order of 1:23,000 whereas that of the A-2 was about 1:35,000. Moreover, the design of the B camera provided uniform focus throughout the field whereas on the A-2 it fell off at the edges. In spite of superior design, however, much of the B photography was not sharp and crisp, and some was blurred.

At the Boston meeting [redacted] who designed the B 3.5(c)
camera,* expressed disappointment in its performance to that date. As he saw it the problem was threefold: reliability, focus, and need for better maintenance techniques. If all three facets of the problem could

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* For further information on the B camera, see p. 124, above, and p. 395, below.

be solved, he expressed confidence that the superior potential of the B camera could be realized.

[redacted] of Hycon stated that a modified shutter 3.5(c) with new bearings and microswitches was currently undergoing bench tests. As of 8 October, the day before the Boston meeting, the shutter had completed 50,000 cycles without a malfunction. In addition to the shutter, McFadden thought that there was a problem of vibration, which could be caused by the image motion compensation mechanism, by the film drive, or by shutter or mirror vibration. It was agreed that all B cameras and shutters would be returned to Hycon for overhaul and for the incorporation of all the latest modifications. Plans were also made for a joint test by Eastman Kodak and Perkin-Elmer of the red and yellow filters used on the B cameras. Finally, Hycon complained that some malfunctions in the feeding of film to the camera was caused by dished flanges on the spools holding the film. Hycon provided Eastman with drawings of internal supports for flanges in the film shipping containers. Project headquarters authorized Eastman to put in a pilot order for 20 of these modified shipping containers. 340/

This involvement of HTA in technical problems associated with the collection systems was no gratuitous excursion into matters that had no detectable relation to exploitation of the photography. On the contrary, the ultimate success of the multimillion dollar collection effort could be measured only in terms of the quality and exploitability of the photography obtained. HTA, as the prime customer and the one having the greatest familiarity with the collection system, was in a key position to assist in evaluating the effectiveness of the effort. Indeed, Project headquarters and the manufacturers depended primarily on feedback in the form of mission photo evaluation reports, produced on a continuing basis by HTA, and on special exhibits, like the one held on 3 October in the Steuart Building, as a source of information to help them correct deficiencies in the functioning of the systems.

In a broader sense, experience to date was demonstrating the wisdom and necessity of close working relationships between the collectors and exploiters in both the planning phase of the collection system and, later, in the operational phase. The extraordinary success of the AQUATONE Project was dramatic proof of the productiveness of such an approach. The small size of the AQUATONE effort and the open handed stance taken by both Bissell and Lundahl and their people were doubtlessly important factors in the smooth and effective relationships that developed. In the future, as the size of the national effort grew, there would be many occasions on which the need for joint participation and effective communications would be overlooked and, at least for a time, the lessons of the past would be forgotten. In the fall of 1957, however, things were moving along just fine.

The arrival of new equipment affected several components, chiefly those providing support to the photo interpreters. The greater success in procuring this type of equipment was due largely to the fact that it had been developed for other users, whereas the paucity of new PI equipment -- particularly that of a sophisticated nature -- was a reflection of the vanguard position of HTA in the exploitation of photography.

The ALWAC III-E computer, the first electronic computer in the Agency, arrived at the Steuart Building on 17 September 1957. 341/ Although the scheduled time of arrival was 0900 hours, a succession of mishaps made it fortunate that the ALWAC was delivered safely at HTA at all on the appointed day.

The computer came by truck from Cleveland, where it had been on display at a business show. The address given the driver was 2430 E Street, Northwest. This was the first mistake. The driver got stuck trying to wind his way around the complex of driveways and parked cars in the area, and after much travail during which he built up a sizable head of steam, he finally offloaded the computer on a mail dock at Que Building and drove off.

In the meantime [redacted] at the Steuart Building, 3.5(c)
was concerned over the whereabouts of this valuable piece of equipment. Once during the day he got a telephone call telling him that a cursing truck driver was attempting to deliver a computer. It was late afternoon, however, before [redacted] discovered where the computer had 3.5(c)
been deposited. Fortunately, he was able to get a GSA moving crew and a truck with a lift gate to get the computer off the mail dock and into the Steuart Building that evening. [redacted] remembers the expressions on the 3.5(c)
faces of the ALWAC engineers, who had been standing by to get the computer in place in the Steuart Building, as they shoved the half-ton main logic cabinet from the bed of the truck onto the lift gate. The gate sagged about six inches in the rear and three inches in the front before it steadied. There was a look of dismay and then relief as it became evident that the cabinet would not topple over and fall on the pavement. It was

not long thereafter that all three cabinets were safely inside the Steuart Building and out of the rain (Figure 75).

The machine was operational about three days after it was delivered to the Steuart Building. Within about a week after its arrival, one or two useful programs were in operation, thanks to the lapse of a few weeks between the completion of the programing course in New York City by [redacted] and the delivery of the computer. As [redacted] recalls it, the first of these was a scale number computation program to determine the scale at a particular point on a photograph. 342/ This was a noteworthy accomplishment in view of the difficulties to be expected in breaking in such a complex piece of equipment. It was also a most timely beginning, coming as it did during the early stages of work on JAM SESSION. 3.5(c)

Monthly reports from the Technical Intelligence Services Branch, beginning with the one for October 1957, noted that computation problems were being programed and solved by the ALWAC. 343/ According to [redacted] during the fall of 1957, the chief uses of the newly acquired computer were (1) the determination of scale at a given point on a photograph in response to specific requests 3.5(c) from other photogrammetrists in the branch who, in turn, were providing mensuration data to photo interpreters, and (2) the calculation of settings for the Reed rectifier, a fairly lengthy computation that involved a trial and error approach. Before the fall was over, the computer was producing scale tables for any given angle of obliquity, flying height, and focal length of camera. 344/ These tables, which were later published, made it possible for PIs to make non-critical measurements themselves and free the few photogrammetrists for work on more critical and demanding calculations.

Once HTA acquired the ALWAC, it became a member of the "ALWAC Users Association," a loose confederation of 25 or more owners. HTA, primarily in the person of [redacted] was quite active in the association from the start. Because of security constraints, HTA gained considerably more from the association than it was able to give. 345/ Monthly reports from the Technical Intelligence Services Branch during the fall of 1957 record visits by [redacted] to meetings of this association and to other computer meetings and demonstrations. 346/ This was a new and promising field, the goals set in justifying purchase of the ALWAC were ambitious, and HTA was vigorously pressing forward to realize the full potential of the computer.

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The fortunate circumstances created by [redacted] 3.5(c)c) suggestion a year earlier, the foresight of HTA supervisors in encouraging him to proceed with the screening of available computers, and the lucky surplus of approximately $50,000 in the equipment budget that made purchase of the ALWAC possible were of the utmost significance in extending the technical intelligence capabilities of HTA far beyond those of its competitors in the intelligence field. They were also of definitive importance in providing the volume of technical intelligence made available to JAM SESSION participants in the fall of 1957. Whereas it would have been technically possible to do the job using mechanical calculators, since all important SOFT TOUCH missions were flown with the A-2 camera, which did not pose the almost insurmountable metrical problems of horizon-to-horizon photography, it would have been physically impossible to handle the volume of requests in the time available by such means. 347/

Although the ALWAC was by far the most significant and interesting piece of equipment delivered at HTA during the fall of 1957, there was one other that merits mention. In September 1957, the photo lab received its first VG 1 enlarger from the Swiss firm of Wild, where [redacted] had visited and inspected this piece of equipment after the VIII International Congress of Photogrammetry a year earlier. HTA was very proud of this enlarger, then the only one of its kind in the United States. 348/ With excellent optics and the capability to enlarge photography up to seven times in one step, the VG 1 was especially useful in the production of briefing boards. It was also convenient and fast to use, qualities that made it a godsend at a time when JAM SESSION was just beginning. The fact that the original VG 1 and three others purchased subsequently by HTA and its successors are still in use by NPIC is convincing testimony of the excellence of this piece of equipment and the good judgment used in selecting it. 3.5(c)

G. The HTAUTOMAT Organization Reacts to JAM SESSION

During the fall of 1957, the seemingly endless struggle to establish and carry out some system of effective project control continued. In November, the Support Staff announced the introduction of a new form for the weekly reporting of progress on projects assigned to the branches. This form provided for the entry of data on the identity of each project assigned to the branch, the name of the responsible analyst, the date the project was assigned, any changes during the reporting period in the estimated date of completion, and, for each project, a comparison of the percent of total estimated work accomplished by the end of the previous week and at the end of the current week. The form was designed so that the report for the last week of each calendar month would sum up the project assignments and accomplishments for that month. 349/

The devising of this form was a further step in carrying out the dictum endorsed by Lundahl in his memo of 29 August 1957 that thenceforth each branch should submit a weekly status report on specific projects assigned to it. 350/ Whereas that earlier announcement had exempted not only the so-called continuing projects (i.e., such as those for preparing mission plots, the mission coverage summary for each new mission, and the like) but also projects in support of other HTA components, the latter were in certain cases now being brought into the system with the concurrence of those in charge.

Thus, the December 1957 monthly report of the Support Staff noted that discussions were held between [redacted] of the Support Staff and [redacted] of the Technical Intelligence Services Branch to bring work in that branch within the weekly reporting system. It was further stated that

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[redacted] who was chief of the graphics shop, agreed to 3.5(c) enter all support projects assigned to his component on the weekly reporting form. Other types of projects in TISB which were no doubt included in the discussion were requests for photogrammetric services, chiefly in support of the PIs, and the varied services of the reorganized Special Projects Branch, now designated in administrative circles by the new name, Operations Support Branch. 3.5(c)

The December 1957 Support Branch monthly report also noted that [redacted] had conferred with [redacted] 3.5(c) chief of the unofficially constituted Central Branch, concerning the possibility of bringing the monitoring and reporting of projects in that branch within the weekly reporting system. [redacted] responded favorably 3.5(c) and agreed to place all Central Branch projects in the HTA weekly reporting system.

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During the same month, [redacted] met with 3.5(c) [redacted] of the Military-Scientific Branch 3.5(c) concerning the weekly reporting on the status of projects assigned to that branch. As a result of the meeting, it was agreed that the Military-Scientific Branch would immediately begin using the new weekly reporting form. In an apparent *quid pro quo*, [redacted] requested and received 3.5(c) tacit agreement to keep all projects assigned to his branch, though many had been totally inactive during the hectic months of JAM SESSION. 351/ Aside from projects being done in response to the GMIC and JAEIC requirements, MSB monthly reports for October and November 1957 showed only four other projects completed by that branch.

The success achieved by the Support Staff in bringing virtually all project work within the weekly reporting system was an accomplishment of some technical significance. It could hardly be regarded, however, as an enduring solution to attempts by the Support Staff to centralize control of HTA production. Supervisors in the branches were unanimous in their desire to manage their own people and production without encroachment by the Support Staff on their responsibilities as line officers. There is no evidence that higher authority disagreed with this eminently sound position. The Support Staff was getting cooperation in differing degrees and information of varying precision, but could only monitor production. At best, the weekly report provided information for responding to queries by requesters, or to suggest the need for corrective action in cases when the record revealed obvious production problems.

JAM SESSION also broadened the use of COMINT by photo interpreters. Though all persons working in Project HTAUTOMAT were cleared for Special Intelligence, COMINT information was not permitted in the PI and other work areas. All such documents were held and used in a small vault within a vault in that part of the Steuart Building occupied by the Information Section of the OCR Statistical Branch. Here persons, chiefly PIs, having a need for such information would squeeze into the room, sign the log sheet, and read the pertinent document or documents under the watchful eye of a bleached blonde named [redacted] 3.5(c)

Not only was access to COMINT materials awkward to the point of almost discouraging their use save in the most urgent circumstances, but no regular dissemination of such documents was made to HTA prior to JAM SESSION. Only those specifically requested were received for use in the Steuart Building. Though inconvenient, this mode of operation had not seriously compromised the effectiveness of operations because of the limited need for such information. With the acquisition of photographic coverage of Russian scientific and technical targets, on which COMINT constituted some of the most important collateral information, the situation changed.

Exploitation of GMIC targets provided the extra measure of urgency needed to overcome the inevitable resistance to change. The critically important role of COMINT in providing information on installation construction and missile firings at the test centers dramatized for all concerned the need for access to such materials in the exploitation of photography covering those targets. Impetus to change was added by the requirement of the Special Engineering Analysis Group for use of all available COMINT, ELINT, and RADINT in the preparation of their all-source report. Obviously these consultants had to use COMINT materials in their working area, the Minicard Room. This effectively breached the earlier rule that required PIs to consult such materials in the small vault in the OCR Statistical Branch.

The result of these inexorable forces was action. The monthly report of the Support Staff for November 1957 noted that [redacted] of that staff, [redacted] of the HTA security office, and [redacted] of OCI had met to "discuss the transfer of special materials" to HTA. 352/ This statement, which displayed the effects of sanitization for inclusion in a document classified SECRET, was illuminated by the OCR Statistical Branch

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status report for October.* For the first time in that series of monthly reports, mention was made of the receipt of COMINT documents. One hundred and twenty-eight such documents were reported to have been received on regular dissemination and 248 more in response to six requirements levied by HTA on the Special Register. 353/

These developments during the fall of 1957 also demonstrated to both HTA and NSA that the limited contacts that had been developing since the inauguration of U-2 operational flights should be greatly expanded. It was obvious that the intelligence to be expected from the joint use of COMINT and TALENT information was far greater than the sum of the component parts. The December 1957 status report of the OCR Statistical Branch noted that plans were being made for closer working relationships between HTA and NSA. It referred to forthcoming briefings at both HTA and NSA to familiarize certain of their analysts with the capabilities and potential contributions of their counterparts. After that, weekly or other periodic meetings were planned to

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* Date of issue of the October 1957 Statistical Branch monthly report was 19 November. It was customary to include information, aside from the monthly statistics, down to date of issue. Hence, the reflection of events of early November in the report for October.

facilitate the exchange of information on a continuing basis. 354/ All-source exploitation was entering a new phase at HTA.

The extraordinary accomplishments during the fall of 1957, the favorable impressions made on people in higher authority, and the thousands of hours of over-time spent on JAM SESSION work by HTA PIs and support personnel were setting the stage for reconsideration of the job freeze announced the previous August, as it applied to the ORR and OCR components in Project HTAUTOMAT. By the time JAM SESSION was well under way, senior ORR and OCR managers in HTA lost no time in making known, in circles where it would do the most good, that more, not fewer, positions were needed on the T/O.

The first attempt to avoid the August 1957 cut in positions was forwarded to Amory on 23 October 1957 over the signature of Paul Borel. It recommended that the Statistical Branch be reconstituted as a division of OCR and that its strength be raised to 62 positions. This proposal would, in effect, restore the eight positions cut in August and add nine more. It further established an order of priority for the nine new positions. One additional courier would be added, and the number of personnel engaged in the reproduction, dissemination control, classification, and research activities would each be augmented by one person. Second priority would be given to additional personnel in reproduction, dissemination control, and reproduction. The photo lab would have third priority.

In justifying this proposal, Borel pointed out the wide-ranging responsibilities acquired by the Statistical Branch, the advisability of freeing the chief, Special Register, from supervision of a branch physically removed from the Special Register and having rather different functions, and his desire to exercise more direct supervision of the OCR operation in the Steuart Building from his own office. As far as the additional positions were concerned, Borel observed that the program developed in response to the realities of the HTA operation were of far greater dimensions than those expected, and he cited numerous statistics showing the enormous volume of materials handled by the Statistical Branch. 355/

Borel's memo was an extensive rewriting of a draft memo prepared in [redacted] office for Borel's signa- 3.5(c)
ture. 356/ The [redacted] draft, dated 26 September, was 3.5(c)
tangible proof of the alertness and aggressiveness with which Statistical Branch supervisors set and pursued their goals. The proposed augmentation of staff by 17%,

and elevation of the branch to division status, confirmed the fact that they were in no danger of being regarded as timid. It remained to be seen what reaction this expansionary proposal would evoke from higher authority.

The next move in HTA to circumvent the August T/O cut was made by D/GP. In a memo dated 28 October 1957 and directed to DDI Robert Amory, Lundahl recapitulated the August decision that had postulated a reduction of 12 positions in D/GP Table of Organization and the agreement that permitted him to continue with the on-duty staff of 85 persons. He also pointed out that he had made every effort, albeit with a liberal use of overtime, to provide the minimum of services short of jeopardizing Agency responsibilities in the exploitation of U-2 photography. He further called Amory's attention to the deleterious effect on the well-being of HTA employees as well as the considered opinion of his supervisors that overtime work was already beginning to result in decreased productivity.

In consideration of all these unfavorable circumstances, Lundahl made a strong plea for restoration of the 12 positions plus the addition of six more. With the initial 92 positions plus the two military slots in the January 1956 T/O, this would bring to an even 100 the number of positions in D/GP. Lundahl pointed out that restoration of the 12 positions would reestablish the earlier organizational balance, whereas the six new positions would provide for augmentation of the photogrammetric and graphics capability in response to new requirements.

Lundahl closed with the observation that HTA was, in effect, passing from the pilot stage to a condition of expanded responsibilities contingent on the success of the initial effort. With a fine sense of propriety Lundahl continued, "This is not to say that expansion is inevitable, rather that it might be logically expected if the intelligence effort behind it were successful. I feel certain that I can conservatively assert that this effort has been much more than merely 'successful'."

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A note in [redacted] handwriting was appended to a draft of this memo. It was directed to Chief GRA/ORR Brammell, for consideration by him and AD/ORR Guthe. [redacted] noted that the attached memo was related to the OCR memo and claimed that the HTA memo had been drafted at the behest of the DDI. [redacted] observed that the memo had not yet been forwarded to the DDI and that it would be rewritten for submission through the chief, GRA, and the

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AD/ORR, if they so desired. The document was returned to [redacted] with the notation that it had been shown to Guthe, who said to submit it as drafted. With this perfunctory exchange of civilities, the ties that bound the ORR element in HTA to its parent organization were eased another notch. 357/ 3.5(c)

The handling of this situation by Lundahl and his associates in D/GP merits examination. If it were only possible to learn well what history teaches instead of having to relive it, the astute manner in which this situation was handled had the potential for saving much future travail.

First of all, D/GP managers held their fire; they didn't force the issue prematurely. Though the record doesn't reveal whether or not they were prescient about events as they developed during the fall, they waited to build their case. By the time JAM SESSION was well under way and the whole Intelligence Community was agape over the information already available as well as the promise of extraordinary accomplishments to come, it would be hard to imagine circumstances more conducive to sympathetic consideration of the D/GP plea.

Secondly, it is apparent from [redacted] memo to Brammell 3.5(c)
and Guthe that Lundahl and his people had the DDI on their

side. Though it is difficult to discern the extent to which [redacted] phrasing was intended to intimidate as well 3.5(c) as inform Brammell and Guthe, it seems certain beyond reasonable doubt that the subject had been discussed with the DDI on one or more occasions and that his response was encouraging.

Thirdly, the size of the bite was small. There was no doubt by October that there was far more work than could be handled by the on-board strength, and the request for six additional positions was very modest. Moreover, the purposes for which they were needed left no room for suspicion. The heavy requirements for mensuration on Russian scientific and technical targets and the impressive array of mensural detail being extracted were already known. The need for additional graphics personnel was also an obvious and highly visible need. With so many intelligence analysts and consultants lacking training in the exploitation of overhead photography and relying on the extremely helpful line drawings and perspective sketches being turned out by the small cadre of illustrators, the request for just a few more slots for that activity was a very plausible one. Indeed, the proposal gave evidence of careful planning and suggested prudent management.

Finally, the allusion to the success of Project HTAUTOMAT and the disclaimer that expansion was inevitable concluded in a persuasive manner. HTA managers had analyzed the situation carefully and presented a proposal that was sound in substance and couched in tactful language. They were certainly entitled to look forward to the outcome with optimism.

VII. Winds of Change

With the conclusion of the highly successful work on GMIC targets in early December 1957, emphasis on JAM SESSION shifted smoothly back to JAEIC targets. Before Christmas, consultant meetings on two installations of interest to JAEIC were held in the Steuart Building. 358/ No more were held for another two months.

To managers and supervisors, this hiatus brought no easing of the torrid pace set during the fall. To them, this was an opportune time to consider changes in the allocation of space in the Steuart Building, to examine critically the success of the organizational changes made the previous summer, and to develop a proposal for a basic reorganization in response to lessons learned during the fall.

Consultant meetings on JAEIC targets in December involved the Semipalantinsk Nuclear Weapons Proving Ground and the Novosibirsk AE Feed Materials Complex. First of these was the one dealing with the installation near Semipalantinsk.

A. <u>The Semipalantinsk Nuclear Weapons Proving Ground</u>

Like other JAM SESSION targets, the Semipalantinsk Nuclear Weapons Proving Ground was the object of joint PI interpretation efforts by CIA and the military services. Army and Navy photo interpreters joined with [redacted] of CIA, who was the team chairman, in exploiting the photography. As in the case of the other JAM SESSION targets, the Air Force chose to produce its own PI report. 3.5(c)

Inasmuch as there were initially no real PI experts in HTA on exotic installations such as those covered on SOFT TOUCH missions, it made little difference which PIs were assigned to the interpretation of photography covering a given target. Thus, [redacted] was the one called in on a weekend after the receipt of photography covering the Nuclear Weapons Proving Ground late the previous summer. At that time he was simply assigned the task of ordering the photography and making a preliminary examination so as to be able to brief OSI analysts on such generalities as the size of the installation, the number of ground zeros (GZs), and the estimated dimensions of the craters and blast scars. It was later, when JAM SESSION was initiated, that [redacted] was named chairman of the photo interpretation team. [redacted] 3.5(c) 3.5(c) [redacted] of the Army and [redacted] of the Navy were designated the service PIs. Arbitrarily, [redacted] worked on the low-numbered GZs and [redacted] on those with high numbers. [redacted] was assigned the support facilities. 3.5(c)

The consultant's panel for the Semipalantinsk Nuclear Weapons Proving Ground met at the Steuart Building on 2 and 3 December 1957. 359/ The installation on which they were working was an impressive one. Situated approximately 100 miles west of the Central Asian city of Semipalantinsk, it had been photographed on both 21 and 22 August 1957. The best coverage was on the latter date, when good quality vertical photography of the shot area was obtained.*

The proving ground and nearby related facilities consisted of a roughly circular, fenced shot area about nine miles in diameter, and adjacent possible target test area, several instrumentation sites, what appeared to be an auxiliary test range, housing and support facilities, and two inactive airstrips. Semipalantinsk Airfield, more than 100 miles east of the proving ground,

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* The source of the following information on the Nuclear Weapons Proving Ground is the Joint Photographic Intelligence Report published in early 1958. 360/

and Dolon Airfield, a new facility under construction approximately 50 miles east-northeast of the proving ground, were also of special interest because they were believed to be takeoff points for air drops in the proving ground.

The heart of the installation was the fenced shot area in which photo interpreters identified 20 different ground zeros, one of which was just outside the fence (Figure 76). It appeared to photo interpreters that several of these had been used more than once. Several of the related facilities, including control points, instrumentation sites, and an apparent explosives storage area were also situated within the shot area, though some were at a safe distance from the center of shot activity. The array of structures and objects around some ground zeros and the general lack thereof in others suggested that two purposes were being served, one military effects testing and the other diagnostic testing.

Four of the GZs -- I, III, V, and VI -- showed little or no evidence of having been involved in previous nuclear tests. Moreover, they displayed no firm indications of preparations for a future nuclear shot.

The target at GZ I consisted of a circle 300 meters in diameter enclosing a square 148 meters on a side (Figure 77). Opposite sides of the square were connected by the arms of a cross. There were three unidentified upright objects at the center of the cross. In the immediate vicinity of this GZ were several small craters, on the order of three to six meters in diameter. There was neither instrumentation nor evidence of any preparation for military effects testing. JAM SESSION participants concluded that this GZ was probably for practice dropping of dummy weapons.

At GZ III, the target consisted of a 185-meter square enclosing a cross (Figure 77). Two upright objects were situated at the center of the cross. A perimeter road had been constructed about half way around the target area, and two roads connected the ground zero with the perimeter road. Though there were several trenches and bunkers in the area, they seemed oriented to GZ II. No conclusions were drawn with respect to the specific purpose or use of this GZ.

At both GZ V and VI, very prominent circular targets 755 meters in diameter enclosed a cross (Figure 78). The chief difference between these two was a perimeter road that had been constructed around GZ VI.

As in the case of GZ III, no conclusions were reached concerning the intended use of these ground zeros.

Four other GZs -- X, XII, XIV, and XV -- were being prepared for future tests at the time of the photography. Preparations at GZs X and XIV were well advanced; indeed, it was believed that a test (JOE 36), which took place on 22 August 1957 after the photo coverage, was conducted at GZ XIV. At GZ XV, a crater with a diameter of 198 meters indicated that this site had been used previously.

Preparations at GZ XV involved utilization of the earlier ground zero. At that point, a small foundation had been built, possibly as a base for a tower. Many bunkers of various sizes and configurations, some of them partly underground, were situated at distances of 95 to 1360 meters from the ground zero (Figure 79). Other structures and items to be used in the future test included three unidentified swept-wing aircraft, located 875, 1265, and 1550 meters from the ground zero, and two firing trenches, with parapets facing the GZ, located at 760 and 1045 meters from the GZ. The type and arrangement of structures and objects indicated that the purpose was a military effects test. Two irregularly octagonal natural-surface roads encircled the ground zero, with radial roads reaching from the circumferential roads to the ground zero.

The target at GZ XIV consisted of a square, approximately 300 meters on a side, within which there was inscribed a white cross whose arms connected opposite sides of the square (Figure 80). Three objects, probably small towers arranged in a straight line, were situated approximately at the center of the cross. The customary irregularly octagonal natural-surface road surrounded the test area, with radial roads connecting the ground zero with the perimeter road.

Though there were several concrete bunkers at varying distances from the ground zero, these test preparations featured a preponderance of vehicles and aircraft. Photo interpreters counted no fewer than 23 vehicles and seven aircraft within the test area (Figure 81). There were also several trenches with parapets facing the ground zero. JAM SESSION workers concluded that the impending test would be one including the blast effects on military vehicles, aircraft, and various ground surfaces.

At GZ X, a tower 100 meters high was already in place (Figure 82); obviously the future shot being planned for this site would be a tower test. A natural-surface octagonal perimeter road, with radials to the ground zero, surrounded most of the test facilities. At this ground zero, however, several bunkers were situated up to nearly 1,000 meters beyond the perimeter road.

The array of objects and structures in place or under construction at this GZ was very diverse (Figure 83). Obviously this was to be a military effects test. As usual in such tests, there were numerous bunkers of various sizes and configurations. In addition, there were three buildings, apparently with arched roofs and of concrete construction. These buildings were on the order of 20 by 7 meters and 2.5 meters high. Some 25 or 30 other unidentified structures, many small and most under construction, were likewise to be subjected to the test. There were also 20 S-shaped infantry trenches arranged in five groups of four each as well as several series of "construction scars," some of which may also have been trenches. At least 34 vehicle trenches of various sizes and several small vehicle revetments were arranged in groups adjacent to the S-shaped trenches. A few of the trenches appeared to have vehicles in them, suggesting that the date for the test might be drawing close.

The target at GZ XII consisted of a small pad, thought to be of concrete, centered in an equilateral triangle 213 meters on a side (Figure 84). The perimeter and radial roads seemed complete, but the course of the former departed considerably from the customary octagon as a result of detours around terrain obstructions. No other facilities were observable in the area, and no firm conclusions could be drawn by JAM SESSION participants about the purpose of the future shot planned for this GZ.

Four other ground zeros -- GZs VIII, XI, XIII, and XX -- were believed to have been used for diagnostic tests, some for more than one. In each case, limited facilities or a complete absence of indications that there ever were any tests led those working in JAM SESSION to this conclusion.

GZ XX appeared to be among the oldest in the shot area. The circular target, with cross inside, was scarcely visible. Moreover, only part of the perimeter road was still identifiable (Figure 85). The few facilities at this ground zero suffered not only from the presumed effects of the GZ XX test, but also from the effects of other detonations in the vicinity as well as more recent construction for nearby tests. Most man-made structures near GZ XX seemed to JAM SESSION analysts and consultants to be associated with other tests. The two bunkers situated on and within the circular marker were believed, however, related to the test at GZ XX. Both were severely damaged.

Ground Zero VIII was marked by several craters (Figure 84). Three were large, measuring from 25 to 65 meters in diameter; there were at least seven smaller ones. It was believed by JAM SESSION analysts and consultants that at least three subsurface shots had been detonated here, and that two of them might have employed conventional explosives.

Ground Zeros XI and XIII were believed the sites of tower shots. There was no cratering at either GZ, but each had a well defined scorched area (Figure 84). Both sites had the usual perimeter and radial roads, and in both cases there was an absence of facilities such as those used for military effects.

All eight remaining ground zeros were the sites of one or more previous tests. JAM SESSION workers believed all had been used for military effects testing.

Two of the eight, GZs XVIII and XIX, were characterized by large, overlapping blast scars. The one associated with GZ XVIII was 1,150 meters in diameter and the one with GZ XIX 1,000 meters in diameter. To JAM SESSION participants, both seemed among the older nuclear events at the proving ground, and both were clearly the result of above-surface detonations. Details on these events and the purposes for which they were conducted were not, however, obvious from the photography. It was believed that any evidence of the facilities that presumably existed in and around these ground zeros had been obliterated by more recent detonations at other GZs in the vicinity.

At the six others -- GZs II, IV, VII, IX, XVI, and XVII -- which were also believed by JAM SESSION analysts and consultants to have been used for military effects testing, the evidence was more tangible. All had evidence of some facilities typically associated with such tests, and at some the layouts were very elaborate indeed. Two had large blast scars but no craters; the other four had craters.

Targets at Ground Zeros IV and XVII consisted of a cross within a square, though the target at GZ XVII was lacking in boldness and raised some question as to whether it was damaged from an earlier test or only in the early stages of construction (Figures 77 and 80). At both GZs, there was a prominent crater wide of the center of the target. At GZ IV, the apparent drop hit one side of the marker; at GZ XVII, the crater was well beyond any portion of the target. Both GZs had the usual perimeter road, but well defined radials were evident only at GZ XVII.

Most facilities still evident at GZ IV consisted of trenches, revetments, and bulldozed areas, perhaps for the placement of equipment (Figure 86). No equipment was evident in the photography, however, at any of the prepared positions. Except in the blast area, which was defined by a scar 810 meters in diameter, the various types of prepared positions appeared undamaged.

At GZ XVII, the array of structures and positions consisted basically of bunkers, trenches, and what appeared to be buildings (Figure 87). JAM SESSION participants expressed serious doubt, however, that the buildings, whose former existence was indicated by the presence of their foundations, were demolished by the detonation at GZ XVII. The ground in that vicinity was badly scorched, and it appeared that the gutting of the buildings was the result of an earlier test whose center was not the same as that for GZ XVII. Reconstruction of the past history was exceedingly difficult, however, because of the effects of several earlier detonations in the immediate vicinity.

Two more GZs, IX and XVI, were marked by prominent craters, but at neither one was there a target marker (Figures 80 and 84). Even so, the detonation at GZ XVI was believed by JAM SESSION analysts and consultants to have been an air drop. Ground Zero IX, however, was regarded as the site of a surface or subsurface detonation. At GZ IX, there was a typical octagonal perimeter road with radials (Figure 88). Within the scorched area, which had a diameter of 1,100 meters, was an inner circumferential road. At GZ XVI, there was an encircling road in the position of the inner circumferential road at other sites; there was no counterpart of the perimeter road typical of most other GZs at this site (Figure 89).

Test facilities at GZ IX consisted mainly of bunkers and vehicle trenches. Those within the blast scar were destroyed or heavily damaged. Some of the others were being refurbished for use with the upcoming shot at GZ X.

Adjacent to GZ XVI were several small craters, probably the result of preliminary test drops. All identifiable test facilities associated with this ground zero were bunkers of various sizes.

Ground Zeros II and VII were characterized by blast scars larger than those at any other of the ground zeros (Figures 77 and 78). The diameter of the blast scar at GZ II was 1,770 meters and the one at GZ VII an impressive 2,650 meters, well over a mile and one-half.

The target at GZ II consisted of those concentric circles enclosing a cross. The outer circle, however, was very faint. JAM SESSION participants speculated that the outer circle may have been used in an earlier test. No target marker was apparent at GZ VII. What was interpreted as an excavation was situated at this ground zero.

Both of these ground zeros featured encircling and radial roads. At GZ II, however, the perimeter road was neither neatly circular nor typically octagonal; it was somewhat irregular. At GZ VII, in addition to the roughly octagonal perimeter road, there was an intermediate circumferential road of irregular outline plus an incomplete inner road. Radials at GZ VII, though present, were augmented by an unusual number of somewhat randomly oriented roads or tracks.

At both of these ground zeros the array of test structures and facilities was large and varied (Figures 90 and 91). Both had numerous bunkers of various sizes and shapes, many of which were earth covered. Both also had numerous other structures, some of which were earth covered or protected by revetments. Military trenches and revetments were also common to both target areas.

At GZ II, facilities not similar to those at GZ VII included a gridiron of roads, with the bounding roads defining a rectangle 785 by 770 meters. Internal parallel roads in the grid were approximately 45 meters apart. An excavation with an earth ridge, thought by JAM SESSION participants possibly to cover a buried pipe, appeared on both sides of GZ II. Along the trace of this feature, between a point 380 meters from the GZ on one side and 470 meters on the opposite side, the earth ridge seemed to disappear leaving only a scar. No objects or structures were located along the earth scar where it passed through the ground zero. The JAM SESSION analysts and consultants speculated that any such structures or objects that might have been positioned there were destroyed in the test.

At GZ VII, unusual facilities included a series of 14 towers 11 meters high arranged along two radial roads. On top of eight of the towers was a mast 7 meters high with a crossarm. Three towers along one of the roads were lying on their sides (Figure 92). Also in the GZ VII target area were three pairs of apparent bridge approaches, two of them with abutments and one or more piers. No bridges were in place at the time of photography. In addition, facilities at GZ VII included what

JAM SESSION workers interpreted as two groups of destroyed buildings.

Test facilities at both GZs showed abundant evidence of damage from the detonations. At GZ II, revetments situated at 730 and 975 meters from the ground zero were damaged by the blast, but those at and beyond 1,435 meters from the GZ showed no evidence of damage. Military trenches at 300 meters from the GZ showed damage, but those at and beyond 530 meters from the center of detonation displayed no observable damage. At 240 meters from GZ II, there was an irregularly shaped structure thought by JAM SESSION PIs possibly to be a badly damaged bunker. Five other bunkers as close or closer than this to the ground zero showed no visible damage, however. One of the latter was a mere 75 meters from the GZ.

At GZ VII, the three towers lying on their sides were situated 490, 585, and 775 meters from the ground zero. Whether these were knocked down by the detonation or lying on their sides for some other reason, was not clear to JAM SESSION analysts and consultants. There were three other similar towers at comparable distances from GZ VII along another of the radial roads, yet they were not lying on their sides.

The evidence in the cases of the three bridge approaches was less equivocal. The presence of abutments and one or more piers at two of the three was highly suggestive of bridging. The length of the presumed bridges would have been 23 meters, 30 meters, and 56 meters. These structures were situated between 470 and 945 meters from ground zero. It was confidently believed by JAM SESSION participants that bridges had existed and that they had been destroyed by the detonation.

Each of the two groups of destroyed buildings was situated between approximately 2,400 and 2,700 meters from the GZ. In one group, the remains of the buildings appeared as though a fire had raged through them; in the other there was no such indication of fire.

The main entrance to the fenced shot area was along the northeast perimeter at the point nearest to the housing and support facilities (Figure 76). There were three other entrances spaced at intervals around the perimeter fence.

At three locations inside the shot area were facilities believed by JAM SESSION participants for use as control points. Arbitrarily designated Control Points A, B, and D, each of these facilities had one to three bunkers. What appeared to be cable scars extended from each of these points to several of the GZs nearby. Each of the GZs, except GZ I, was thus connected to one of these control points, but no GZ was connected to more than one.

The main control point, at the entrance nearest the housing and support facilities, and Control Point C, at the west entrance to the shot area, presented a somewhat different appearance. Though Control Point C had two small structures which appeared to be bunkers and a walled area within which was a small tower, it also had four conventional buildings. Aside from controlling access through the adjacent entrance, JAM SESSION analysts and consultants believed that this site provided additional instrumentation facilities. The main control point, which obviously controlled physical access through the main gate, had three large buildings.

In or near the fenced shot area, there were also seven sites or facilities believed by JAM SESSION analysts and consultants to have been devoted exclusively to instrumentation. Two of them, the unidentified facility and Instrumentation Point D (one facility) and Instrumentation Point F were situated outside the perimeter fence. The other five were within the shot ground. Facilities and structures at these sites varied from clearings with road turnoffs, believed used for mobile instrumentation, to much more elaborate ones, including blockhouses or bunkers, conventional buildings, towers, and, in one case, an instrumentation platform.

Several other support areas or facilities were situated in or near the fenced shot area. Included were two natural-surface airstrips that seemed in disuse, and an equipment graveyard. Just outside the fenced shot area were what appeared to be an auxiliary test range and an apparent target test area. JAM SESSION participants speculated that the auxiliary test range was probably used for practice drops or air-to-surface exercises. They thought that the target test area, which displayed numerous earth scars in the vicinity of many of the 49 square or rectangular markers, was used for practice drops prior to actual nuclear weapons testing.

Just a few miles northeast of the fenced shot area were housing and numerous other support facilities (Figures 76 and 93). The latter included aircraft and munitions storage areas, a probable vehicle maintenance area, and a tent camp in addition to a large housing and administration area. According to rough and ready calculations, 3,540 square meters of floor space were available for barracks and administrative purposes. No record is available to reveal the speculations, if any, concerning the functions of the two unidentified areas.

Interpretation of the photography covering Dolan Airfield was hampered by the fact that only tracker photography was available. The airfield was new and appeared still to be under construction. Photo interpreters were able to say that the runway, probably of concrete construction, was about 4,000 meters long and that the eastern 2,700 meters appeared to be twice as wide as the rest.

Semipalantinsk Airfield was covered by photography from the framing camera. This large scale imagery revealed clearly a special weapons loading area as well as a 3,000 meter runway. The weapons loading area was secured by both wire and solid fences (Figure 94). Within the fenced area was a concrete apron on which two Badgers were parked at the time of photography. Also within the main fences were a hangar, a drive-through building, and a weapons loading pit. Immediately adjacent to the main fenced area was a bunker believed by JAM SESSION analysts to be used for nuclear weapons storage. It was enclosed by a wire fence. Nearby was a separately fenced drive-in building and another small building, which was also fenced. A rail spur, on which

16 rail cars were parked at the time of photography, served a warehouse and ended near the outer fence around the drive-in building.

This was the story of the large Soviet nuclear weapons test ground, the counterpart of the US Nevada test site, as it appeared, with its supporting facilities, to the Intelligence Community during the exciting days in the late summer and fall of 1957. Indeed, it was not merely the aerial view of the Soviet test site that was unfamiliar to analysts and consultants working with HTA photo interpreters on the analysis of the Semipalantinsk installation. It was apparent to PIs and their supervisors that many of the characteristics of the Nevada test site, as it would appear from the air, were as unfamiliar to intelligence analysts and consultants as they were to the PIs. This significantly detracted from the utility of the Nevada test site as an analogue in studying the photography of the Soviet installation. HTA photo interpreters noted this lacuna and resolved to fill it as the first opportunity.

B. <u>The Novosibirsk AE Feed Materials Complex</u>

The other nuclear installation on which consultant meetings were held in the Steuart Building during December 1957 was the Novosibirsk AE Feed Materials Complex.

The consultants, [redacted] 3.5(c)
met with PIs and intelligence analysts at HTA on Friday 13 December and Saturday 14 December. 361/

Excellent vertical photography taken over the central Asian city of Novosibirsk on 21 August 1957 revealed a heavily secured plant with the general physical characteristics of an ore processing and metals fabrication installation.* The existence of a uranium metal plant in Novosibirsk was known from collateral. Indeed, this same plant and the adjoining steam and power plant had been photographed from the Trans-Siberian Railroad in 1950 and 1953, thus providing valuable data on the initial construction and magnitude of earlier operations. Incidentally, the uranium plant was not a prime target; it was a "bonus" deriving from coverage of the Novosibirsk aircraft plant, which was the determining factor in routing the mission over the city.

Announcement of coverage of the plant generated wide Community interest followed by requirements, and the resulting project was included with projects for JAEIC in JAM SESSION. The photo interpretation team, which included

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* Except as indicated otherwise, photo-derived information presented herein is based on JR-5-58, *Novosibirsk AE Feed Materials Complex*, published in July 1958. 362/

CIA, Army, and Navy PIs, was chaired by the Agency member, [redacted] Before work progressed very far in 3.5(c) preparations for meetings with the consultants, it was apparent that the PIs and the intelligence analysts would need more information than they possessed about the operation of such a plant.

To provide this background, a trip was arranged to the Feed Materials Production Center at Fernald, Ohio, just outside of Cincinnati. On the morning of 8 November 1957, [redacted] joined a group of 21 OSI and ORR intelligence 3.5(c) officers for a conducted tour of the plant. In his trip report, [redacted] said the plant tour was one of the best in 3.5(c) which he had participated. Repeating the theme of HTA PIs and supervisors on earlier on-site trips, [redacted] closed 3.5(c) with a strong recommendation that orientation trips be arranged for other PIs working in fields such as atomic energy, guided missiles, and electronics. 363/ [redacted] 3.5(c) trip to the Fernald, Ohio, plant was very valuable in apprising him of the processes and flow of materials in the building. It was not so helpful, however, with respect to the physical appearance of the plant from the air because, in this respect, the Fernald and Novosibirsk plants displayed marked differences.

The August 1957 photography over Novosibirsk showed that the feed materials complex with which the photo interpreters were concerned consisted of three components, a uranium metal plant (Figures 95 and 96), a steam and power plant being expanded to nearly four times its previous capacity (Figure 97), and a large ore processing plant, thought to be for the processing of uranium ore. Three miles from the main plant area there was a fenced waste pond to which material from the uranium plant was apparently carried by truck.

Compared with the Fernald, Ohio, plant, the Novosibirsk uranium plant was far larger. At the same time, the waste pond seemed relatively small, leading the consultants and intelligence analysts to conclude that the ore being processed was fairly concentrated. They estimated the capacity of the Novosibirsk uranium metal plant at 15,000 to 20,000 tons of uranium metal a year in the form of slugs for use in nuclear reactors.

In a memo to the chairman, JAEIC, following the meetings, [redacted], chairman of the TALENT working group, pointed out that the estimate of production capacity at the Novosibirsk plant based on the August 1957 photography exceeded by a factor of five the output figures used in the preparation of NIE 11-2-57. Though he conceded that the actual production could be considerably less than plant capacity, he added that such a wide discrepancy suggested the possibility that the estimate of fissionable materials production for the Siberian area in NIE 11-2-57 might be grossly in error. 364/

With this parting shot, consultant meetings, which had been virtually a continuing feature of activity at HTA, ceased for the next two months. Before winter was over, however, there was another round of consultations involving an installation that unexpectedly appeared in the limelight.

C. Vozrozhdeniya Island Biological Warfare Proving Ground

At the time JAM SESSION was established, only projects resulting from JAEIC and GMIC requirements were included in that very special all-source exploitation effort. The photo interpreter who chaired the joint PI effort on the Vozrozhdeniya Island Biological Warfare Proving Ground was [redacted] an employee of CIA. 3.5(c)
[redacted] who was among the six PIs transferred from the 3.5(c)
Special Projects Branch to the Military-Scientific Branch in July 1957, was a capable, aggressive, and experienced photo interpreter. His strong commitment to the proposition that PI and collateral evidence confirmed the suspicion that this installation was, in fact, a BW test center was instrumental in stimulating the interest of

those in the Intelligence Community who were responsible for such matters.

[redacted] advocacy of this position was also a significant factor in the decision of the chief, HTA, belatedly to incorporate the project on the Vozrozhdeniya Island installation into JAM SESSION. Immediately following this action early in February 1958, plans were made to bring the biological warfare working group of the Joint Technical Intelligence Subcommittee of the Joint Chiefs of Staff to the Steuart Building on the 24th and 25th of that month. 365/ In a JAM SESSION-type presentation, they were provided with an 18-page book of graphics and a 68-page text as well as collateral information and briefings on the PI interpretations. Intelligence resulting from these studies was the subject of a special report by the working group to the Scientific Estimates Committee of the Intelligence Advisory Committee on 27 March 1958.* 3.5(c)

For many years prior to the 1957 photo coverage, Vozrozhdeniya Island had been suspected as a Russian test ground for chemical agents developed for use in biological

* The source of this information and subsequent descriptive details and evaluations is the joint photo intelligence report published by HTA in March 1958. 366/

warfare (BW). Following World War II, German sources indicated that information dating back to 1936 associated the island with biological warfare activity. 367/ No hard information was available, however, until the U-2 coverage of 5 August 1957. On that date, the same mission that provided the first coverage of the Tyura Tam Missile Test Center also yielded vertical coverage over the central portion of Vozrozhdeniya. Good coverage of the presumed supply base at Aralsk was achieved on 28 August by the same mission that provided the first definitive coverage of the Tyura Tam installation. No coverage of Vozrozhdeniya Island was achieved on the latter date.*

Situated in the Aral Sea well over 100 miles from any sizable settlement and with vast expanses of virtually empty desert surrounding the landlocked sea, Vozrozhdeniya Island was ideally situated to minimize chances for the inadvertent spread of disease and to inhibit observation

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* In view of the advantage to be gained from use of the best possible photography, it would be interesting to speculate on how better vertical coverage of the island, such as might have been obtained with the A-2 camera used on the 28 August mission, might have affected future controversy about the function of this installation. In this type of facility, many of the components were small and difficult to see and identify on even the best U-2 photography. The fact that the 5 August 1957 mission was flown with the early model of the B camera, which was not yet performing satisfactorily, multiplied the problems of an interpretation task that was, at best, very difficult.

of sensitive operations by unauthorized persons (Figure 98). According to German prisoners of war, by 1936, the island's entire population, consisting of fishermen and political prisoners, had been evacuated and replaced by BW technicians.

The August 1957 photography revealed three major areas of activity on the 55-square-mile island: a laboratory area, an extensive field test area, and an administration area. In addition, facilities located on the north end of little Konstantin Island, three miles south of Vozrozhdeniya Island, were thought to be associated with BW activity on the main island.

A "hot" biological laboratory was situated in the north-central part of Vozrozhdeniya Island, in the vicinity of the former village of Kantyubek and the site of a Czarist prison (Figure 99). Within a walled compound were laboratory buildings, a power plant, an incinerator, and a water tower. Outside the north and south walls were pens for holding both large and small animals. A tramway led northward from the adjacent ends of the two largest buildings in the enclosure to disposal pits 1,400 feet away (Figure 100). A building near the west gate of the walled area had a fenced courtyard with a very light ground tone. JAM SESSION participants believed that the light tone was caused by heavy foot traffic or disinfectants. They identified the building as a change house or decontamination building.

There were seven test sites, six of which were situated in the central or southern part of the island (Figure 99). The seventh (Figure 100), a runway-like pattern whose function was not entirely clear to those working on JAM SESSION, was located north of the [redacted] and the settlement on [redacted] Since the prevailing winds were from the north, all but the latter test site were, thus, located downwind from the two centers of population and main activity.

Five of the six test sites in the central and southern part of the island were similar in general appearance and type of facilities. Each consisted of an apparent command post, a 35-foot tower, small outbuildings, and associated test grids. Included in the test grids were trench systems for tactical tests, vehicle test tracks, and circular grids. According to JAM SESSION participants, delivery systems for BW weapons being used at one or more of these sites included firing from towers, static firing from ground level, and dropping bombs from aircraft.

One unusual test site, not among the five mentioned above but situated in the southern part of the island, consisted of a cruciform structure with four low towers, probably for observation (Figure 101). A nearby barracks-like building with L-shaped entrances at each end, presumably used as air locks or decontamination chambers to keep the interior free of BW agents, may have served as a command post and field laboratory for activities at the cruciform-structure.

The purpose of this structure was not clear but it was thought that the walls could be used to measure the vertical movement of aerosols and that the cross-shape might be a device for simulating the movement of aerosols in city streets. To some JAM SESSION participants, the structure was reminiscent of the wind tunnel at the Dugway Proving Ground in Utah. If such, the construction was incomplete. An open wind tunnel of this type would channel the movement of aerosol clouds and permit observation from above. Another possible use envisaged for the structure was to test effects on the lee side of barriers with a view to gathering data on how troops might gain some protection in the shelter of buildings, walls, and similar obstructions.

The runway testing area consisted of earth scars arranged in a crossed pattern (Figure 102). The two longest legs were 9,000 and 8,000 feet long; their average width was 300 feet. Two shorter legs, one 3,700 by 180 feet and the other 3,000 by 280 feet crossed at the same point of intersection. The earth scars appeared to consist of comparatively newly plowed furrows running lengthwise in parallel strips, with turnaround scars at the ends.

The purpose of the runway testing area was not obvious. Among the more likely hypotheses advanced by JAM SESSION participants were 1) that it might be a crop test area, 2) that it might be a former BW test area now in the process of sanitization, and 3) that it was a simulated US airfield for practice air attacks. Supporting the latter hypothesis was the remarkable similarity in configuration between it and US airfields. If this hypothesis were correct, analysts and consultants pointed out that samplers on the ground would collect and measure the dispersion of aerosols or dust, which, in view of the proximity of habitations, would probably be inert materials. Photo interpreters noted that imaginary lines projected from the ends of the runways passed, in a number of cases, through small buildings located along the coast. It was believed that electronic instrumentation to measure the success of presumed bombing runs could be housed in the buildings.

Since BW testing had apparently been under way on the island for approximately 20 years prior to the 1957 photo coverage, it seemed reasonable to JAM SESSION participants to assume that some old test areas would be abandoned and that attempts would be made to sanitize them. In this event, disinfecting materials, such as lime, might be spread on the ground. This hypothesis was supported by the light tone of the ground in the area of the plowed scars and by the piles of a white substance on the pier at [redacted]

The administration area, which, to JAM SESSION participants, seemed obviously run by the Soviet military, was situated on [redacted] In addition to the usual barracks and housing, there was a motor pool, storage facilities, fenced areas believed used for decontaminating personnel and equipment, and a power plant. Also included among facilities in this area were stables, pens, and corrals for raising "clean" livestock for the presumed BW tests and, possibly, for local consumption. Port facilities for vessels plying the sea were likewise situated in this area.

Though PIs identified several towers on the island in addition to those at the test sites, they were unable to find any antenna arrays or parabolic reflectors that might have revealed the existence of VHF or UHF communications facilities. They were likewise unable to identify micrometeorological stations, though suspect stations suggested by telltale tracks were found on some topographic high spots around the periphery of the island.

Assuming the validity of the BW testing function imputed to the island installation, JAM SESSION participants found two puzzling omissions in the inventory of facilities. Unlike the search for electronics sites or micrometeorological stations, these were, moreover, items that should have been easily identifiable on B camera photography having less than the desired resolution. One of the missing facilities was an airfield, unless PIs were incorrect in their interpretation of the runway testing area and it was, in fact, a natural surface airfield. The other was a lack of tanks for storing petroleum products. It was apparent from the photography that the island had a system of roads, and at least 28 vehicles were present at the time of the photo coverage. PIs pointed out, however, that there were two protected bays suitable for landing seaplanes and that helicopters could be used for landings on the island instead of conventional aircraft. The only plausible explanation for lack of POL storage was the possible use of tanks indistinguishable from other storage facilities.

The facility at the north end of neaby Konstantin Island included 20 buildings grouped irregularly around a natural surface runway 2,000 feet long (Figure 104). The irregular grouping of the buildings suggested dwellings rather than a military post. Three towers were located near the beach on the north tip of the island; two of them resembled those on the cruciform structure on Vozrozhdeniya Island. The third was similar to towers at the field test sites on the larger island. A fence extending from shore to shore secured this facility from the rest of the island. There also appeared to be a ring of guard posts spaced at 500-foot intervals around the facility at the northern end of the island.

Though the purpose of the Konstantin Island facility was at best uncertain, [redacted] and some others inclined strongly to the hypothesis, based on a combination of collateral and photographic evidence, that it was used for housing human volunteers or prisoners to be used as subjects in BW tests. As might be expected, the mere mention of such an opinion had repercussions throughout the Intelligence Community. When Lundahl mentioned this hypothesis in a briefing for OSI representatives in 3.5(c)

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3.5(c)

December 1957, it met strong objection from [redacted] 3.5(c)
who cautioned against mention of such a possibility without conclusive evidence. 368/

What JAM SESSION participants believed was the supply base for operations on Vozrozhdeniya Island was located at Aralsk, a port city nearly 150 miles to the northeast (Figure 105). Situated on the east side of Aralsk behind a high wall, this supply base was similar in size, number and spacing of buildings, and in many finer details to the administration area [redacted] North of the main part of the supply base, and across a rail spur, were eight cylindrical storage tanks and seven storage bunkers. The latter were similar to others [redacted]

As a result of the all-source exploitation effort, [redacted] and his fellow PIs were convinced that on Vozrozh- 3.5(c)c)
deniya Island the Soviet Union had a BW proving ground of "large proportions." They were likewise of the opinion that the testing of BW agents had been conducted on the island for many years. These were conclusions that some in the Intelligence Community were reluctant to accept. Indeed, in later years the nature of the activity on the island, which displayed puzzling evolutionary changes, became the object of prolonged controversy and much uncertainty.

D. Not by JAM SESSION Alone

Though JAM SESSION dominated all other activities in HTAUTOMAT during the fall of 1957, by early winter it began to wind down. Even so, HTA employees still charged much time to JAM SESSION as work and consultations continued on the remaining installations. Moreover, on those for which consultations were already concluded, HTA was still committed to publish photo intelligence reports. Photo interpreters and their supervisors were well aware that the extension of this effort under the guise of JAM SESSION would provide some insulation from bureaucratic red tape as well as priority support in competition with other less glamorous production work. Thus, JAM SESSION continued through the winter months on a rather broad front.

Though the flow of new discoveries and fresh ideas on JAM SESSION installations was diminishing, Lundahl was still engaged in a heavy schedule of briefing. In spite of the many high-level officials, domestic and foreign, who had been treated to the joint delights of JAM SESSION revelations from U-2 photography and Lundahl's stimulating presentations, there were still others sufficiently well placed to request and get briefings once the word got around. And it did. Among the briefings given by Lundahl during that winter, three deserve special mention.

As a shower of accolades fell on Lundahl following his performance [redacted] he slipped smoothly back into 3.3(b)(1) 3.3(b)(6)
the round of briefings on the Washington circuit. Late in the afternoon of 16 December, he was at Headquarters, in the DCI's briefing room, arranging briefing boards in conspicuous positions against the walls and on the tables. The occasion was the visit to Headquarters of the Vice President of the United States, Richard Nixon, and his good personal friend, William Rogers, the Attorney General.

Soon, the door from the DCI's office opened. Allen Dulles brought the Vice President and Rogers into the room and introduced them to Lundahl. Without missing a cue, Lundahl led them around the room, among the photographic exhibits, giving the technical characteristics of the system and describing and explaining the factual information imaged on the photography. According to Lundahl, the Vice President displayed high interest in what he was shown and asked Dulles why the United States was not getting more such information. As Lundahl recalls, the DCI responded, "Now, Dick, that's why we've got you here." To Lundahl, the purpose of the presentation seemed crystal clear. 369/

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Another briefing, on 23 December, was notable from the point of view of human interest. On that date, Lundahl briefed Kelly Johnson, designer of the U-2. Though Johnson had previously seen random samples of U-2 photography, particularly during the early days of testing when the aircraft was flown from its base in the Nevada desert, this was his first formal briefing on U-2 photography by Lundahl. At this time, with the aid of selected photography from SOFT TOUCH missions, Lundahl brought Johnson up to date on recent accomplishments of the collection system in whose creation the latter had played a key role. 370/

Then, as winter was drawing to a close, on Saturday, 8 March 1958, Lundahl briefed Robert Cutler of the White House Staff, along with [redacted] 3.5(c) 3.5(c) The response to this presentation was relayed in a letter from Cutler to Allen Dulles on the same day. In this letter, which was far from perfunctory, Cutler waxed lyrical about what he characterized as ". . . these great accomplishments which are being carried on under your auspices." Cutler alluded to the briefer, whose name he thought best not to mention, as "the gifted individual" and pronounced him "most extraordinarily qualified." 371/ The Lundahl charisma continued to amplify the visual impact of the stunning photography.

During the winter of 1957 and 1958, while JAM SESSION and related matters were still engaging the efforts of many within HTA and commanding the attention of those outside the Steuart Building, there were many others in the organization engaged in less glamorous tasks. Among the latter were PIs in the Geographic Branch, who were witnessing a progressive widening of the gap between them and their counterparts in the Military-Scientific Branch in terms of type of work as well as in career opportunities and prospects.

By December 1957 [redacted] chief of the Geographic Branch, reported that a continuing lack of specific requirements from Agency components had led the branch to initiate work on urban studies of Omsk, Novosibirsk, and Stalinsk, USSR. He further justified such a course of action by pointing out that the expected identification and reporting of items of intelligence interest in these cities would not only fulfill existing needs in the Intelligence Community but would probably generate further specific requirements as well. 372/ It was apparent that the quick, simple "documentation" of facts from the photography of conventional industrial-type installations was not sufficient to keep upwards of 10 photo interpreters continuously engaged in answering externally generated requirements based on spasmodic inputs of U-2 photography.

By January 1958, there was a further elaboration of the urban studies program. Work was suspended on Stalinsk but initiated on the cities of Chimkent and Stalinabad, whose study was judged to have higher priority. Growing interest in the use of U-2 photography in these studies was reflected in a town plan seminar chaired by [redacted] 3.5(c)c) and held at HTA on 22 January 1958. At this meeting, requirements, priorities, and town plan programs in the Intelligence Community were discussed. Representatives were present from several Agency components as well as the Air Force, Navy, and Army.

The month of January also marked the commencement of another self-initiated type of project in the Geographic Branch. This was the production of intelligence overlays for selected World Aeronautical Chart (WAC) areas in the USSR and its Satellites. In this program, the Geographic Branch undertook routinely to provide information on known installations or confirmation of suspected installations of intelligence interest located in the area of the chart. Like the urban studies initiated the previous month, it was hoped that the program would fulfill existing needs and stimulate the levying of requirements for more detailed exploitation of at least some of the installations. 373/

By the close of February 1958, photo interpreters in the Geographic Branch were spending 50% of their project time on the WAC overlay and urban studies programs. Moreover, the ramifications of the latter were proliferating, though there was as yet no clear indication of its long-range viability. On 12 February, a second town plan seminar was held at HTA to discuss ways of coordinating town plan programs then under way in the Intelligence Community. At this meeting, it was decided that HTA and GRA's Cartography Division would begin work on select urban areas and present sample maps to the Urban Areas Branch (UAB) to provide data for use in making policy decisions concerning sanitization procedures with reference to the use of TALENT photography in town plans. Agency representatives also acceded to the suggestion that CIA initiate correspondence intended to encourage the formal establishment of a joint urban studies group composed of members of all the military services and CIA. 374/

This groping to find productive work and to test the utility and feasibility of using U-2 photography in fields other than military and industrial installations and facilities directly related to strategic threat, was inviting reconsideration of the mission and functions of

HTA in the light of changing circumstances. It was also raising further question about the desirability of having detailed photo interpretation responsibilities split between two branches.

Aside from the problems being experienced by the Geographic Division, the other noteworthy activities in the winter of 1957-58 involving D/GP photo interpreters took place in the Central Branch. The third in the new series of PI training courses was concluded on 19 December 1957, and the fourth started on 7 January 1958. 375/ These courses were so popular that, upon the conclusion of the latter offering in March 1958, the Central Branch reported that the ORR Administrative Staff advised there was a two-year backlog in prospective students. They added that, were the course to be advertised in the OTR Bulletin, the response would be overwhelming. 376/ Doubtlessly, the furor created by JAM SESSION was augmenting the general interest in photography as a source of intelligence information.

February 1958 was also marked by the issuance of a third photo intelligence memorandum in answer to a DDP requirement on Indonesia. This publication, done on a crash basis, reported on a drop zone. 377/ Though the civil war was well under way by the end of that month, D/GP support was still minimal.

E. How to Proceed with the Publication of Reports

When 1958 arrived HTA was still without a publications unit. Until that time, manuscripts whose component parts had been produced by the PIs were usually passed on to the Support Staff for editing. During editing, interpreters were consulted about problems and proposed changes in the manuscript, and their approval was obtained for the final version of the manuscript prior to sending it to reproduction. Thus, from the receipt of the manuscript in the Support Staff until it was delivered to reproduction, the initiatives lay largely in the hands of the editors. Moreover, from this point on neither the PIs nor the editors saw the publication again until it was disseminated. Unless the whole mechanism for editing and publishing HTA reports were singularly troubleproof and adaptable, which it was not, this was a facet of operations that could scarcely escape an overhaul.

Two events of the then recent past set the stage for a change. One was the establishment of the graphics shop in the summer of 1957. The other was JAM SESSION.

As a result of the painstakingly detailed exploitation during JAM SESSION, the type of PI reports envisaged for these highly important installations was different from any earlier HTA publication. They would include much interpretive material instead of being merely a readout or a documentation of PI facts. The level of detail was such that many line drawings were needed to convey all the facts. The intense interest by consumers in certain key facilities required their portrayal in perspective sketches. The excellence of the photography invited the use of photographic enlargements. The page size contemplated was 18 by 20 inches. The completed reports were to be what [redacted] deputy director of HTA, 3.5(c) in one of his rare meetings with the editors and graphics personnel, alluded to in quite uncharacteristic terminology as "Dago dazzlers." EO 13526 3.3(b)(6)>25Yrs

The capability to produce such illustrations had, of course, been enhanced by the establishment of a separate graphics shop the previous summer. It was also a dividend derived in part from the hand-in-glove relationship that existed at that time between the chief of the Military-Scientific Branch and the leaders of the new graphics unit, in the establishment of which [redacted] had 3.5(c) played a strong supporting role. Moreover, with the increasingly complex task of page composition created by the introduction of so many graphics and the general upgrading of the physical appearance of HTA publications, in which [redacted] the chief of the graphics shop, 3.5(c) exerted a decisive influence, it was apparent that graphics personnel would want much to say about the preparation of materials for reproduction as well as the composition and appearance of the resulting publications. This was also a claim in support of which the graphics shop could expect a strong assist from [redacted] in whose 3.5(c) branch all reports would originate.

Though the foregoing circumstances set the stage for changes in publications procedures, the action that triggered the initial skirmishes in the competition to develop new procedures was the issuance of a Support Staff proposal entitled "Procedures Governing the Establishment, Assignment, Progress Reporting and Final Disposition of HTAUTOMAT Projects." This proposal, which was a further extension of work undertaken by the Support Staff a few months earlier to bring all HTA components under provisions for weekly reporting on the status of projects, was directed to all branch chiefs and circulated by [redacted] 3.5(c) who was already functioning as the plant manager.

This proposal was largely the work of [redacted] 3.5(c) who believed in centralized control of all project work. It would have vested in the Support Staff the power to accept or reject requirements submitted to HTA. It would have left the ordering of TALENT coverage of the target as well as the procurement of collateral aerial photography to the Support Staff. Only after receipt of the TALENT coverage would the resulting project be assigned to the appropriate PI branch -- also to be determined by the Support Staff. Moreover, it would have perpetuated the physical control of the manuscript by the editors subsequent to their receiving it as well as the preparation of printing specifications and delivery of the manuscript directly to the OCR reproduction unit. 378/

In a memo of transmittal, [redacted] who obviously 3.5(c)
smelled trouble, advised the branch chiefs to study the proposal carefully and invited them to submit any revisions that they believed would improve the proposal. He closed with the assurance that their opinions would be given "full consideration" and that they would be contacted personally concerning any suggested revisions. 379/

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The response by [redacted] who challenged all the 3.5(c)
controversial points mentioned above, was swift and pointed. With a surprising show of conciliation -- presumably because he tacitly conceded that requirements handling was clearly the business of the Support Staff -- he suggested that the acceptance or rejection of requirements submitted to HTA be done by the Support Staff in

consultation with the branch concerned. Taking a less compromising view, he firmly insisted that the PI branches should order the TALENT coverage. He emphasized that the effort thus saved could better be spent in improving procurement of collateral aerial photography, a service already provided by the Support Staff. Warming up to the subject, he pointedly criticized the proposed delay in assigning the requirement to the PI branches until after the Support Staff had received the pertinent TALENT photography. With some justification, he averred that this should be done as soon as a copy of the requirement was given to the OCR Information Branch for the procurement of collateral.

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Having disposed of the preliminaries, [redacted] addressed himself to the heart of the matter -- the respective responsibilities of the PIs, graphics personnel, and editors, together with the checks and balances to be employed in controlling those engaged in preparing and processing the emerging manuscript. These he spelled out in a series of 14 steps. Basically, they provided for continuous control of the substance of the report by the photo interpreters and transferred the responsibility for report layout and the preparation of printing specifications from the editors to the graphics unit. 3.5(c)

They specified that the editors would confine their efforts to changes involving "readability, grammar, organization, punctuation, etc." 380/ The reasonableness and logic of this counterproposal -- at least insofar as it emphasized that substantive responsibility must rest with the PIs -- was somewhat vitiated, however, by the common practice of the photo interpreters to deliver all or any considerable part of a manuscript, whatever its condition, to the Support Staff and then advise their supervisors that the photo interpretation, or even the project, was completed.

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In an apparent attempt by [redacted] to ensure that all MSB projects were handled as he wished, at least until uniform HTA procedures were agreed upon and issued, he addressed a memo to all MSB personnel and military participants engaged in joint work on projects. In much more explicit language than that used in the response to [redacted] he specified just how he wanted work on MSB projects handled. He attached a cover sheet with the names of each photo interpreter and supervisor in MSB and directed that each read and initial the memo to indicate that he had seen it. [redacted] further provided that it be returned to him for filing. He also asked that it be shown to all service PIs working on joint

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projects and that they, too, be requested to read and initial it.

Further, to monitor implementation of the rules as well as to ensure that liaison with other components was handled in a businesslike manner, at least for the interim, the memo announced establishment of the position of production assistant in MSB and named [redacted] 3.5(c)
to fill the job. It was [redacted] duty to arrange for 3.5(c)
consultations between PIs on the one hand and editors and graphics personnel on the other. It was also his duty to receive and transmit graphics and manuscripts between MSB and support components. In discharging his duties [redacted] was likewise obliged to initial, along 3.5(c)
with the PI, the acceptance or approval of work done in other components. 381/

Though no other comments or counterproposals to the Support Staff proposal can be found, the other branches were not unsympathetic to the firm position taken by [redacted] in defense of the supremacy of the PIs 3.5(c)
in substantive matters. The aggressive position taken by [redacted] foreclosed the possibility that the Support 3.5(c)
Staff proposal would be adopted without substantial revision. In the meantime, the operations and products of other branches were not critically affected by a continuation of the status quo. Though it was apparent that

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the ultimate decision was at least a few months away, everyone could wait.

F. Carpenters, Plumbers, and New Equipment

Experiences of the first year or more in the Steuart Building revealed a need for certain changes in physical accommodations. The longest standing need was for vaulting of the Support Staff working area on the fifth floor. At first, this unvaulted area just across from the elevator seemed ideal for the Support Staff, which would not be directly involved in the exploitation of sensitive materials and, additionally, would have many contacts with persons outside the building. Before long, it was quite apparent that the handling of requirements, many of which contained highly sensitive background information, and the editing of manuscripts, which included TS CODEWORD text and graphics, made it awkward to work in an area where all sensitive materials had to be loaded on carts and wheeled into the adjoining OCR vault at night. Also, all such materials not in immediate use had to be stored in the vault.

Another and somewhat different space problem involved briefings. The rapidly growing demand for briefings following the SOFT TOUCH missions and JAM SESSION could only be held at the expense of intrusions in areas needed for production work. It was clear that HTA needed a briefing room. The decison was made to carve this space out of the Support Staff quarters.

The solution to both problems was achieved in the course of renovations during the winter of 1957-58. By December work was already well advanced, and completion of vaulting the Support Staff work area and partitioning of the briefing room was expected early in January. 382/

Construction was also under way at the same time in OCR work areas, on the fourth and fifth floors. Additional space was provided for the photo lab, reproduction machinery, and the assembling of publications. 383/ By February most of this new construction had been completed. 384/

New lab equipment included a LogEtronic continuous strip printer, a second eight-compartment processor for use in processing film, and the HEICO dessicant drier. The LogEtronic continuous strip printer arrived in December 1957. 385/ This printer combined the automatic dodging which was the hallmark of LogEtronic equipment with the ability to handle roll materials, thus giving the lab a continuous printing capability. This printer was used mostly for the making of duplicate positive copies on film which were beginning to be popular with the PIs. It could also be used to make paper prints.

Procurement of another processor, which was installed in February 1958, provided the capability to process both film and paper prints simultaneously. 386/ A closely related piece of equipment, the HEICO drier, was received in the same month and made possible the drying of roll film or paper prints that had been exposed in the LogEtronic printer and developed and washed in the processor. Completion of the installation and use of the HEICO was delayed several weeks, however, until PEPCO provided additional electrical power to satisfy the rapidly expanding demands of the new equipment. 387/

December 1957 also marked the arrival of the IBM Model 519 Reproducer and the Model 079 Collater. Prior to this, the OCR unit had on hand a keypunch and verifier. 388/ With the arrival of the new pieces of equipment, it was now possible to reproduce IBM cards already punched and to sort them. It was still necessary, however, to take the cards to the Riverside Stadium facility to print a listing. Thus, in the winter of 1957-58, HTA still lacked the capability to automate the preparation of highly formatted publications, such as first- and second-phase PI reports, but it was moving closer to the day when this pioneering step would be possible.

In February 1958, the long-awaited Minicard equipment arrived. It consisted of a copying camera, a film processor, a film conditioner, a film cutter, an inspection viewer, and several analysis viewers. 389/ The December 1957 monthly report for the OCR component reported that, based on several two-to-three week tests that had been conducted in the previous summer and fall, the equipment was judged to be acceptable and arrangements would soon be made to move it to Washington. 390/ Completion of the installation of this equipment was delayed a few weeks, however, by the need for special plumbing for the processor. 391/

After installation of the Minicard was completed in March 1958, sample prints of U-2 photography were made and shown to Bissell. These included materials that had been photographed at a 20-times reduction and then printed at a 20-times enlargement. Others had been reduced by a factor of five and then printed at 20X. The monthly report for the Statistical Division stated that Bissell was pleased with what were called "excellent results." 392/

Even though Bissell was pleased, there is no indication that the PIs shared the enthusiasm imputed to Bissell by the Statistical Division monthly report. Having narrowly avoided, nearly two years earlier, the pitfall of being tied to an unproven system as well as the disadvantage of using third or fourth generation photography, the PIs were sitting on their hands. The two years that had elapsed had provided ample opportunity to establish more conventional procedures for storing and retrieving less degraded imagery. They had also demonstrated the crucial importance, in many instances, of having the very best imagery for exploitation. Indeed, it had been proven in several instances during the exacting technical exploitation of SOFT TOUCH materials that image enhancement techniques, such as density cuts, were needed to extract all the desired information from the photography. By the time Minicard arrived, any chance that it might have had in the competition to store and retrieve photography for use by the PIs was already foreclosed.

The other noteworthy piece of equipment delivered in the winter of 1957-58 was the Model 2066 Addressograph Multigraph offset press, which arrived in January. 393/ This press accommodated sheets up to 18 by 20 inches. It made possible the transfer of reproduction materials up to this size to multilith plates from copy camera negatives. At last, it was possible to produce half-tone prints of photography up to this size in HTA reports.

Heretofore, in publications such as the oversize consultant workbooks line work had usually been reproduced on the Ozalid machine; any oversize photographs had to be reproduced photographically, a slow and expensive process.

One other space problem was also solved during the winter of 1957-58. Ever since the previous summer, the much reduced staff in the newly designated Operations Support Branch had scarcely filled the old SPB work space on the seventh floor of the Steuart Building. On the other hand, with the advent of JAM SESSION the Military-Scientific Branch found its old quarters on the sixth floor, between the Geographic Branch and Technical Intelligence Services Branch, entirely inadequate. It was, indeed, customary for MSB to make frequent use of the PARAMOUNT Room, on the seventh floor, for briefings and consultant meetings.

The solution to this problem was obvious. On 31 January 1958, the Military-Scientific Branch moved to the seventh floor of the Steuart Building. 394/ The Operations Support Branch moved to the space vacated by MSB on the sixth floor. 395/ Apart from the more suitable physical accommodations, this placed the Operations Support Branch in close proximity to the Technical

Intelligence Services Branch, to which it seemed destined to be subordinated at the earliest opportunity.

G. People and Heirarchies

When HTA was established, the initial proposal to do so at the Office level was rejected. 396/ This was a fact not forgotten by either the ORR or OCR managers. The extraordinary success of JAM SESSION during the fall of 1957 as well as the lessons learned as a result of the manifold activities connected with it invited a reconsideration of organizational relationships. Now, in the winter of 1957-58 with many of the consultant meetings concluded, there was an opportunity to examine the existing organizational relationships with a view to charting the future course of HTA.

Ever since HTA became a reality, joint work with the military services had been a major theme running through the operation of the project. The Army had joined in force from the beginning and, after a slow start, the Navy participated to a significant degree. Even the Air Force, which had demurred about joint PI work, relaxed its opposition sufficiently to join CIA and the other services in the first-phase exploitation of SOFT TOUCH missions. Though the Air Force remained aloof from the joint detailed exploitation of photography in support of JAM SESSION, they did have some representation at the consultant meetings. What they learned further weakened their earlier resolve to compete rather than cooperate. By December 1957, the Air Force expressed a desire to increase its liaison force at HTA from one to six persons. 397/ Lundahl's dream of a national center for the exploitation of intelligence photography had moved a halting step closer to reality.

Though the chief thrust of planning at this time was in the direction of major organizational changes, there were a few loose ends that needed attention first. Some involved the ORR component in HTA, and some their co-workers from OCR. Most important of these untidy leftovers was the question of slots lost during the job freeze announced in August 1957. By early winter the success of the counterproposals made in the fall seemed assured. An OCR Notice dated 13 November announced that as of 15 November the Statistical Branch, Special Register, would become the Statistical Division, OCR, and that it would no longer be formally associated with the Special Register. It further stated that [redacted] would be chief and [redacted] his deputy. 398/ 3.5(c) 3.5(c)
News of the restoration of Statistical Division slots

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lost the previous August and approval by the DCI of the nine new ones was recorded in the December monthly report of the division. 399/* The same report announced that all vacancies were being "advertised."

Meanwhile, the T/O request of the ORR Photo Intelligence Division seemed headed for approval. By early December, [redacted] was able to announce at an HTA staff 3.5(c)
meeting that the "new increased T/O" was then on General Cabell's desk. At the same time [redacted] optimistically re- 3.5(c)
quested branch chiefs to submit names of qualified persons for the new positions. 401/ By early January, the news was official; in a memo from the Office of the DDI to Lundahl [redacted] advised that the DCI had 3.5(c)c)
approved an increase in the ceiling for Project HTAUTOMAT of 35 positions -- 17 for the OCR component and 18 for D/GP to be used only for HTAUTOMAT.** This memo also requested that a memo be submitted through [redacted] 3.5(c)
asking that he set up the specific positions needed. 402/

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* A summary of the entire proposal and a comparison of the previous and new tables of organization was included in a memo from Paul Borel, Assistant Director, OCR, to the Deputy Director, Support. 400/

** These figures included both the slots lost the previous August and the new ones requested in the fall.

EO 13526 3.3(b)(6)>25Yrs

At least from an HTA point of view, this personnel operation had been exceedingly smooth and highly successful.

There were two other sticky organizational problems whose course had to be set toward an ultimate solution. One was what to do with the Operations Support Branch, which was still without recognition in the official T/O. A somewhat analogous case was the Central Branch, whose existence had never enjoyed formal recognition.

The course of the Operations Support Branch had been reasonably clear from the time it emerged from the ashes of the [redacted] empire. It would one day become 3.5(c) part of the Technical Intelligence Services unit. This was still proving to be an awkward change to accomplish officially, since both components were nominally accorded branch status. Nevertheless, the course of events was inexorably pointing in this direction. Soon after the removal of OSB to the sixth-floor quarters vacated by the Military-Scientific Branch, right next to the Technical Intelligence Services Branch, the ingestion began.

The January 1958 monthly report for the Technical Intelligence Services Branch stated baldly that the "Special Projects Branch. . . is being integrated into the Technical Intelligence (sic) Branch." 403/ The

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February 1958 TISB monthly report stated that "much effort was devoted to developing record and report systems for the combined Special Projects and Technical Intelligence Branches." 404/ A month later, TISB reported that the record and reporting systems were already functioning and that plans were submitted for rearranging personnel and equipment so as to admit of a more efficient functioning of the "combined branches." 405/ In May 1958, the TISB monthly report said the rearrangement of work areas had been completed, and, in the same month, the Special Projects Branch* report first mentioned the subject and acknowledged that it had begun to operate as part of the Technical Intelligence Services Division (sic). 406/ The ingestion was complete.

The disposition of the Central Branch was, perhaps, no less clear to discerning students of the problem, which undoubtedly included all those in the branch. Because of distance, however, the process of ingestion that resulted in the final demise of the Special Projects

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* Old names died hard in D/GP. The name "Special Projects Branch," didn't disappear until it was absorbed into the Technical Intelligence Services Division as the Operations Support Branch. The name "Technical Intelligence Branch," continued to be used at the branch level -- though probably not because this was still the name on the official T/O -- until the component officially became the Technical Intelligence Services Division of the CIA Photographic Intelligence Center.

Branch was impractical. First, Central Branch would have to move and there was no immediate plans for that in the winter of 1957-58.

The nature of the impending solution was recorded in comments on the proposed reorganization of D/GP included in a memo from [redacted] chief of the Central Branch, to Lundahl. The major portion of this memo consisted of a spirited justification of the continuance of the functions of the branch as a Central Division in the new PI organization. At one point, however, [redacted] digressed to decry the proposal to incorporate the Central Branch as part of a Geographic-Industrial Division, insisting that this would cause administrative problems and preclude effective management of the branch. 407/ 3.5(c) 3.5(c)

The proposed reorganization was the most important subject on the minds of managers in HTA during the winter of 1957-58. That this activity involved the expenditure of much effort was indicated by the D/GP monthly report for January 1958. 408/ It is clear, moreover, from the comments on reorganization by [redacted] that the proposal was already available for branch comments by the middle of January. 409/ 3.5(c)

On 7 March 1958, the proposal for the reorganization was forwarded to the DDI, Robert Amory. 410/ It provided for the establishment of a CIA Photographic Intelligence Center at the Office level. The Center would consist not only of ORR personnel in the Photo Intelligence Division, but also the OCR personnel in the Statistical Division. All would be subordinated administratively as well as functionally to the director of the new Center. There was no request for additional positions beyond those added earlier in the winter, which brought to 162 the number of positions in HTA, and no stated requirement for additional space or operating funds at this time. There was, however, an increase in the average grade from 8.8 in the combined HTAUTOMAT organization to 10.1 in the proposed Photographic Intelligence Center.

Major features of the table of organization for the proposed Center were reminiscent of HTA (Figure 106). The former OCR Statistical Division would now become the PIC Data Management Division and its former sections, which had been designated branches at the time the Statistical Branch became the Statistical Division, would retain their existing names. Each of these branches would consist of two or three sections, a reflection of the fact that, with a T/O of 62 DMD would be the largest division in the new Center.

Line personnel in the ORR component would be organized in three divisions. One, the Industrial-Geographic Division, a name that the Geographic Branch had acquired in the semiofficial realignment of the previous summer but never used, would be organized in a European and Satellite Branch, an Asian USSR and China Branch, and the Central Branch. [redacted] lost his obviously belated bid 3.5(c) for an independent Central Division.

A second line division, also devoted to photo interpretation, was the Military-Scientific. As its name suggested, this division consisted of two branches, the Military and the Scientific. The latter was to be responsible for producing PI reports and services with reference to the foreign production and the research and development of guided missiles, long-range aircraft, nuclear energy, electronics, and chemical and biological warfare. The Military Branch would be responsible for the military applications of the above categories of things. The academic distinction thus applied to the division of labor between the two branches probably reflected the relative immaturity of this whole exotic field of photo intelligence. In view of the great imagination already displayed by [redacted] and his PIs, there was little cause 3.5(c) for concern about the workability of the suggested

3.5(c)

arrangement. It would change whenever necessary.

The third line element was the proposed Technical Intelligence Services Division. It was to consist of a Technical Intelligence Branch, composed of photogrammetrists, an Operations Support Branch, consisting of what was left of the old SPB, and a Graphical Analysis Branch, the new graphics shop now elevated to branch status.

In each of the four photo interpretation divisions -- DMD, IGD, MSD, and TISD -- the chief was slotted at GS-15 and the deputies at GS-14. Chiefs of branches engaged in photo interpretation occupied GS-14 slots, as did the chiefs of the DMD Information and Technical Branches and the TISD Technical Intelligence and Operations Support Branches. The chief of the Graphical Analysis Branch was slotted at GS-13, thanks to some tenacious and astute arguing by the incumbent, [redacted] 3.5(c)
Chief of the DMD Support Branch was pegged at GS-12.

The proposed Center would have three staffs. The desire of the senior security officer, [redacted] to 3.5(c)
be independent of the Administrative Staff was recognized in this proposal by the proposed establishment of a security office. The third staff, called Coordination and Control, was the old Support Staff under a new name.

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It alone among the staffs had any official organizational articulation. It was divided into two branches, the Coordination and Requirements Branch, which handled requirements, project coordination, procurement of collateral overhead photography, and liaison with many organizations outside HTA, and the Editorial Branch.

The mission and functions statement for the Coordination and Control Staff revealed trends in HTA thinking at higher levels with respect to issues then being contested at the branch and staff level. If adopted, the missions and functions accompanying the proposed reorganization would provide that the staff "coordinate" incoming requirements among Center and military components to determine interest in and feasibility of accepting them. It was not entirely clear whether or not the CCS would procure TALENT coverage; but one of its stated functions was to "provide for the procurement" of special photographic material. Doubtlessly, this referred to TALENT photography and, if so, it left considerable room for interpretation and maneuvering for position.

The functions of the Editorial Branch revealed that editing of Center publications would be for organization, pertinence, consistency, clarity, grammar, and for agreement between text and graphics. The latter function, correlation of text and graphics was a real sleeper. No one but the editors came anywhere close to an appreciation of the wide disagreement that almost always existed between the content of the text and the portrayal by the numerous graphics. In the years that followed, the discharging of this duty was a very significant factor in the editorial work load. Surprisingly, the proposed Editorial Branch functions provided explicitly for the preparation of reproduction specifications and dissemination instructions and the transmittal of the final manuscript to the reproduction facility. This could hardly be regarded as a lasting victory, however. In the escalating controversy between the editors and the chiefs of MSB and the graphics unit, both of whom wanted this function transferred to the latter unit, it was only a question of time before the assignment of this function to the Editorial Branch would be rendered null and void. Slotting in both the Security office and the CCS would be at the GS-15 level but the chief of the Administrative Staff would occupy a GS-13 position. The chiefs of both the Editorial Branch and Coordination and Requirements Branch, like most branches in the line divisions, was at the GS-14 level.

In charge of this whole operation there would be a director occupying a GS-16 slot, and a deputy director and an executive officer, both of whom occupied GS-15 slots. Though the GS-16 for the director would replace a GS-15/17 slot in the former T/O, this modest upward tilt would impose no troublesome ceiling. Lundahl had already made his mark. If future operations were as successful as seemed likely, this would not hamper his upward movement.

The big change took place in the relationship between [redacted] who was the deputy, and [redacted] who was 3.5(c)
the executive and coming on strong. The proposal would place them in slots at the same grade. In view of the reluctance displayed by [redacted] to take a firm hand in 3.5(c)
the internal operation of the organization as well as his preoccupation with less demanding peripheral chores, his long-standing official position as the number two man in the table of organization was already precarious.

The foregoing reorganization, though spelled out in detail in the 7 March 1958 memo to Amory, could scarcely have come by surprise. All the elements of staffing as well as slot restoration and augmentation leading up to it displayed abundant evidence of a well-coordinated effort. Moreover, more than two years earlier and lacking tangible exploitation accomplishments with which to justify the proposal, Amory had recommended establishment of HTAUTOMAT as the Office of Statistical Research. Nevertheless, it was appropriate to include justification for the reorganization now being proposed, and such justification was an integral part of the memo to Amory.

Among major points developed in this connection were (1) the critically important accomplishments already made in the use of photo intelligence in assessing the then current threat as well as the economic, military, and scientific potential of the Soviet Union, (2) the prospect of breakthroughs in US photo reconnaissance programs that promised to surpass achievements of the U-2 system by a considerable margin, (3) the success realized in the establishment of an Agency-sponsored facility -- HTAUTOMAT -- devoted to the joint all-source exploitation, with military and other Intelligence Community personnel, of high resolution photography, and (4) the discrepancy between the official administrative and organizational structure of HTA and the actual command and reporting channels, particularly in critical situations requiring rapid response. In short, it was the position of HTA managers that the earlier subordination of the project had outlived its usefulness and was totally inadequate to serve the needs of a permanent photo intelligence operation having the scope, importance, and future potential of HTA.

Thus, by the close of the winter of 1957-58 HTA was ready for the next leap forward. The substantive work of the previous fall had been a smashing success. The ill effects of the job freeze had been weathered, and HTA had emerged from it with more positions than it had the previous summer. Organizational problems that had developed as a result of initial miscalculations, for which HTA could scarcely be faulted, had been identified and seemingly rectified. Related organizational problems had also been diagnosed and proposals made to solve them. Above all, the prospect of getting out from under the wing of ORR and achieving Office status seemed virtually certain. Approval of the proposed reorganization would, moreover, provide further headroom, particularly for those in intermediate and higher grades. As the spring of 1958 approached, all that seemed necessary was to keep striving for further creditable accomplishments and to exercise a little patience. This is precisely what HTA personnel did.

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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

THE YEARS OF PROJECT HTAUTOMAT, 1956 - 1958

VOLUME III

by

[redacted] 3.5(c)

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NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

THE YEARS OF PROJECT HTAUTOMAT, 1956 - 1958

VOLUME III

by

[redacted]

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VIII. HTAUTOMAT Becomes the Photographic Intelligence Center

The period of waiting between submission of the proposal to create a CIA Photographic Intelligence Center and announcement of the decision to do so stretched out over several months. In a dynamic organization such as HTA, with a highly salable product, there was, however, little danger of just marking time. Though only one mission was flown over the USSR, and that in the Far East on 1 March, the Indonesian affair was warming up, and by summer there would be a new crisis in the Middle East. Moreover, JAM SESSION was not yet ended. Installations still awaiting joint action by PIs, intelligence analysts, and consultants, though in no respect as important as those studied earlier, guaranteed that there would be one last fling with the outside experts.

A. The Last Months of JAM SESSION

During the spring of 1958, work related to Project JAM SESSION consisted not only of preparations for the final consultant meetings, which would deal with Soviet heavy water and uranium mining and milling facilities, but also of a broad range of activities intended to consolidate the gains stemming from the earlier consultant meetings. Among the latter were efforts to publish PI reports on the two Soviet guided missile test centers, provide PI keys to guide HTA interpreters dealing with high-priority scientific and technical installations, familiarize more Military-Scientific Branch PIs with domestic counterparts of Soviet installations in whose interpretation they would be engaged, and obtain approval for use of COMINT in the MSB work area on the seventh floor of the Steuart Building.

1. COMINT Comes to MSB

After months of planning and negotiations, in March 1958 the Military-Scientific Branch was granted permission to have and use COMINT documents along with other collateral documents and photography. 411/ Though the MSB work area was vaulted, like most others in the Steuart Building, this permission was contingent on the installation of a lock and buzzer system for positive control of entry to the vault even during normal working hours. The singling out of MSB for exceptional treatment at this time was a direct result of the special need for COMINT information demonstrated during the previous fall in the exploitation of JAM SESSION installations. It was of immediate and particular usefulness in the preparation of materials for the remaining JAM SESSION consultations as well as work done on manuscripts for the PI reports on the Kapustin Yar and Tyura Tam Missile Test Centers.

2. A Bear by the Tail

[redacted] chief, MSB, had been designated the 3.5(c)
chairman of the JAM SESSION photo interpretation effort
on the Kapustin Yar Missile Test Center and [redacted] 3.5(c)
of the Army, his deputy. For the Tyura Tam Missile Test
Center the positions were reversed, with [redacted] serving 3.5(c)
as chairman and [redacted] as his deputy. 412/ Thus, as 3.5(c)
the publications effort got under way in the spring of
1958, [redacted] was presumptively in charge of the effort 3.5(c)
to prepare the PI report on Tyura Tam and [redacted] the 3.5(c)
staggering job on KY. The joint effort, in both cases, was being carried on, as in all similar reporting, in the space devoted to such work in the MSB area. Moreover, it was then the custom of MSB regardless of the organizational affiliation of the chairman of joint projects, to assume responsibility for monitoring production of graphics, for typing the manuscript, for ordering photography, and all such mechanical details. 413/ Thus, the March and April 1958 MSB monthly reports made the optimistic observation that manuscripts for reports on both the

KY and TT installations were in the final stages of preparation for publication. 414/ Before long, it must have become apparent that, in the KY manuscript, MSB had a real turkey on its hands. During May, [redacted] wrote a 3.5(c)
memo addressed jointly to [redacted] who by then had 3.5(c)
accepted the dubious honor of also chairing the KY project), [redacted] and the "Editorial Staff," outlining how 3.5(c)
MSB photo interpreters would continue to "pull together the many parts of the KY report," and how he, [redacted] 3.5(c)
would review the manuscript in detail, with a view to completing it by 31 May. He added that he and [redacted] 3.5(c)
together would then examine the manuscript in detail to assure that it was completely acceptable to [redacted] before 3.5(c)
forwarding it to the Editorial Staff, hopefully by 15 June. 415/

That these implied promises of early publication were premature was suggested by a lack of information on the same subject in subsequent MSB monthly reports. In reality, both manuscripts were casualties of attempts to ramrod materials not yet in finished form through to publication. These were also days when MSB was vigorously pursuing the concept that the most expeditious procedure for publishing reports was to limit the editors to a copy edit of text prepared by the PIs, and to foreclose possibility of more than very minor editorial changes on illustrations prepared in the graphics shop. Indeed, [redacted] ordered that the graphics for both reports be 3.5(c) shot in final form in the lab prior to submission of text to editors, and in at least one instance delivered the graphics to the lab himself.

Even [redacted] who was earnestly attempting to get 3.5(c) agreement on procedures for the handling of HTA projects, got into the act. One day in March, he appeared unexpectedly in the room occupied by the two editors, [redacted] 3.5(c) In his hands was a very large 3.5(c) envelope containing a jumble of graphics and text for the projected Tyura Tam report. He announced that he would soon call a meeting of MSB and graphics representatives plus the editors. Interestingly, [redacted] the nominal 3.5(c) chairman was not included. [redacted] stated that he had 3.5(c) perused the manuscript and believed it was not fit to edit. He requested that the editors examine it and be prepared to offer testimony at the meeting. Then he left.

In due course the meeting was called and [redacted] ap- 3.5(c) peared to chair it. Obviously, he was expecting strong support [redacted] who was *de facto* head of the editorial 3.5(c) shop and already the object of much criticism by MSB personnel as well as leaders in the graphics shop. To the surprise of [redacted] and probably the MSB and graphics representatives as well, [redacted] refused to endorse [redacted] appraisal of the manuscript. On the contrary, he adopted the position that anything sent to the editors was, *ipso facto*, fit to edit. 3.5(c) 3.5(c) 3.5(c)

This unexpected assertion, from which [redacted] refused to deviate during the course of an extremely unproductive discussion, gave him the conscious satisfaction of adhering to his principles under considerable pressure. Predictably, it won him no friends. To MSB supervisors, it was clear that [redacted] was, in effect, telling them that he was prepared to "worry through" the manuscript, aided by periodic consultations with the PIs, and that supervisors would not be encouraged to transgress on the confidences exchanged between an editor and his clients. To graphics representatives, it was evident that questions involving graphics would be settled in the bilateral negotiations between editor and photo interpreter, thus denying graphics personnel an active role in the final review of the manuscript. One could only speculate on the thoughts that coursed through [redacted] mind as he found himself out on a limb in his attempt to establish more effective procedures for assigning responsibilities in the processing of manuscripts for HTA reports. It would not 3.5(c) 3.5(c) 3.5(c) be unrealistic to assume they were unprintable. In [redacted] there were joined an unusually happy faculty for the evocation of vivid mental pictures and an exceedingly colorful vocabulary for describing them.*

The TT manuscript came to life again in June 1958 when [redacted] the deputy in the 3.5(c) graphics shop, appeared at the entrance of the room occupied by the editors. In a conversation that began in a cautious and diffident manner, they revealed the fact that a new attempt to prepare the manuscript for publication was imminent. [redacted] asserted that he was personally 3.5(c) taking charge of the effort and intended to rewrite the entire text, preferably with the guidance and counsel of an editor whom he would like assigned full time to the project for at least several weeks. [redacted] expressed 3.5(c) a strong desire to have the graphics shop assume the

3.5(c)

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* It should be noted that this was not the only such meeting chaired by [redacted] On a number of other occasions within the next several months, [redacted] would attempt to resolve publications problems by sitting down with representatives of the editorial shop, the graphics shop, and MSB. Moreover, when [redacted] first returned to the Steuart Building to function as a Special Assistant in the Office of the Chief, as the transfer to HTA of Central Branch personnel approached, his most important assignment was the solution of procedural and other problems relating to the publication of HTA reports. These negotiations were made difficult and progress was slow because of the maneuvering for political advantage of many of the participants. For the record, it should be noted that [redacted] did not shrink from a task that he almost certainly knew would be frustrating and, at time, humbling. 3.5(c) 3.5(c) 3.5(c)

responsibility for the preparation of the printed forms, which would consist of fully integrated text and graphics for the publication of a report in the new outsize format measuring 14 by 18 inches.

In the course of an amiable, if not animated, discussion, [redacted] expressed a preference for a report consisting of separate text and graphics, but left the question open. [redacted] favored a fully integrated report. The result of the exchange was the assignment of [redacted] to work with [redacted] on the preparation and editing of a new text which was to be fully integrated with the accompanying graphics. The text would be typed on the Justowriter, which was still situated in the editorial shop on the fifth floor, but would be composed in the graphics shop on the sixth floor. Specifications for reproduction would be prepared in the graphics shop.

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Though there were as yet no firm guidelines issued for the preparation and publication of joint photographic intelligence reports in HTA, these ad hoc decisions provided a *modus vivendi* with which all participants could live. Though control of the project by MSB was substantially precluded as a result of [redacted] assumption of full responsibility as project chairman, his substantive decisions in the preparation of the manuscript would have

3.5(c)

to survive the scrutiny of MSB photo interpreters at the time of sign off. For the editors, it placed one of their kind in a key position in the effort to prepare a new text. Though the arrangement fell short of affording the full measure of control envisaged by graphics supervisors in decisions involving the selection and planning of illustrations, [redacted] exceptional grasp of the subject and how he wanted it presented, permitted them to use their expertise and imagination in developing his concepts and preparing them for the reader. This phase of the undertaking was directed by [redacted] 3.5(c) 3.5(c)

This complete reworking of the Tyura Tam manuscript continued into August 1958. The result, published a month later, was a CIA/PIC showpiece comprising 51 pages of text and illustrations, the latter consisting of all types and sizes of graphics. Quite apart from the physical and substantive characteristics of the report, the procedures used and the energy and cooperation displayed in completing the job served, at least in some degree, as an object lesson in one way to produce an HTA photo intelligence report, particularly a large and complex one.

On the credit side of the ledger was, first of all, the dramatic demonstration of the advantage of having the total concept of the report as well as its substantive content under the firm direction of a highly competent photo interpreter. Such a situation energized the specialized talents of support personnel without providing a leadership vacuum into which all participants could rush to acquire the largest possible piece of the action. Less obviously on the credit side of the ledger was the carefully composed graphics and text, with the latter in columns justified on both the right- and left-hand margins. That such a physically attractive report served to excite favorable comment and reflect credit on the rapidly developing capability of a young organization fighting for its place in the sun cannot be doubted. From the beginning, however, many of those not emotionally involved in defending the course of development being set and advocated by the chief of the graphics shop and his deputy, doubted the wisdom of investing the manpower and machines needed to add the cosmetics. This question was to be a perennial one and reappears at frequent intervals in the future history of NPIC.

More obviously on the debit side of the ledger was the use of an editor in the preparation of the manuscript. Unless it proved to be an exception, the full-time services of an editor for such a prolonged period as well as his almost total involvement in the preparation of the manuscript was difficult to justify. Not only did it virtually double the manpower needed to write the text but it also precluded the editor examining the completed manuscript with the detached view of an uninvolved critic. On the other hand, in this role the editor was able to offer valuable guidance and assistance in the preparation of the manuscript at a time when procedures were vague and no style manual for HTA publications was yet available.* Moreover, it should be noted that such use of an editor effectively neutralized what was regarded, rightly or wrongly, by many -- but by no means all -- HTA photo interpreters as one of the most difficult obstacles in the publications process.

3.5(c)

* As early as the summer of 1957 when editorial responsibilities and judgments first became controversial, [redacted] 3.5(c)
had directed [redacted] to prepare a style manual. [redacted]
the senior editor, was on an extended vacation on the West 3.5(c)
Coast but returned in time to review the first draft before it was passed on to [redacted] for review and coordination 3.5(c)
and comments from the branches. In those days, before the advent of the Xerox machine, no duplicate was made, and the sole copy mysteriously disappeared while in the process of coordination. It reappeared just as inexplicably nearly six months later when MSB was moving from the sixth to the seventh floor of Steuart Building. By that time, because of the rapidly evolving situation in HTA, the style manual was hopelessly out of date. Besides, few, with the exception of [redacted] and the author, had any urgent desire to 3.5(c)
see it published. [redacted] avowed position was to keep 3.5(c)
things as fluid as possible, a position shared by many in the graphics shop and MSB, who, however, had different objectives in mind.

Progress on the Kapustin Yar manuscript was not revived at this time. In all probability there was a tacit recognition of the fact that any attempt to undertake the much larger task on the KY report concurrently with work on TT would inevitably fail, particularly with [redacted] engaged full time on the TT manuscript. Moreover, it would divert manpower from other tasks sufficient to jeopardize the successful conclusion on ongoing activities.

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3. <u>The Show Goes On</u>

While many photo interpreters and others in HTA were struggling with the preparation of PI reports and trying to develop workable procedures for producing them, Lundahl continued his seemingly unending schedule of high level briefings. Though many were reminiscent of the round of presentations to top military and civilian officials in Washington during the previous fall and winter, two were decidedly out of the ordinary. [redacted]

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4. <u>A General on his Knees and PI Keys</u>

Late in the spring of 1958, as Military-Scientific Branch personnel began to get out from under the crushing work load of recent months, they turned to the job of increasing their capability to handle the type of exotic targets to which they had been exposed since the previous fall. The May 1958 MSB monthly report stated that the acquisition of aerial photos on nuclear installations was well along, and that photography collected on U-2 domestic training missions had been obtained and added to the file. During the same month, U-2 coverage of the Nevada Proving Ground had been obtained, a need

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that had been impressed on HTA photo interpreters and their supervisors the previous fall when neither intelligence analysts nor AEC personnel were able to offer a lucid description of the appearance of that facility from the air.

Upon receipt of the proving ground coverage, HTA prepared photo mosaics of Frenchman and Yucca Flats, the main sites of aboveground nuclear tests in this country. Facilities shown on the photography were identified and annotated with the help of OSI and AEC personnel. This was still one step short of the complete job. HTA wanted an on-the-ground check to ensure 100% accuracy as well as field experience in observing the facilities and results of nuclear testing. 425/

The photography of the Nevada Proving Ground that had just been obtained by HTA had been flown with the approval of Lt. Gen. Starbird of that installation,* and, at the request of the general, [redacted] 3.5(c) journeyed to the AEC in Germantown, Md., to show the results to him. The general conducted them to a vault

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* U-2 coverage of the Nevada Proving Ground had been obtained earlier, but all the film had been destroyed. Upon discovering this, HTA had placed a request to have it flown again so as to provide comparative photography of US and USSR nuclear weapons testing facilities.

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about the size of a large office where the photography was laid out on the floor; the general removed his shoes, got down on his hands and knees with [redacted] 3.5(c) and examined each ground zero and related facilities 3.5(c) with enthusiasm. Like other AEC personnel and CIA intelligence analysts, he had not previously had an adequate conception of how our proving ground appeared on overhead photography. While [redacted] had the 3.5(c) general's attention, they let him know how much they would like to go to the proving ground and run a ground check. Although all previous attempts to gain permission had resulted in failure, this one did not. According to [redacted] the general said, "O.K., any time you want to, 3.5(c) I'll O.K. it." 426/

When [redacted] returned to the Steuart 3.5(c) Building, they reported their success and immediately took steps to arrange the trip which the general had said he would approve. Initial arrangements for field study of the proving ground were made on 21 May with General Starbird and with [redacted] of the 3.5(c) AEC. In a followup letter to [redacted] of the 3.5(c) AEC, Lundahl also requested permission to take photographs of selected facilities. He further pointed out that an aircraft or helicopter flight over the proving ground would be helpful. 427/

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On Monday, 16 June 1958, [redacted] departed 3.5(c) Washington for Las Vegas. They were accompanied by [redacted] 3.5(c) [redacted] who was serving as courier to safely trans- 3.5(c) port the U-2 photography of the proving ground, and [redacted] 3.5(c) [redacted] representing the AEC Intelligence Division. 3.5(c) En route, they were able to take air photos of some of the uranium plants on the Colorado Plateau as well as the Lake Mead National Stockpile Site.

The morning after their arrival in Las Vegas, they reported to Camp Mercury, the support base for the proving ground, where they met [redacted] acting chief 3.5(c) of security, and [redacted] project engineer, who were 3.5(c) to serve as guides. Following a brief orientation, they headed out into the field in their rental car, with their escort. For the next three days, as [redacted] phrased it, 3.5(c) they "saw whatever we wanted to see, measured whatever we wanted to measure, and photographed whatever we wanted to photograph." They carried with them their copy of the mosaic which, for this purpose, was classified TOP SECRET, without systems controls. Key proving ground personnel with whom they came in contact were aware that, for whatever reason, these visitors were interested in identifying on the ground the test facilities imaged on the photography.

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One feature of the check was a flight over the proving ground in a Beech aircraft. For purposes of close inspection, the flight proceeded at an elevation of about 1,000 feet. The result was an extremely rough ride that made [redacted] and the security man feel quite ill. In 3.5(c)
the course of the flight [redacted] were able to 3.5(c)
make stereo photographs of many facilities of interest to them. They also overflew Project Rover, the nuclear jet propulsion test site then under construction in nearby Jackass Flat, as well as the Tonopah Test Site, a nuclear artillery ballistic proving ground about 100 miles northwest of Camp Mercury.

In the course of their ground inspection, they met [redacted] the senior scientist then present at 3.5(c)
the test site. [redacted] was directing the preparation of 3.5(c)
tunnels for future underground tests. He spent considerable time with the visitors in his office, explaining the work going on in the proving ground and providing them with maps and photographs. [redacted] examined 3.5(c)
the effects of a previous underground shot (Ranier), which were barely visible on the surface. [redacted] vigor- 3.5(c)
ously pursued the thesis that they should not pay too much attention to what had happened out on the flats, since that kind of testing would soon be terminated. 428/

On the contrary, he advised them to direct their attention to what was going on in the tunnels, and urged them to spend as much time as possible in the area of underground testing. [redacted] did go into one 3.5(c) of the tunnels -- about 10 or 15 minutes after the removal of two injured men, one of whom died. A big rock had fallen on them from the roof of the tunnel while the two men were standing at a water cooler getting a drink. [redacted] were told that the material through 3.5(c) which the tunnel was being bored, unlike some, never gave any audible warning before breaking loose. [redacted] easily 3.5(c) preoccupied with matters of intellectual interest to him, was a willing subject for [redacted] enthusiastic discourse 3.5(c) on the fine points of tunneling. [redacted] who was not 3.5(c) so oblivious to the risk involved, reflected on the fact that he never expected to see the inside of a tunnel on a photograph. Accordingly, he asked himself, "Why in the hell am I in here?" He thereupon got out of the tunnel. 429/

The ground check proved highly illuminating. Though several persons who had spent considerable time at the proving ground had assisted [redacted] in the an- 3.5(c) notation of the mosaic before leaving Washington, they found a "large number" of these annotations in error. They concluded that it was highly desirable for PIs working on new, exotic installations to examine such targets on the ground, with aerial photography in hand, before attempting to interpret such photographs in the office. They also expressed the hope that in the future overflights of such installations could be made in a helicopter, with its ability to hover over features of interest.

Pictures taken by [redacted] were left with AEC officials at the proving ground for processing, classification, and forwarding to HTA. 430/ The July report of the Military-Scientific Branch noted that the photographs, which were in stereo and in color, had arrived, and that they were well suited for incorporation into the branch intelligence exploitation file. The report added that plans were under way to use these photographs in a forthcoming briefing to be given Center photo interpreters. 431/ 3.5(c)

On-site trips during the spring of 1958 were not confined to the ground check by [redacted] at the Nevada Proving Ground, and the addition of photographs taken by them were by no means the only inputs to the growing collection of key-type materials in the branch. In May 1958, the MSB monthly report noted that good progress was being made on the collection of aerial 3.5(c)

photos of nuclear installations. It also added that when "Air Force photography" then on order arrived, MSB would have photography covering 75% of all known nuclear installations in the world. Installations covered by photography taken on U-2 training missions over the United States had also been obtained and added to the MSB file. 432/ Two months later, MSB reported that [redacted] 3.5(c)
[redacted] had organized the "Soviet Aircraft Key" started 3.5(c)
nearly two years earlier when [redacted] was in the Special 3.5(c)
Projects Branch, and that it would be ready for publication in the fall. 433/

Nor was the [redacted] trip to Nevada the only 3.5(c)
one during the spring. Others, such as the [redacted] trip EO 13526 3.5(c)
from 9 to 24 April to various domestic guided missile operational and test facilities 434/ and the trip of [redacted] to Grand Junction and nearby uranium mining and milling sites in Utah followed by a stopover at the Fernald, Ohio, feed materials plant on the way home, 435/ were only of lesser historical interest because they substantially repeated earlier experiences of other MSB photo interpreters. All were important, however, in the development of a PI capability second to none in the interpretation of photography covering exotic targets in denied areas.

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As the experience of MSB supervisors grew, they began to question the customary arrangements for gaining access to domestic installations of interest to the branch. In all but rare cases, such as the [redacted] 3.5(c)
[redacted] trip to Nevada, one or two HTA photo interpreters 3.5(c)
would join a larger group from some other Agency component, such as a division of OSI. Though there was a community of interest in the installations included in the itinerary, the points of view were different. The primary interest of intelligence analysts might be in technical details of the manufacturing processes being employed or in the fine points of the guidance system used in the flight of a missile. With the photo interpreter it was different. Though he would be interested in such things for background use, particularly in offering explanations, they would be of interest only to the degree that they were reflected in objects imaged on overhead photography. Thus, differences in the practical applications called for different approaches.

The appreciation of this difference and its significance in the planning of on-site trips for the PI was best stated in a memo from [redacted] to Lundahl. [redacted] 3.5(c)
emphasized that, to be of greatest benefit to the PI, first of all, on-site trips should be originated in and

planned by HTA. He added -- in the same memo, written before [redacted] went to the Nevada Proving Ground 3.5(c) -- that the PI should examine facilities on the ground in conjunction with overhead photography. He further urged that HTA, through the Support Staff and the OCR Information Branch, should institute a photo and report collection program to identify and then assemble collateral files on US installations and studies in fields of interest to HTA photo interpreters. 436/

Four days later [redacted] followed up the foregoing 3.5(c) memo with one proposing two on-site trips to nine domestic guided missile, nuclear energy, and biological warfare facilities. Each trip would be 20 days in length and provide travel for seven MSB photo interpreters. He thus allowed three spaces for other HTA personnel if the group total were held to 10, and eight additional spaces, if the total number were held to 15. By scheduling two trips, it would be possible to keep MSB manned by more than 50% of its personnel during each trip. Travel would be by Agency plane; one trip was suggested for September 1958 and the other for early October. 437/

With these accomplishments in the spring of 1958, the Military-Scientific Branch supervisors and PIs demonstrated again not only their willingness and interest in

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tackling thorny tasks exploiting exotic targets about which little was known, but also their vision in discerning what had to be done to develop the necessary capability as well as their determination to enlist the approval and support of higher authority in attaining these objectives.

5. Two Soviet Heavy Water Plants

June 1958 saw completion of consultations on the remaining nuclear-related installations under JAM SESSION. First there were the meetings on the heavy water plants.

Reflecting the lesser importance of these installations and the smaller volume of information to be examined, consultations on the heavy water facilities were scheduled for only two days, 2 and 3 June 1958, in the Steuart Building. Co-chairmen of this meeting were [redacted] 3.5(c)
of JAEIC and [redacted] an Army PI and 3.5(c)
chairman of the joint PI effort. Other participants were
[redacted] of OSI, and [redacted] 3.5(c)
The last 3.5(c)
three, [redacted] constituted the PI team. 438/

Objects of the consultation were the heavy water (deuterium oxide -- D_2O) production facilities at the Chirchick Electrochemical Combine, about 20 miles northeast of Tashkent, USSR, and at the Kirovakan Chemical Combine, more than 50 miles south-southwest of Tbilisi, USSR. Information derived from aerial photography of both facilities was prepared and published in a single large-format HTA photo interpretation report in May 1958 in anticipation of the consultations. 439/

Heavy water was believed to be of importance to the Russian nuclear energy program as a moderator in reactors and as a fission fuel. The Intelligence Community was eager to learn the identity of the heavy water facilities, to obtain dimensions of buildings used in the production of heavy water, to determine the layout of pipelines and internal transmission systems, and to get information on the sources of electricity and water.* The latter was important as a raw material; the power would be required in enormous amounts in the catalytic exchange-electrolytic process believed to be in use in both plants.

Photography revealed that the Chirchik plant was nearly twice as large as the one at Kirovakan and had greater available power and water. Consultants concluded

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* The source of information on the Chirchik and Kirovakan facilities, as well as illustrations on them used in this volume, is the HTA photo interpretation report. 440/

that it had by far the larger capacity. Located within the Chirchik Electrochemical Combine, the heavy water facilities were situated in a walled compound in the northern part of the huge installation (Figure 107). The combine was covered by oblique photography on 5 August 1957 and again on the 28th of the same month by better quality vertical photography, a situation reminiscent of the coverage of the Tyura Tam Missile Test Center by the same missions.

Heavy water facilities at the Chirchik Combine consisted primarily of two buildings (Figure 108). The larger one, measuring 631 by 214 feet overall, was identified as the electrolysis building, where hydrogen and oxygen were produced. A 124- by 21-foot extension on the south side of the larger building, rising to a height of about 80 feet, was believed to house catalytic exchange towers. The second building, 295 by 50 feet, was believed by JAM SESSION participants to be a secondary electrolysis facility where dilute D_2O from the larger building was concentrated. A pipeline extended from one of these buildings to the other, supporting this deduction.

Sources of electricity and water appeared sufficient for any conceivable needs, but JAM SESSION participants found it impossible to determine with precision the amount of either consumed by the heavy water plant as distinguished from the rest of the combine. As far as electricity was concerned, there were seven hydroelectric plants along the Boz-Su Canal, near Chirchik. From these facilities 11 power lines fed into the switchyard located inside the combine at a point 750 feet north of the larger electrolysis building. This switchyard was also tied to the Uzbek Power Grid. The only clue as to the amount of power entering the heavy water plant rested on the apparent transformers next to the larger electrolysis building, which suggested an operation in the range of 100 megawatts. An ample supply of water, ultimately in the form of steam or steam condensate, was available from a reservoir situated just west of the combine, along the Boz-Su Canal.

The Kirovakan heavy water plant, located within the Kirovakan Chemical Combine, was photographed on 10 September 1957 by the same mission that covered the Kapustin Yar Missile Test Center. World War II photography of this installation taken by the Germans provided comparative coverage that yielded information dating the expansion of plant facilities.

At the Kirovakan Combine, in contrast to the Chirchik installation, the heavy water facilities were housed in one large building (Figure 109). Piping evident around the building was believed by JAM SESSION participants to carry steam for use in the production process. A comparison of 1942 and 1957 photography showed that the heavy water facility and a structure believed to be a covered reservoir were among several key components in the combine that were built some time between the two dates.

The comparative photo coverage also revealed a big expansion in electric power since 1942. A new power line, probably 110 kw, fed into a substation, which had also been enlarged. It was presumed that the primary user of the added power was the new heavy water plant.

No water treatment or pumping facilities were apparent along the river. A cooling tower adjacent to the structure believed to be a covered reservoir suggested the need for water conservation measures. On the basis of the foregoing evidence, JAM SESSION workers concluded that water for the facility was probably obtained from wells.

6. <u>Uranium Mining and Milling Sites</u>

The last JAM SESSION consultant meetings were held at HTA from Monday, 9 June 1958, through the rest of that week. The subject was the mining and milling of

uraniferous ores in the Soviet Union and Satellites. Objects of the examination were eight sites believed, on the basis of U-2 photography and supporting collateral evidence, to have been engaged in this activity. The sites, six in the USSR and two in the Satellites, extended from Crossen in East Germany to Kadzhi-Say in Soviet Central Asia near the border of China. Participants, led
[redacted] 3.5(c)
[redacted] who were designated co-chairmen, included 3.5(c)
[redacted] industrial consultants, 3.5(c)
and [redacted] Also in 3.5(c)
attendance were three photo interpreters, [redacted] 3.5(c)
[redacted] of the US Navy, and [redacted] 3.5(c)
of the US Army. 441/ All three had worked with [redacted] in 3.5(c)
exploiting the photography and in selecting materials to be included in the consultants' workbook prepared by HTA for these meetings.*

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* This workbook, consisting exclusively of maps, photographs, line drawings, and perspective sketches, is the source of most of the illustrations and the PI information used herein. 442/ HTAUTOMAT photo intelligence reports, based on the photography used in the June 1958 meetings, were published only on the Bukhovo and Crossen installations. Reference to them is made at the appropriate places in the text. The opinions, interpretations, and conclusions attributed to the consultants and intelligence analysts are excerpted from the transcript of the proceedings. 443/

To a degree not typical of other types of installations studied during JAM SESSION, information on the local geology and nature of many of the ore bodies involved in these consultations was available from the pre-World War II open literature, particularly German and Russian sources. In bringing this information to bear on the problems of exploitation, [redacted] also 3.5(c)
skilled at photo interpretation, made a very significant contribution. [redacted] was able to read the original 3.5(c)
Russian texts and similarly made a unique contribution in providing spot translations of items and passages that might otherwise have been difficult or impossible for the others. The two industrial consultants also had interesting and highly pertinent experience as well. [redacted] 3.5(c)
[redacted] a private consultant to industry at the time of 3.5(c)
JAM SESSION, had earlier been director of raw materials for the AEC. [redacted] was a consulting engineer who had 3.5(c)
designed uranium mills in both the United States and South Africa. Though the installations under study were much less exciting and the evaluations of the information less urgent than in the case of most other JAM SESSION targets, this all-source exploitation team achieved considerable success. They were able to provide solutions to many problems posed by the photographic evidence, particularly

in assessing the productive capacity of each of the plants. 444/

The most remote of these installations was the complex of mining and milling facilities in the Tien Shan (Mountains) overlooking the south shore of Issyk Kul (Lake), east of the town of Kadzhi-Say (Figure 110). This complex was unusual among the eight sites studied in that the raw material was lignite or brown coal. According to [redacted] the uraniferous materials had probably been deposited by ground water in fractures in the 3.5(c)
beds of coal or lignite. [redacted] believed that the coal or lignite was crushed, roasted, and the uranium then recovered from the residue by leaching and filtration. 3.5(c)
Such a process would, he observed, result in a product from 50% to 90% U_3O_8. He added that the yearly output of the plant was probably in the range of 400 to 500 metric tons of U_3O_8. [redacted] commented that there was only one active mine, but he believed it capable of producing the estimated 500 tons of raw material per day needed to supply the plant. 3.5(c)

The Kadzhi-Say complex was covered on 21 August 1957 by the same mission that obtained the stunning photography of the Tomsk Atomic Energy Installation. Though the photography was of good quality, many of the identifications

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of facilities were qualified by the common PI hedge, "possible" (Figure 111). The ore crushers were easy to spot, but the buildings presumed to house the roasting, leaching, and filtration equipment were all identified by the PIs with considerable uncertainty. It may seem unusual that the confidence level associated with the identification of all three major processing buildings was so low, but it should be pointed out that these were preliminary interpretations prepared prior to the consultant meetings. Though the interpretations dovetailed nicely with [redacted] description of the possible flow sheet, 3.5(c) this confirmation by so knowledgeable a person would not have been available to the photo interpreters until after the graphics were prepared.

[redacted] observed that the uraniferous ore must have 3.5(c) been well prospected before the building of so elaborate a processing facility in such an isolated place. [redacted] 3.5(c) added that the Russians must have been satisfied that the ore reserve was sufficient to provide a useful life of 10 to 15 years for the plant. On the other hand, he offered the opinion that a considerably larger facility might have been constructed had the ore reserve been determined to be of great magnitude.

The other three Central Asian mining and milling sites, Taboshar, Ispisar, and Mayly-Say, were situated in the Fergana Valley (Figure 112). The Taboshar and Mayly-Say complexes included both mines and mills; at Ispisar there was a uranium mill, but no mines.

The area around Mayly-Say was covered on 5 August 1957 by the same mission that provided the initial, largely oblique photography of the Tyura Tam Missile Test Center. Though the Mayly-Say area was photographed well out on the oblique with the B camera, which was not yet performing up to expectations, photo interpreters were able to identify much activity in the region. Numerous mines were scattered in the hills and mountains, and a large uranium plant was situated in the valley of the Mayly-Say River above the town of the same name (Figure 113).

Photo interpreters were able, in the preliminary analysis on which the plant layout was based, to identify ore and reagent conveyors, a crushing and grinding building, a fine grinding hall, a mixing and agitation facility, thickeners, and a filtration hall (Figure 114). There was also a large building, labeled "recycling, packing and mill product storage," which did not fit nicely into the chemical processing operation suggested by identifications of the other facilities. This was a problem for the consultants to try to resolve.

Waste materials from the filtration hall were moved by pipeline to a nearby slurry pond. Electric power was furnished by a coal-fired generating plant situated along the Mayly-Say River next to the uranium plant. A power line led from the power plant to a transformer yard adjacent to the main processing building.

At the meetings, [redacted] pointed out that the Rus- 3.5(c)
sian literature stated that the uranium in this area was found in limestone. A photo-geological investigation also reported in those open sources indicated that faulting was possibly the dominant control of ore location. This seemed to be confirmed on the photography because the mining activity evident thereon was located
at quite variable altitudes. [redacted] noted that there was 3.5(c)
little evidence on the August 1957 photography of explora-
tion activity in the area. [redacted] added that the apparent 3.5(c)
lack of drilling roads might indicate that the ore bodies were of fair size and could be found by underground prospecting. On the basis of the size of the pile of tailings, he estimated ore production at about a thousand tons per day.

[redacted] observed that the plant layout appeared to be that of a conventional carbonate leach plant, which fitted, with the exception noted, the interpretation of the plant components imaged on the photography. The presence of the ore in limestone precluded preliminary concentration by use of gravity flow and required construction of the full-scale leaching plant. Processing, according to [redacted] would involve grinding, agitation, leaching with sodium carbonate solutions, then thickening of the ground product, and filterings. [redacted] likened the flow sheet to that used at Grants, New Mexico, and speculated that the product would contain between 70% and 75% U_3O_8. [redacted] added that the production of U_3O_8 would likely be on the order of two tons per day. 3.5(c) 3.5(c) 3.5(c) 3.5(c)

[redacted] pointed to the building labeled "recycling, packing, and mill product storage" and observed that it was the one building that did not seem to fit what he called normal milling practice. The feature that puzzled him particularly was the conveyor between it and the main building. He suggested that this might house a facility where concentrates from mines other than those producing carbonate ores for the main facility were received for upgrading as concentrates before shipment to a solvent extraction or metals plant. 3.5(c)

The mining and milling complex at Taboshar was situated in the mountains, approximately 25 miles north of Leninabad. Photography of 28 August 1957, taken on the same mission that obtained the excellent vertical coverage of the launch area at the Tyura Tam Missile Test Center, revealed an ore processing installation near the town of Taboshar fed by mines in the hills farther to the northeast. A power line entered the area from the south and split into two lines, with one serving the milling area and another mines (Figure 115). The photography also disclosed that the region was arid, suggesting that conservative use of the available water would be required in milling operations.

Though there were several significant differences between the Taboshar complex and those at Mayly-Say and Kadzhi-Say, most fundamental of all was the difference in the nature of the ore body. [redacted] explained that, at Taboshar, the uranium was found in small polymetallic veins in granitic rocks. Quoting a 1935 Russian source, [redacted] added that the ore was susceptible to initial concentration using physical means, including gravity, because of the sharp contrast between the physical properties of the ore and those of the surrounding rock.

3.5(c)
3.5(c)

The milling area was dominated by a large multilevel ore-dressing building which made full use of the high relief so as to provide for gravity flow of materials in the processing cycle (Figure 116). Identification of several other mill facilities was less appropriate, in part, at least, because of the obliquity of the photography. Among those deserving special mention were two large "underground tanks," a "storage and loading building," and four "Durr-type filters" with several adjacent piles of water-deposited tailings (Figure 117).

[redacted] believed that the ores were crushed, 3.5(c)
screened, passed through a ball mill, then conveyed to tables where the heavy minerals were sorted out, leaving sands, which were dumped in the waste piles adjacent to the ore dressing building. The ore concentrates and fine grained material, which contained most of the uranium, would then be thickened in the two thickeners ("underground tanks") next to the main processing building and then sent to a filter plant (Item 10, Figure 117) for dewatering.

[redacted] remarked on the apparent absence of acid 3.5(c)
tanks or reagent handling facilities which would suggest that the ores were being treated chemically. He did not, however, rule out the possibility that there might be

some chemical treatment rather than direct shipment of the concentrate. The reason for his uncertainty was the presence of the large water-deposited tailings piles adjacent to four thickeners (Item 26, Figure 117). To [redacted] this suggested the possibility that the fine material might be leached in the large ore processing building with dilute acid and the uranium precipitated and filtered in the two large thickeners (Item 9, Figure 117). The slime tailings, which would have to be neutralized with lime, might then be sent to the four smaller thickeners and the residue piped to the nearby waste piles. The exact nature of the ore processing and the flow sheet in the Taboshar mill were, thus, somewhat uncertain. 3.5(c)

[redacted] estimated that the plant might process about 1,000 tons of ore a day and produce one and one-half tons of uranium concentrate. If physical means alone were used in the concentration, he speculated that the products would assay one-percent or more U_3O_8. On the other hand, he esitmated that the concentrate would run 14% to 15% U_3O_8, if chemically treated. In either case, the concentrate would be sent to the uranium plant at Ispisar for further refinement. He believed, therefore, that the mill at Taboshar was a satellite facility with respect to the plant at Ispisar. 3.5(c)

The Ispisar Uranium Plant was photographed on 28 August 1957 by the same mission that covered the Taboshar mining-and-milling complex, farther south. At Ispisar, however, the photography was essentially vertical, a circumstance that facilitated interpretation and resulted in a high degree of compatibility between the PI information and the functional interpretations of the consultants.

The plant was situated out in the broad plain of the Syr-Darya (River), on the outskirts of Ispisar. Main components of the plant, as revealed on the photography, were an ore storage yard, a chemical storage facility, an ore processing plant, a tailings pond, and what the PIs confidently identified as a thermal power plant (Figure 118). Within the plant itself, the main facilities were a chemical storage area with numerous round and rectangular tanks, a nearby chemical preparation building, an array of seven ore bins, a series of crushers and grinders, two large thickeners, an ore concentration facility, and a "recovery" plant (Figure 119).

There were no uranium mines in the immediate vicinity of the Ispisar Uranium Plant. Rather, [redacted] pointed out, this plant appeared to be the main facility for the further processing of ores from many mines in the Fergana

Valley. [redacted] 3.3(b)(1)

Ores in the Fergana Valley, with the exception of those at Mayly-Say, occurred in either granitic rocks or sandstones, both of which were susceptible to preliminary concentration. He added that the presence of raw ore piles around the plant indicated that both ore and concentrates were being treated there.

[redacted] expressed the belief that the plant was 3.5(c) processing concentrates and small amounts of crude ore. As he saw it, the seven ore bins probably held high-grade concentrates for blending, to be used in the ore receiving and blending station. The feed material would then pass through the crushing and grinding units and probably ball mills, which would, in turn, feed the thickeners. The underflows from the thickeners would be leached (in Item 5, Figure 119) and the solution sent to be neutralized and the uranium precipitated (in Item 7, Figure 119). All these steps in the flowsheet fitted nicely into the facilities identified in the plant by the photo interpreters.

Though the plant was an old one that could not be compared favorably with then current American practices of ion exchange or solvent extraction, [redacted] observed 3.5(c) that it looked like a first-class operation. He believed that the product was amonium diuranate, with a U_3O_8 content of 75% to 90%. The fact that the percent of U_3O_8 from the other presumed sources was even less certain than that from Taboshar, coupled with the fact that the mix of concentrates and raw ore was unknown, made production estimates quite uncertain. [redacted] offered the opinion that 3.5(c) the annual production was probably on the order of 2,000 metric tons.

The complex of mines and mills northwest of Pyatigorsk, on the north flank of the Caucasus Mountains, was covered on 10 September 1957 by the mission whose prime target was the Kapustin Yar Missile Test Center (Figure 120). Source of the uraniferous materials here was believed by Russian sources in the open literature to be a common magma, from which the 11 plutonic bodies shown on a Russian geologic map and the September 1957 photography were evidently derived. These intrusions were scattered over an area nearly ten miles in diameter. Typically, they appeared on the photography as topographic highs in which the igneous rocks were exposed near the top and older sediments covered the flanks (Figure 121). According to a 1937 Russian source, all the intrusives were abnormally radioactive. The literature further indicated that veins of black material, reportedly having a content of 20% manganese oxide, were found on the slopes of Mount Tupaya, one of the 11 plutonic bodies mentioned above. [redacted] noted the opinion 3.5(c) of the US Geological Survey that uraniferous material in the area was probably associated with the manganese oxide. He also pointed out that the sedimentary deposits were said to have much carbonaceous material, which was concentrated in fissures and near zones of contact. He added that these carbonaceous materials, too, appeared to bear secondary deposits of uranium derived from primary sources in the associated igneous rocks.

The September 1957 photography revealed that most mining in the area was concentrated in two of the peaks, Gora (Mt.) Beshtau and Gora Byk. According to [redacted] 3.5(c) most of the mines and, apparently, most of the ore production were associated with the veins in the igneous rocks, as shown by the alignment of mines with linear features evident on the photography. Only three mines, including a very large one on the side of Gora Byk, were exploiting deposits in the overlying sediments. It was the conclusion of [redacted] that, since there were nine 3.5(c) other intrusive masses in the area and since the potential of the sediments was scarcely scratched, the ore reserves in the area were probably very large.

An ore crushing mill was situated on the slopes of the Gora Beshtau and another on Gora Byk. In the former, at least, [redacted] noted that the material mined was apparently a sand or conglomerate in which the fine material contained the uraniferous constituents. He suggested that the ore was first crushed and screened several times, after which the fine material was dropped from a hopper into railway cars for shipment to the main processing plant. Such a process would permit the handling of really low-grade ore. There was no indication that the bulk of the ore, which came from veins in the igneous rocks, was given any such preliminary concentration. 3.5(c)

The main ore processing plant appeared very new. Key components included ore receiving buildings, crushers, and leaching and concentration facilities (Figure 122). Adjacent to the uranium processing facilities was a coal-fired power plant, and nearby a tailings pond.

The facilities thus identified by the PIs fitted very nicely the flow of materials suggested by [redacted] 3.5(c)
According to him, the concentrates were probably received at Building 1 (Figure 122) and the raw ores at Building 6. The former and, after crushing in Building 5, the latter would move to the acid leaching building and

then to Building 7. [redacted] noted that the latter 3.5(c)
facility, with the pachuca tanks in the front of it (Figures 122 and 123), was "almost identical in size and design" with the ion-exchange plants in South Africa, which had been constructed earlier.* He observed, incidentally, that in the South African plants the pachuca tanks were used for manganese recovery, a point of at least passing interest in view of the opinion that the bulk of the uraniferous ores in the Pyatigorsk area were associated with deposits of manganese oxide.

Since processing in this plant apparently employed ion exchange, [redacted] believed that the recovery rate of 3.5(c)
U_3O_8 was high and that the product probably contained 85% to 90% U_3O_8. Assuming an average grade of ore, he estimated the production at about two short tons of U_3O_8 per day.

[redacted] both remarked on the excellent 3.5(c)
design and construction of the Pyatigorsk plant, and pronounced it by far the best and most modern of those considered during JAM SESSION. [redacted] observed that 3.5(c)
the Soviets must have been very confident of the ore

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* [redacted] upon hearing this comparison asked, somewhat 3.5(c)
rhetorically, whether the slowness of the Soviets in building the plant could have been because their information wasn't coming through fast enough from South Africa.

reserves and the continued success of their mining operations or else they would not have constructed such a fine plant. He summed it up in these words, "That's one hell of an expensive plant."

JAM SESSION deliberations ruled out the Sillamae mining and milling complex as a continuing, productive source of uranium. It had been photographed on 4 July 1956 by the first U-2 mission that penetrated Russian airspace. The photography showed an expansion in open pit mining and in the ore processing plant since the site was photographed by the Germans in World War II. There was little photographic evidence, however, to support the hypothesis that this was a large-scale uranium mining and milling complex.

The evidence and opinions of the consultants were even less promising. [redacted] presentation of the 3.5(c)
geological background led to the conclusion that the U_3O_8 content of the shales was but a small fraction of that in the other Russian ore deposits considered during JAM 3.5(c)
SESSION. [redacted] took his cue from [redacted] and compared 3.5(c)
the shales around Sillamae and possible Russian attempts to exploit them for their uranium content with the abortive attempt by the United States to exploit the Chattanooga shales. As the United States found material of higher grade, the research and development effort to utilize

these shales was dropped in spite of the fact that a good process was found because it was too costly in money, equipment, and effort.

The plausibility of this reasoning was confirmed by the photography, which yielded no evidence of the monstrous processing plant or plants that would have been required to handle millions of tons of ore per year. Moreover, there were no waste dumps of the size expected if such large volumes of extremely low-grade material were processed through a plant. Consultants agreed that whatever the mine and mill near Sillamae were producing, it was not U_3O_8.

The other two uranium mining and milling installations examined during JAM SESSION were situated at Crossen, East Germany, and Bukhovo, Bulgaria.* Unlike Sillamae, these were obviously significant producers of uranium for the Soviet Union. In the vicinity of Bukhovo there were both mines and a concentration plant; at Crossen, which received its ore from more distant sources,

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* The photo intelligence report on the Bukhovo complex was issued in November 1958, and the one on the Crossen plant the following July. 445/ Information from both, as well as from the graphics prepared for the consultants and the transcript of the meetings, have been used in the sections dealing with these two installations. Incidentally, graphics incorporated in these two photo intelligence reports were identical with those in the consultant workbook.

there was only a concentration plant.

There were many similarities in the operations at these two plants as well as profound differences in the concept of operation at these plants, which were outside the political boundaries of the USSR but under direct Russian control, and those in the Soviet Union. As [redacted] 3.5(c)
[redacted] pointed out, the Russians were clearly committed 3.5(c)
to the policy of getting the ores or processed materials out of the Satellites as early in the handling process as possible and with a minimum of capital investment. Thus, in both East Germany and Bulgaria, ore was sorted at the mines by radiometric inspection and that containing approximately one percent or more of uranium was boxed and shipped directly to the Soviet Union. The rest was treated in the Satellites and upgraded to a concentrate having from one percent to five percent or more U_3O_8 before being shipped to the USSR for further processing.

The Crossen plant was a former paper mill converted by the Soviet uranium combine after World War II to process East German ore. At the time of JAM SESSION, it was the largest known uranium concentration plant in the world. It was old and inefficient, however, and its size was more a testimony to inefficiency and the low grade of ore handled than the amount of concentrates produced, though

the output was obviously large. [redacted] observed that 3.5(c)
the Crossen plant was 10 or 12 times as big as a modern ion-exchange facility handling a similar tonnage of ore. He added that the consumption of chemicals at Crossen was astronomical, "and the cost of them alone would exceed the total operating expenses of a modern plant."

The installation was photographed on 10 July 1956 by the last of the initial group of U-2 operational missions. Ground photography of April 1957 was also available to supplement the overhead coverage. On the basis of what the PIs saw on the photography -- and with a big assist from collateral information -- they grouped operations into three categories, which were somewhat confusingly designated "plants," namely, Plant A, Plant B, and Plant C (Figures 124 and 125).

Collateral information, of which [redacted] also made 3.5(c)
liberal use -- the other JAM SESSION participants had virtually nothing to say -- indicated that the ore processed at the Crossen installation was of two types, each from a different source. One was a hard, granitic ore from the Erzgebirge, in Saxony, and the other a lower-grade ore from sedimentary deposits in Thuringia. The latter was amenable only to chemical processing, but the former was susceptible to mechanical concentration.

[redacted] gave no specific information on his conception of the flow of materials through the Crossen plant, but he did compare the flowsheet to that of the initial "100-ton" unit installed at Monticello, Utah, except for the roasting ovens used to recover vanadium at the latter installation. 3.5(c)

The PI report, published a year later did speculate, however, in some detail about the manner in which ore was processed through the plant. According to this source, Erzebirge ore arrived by rail at a large ore stockpile on the south side of the Zwick Mulde River, opposite Plant A. An overhead conveyor transported it across the river to Plant A, where it passed through a radiometric sorting device and then through a series of crushers, grinders, and classifiers before being dumped into ore bins.

The ore was then concentrated mechanically in a series of non-contiguous buildings and facilities designated Plant B. Buildings in this so-called plant housed jigs, filter presses, and thickeners. Some of the latter were also located out in the open.

Thuringian ore, which was believed to constitute about 25% of the total, was chemically treated for recovery of the uranium in facilities designated Plant C. This so-called plant had its own crushers as well as acid leaching and precipitation facilities to concentrate the ore and recover the valuable materials. Since it was not a modern facility using an ion-exchange process, the product was comparatively low grade, probably on the order of 5% to 10% U_3O_8.

Power for the Crossen installation was supplied primarily by a coal-fired electricity generating plant within the fenced area. This source was augmented by power from a substation in Crossen and another in Goesanitz. Auxiliary power was provided by a small hydroelectric plant using water from the Muehlgraben Canal, which flowed through the plant area. That the power supply was probably inadequate was suggested by construction under way of another power plant on the east side of the overall installation at the time of the overhead photography. Water for processing the ore was available in abundance from the Zwick Mulde River, which bounded the uranium concentration plant on the south and west sides.

Daily production was estimated by to be 3,200 pounds of U_3O_8 from the gravity plant and 4,500 pounds of U_3O_8 from the chemical processing plant. Estimated daily production given in the PI report published a year later, presumably after further analysis, was substantially the same. The latter publication also reported on a methodology for estimating production based on the amount of floor space (square feet) and volume (cubic feet) needed to produce one ton of U_3O_8 per day at Crossen by each of the two processes, physical and chemical. It was believed that these figures would be useful in making estimates of production at similar uranium processing plants in the Satellites.

The mining and milling complex around Bukhovo was covered by U-2 photography on 10 December 1956. Ground photography taken four months earlier was also available for the uranium plant. The overhead photography revealed that mining was most active on and around Mt. Goten, just north of Bukhovo (Figure 126). There was no evidence of shaft mines or adits, just a multiplicity of small diggings.

[redacted] explained that the geologic literature indicated that Mt. Goten was underlain by an intrusive mass that was not exposed at the surface. He noted that the overlying rocks on the high points seemed more massive and more metamorphosed than those farther down the flanks. He observed that most of the mining seemed to be taking place in small vein-like deposits in the zone of highly metamorphosed rocks lying near the contact between the sedimentaries and the underlying plutonics. He pointed 3.5(c) out the virtual impossibility of making any logical estimate of the probable ore reserves in this kind of situation. [redacted] added that such mining might go on for years and years without anyone ever knowing how much ore was left. 3.5(c)

The Bukhovo uranium concentration plant occupied a site covering more than 20 acres at the foot of Mt. Goten, on the edge of the village of Bukhovo. Here, roads from the mines converged, and the sloping piedmont facilitated a gravity flow of materials through the plant.

[redacted]observations at the time of JAM SESSION on the possible flowsheet were rather sketchy. Interpretations in the PI report utilized and amplified [redacted] 3.5(c) observations and presented a somewhat more complete picture of the apparent manner in which the ore moved through the plant. According to the PI report, ore drawn from the stockpile high on the hill moved by two parallel conveyors through two separate sections of the plant. The very low-grade ore was processed by both gravity and chemical means; the rest was concentrated by gravity. PIs were able to identify buildings that appeared to house ore crushers and grinders (Buildings 1, 18, 19), gravity concentration facilities (Building 22), and leaching plant (Building 25), a building thought to house precipitation facilities (Building 27), thickeners, and a long narrow building (Number 45) which was believed likely to house filter presses for clarifying the solutions (Figures 127 and 128). Two large piles of tailings and a tailings pond were situated downslope from their respective sources of waste material.

Water for plant operations reportedly was piped from a reservoir on the summit of Margush Mountain, several miles to the northeast. A power plant situated in the southwest corner of the site was judged to have a generating capacity sufficient only for the needs of the Bukhovo plant itself. Collateral sources indicated that power for the mines was transmitted from the Kurile power plant northeast of Sofia, but PIs were unable to trace power lines on the photography. The supply base and point for rail shipment of the concentrates were located at Yana, a few miles south of Bukhovo (Figure 126).

Estimates of the plant capacity, based on photographic evidence, varied widely between the "horseback
estimate" given by [redacted] at the JAM SESSION meetings 3.5(c)
and that published in the PI report. At the time of JAM
SESSION, [redacted] suggested that one key to the possible 3.5(c)
production was the surface area of the three 45-foot thickeners. By a process that involved an assumption concerning the tonnage of ore handled in this key facility,

the slime/sand ratio derived from the Crossen plant, the amount of U_3O_8 believed contained, on the average, in a ton of Bukhovo ore, and the percentage of that U_3O_8 believed to be recovered through processing, [redacted] estimated potential output for 300 work days as 160 tons per year. 3.5(c)

Using a more complicated system based on factors developed from a study of the Crossen plant, the PI report gave a comparable estimate of 360 tons per year. The PI report warned, however, that parallels drawn between the Crossen and Bukhovo operations might not hold, that one of the four factors used -- the size of the waste dump at Bukhovo -- could not be measured accurately, and that photo interpreters had no way of determining how much of the plant capacity was being utilized.

The publication issued by HTA on the Bukhovo plant following JAM SESSION, though ostensibly a PI report, was in reality an all-source report. Indeed, the SC control number betrayed this fact. Included in four appendixes was such non-photographic information as a list of Bulgarian uranium deposits, a long list of Russian payments to the Soviet-Bulgarian Mining Company (SBGO), details of chemical shipments to SBGO, and a very long list of Soviet personnel employed by SBGO.

Predictably, the report evoked a swift and highly unfavorable reaction from OSI, which made known to HTA and to [redacted] the author, its displeasure concerning what it considered a departure beyond the bounds of PI reporting. The resulting exchange of opinion was a significant factor at the time in refocusing the attention of HTA photo interpreters on photography as the prime source of information for their reports. 3.5(c)

The conclusion on 13 June 1958 of consultant meetings dealing with the uranium mining and milling installations brought to a close the most exciting and prestigious type of exploitation activity in which HTA photo interpreters had yet participated. There is no record to show, however, that the end of these meetings was followed by a formal announcement terminating JAM SESSION, though vague recollections suggest that this was done. The only related work still under way was that devoted to completion of manuscripts for PI reports on the missile and the mining and milling installations. Whatever the technicalities of record keeping, most of the potential inherent in use of the magic phrase, which had opened so many doors and provided almost instantaneous service on hundreds of requests for support, was exhausted. For all intents and purposes, JAM SESSION had ended.

B. Keeping Busy

Even in the Military-Scientific Branch, which had enjoyed a steady diet of JAM SESSION work for months, photo interpreters were not immune from more normal tasks. One of the more exciting among these -- and a task far more challenging than the humdrum activity in the Geographic Branch -- was the production of ODE's. Work on these first-phase reports on Russian penetration missions was always stimulating, since it offered an opportunity to see new targets and, perhaps, to discover others, like the Mozhaysk installation, whose existence was not even suspected.

The Far East mission, flown on 1 March 1958, afforded just such an opportunity. It covered the heart of the Soviet Far East, including cities and installations along the Trans-Siberian Railroad and the area around Sovetskaya Gavan, on the Gulf of Tartary. 446/

Most important and perplexing among discoveries from this mission was an installation, subsequently known as the Malaya Sazanka installation, located about 10 miles southwest of Svobodnyy and similar to those in the vicinity of Mozhaysk and Valday, in European Russia. As might be expected, this discovery rekindled flagging interest in the Mozhaysk problem. It did not, however, result in an immediate grandstand effort to publish a definitive report. Not only HTA but also other elements in the Agency and in the Intelligence Community were well aware of the difficulty they faced and the risk of disappointment. Though analysis of the photography was undertaken as soon as possible and the PI information made available to the Community, the overall effort to solve the intelligence problem was undertaken with caution and only after much consultation and planning. Consequently, the major portion of HTA work and the resulting detailed PI report were not available in published form until long after the end of the HTA period.

During the spring of 1958, ill effects suffered in the Geographic Branch during the winter as a result of the dearth of new requirements were substantially eliminated. The change resulted primarily from a dramatic increase in the amount of work for the Economic Research Area of ORR. From 26% of the project time in March, the comparable figure rose to 79% in May and held at 70% in the following month. There was also a modest but significant increase in the amount of time spent on DDP projects. 447/

Most of the increased work for DDP involved area studies in the Balkan States, near Murmansk, and around

Tyura Tam. In April, requirements for information on installations reported in the Mission Coverage Summary for the 1 March 1958 Far East mission gave a significant boost to the amount of work undertaken for ORR, and a search for possible deployed offensive missile sites in the Soviet Bloc further augmented work done for the same Office.

The requirement for the missile search, in which OSI was also interested, was generated by concern over the total absence of such information in the face of conclusive evidence of medium- to long-range missile development at the Kapustin Yar and Tyura Tam Missile Test Centers. The assignment of this task to the Geographic Branch, in spite of the fact that PI expertise in the interpretation of missile targets rested exclusively in the Military-Scientific Branch, was a reflection of the fact that PIs in the latter branch were busy with higher priority work. Ostensibly, GB photo interpreters, upon discovering a suspected missile site, would turn the evidence over to the Military-Scientific Branch, where the information would be examined, and if validated, published.

In due course, the search produced four sites suspected by Geographic Branch photo interpreters to be missile sites. The ones at Ventspils, USSR, and at

Kolberg Deep and Bydgoszcz, Poland, were qualified as possible guided missile sites; the one on the Hel Peninsula, Poland, was alleged to be a probable guided missile site. 448/ The Geographic Branch, unmindful of the need to pass such discoveries on to the Military-Scientific Branch for validation, promptly prepared a brief on each of the sites. Immediately following publication of the briefs, which took place simultaneously, several intelligence officers, including [redacted] 3.5(c)

[redacted] came to the 3.5(c)

Steuart Building -- to MSB, whose photo interpreters they assumed had prepared the briefs. When MSB interpreters told them that these were not guided missile sites but old gun positions identifiable on World War II German photography -- a source that PIs in the Geographic Branch had inexplicably failed to consult -- the visitors were very upset and expressed concern about the failure of HTA to speak authoritatively and with one voice. This was particularly true of the installation on the Hel peninsula, which had been called a probable guided missile site. Though swift and effective corrective action was taken by HTA to prevent any repetition of the same mistake by PIs working on this particular project, the continued existence of the two separate and equal detailed reporting divisions left the door open to future incidents of this type whenever there was overlap in their exploitation tasks.

First to suffer from this competition with higher priority projects in the Geographic Branch were the urban studies. The March monthly report from the Branch noted that work on the several urban studies was progressing slowly; the April report said that it had been temporarily suspended. 449/

EO 13526 3.3(b)(6)>25Yrs

There was one project concerning an urban area that was not deferred, however. The same April monthly report that a pilot study of Komsomolsk, which had been covered by the 1 March 1958 Far East mission, was in preparation for ORR. The purpose of the study was to determine the extent to which answers to questions on targets assigned to attaches could be obtained from TALENT system photography. The study was requested [redacted] but 3.5(c)
Otto Guthe and [redacted] were said to be quite interested in the results, which could drastically alter the [redacted] 450/ 3.3(b)(1)

The project, which was established on 28 April 1958, was assigned to [redacted] of the Geographic Branch, 3.5(c)
but involved close support from the Information Branch of the OCR Statistical Division. Like most other projects

in which [redacted] chief of the Information Branch, served as a catalyst, progress on this one proceeded rapidly, and it was completed in exactly one week. 451/ The study, which examined the 39 requirements listed in the Town Brief, demonstrated that at least 35 could be answered better by the use of the existing TALENT photography than by an attache or traveler. 452/ EO 13526 3.5(c)

At Lundahl's suggestion, [redacted] conferred on 2 May 1958 with [redacted] chief of the Geographic Research Area, about city plan production. 453/ One result of this conference was the assignment of [redacted] of D/GC to work in the Geographic Branch a few days each week on city plans, with limited assistance from the PIs. 454/ This working arrangement continued through the summer. Thus, the urban studies program, if it could be dignified by such an appellation, became, at least as far as HTA was concerned, merely an assist to an Agency cartographer working on town plans. 3.5(c) 3.5(c) 3.5(c)

The WAC overlay intelligence program* suffered a similar fate. Work on this self-initiated project essentially ended by April. 455/ In this case, however,

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* See p. 324.

the project was strictly one involving photo interpreters and the product a gratuitous offering. When the pressure of higher priority work increased to the point where no time was left for this project, there was no other competent or interested party to step in and take over any part of the program.

Elsewhere in HTA and at overseas photo interpretation centers, HTA PIs became involved in two historic crises. One was the revolt in Indonesia, the other the threat to Lebanon by its Arab neighbors.

In the case of the Indonesian revolt, 29 U-2 missions were flown from Cubi Point Naval Air Station in the Philippine Islands between 29 March and 7 June 1958 to photograph targets spread over the far-flung Indonesian homeland. The purpose was to obtain timely information for the US Government and, in particular, for the DDP, which was providing operational support to the anti-Communist

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rebels.

In late March, [redacted] of 3.5(c)
HTA were sent to Clark Air Force Base, in the Philippine Islands, to help establish a photo interpretation facility. [redacted] was to serve as deputy commander for 3.5(c)
intelligence and [redacted] was to direct setting up of 3.5(c)
the film processing equipment. 456/ Film from the first

mission and all subsequent ones was processed and exploited at this facility, which was 30 minutes by air from Cubi Point. [redacted] returned to HTA after com- 3.5(c)
pleting his assignment, and [redacted] was later relieved 3.5(c)
by [redacted] who departed Washington, D.C., on 3.5(c)
15 May for the Philippines. 457/

With the fall of the rebel capital at Bukittinggi, in central Sumatra, on 4 May, the revolt was essentially over, and the United States withdrew its support of the rebel cause. On 9 June 1958, two days after the last U-2 mission was flown over Indonesia, the PI facility at Clark AFB was closed. 458/ [redacted] returned to HTA 3.5(c)
nine days later. 459/

During late April and early May, when the revolt had reached a critical stage following the landing of amphibious forces by the Indonesian Government on the west coast of Sumatra, crash support was provided at HTAUTOMAT for the faltering operation. Between 21 and 29 April three photo interpretation projects on Indonesian targets were done by the small group under [redacted] in the Operations Sup- 3.5(c)
port Branch. In addition, HTA prepared a photo mosaic of Djakarta. 460/

HTA photo interpretation support for the Lebanon crisis was confined largely to the URPICs. Following widespread civil unrest in Lebanon during the late spring of 1958, the tempo of U-2 reconnaissance flights, which had continued at a low level since the Suez Crisis nearly two years earlier, was stepped up. In addition, URPIC-1, at [redacted] which had been on standby 3.5(c) status for nearly a year, was reactivated on 22 June 1958. [redacted] an HTA photo interpreter assigned 3.5(c) to URPIC-W, in Wiesbaden, Germany, was sent to the [redacted] 3.5(c) facility as deputy commander for intelligence. [redacted] 3.5(c) who had just returned from the Philippines, replaced him [redacted] Both men were bachelors and willing to 3.5(c) travel. In addition, by this time [redacted] had more ex- 3.5(c) perience in such assignments, including the difficult task of starting up operations, than any other working-level PI in HTA. Soon it became apparent that help was needed [redacted] supplanting 3.5(c) him as the deputy. 461/

The tempo of work and level of responsibility reached a peak with the US troop intervention. On 15 and 16 July 1958, at the request of President Camille Chamoun of Lebanon, 3,500 US Marines were landed on beaches south of Beirut. 462/ More Marines and Army troops followed. [redacted] scanned U-2 photography 3.5(c) covering airfields, military establishments and ports in nearby Arab countries, particularly those receiving Soviet

arms and equipment, for signs of possible armed intervention. Activity [redacted] continued into the fall, 3.5(c)
but the complete withdrawal of US troops by late October was quickly followed by the reversion of URPIC-1 to a standby status and the return of [redacted] [redacted] 3.5(c)
to Washington. 463/ EO 13526 3.3(b)(6)>25Yrs

C. Operating Procedures for HTA -- and PIC

The pangs of childbirth through which HTA was passing in the spring and early summer of 1958 resulted in a litter of procedural memorandums. As [redacted] assumed 3.5(c)
the responsibilities of plant manager, he was obviously impressed by the need for establishing agreed-upon procedures for accomplishing the tasks of exploitation and reporting. The growing size of the organization and the division of labor that had taken place since the advent of HTA -- the handling of requirements and monitoring of production by the Support Staff, the utilization of collateral researchers, the development of a mensuration capability apart from the PI branches, the acquisition of editors, and the founding of a separate graphics shop -- created little fiefdoms that had to be bent to the task of getting out photo intelligence.

First to be issued, on 10 April 1958, were the "Procedures Governing the Establishment, Assignment, Progress Reporting and Final Disposition of HTAUTOMAT Projects." 464/ This paper was a significantly revised and coordinated version of the draft submitted by the Support Staff [redacted] a few months earlier. 465/ Most of 3.5(c) the objections raised by [redacted] in his 24 February 1958 3.5(c) memo to [redacted] were resolved in [redacted] favor. Thus, 3.5(c) the procedures provided that the Support Staff would

3.5(c)

consult with the appropriate branches in evaluating and accepting requirements, that the requirements would be assigned to the responsible PI branch promptly, and that certain steps in the handling and assignment of requirements could be waived. It tacitly left to the branches the ordering of TALENT System photography, the primary source of information for HTA photo interpreters. This memorandum, which emphasized the handling of requirements and projects as distinguished from the preparation of reports, left for a later memo answers to the thorny questions that prompted [redacted] to add his 14 suggested 3.5(c) steps for preparing manuscripts for PI reports. 466/

The decisions on the latter points were included in the next memorandum, entitled "Procedures Governing the Preparation and Publication of HTAUTOMAT Photographic Intelligence Reports," issued near the end of May. 467/ This memo placed the responsibility for producing photographic intelligence squarely on the shoulders of the PI branch chiefs, though it permitted the delegation of exploitation work and the initiative in matters involving coordination of support to the photo analyst assigned to the project. It sorted out some of the problems involved in the preparation of PI publications by disposing in a summary manner of such relatively simple and highly formatted publications as the ODE, the Brief, the Mission Coverage Summary, and the Informal Report. It then addressed in detail problems and procedures involved in producing PI Memorandums, PI Reports, and Special Reports. These were the ones likely to involve use of much comparative photography, many collateral documents, substantial demands for mensuration support, numerous and complex graphics, considerable text, and trying editorial problems.

The successful coordination of this memo was given a strong assist by the presence of [redacted] who was re- 3.5(c)
assigned from the Central Branch, of which he had been chief, to the Office of the division chief, where, as special assistant, he immediately began to work closely
with [redacted] to bring the coordination of this and subsequent 3.5(c)
procedural papers to a speedy and successful conclusion. That conclusion incorporated many of the 14 steps advocated

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[redacted] but it also provides support elements with 3.5(c) a strong voice in the planning and shaping up of the manuscript. For better or worse, it gave the graphics shop a powerful hand in the selection of graphics and in the layout of the report, but it involved the editors, as well as graphics personnel, repeatedly in all phases of reporting, from early planning to the final approval of the printed forms. It also introduced a final step, a coordinated examination of approval copies of the printed publication before release for dissemination. The procedures initially called for three approval copies, one for the office of the chief, HTA, one for the office of the chief of the originating branch, and one for the Support Staff, which included the editors. It was not long, however, before the Technical Intelligence Services Branch, which included the graphics shop, was also receiving a copy. Each of the pertinent components, PI branch, editorial section and graphics shop would examine the approval copy for items of particular concern to it and express approval or challenge dissemination of the publication. The final decision as to whether to release the publication or to revise it was up to the office of the chief, HTAUTOMAT.

The result of the adoption of these procedures was an improvement in the sense of direction and the harmony displayed in the production of HTA publications. Compared with a more straightforward assignment of responsibilities and an insistence on the satisfactory accomplishment of the assigned tasks by supervisors in each component, the price was fairly high. On paper, at least, the production of HTA memorandums, reports, and special reports thereby became a committee job. Fortunately, the procedural paper itself added a "note" authorizing arbitrary departures from the specified procedures on the authority of the chief of the PI branch assigned the project. This escape clause provided a loophole that was used increasingly to avoid excessive coordination on the simpler projects. Even so, the committee approach still remained the recommended one and required considerable effort to follow the complexities of the system, particularly in projects handled by photo interpreters unable to exert firm control to bring the reporting phase of a project to a successful conclusion.*

EO 13526 3.3(b)(6)>25Yrs

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* In the wake of [redacted] unsuccessful attempt to establish that the original Tyura Tam manuscript was not "fit to edit," this procedural paper stated that the "Editorial Section will promptly review all report texts and proof prints to determine (footnote continued on following page) 3.5(c)

Though the aforementioned procedural memo ostensibly established procedures for handling HTA publications, it had no legal standing as a guide for the production of joint PI publications, of which there was an increasing number. As chief of the Military-Scientific Branch, under whose auspices virtually all CIA work on joint projects was accomplished, [redacted] had a special concern 3.5(c) over the prospect of having to submit to the constraints of the newly formulated rules for handling CIA projects and preparing the resulting manuscripts while the production of joint publications with the military was not subject to comparable rules. [redacted] concern was 3.5(c) amplified by the assumption of greater responsibility by the military shops in the supervision of joint projects

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(footnote continued from preceding page) suitability to edit." It further required that, in cases where they were not suitable to edit, "particularly if major changes are considered warranted by the assigned editor," the manuscript, accompanied by explanatory comments, be for- 3.5(c)
warded to [redacted] the executive officer, HTAUTOMAT. [redacted] 3.5(c)
instinct for identifying a major problem was excellent, but his solution failed. It was obviously easier to reach some accommodation with those who were ultimately going to have to approve changes in the manuscript anyway than to face the disruptions in working relationships and inevitable retaliations that would result from charges that a manuscript was unfit to edit. The only workable solution to this problem was foreclosed by the failure of the PI branch chiefs, primarily the chief, MSB, to take effective action to ensure that only manuscripts meeting reasonable standards of acceptability for content and presentation be forwarded to the editors.

for which their photo interpreters were named chairmen. As [redacted] himself summed up the problem in a 7 May 1958 3.5(c)
memo to the attention of [redacted] "The whole thing boils 3.5(c)
down to my omnipresent bitch that if we have an HTA organization functioning for the Agency, Army, Navy, Ops, ARC, etc. -- with all concerned competing for the use of HTA personnel and equipment, it is imperative that all users function under the same rules, regulations, limitations, procedures, priorities -- call it what you may." 468/ Not only was [redacted] concerned about the 3.5(c)
recently issued procedures for producing HTA publications, he was particularly upset by the independent demands levied by the military services on HTA support personnel and facilities without due regard for their effect on the amount of timeliness of service available for MSB projects.

The third procedural memorandum, issued by HTA on 3 June 1958, addressed itself to the problem of priorities and doubtlessly sought, among other objectives, to respond constructively to [redacted] protest. 469/ It dele- 3.5(c)
gated to the Suppprt Staff the authority to set the priorities and specified the basis for determining them. It further stated that all work done by HTAUTOMAT personnel would be scheduled in compliance with the priorities. The memo then set forth and defined four levels of

priority, from Priority #1, which took precedence over all other work, to Priority #4, which included non-deadlined projects that were to be done only as time and current workload permitted.

In a closing paragraph having a somewhat philosophical orientation, the procedural memo explained that the priority system was not intended to put supervisors in a straightjacket, rather it was to be used judiciously in planning and directing work assignments. This recurring theme of exceptions with respect to the procedures that were being promulgated was variously interpreted by those affected as either an appreciation of the proposition that no rules would work without loopholes or as evidence that management was not prepared to enforce the rules in cases where supervisors might object strongly to complying with them. In general, those who dealt with the problem of priorities most successfully did so by making every effort to meet deadlines that were inflexible, then trying to complete enough of the remaining work in time to keep most of the customers happy, and avoiding, insofar as possible, never getting the lowest priority projects done.

Appropriately, the last procedural memorandums related to joint requirements and the establishment of joint projects on the one hand, and procedures to be followed by photo interpreters in preparing the resulting joint reports on the other. These two memorandums, which constituted an interdependent pair and were issued simultaneously on 15 July 1958, also anticipated establishment of the CIA Photographic Intelligence Center. Both used the name of the future organization and followed it with HTAUTOMAT in parentheses. Moreover, the memorandum on reporting procedures referred to the soon-to-be Data Management Division rather than the rapidly fading Statistical Division, OCR. Both included the US Air Force whenever specific names of the military services were mentioned, and there were four signature lines at the end of each memo, including one for the Military Liaison Officer, USAF. That the USAF was not to be so easily lured into the fold was clear, however, from the fact that the line for the Military Liasison Officer, USAF, was the only one on either memo without a signature.

To provide for the formulation of joint requirements and the establishment of joint projects, one of the procedural memorandums announced the establishment of the Photographic Intelligence Center (HTAUTOMAT) Joint Projects Requirements Committee. 470/ Membership consisted of one representative from the CIA Photographic

Intelligence Center (HTAUTOMAT), the PIC (HTA) Military Liaison Officer, USA, the PIC (HTA) Military Liaison Officer, USN, and the PIC (HTA) Military Liaison Officer, USAF. [redacted] as chairman was responsible for committing 3.5(c) PIC (HTA) facilities needed for the accomplishment of the work inherent in the joint projects established by the committee. The CIA (HTA) representative served as secretary for the committee and kept the minutes of each meeting.

Requirements received by member organizations and judged to be of potential joint interest were registered with the secretary who made them available to representatives of the other organizations. Those of interest to two or more organizations were then discussed by the committee and a consolidated requirement prepared. This was followed by establishment of a joint project and the determination of a suitable priority. Joint projects were assigned by memorandum to the Senior Intelligence Officer (SIO) of the organization selected to chair the project -- usually the one judged to have the primary interest in it. The SIO would then name as project chairman one of his photo interpreters, who would contact representatives of other participating organizations for their designation of members to the PI team. The SIO of the organization chairing the joint project was responsible for accomplishment of the work in accordance with the procedures specified in the procedural memorandum on the preparation and publication of joint reports.

The latter memorandum differed from the one issued on 28 May 1958 for the handling of HTA projects only by an adaption of the phrasing to recognize the several participating organizations and the joint nature of the work. Even the "note" to permit arbitrary departures from the details so elaborately spelled out -- this time on the authority of the responsible SIO -- was included. 471/

With the issuance of these two procedural memorandums, joint reporting was formalized and brought under substantially the same controls as other HTA activity. Heretofore, the status of military participants had been somewhat vague and suggested the position of guests, who, though heartily welcomed, were, nevertheless, coequals with their Agency counterparts only with respect to the substance of joint PI publications. Now, with creation of the Joint Projects Requirements Committee and introduction of the concept of the Senior Intelligence Officer, military participants in HTA and PIC would also operate on equal footing with Agency personnel in the planning and supervision of joint photo interpretation work. On the other hand, in competition for limited Agency support facilities and manpower, they would be subject to the same constraints as their CIA counterparts. This was bound to reassure [redacted] and assuage his fears of delays 3.5(c) to CIA-chaired projects because of unbridled demands on HTA support components by the military.

D. <u>Automated Mensuration -- with Bugs</u>

The spring of 1958 was an exciting one for HTA photogrammetrists because they appeared to be on the threshold of a breakthrough in mensuration. One aspect of this breakthrough was the prospect of measuring in stereo -- i.e., with an instrument that made it possible to view the object being measured in three dimensions, thereby enhancing the probability of obtaining a more accurate measurement. The other was a further step in automating the mensuration process. At this particular point in history, late spring and summer of 1958, the latter was the more promising of the two efforts.

Measuring in stereo was to be accomplished on a Model TA-3 stereocomparator manufactured by the Ottico Meccanica Italiana in Rome (Figure 129). Headed by the former Italian Senator, Umberto Nistri, the company was one of those that [redacted] had visited after the VIII 3.5(c)

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International Congress of Photogrammetry, two years earlier. [redacted] had become enthusiastic about the piece of equipment, then under development, and HTA had put in an order for the first instrument off the production line. It arrived in April 1958, and installation by company technicians was completed during May. 472/ 3.5(c)

Familiarly alluded to by HTA personnel as "the Nistri," this instrument provided readout of coordinates for points measured through use of an Olivetti typewriter that produced a paper tape. The tape was then used to feed the data to the ALWAC, which did computations and printed out the measurements on a Flexowriter. The operation of the Nistri was, therefore, not on line with the ALWAC, though the paper tape did eliminate manual recording of the coordinates and keyboarding of the data for entry into the computer.

The seeming simplicity of the foregoing system belied the all but insurmountable problems of operation. The very features that intrigued HTA managers made it a delicate and fussy instrument to use, particularly in the uncontrolled environment of the Steuart Building. An estimated 75% to 95% of all measurements were in error. Obvious errors were annoying and caused loss of valuable time, but subtle ones, not easily detected, were a potential source of embarrassment.

As if the malfunctions and need for constant and costly recalibration were not enough, the detrimental effects on the operator were even worse. Difficulties inherent in the manipulation of four different handwheels to orient the photographs so as to get and keep them in proper register for stereoviewing subjected the eyes of the operator to constant abuse, resulting in headaches and fatigue. It thus became necessary to limit duty at the instrument to no more than four hours per day per person -- and there were few persons qualified as operators. 473/

To say that the instrument, which was designed primarily for photogrammetric triangulation in the compilation of maps, was a limited success in the production of photo intelligence would be an overstatement. Yet for a few years it was the only stereocomparator in the NPIC organization and was used in difficult assignments where the stereoviewing feature was deemed desirable to obtain the best possible measurements.

The further automation of the mensuration process that took place in the late spring and early summer of 1958 eliminated the manual recording of readings from the Mann Comparator by a second person, and supplanted the use of a desk calculator by the electronic wizardry of the computer. Key elements in the system were the Mann Comparator, a Telecordex, and the ALWAC. The Mann comparator had been previously acquired from the Navy and modified by the addition of magnetic readout heads. 474/ These heads, one for encoding data on the X-coordinate and another for data on the Y-coordinate, provided inputs for the Telecordex, which produced a paper tape. This tape was then loaded manually on the supervisory control Flexowriter attached to the ALWAC. Readout of the encoded data by this Flexowriter served as the input to the computer, which printed out the desired measurements.*

EO 13526 3.3(b)(6)>25Yrs

The Telecordex, missing link in the system, arrived on 26 May 1958. 475/ Steps to acquire it dated back to July 1957 when [redacted] had visited several firms in the Los Angeles area in an attempt to find a means for micron digitation of HTA comparator readout. Among companies visited was the Telecomputing Corporation, where he found the only suitable equipment, including magnetic readout heads and the Telecordex. 476/

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* To HTA photogrammetrists this constituted automation of the mensuration process, a characterization that was certainly well-merited. It is obvious, however, that this did not constitute on-line operation with the computer.

Use of this equipment promised to speed up the mensuration process and thus add to the computer workload. Moreover, acquisition of photographic coverage of Soviet Central Asia, where available maps were poor and inaccurate, begot requirements that called for attempts by HTA to undertake limited extension of geodetic control and bridging. These, too, taxed the existing computer capability. In choosing the ALWAC, however, [redacted] had regarded 3.5(c) with favor the availability of additional peripheral equipment, and the fact that the capacity of the computer itself could be readily expanded should the need develop. Now it had, and HTA proposed to upgrade the capability of the ALWAC to handle a mass data reduction operation which would use a rather large number of programs.

The upgrading included purchase of a Ferranti high-speed photoelectric paper tape reader and a high-speed tape punch -- operating respectively at 20 and six times the speed of the existing equipment -- a second Flexowriter for off-line transcription of punched tape output, an increase in the memory capacity of the computer by replacing the 4,096-word drum with an 8,192-word drum, and the addition of a pre-select command to permit direct access to any of the individual sets of coordinates stored in the main memory. The latter feature was needed particularly in connection with geodetic control extension and bridging, operations that involved the internal storage of large numbers of point coordinates which the program called for in a non-serial manner.

Interchange of the drums and addition of the preselect command could both be accomplished as field changes on the existing equipment at the loss of from two-to-five weeks of computer down time. The manufacturer proposed however, an exchange of the memory and logic cabinets at a cost of several thousand dollars less than the field change.* 477/ Since this alternative would also substantially eliminate the down time, it was the course of action chosen. The exchange of cabinets and installation of peripheral equipment were accomplished in May 1958. 479/ This dovetailed nicely with the arrival of the Telecordex in the same month.

The acquisition of the TA-3 stereocomparator, the receipt of the Telecordex -- which set the stage for the first automation of the mensuration process by a photo intelligence organization -- and the upgrading of the

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* One of the intriguing aspects of the ALWAC Corporation, which was already in financial difficulty and had merged with the El-Tronics Corporation by the time these modifications were proposed, 478/ was the relatively good equipment offered at a very competitive price -- perhaps too low to permit corporate survival.

ALWAC that contributed to proper functioning of this improved mensuration system once more demonstrated the vanguard position of HTA in the conception of a total system for the exploitation of high-resolution aerial photography, such as that in the TALENT system. It was also another example of the type of planning and procurement that kept rival organizations beating a path to the door of HTA to seek assistance in expanding their own exploitation capability.

EO 13526 3.3(b)(6)>25Yrs

The Strategic Air Command, probably the most aggressive and certainly the best financed among those pursuing the task of upgrading their exploitation capability, was one of those rivals that sought to benefit from the HTA research-and-development effort. In October 1957, at the urgent request of [redacted], an HTA team consisting of Lundahl, [redacted] had traveled to Offutt Air Force Base at Omaha, Nebraska, to present to SAC personnel the HTA systems concept for the exploitation of aerial photography. The request for this briefing resulted from enthusiastic reports brought back to Offutt by SAC personnel who had visited the Steuart Building, where they had been exposed to HTA research-and-development concepts and some of the equipment already procured. 480/

3.5(c)

As a result of the series of October 1957 briefings at Offutt, eight SAC photo interpreters and photogrammetrists came to HTA for the month of May 1958 for indoctrination in the operation of photo lab and mensuration equipment, including the ALWAC. 481/ Unfortunately, they could scarcely have chosen a worse time to learn about the new mensuration equipment. The Nistri stereocomparator had just arrived and was being installed. The Telecordex didn't arrive until just before they departed. And, though the ALWAC had already been functioning for several months, it was in May 1958 that the exchange of the memory and logic cabinets and other modifications took place.

The two persons assigned to the photo lab, which was unaffected by the absence or arrival of new equipment, accomplished their goals. The others were not so lucky. [redacted] the ranking member of the group, observed that the SAC personnel had learned much but added they would like to return after a few months when the functioning of the new equipment had stabilized. [redacted] said that installation of the ALWAC that SAC had ordered was scheduled to be completed on 5 June, and that he and [redacted] would like to return later in the summer with a list of specific questions.* He also

* [redacted] proved (footnote continued on next page)

expressed particular interest in learning more about the operation of the new mensuration equipment. 483/ In spite of this enthusiastic proposal, there was, however, no reprise.

[redacted]

3.3(b)(1)
3.3(b)(6)

(footnote continued from preceding page) to be an unforgettable character. He left a legacy of stories that were subjects of conversation years after he departed. One recounted how he and a couple of other master sergeants pulled into town, rented an apartment, proceeded to Bolling AFB where they conned the NCO Wives Club into providing them with pots, pans, and furniture and then went out and bought a television with the intent to default immediately on the payment. 482/

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[redacted]

F. A Center at Last

On 18 August 1958 the CIA Photographic Intelligence Center was finally established under the DDI. Arthur C. Lundahl was named director [redacted] was 3.5(c) appointed deputy director, and [redacted] was designated executive officer. At the same time, the Photo Intelligence Division, ORR, and the Statistical Branch [sic], OCR, were abolished. 491/ At last the long period of waiting was over. The organization for exploiting U-2 photography, which had been prematurely proposed as the Office of Statistical Research in December 1955, had finally achieved Office status. 3.5(c)

Though the organization thus created was almost identical with the one contemplated in Lundahl's 7 March 1958 memo to Amory, the grade structure was another matter.* The table of organization approved by the DDS, L. K. White, on 31 July 1958 omitted all grades. White requested that Lundahl and [redacted] the Director of Personnel, discuss the proposed grade structure and report to him on or about 1 September. 492/ 3.5(c)

The reason for withholding approval of the grades stemmed from the failure of [redacted] Director of Personnel, to concur in the proposed grade structure for the new center. In his memo to White, in which he 3.5(c)

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* Minor alterations in the proposed organization included a change in title from "Security Office" to "Security Staff," elimination of a "Courier Section" in the Technical Branch of the Data Management Division, and several minor changes in job titles.

challenged the grades, [redacted] made three major points. 3.5(c)
First, he denied approval of GS-15 grades for the positions of division chief. Second, he maintained that the center did not, as yet, have sufficiently experienced personnel to justify such positions for division chiefs or many key positions below that level. Third, he urged recruitment from the outside rather than what he characterized as hasty promotion from within to fill some of these key positions. 493/ Obviously, these were substantial matters and required some extended study and negotiations before the conflicting claims could be resolved. The grade structure would certainly be an early and important piece of business for the director of the newly established center and his executive officer.

Apart from the small cloud caused by the unresolved question of grades, there was much room for optimism over the prospects for the new organization. Much as it resembled the earlier HTAUTOMAT, there were significant differences, particularly when viewed in the perspective of future growth and development. No longer was there a question about the survival of the organization. Barring termination of the U-2 collection program and disastrous failure in the development of follow-on systems, photo interpretation in CIA in support of national intelligence objectives was here to stay.

As far as relations with other components in CIA and the Intelligence Community were concerned, establishment of PIC was a boon. No longer would functioning through channels require dealing with [redacted] and Guthe 3.5(c) to reach the DDI -- at least in cases where courtesy and circumstances seemed to demand it. Ever since the creation of HTA, continued subordination of D/GP to the Geographic Research Area and ORR had seemed anachronistic, particularly since much of the activity in HTAUTOMAT transcended the purview of these two components. The advantages of Office status were even greater with respect to rapidly expanding contacts between HTA/PIC and other organizations in the Intelligence Community. Not only did the creation of PIC provide considerably greater prestige, it also afforded more direct channels of communication and enhanced the rapidly developing national posture of the organization.

As the new center faced the future, the elimination of several past problems was offset, to some extent, by the survival of others that promised to grow. Most immediate among the latter was the need for some solution to the controversial question of how to staff and organize for the production of photo intelligence reports. The cumbersome procedures hammered out and approved in the spring of 1958 could scarcely eliminate the need for imaginative action to harness the editors and graphics personnel into a team for the smooth and effective publication of photo intelligence.

The perpetuation of two PI divisions in the new organization was of doubtful wisdom, but need for a tough decision on this matter was less urgent. Nevertheless, the dramatic successes of photo interpreters in the Military-Scientific Division stood in ever sharper contrast to the World War II-type accomplishments of the Industrial-Geographic Division. Moreover, the thrust of the work in the Military-Scientific Division was inexorably staking out the territory that the new PIC would inevitably claim as its domain. By now it was reasonably clear that it was in this area of highest-priority military and scientific targets that the real future of the organization lay. If neither the sheer ennui of "documenting" endless industrial plants or rail yards nor an open revolt of disadvantaged IGD photo interpreters precipitated a crisis, if flaps like the one over the coastal defense site on the Hel Peninsula didn't embarrass PIC into further action, some day a critical need to marshal all available PI manpower to fill requirements for photo intelligence on missile, nuclear, and BW/CW targets promised to bring all PIC photo interpreters into one division, under one management to pursue work on photography covering these types of installations.

In the summer of 1958 there were also faint stirrings of further problems in the management of the R&D effort. Until now, DDP/TSS had provided much support and some funding in the development and in the procurement of equipment for HTA. Now, with the achievement of Office status and with the need to develop much more sophisticated exploitation and data handling equipment for even more exotic inputs from collection systems already under development, PIC was thinking in terms of a more self-contained R&D effort. Such a course of action not only promised to be less confining and more responsive to PIC, it also offered a better opportunity to keep the equipment purchased or developed under control of those who would use it. That Lundahl was cognizant of the danger that PIC might even lose ground in the competition to control this effort, which would be of critical importance in determining the future exploitation capability of the center, was suggested in a memo to Bissell in which he stated, apropos of the oncoming W117L system, ". . . there may be need of some discussion and agreement as to just what role or authority TSS might have in accepting, monitoring, and approving contracts related to Photographic Data Extraction Systems and particularly information handling as a corollary of internal management of HTA [sic]. I am sure that this can be worked out with TSS representatives but I must state that I would be reluctant to accept any plan whereby my highly qualified R&D specialists in photographic intelligence, and in day to day working contact with the problems and achievements at HTA, would be eliminated from contacts with industrial representatives and the right to participate in preparation of requirements and the review and acceptance of proposals." 494/

Concern over R&D matters was a very real problem for the new center, particularly in view of the prospect of future large inputs of photography that was certain, in the long run, also to improve in resolution. It was, however, also certain to lead the center into dangerous waters. Research and development were bound to be expensive and, at times, disappointing. They were, moreover, not central to the job of PIC, which was the exploitation of photography. It could easily become a case of being damned if you do and damned if you don't. Whatever the risk, HTAUTOMAT and the new center were showing signs of wanting to try it.

Lest it seem that emerging long-range problems, so easy to identify with the benefit of hindsight, cast a pall over PIC when the mood should have been one of rejoicing, assurance should be given that this was not the case. Even the near-term problem of grades could be regarded philosophically. There was no great problem of headroom in the new center. The newly named but familiar Director and his people stood high in the esteem of senior managers in the Agency and among leaders elsewhere in the Intelligence Community, as well as in key sectors of the scientific and industrial world. They had finally achieved the organizational status they sought and which they felt confident would provide the opportunity they required to attain even higher levels of achievement. With further development of the capabilities of those in the center and a continuation of the dedicated and imaginative work that had become the hallmark of the organization, the rest should take care of itself. It would not be unrealistic to suppose that, on 18 August 1958, from where Lundahl sat "he looked at what he and his people had wrought and pronounced it good."

Appendix A

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Appendix B

Chronology: 1956 - 1958

1956

9 Jul	HTA initiates operations in the Steuart Building.
10 Jul	Date of the last Russian penetration missions before the initial stand-down.
2 Aug	Lundahl returns to duty in Washington after attending the VIII International Congress of Photogrammetry, Stockholm, Sweden.
29 Aug	First U-2 mission over the Middle East.
7 Sep	Reber and Lundahl deliver first U-2 photography to the British. 3.3(b)(1) 3.3(b)(6)
7 Sep	HTA issues a PI Alert on the Mozhaysk installation.

[redacted]

12 Sep	Intelligence Advisory Committee creates the PARAMOUNT Committee.
13 Sep	First Middle East mission flown from new base at Adana, Turkey.
29 Oct	Outbreak of hostilities in Middle East.
7 Nov	Ceasefire in Middle East.

1956 (cont.)

13 Nov	Intelligence Advisory Committee deactivates the PARAMOUNT Committee.
19 Nov	Decision to establish an overseas PI center on the base at Adana.
4 Dec	Date of Mission B-1344; photography first processed and exploited at Adana.
12 Dec	Date of issue of the first of two HTA publications on special weapons storage and loading facilities at Soviet long-range airfields.

1957

29 Jan	[redacted] depart Washington, D.C., for Eglin AFB, Florida, for tests on the Project OSTIARY camera system. 3.5(c)
1 Feb	Lundahl calls for a revision of the mission and functions and a reorganization of HTA.
7 Mar	Consultant meeting at Headquarters on the [redacted] problem. 3.5(c)
3 Apr	[redacted] leave on first extended on-site trip to US missile and nuclear installations. 3.5(c)
15 Jul	HTA graphics shop begins operation.
25 Jul	HTA recommends use of A-2 camera for SOFT TOUCH missions.
26 Jul	[redacted] announces completion of reassignment of HTA personnel in connection with the organizational realignment. 3.5(c)
5 Aug	First of the SOFT TOUCH missions flown from Pakistan.
8 Aug	Reduction of 20 positions announced -- 12 in the ORR division and eight in OCR branch.

1957 (cont.)

Aug	Joint Army-Navy-CIA-Air Force first-phase exploitation of photography initiated at HTA.
17 Sep	ALWAC III-E computer delivered to Steuart Building.
23 Sep	Project JAM SESSION instituted at HTA.
30 Sep	[redacted] relieved of his duties as chief of the former Special Projects Branch. 3.5(c)
8-9 Oct	Consultations at HTA on the gaseous diffusion plant, Tomsk AE Installation.
22-23 Oct	Consultations at HTA on the reactor area and the chemical separation plant under construction, [redacted] 3.5(c)
4 Nov	GMIC Special Engineering Analysis Group starts work at HTA.
15 Nov	OCR designates the Statistical Branch, SR, the Statistical Division, OCR.
16 Nov	Lundahl and [redacted] depart for London to give briefings on information from SOFT TOUCH missions. EO 13526 3.5(c)
27 Nov	Report on findings of the GMIC Special Engineering Analysis Group published by HTA.
2-5 Dec	GMIC Scientific Advisory Panel meeting at HTA.
2 Dec	Allen Dulles makes first and only visit to HTA.
2 Dec	Consultations begin at HTA on the Semipalantinsk Nuclear Weapons Proving Ground.
13-14 Dec	Consulations at HTA on Novosibirsk AE Feed Materials Complex.

1957 (cont.)

16 Dec — Lundahl briefs Vice President Nixon on a wide range of U-2 photography in the DCI conference room.

23 Dec — Lundahl briefs Kelly Johnson, designer of U-2, on some of the photographic accomplishments of the U-2 collection system.

1958

3 Jan — Announcement of DCI approval for an increase of 35 slots in the combined ORR-OCR HTAUTOMAT Table of Organization.

31 Jan — Military-Scientific and Operations Support Branches exchange work areas, with MSB moving to the seventh floor and OSB to the sixth.

Feb — Minicard equipment finally arrives at HTA.

24-25 Feb — Consultations at HTA on the Biological Warfare Proving Ground, Vozrozhdeniya Island.

7 Mar — Proposal to create the CIA Photographic Intelligence Center forwarded to DDI.

14 Mar — [redacted] 3.3(b)(1) 3.3(b)(6)

16 Mar — Lundahl briefs Chancellor Konrad Adenauer in Bonn.

Mar — [redacted] depart [redacted] to establish a film processing and interpretation center for U-2 missions over Indonesia. 3.5(c)

1958 (cont.)

10 Apr	First of several procedural memos issued for use in guiding internal HTA operations.
Apr	Model TA-3 stereocomparator (the "Nistri") delivered to HTA.
May	Capability of the ALWAC III-E upgraded.
26 May	Telecordex delivered to HTA.
2-3 Jun	Consultations at HTA on the Soviet heavy water plants at Chirchik and Kirovakan.
9-13 Jun	Consultations at HTA on Soviet uranium mining and milling sites.
16 Jun	[redacted] depart for the Nuclear Weapons Proving Ground in Nevada to make ground-truth check of U-2 photography covering the installation. 3.5(c)
22 Jun	URPIC-1, at Adana, Turkey, reactivated; [redacted] assigned as Deputy Commander for Intelligence. 3.5(c)(c)
11 Jul	[redacted]
18 Aug	Establishment of the CIA Photographic Intelligence Center announced. 3.3(b)(1) 3.3(b)(6)

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39. CIA/HTA, B-1-56, 8 Aug 56, "Moscow/Fili Airframe Plant No. 23." TS CODEWORD.

40. CIA/HTA, B-2-56, 22 Aug 56, "Sudomekh Shipyard, 196." TS CODEWORD.
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57. See reference 51, above, p. 7.

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60. ORR/GP, GP/I-212, 31 Aug 56, Aircraft Shipping Crates on Chu-Hsien [sic] Airfield. S NOFORN Continued Control.

61. ORR/GP, GP/I-209, 21 Aug 56, PEGMATITE.

62. ORR/GP, GPI-205, 14 Aug 56, Amateur Photography from Commercial Aircraft.

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3.3(b)(6)

63. Monthly Report of the Photo Intelligence Division, Aug 56, p. 2.

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474. Memo for the record, 13 Jul 73, sub: Identification of the Mann Comparator First Used with the TELECORDEX. C.

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Memo [redacted] 11 Jun 58, sub: Receipt of 3.5(c)
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476. Memo, [redacted] Guthe, 2 Aug 57, sub: Report of Trip to Hycon Manufacturing Co., Telecomputing Corp., Chicago Aerial Industries, and Acme Teletronix, Inc., p. 2.

477. Memo, Lundahl for Chief, Business Machines Services, Management Staff, 28 Mar 58, sub: Justification for Purchase of Additional Equipment for the Project HTAUTOMAT Computing Facility.

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492. Memo (draft), [redacted] for Comptroller, 31 Jul 58, sub: Establishment of the Photographic Intelligence Center, Deputy Director (Intelligence) Area. 3.5(c)
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FIGURE 1

Steuart Building. This photograph was taken from the south-west corner of sixth and K Streets, Northwest, nearly seven years after the removal of NPIC to Building 213. Entrance to HTA work areas on the four upper floors was at 1014 fifth Street.

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FIGURE 2

The U-2: Reconnaissance aircraft supreme.

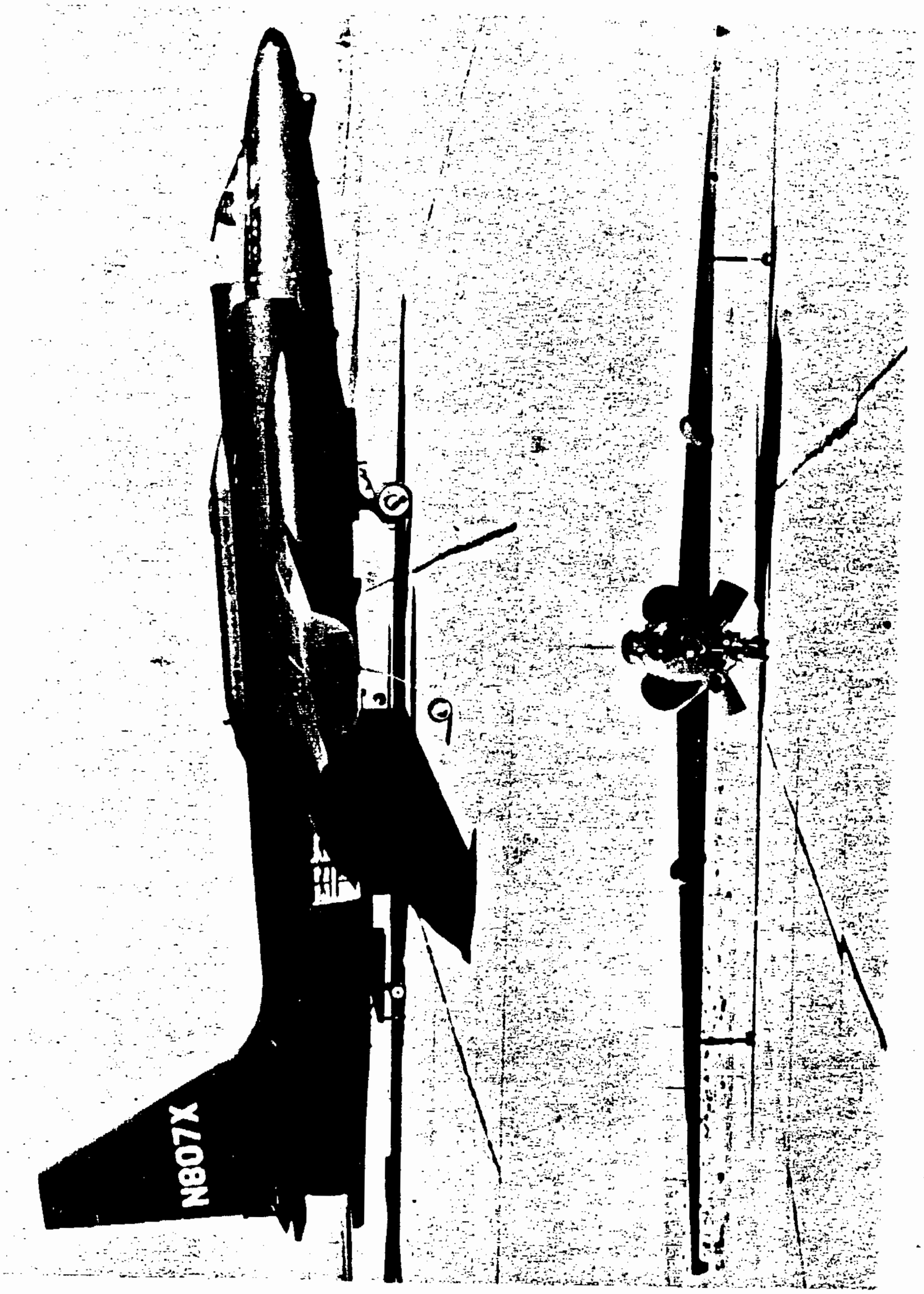

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FIGURE 3

HTAUTOMAT: Organization and Key Personnel, July 1956.

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3.5(c)
EO 13526 3.3(b)(6)>25Yrs

[redacted]

3.5(c)

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FIGURE 5

Central Building. Central Branch of D/GP occupied space on the second floor at the west end (right hand side on photo) of this building, including the wing in the foreground.

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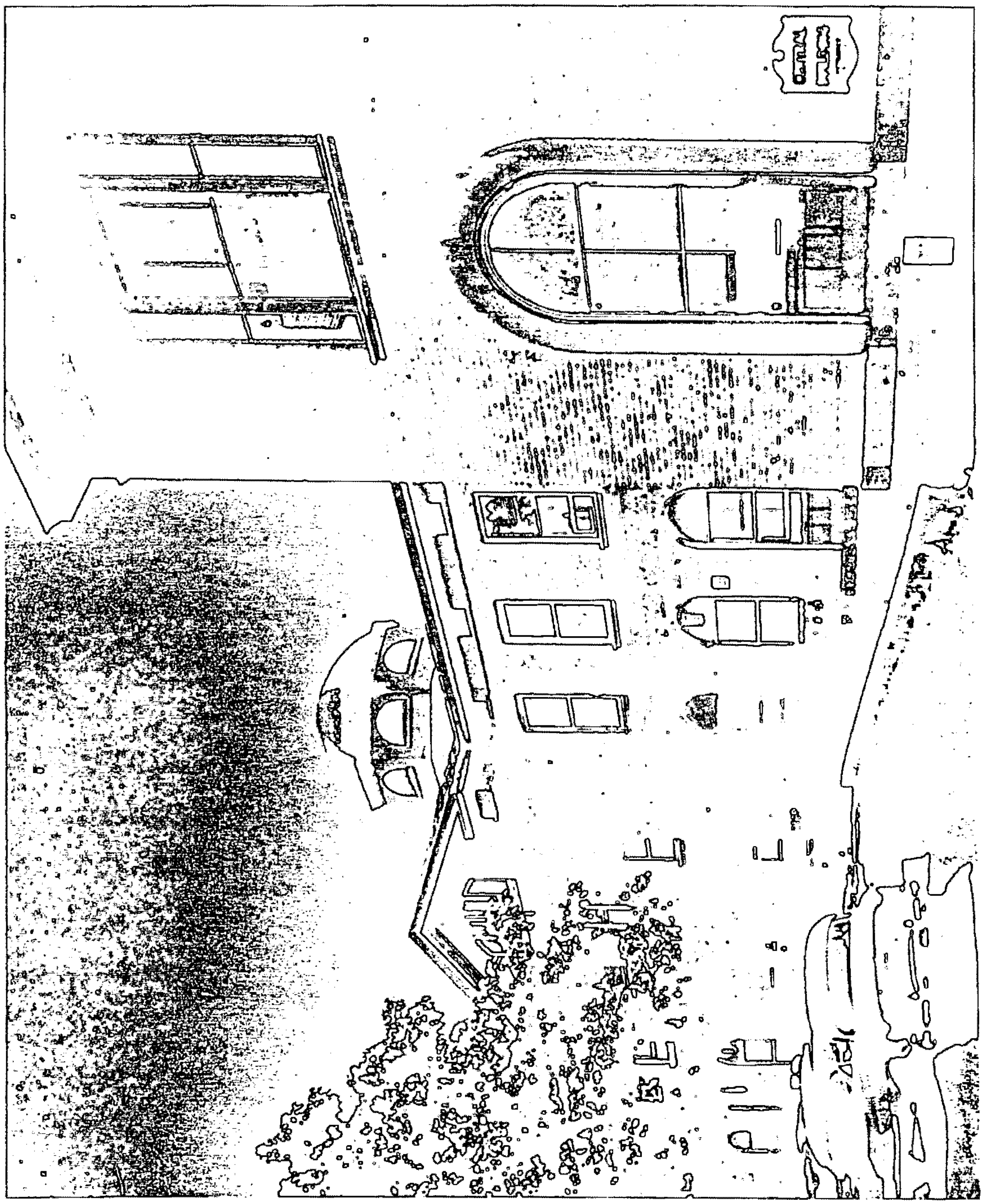

FIGURE 6

Range of U-2 Aircraft from operational bases in Europe and the Near East.

3.3(b)(1)
3.3(b)(6)

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FIGURE 7

Tracks of the first eight U-2 operational missions.

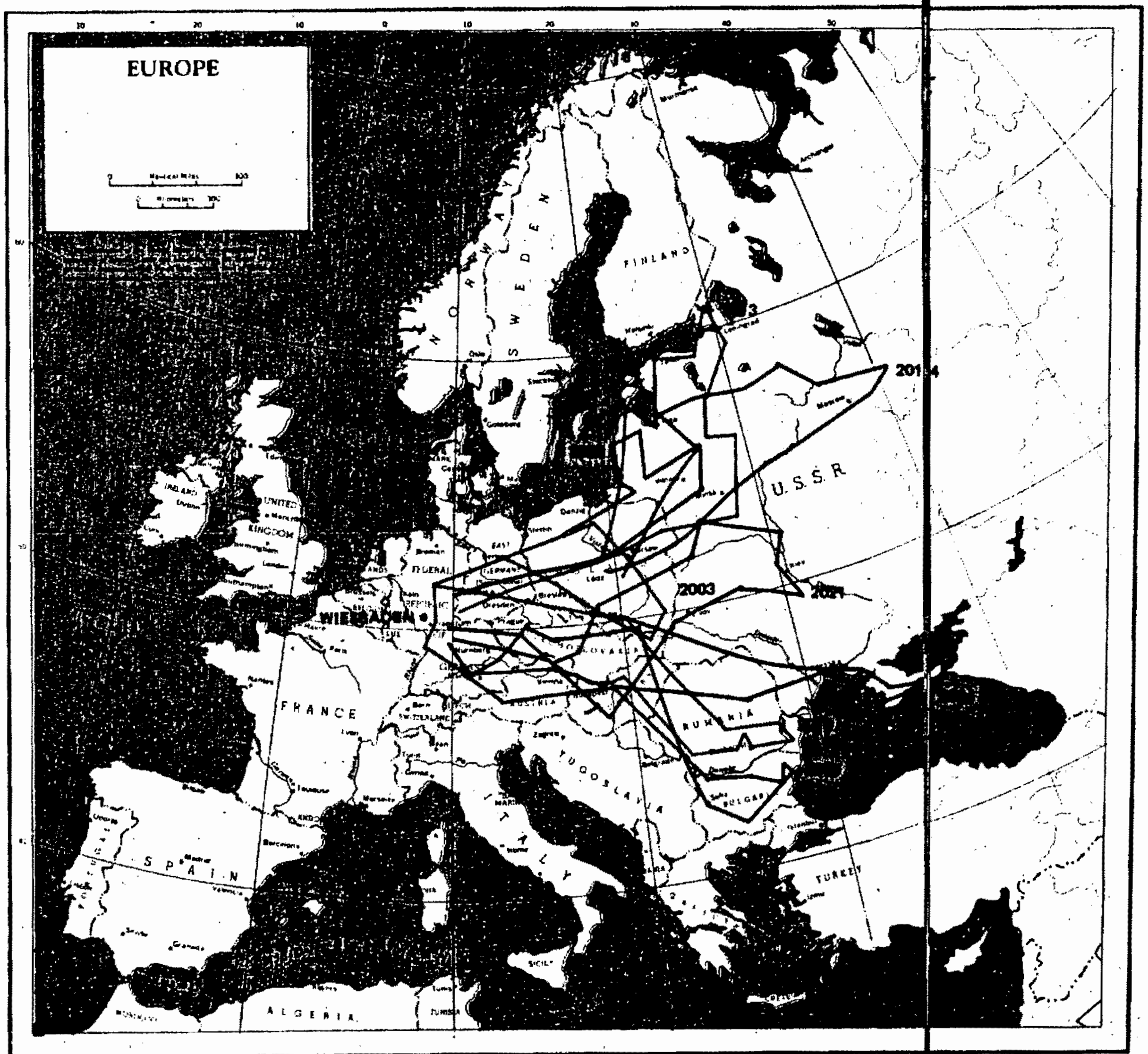

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FIGURE 8

MM 50 Surveying Camera.

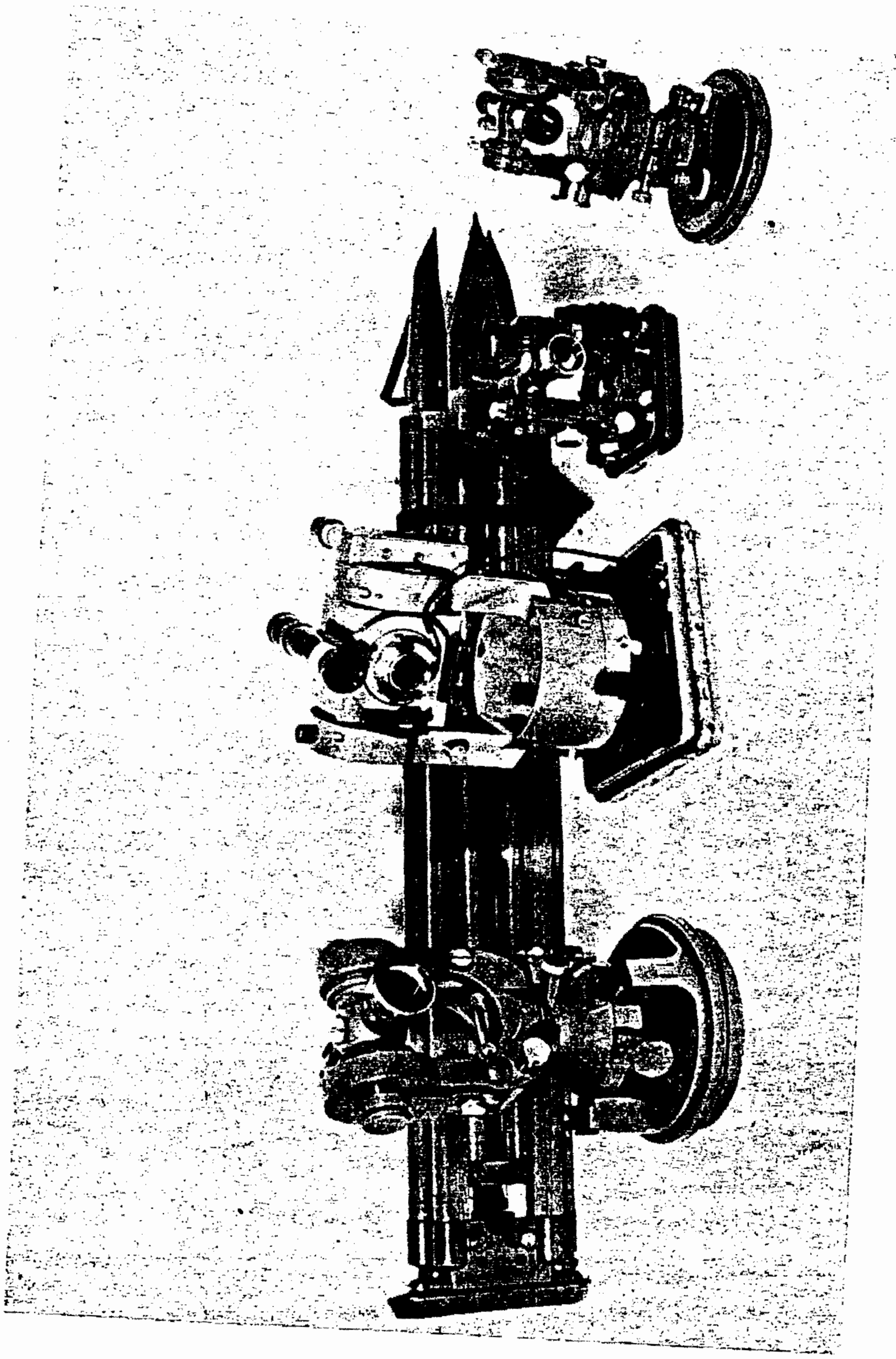

FIGURE 9

Orsha Airfield and possible special weapons storage area, 4 July 1956.

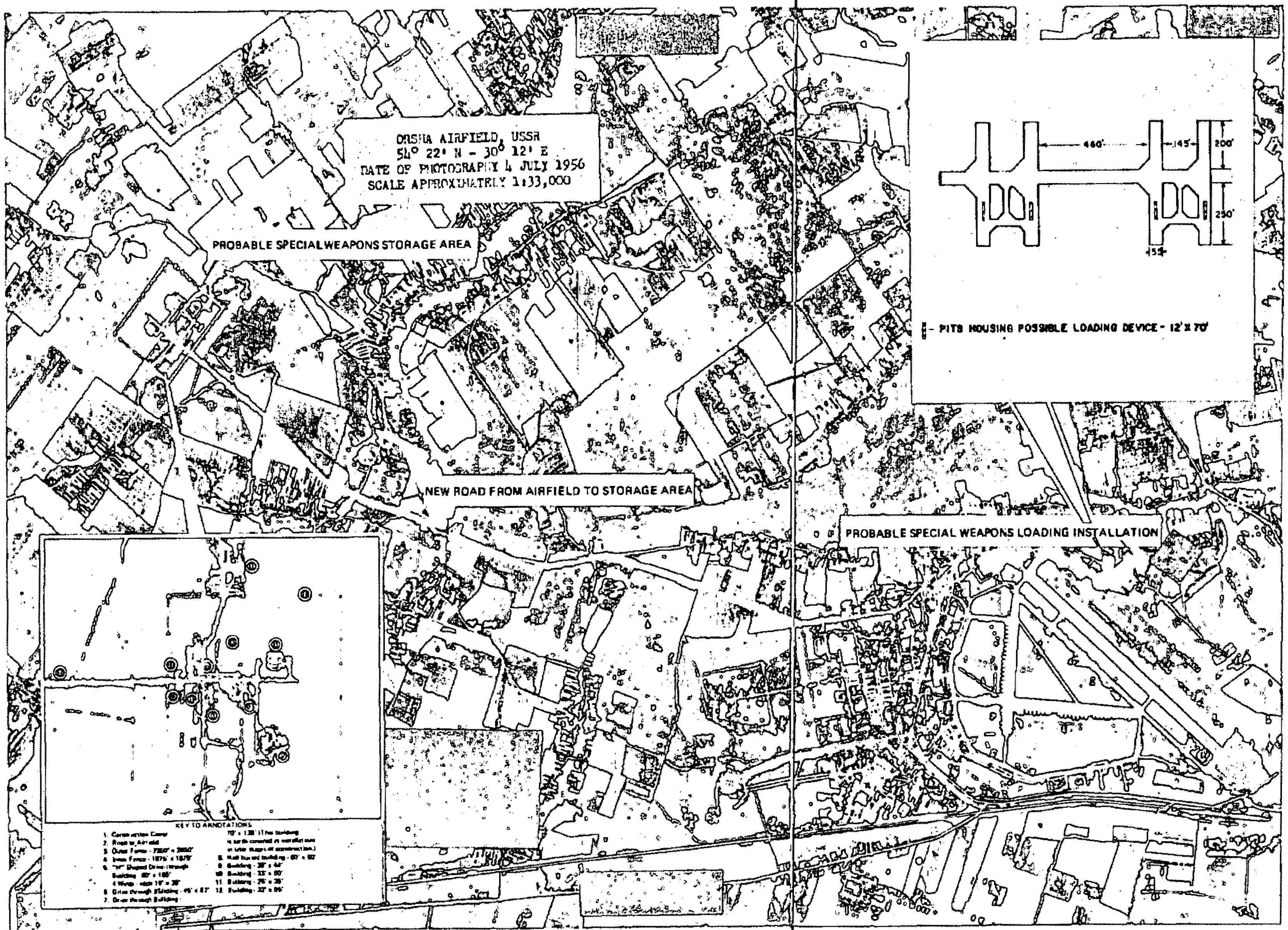

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FIGURE 10

Stryy Airfield and special weapons storage and loading installation, 10 July 1956.

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1. REVETTED PARKING APRON 42 X 42 FEET.

2. WOODEN FENCE WITH GUARD TOWERS AT THE CORNERS AND AT INTERVALS ALONG THE LONGER SIDES. FENCE, 4300 X 1500 FEET, ENCLOSES AN AREA OF 148 ACRES.

3. POSSIBLE WIRE FENCE.

4. MAIN ROAD WITHIN INSTALLATION 21 FEET WIDE.

5. PROBABLE EARTH-COVERED BUILDING 21 X 32 FEET.

6. INNER FENCED AREA 570 X 815 FEET. THREE SMALL BUILDINGS ARE LOCATED ADJACENT TO FENCE.

7. H-SHAPED DRIVE-THROUGH BUILDING WITH 42 X 54 FOOT WINGS AND 32 X 58 FOOT CENTER SECTION. A LARGE EARTH REVETMENT IS LOCATED ALONGSIDE THE BUILDING ON THE SIDE NEAREST THE AIRFIELD. THIS BUILDING COULD POSSIBLY BE USED AS AN ASSEMBLY BUILDING FOR COMPONENTS OF A NUCLEAR BOMB OR A MISSILE.

8. EARTH-COVERED, FLAT-TOPPED, PYRAMIDAL-SHAPED BUNKER 117 X 128 FEET. A 10 FOOT ACCESS ROAD LEADS TO SMALL ENTRANCES ON EITHER SIDE OF THE BUNKER. THIS BUNKER COULD POSSIBLY BE USED FOR STORAGE OF NUCLEAR COMPONENTS OF A NUCLEAR BOMB OR FOR THE WARHEAD OF A MISSILE.

9. REVETTED BUILDING 21 X 23 FEET.

10. MOUND 21 X 21 FEET. (POSSIBLE EARTH COVERED BUILDING.

11. REVETTED BUILDING 43 X 120 FEET, WITH ACCESS ROADS ENTERING REVETMENT AT BOTH ENDS. ON ONE END OF REVETMENT IS A PARKING APRON 53 X 75 FEET. ON THE OTHER END IS AN ASSOCIATED SMALL BUILDING, 21 X 42 FEET.

12. CIRCULAR TOWER WITH CYLINDRICAL TOP.

13. PROBABLE GUARD HOUSE AT ROAD GATE.

14. BLAST WALL.

15. LOADING RAMP 60 X 180 FEET RAMP NARROWS TO 55 FEET AT REAR WITH LOADING PIT 10 X 60 FEET.

16. LOADING RAMPS 62 X 120 FEET (RAMPS NARROW TO 50 FEET AT REAR WITH LOADING PITS 10 X 60 FEET.

17. SERVICING APRON 220 X 490 FEET.

18. LARGE LOADING RAMP 140 X 330 FEET WITH LOADING PIT 10 X 70 FEET. LOADING PIT WIDENS SLIGHTLY NEAR CENTER.

19. TAXIWAY GATE. A TAXIWAY, 70 FEET WIDE, EXTENDING FROM THE RUNWAY ENTERS THROUGH THIS GATE.

20. PROBABLE GATE CONTROL HOUSE.

21. BUILDING 30 X 55 FEET.

22. ROAD 10 FEET WIDE.

23. BUILDING 30 X 30 FEET.

24. BUILDING 32 X 42 FEET.

25. BUILDING 21 X 53 FEET; PARKING APRON IN FRONT OF BUILDING MEASURES 42 X 53 FEET.

26. BUILDING 42 X 88 FEET WITH 28 FOOT PARKING APRON. L-SHAPED STRUCTURE WITH WINGS MEASURING 23 X 42 FEET AND 23 X 53 FEET PROJECTS FROM REAR OF BUILDING.

27. ROAD 16 FEET WIDE.

NOTE: ALL MEASUREMENTS ARE APPROXIMATE.

MEASUREMENTS SOMEWHAT LESS RELIABLE THAN THE REST DUE TO POOR IMAGE AT THESE POINTS.

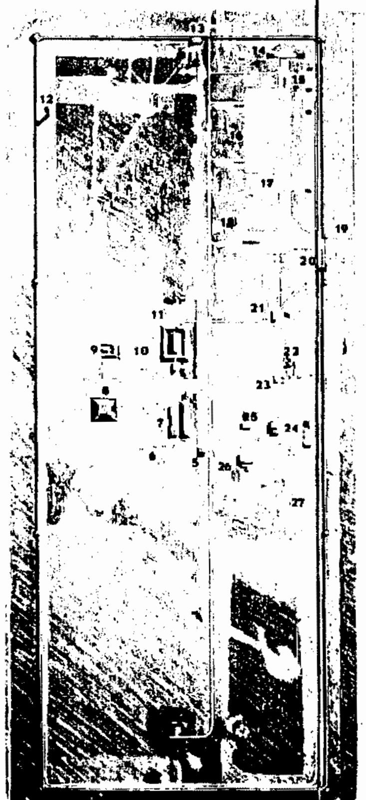

FIGURE 11

Mozhaysk Installation, 5 July 1956. Numbers on the photograph refer to components detailed on Figure 12 through 15.

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FIGURE 12

Domed Structure (Unit 2), Mozhaysk Installation. This perspective drawing was done by [redacted] who later became the first chief of the HTA graphics shop. 3.5(c)

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SECRET

FIGURE 13

Overhead concept of the domed structure and its incomplete counterpart (Unit 1). These views were the work of the late [redacted] the most accomplished of HTA illustrators. 3.5(c)

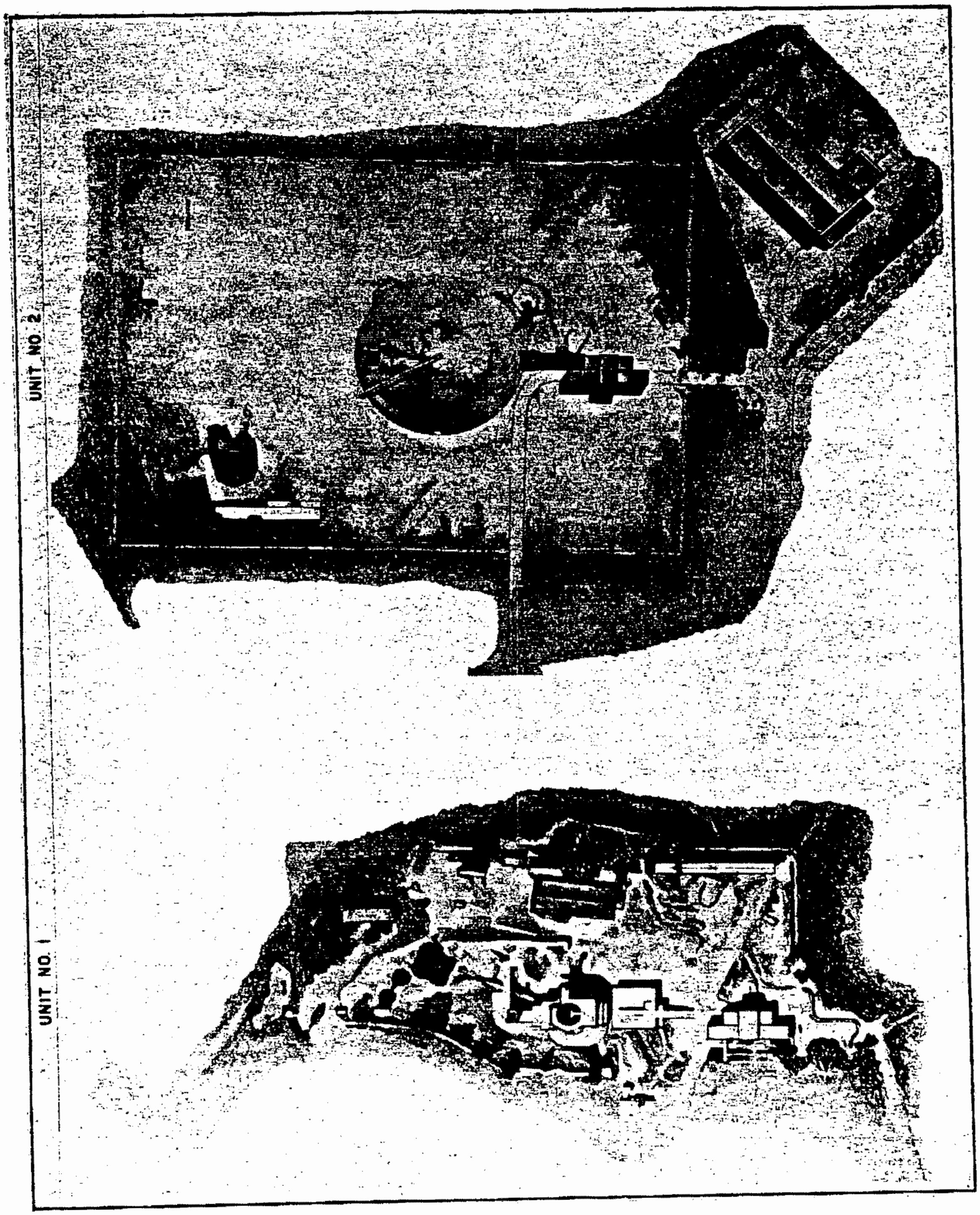
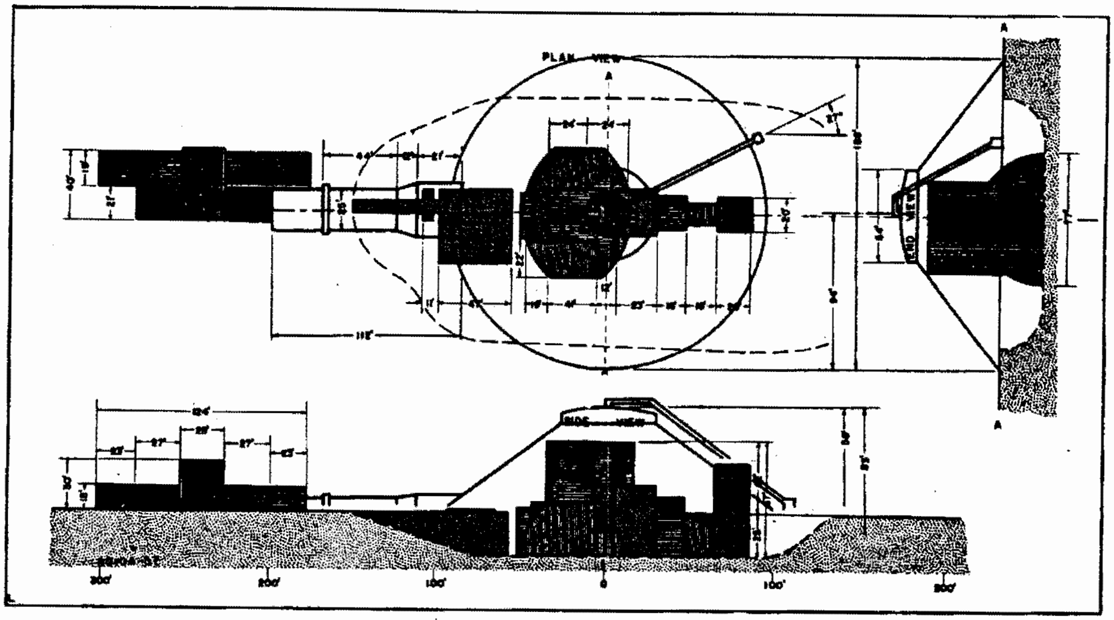

UNIT NO. 2
UNIT NO. 1

FIGURE 14

Oblique view and metrical analysis of Unit 1. Coverage such as this, achieved during construction, is invaluable in revealing internal details that cannot be seen on later aerial photography.



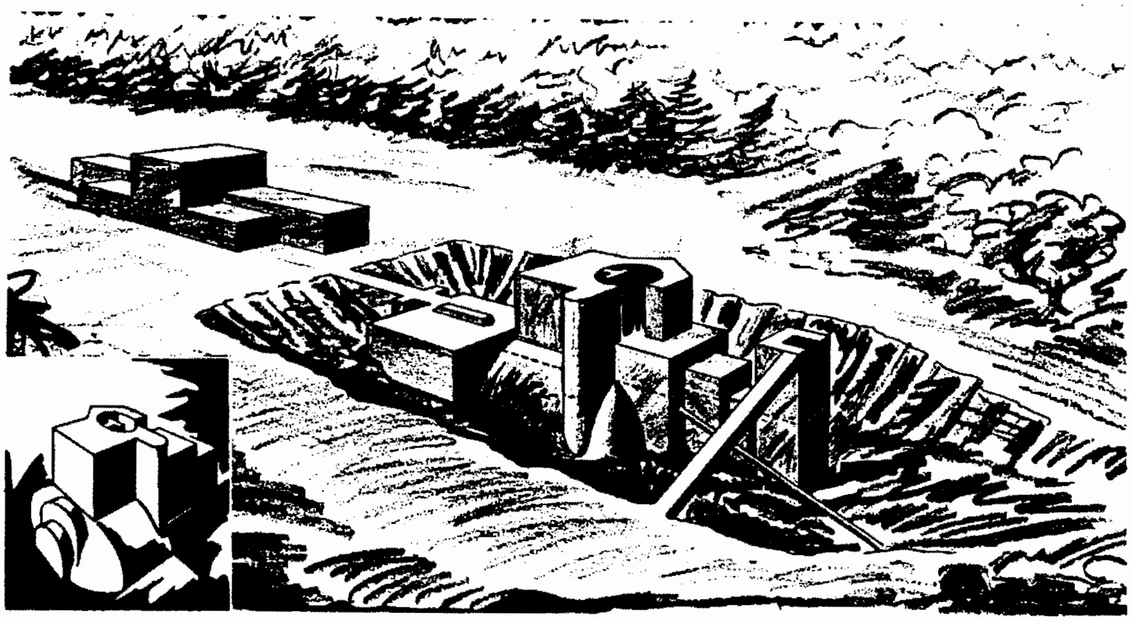
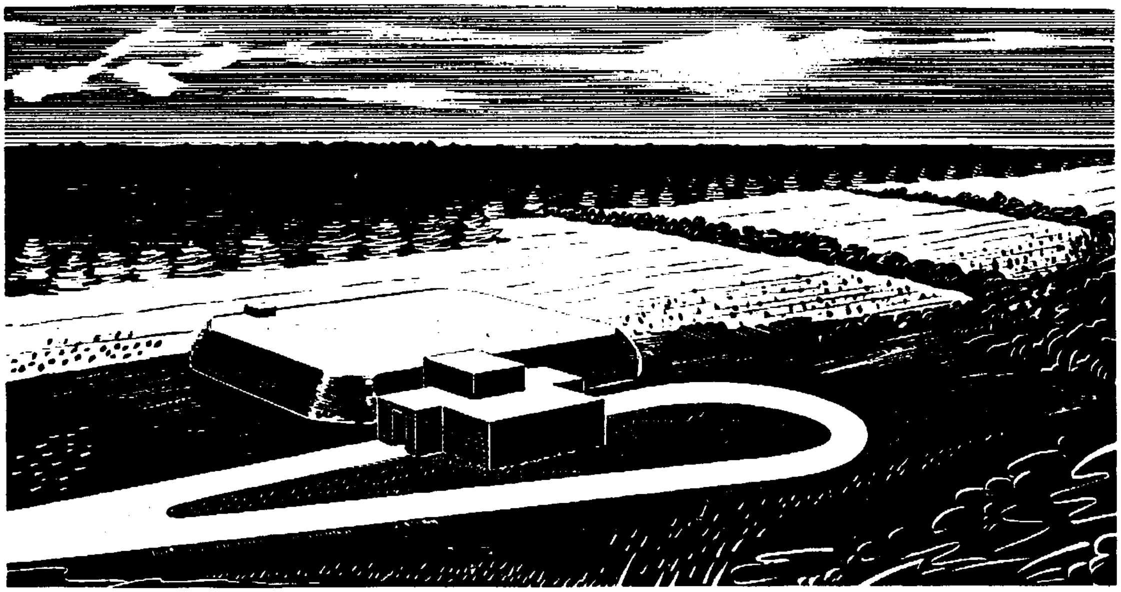


FIGURE 15

Composite layout of Units 4, 5, and 6. It was believed that these were to be storage facilities. Note the massive construction and burial underground. Upper panel is a sketch of Unit 6, which appeared complete at the time of photography.



VERTICAL SKETCH
UNIT NO 6

COMPOSITE VIEW
UNITS 4,5 AND 6

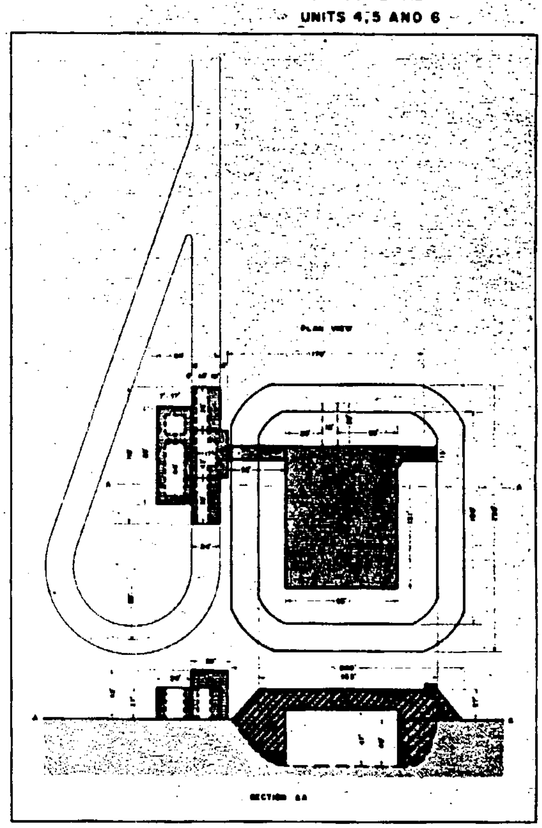
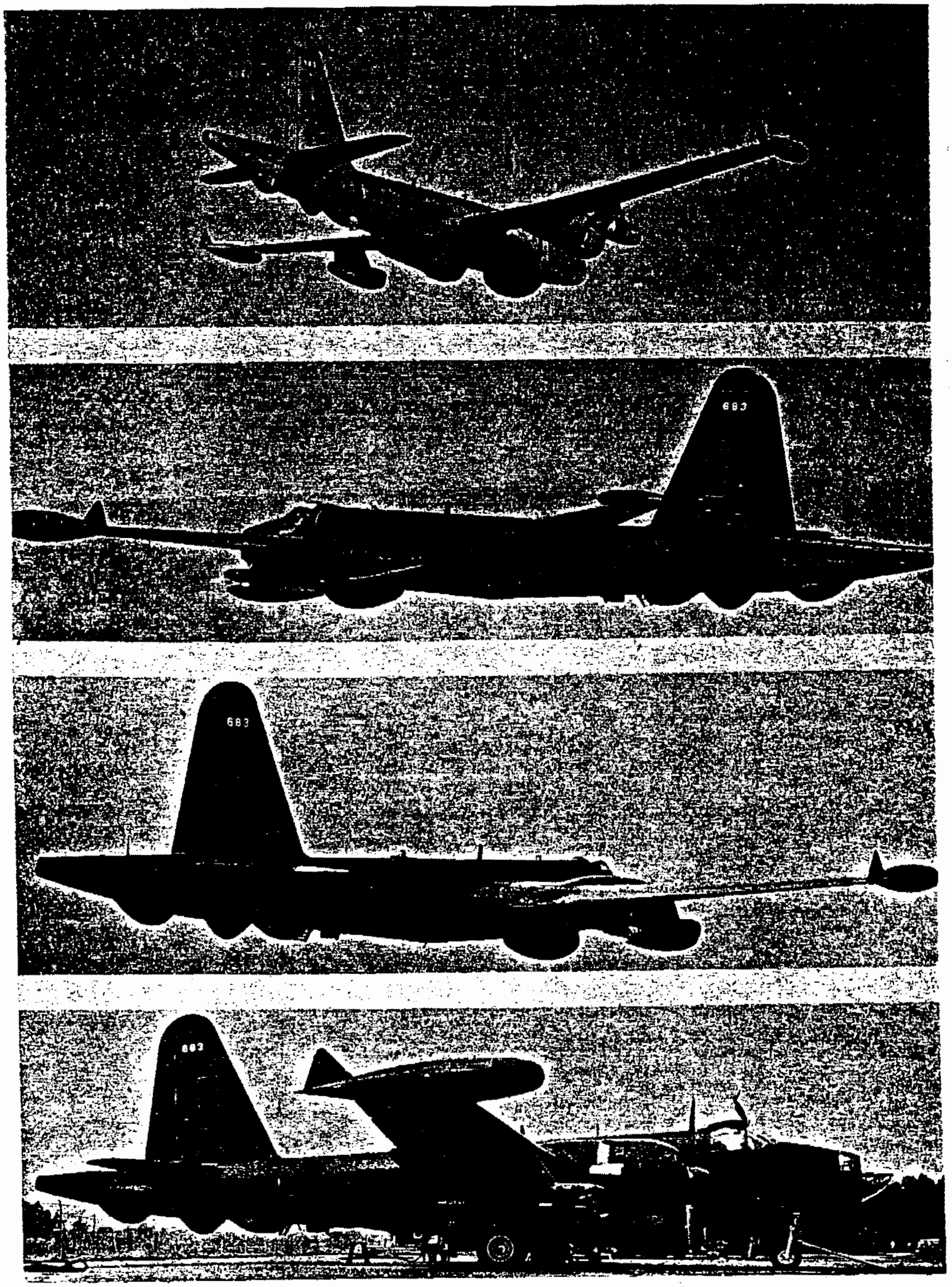


FIGURE 16

P2V-7: Disappointment in Night Photo Reconnaissance. The night photographic configuration differed from the one in these photos in that the wing pods contained the lights and a propeller-driven generator and there was no large radome under the forward part of the fuselage.


683
683
683

EO 13526 3.3(b)(6)>25Yrs

FIGURE 17

Photogrammetry, Incorporated, Comparator. Much of the en-
gineering work on this piece of equipment was done by [redacted] 3.5(c)
of HTA and successor organizations, when he was em- 3.5(c)
ployed by the Silver Spring, Md., firm that designed and
manufactured this device.

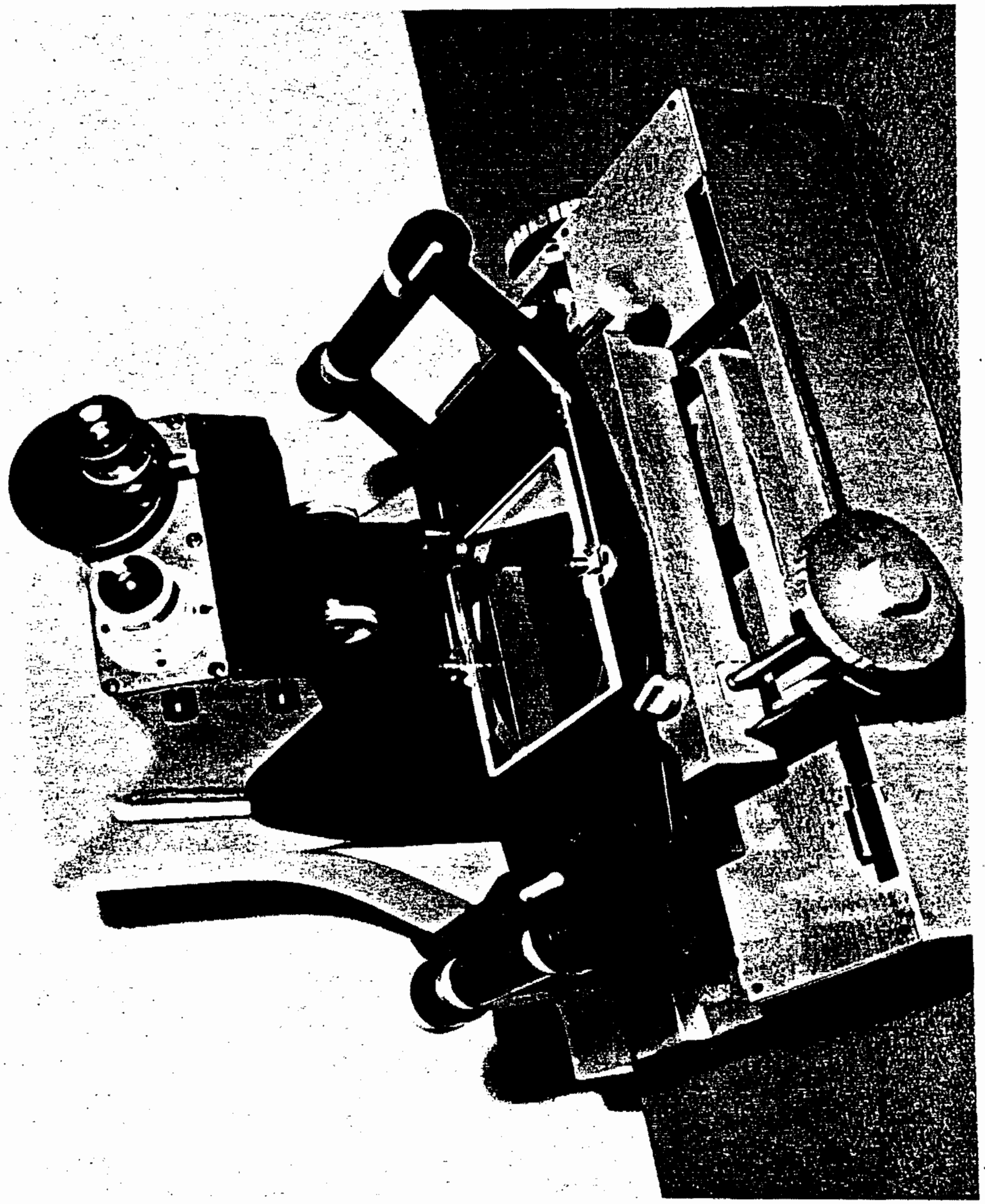


FIGURE 18

Mensuration teams in the Technical Intelligence Services Branch, probably in the fall of 1957. The team at the left consisted of an unidentified person operating the Photogrammetry, Incorporated, comparator and [redacted] acting as recorder and computist. On the right, [redacted] was using the Mann comparator obtained from Navy PIC and [redacted] was recording and computing.

3.5(c)
3.5(c)
3.5(c)

[redacted]

FIGURE 19

Reed Transforming Printer. When this machine was used in the first step for rectifying high oblique photographs, the image was projected onto negative film which was then loaded into the Reed Rectifier for printing.

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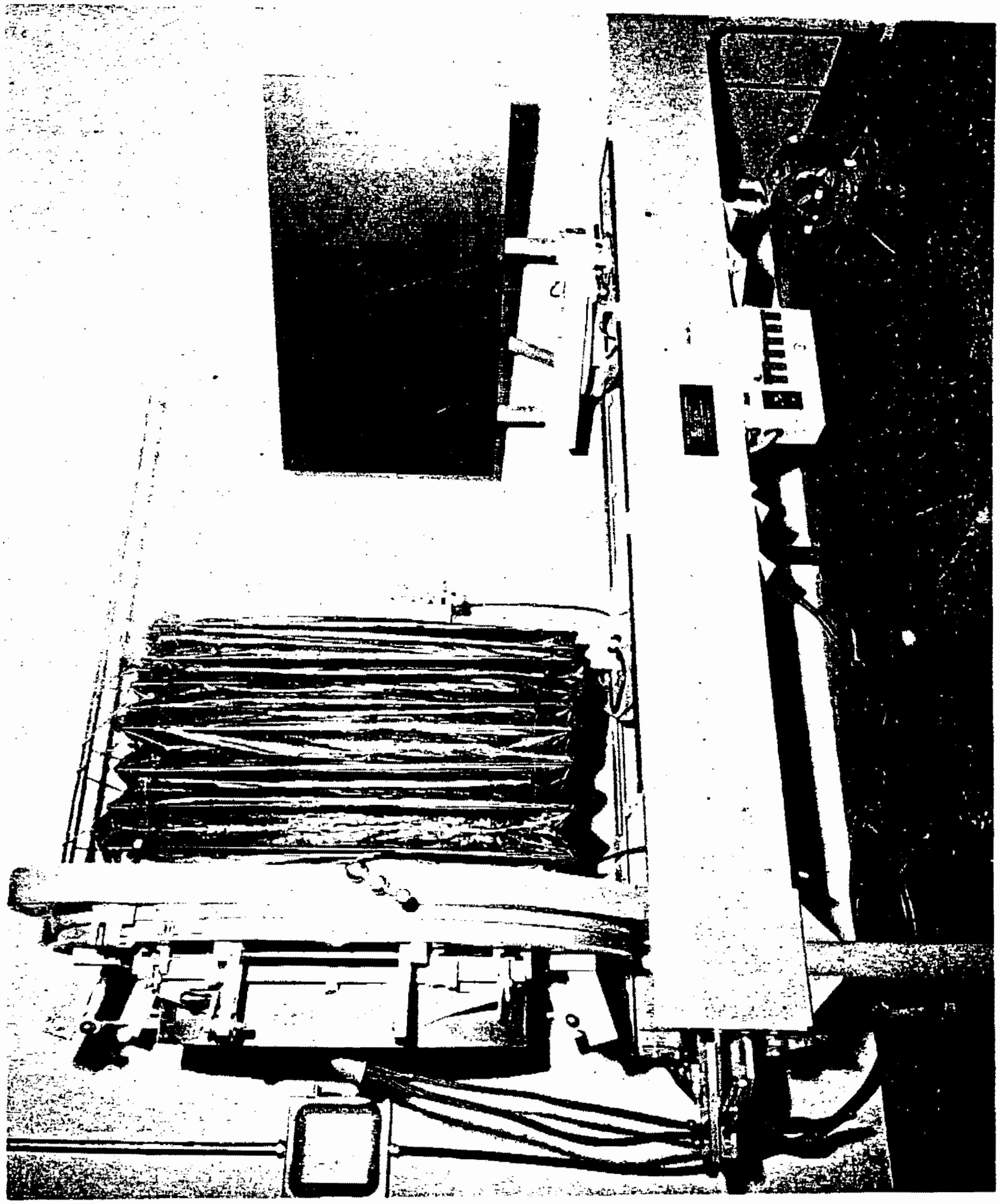

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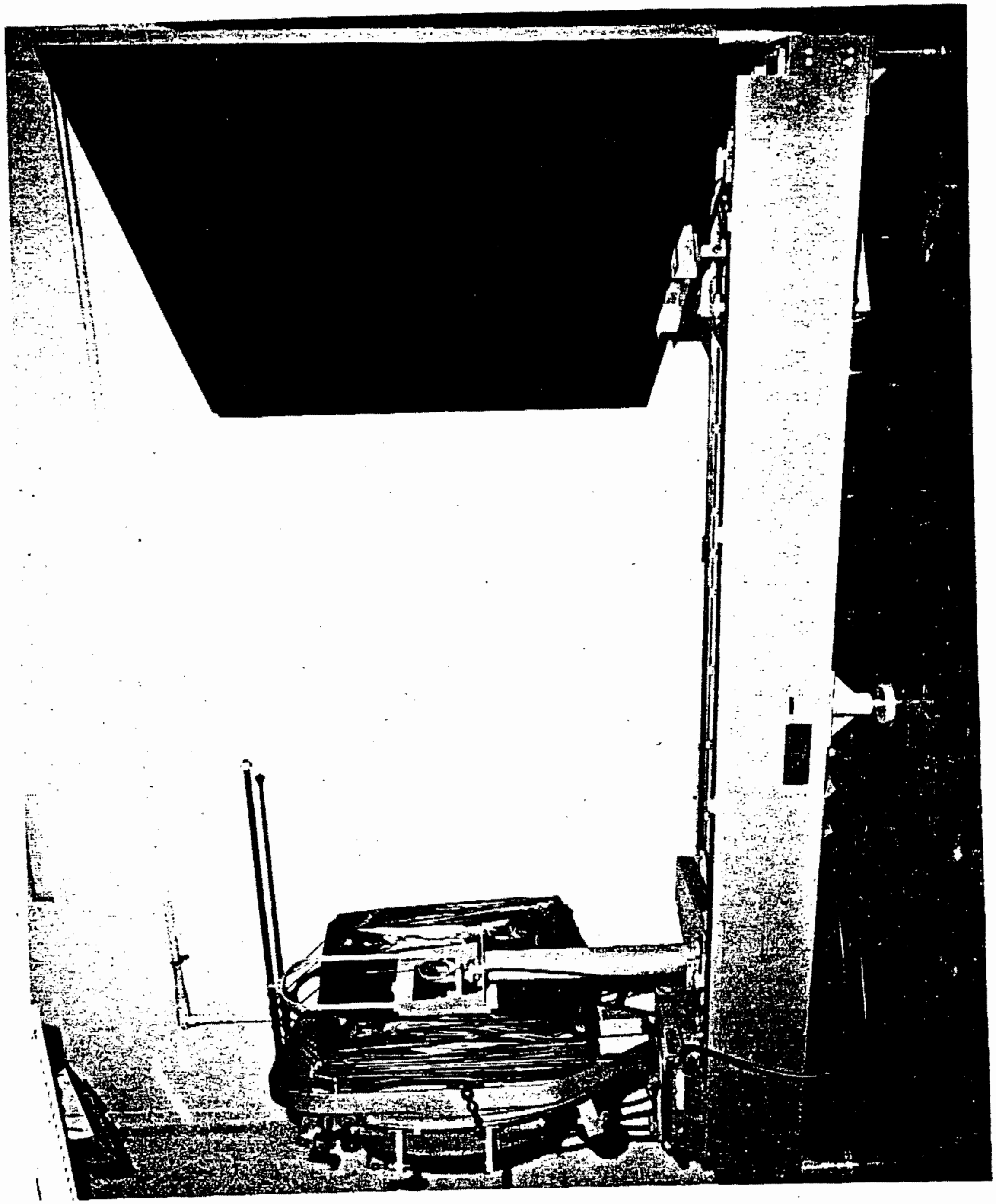
FIGURE 20

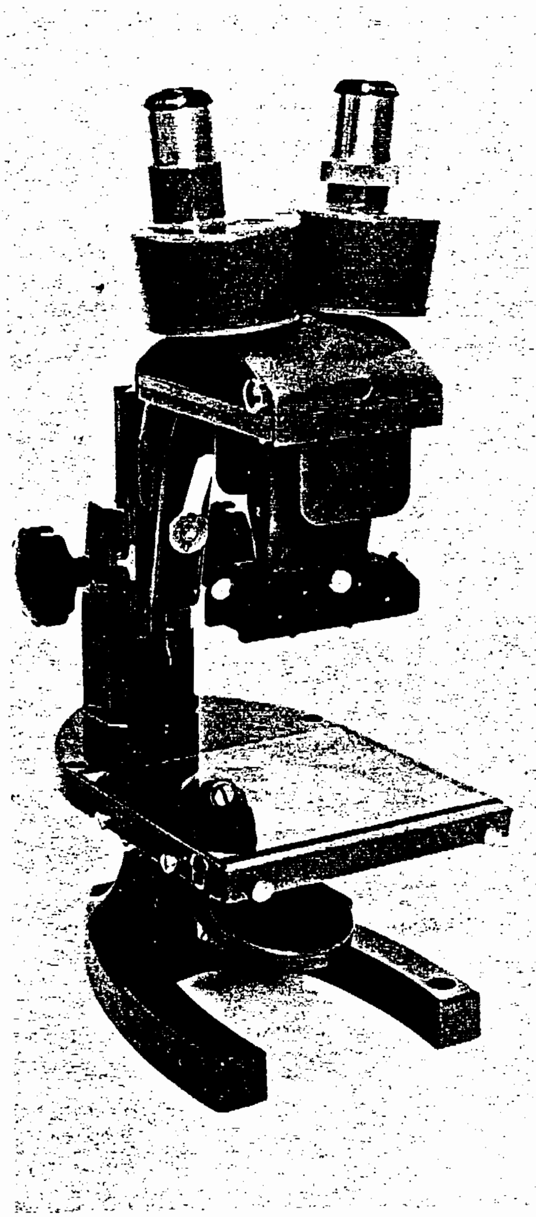
Reed Rectifier. This autofocusing equipment was used in the final step in the process of rectifying high oblique photographs.



EO 13526 3.3(b)(6)>25Yrs

FIGURE 21

Modified Binocular Microscope. At right note the cardboard-mounted prisms produced by [redacted] The flap at the left was provided to permit adjustment so as to bring both images into conjunction. The metal-mounted prisms below the [redacted] mount are believed to have been produced in the OCR Machine Division. These mounted in the instrument itself are probably the ones subsequently produced commercially. 3.5(c) 3.5(c)



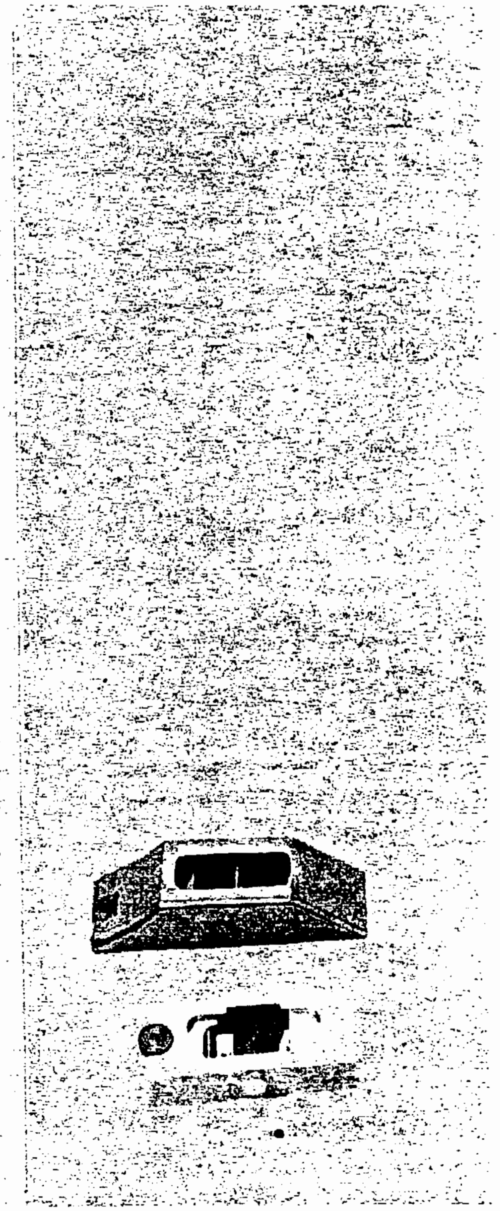


FIGURE 22

Using the Heath prisms. [redacted], a Navy PI, was using the instrument.

EO 13526 3.3(b)(6)>25Yrs

3.5(c)

[redacted]

FIGURE 23

"Twin Eyes", 10 July 1956. The two probable launching pads were in Area A, the probable storage or assembly facilities in Area B, and the probable electronics site was designated Area C.

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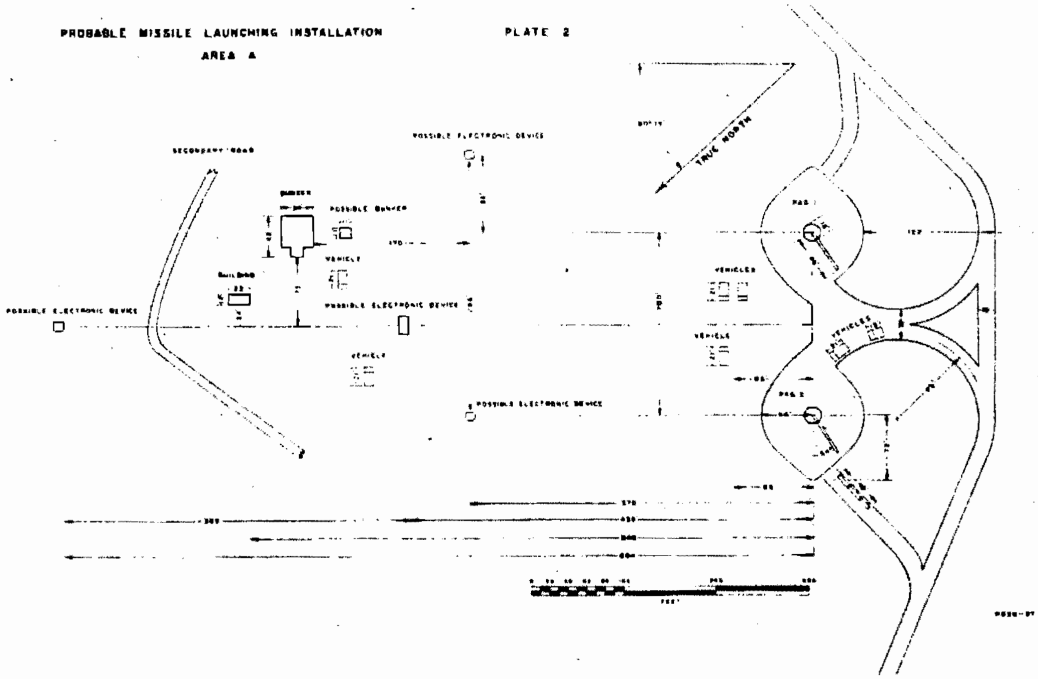

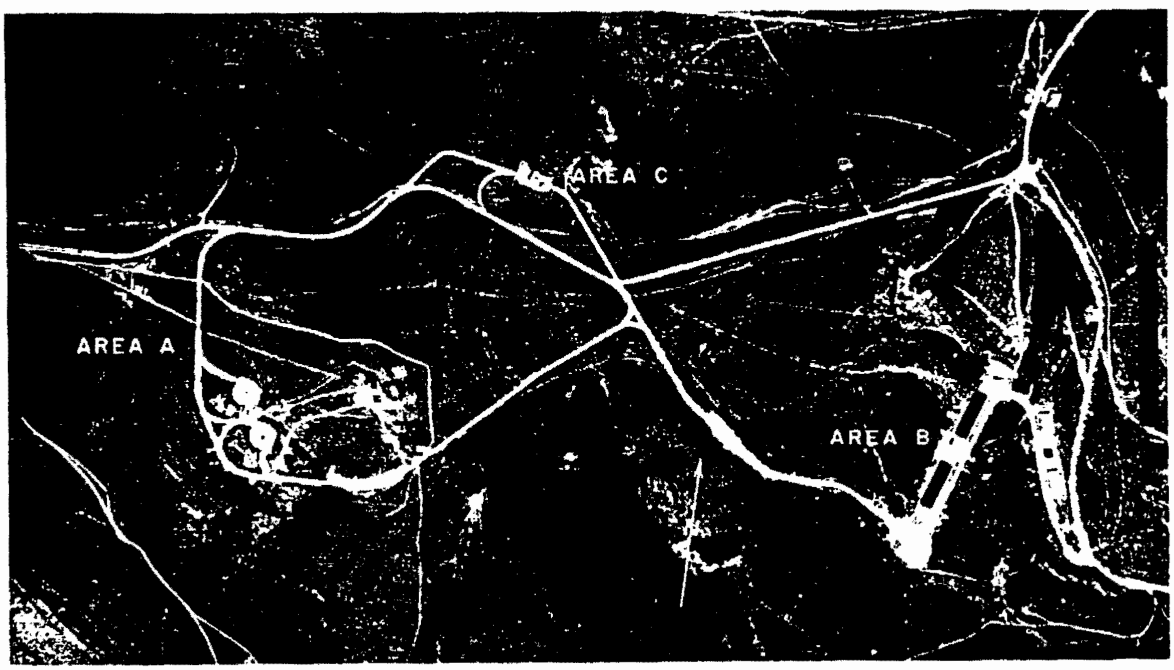

SECRET

FIGURE 24

Karangit Installation, 10 July 1956. The newly established HTA graphics shop was committed to the proposition that PI reports should contain few, if any, graphics. Rather, it was held, analysis of the form, shape, and configuration of objects and facilities as well as the layout of installation should be done by illustrators and the results presented in the form of line drawings and three-dimensional drawings. The Photographic Intelligence Memorandum issued in September 1957 which reported on the Karangit installation had the distinction of being the first detailed HTA publication that included no photography. This unusual circumstance resulted from the fact that interpretation of the photography and preparation of the report were done by [redacted] a PI who had just been named deputy chief of the new graphics shop. 3.5(c)

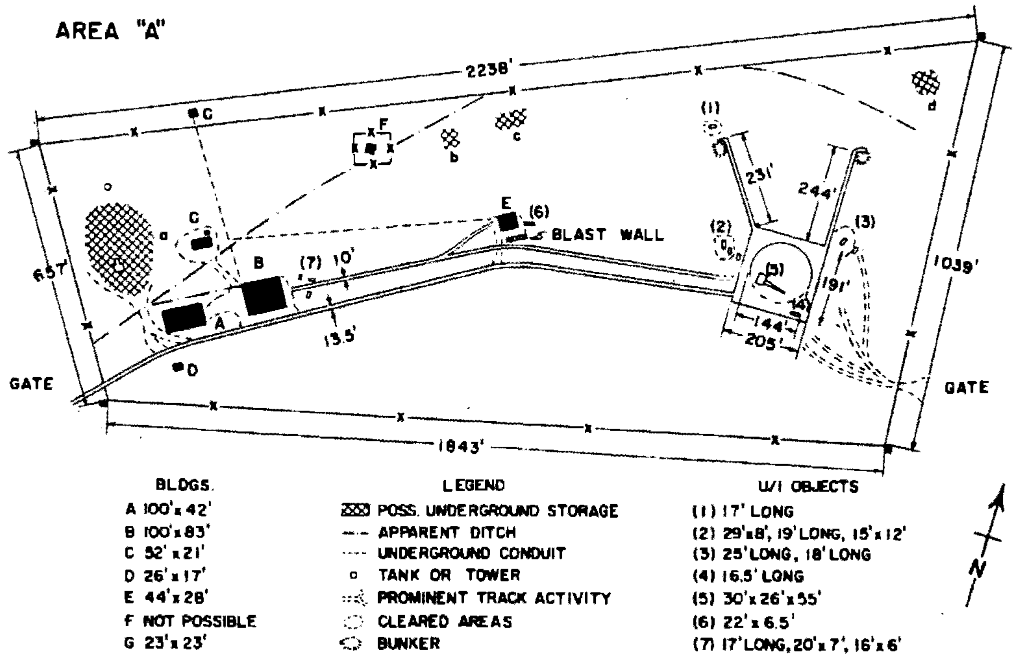
AREA "A"
2238'
657'
1039'
1843'
231'
244'
191'
144'
205'
10'
13.5'
BLAST WALL
GATE
GATE
N
BLDGS.
A 100'x 42'
B 100'x 83'
C 52'x 21'
D 26'x 17'
E 44'x 28'
F NOT POSSIBLE
G 23'x 23'
LEGEND
POSS. UNDERGROUND STORAGE
APPARENT DITCH
UNDERGROUND CONDUIT
TANK OR TOWER
PROMINENT TRACK ACTIVITY
CLEARED AREAS
BUNKER
U/I OBJECTS
(1) 17' LONG
(2) 29'x8', 19' LONG, 15'x 12'
(3) 25' LONG, 18' LONG
(4) 16.5' LONG
(5) 30'x 26'x 55'
(6) 22'x 6.5'
(7) 17' LONG, 20'x 7', 16'x 6'

FIGURE 25

HTA Organizational Realignment, July 1957. The dashed line between the box for the Operation Support Branch (previously the Special Projects Branch) and that for the Technical Intelligence Services Branch is meant to imply the custodial relationship that was developing as TISB prepared to ingest the remains of SPB. Though the Geographic Branch displayed incipient tendencies to acquire the name Geographic-Industrial Branch, the old name prevailed until the next reorganization. Not so with the former Industrial Branch, which had all but shed its previous unglamorous industrial responsibilities. Even before the realignment was announced, [redacted] its chief, who knew the importance of a name, consistently referred to the component as the Military-Scientific Branch, a name that was quickly picked up and used by others on HTA.

3.5(c)

3.5(c)

3.5(c)

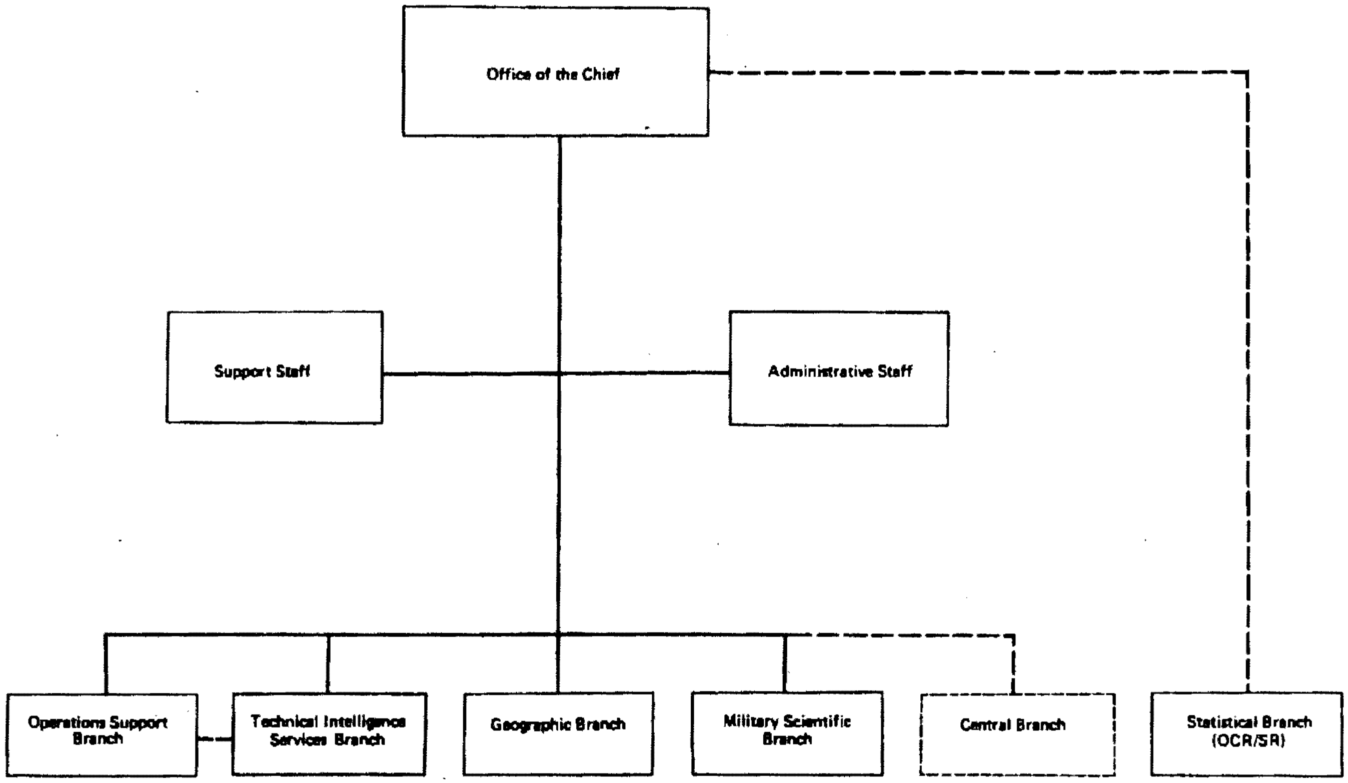

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FIGURE 26

U-2 bases and reference points for important targets covered during the summer and fall of 1957. The Fairbanks, Alaska, base used for the Klyuchi mission (6008) falls outside the area covered by this map.

3.3(b)(1)
3.3(b)(6)

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FIGURE 27

Layout and major components of the Tomsk Atomic Energy Installation, August 1957.

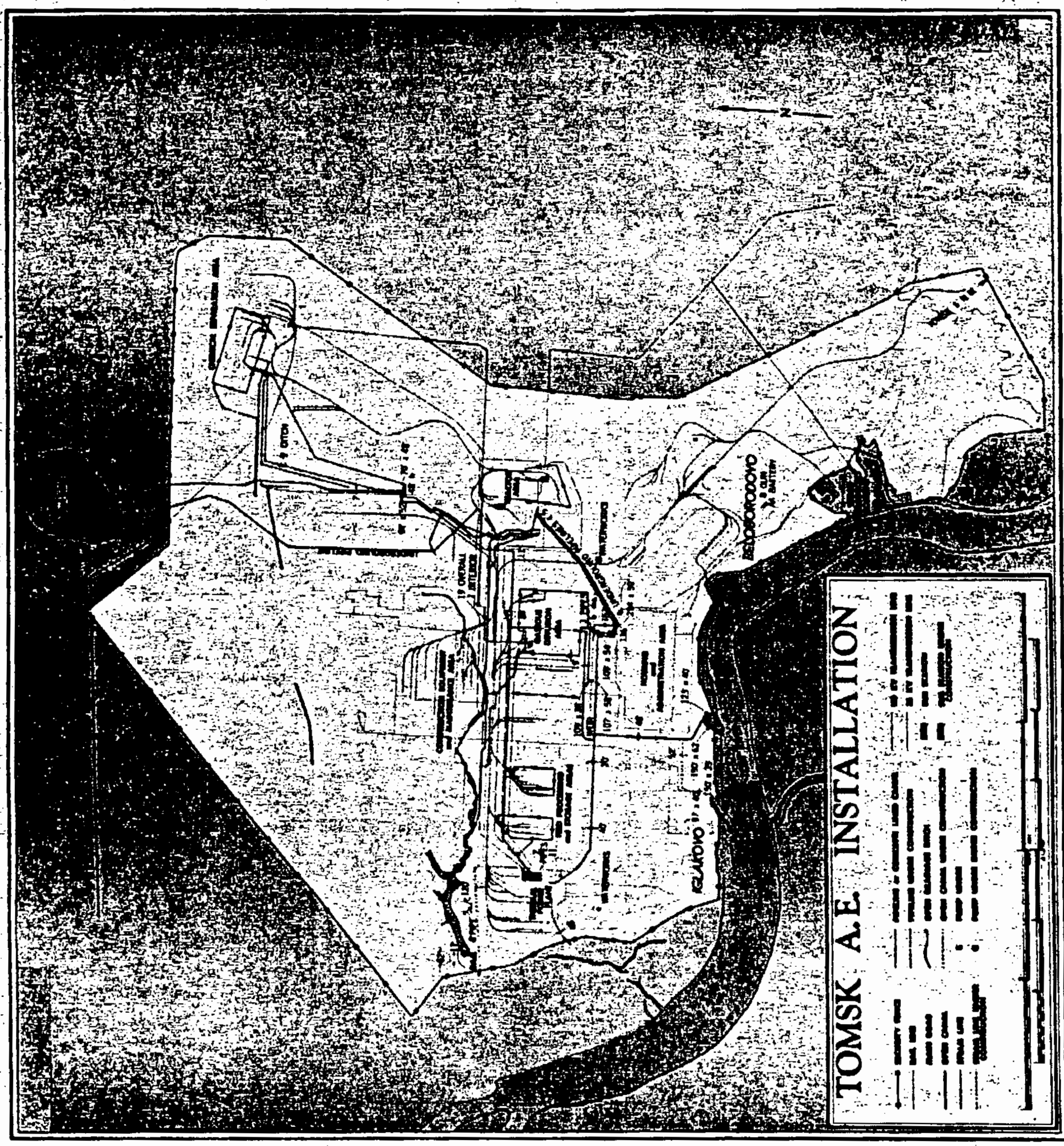
TOMSK A.E. INSTALLATION
IGLAKOVO
BELOBORODOVO
19 OVERALL
3 INTERIOR
8 GUN AA BATTERY
HOUSING and ADMINISTRATION AREA

FIGURE 28

Overhead view, Tomsk Atomic Energy Installation, August 1957


MUD LAKE DUMP AREA
CHEMICAL SEPARATION AREA
CONSTRUCTION EQUIPMENT AND MAINTENANCE AREA
FEED PROCESSING AND STORAGE AREA
REACTOR AREA
THERMAL POWER PLANT
GASEOUS DIFFUSION AREA
IGLAKOVO
HOUSING AND ADMINISTRATION AREA
TOM' RIVER
BELOBORODOVO
WOOD PRODUCTS COMBINE
N

FIGURE 29

Isotope Separation Area, Tomsk Atomic Energy Installation, August 1957. Major components in this area were the gaseous diffusion plant, at the right, and the feed processing plants, at the left.

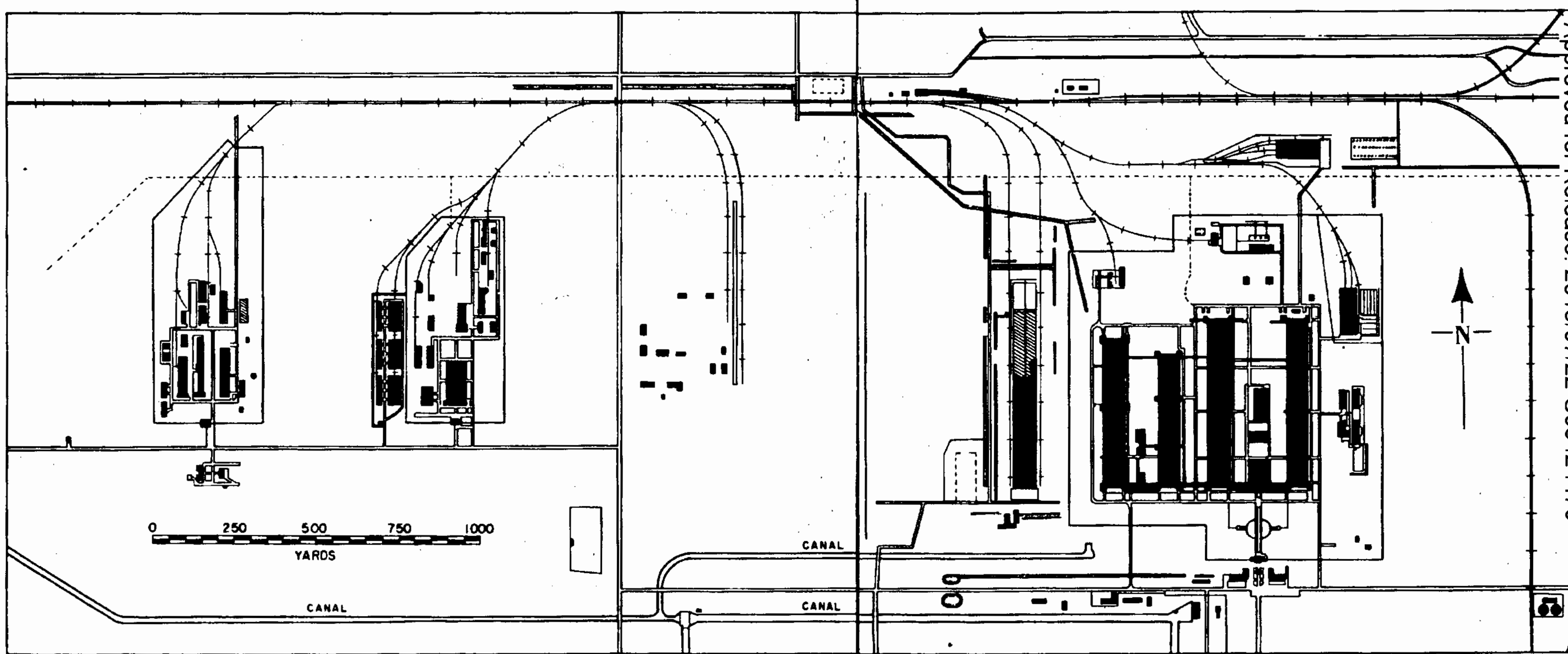
0
250
500
750
1000
YARDS
CANAL
CANAL
CANAL
N

FIGURE 30

Gaseous Diffusion Plant, Tomsk Atomic Energy Installation, August 1957. In comparing this perspective view with the line drawings and photography, in which north is at the top of the page, note that here the orientation is different. It will be helpful to observe that the large buildings are oriented north-south, and that north is at the near end of the building as represented here.

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GASEOUS DIFFUSION PLANT

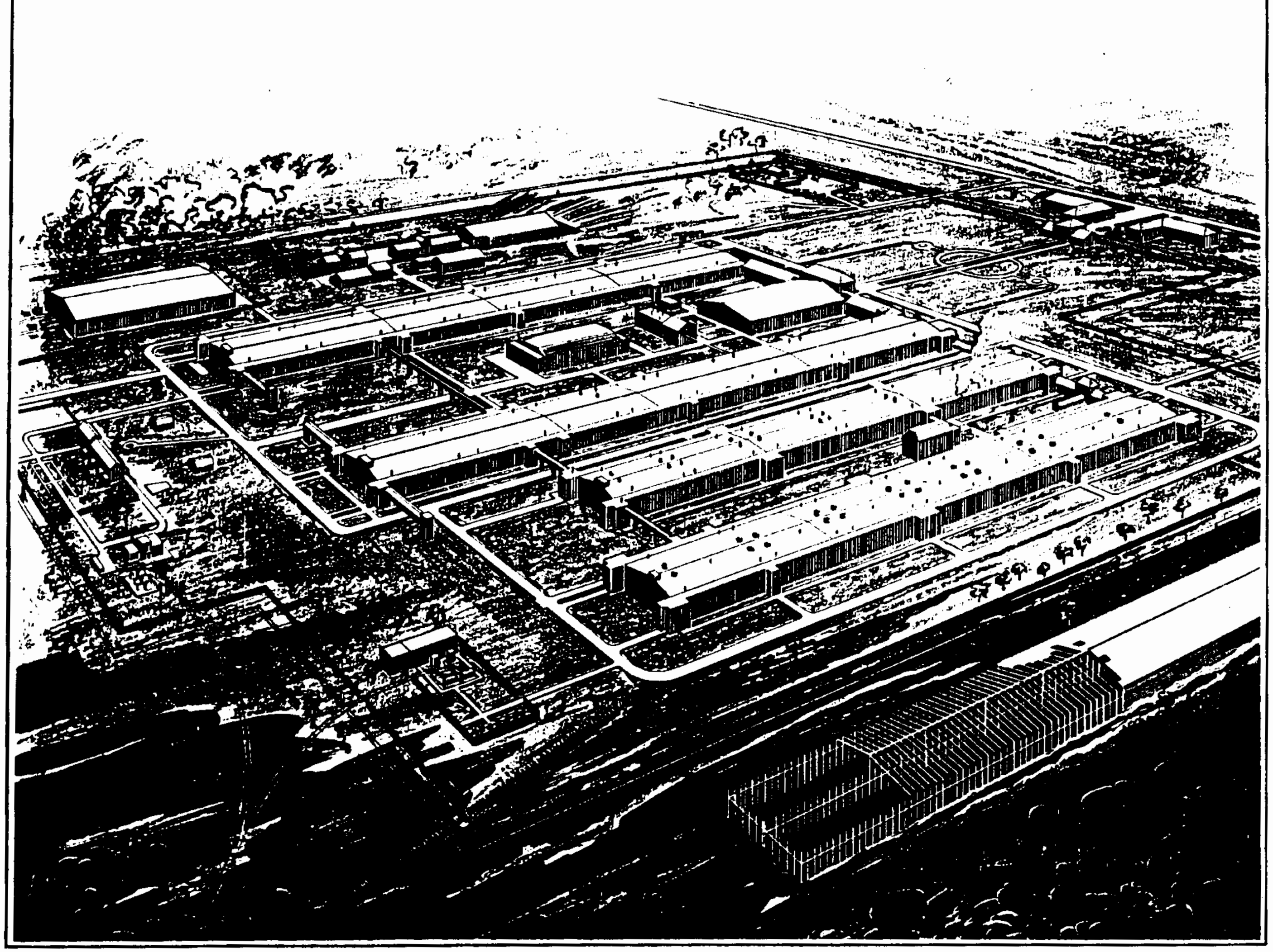

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FIGURE 31

Layout and major details of construction, gaseous diffusion plant, Tomsk Atomic Energy Installation, August 1957.
This is an example of the painstaking, mensuration done by HTA photogrammetrists on Soviet scientific and technical targets and of the extremely effective engineering-type drawings prepared in the newly established graphic shop for JAM SESSION analysts and consultants.

SECRET

GASEOUS DIFFUSION PLANT

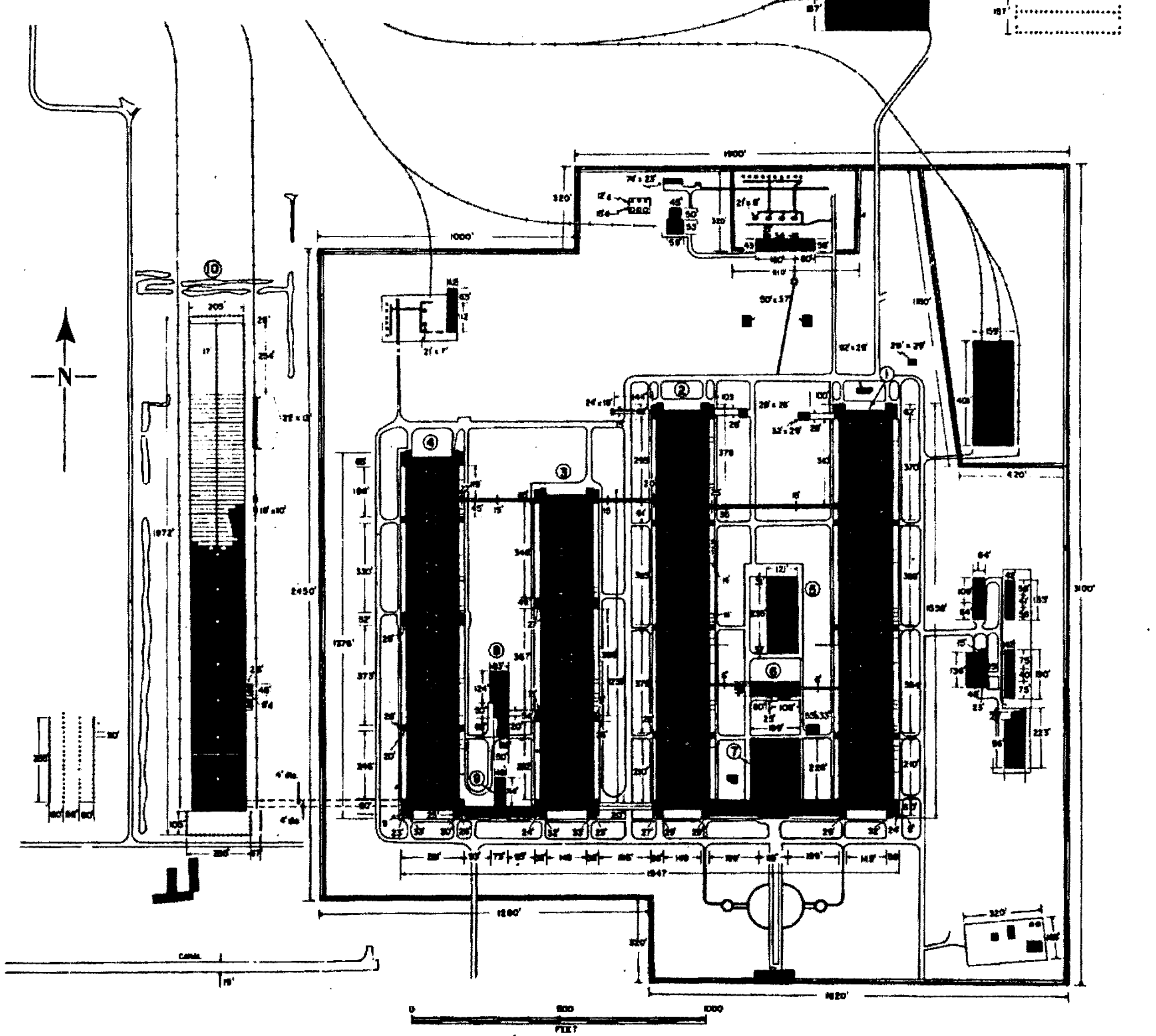

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FIGURE 32

Additional structural details, gaseous diffusion plant, Tomsk Atomic Energy Installation (cf. Figure 31)

Dimensions and Roof Area of
Gaseous Diffusion Plant Buildings

Building Number	Maximum Length (feet)	Maximum Width (feet)	Maximum Height (feet)	Actual Roof Area (sq. ft.)
1	1558	218	39	327,190
2	1558	207	39	322,506
3	1235	214	39	264,290
4	1376	212	39	291,712
5	297	121	39	35,937
6	193	58	41	11,194
7	255	199	37	50,745
8	242	83	47	20,086
9	144	49	13	5,586
10*	1972	205	39	404,260

*Final measurements. Building under construction.

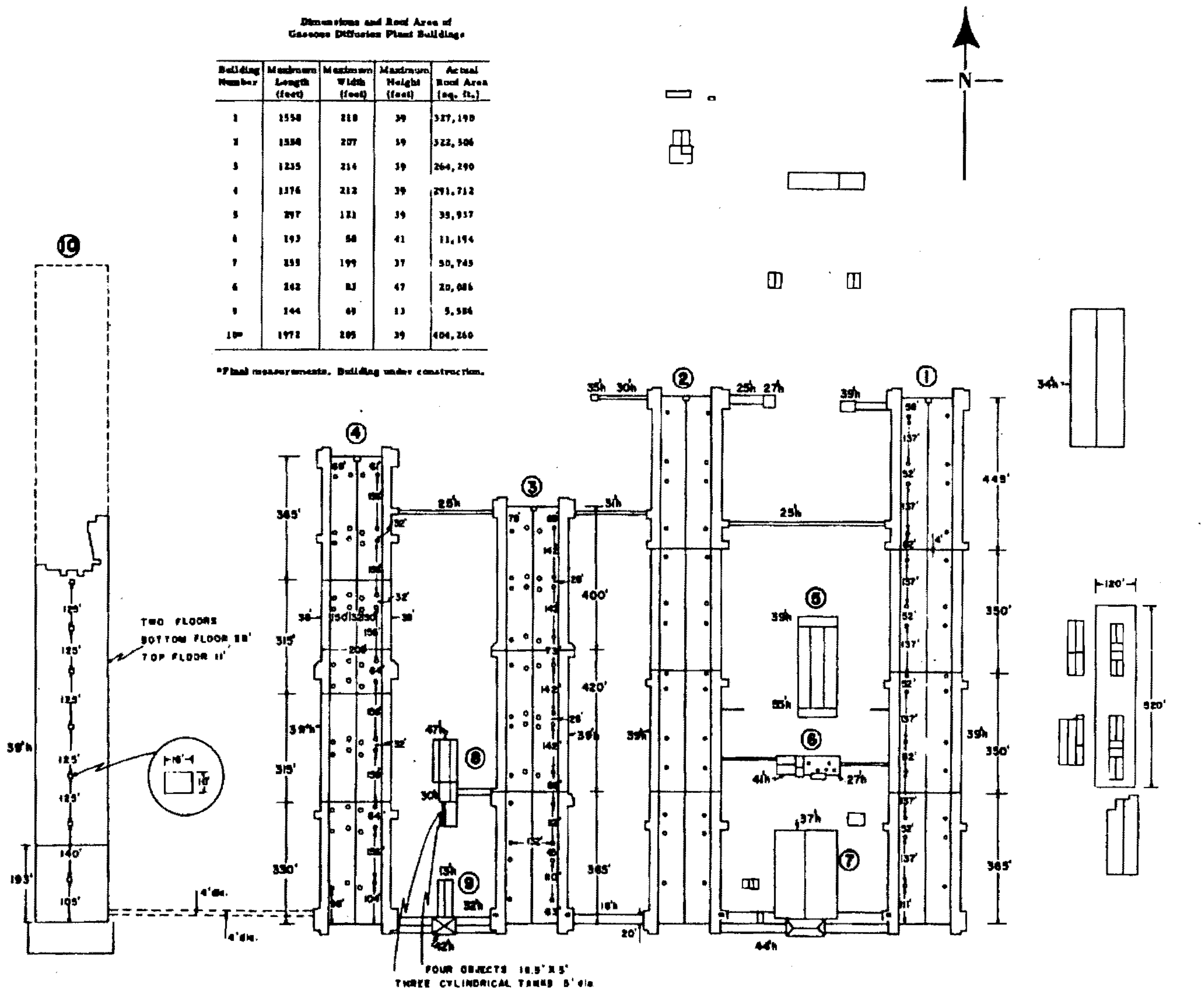

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FIGURE 33

Gaseous Diffusion Plant and expansion in progress, Tomsk Atomic Energy Installation, August 1957. Note the partially roofed building and the initial clearing for construction west of it.

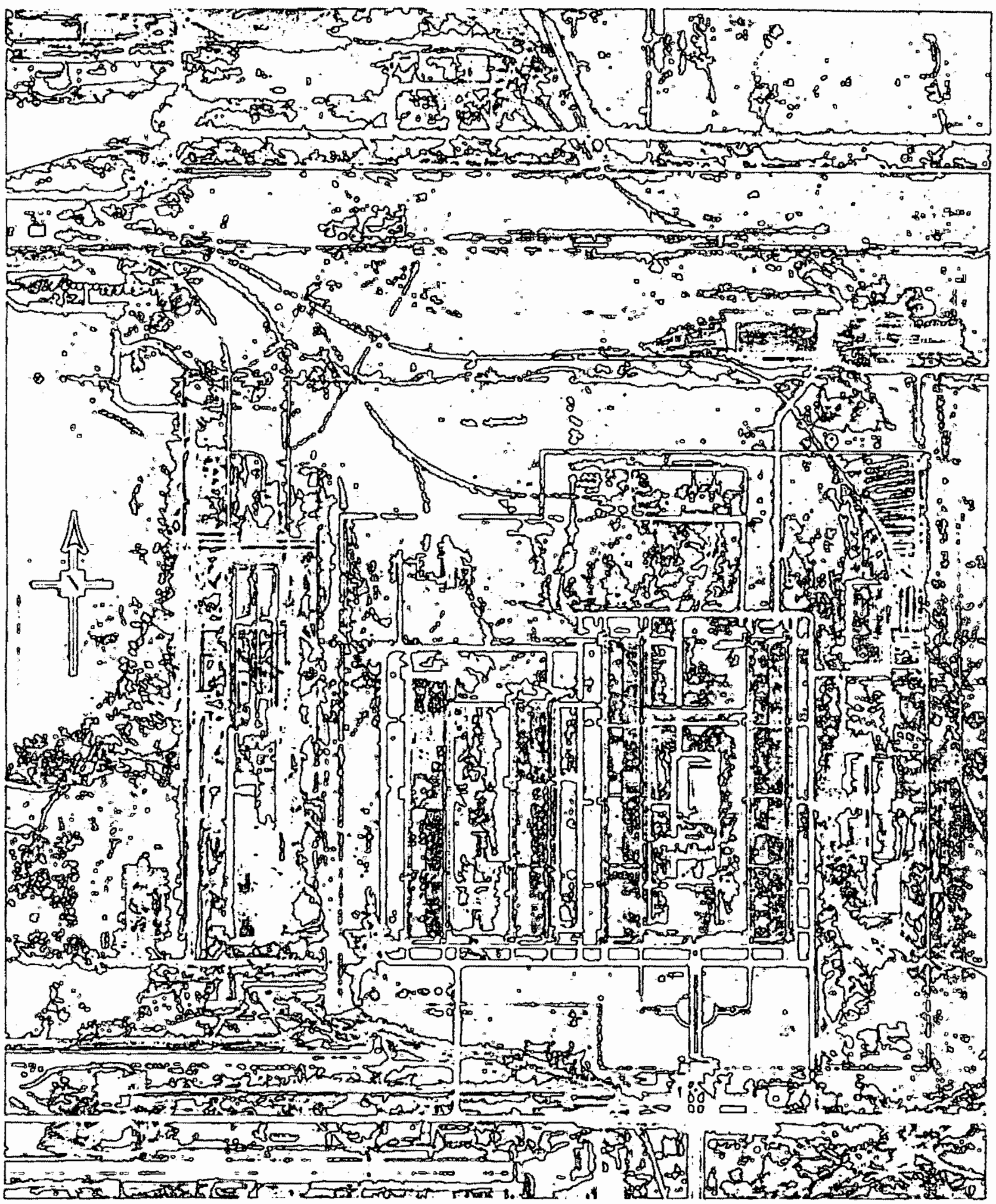

FIGURE 34

Layout and structural details, feed processing plant, Tomsk Atomic Energy Installation, August 1957.

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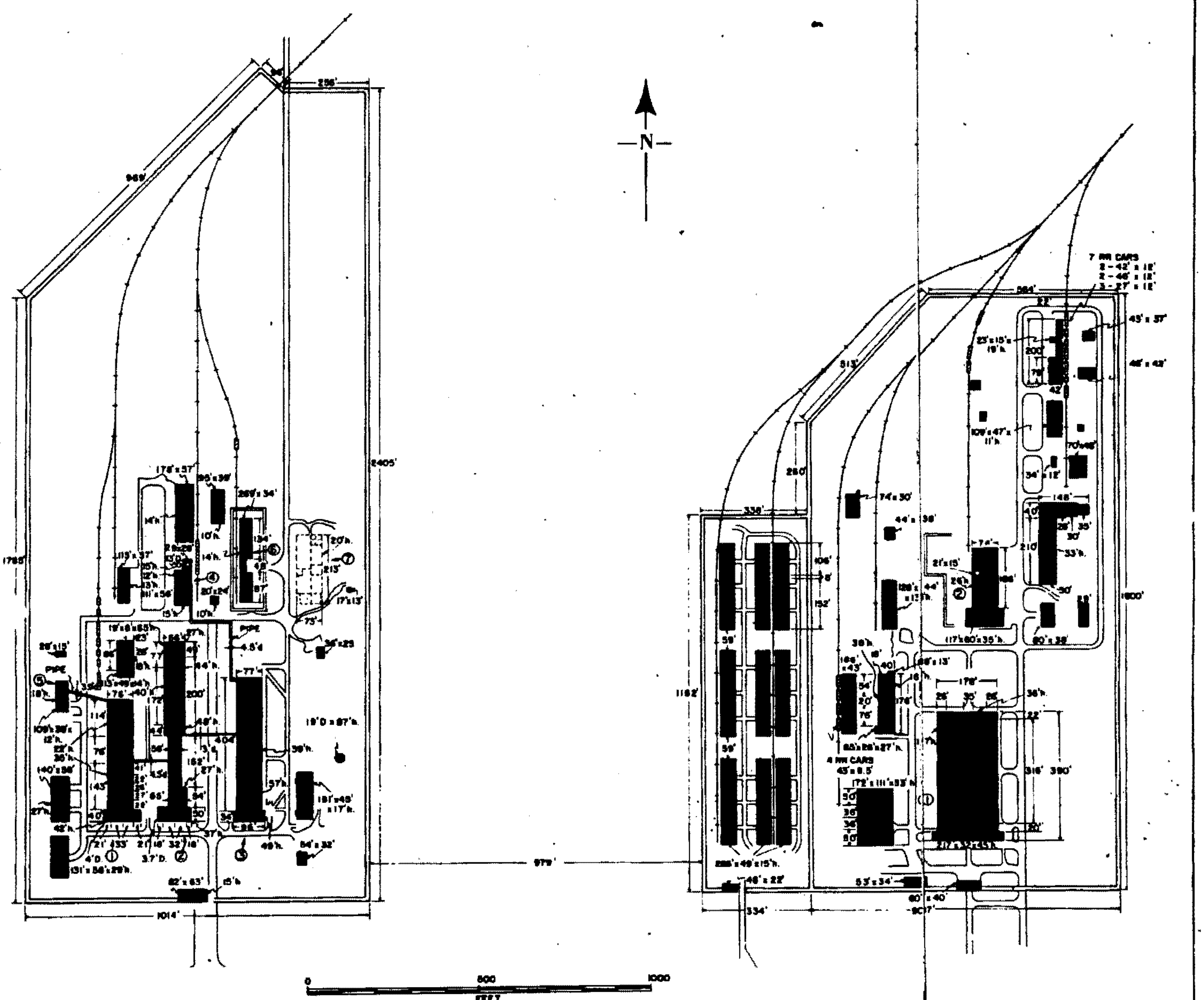

SECRET

FIGURE 35.

Reactor area, Tomsk Atomic Energy Installation, August 1957.

REACTOR AREA

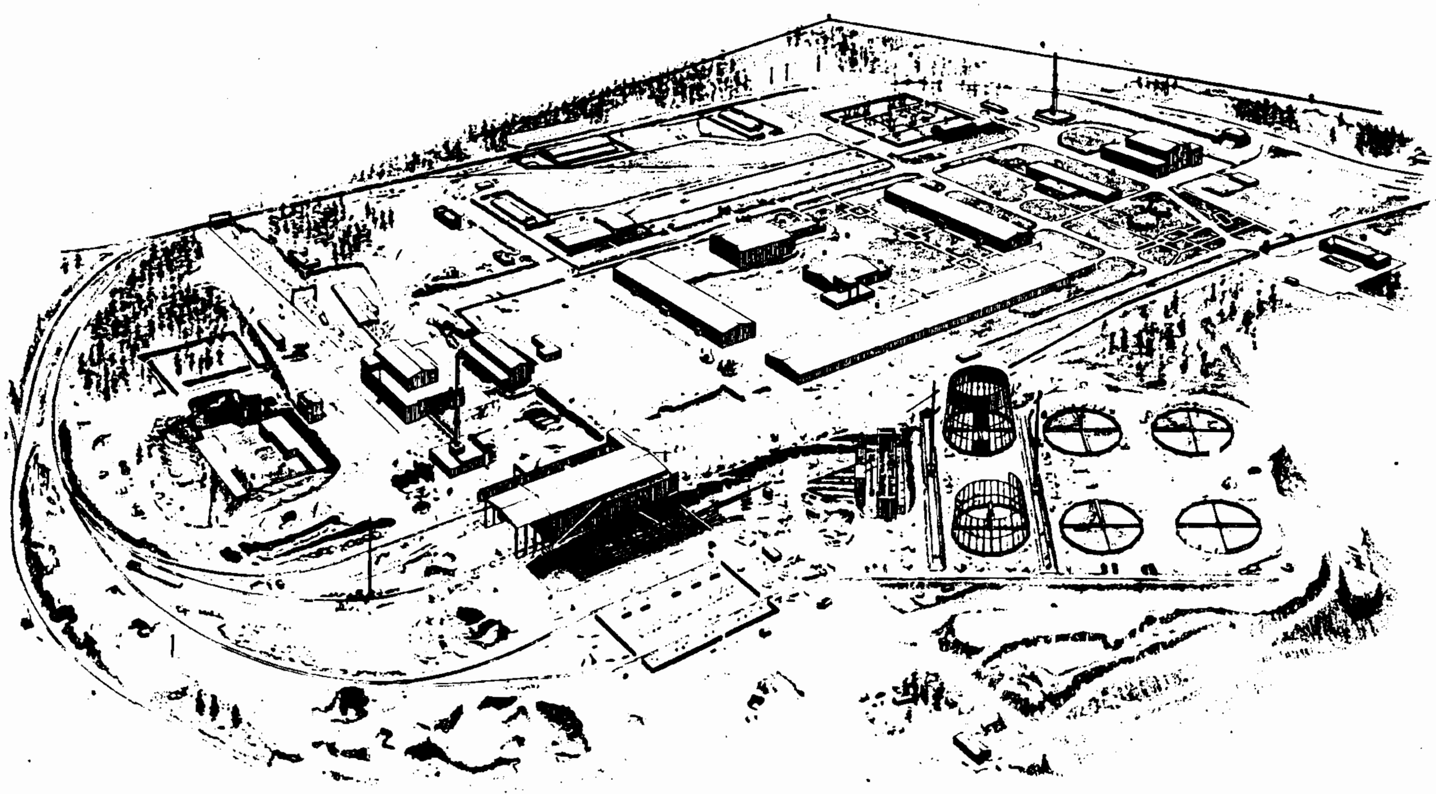

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FIGURE 36

Layout and configuration of facilities in the reactor area, Tomsk Atomic Energy Installation, August 1957. Buildings 1 and 16 housed reactors; Buildings 2 and 17 had tall stacks and exhaust fans for the reactors. Buildings 3 and 19 had slug handling facilities. Building 6 was the control building for the substation serving the original reactor; there was as yet no evidence of a counterpart for the new substation. Buildings 7 and 12 were believed intended for fuel preparation, and 8 and 13 were thought to be for fuel storage. Water purification facilities were probably housed in Buildings 5 and the "a" portion of 11; their counterparts for the newer reactor were thought to be Building 14 and the newly added "b" section of Building 11. Items 4 and 15 were interpreted as pumphouses for the two reactors. Building 21 was the partially completed turbogenerator hall. It was to be connected to the valve house and auxiliary pumping station, Item 23, by six pipes six feet in diameter. The cooling towers under construction were just beyond the latter facility. The functions of Buildings 9 and 10, which appeared to be associated with the original reactor and which had no counterpart for the new reactor, were not determined. Building 18 was believed used for assembly of reactor components.

REACTOR AREA

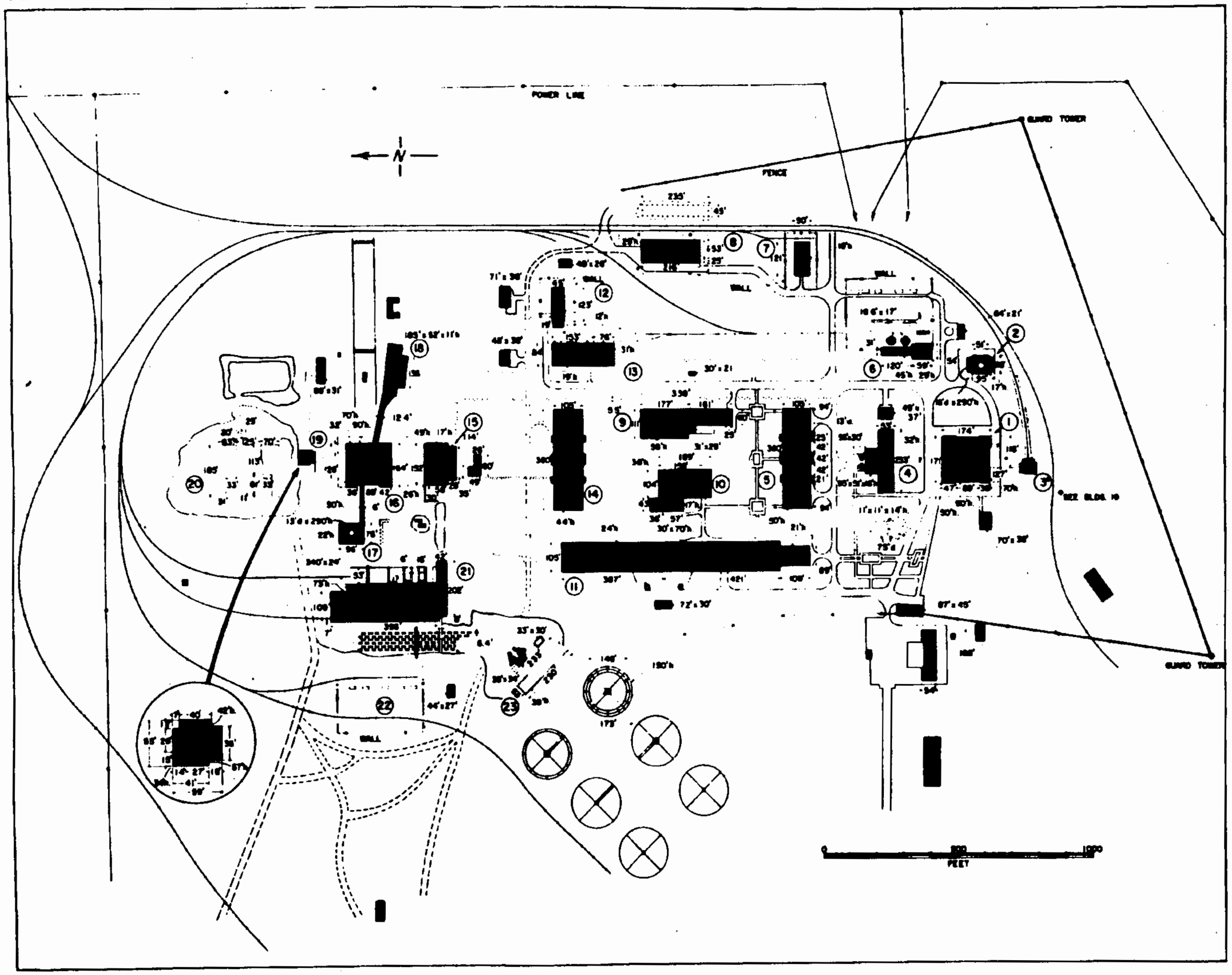

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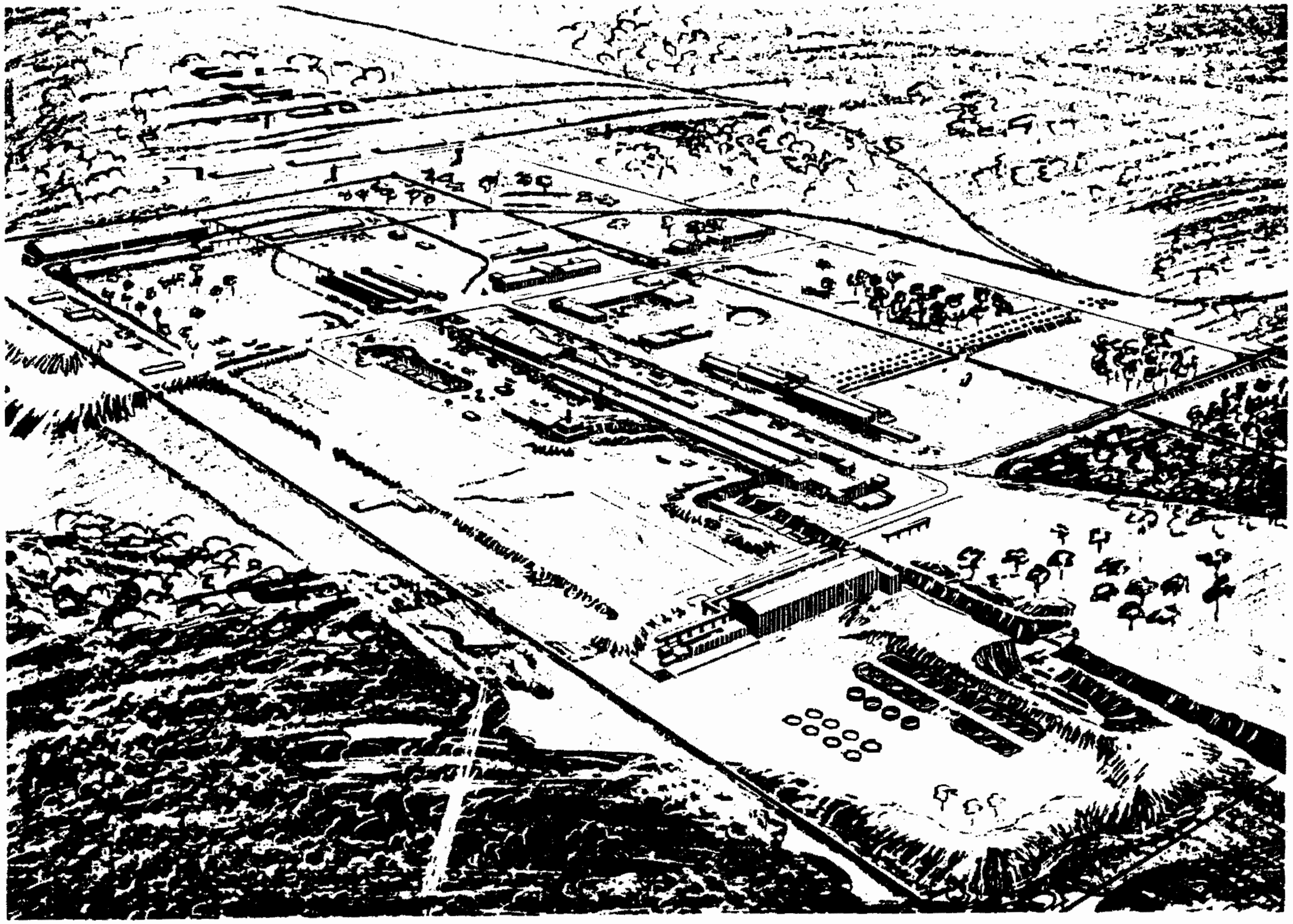
FIGURE 37

Chemical Separation Area, Tomsk Atomic Energy Installation, August 1957.

CHEMICAL SEPARATION AREA



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SECRET

FIGURE 38

Layout and mensural details, chemical separation area, Tomsk Atomic Energy Installation, August 1957. Key structure in the area is the CANYON building, Item 5. The control building was Item 9. Building 8 was the one believed designed for the concentration and/or isolation of radioactive materials.

CHEMICAL SEPARATION AREA

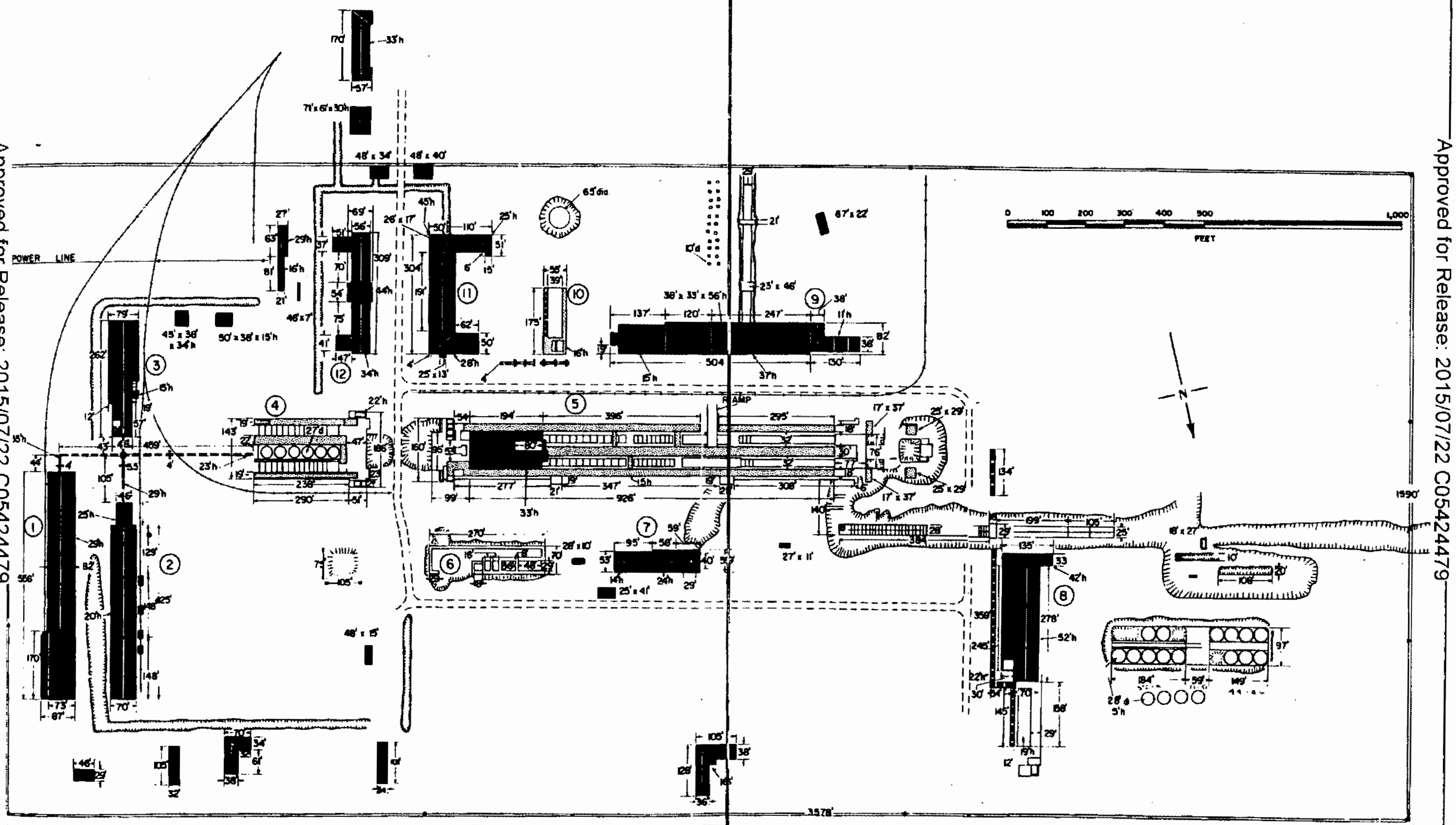

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FIGURE 39

Location and general geographical relationships of the Tyura Tam Missile Test Center and associated ballistic missile test range.


Scale 1:20,000,000

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~~CIA Internal Use Only~~

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EO 13526 3.5(d)

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THE YEARS OF PROJECT HTAUTOMAT, 1956 - 1958

VOLUME V

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FIGURE 40

Chief components of the Tyura Tam Missile Test Center, August 1957.

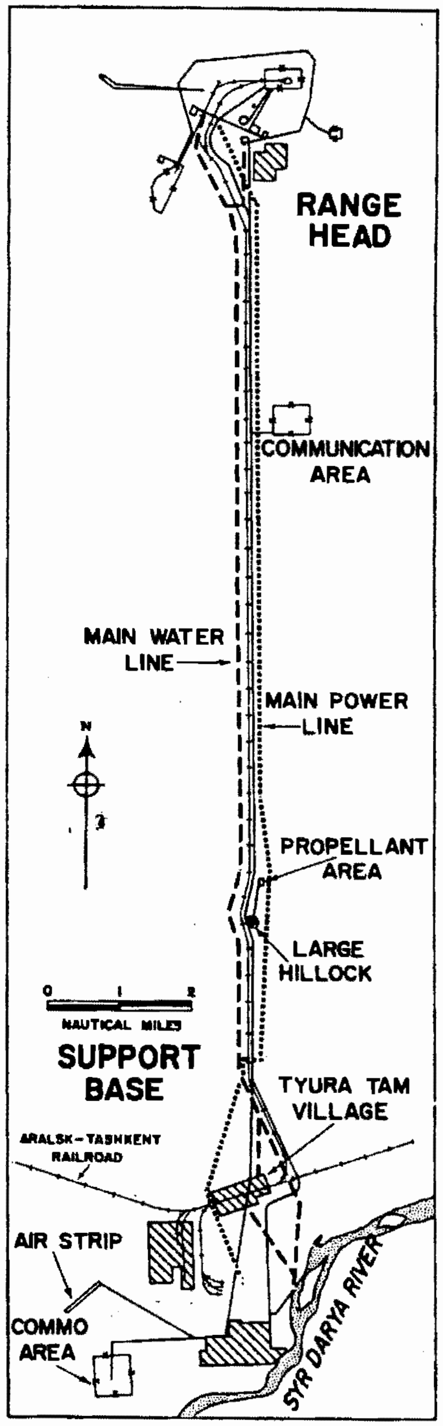
RANGE HEAD
COMMUNICATION AREA
MAIN WATER LINE
MAIN POWER LINE
N
PROPELLANT AREA
LARGE HILLOCK
0 1 2
NAUTICAL MILES
SUPPORT BASE
TYURA TAM VILLAGE
ARALSK-TASHKENT RAILROAD
AIR STRIP
COMMO AREA
SYR DARYA RIVER

FIGURE 41

Launch Area A, Tyura Tam Missile Test Center, August 1957.

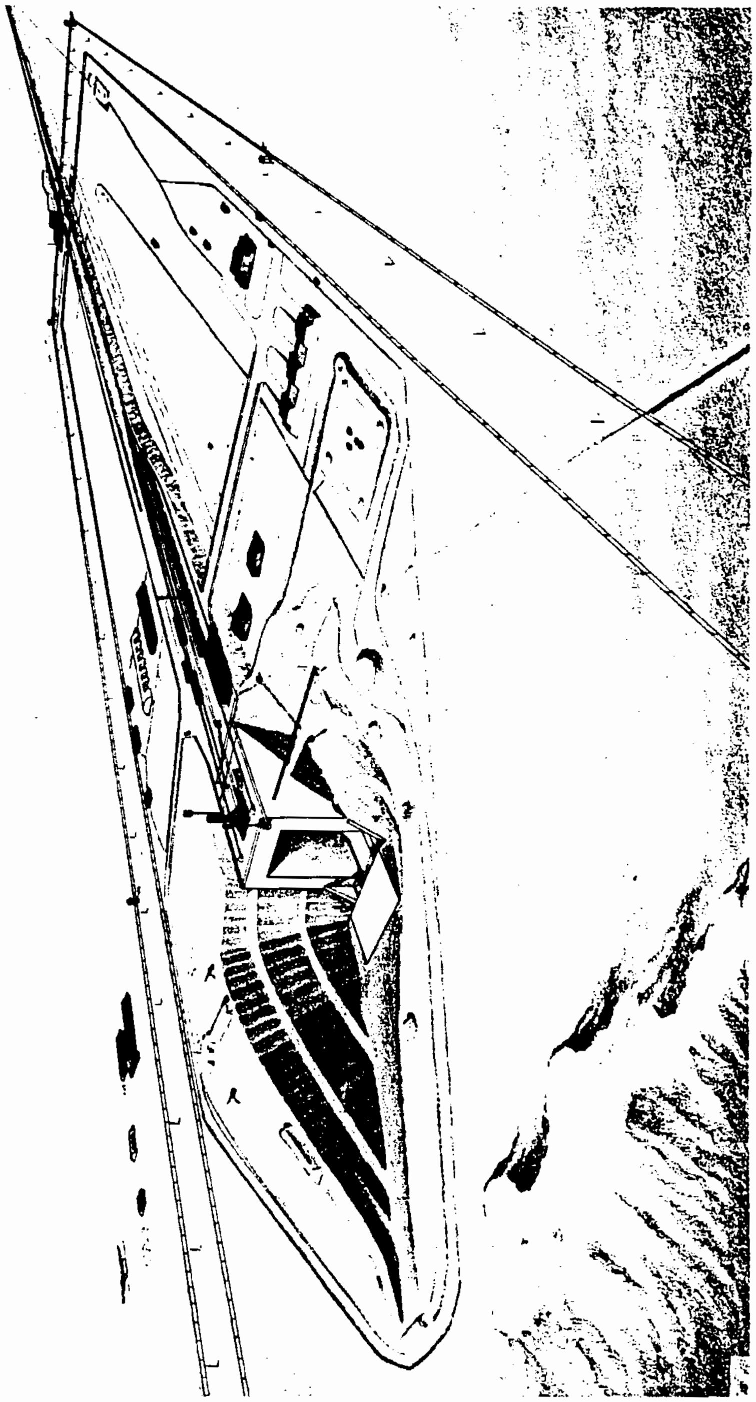

FIGURE 42

Details and dimensions of the launching platform and associated pit, Launch Area A, Tyura Tam Missile Test Center, August 1957.

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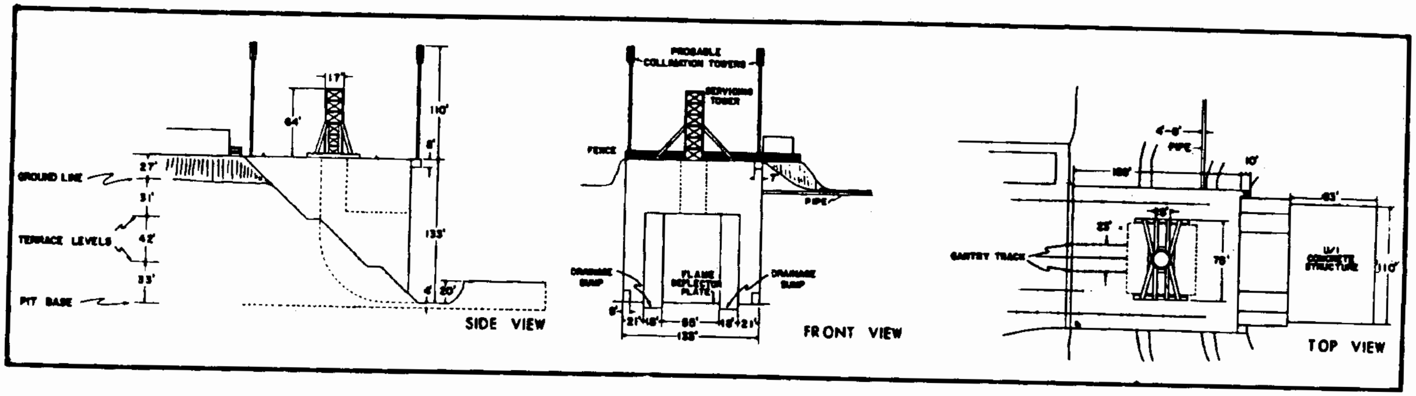

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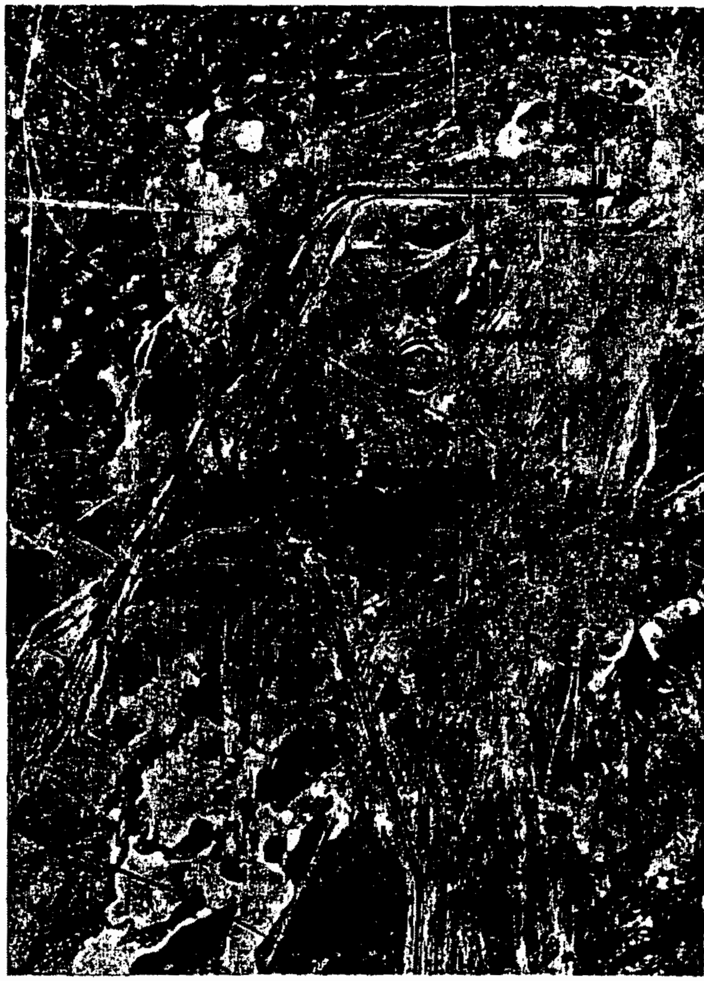
FIGURE 43

Range head facilities, Tyura Tam Missile Test Center, August, 1957. A comparison of the line drawing with Figure 42 and 44 will confirm the fact that much more technical detail was extracted from the photography of the key components than is represented in this generalized representation of the entire range head.



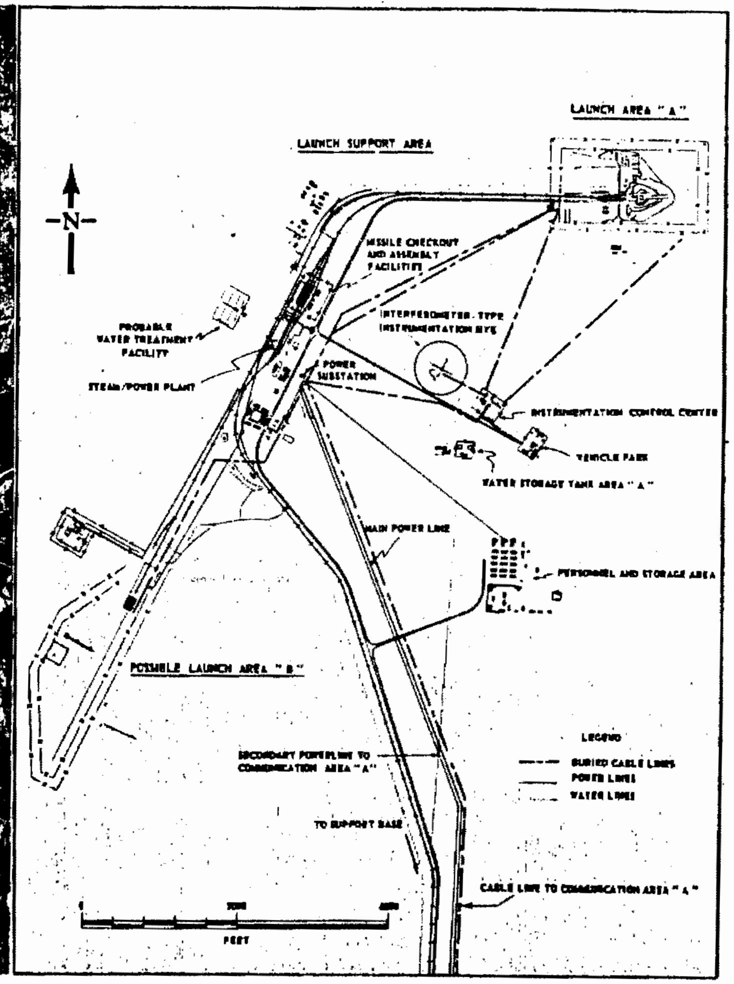


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FIGURE 44

Details of the launch support facilities, Launch Area A, Tyura Tam Missile Test Center, August 1957. Note especially the water lines and pumphouse and the parked rail cars.

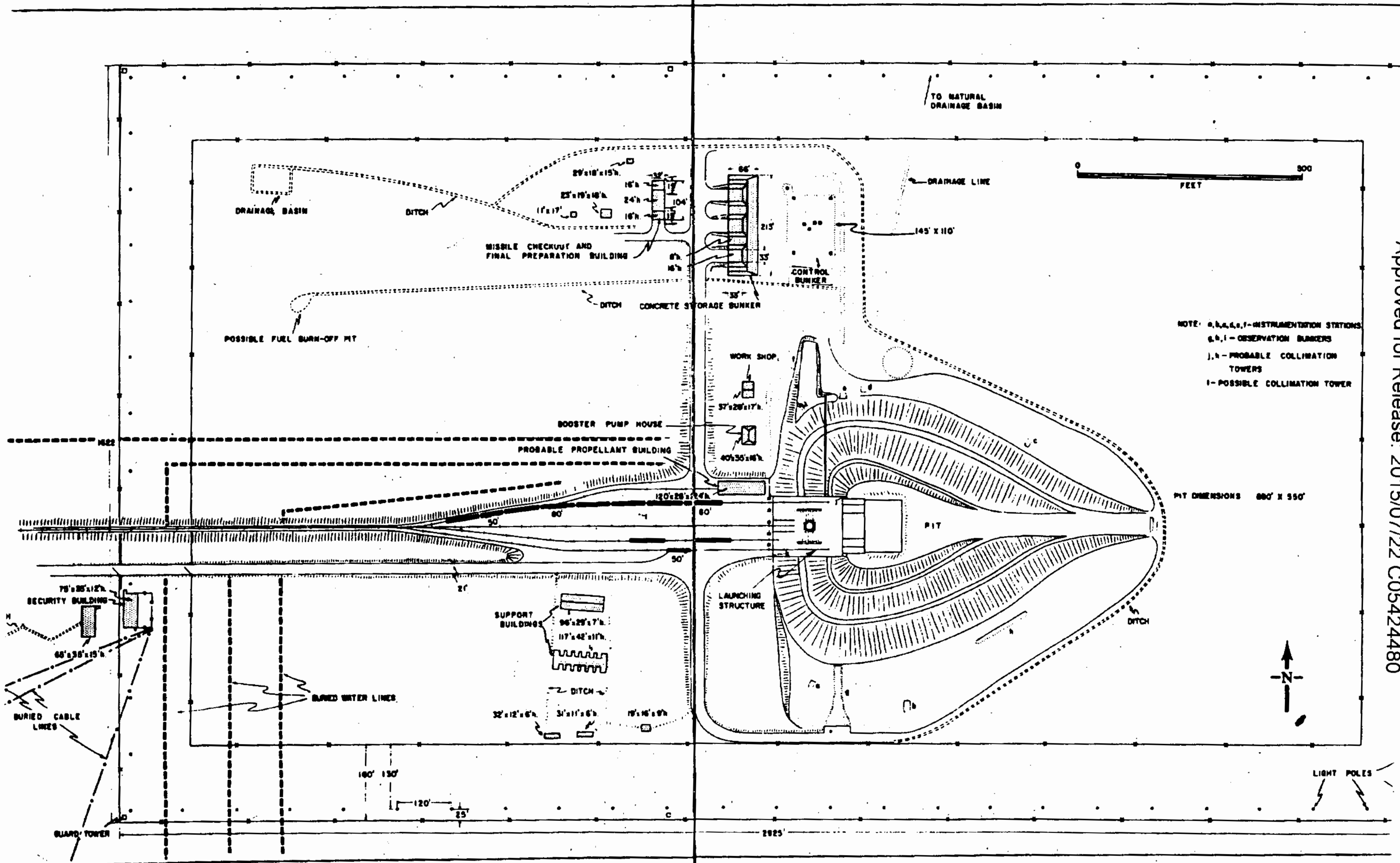

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FIGURE 45

Support Base, Tyura Tam Missile Test Center, August 1957.

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FIGURE 46

Communications Area B, a receiving station activated in the Support Base, Tyura Tam Missile Test Center. See Figure 47 for orientation and dimensions of the antennas and for sketches of rhombic and fishbone arrays. Data displayed in the graphics and in tables (Figure 47) exemplify the detailed technical analysis on Soviet communications systems done during JAM SESSION using U-2 photography, electronic intercepts, and the open literature.

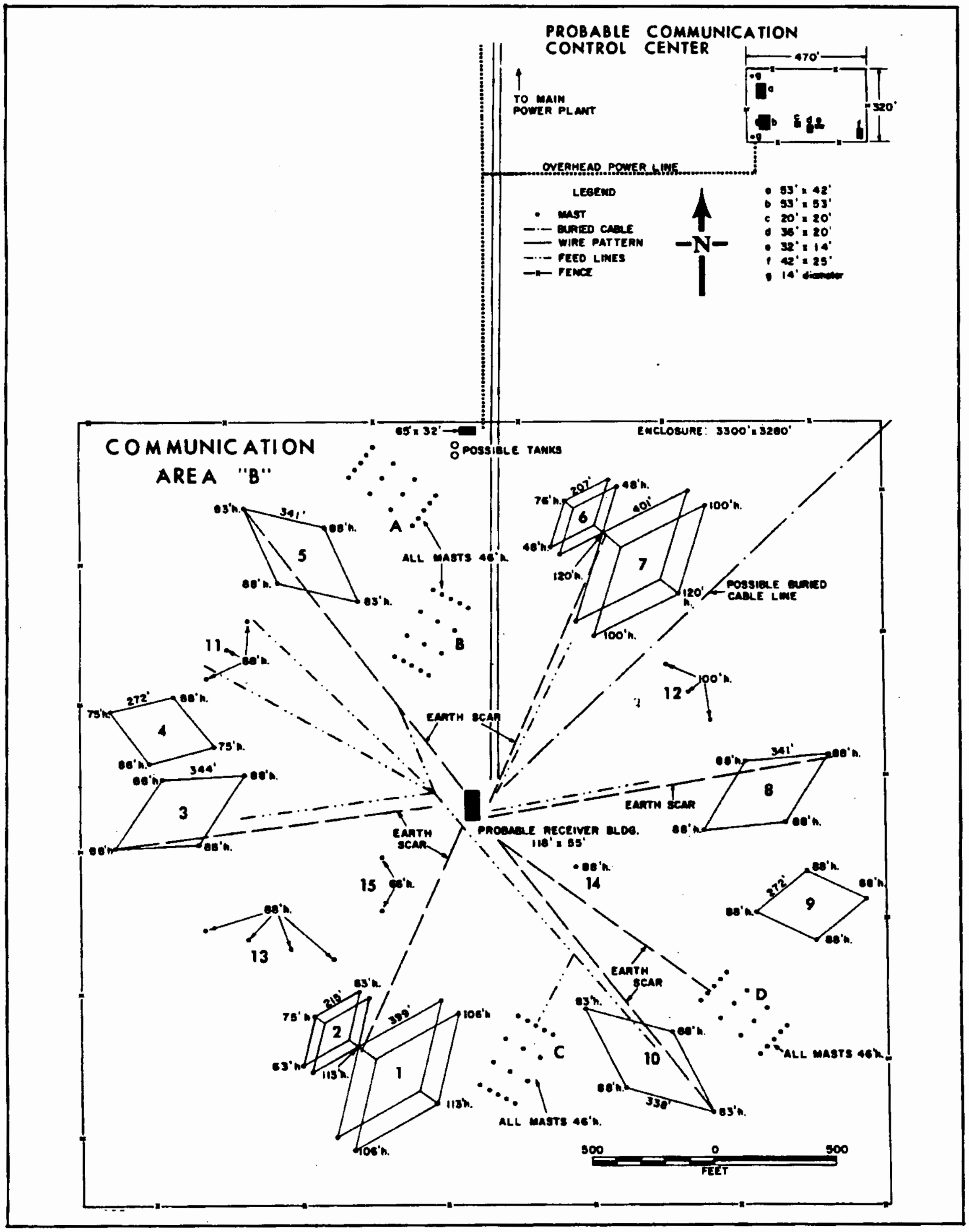

PROBABLE COMMUNICATION CONTROL CENTER
470'
320'
TO MAIN POWER PLANT
OVERHEAD POWER LINE
LEGEND
MAST
BURIED CABLE
WIRE PATTERN
FEED LINES
FENCE
N
a 53' x 42'
b 53' x 53'
c 20' x 20'
d 36' x 20'
e 32' x 14'
f 42' x 25'
g 14' diameter
COMMUNICATION AREA "B"
65' x 32'
POSSIBLE TANKS
ENCLOSURE: 3300' x 3280'
ALL MASTS 46'h.
POSSIBLE BURIED CABLE LINE
EARTH SCAR
PROBABLE RECEIVER BLDG. 118' x 55'
500
0
500
FEET

FIGURE 47

Rhombic and fishbone antenna arrays and the orientation and dimensions of those in Communications Area B, Tyura Tam Missile Test Center, August 1957.

ORIENTATIONS AND DIMENSIONS OF ANTENNA ARRAYS, COMMUNICATION AREA 'B'

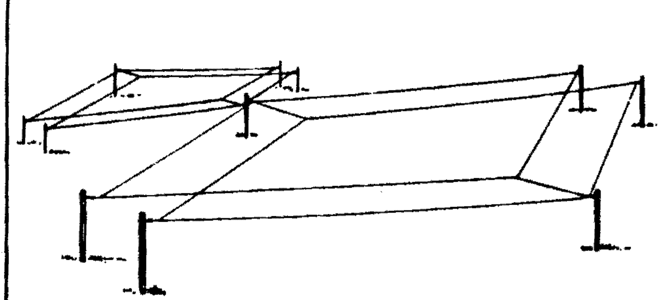
A. RHOMBIC ANTENNA ARRAYS

ARRAY NO.	LENGTH OF MAJOR AXIS (FEET)	AZIMUTH OF MAJOR AXIS (DEGREES)	LENGTH OF ONE SIDE (FEET)	LENGTH OF MINOR AXIS (FEET)	HEIGHT OF END MAST* (FEET)	MASTS AT EACH END (NO.)	SEPARATION OF END MASTS (FEET)	HEIGHT OF SIDE MASTS* (FEET)
1	716	42/222	399	339	106	2	99	113
2	386	42/222	215	192	63	2	46	113/75
3	618	60/240	344	305	88	1	–	88
4	458	112/292	272	294	75	1	–	88
5	618	131/311	341	300	83	1	–	88
6	370	42/222	207	182	48	2	50	120/76
7	724	42/222	401	346	100	2	92	120
8	605	60/240	341	308	88	1	–	88
9	460	86/266	272	297	88	1	–	88
10	590	131/311	338	294	83	1	–	88

B. TWO-BAY FISHBONE-TYPE (5-3-3-5) ANTENNA ARRAYS

ARRAY DESIGNATOR	AZIMUTH OF LONG AXIS (DEGREES)	LENGTH OF LONG AXIS (FEET)	LENGTH OF SHORT AXIS (FEET)	SEPARATION OF ROWS IN SHORT AXIS (FEET)	SEPARATION OF MASTS IN ROWS OF 5 (FEET)	SEPARATION OF MASTS IN ROWS OF 3 (FEET)	HEIGHT OF MASTS (FEET)
A	131/311	316	168	105	42	84	46
B	30/210	316	168	105	42	84	46
C	30/210	316	168	105	42	84	46
D	131/311	316	168	105	42	84	46

PAIRED DOUBLE RHOMBICS



TWO BAY FISHBONE ARRAY (5-3-3-5)

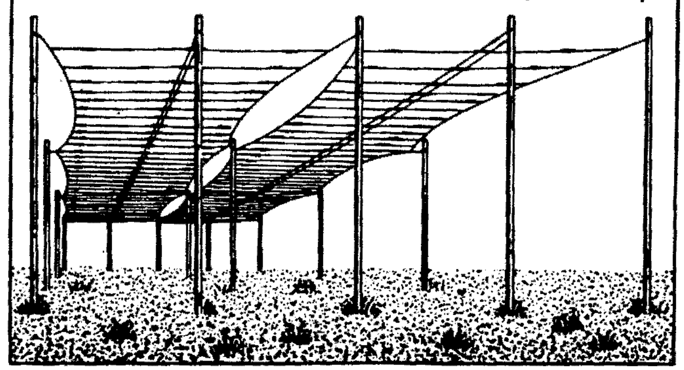


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FIGURE 48

Probable propellant production plant under construction, Tyura Tam Missile Test Center, August 1957.

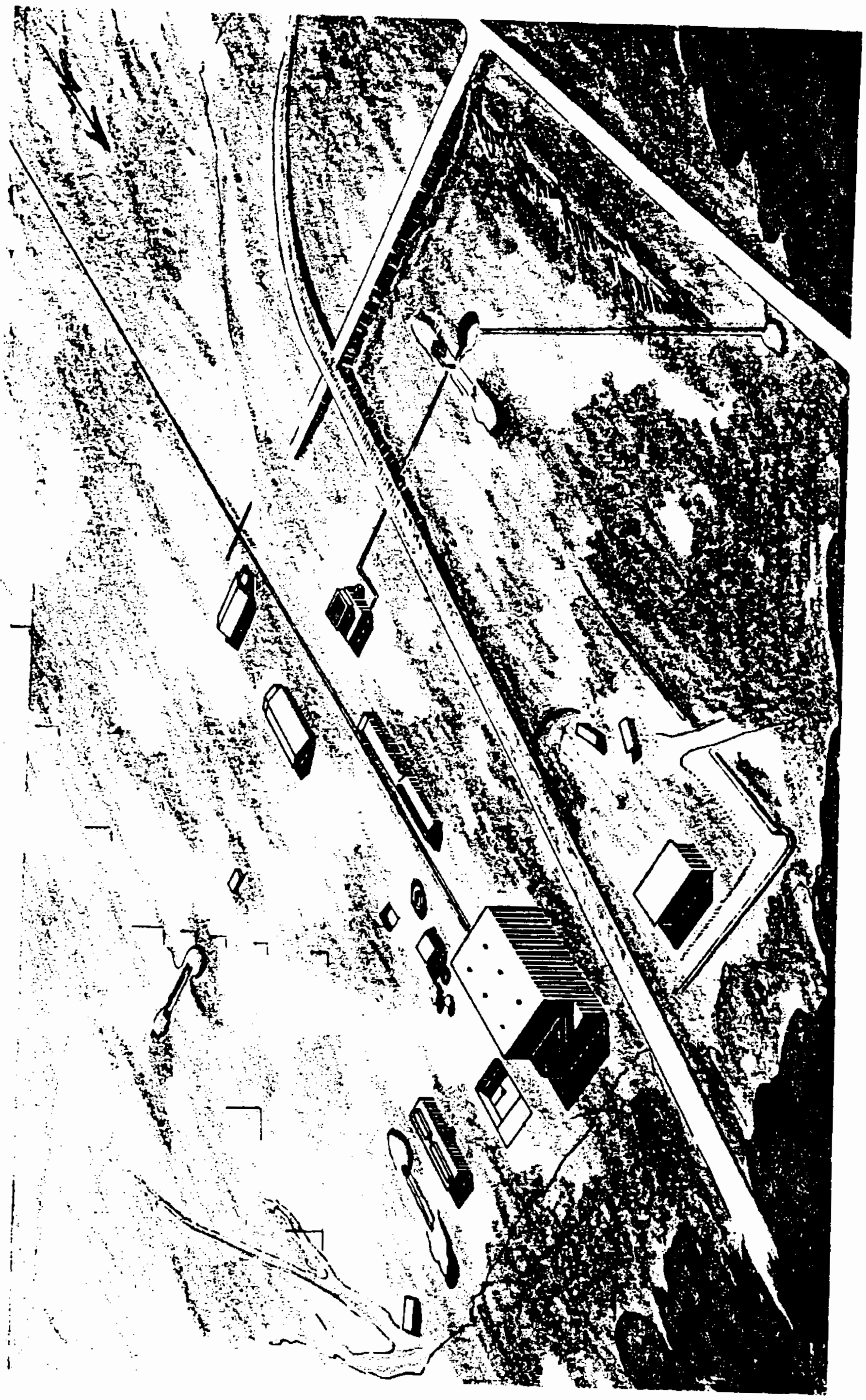


FIGURE 49

Probable primary direction of fire from Launch Area A, Tyura Tam Missile Test Center.

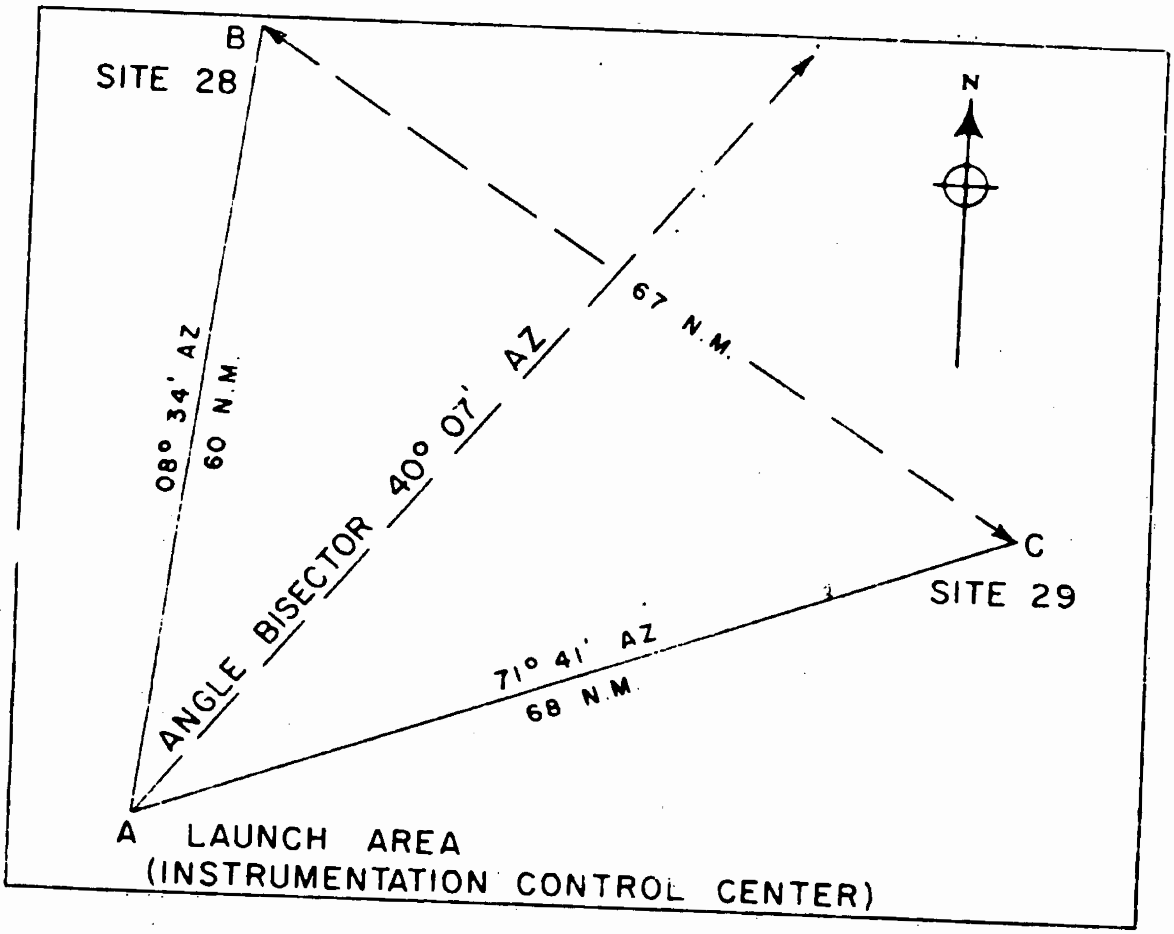

B
SITE 28
N
08° 34' AZ
60 N.M.
ANGLE BISECTOR 40° 07' AZ
67 N.M.
C
SITE 29
71° 41' AZ
68 N.M.
A LAUNCH AREA
(INSTRUMENTATION CONTROL CENTER)

FIGURE 50

Probable terminal range instrumentation in the Kamchatka Peninsula for the Tyura Tam Missile Test Range, June and September 1957.

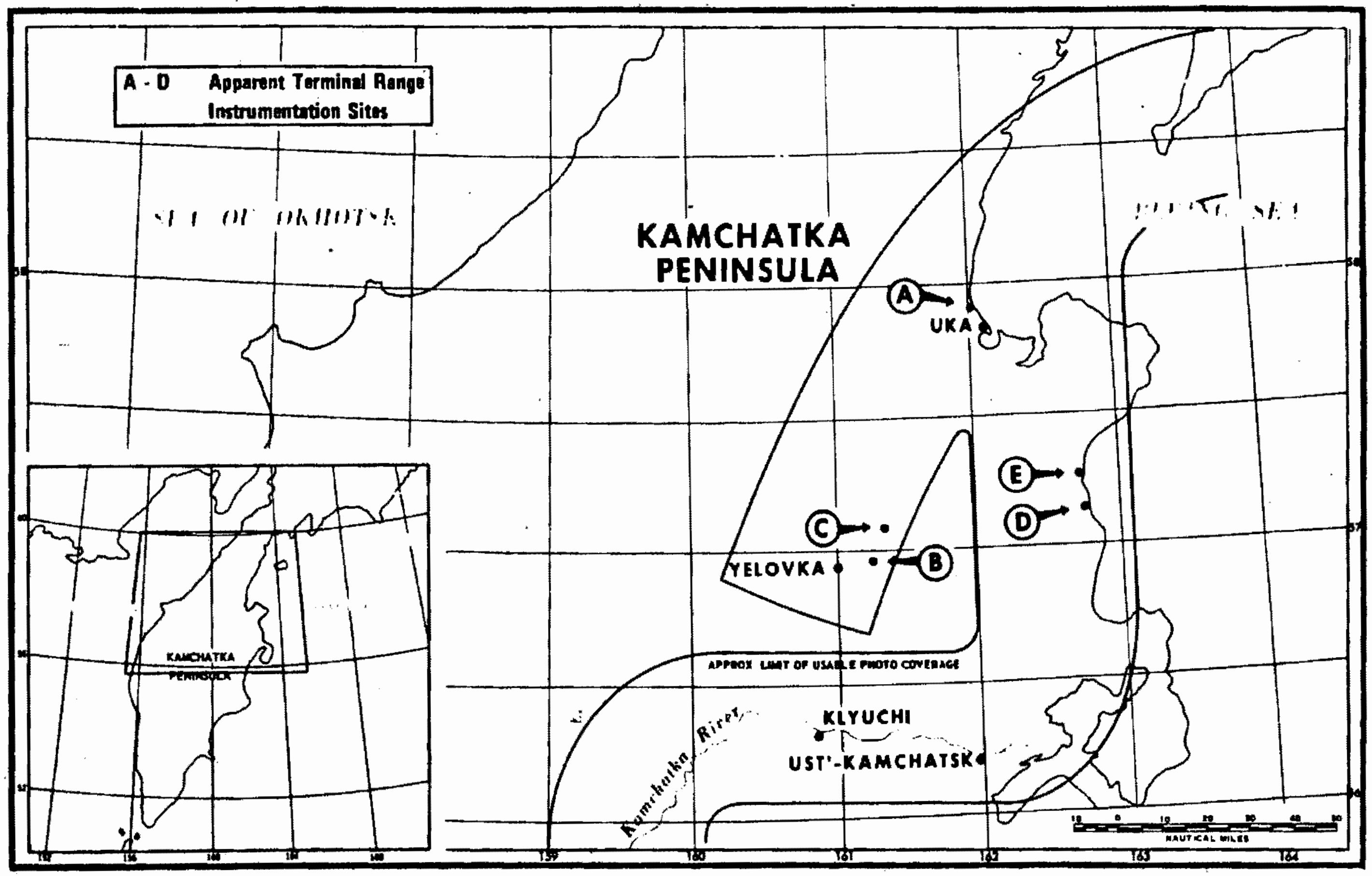
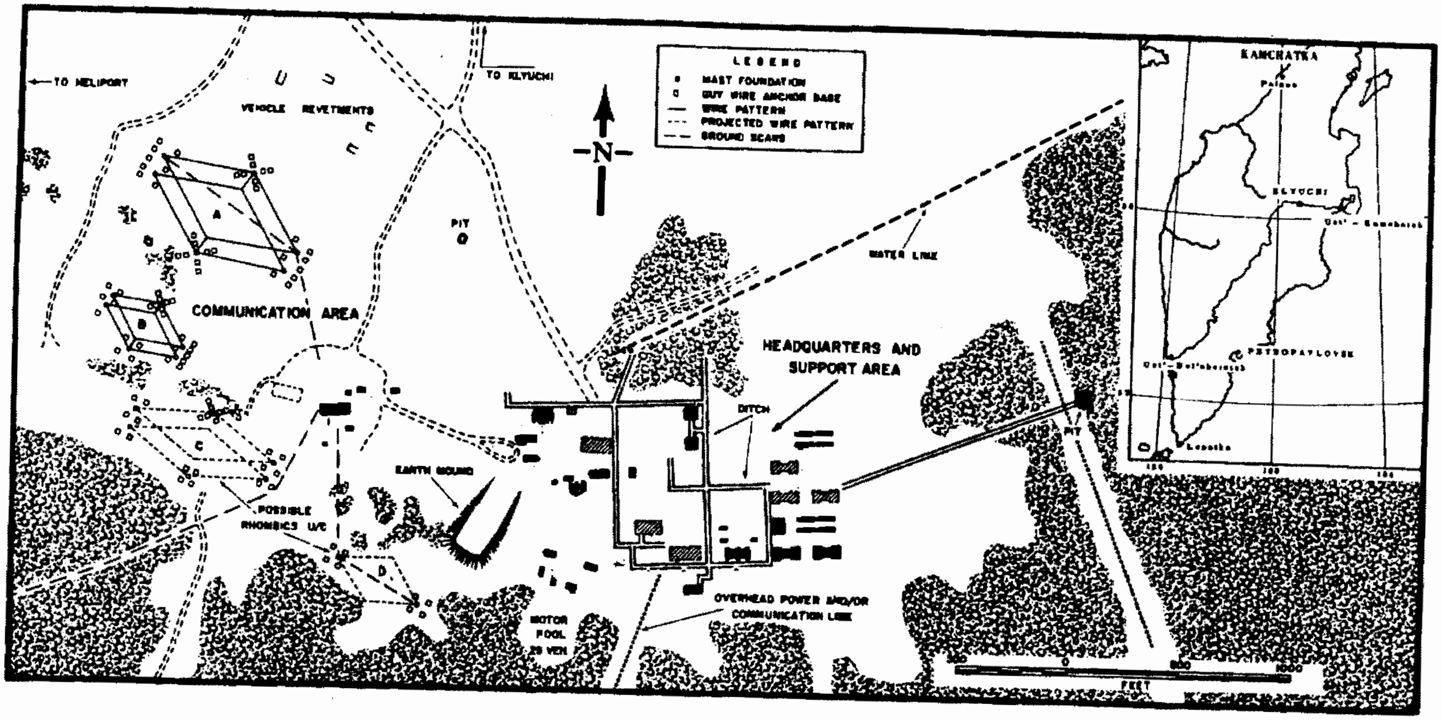

A - D Apparent Terminal Range
Instrumentation Sites
KAMCHATKA
PENINSULA
A
UKA
E
D
C
B
YELOVKA
APPROX LIMIT OF USABLE PHOTO COVERAGE
KLYUCHI
UST'-KAMCHATSK
Kamchatka River
NAUTICAL MILES
KAMCHATKA

FIGURE 51

The communications center under construction in September 1957 near the town of Klyuchi, in the Kamchatka Peninsula. This center was believed associated with the Tyura Tam Missile Test Range.

SECRET



SECRET

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FIGURE 52

Layout of the range head facilities with respect to each other and to the settlements of Kapustin Yar and Vladimirovka, September 1957. The number 16 designates Vladimirovka and 17 identifies Kapustin Yar.

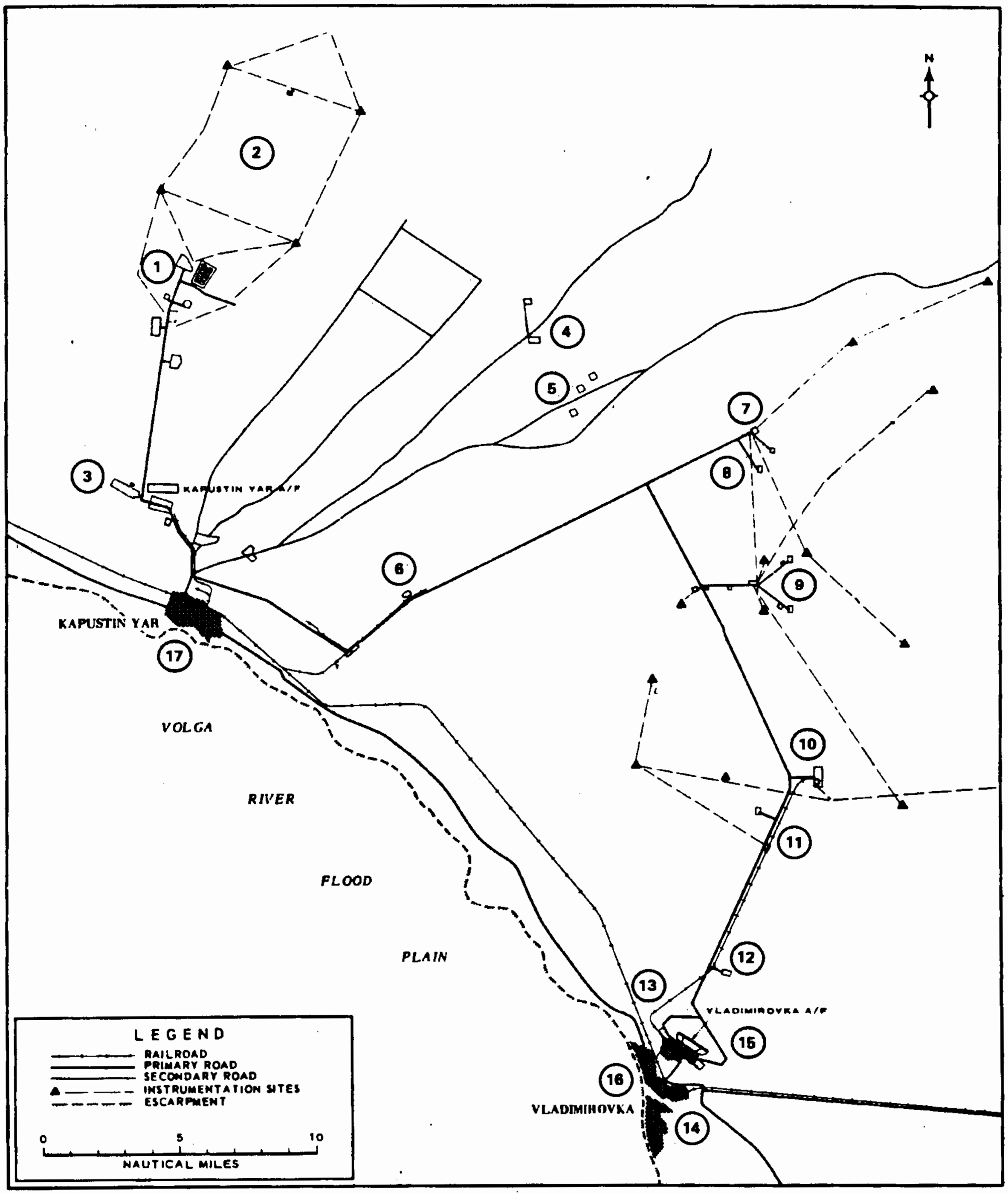
N
KAPUSTIN YAR A/F
KAPUSTIN YAR
VOLGA
RIVER
FLOOD
PLAIN
VLADIMIROVKA A/F
VLADIMIROVKA
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
LEGEND
RAILROAD
PRIMARY ROAD
SECONDARY ROAD
INSTRUMENTATION SITES
ESCARPMENT
0
5
10
NAUTICAL MILES

FIGURE 53

Zones 4, 5, and 6, Kapustin Yar Missile Test Center, September 1957.

SECRET

NAUTICAL MILES

0 1 2 3 4 5

SECRET

FIGURE 54

Layout of facilitíes, Zones 7 and 8, Kapustin Yar Missile Test Center, September 1957.

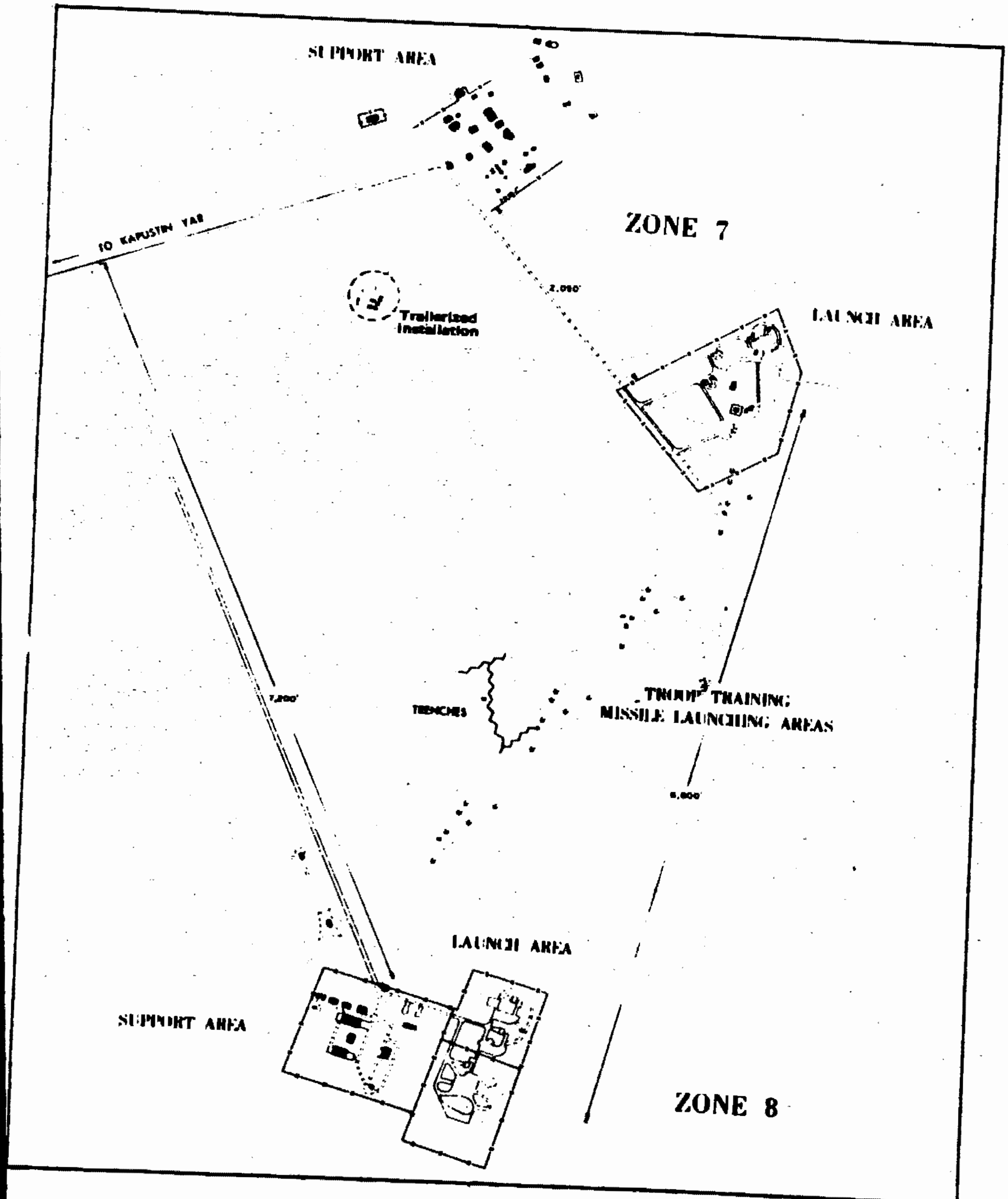
SUPPORT AREA
TO KAPUSTIN YAR
ZONE 7
2,050'
Trailerized Installation
LAUNCH AREA
7,200'
TRENCHES
TROOP TRAINING MISSILE LAUNCHING AREAS
6,000'
LAUNCH AREA
SUPPORT AREA
ZONE 8

FIGURE 55

Trailer-mounted Soviet MRBM associated by JAM SESSION consultants with firings from the main pads, Zone 7, Kapustin Yar Missile Test Center.

TRAILER MOUNTED MEDIUM RANGE BALLISTIC MISSILE

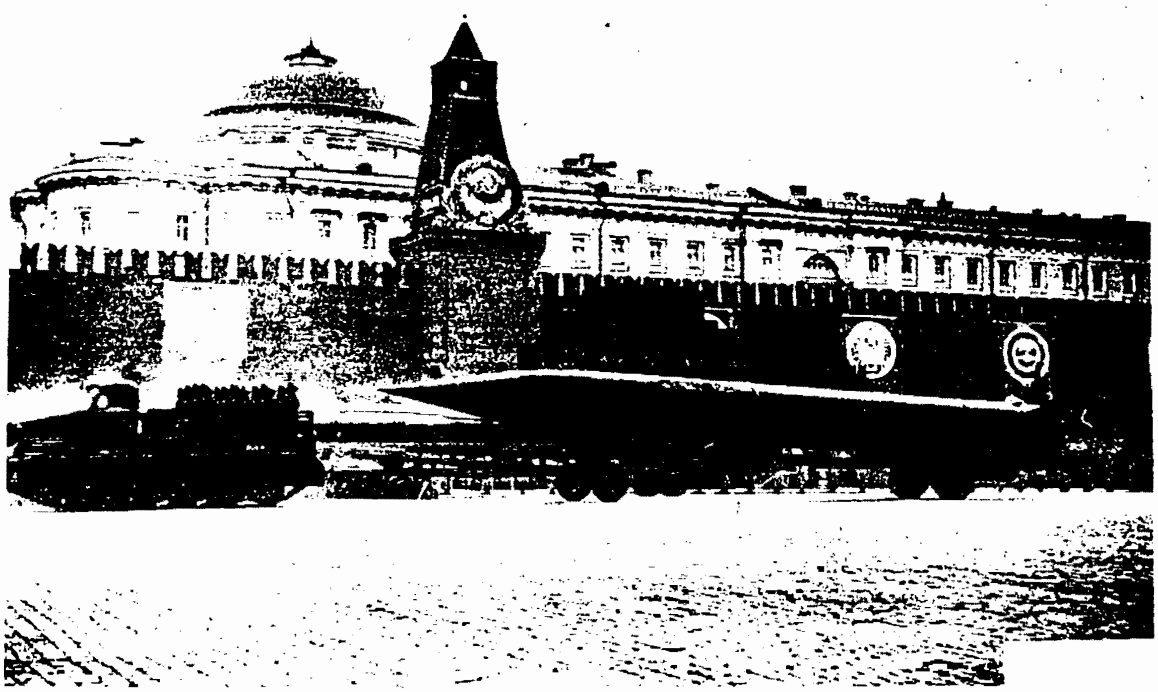

FIGURE 56

Tank-mounted short-range Soviet ballistic missile associated by JAM SESSION consultants with firings from the smaller pads at Zone 7, Kapustin Yar Missile Test Center.

TANK MOUNTED SHORT RANGE BALLISTIC MISSILE

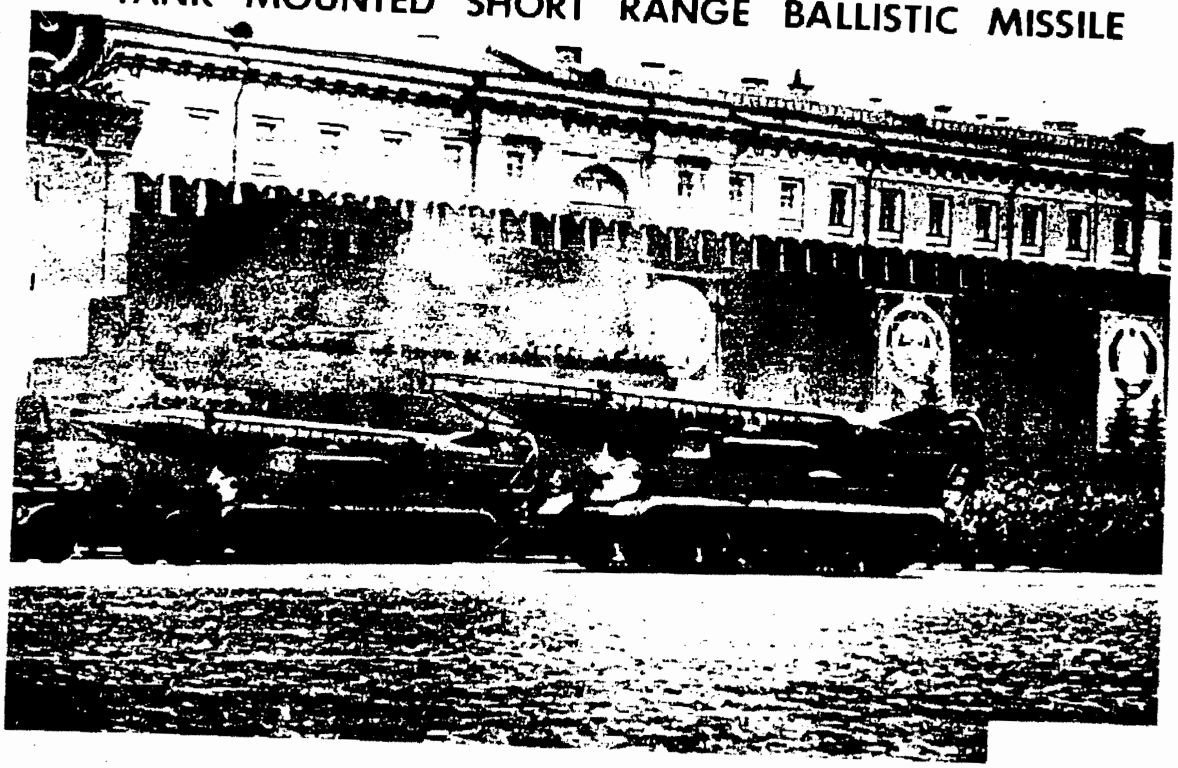

FIGURE 57

Zones 7 and 8, Kapustin Yar Missile Test Center, as they appeared on photography of 10 September 1957.

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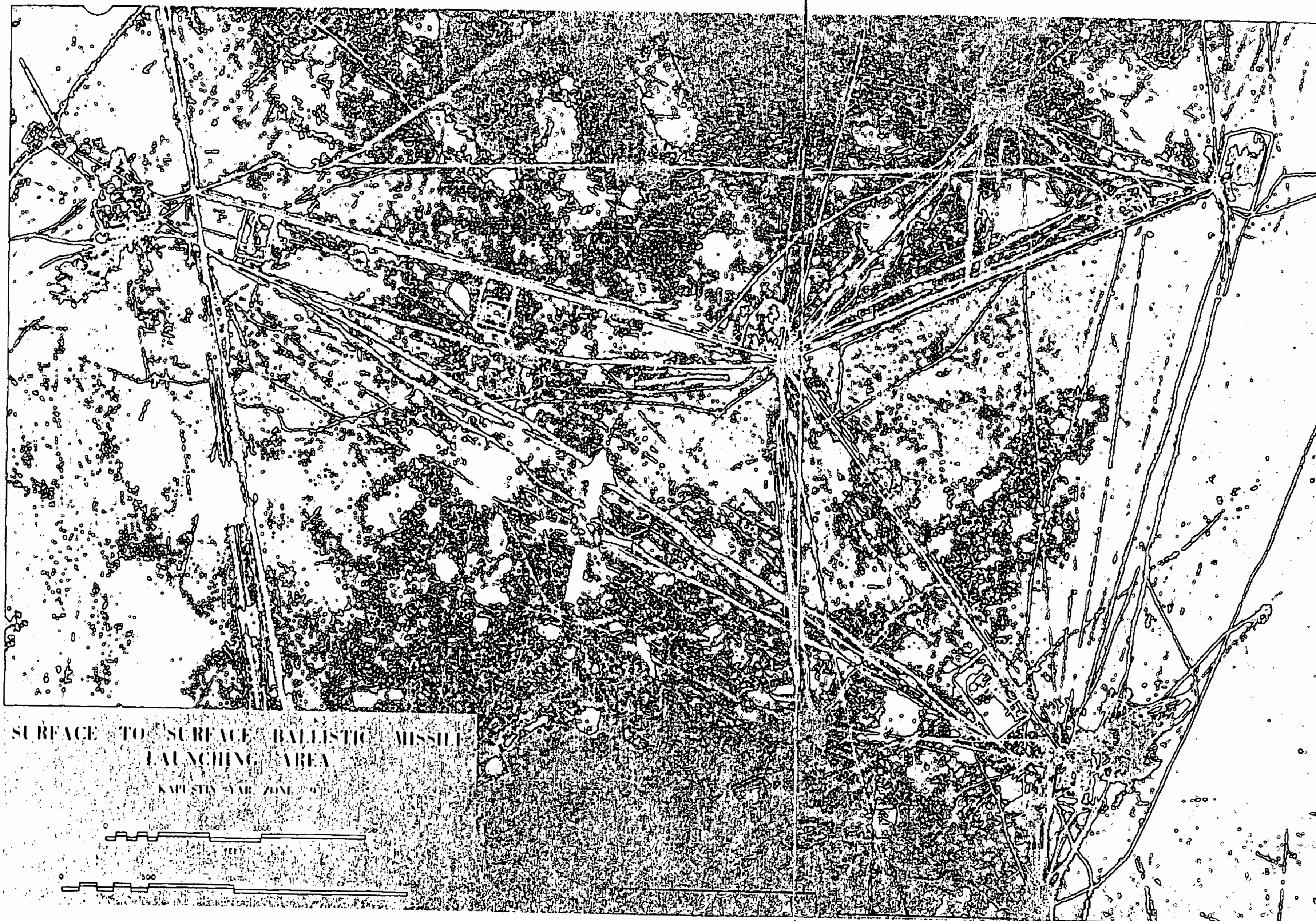
FIGURE 58

Photograph of Zone 9, Kapustin Yar Missile Test Center, September 1957.

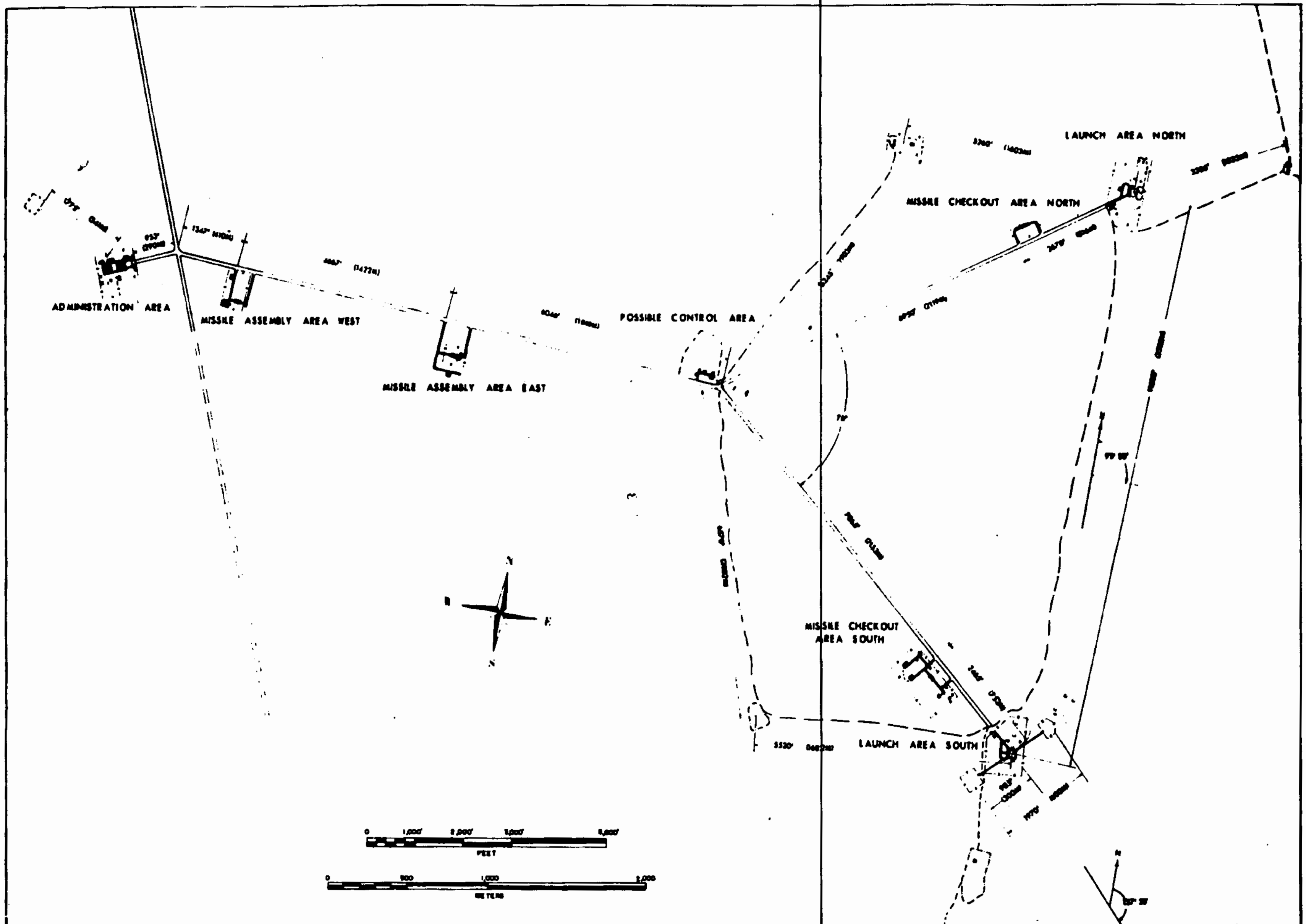


SURFACE TO SURFACE BALLISTIC MISSILE
LAUNCHING AREA

KAPUSTIN YAR ZONE

FIGURE 59

Layout of facilities, Zone 9, Kapustin Yar Missile Test Center, September 1957



SECRET

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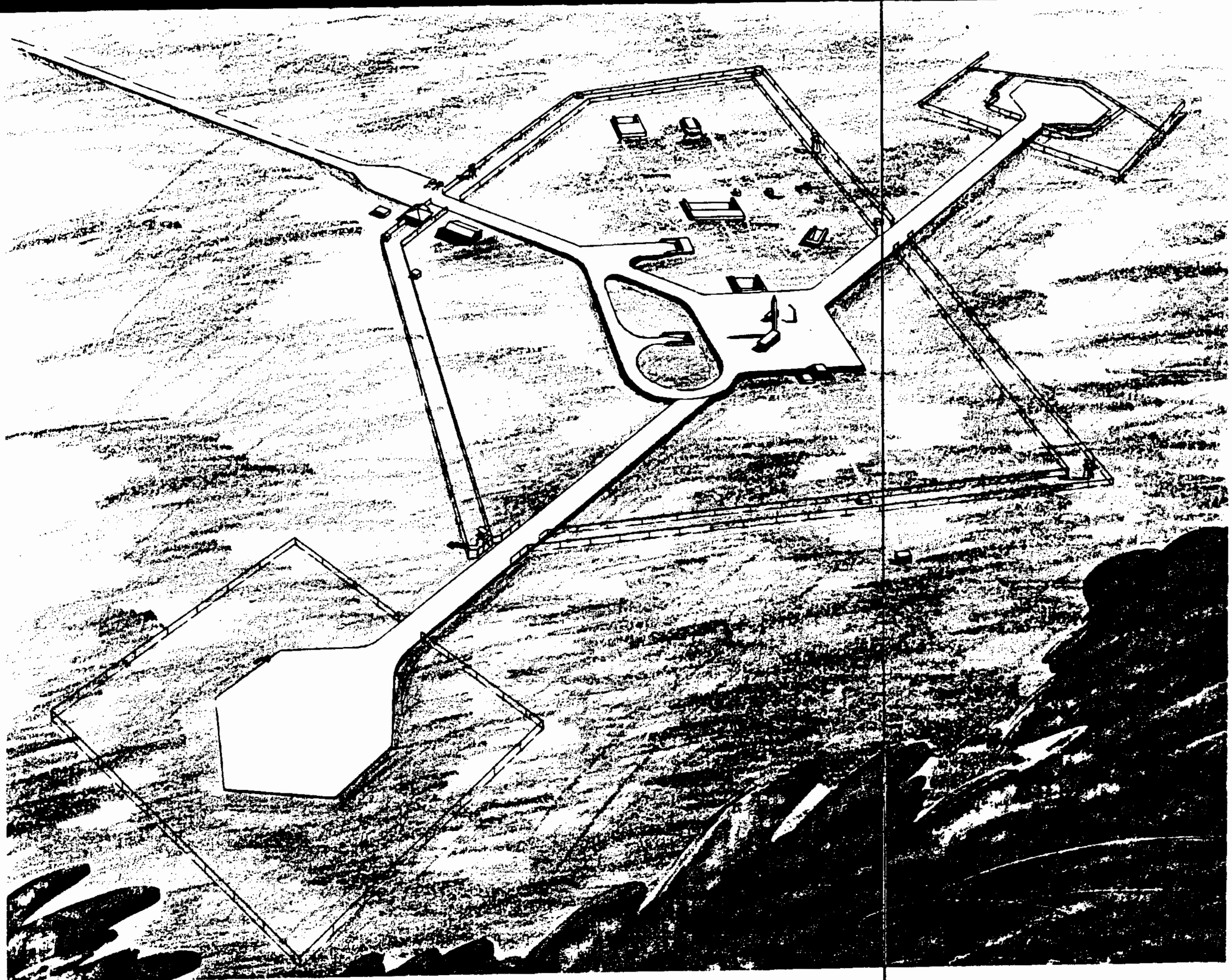
FIGURE 60

Launch Area South, Zone 9, Kapustin Yar Missile Test Center, September 1957. Note the erected missile on the center pad.



SECRET

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FIGURE 61

Photograph of launch complex, Zone 10, Kapustin Yar Missile Test Center, September 1957.

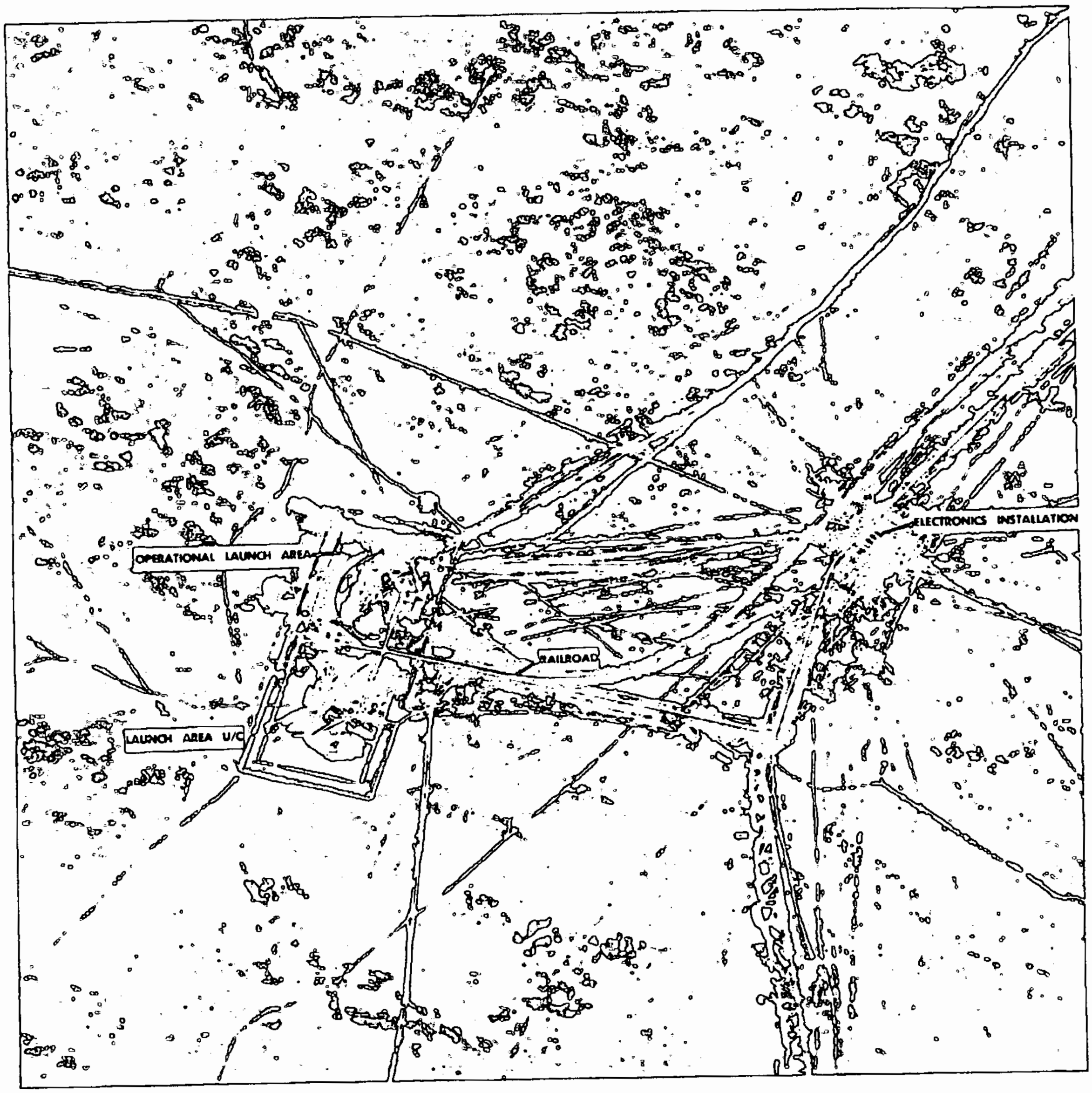
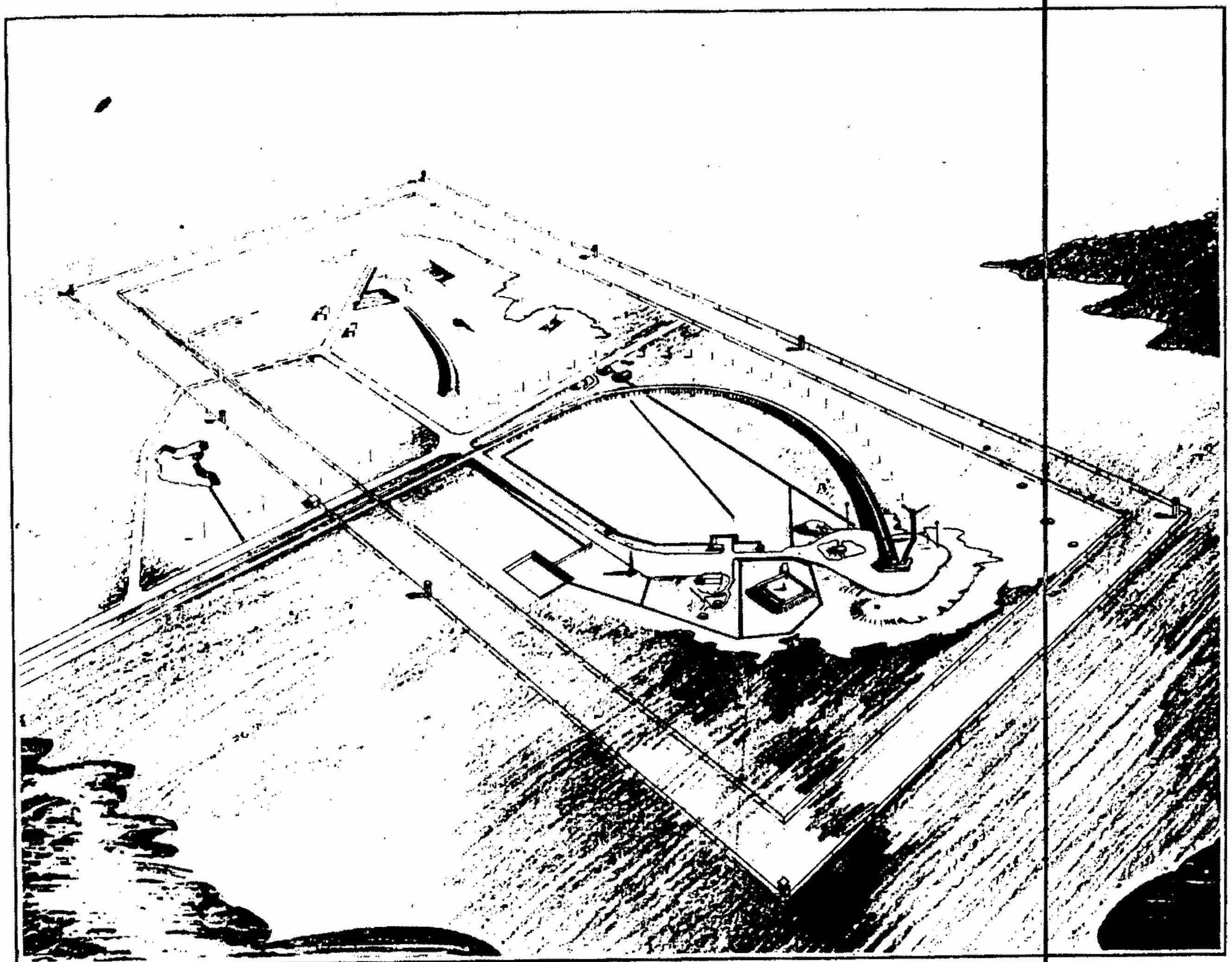

ELECTRONICS INSTALLATION
OPERATIONAL LAUNCH AREA
RAILROAD
LAUNCH AREA U/C

FIGURE 62

Perspective view of launch complex, Zone 10, Kapustin Yar Missile Test Center, September 1957.



SECRET

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FIGURE 63

Zone 11, Kapustin Yar Missile Test Center, September 1957. This facility was believed to be some kind of missile component manufacturing and test facility.

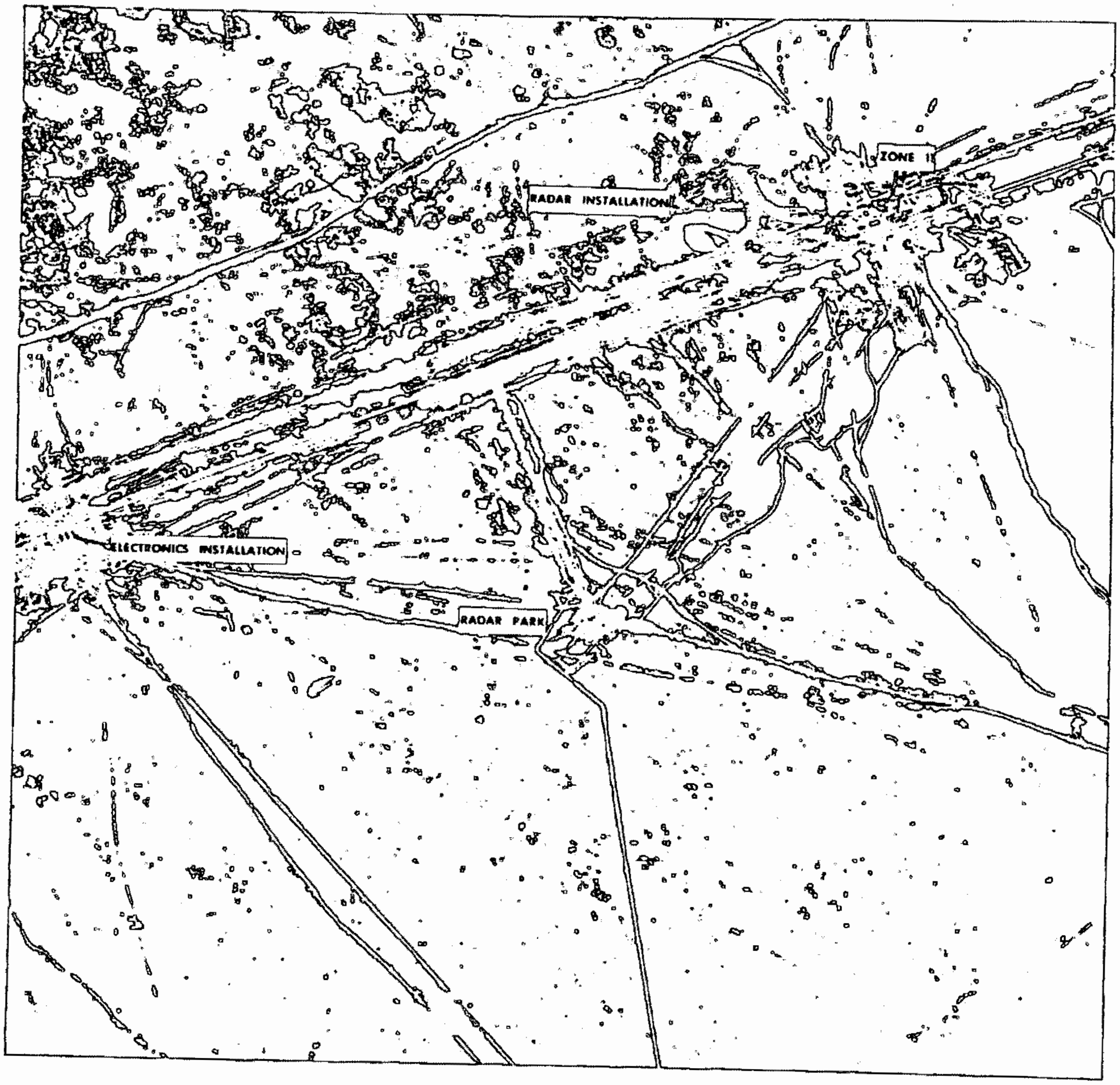
ZONE
RADAR INSTALLATION
ELECTRONICS INSTALLATION
RADAR PARK

FIGURE 64

Zone 12, Kapustin Yar Missile Test Center, September 1957. It was thought that this facility might be used as an assembly and support facility for the Zone 10 launch area.

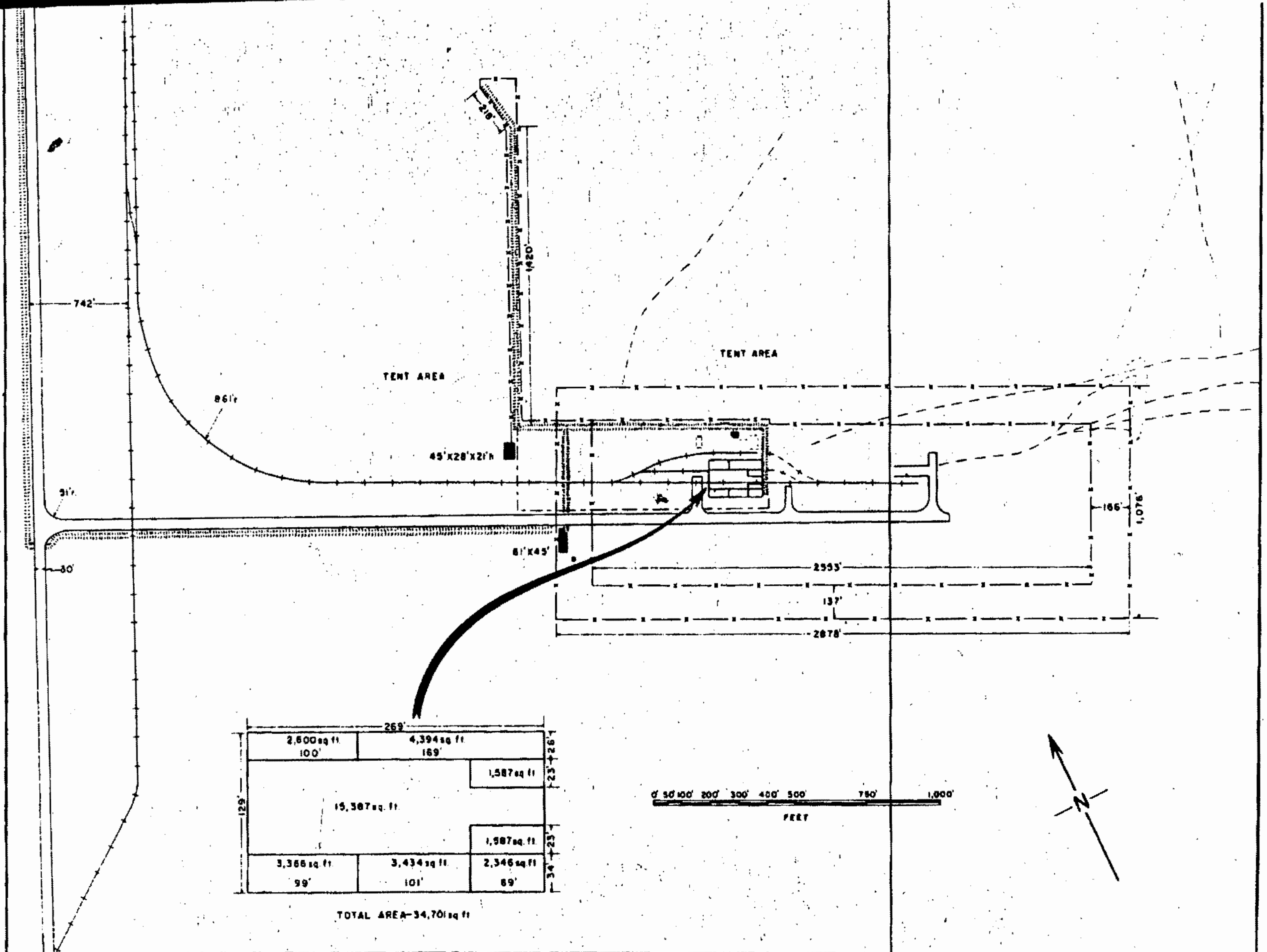

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FIGURE 65

Vladimirovka Airfield Complex, Kapustin Yar Missile Test Center, September 1957. Zone 13 was the airbone-missile assembly and loading complex and Zone 14 was what was characterized as a missile assembly and support facility for Zone 10.

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FIGURE 66

Cruise-missile test complex, Zone 15, Kapustin Yar Missile Test Center, September 1957.

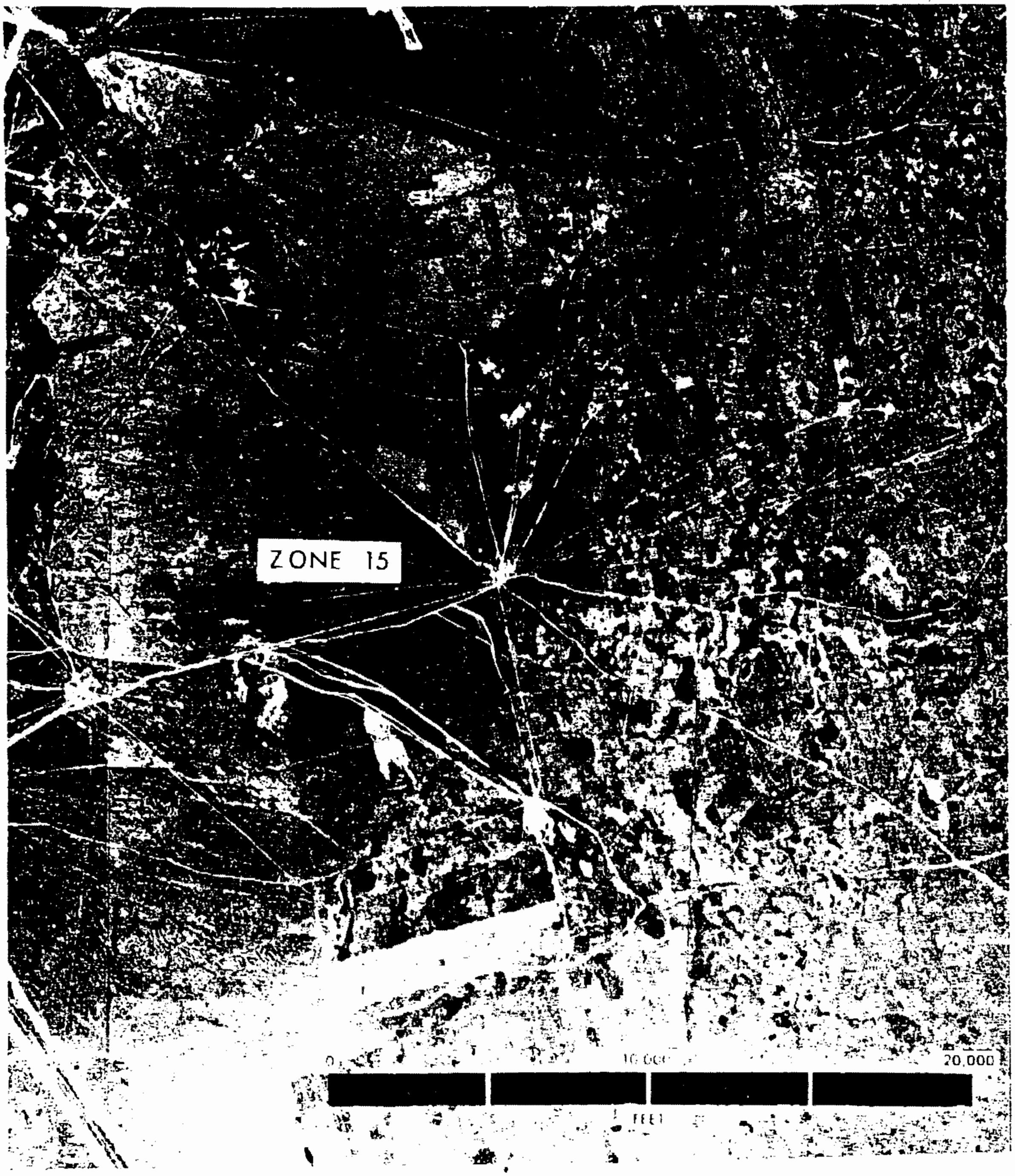

ZONE 15
0
10,000
20,000
FEET

FIGURE 67

Airborne-missile assembly and loading complex, Kapustin Yar Missile Test Center, September 1957.

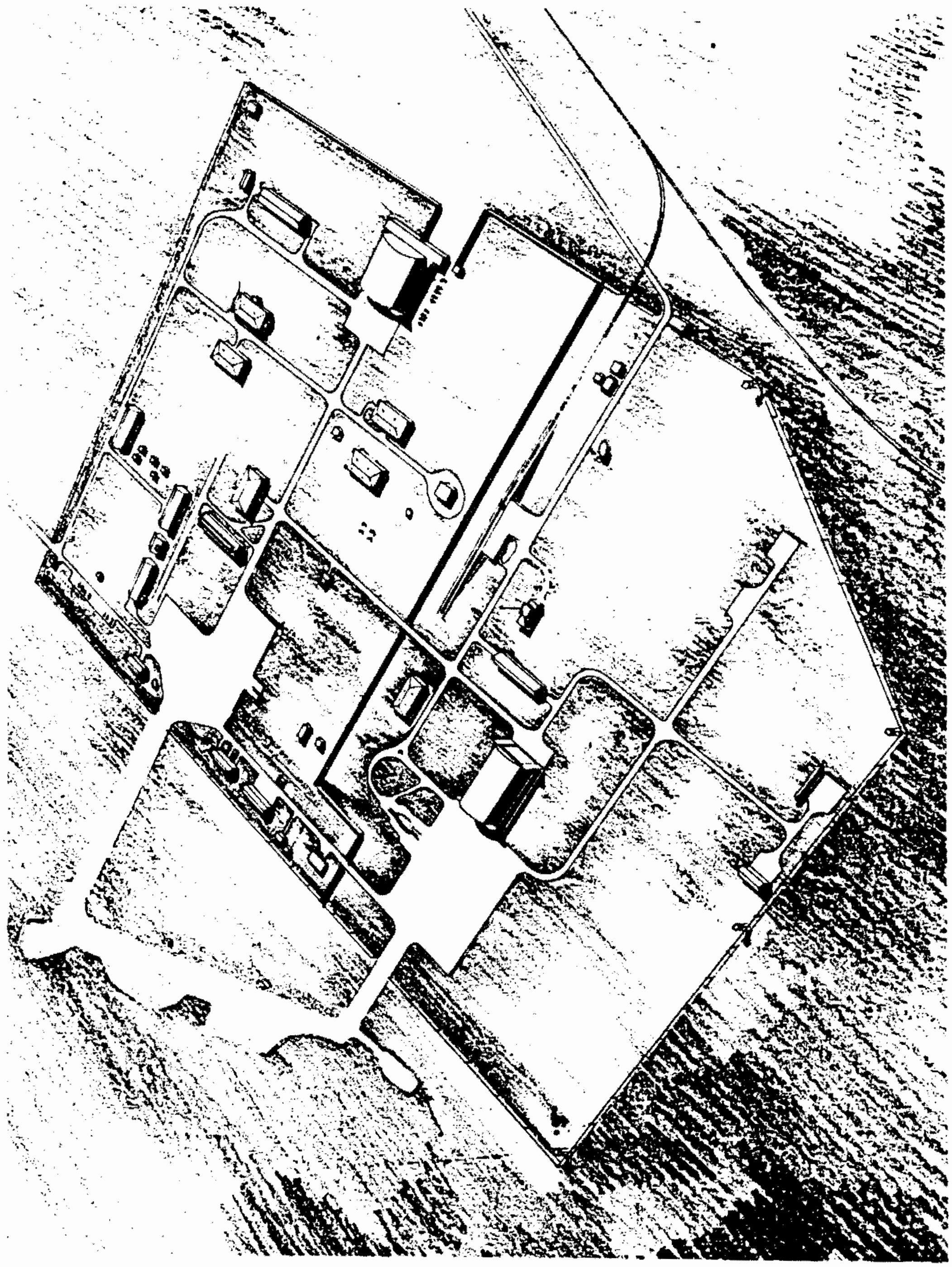
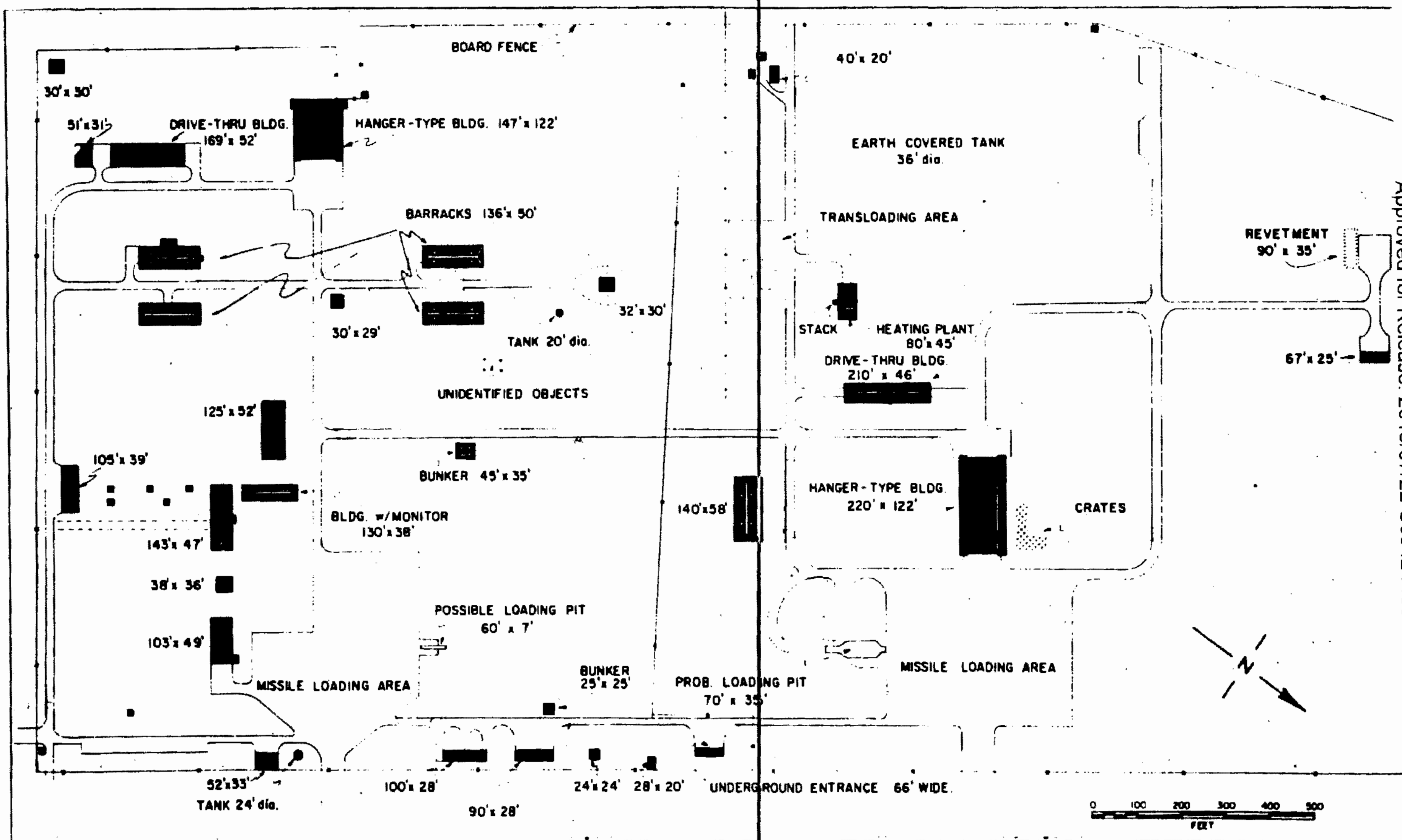


FIGURE 68

Layout and dimensions of structures, airborne-missile assembly and loading complex, Kapustin Yar Missile Test Center, September 1957.



BOARD FENCE
30' x 30'
51' x 31'
DRIVE-THRU BLDG. 169' x 52'
HANGER-TYPE BLDG. 147' x 122'
BARRACKS 136' x 50'
30' x 29'
TANK 20' dia.
32' x 30'
UNIDENTIFIED OBJECTS
125' x 52'
105' x 39'
BUNKER 45' x 35'
BLDG. w/MONITOR 130' x 38'
143' x 47'
38' x 36'
103' x 49'
MISSILE LOADING AREA
POSSIBLE LOADING PIT 60' x 7'
BUNKER 25' x 25'
PROB. LOADING PIT 70' x 35'
52' x 33'
TANK 24' dia.
100' x 28'
90' x 28'
24' x 24'
28' x 20'
UNDERGROUND ENTRANCE 66' WIDE
40' x 20'
EARTH COVERED TANK 36' dia.
TRANSLOADING AREA
REVETMENT 90' x 35'
STACK
HEATING PLANT 80' x 45'
DRIVE-THRU BLDG. 210' x 46'
67' x 25'
140' x 58'
HANGER-TYPE BLDG. 220' x 122'
CRATES
MISSILE LOADING AREA
N
0 100 200 300 400 500
FEET

FIGURE 69

Surface-to-air missile test complex, Zone 1,
Kapustin Yar Missile Test Center, September 1957.

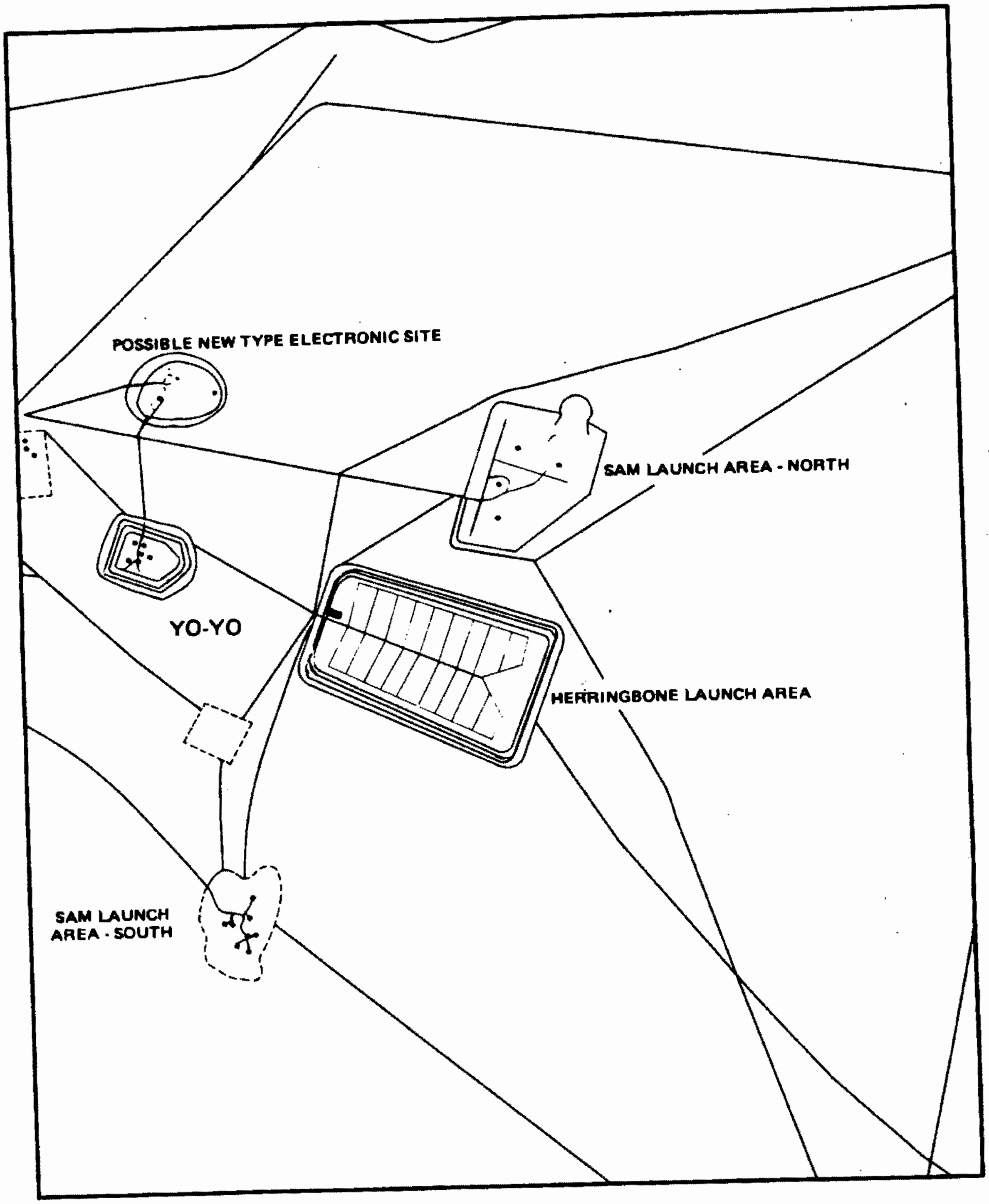

POSSIBLE NEW TYPE ELECTRONIC SITE
SAM LAUNCH AREA - NORTH
YO-YO
HERRINGBONE LAUNCH AREA
SAM LAUNCH
AREA - SOUTH

FIGURE 70

Surface-to-air missile test range guidance and instrumentation facilities, Zone 2, Kapustin Yar Missile Test Center, September 1957.

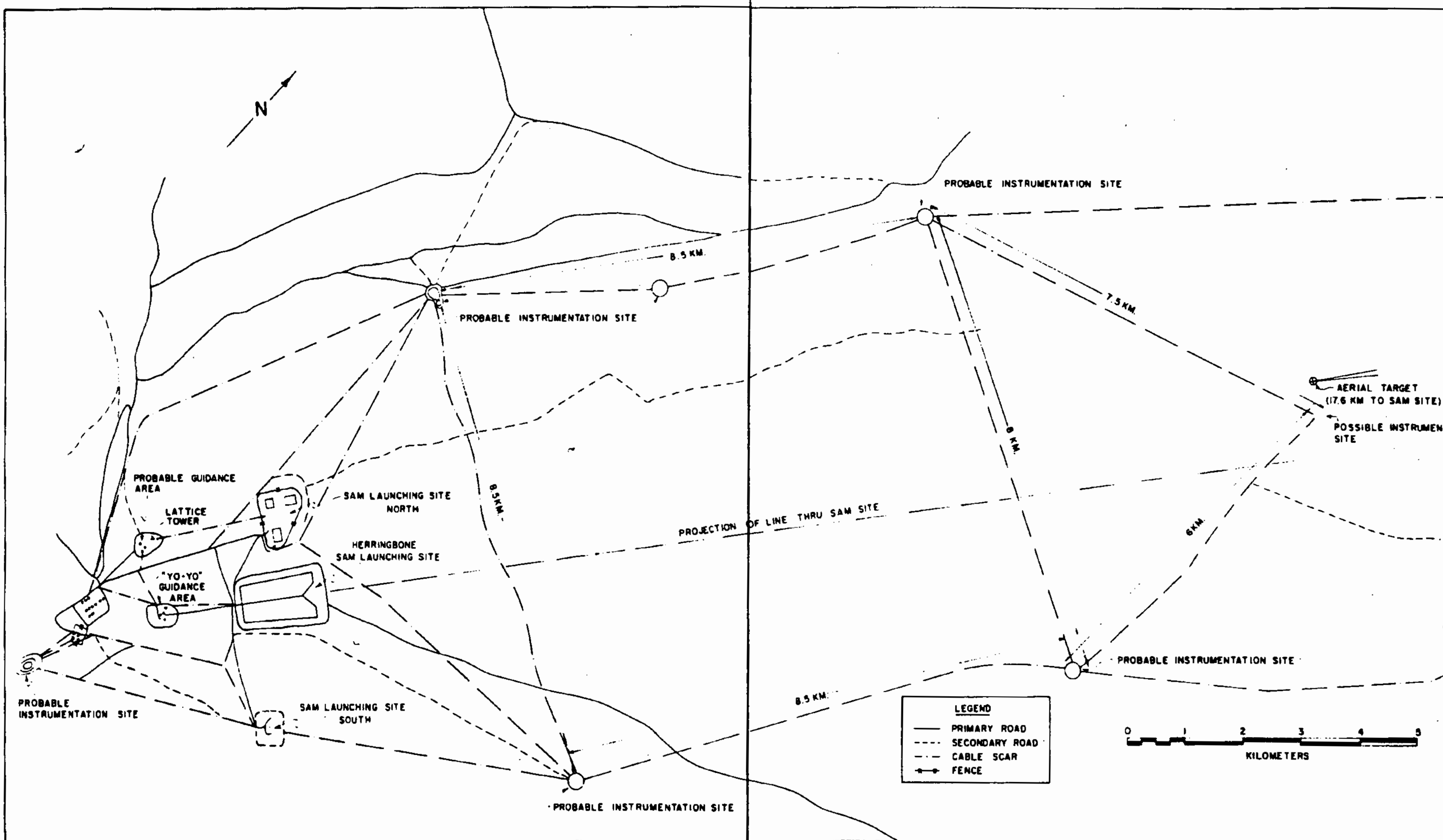
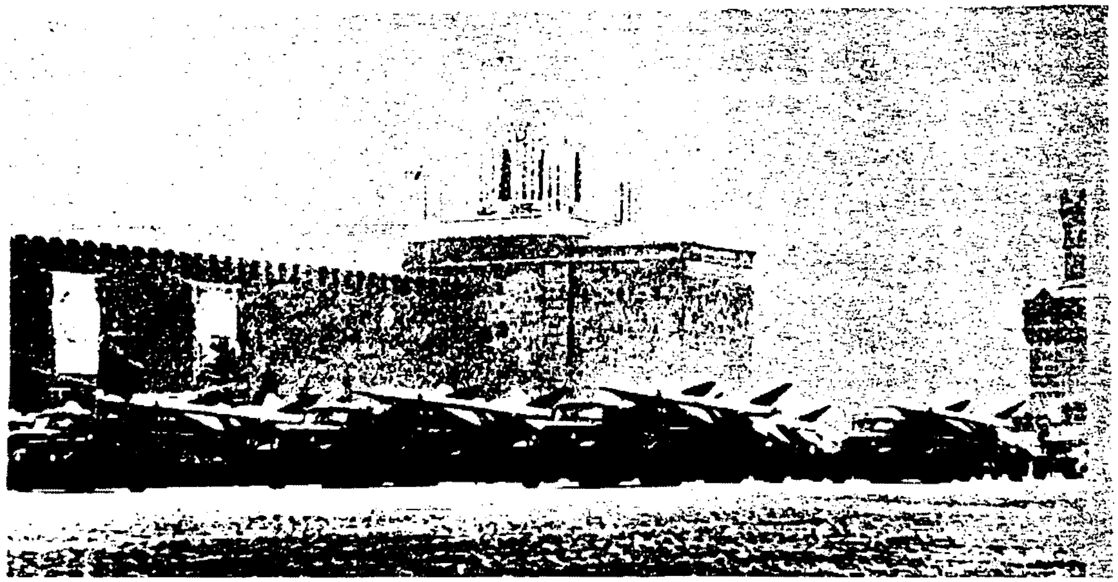

N
PROBABLE INSTRUMENTATION SITE
8.5 KM.
PROBABLE INSTRUMENTATION SITE
7.5 KM.
AERIAL TARGET (17.6 KM TO SAM SITE)
POSSIBLE INSTRUMEN SITE
8 KM.
8.5KM.
PROBABLE GUIDANCE AREA
LATTICE TOWER
SAM LAUNCHING SITE NORTH
HERRINGBONE SAM LAUNCHING SITE
"YO-YO" GUIDANCE AREA
PROJECTION OF LINE THRU SAM SITE
6KM.
PROBABLE INSTRUMENTATION SITE
8.5 KM.
PROBABLE INSTRUMENTATION SITE
SAM LAUNCHING SITE SOUTH
PROBABLE INSTRUMENTATION SITE
LEGEND
PRIMARY ROAD
SECONDARY ROAD
CABLE SCAR
FENCE
0 1 2 3 4 5
KILOMETERS

FIGURE 71

Surface-to-air missiles photographed in the Moscow parade and believed to be the type tested at the surface-to-air missile test facility, Kapustin Yar Missile Test Center. The upper photograph shows a front view and the lower a rear view.



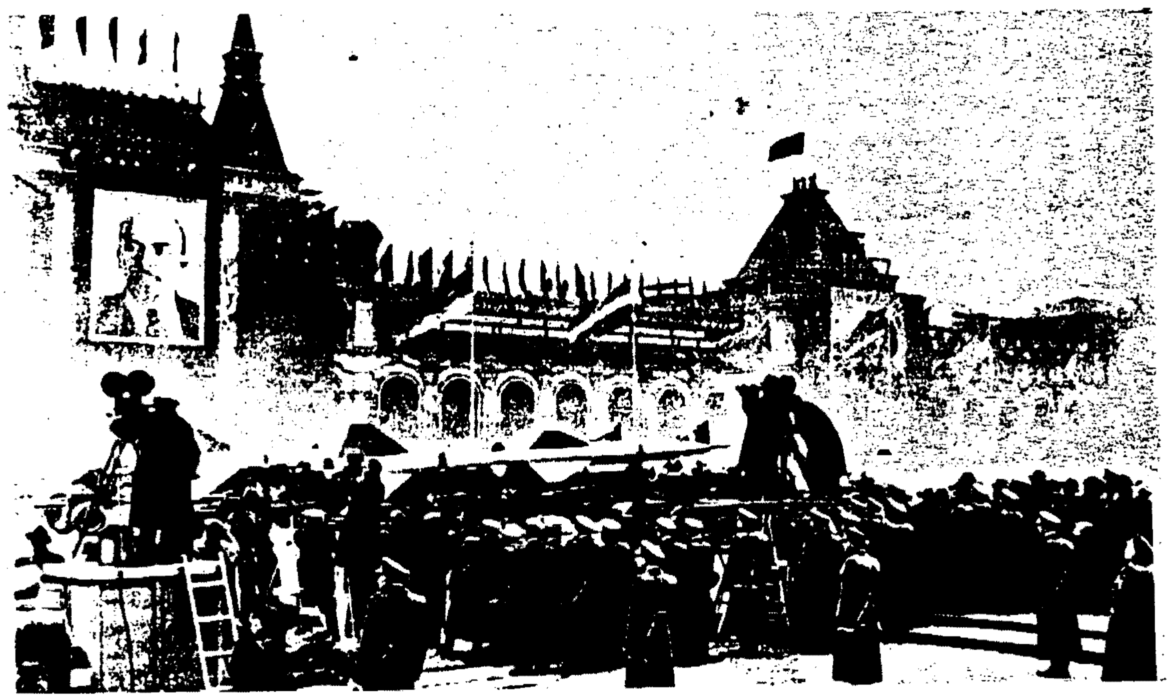


FIGURE 72

Forward instrumentation, Zone 7, Kapustin Yar Missile Test Center, September 1957.

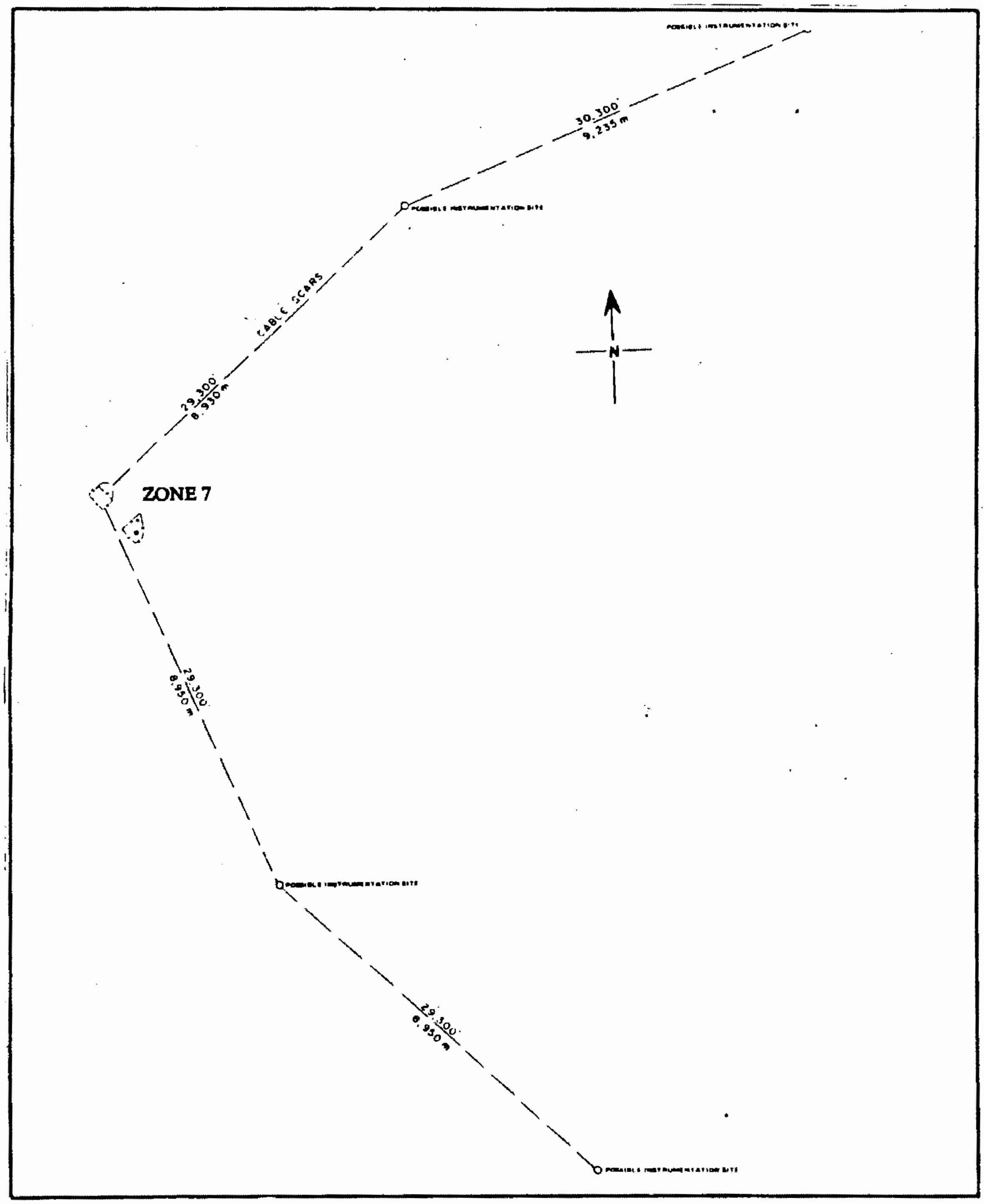
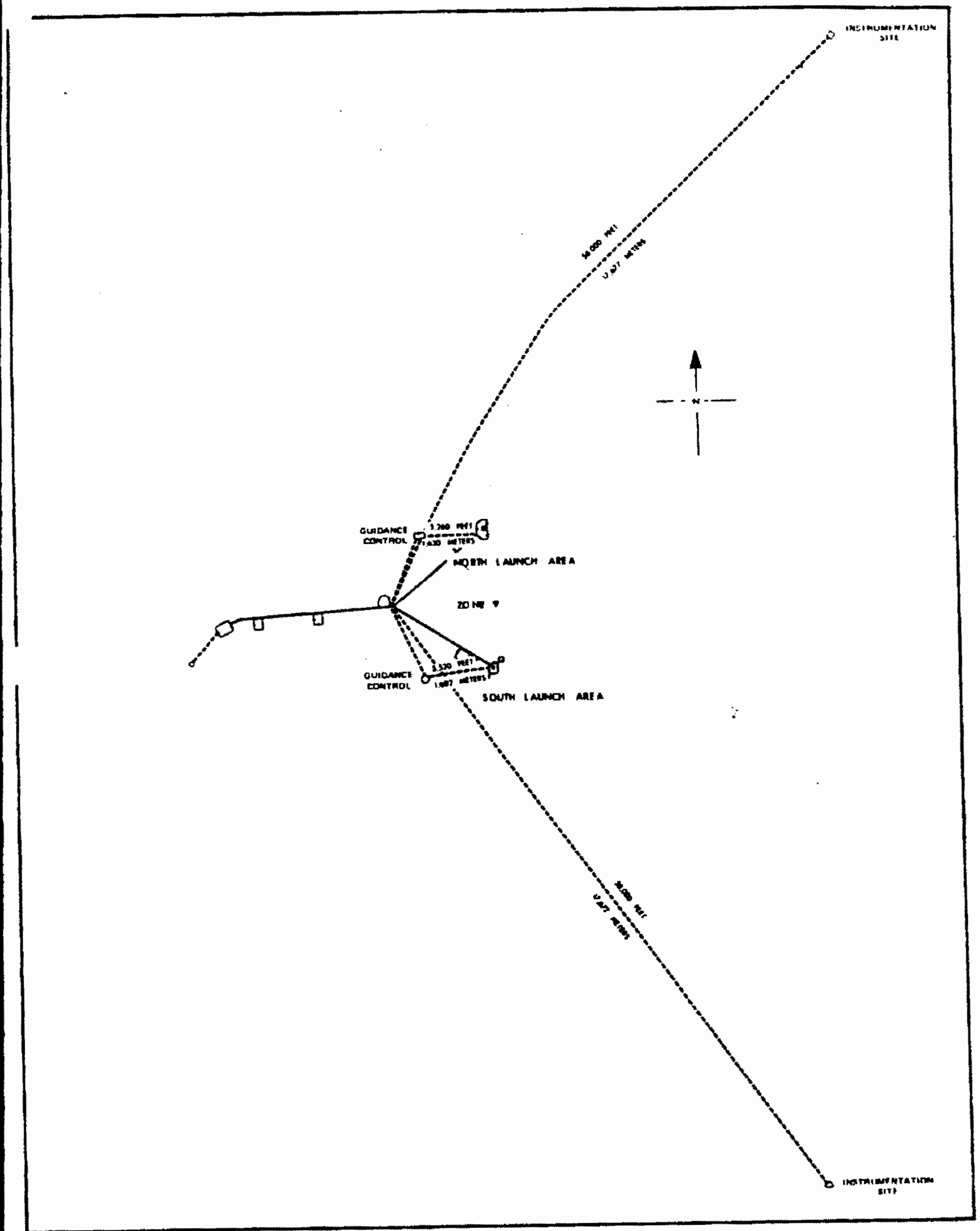

30,300'
9,235 m
CABLE SCARS
29,300'
8,930 m
ZONE 7
29,300'
8,930 m
29,300'
8,930 m
N

FIGURE 73

Guidance and forward instrumentation, Zone 9, Kapustin Yar Missile Test Center, September 1957.

SECRET



SECRET

FIGURE 74

L-shaped instrument patterns associated with Zone 10, Kapustin Yar Missile Test Center, September 1957. The dashed lines show cable scars connecting instrumentation and other electronics sites associated with the L-shaped patterns.

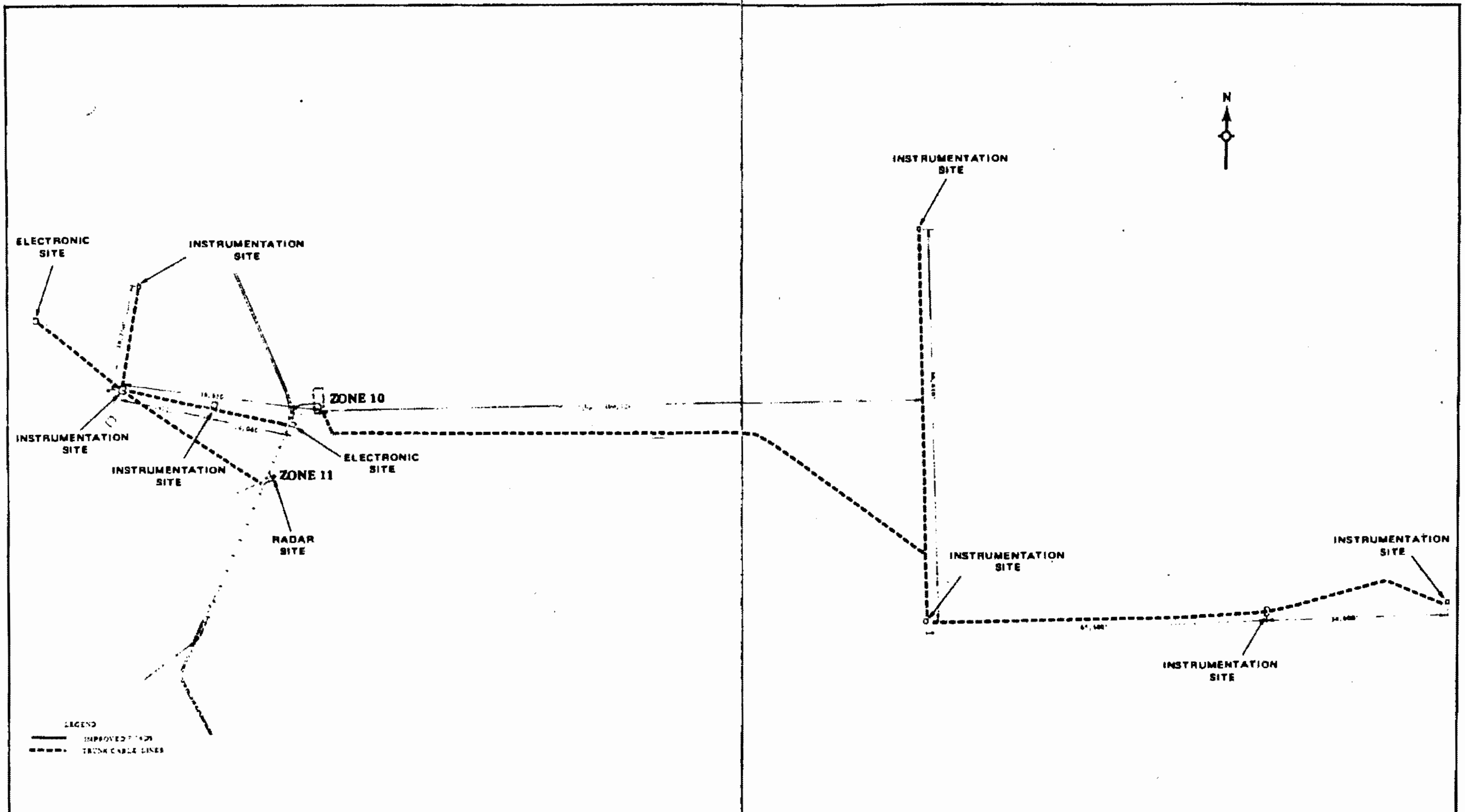

N
INSTRUMENTATION SITE
ELECTRONIC SITE
INSTRUMENTATION SITE
ZONE 10
INSTRUMENTATION SITE
INSTRUMENTATION SITE
ELECTRONIC SITE
ZONE 11
RADAR SITE
INSTRUMENTATION SITE
INSTRUMENTATION SITE
INSTRUMENTATION SITE

FIGURE 75

The ALWAC III-E Computer. This piece of equipment virtually filled the small corner room where it was located on the sixth floor of the Steuart Building. At the extreme right of the photograph is the power supply unit. At the left, with one door removed is the memory unit. In the center of the photograph, with one door off and one door on, is the arithmetic or logic unit. The open portion of the latter unit reveals the circuit boards with their vacuum tubes. The heat generated by the ALWAC caused serious cooling problems. In addition to the central air conditioning, there were two or three window units in the room. At the lower left of the photograph, is the control console and, to the left of it, a corner of the Flexowriter which was used for input and output.

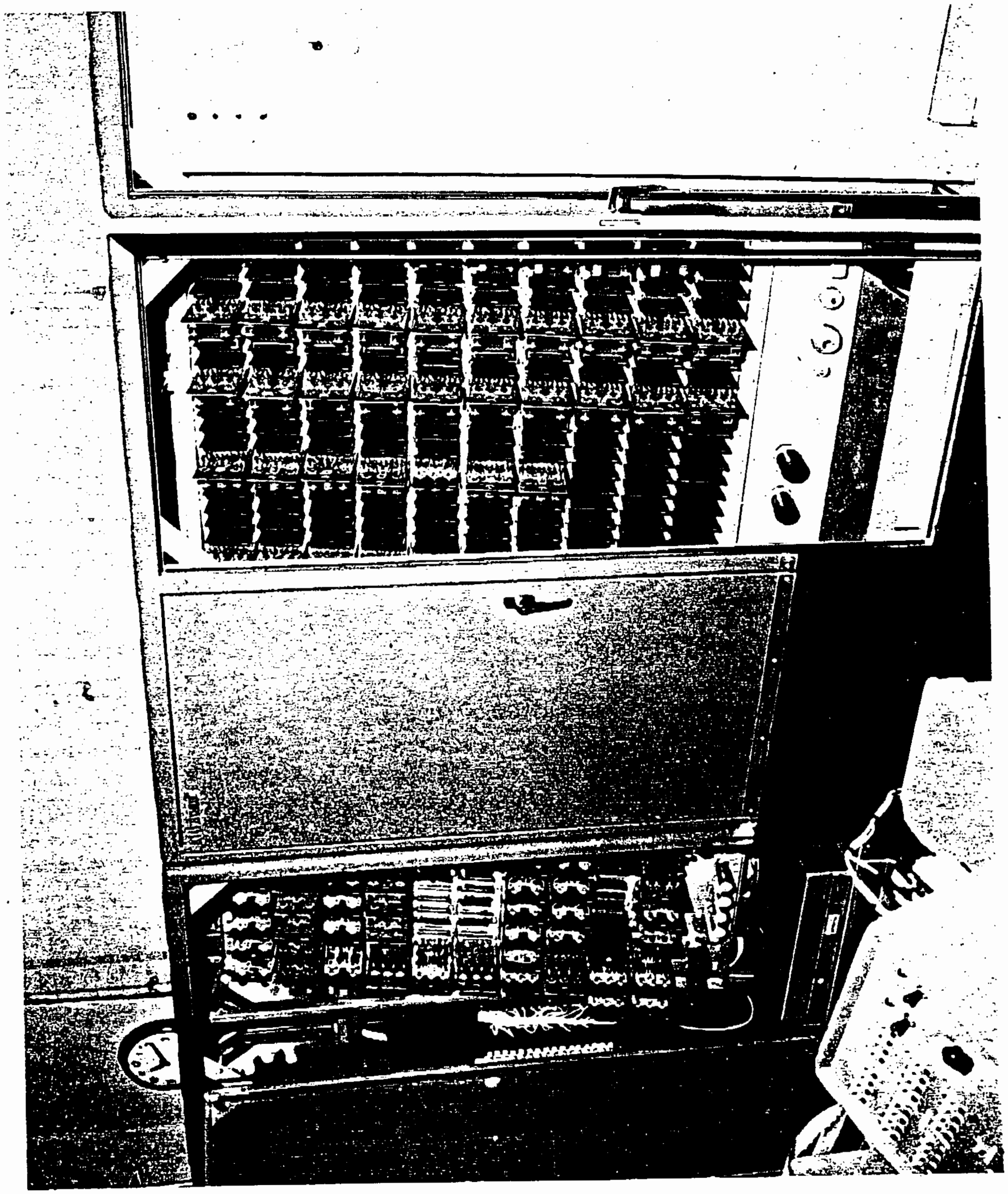
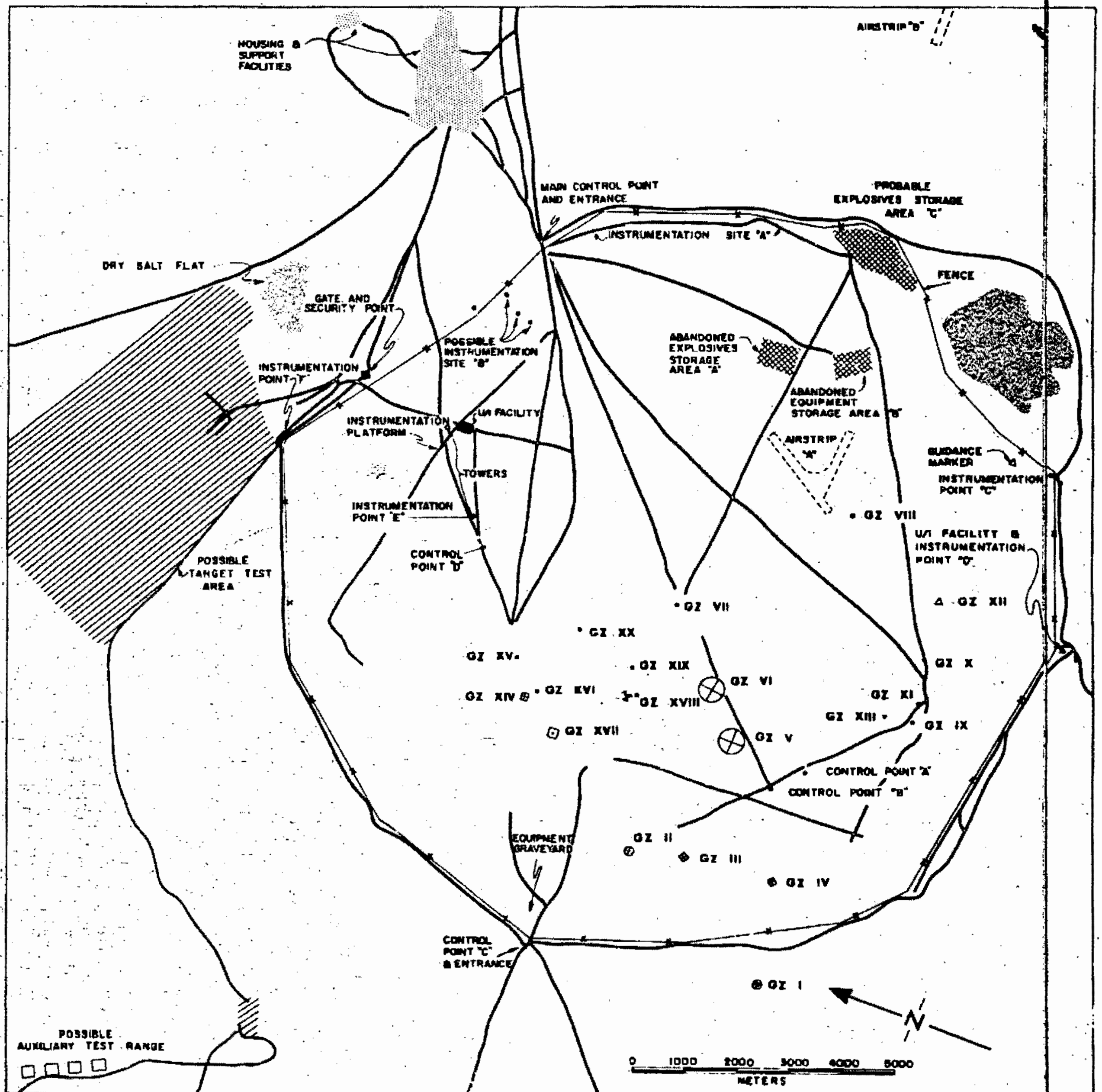


FIGURE 76

Semipalatinsk Nuclear Weapons Proving Ground, August 1957. Shown are the fenced shot area, the 20 ground zeros, and other facilities in and near the shot area.



HOUSING & SUPPORT FACILITIES
AIRSTRIP "B"
MAIN CONTROL POINT AND ENTRANCE
PROBABLE EXPLOSIVES STORAGE AREA "C"
INSTRUMENTATION SITE "A"
DRY SALT FLAT
GATE AND SECURITY POINT
FENCE
POSSIBLE INSTRUMENTATION SITE "B"
ABANDONED EXPLOSIVES STORAGE AREA "A"
INSTRUMENTATION POINT "F"
ABANDONED EQUIPMENT STORAGE AREA "B"
INSTRUMENTATION PLATFORM
U/I FACILITY
AIRSTRIP "A"
TOWERS
GUIDANCE MARKER
INSTRUMENTATION POINT "C"
INSTRUMENTATION POINT "E"
GZ VIII
CONTROL POINT "D"
U/I FACILITY & INSTRUMENTATION POINT "D"
POSSIBLE TARGET TEST AREA
GZ VII
GZ XII
GZ XX
GZ XV
GZ XIX
GZ X
GZ VI
GZ XIV
GZ XVI
GZ XVIII
GZ XI
GZ XIII
GZ IX
GZ XVII
GZ V
CONTROL POINT "A"
CONTROL POINT "B"
EQUIPMENT GRAVEYARD
GZ II
GZ III
GZ IV
CONTROL POINT "C" & ENTRANCE
GZ I
N
POSSIBLE AUXILIARY TEST RANGE
0 1000 2000 3000 4000 5000
METERS

SECRET

FIGURE 77

Ground Zeros I through IV, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. Note the apparent lack of use of GZ's I and III for nuclear tests in contrast to the huge blast scar at GZ II and the crater and blast scar at GZ IV.


CONTROL POINT A
CONTROL POINT B
G Z IV
G Z I
G Z III
G Z II

FIGURE 78

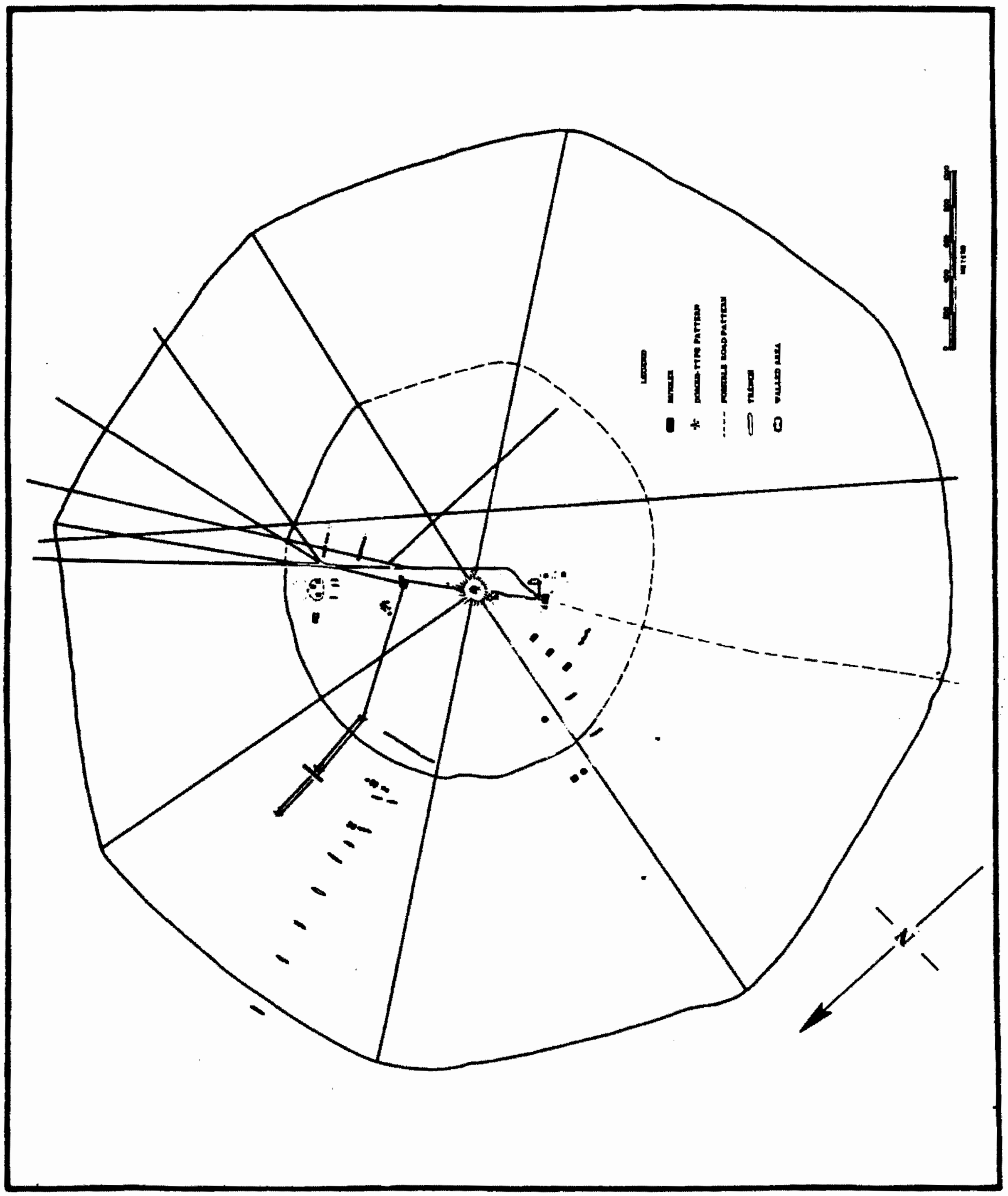
Ground Zeros V through VII, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. The markers at V and VI were identical in size and design and their undisturbed character was in sharp contrast to the enormous blast scar, the largest in the shot area, at GZ VII.


G Z VII
G Z VI
G Z V
N

FIGURE 79

Test facilities and objects associated with GZ XV, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. The structures and objects depicted were for a future test.

SECRET



SECRET

FIGURE 80

Ground Zeros XIV through XX, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. Note especially the bright marker at GS XIV and the prominent craters at GZ's XVI and XVII.

G Z XIX
G Z XVIII
G Z XX
G Z XVI
G Z XVII
G Z XV
G Z XIV
CONTROL POINT D

FIGURE 81

Test facilities and objects associated with GZ XIV, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. Preparations, which were virtually complete at the time of photography, were obviously for a military effects test.

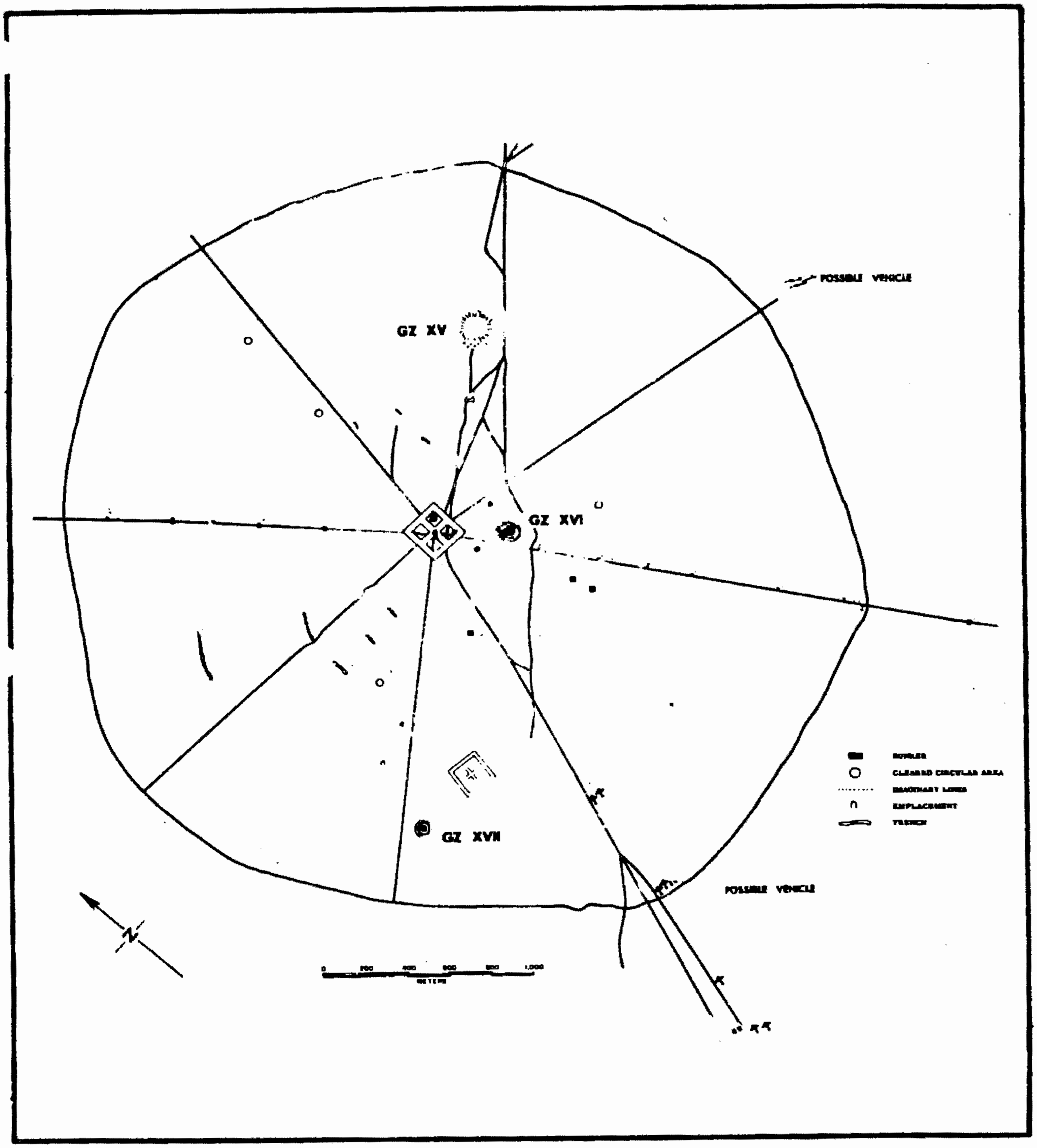

POSSIBLE VEHICLE
GZ XV
GZ XVI
GZ XVII
CLEARED CIRCULAR AREA
EMPLACEMENT
POSSIBLE VEHICLE
N

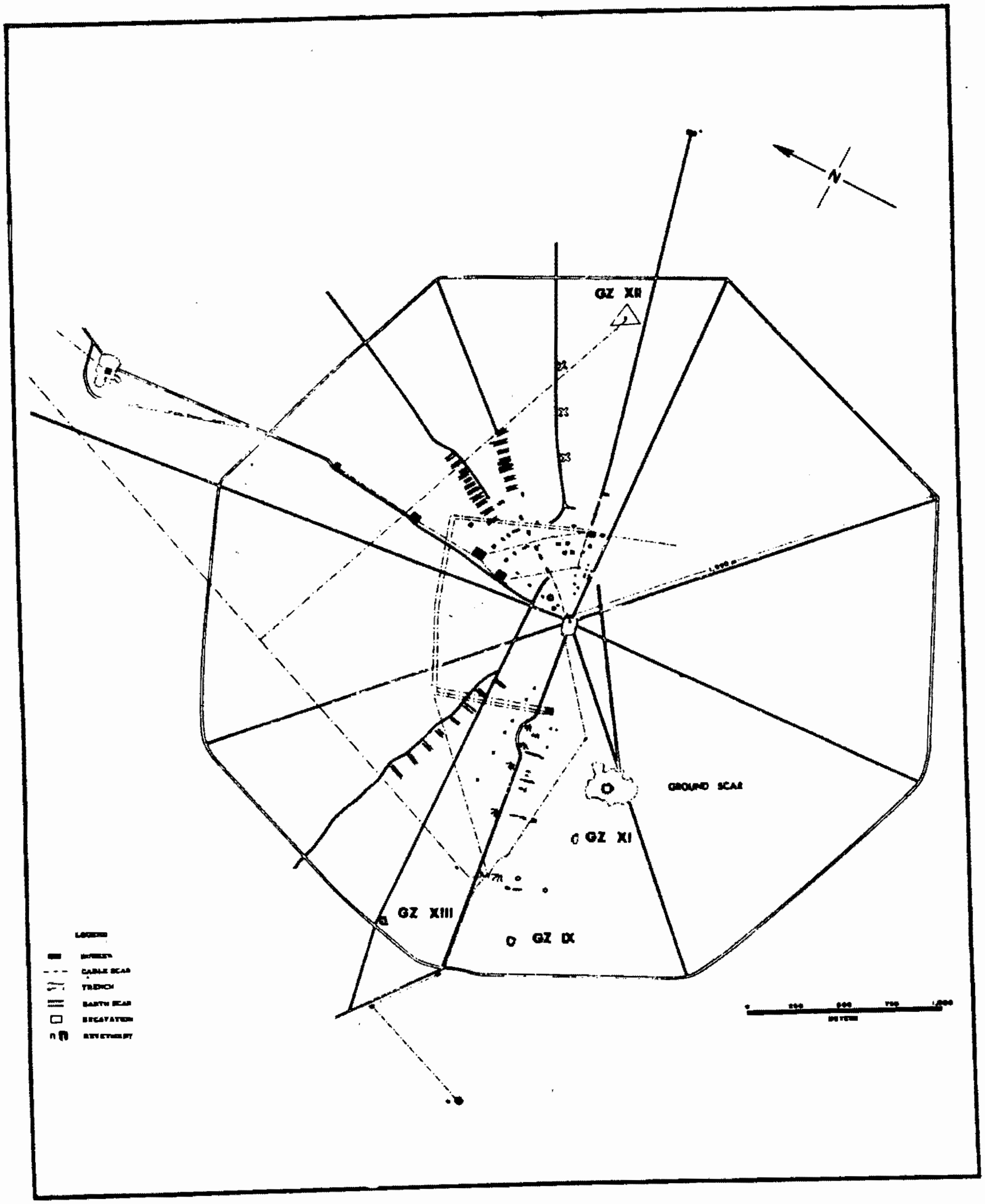
FIGURE 82

Ground Zero X and associated test facilities, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. The perspective sketch shows the shot tower and the numerous bunkers especially well.

FIGURE 83

Test facilities and objects associated with GZ X, Semipalatinsk Nuclear Weapons Proving Ground, August 1957.

SECRET

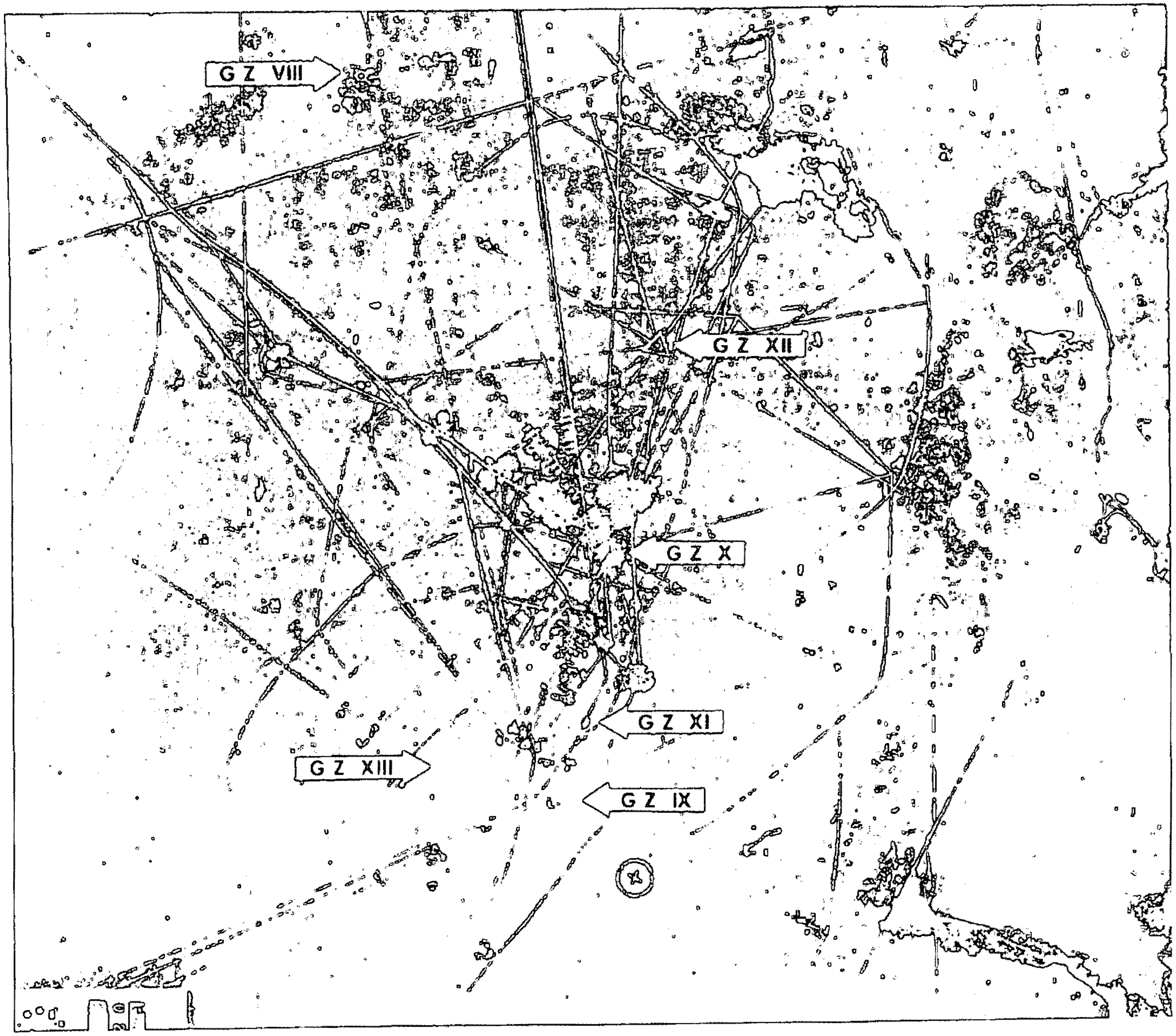


SECRET

FIGURE 84

Ground Zeros VIII through XIII, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. Note the equilateral triangle and enclosed pad at GZ XII. On this overhead photograph, the tower of GZ X casts a long shadow on the ground.

SECRET



SECRET

FIGURE 85

Ground Zero XX, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. Note the very limited facilities.

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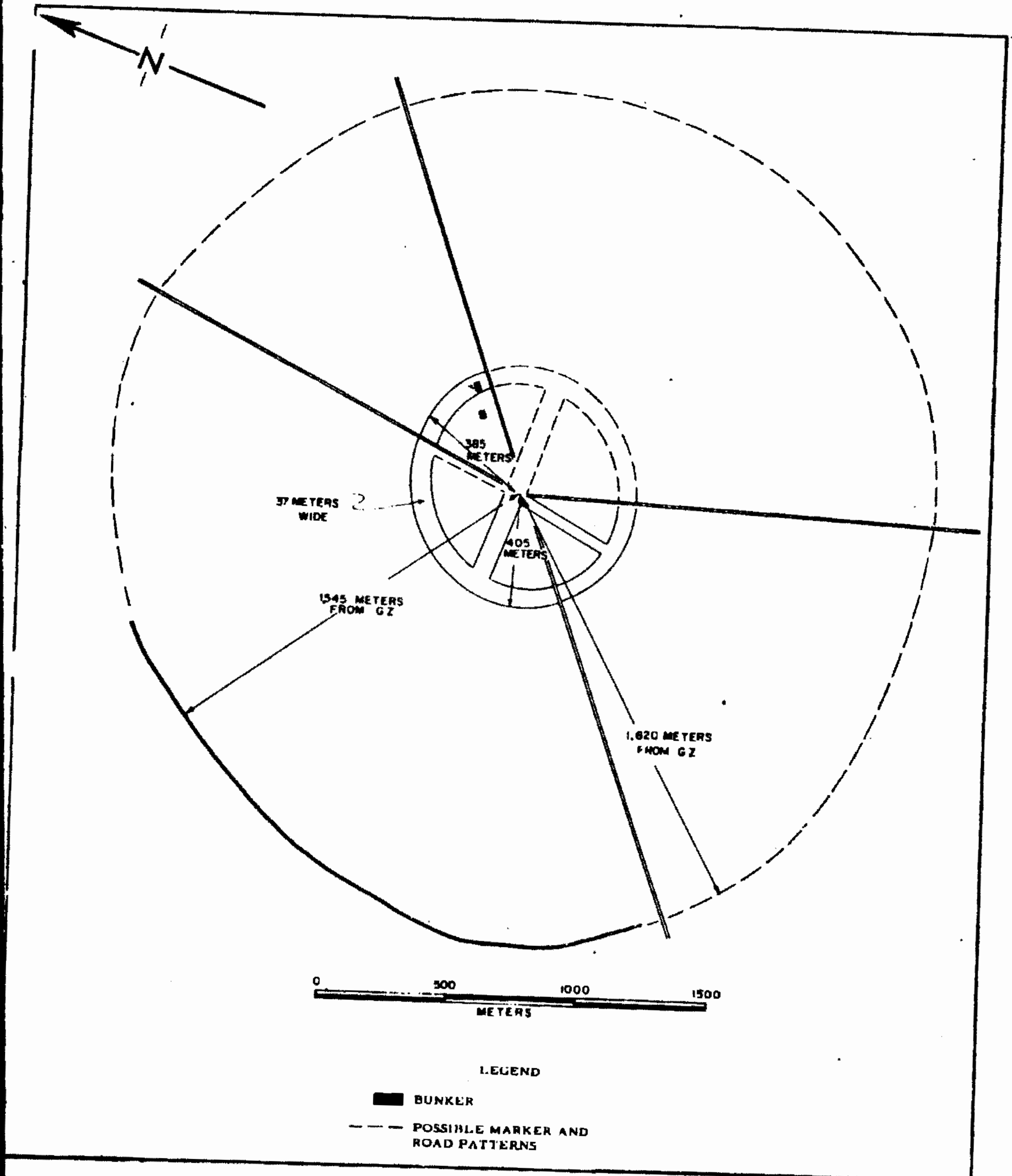
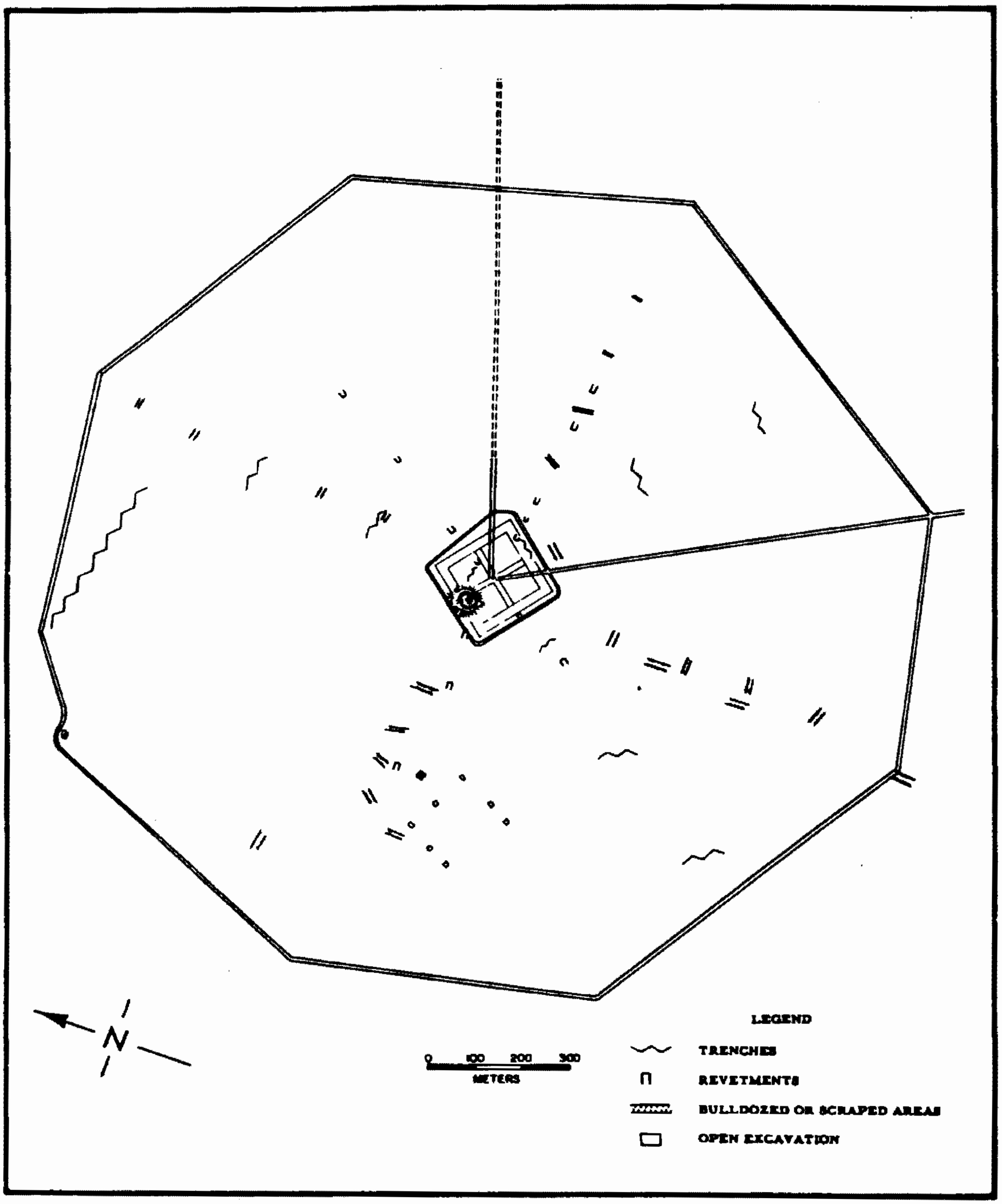

N
385 METERS
37 METERS WIDE
405 METERS
1545 METERS FROM GZ
1,620 METERS FROM GZ
0
500
1000
1500
METERS
LEGEND
BUNKER
POSSIBLE MARKER AND ROAD PATTERNS

FIGURE 86

Test facilities at, Ground Zero IV, Semipalatinsk Nuclear Weapons Proving Ground, August 1957.


N
0 100 200 300
METERS
LEGEND
TRENCHES
REVETMENTS
BULLDOZED OR SCRAPED AREAS
OPEN EXCAVATION

~~Secret~~
~~CIA Internal Use Only~~

~~Secret~~

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THE YEARS OF PROJECT HTAUTOMAT, 1956 - 1958

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THE YEARS OF PROJECT HTAUTOMAT, 1956 - 1958

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FIGURE 87

Test facilities and structures associated with Ground Zero XVII, Semipalatinsk Nuclear Weapons Proving Ground, August 1957.

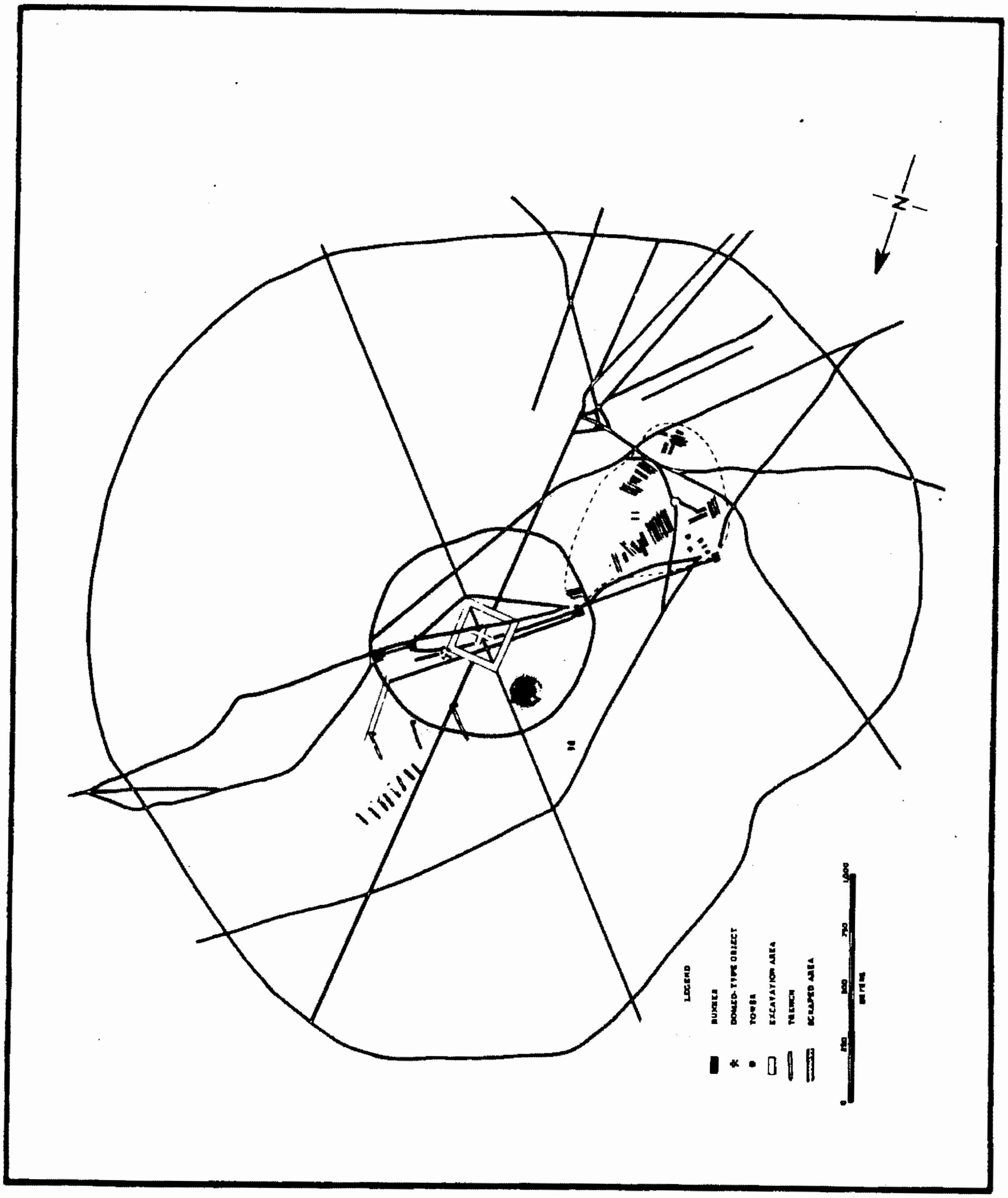
N
LEGEND
BUNKER
DOMED-TYPE OBJECT
TOWER
EXCAVATION AREA
TRENCH
SCRAPED AREA
0
250
500
750
1,000
METERS

FIGURE 88

Test facilities and structures associated with Ground Zero IX, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. The marker at the four o'clock position, just outside the scorched area, was believed to have been a radar reflector not related to this GZ.

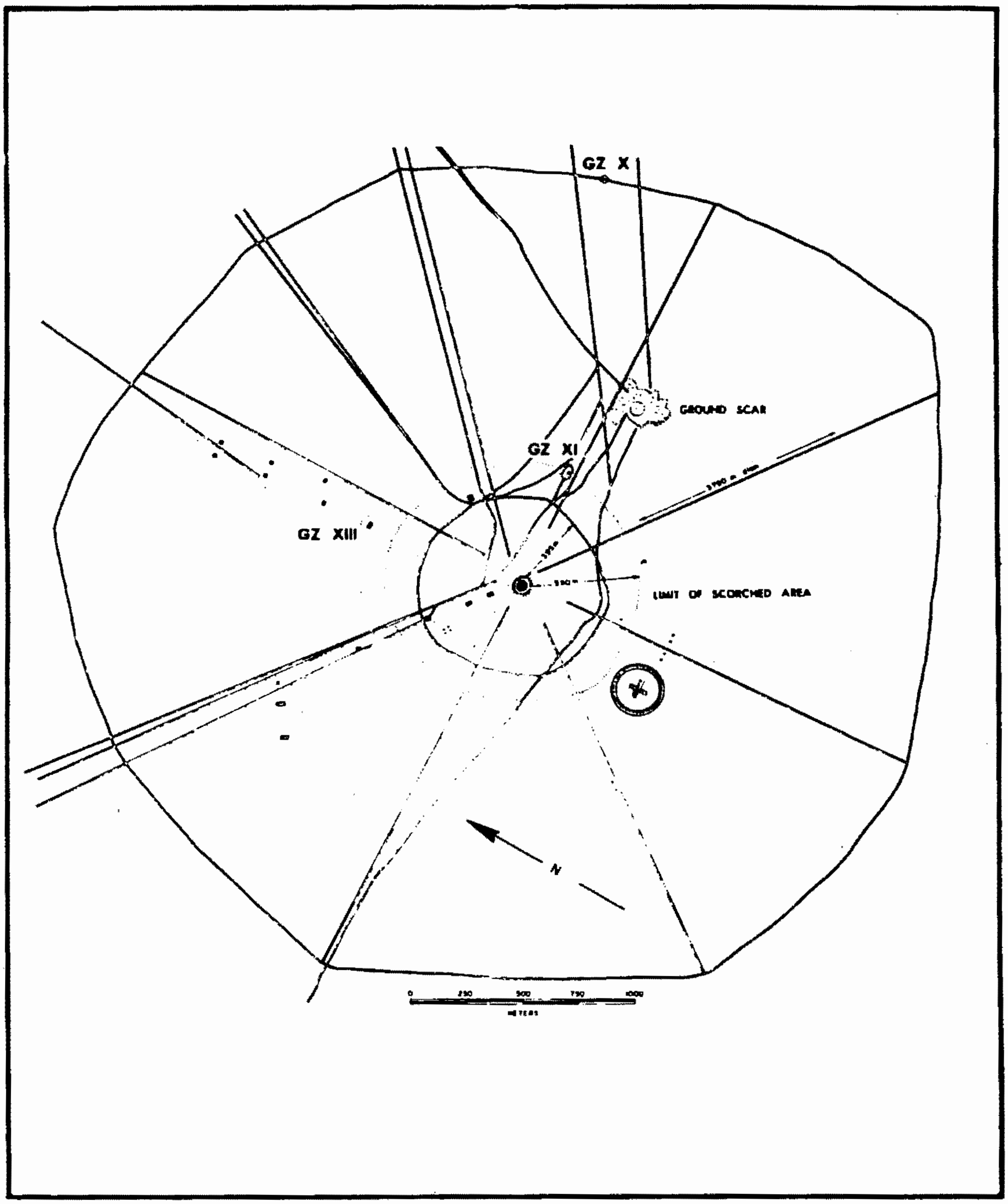
GZ X
GROUND SCAR
GZ XI
GZ XIII
LIMIT OF SCORCHED AREA
N
0 250 500 750 1000
METERS

FIGURE 89

Test facilities and structures associated with Ground Zero XVI, Semipalatinsk Nuclear Weapons Proving Ground, August 1957.

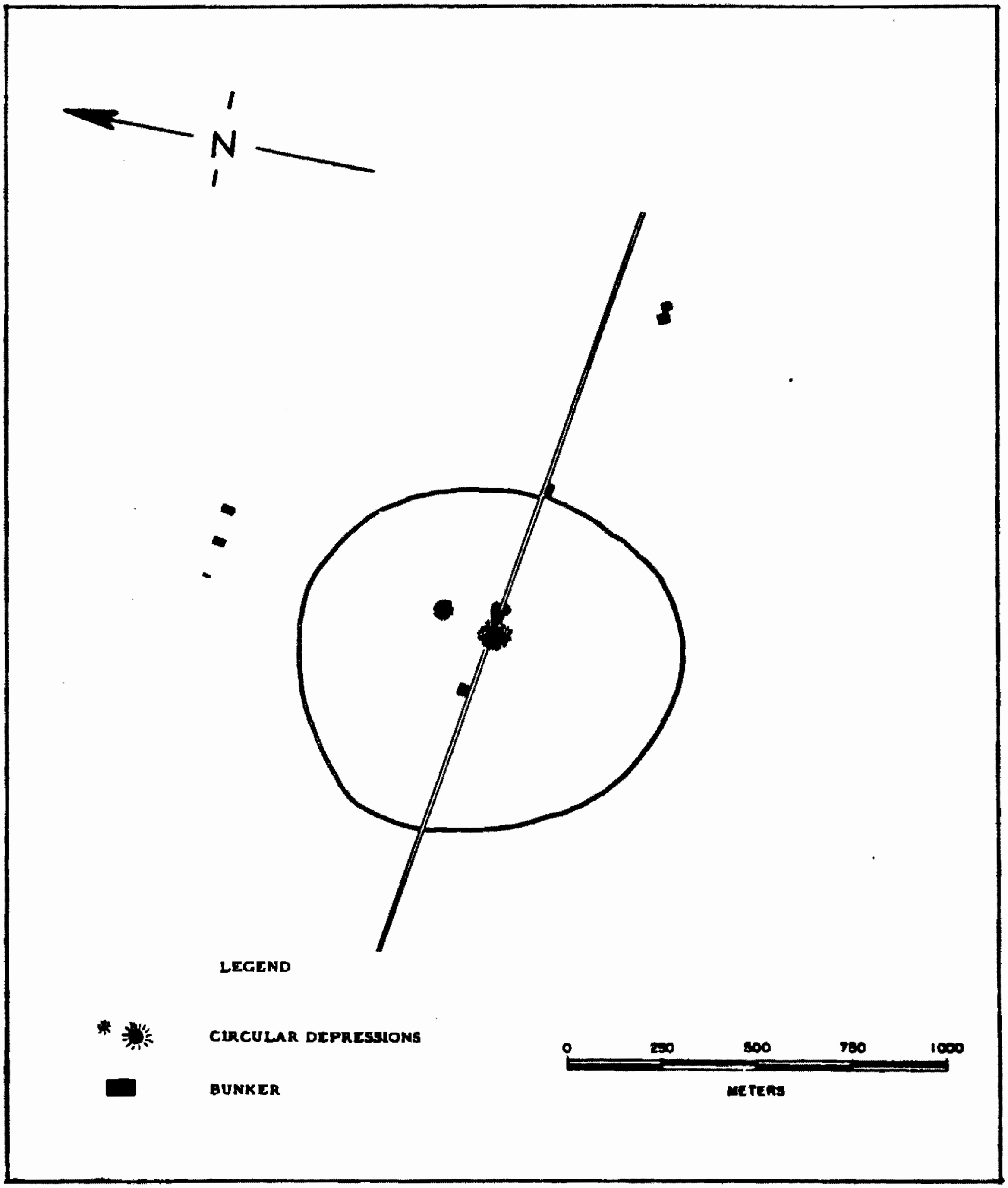
N
LEGEND
CIRCULAR DEPRESSIONS
BUNKER
0
250
500
750
1000
METERS

FIGURE 90

Test facilities and structures associated with Ground Zero II, Semipalatinsk Nuclear Weapons Proving Ground, August 1957.

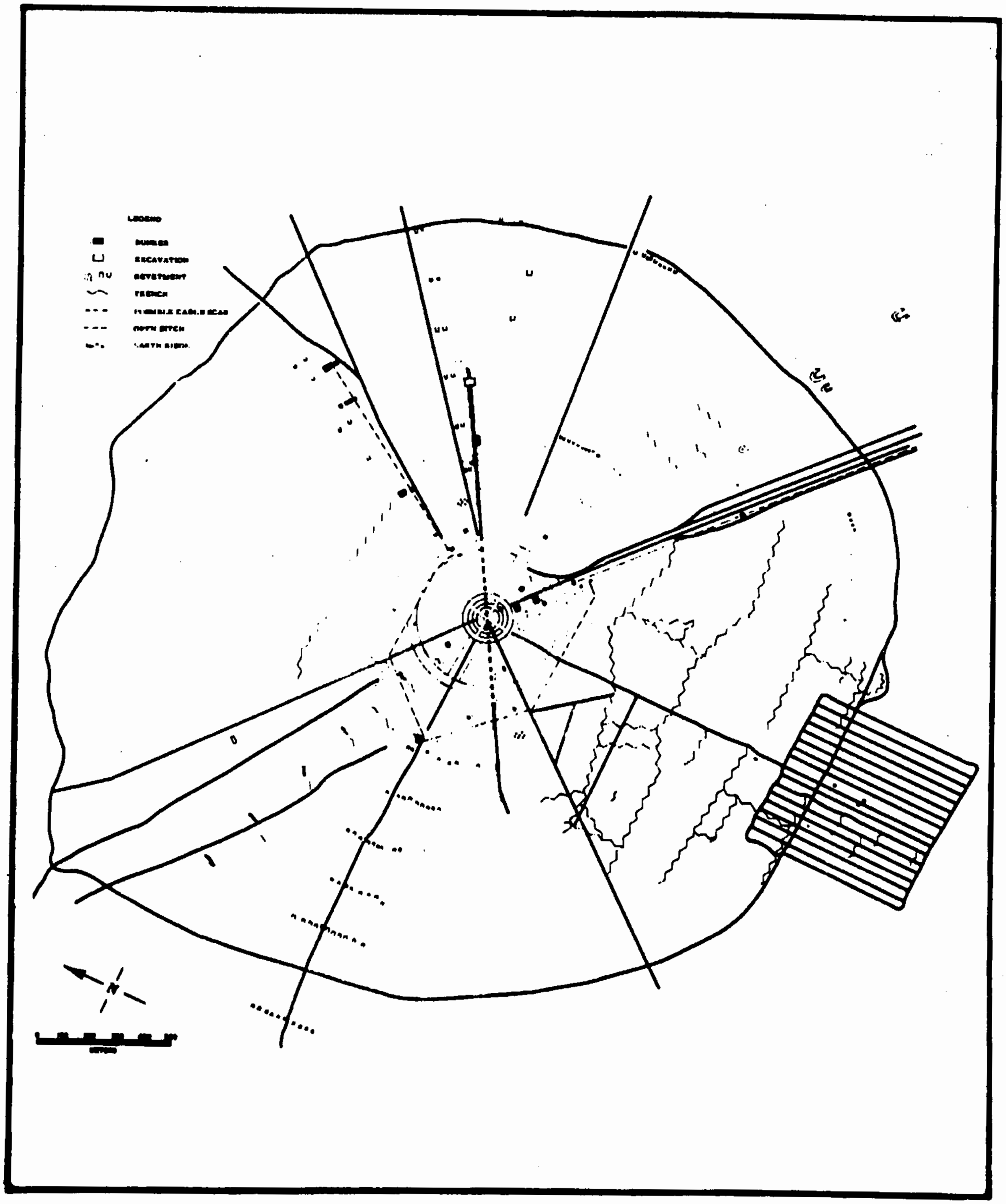

FIGURE 91

Test facilities and structures associated with Ground Zero VII, Semipalatinsk Nuclear Weapons Proving Ground, August 1957.

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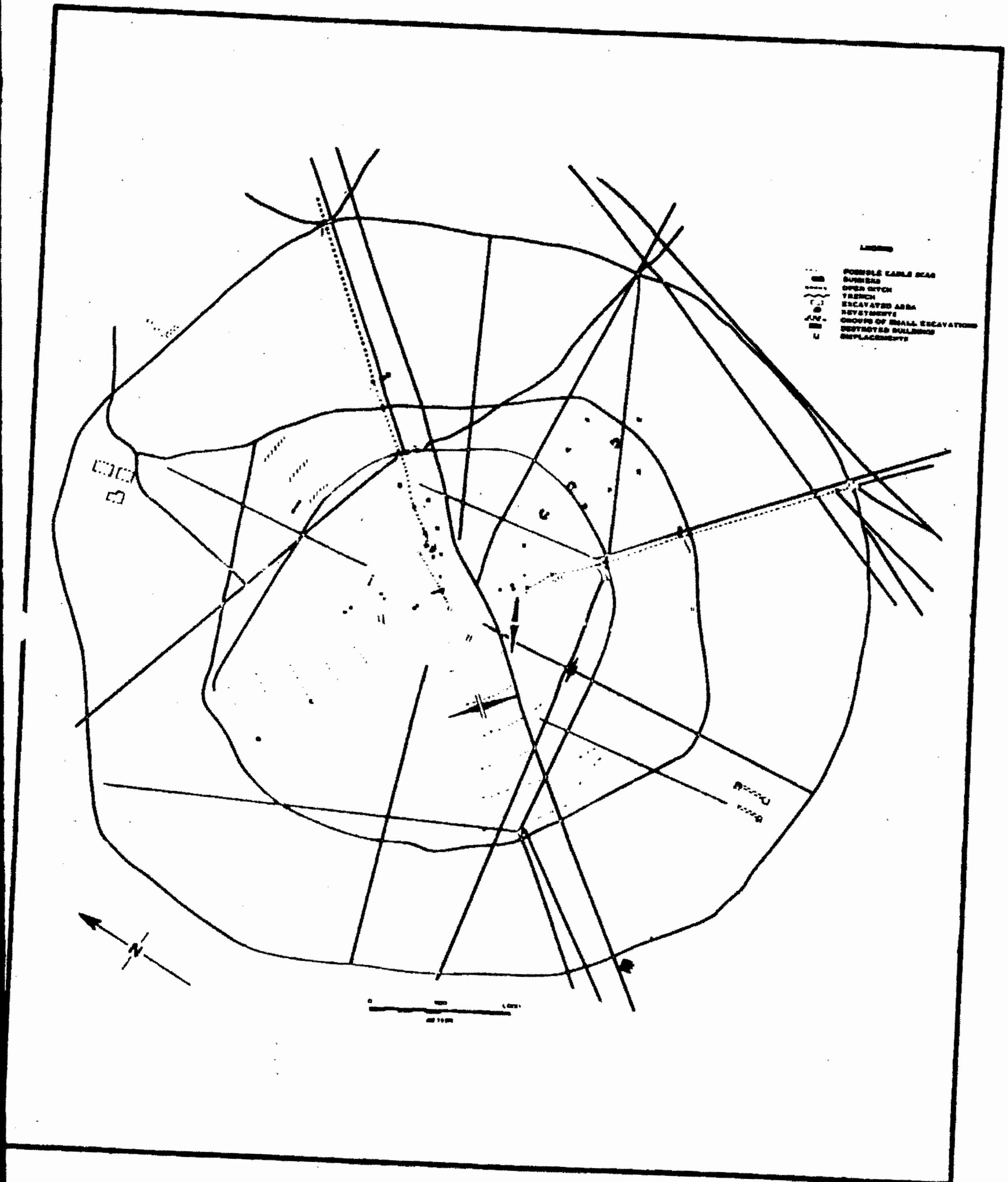


FIGURE 92

Artist's concept of facilities and structures associated with Ground Zero VII, Semipalatinsk Nuclear Weapons Proving Ground, August 1957. Note especially the bridge abutments and the towers, some of which were lying on their sides.

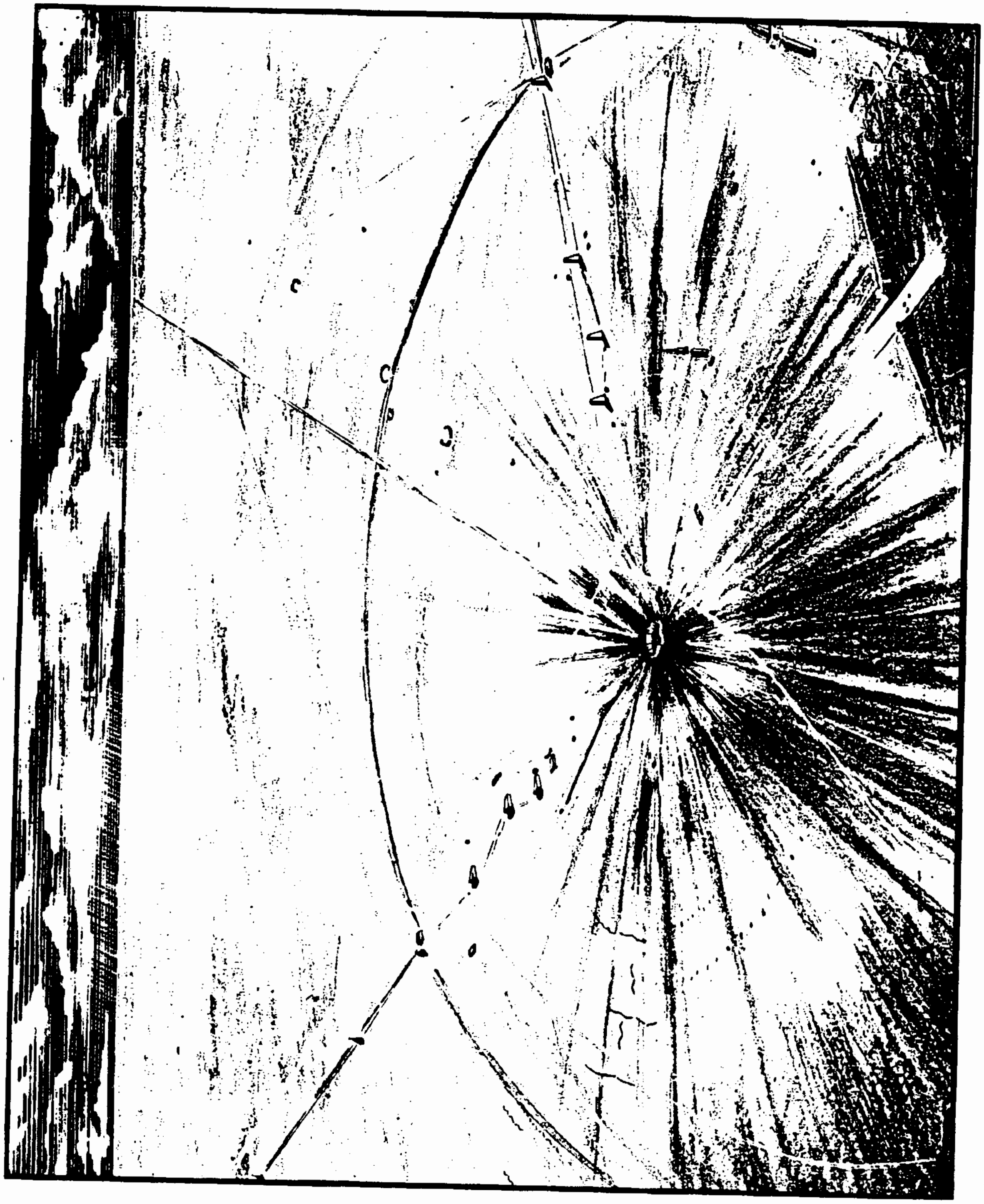


FIGURE 93

Housing and support facilities, Semipalatinsk Nuclear Weapons Proving Ground, August 1957.

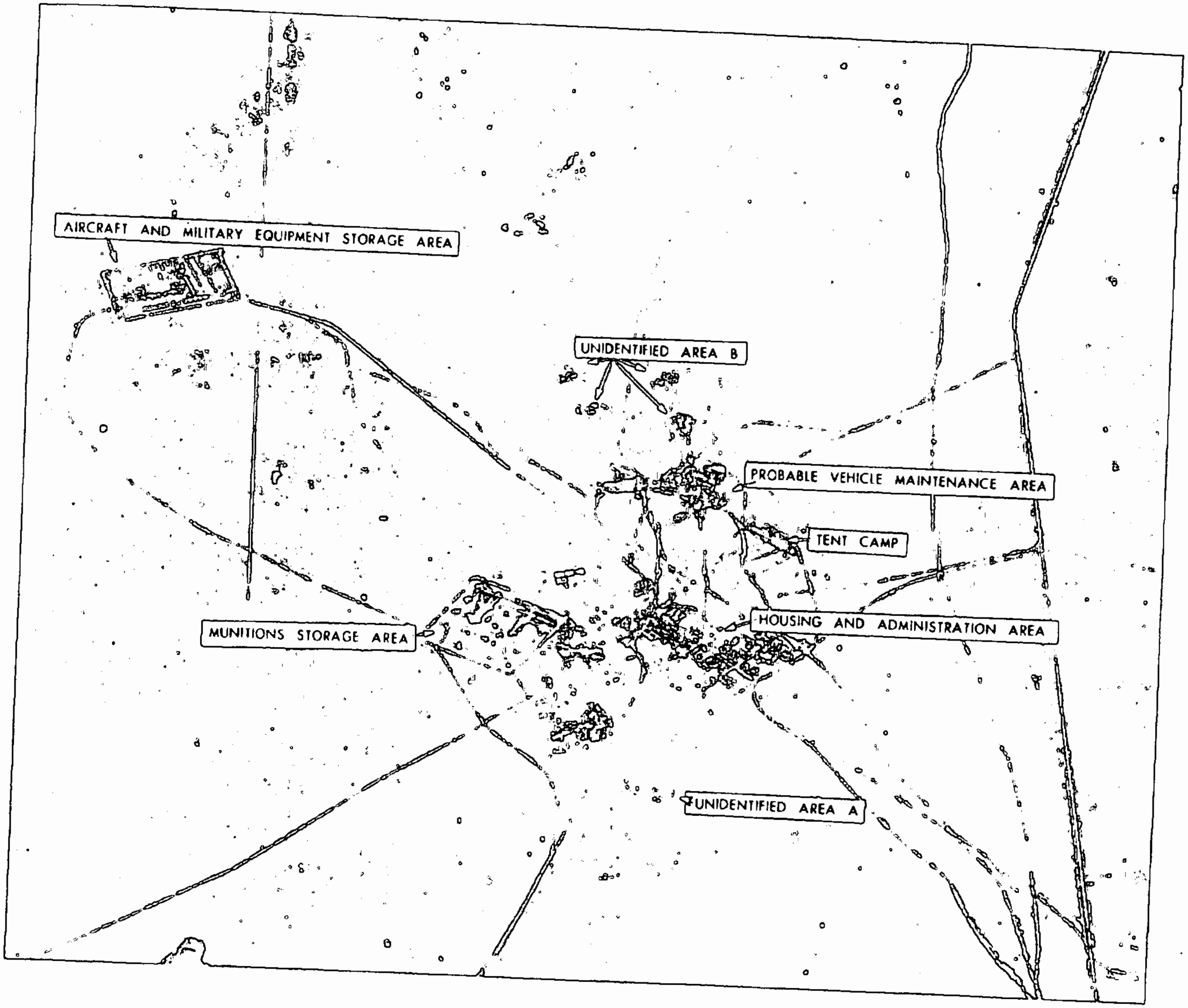
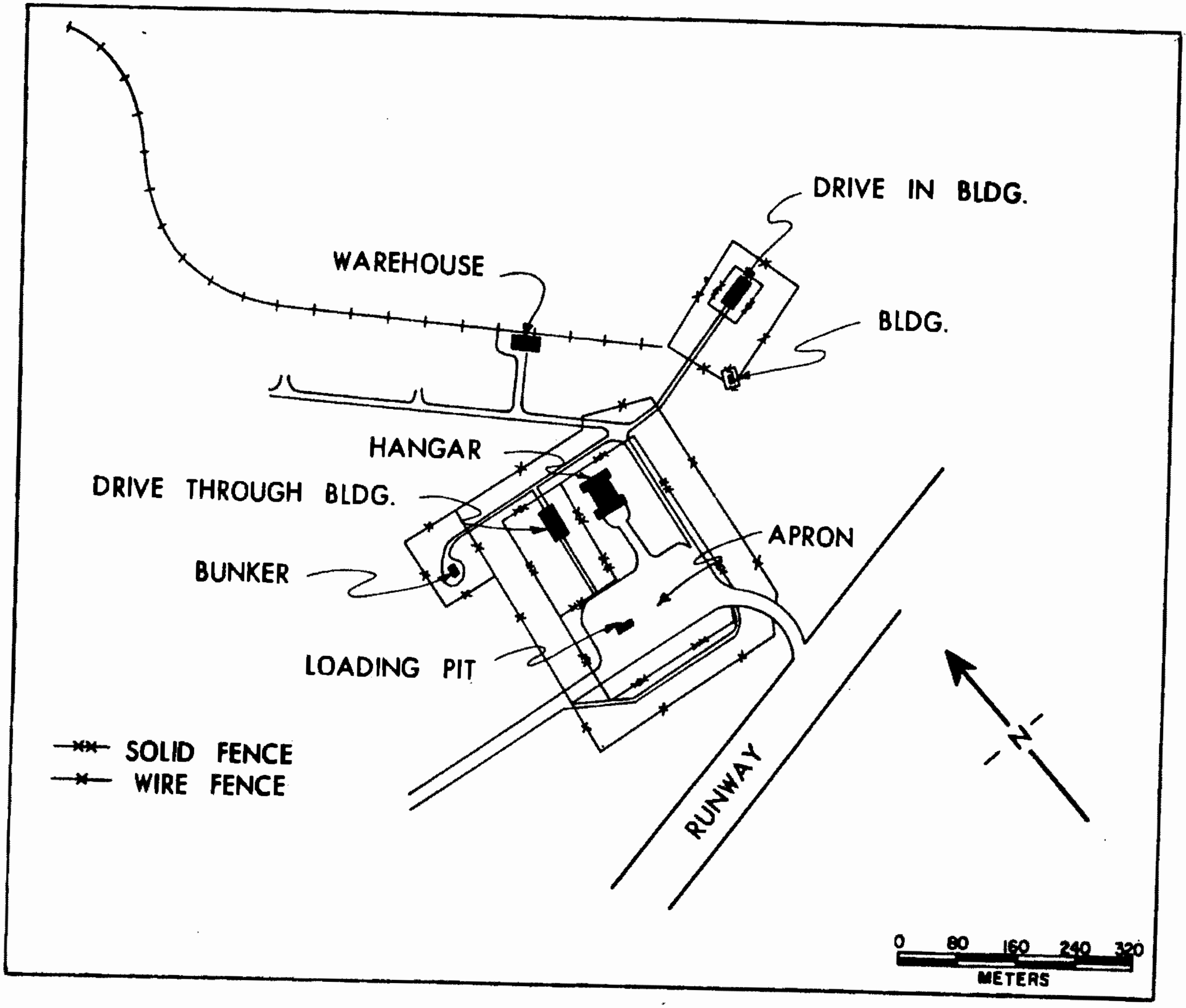

AIRCRAFT AND MILITARY EQUIPMENT STORAGE AREA
UNIDENTIFIED AREA B
PROBABLE VEHICLE MAINTENANCE AREA
TENT CAMP
MUNITIONS STORAGE AREA
HOUSING AND ADMINISTRATION AREA
UNIDENTIFIED AREA A

FIGURE 94

Special Weapons Loading Area, Semipalatinsk Airfield, August 1957.

SECRET



SECRET

FIGURE 95

Uranium Metal Plant, Novosibirsk AE Feed Materials Complex, August 1957. It was believed that ore was processed and refined and that uranium metal was produced, cast, fabricated, tested, and packaged in this facility.


TO STEAM AND POWER PLANT
ORE RECEIVING
ORE REFINERY
URANIUM FOUNDRY
GREEN SALT PLANT
URANIUM FABRICATION
MACHINING AND
SCRAP RECOVERY
TEST - PACKAGING - SHIPPING

FIGURE 96

Artist's concept, uranium metal plant, Novosibirsk AE Feed Materials Complex, August 1957.

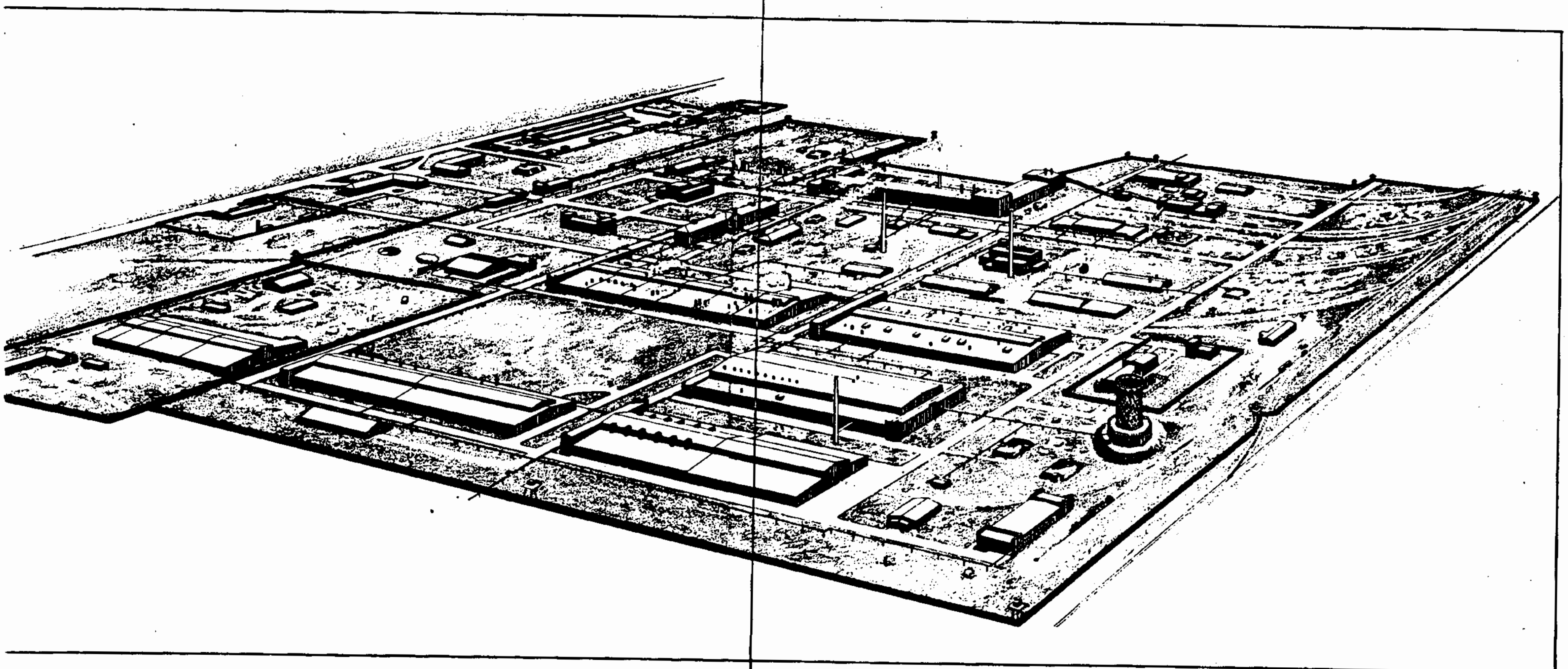


FIGURE 97

Steam and Power Plant Area, Novosibirsk AE Feed Materials Complex, August 1957. A network of steam pipelines, and probable underground power cables extended from this area to the uranium metal plant. The phrasing used in the title of this area was intended to include several other facilities within the same industrial tract; including the large ore processing plant under construction.

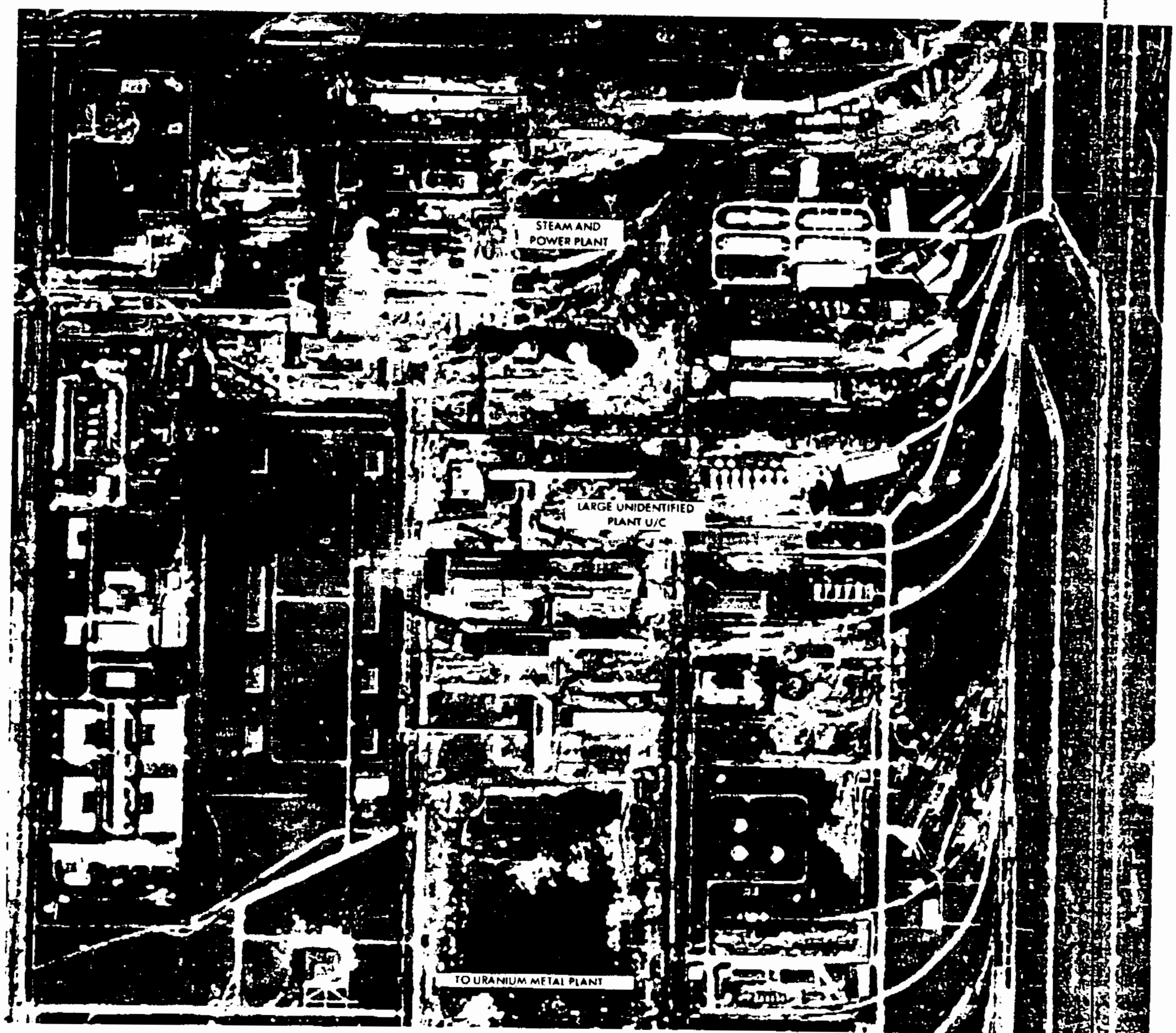


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FIGURE 98

Location of Vozrozhdeniya Island, USSR.

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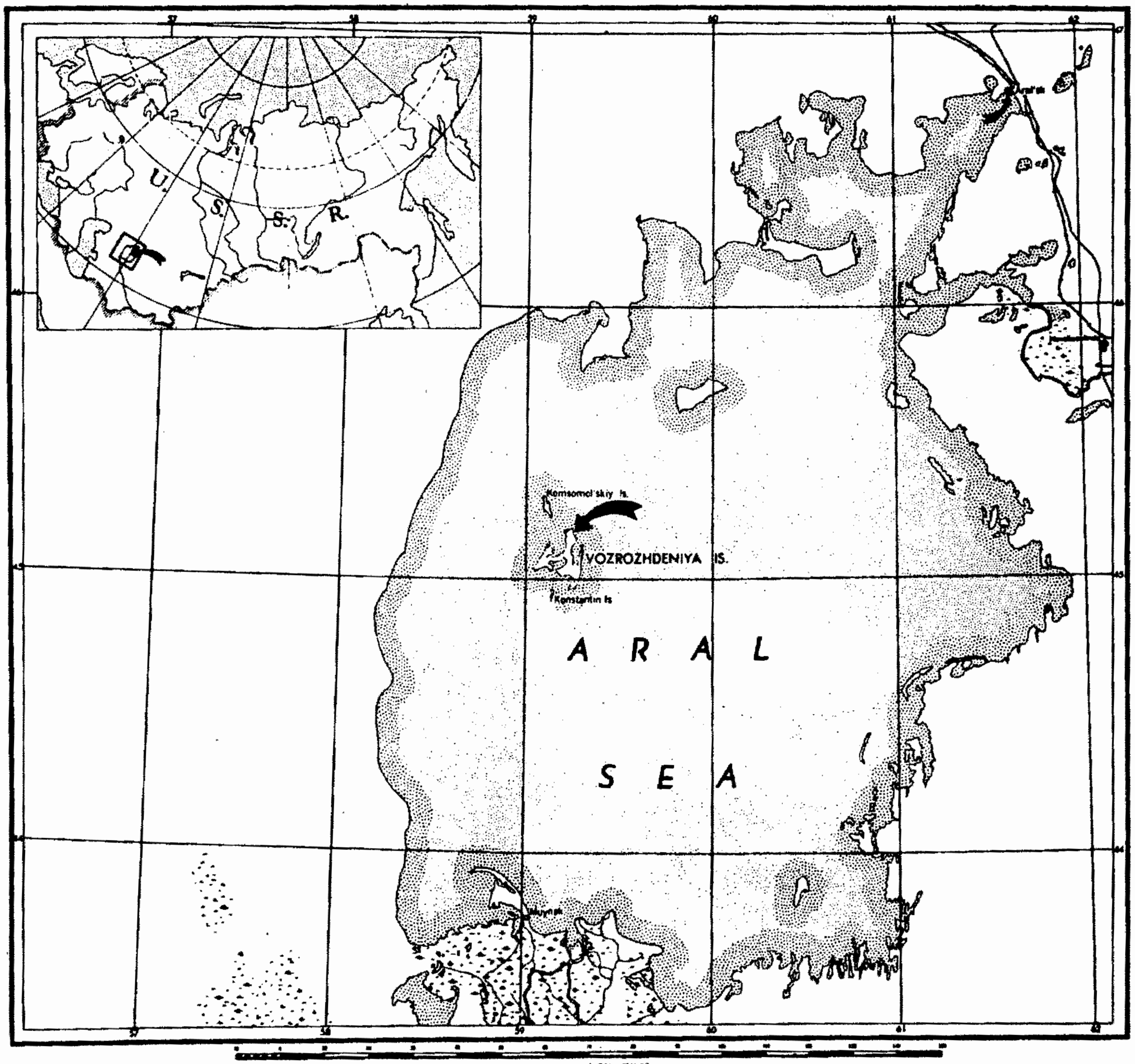

SECRET

FIGURE 99

Vozrozhdeniya Island and facilities, August 1957.

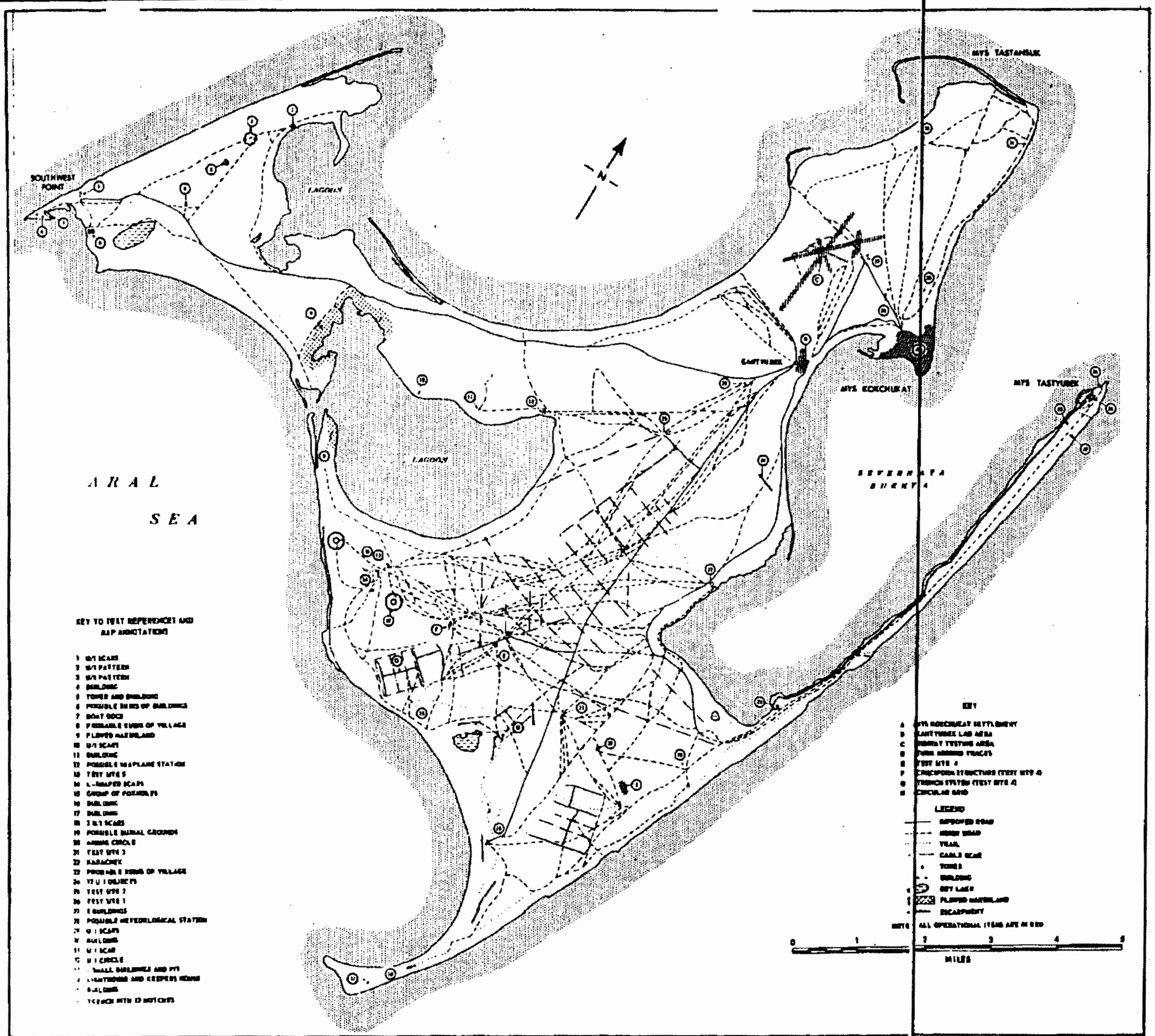

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FIGURE 100

Kantyubek Tramway, Vozrozhdeniya Island Biological Warfare Proving Ground, August 1957.

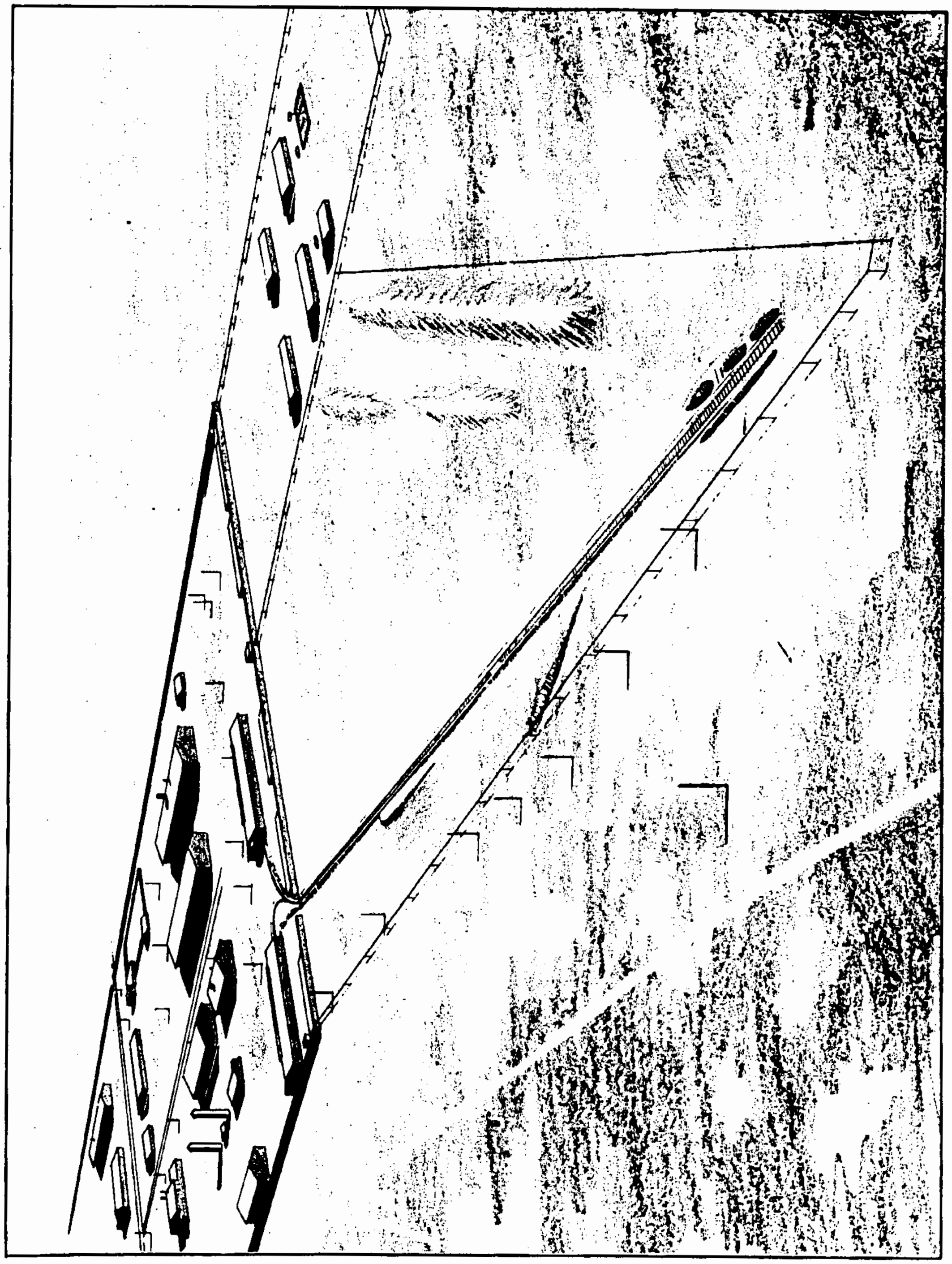

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FIGURE 101

Cruciform Structure, Vozrozhdeniya Island Biological Warfare Proving Ground, August 1957.

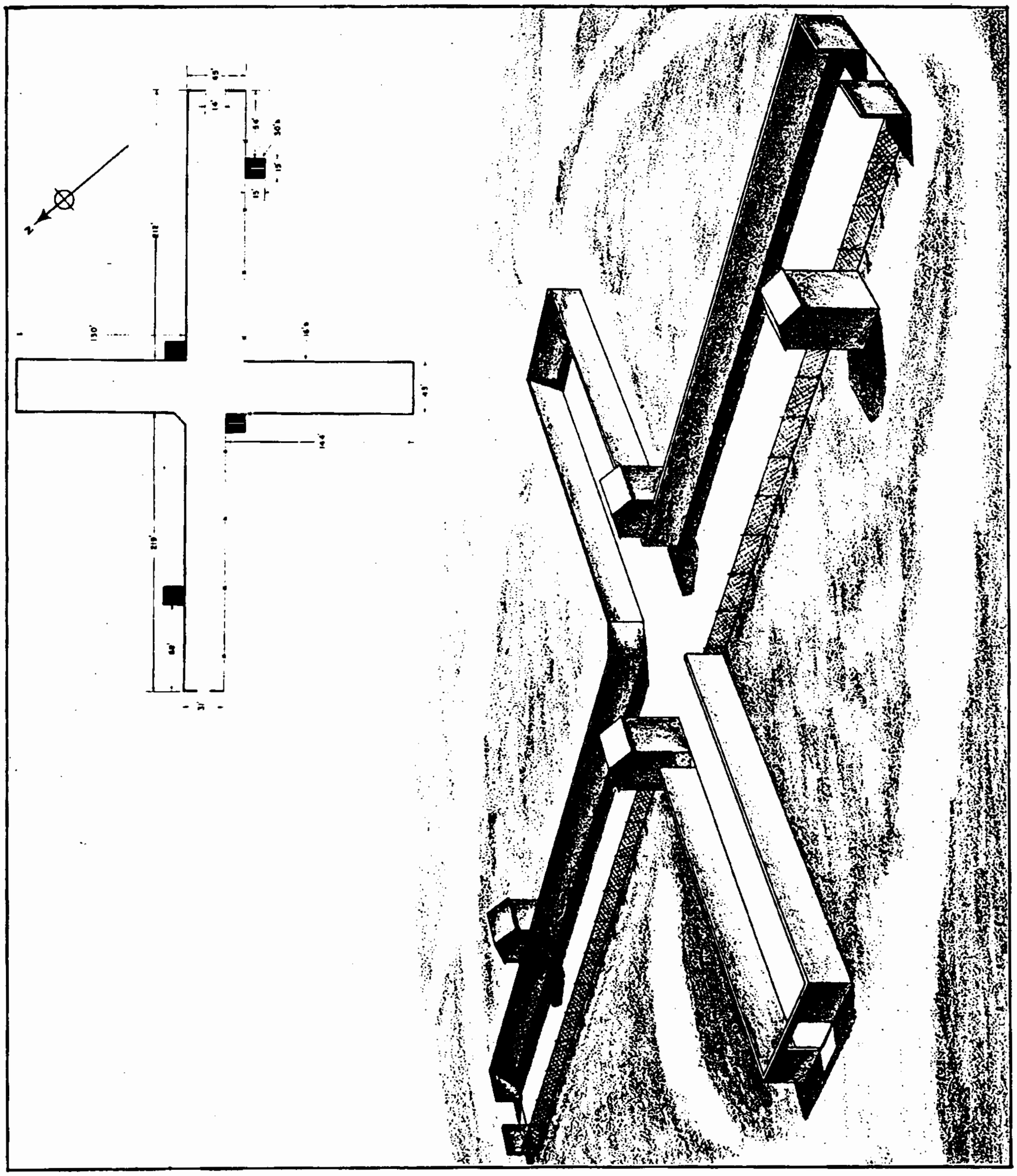
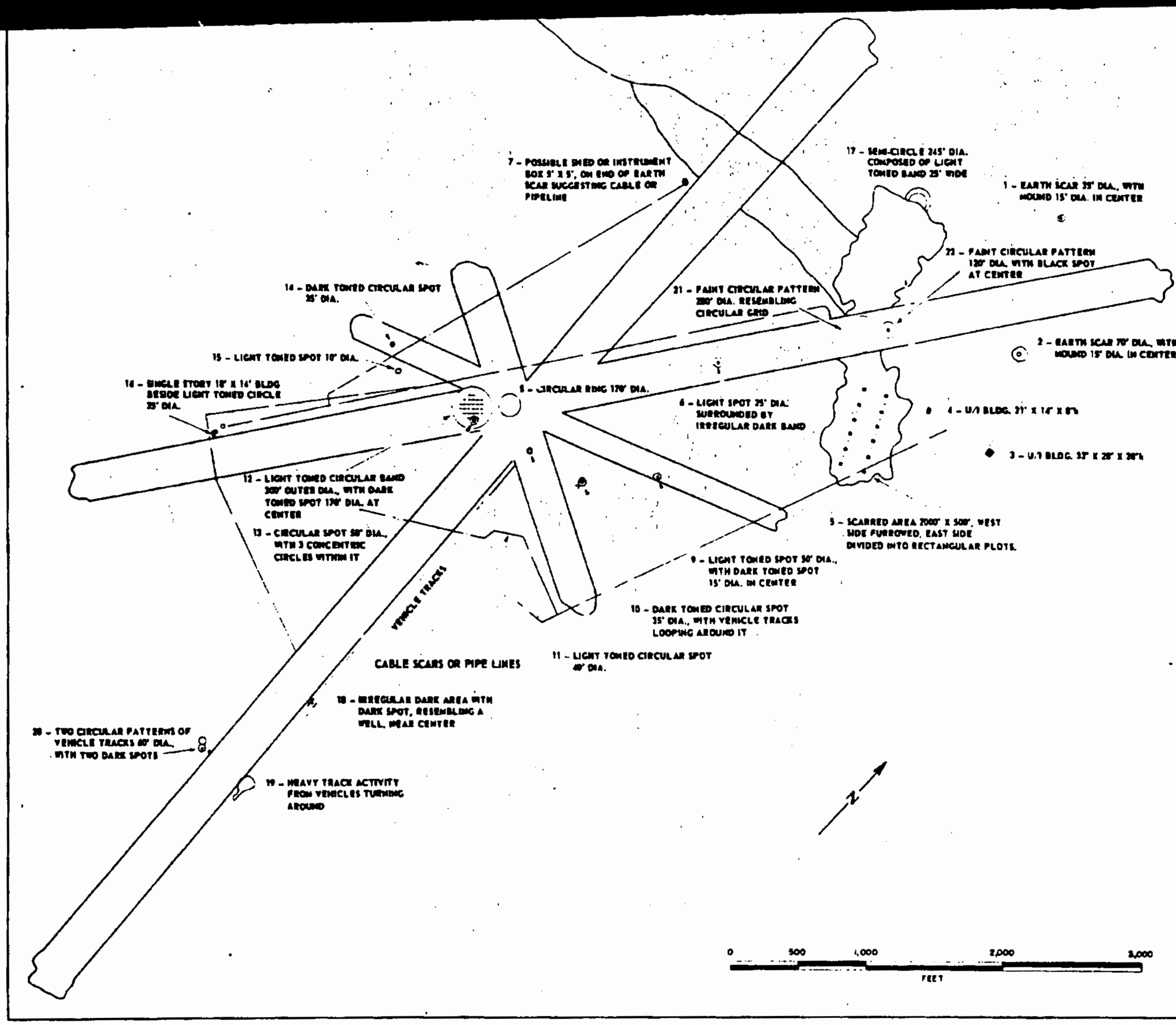


FIGURE 102

Runway Testing Area, Vozrozhdeniya Island Biological Warfare Proving Ground, August 1957.



SECRET

SECRET

FIGURE 103

Mys Kokchukat Settlement, Vozrozhdeniya Island Biological Warfare Proving Ground, August 1957.

SECRET

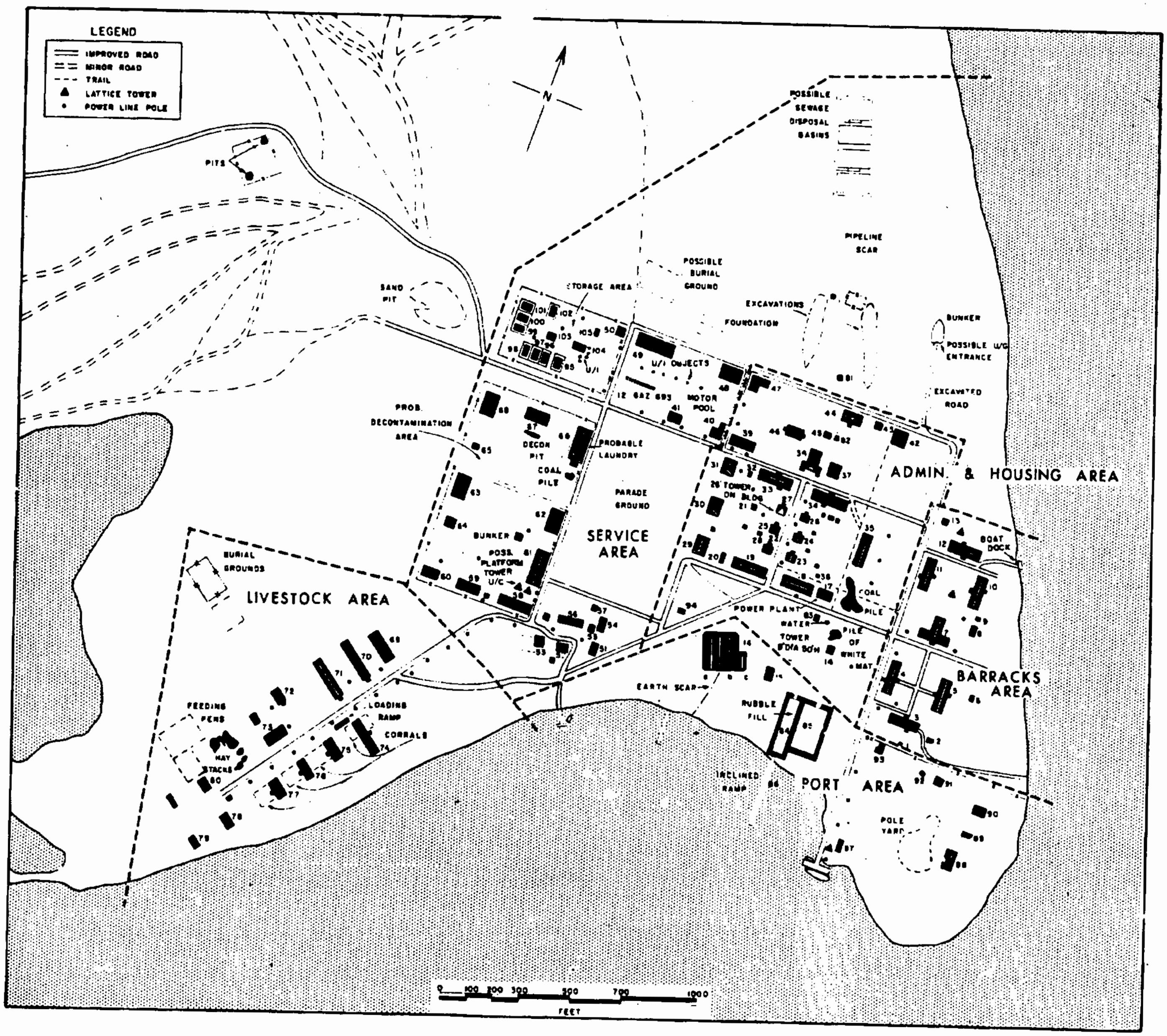


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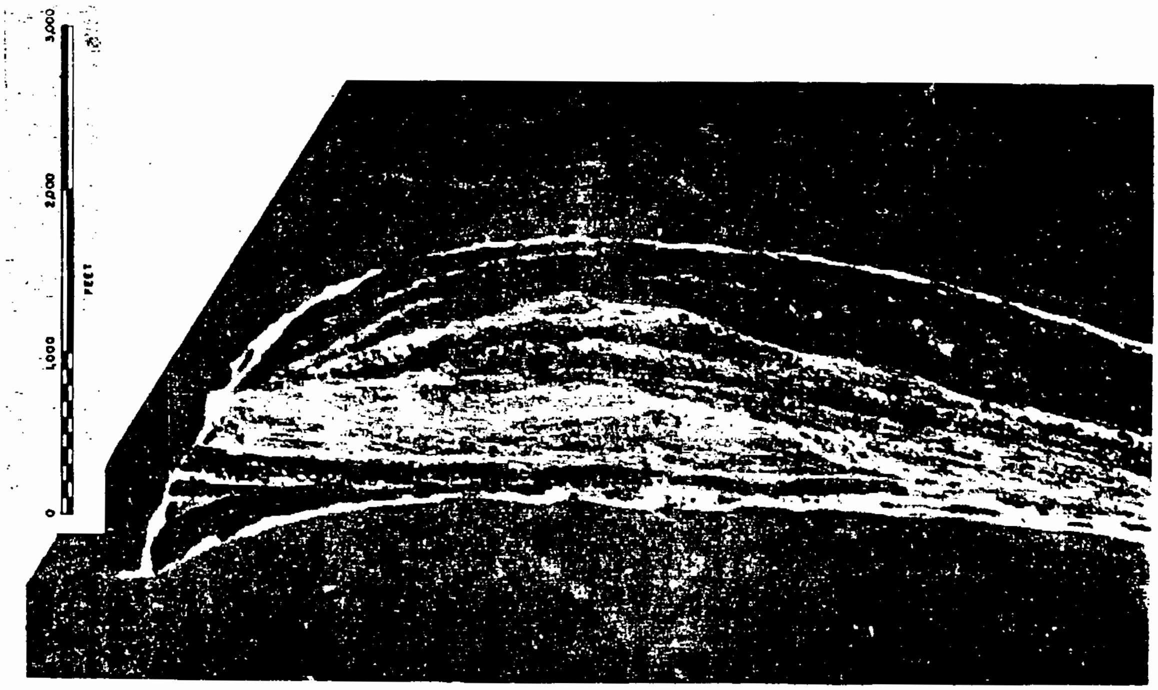
FIGURE 104

Konstantin Island facility, across the strait from Vozrozhdeniya Island, August 1957.


0
1,000
2,000
3,000
FEET

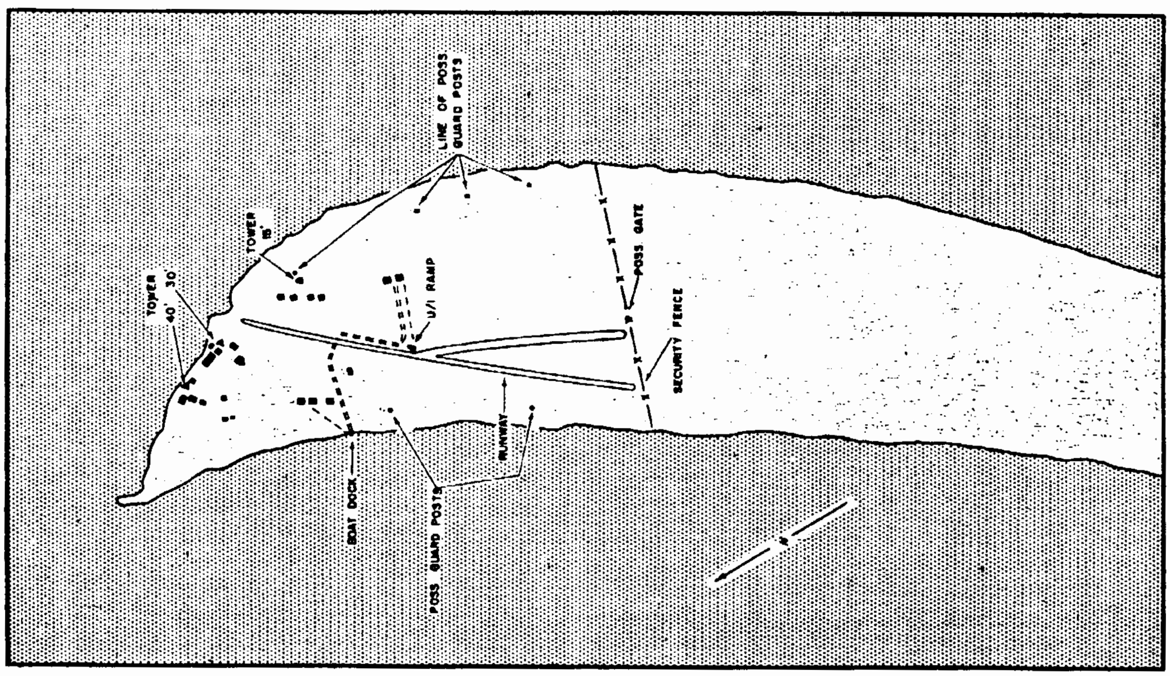

TOWER
40'
30'
TOWER
15'
LINE OF POSS.
GUARD POSTS
U/I RAMP
POSS. GATE
SECURITY FENCE
RUNWAY
BOAT DOCK
POSS. GUARD POSTS

FIGURE 105

Supply Base at Aralsk for operations on Vozrozhdeniya Island, August 1957.

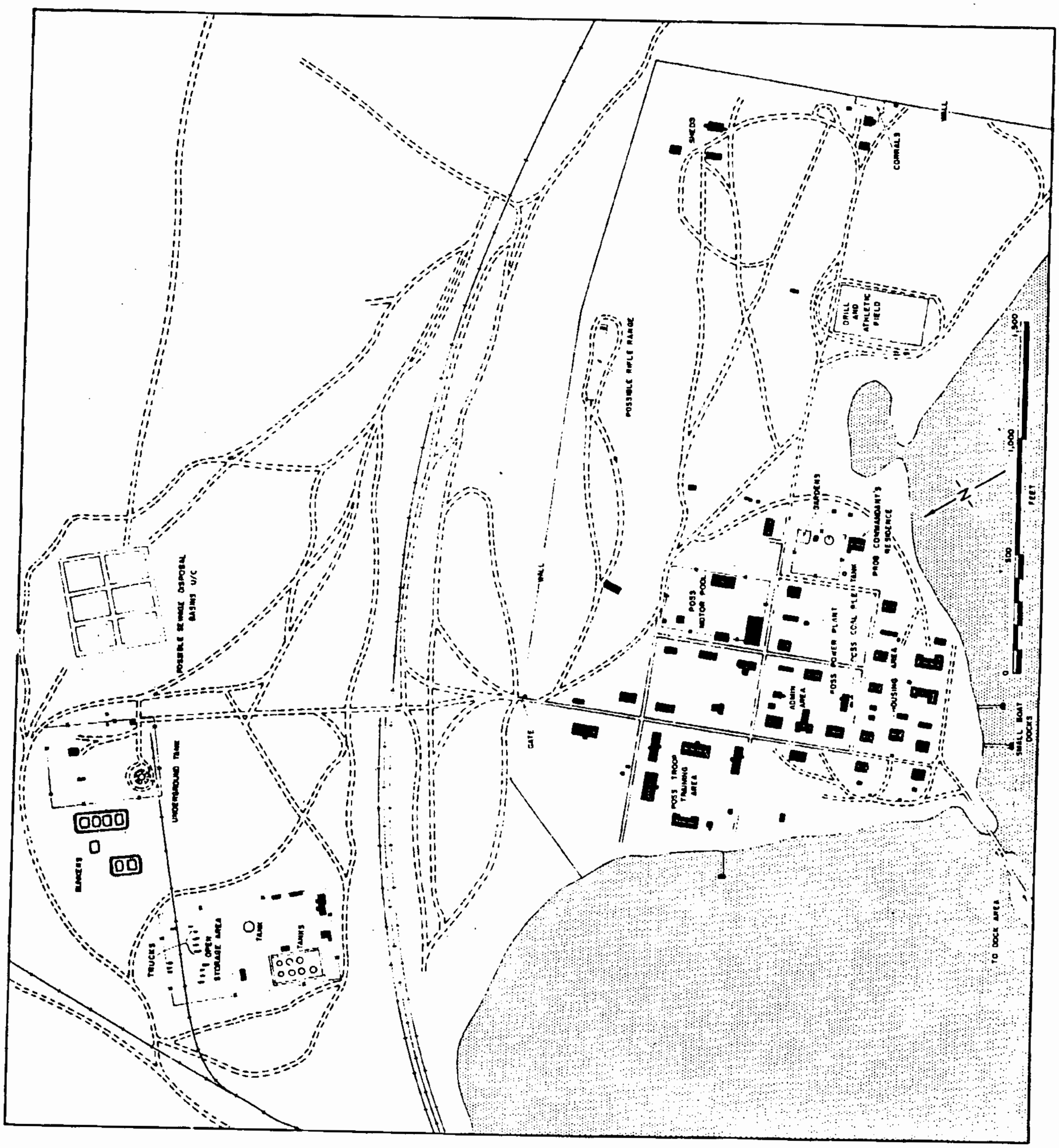

BUNKERS
TRUCKS
OPEN STORAGE AREA
TANK
TANKS
UNDERGROUND TANK
POSSIBLE SEWAGE DISPOSAL BASINS U/C
GATE
WALL
POSSIBLE RIFLE RANGE
POSS TROOP TRAINING AREA
POSS MOTOR POOL
ADMIN AREA
POSS POWER PLANT
POSS COAL PILE
TANK
GARDENS
PROB COMMANDANT'S RESIDENCE
HOUSING AREA
SHEDS
CORRALS
DRILL AND ATHLETIC FIELD
WALL
N
TO DOCK AREA
SMALL BOAT DOCKS
0
500
1,000
1,500
FEET

FIGURE 106

Prepared Table of Organization, 7 March 1958. This prepared reorganization involved a merger of the ORR Photo Intelligence Division and the OCR Statistical Division to form the CIA Photographic Intelligence Center at the Office level under the DDI.

3.5(c)

SECRET

FIGURE 107

Overall view of the Chirchik Electrochemical Combine, August 1957. The Boz-Su Canal appears in the upper left of the photograph.

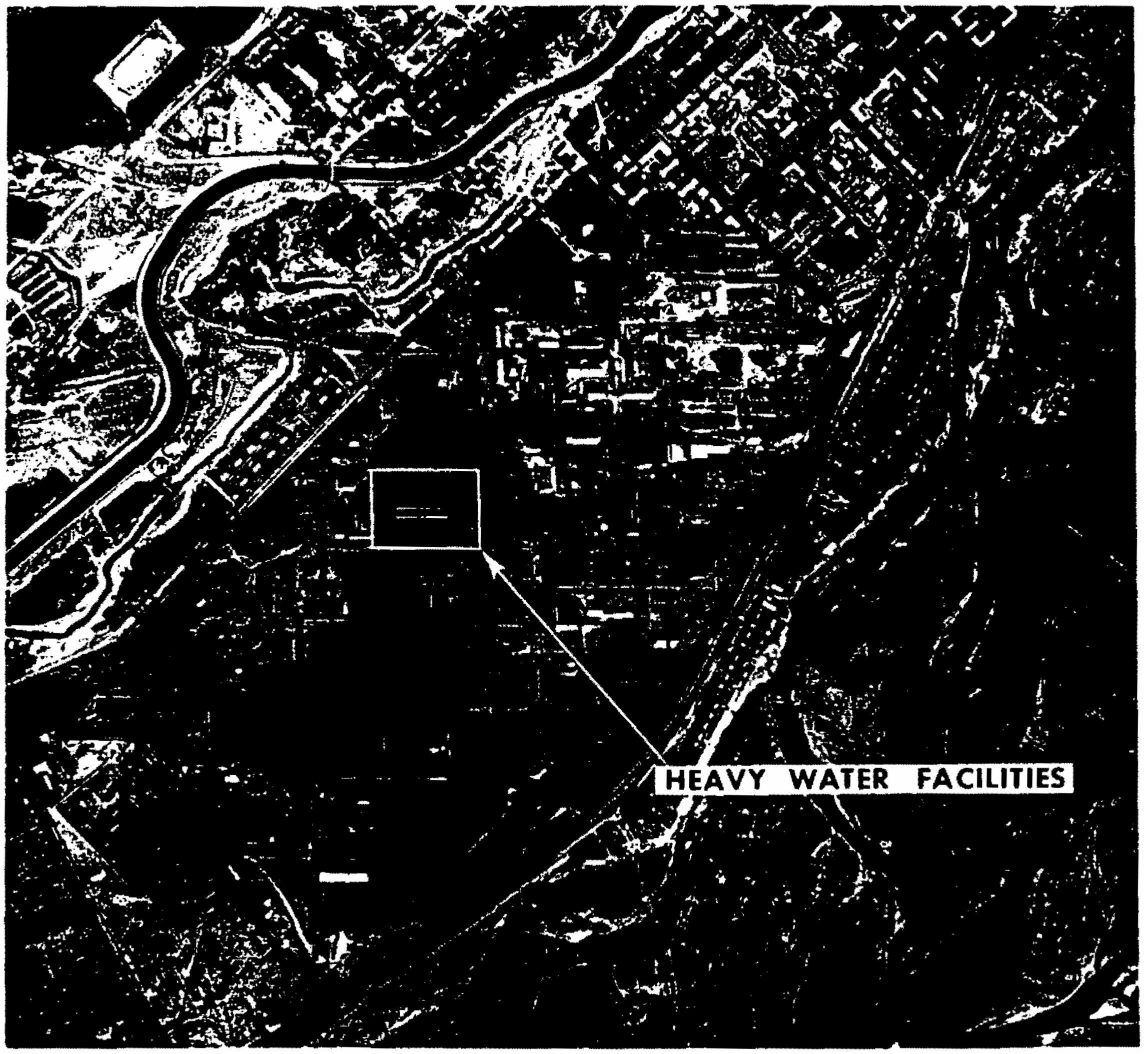
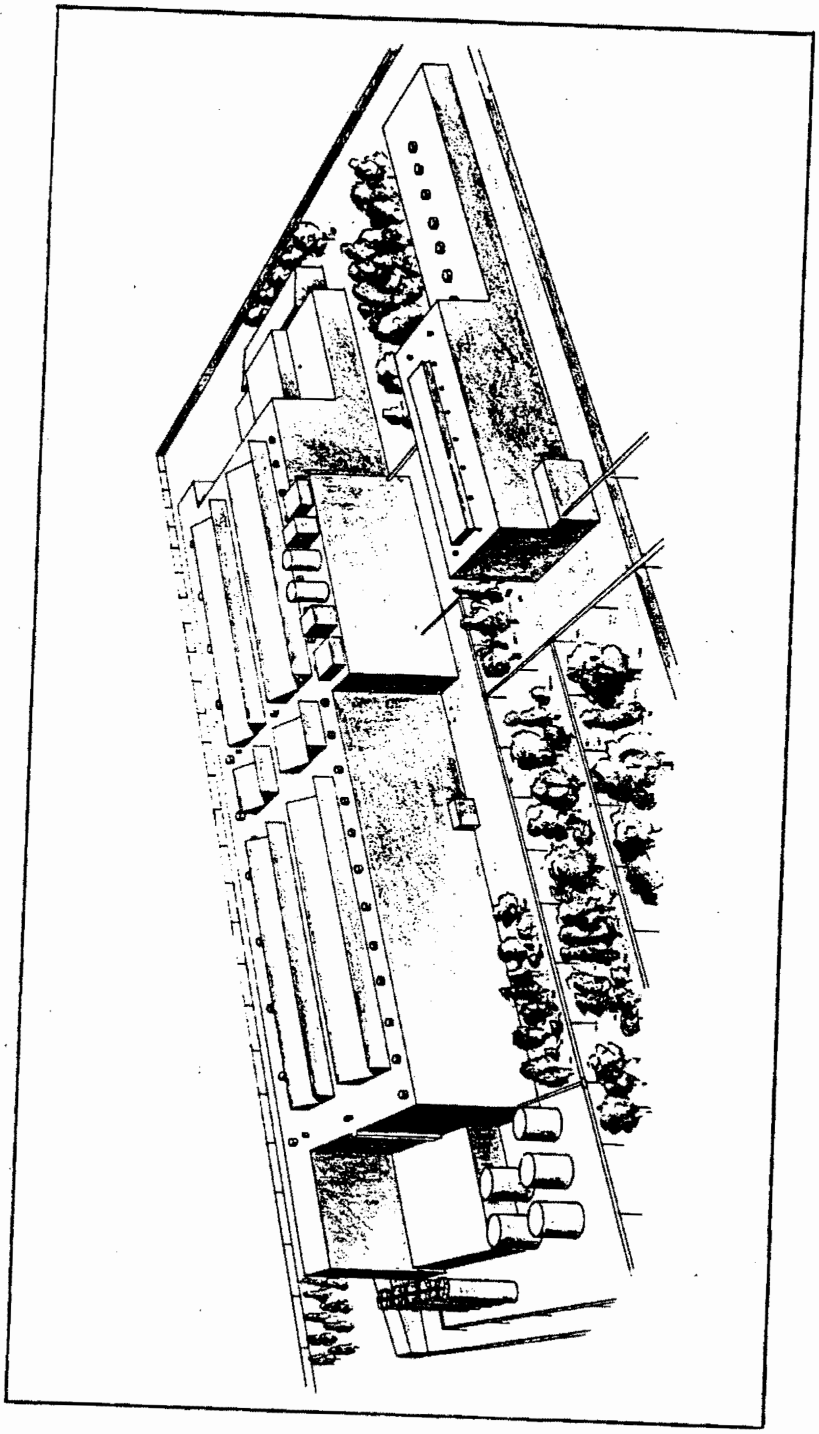

HEAVY WATER FACILITIES

FIGURE 108

Artist's concept of the two main structures constituting the heavy water facilities at the Chirchik Electrochemical Combine, August 1957. The view is approximately north. Note the pipeline extending between the two buildings.

SECRET



SECRET

FIGURE 109

Building housing the heavy water facilities at the Kirovakan Chemical Combine, September 1957. Note the several pipelines.

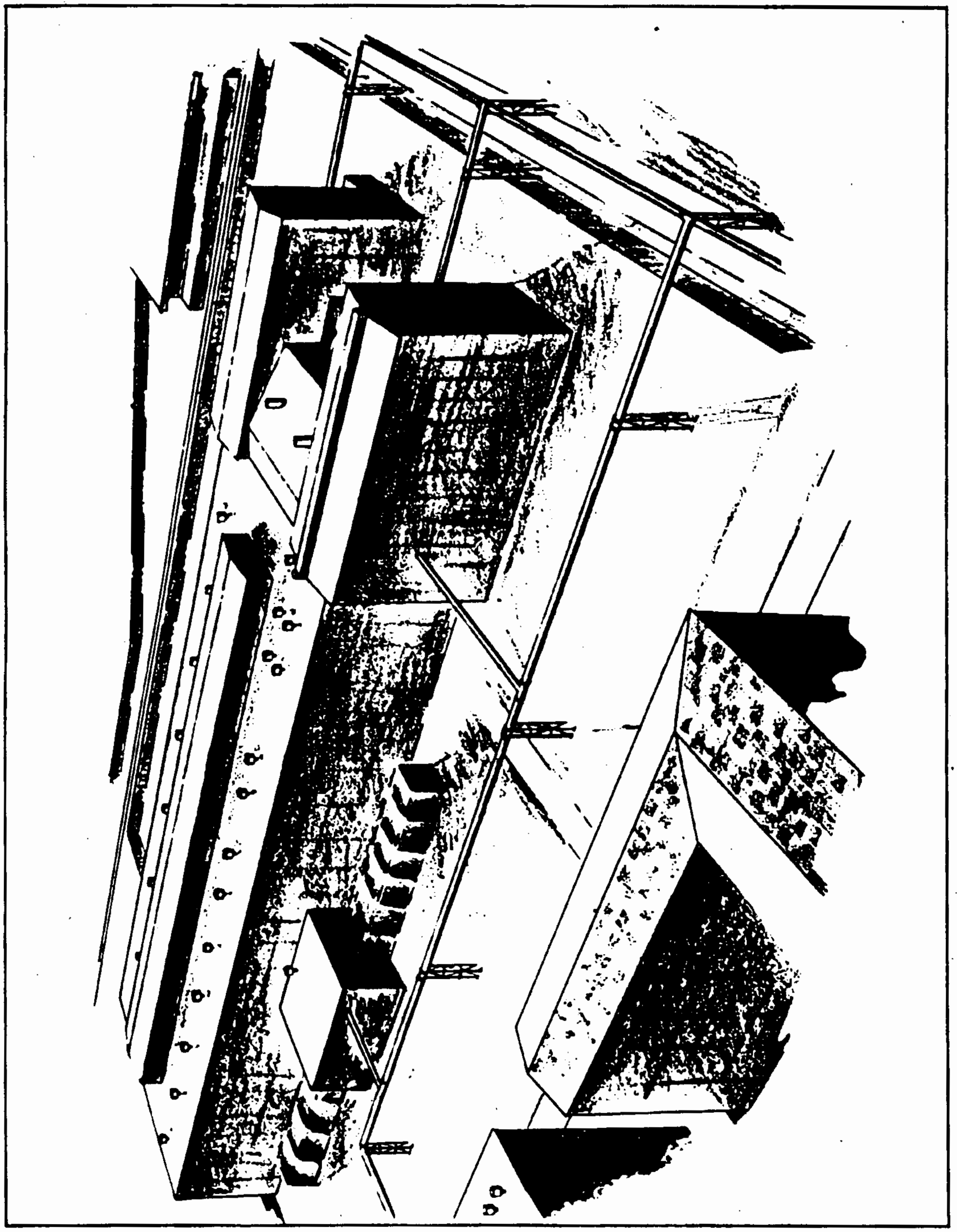
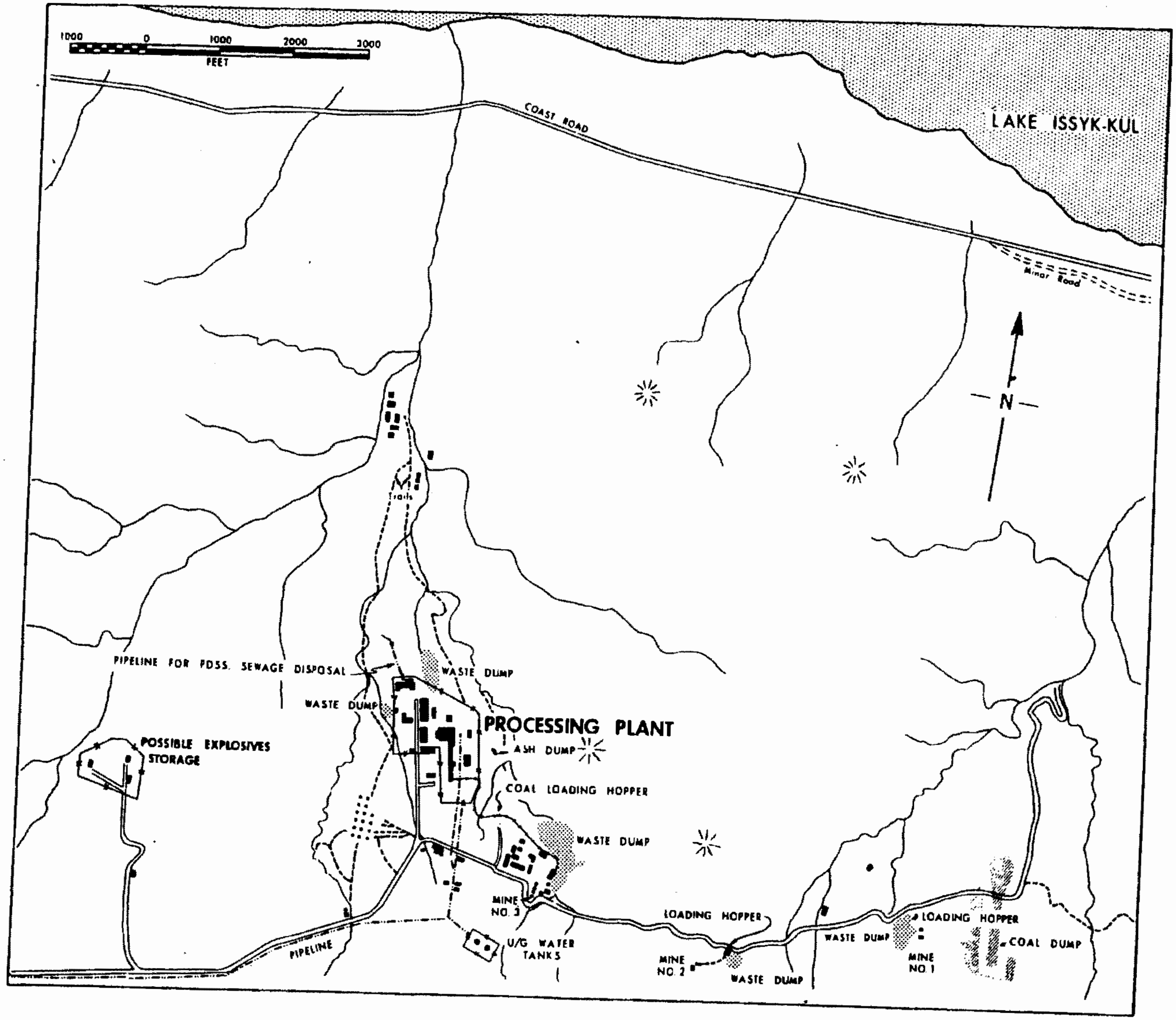


FIGURE 110

The Kadzhi-Say mining and milling complex, August 1957. The town after which the complex was named lies off the map, to the west.

SECRET

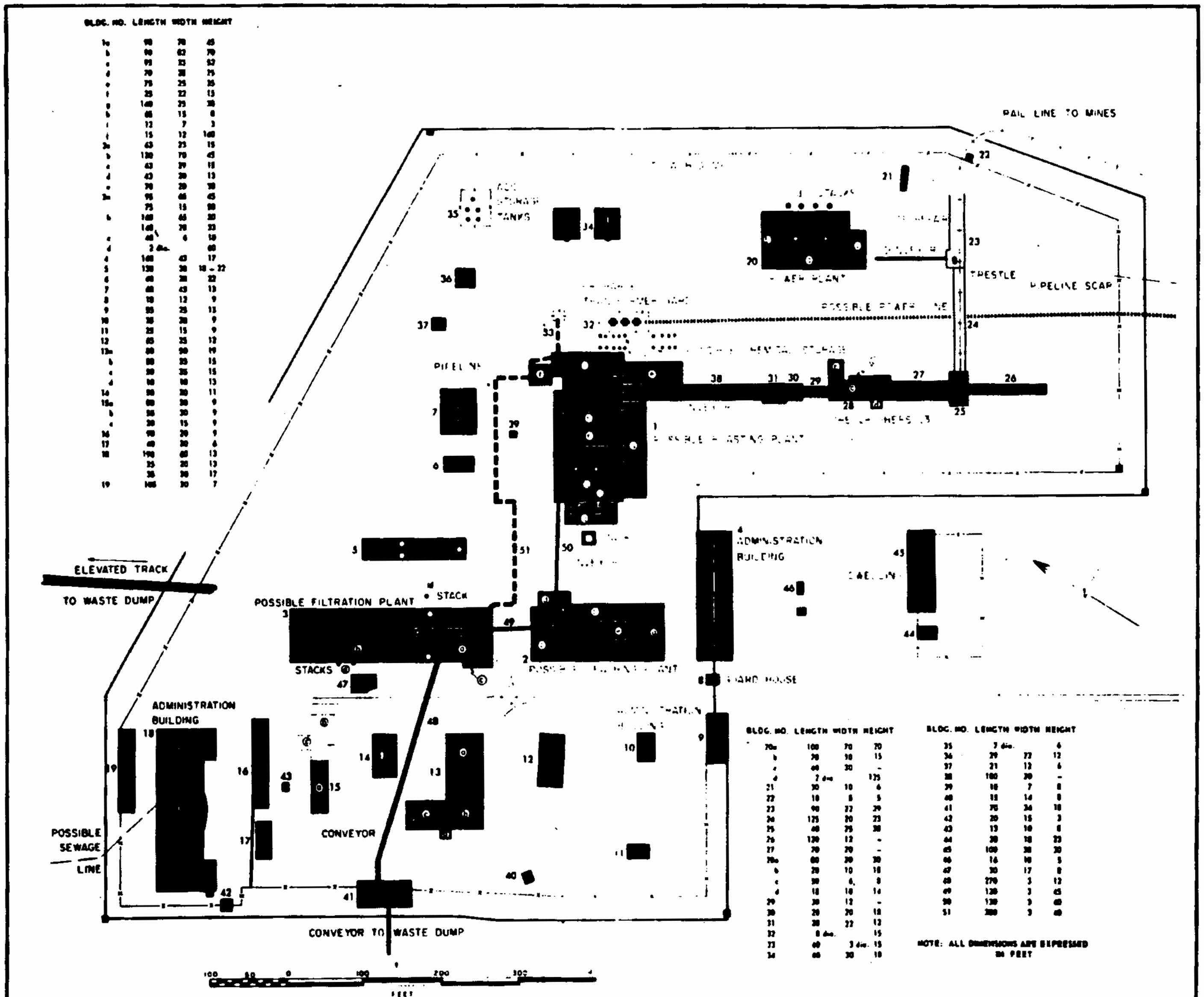


SECRET

FIGURE 111

Layout and identification of facilities in the Kadzhi-Say Uranium Plant, August 1957.

SECRET



BLDG. NO.	LENGTH	WIDTH	HEIGHT
1a	90	70	45
b	90	62	70
c	95	35	52
d	70	30	25
e	75	25	35
f	25	22	15
g	140	25	30
h	65	15	8
i	12	7	3
j	15	12	160
2a	65	25	15
b	120	70	45
c	43	30	15
d	43	30	13
e	70	20	30
3a	95	65	45
	75	15	30
b	160	65	30
	140	70	33
c	40	6	50
d	2 dia.		60
4	160	43	17
5	130	30	18 – 22
6	40	30	22
7	60	43	13
8	10	12	9
9	35	25	13
10	35	30	9
11	25	15	9
12	85	35	12
13a	80	90	19
b	80	35	15
c	30	35	15
d	50	50	13
14	30	30	11
15a	80	30	9
b	35	30	9
c	30	15	9
16	90	20	9
17	40	30	6
18	190	60	13
	25	20	13
	35	30	17
19	105	30	7

BLDG. NO.	LENGTH	WIDTH	HEIGHT
20a	100	70	70
b	70	10	15
c	40	30	–
d	7 dia.		175
21	30	10	6
22	10	8	5
23	90	22	29
24	175	20	23
25	40	75	30
26	120	12	–
27	70	20	–
28a	80	20	30
b	20	10	18
c	30	6	8
d	18	10	14
29	30	12	–
30	20	20	18
31	30	22	12
32	8 dia.		15
33	40	3 dia.	15
34	60	30	18

BLDG. NO.	LENGTH	WIDTH	HEIGHT
35	7 dia.		6
36	29	22	12
37	21	12	6
38	100	30	–
39	18	7	8
40	33	14	8
41	75	34	18
42	20	15	3
43	13	10	8
44	30	18	23
45	100	38	30
46	16	18	5
47	30	17	8
48	270	3	12
49	120	3	65
50	130	3	60
51	300	3	60

NOTE: ALL DIMENSIONS ARE EXPRESSED IN FEET

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FIGURE 112

Location of the mining and milling sites at Taboshar, Ispisar, and Mayly-Say with respect to each other and to population centers in the Fergana Valley of the USSR.

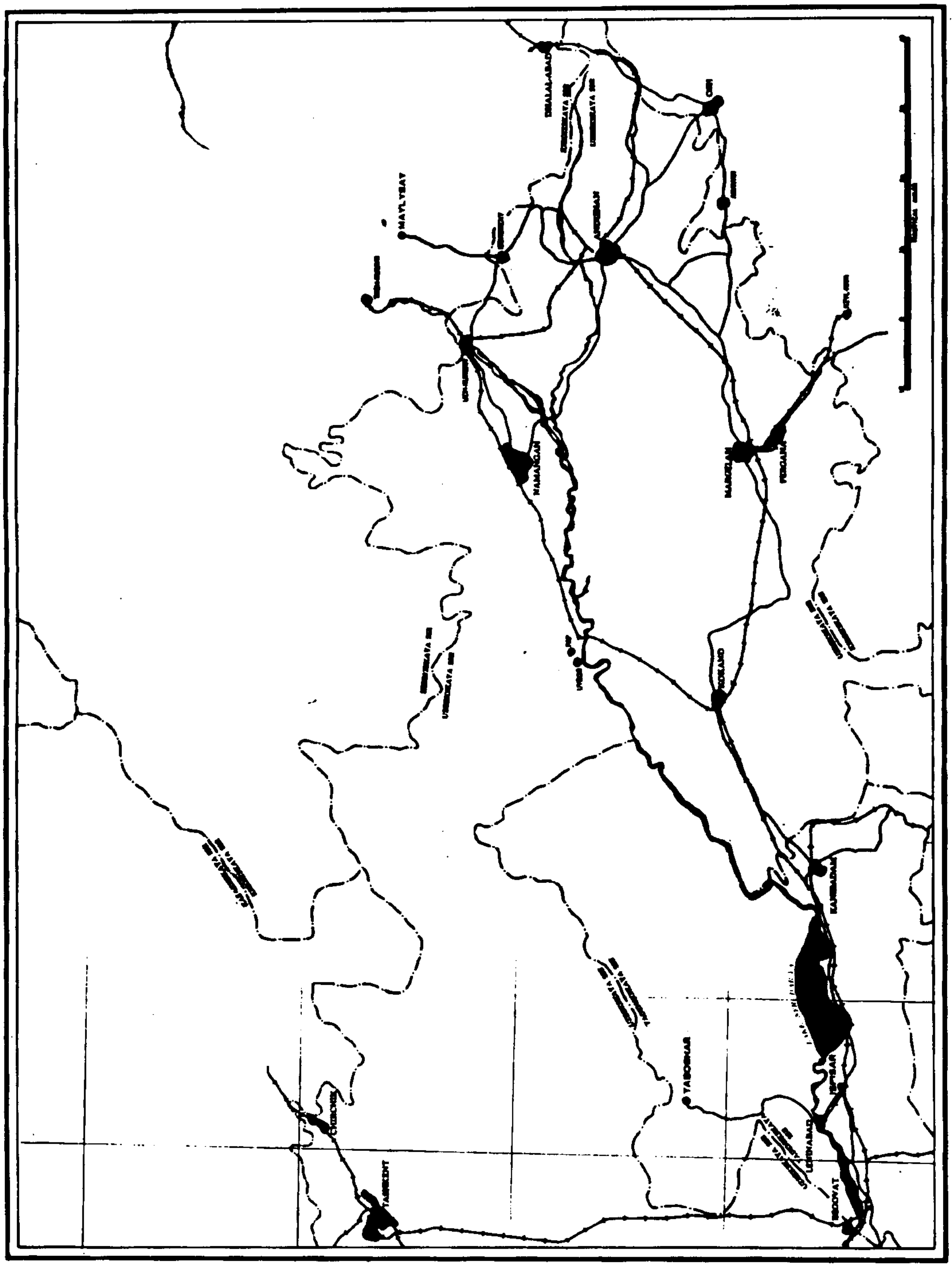
TASHKENT
CHIRCHIK
TABOSHAR
LENINABAD
BEGOVAT
KANIBADAM
KOKAND
MARGELAN
FERGANA
NAMANGAN
ANDIZHAN
OSH
DZHALAL-ABAD
MAYLYSAY

FIGURE 113

The Mayly-Say mining and milling complex, August, 1957. Note the location of the uranium plant in the valley and the numerous mines scattered at various elevations in the surrounding mountains.

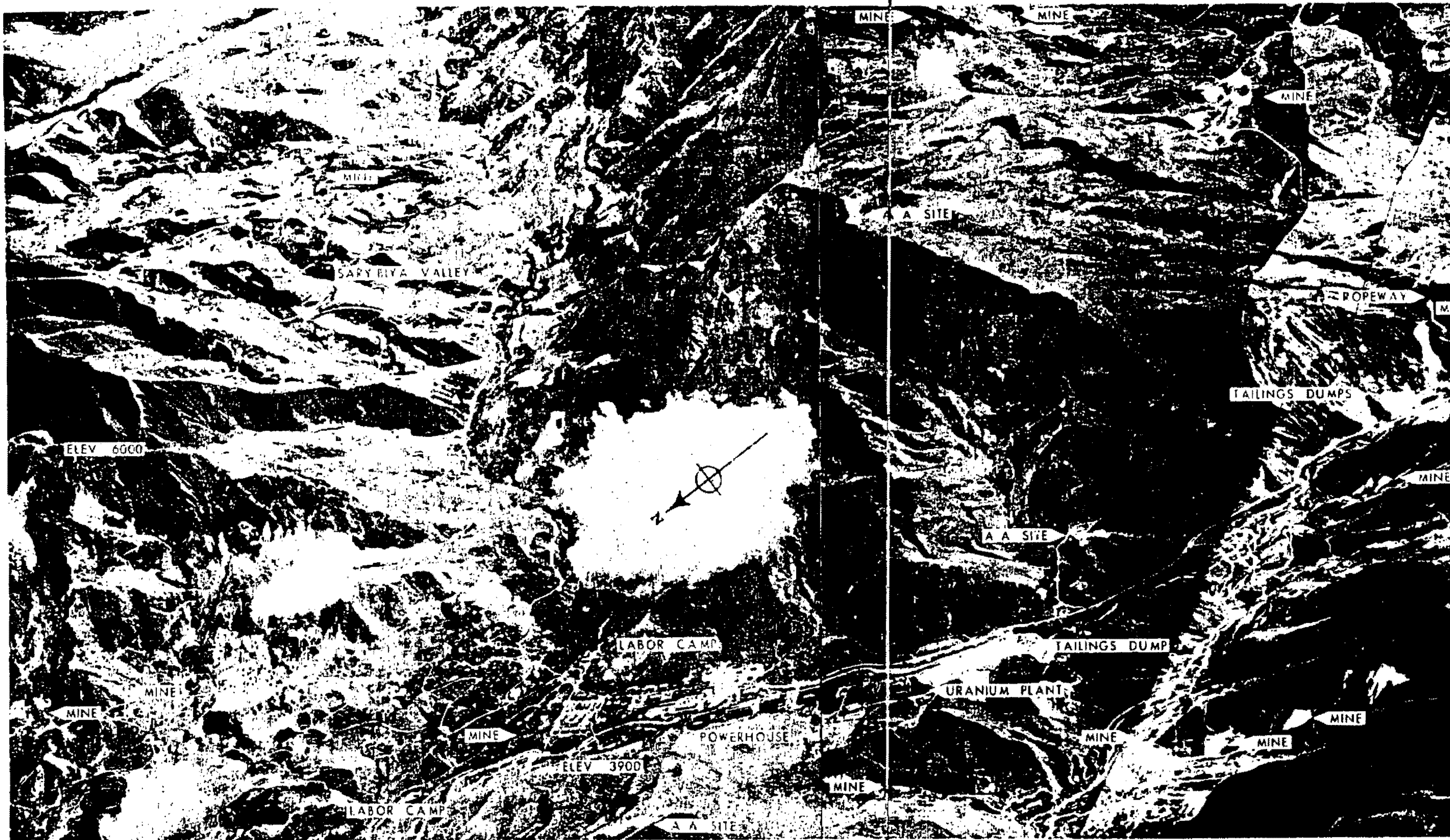

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FIGURE 114

Uranium Plant and adjacent powerhouse, Mayly-Say, USSR, August 1957.

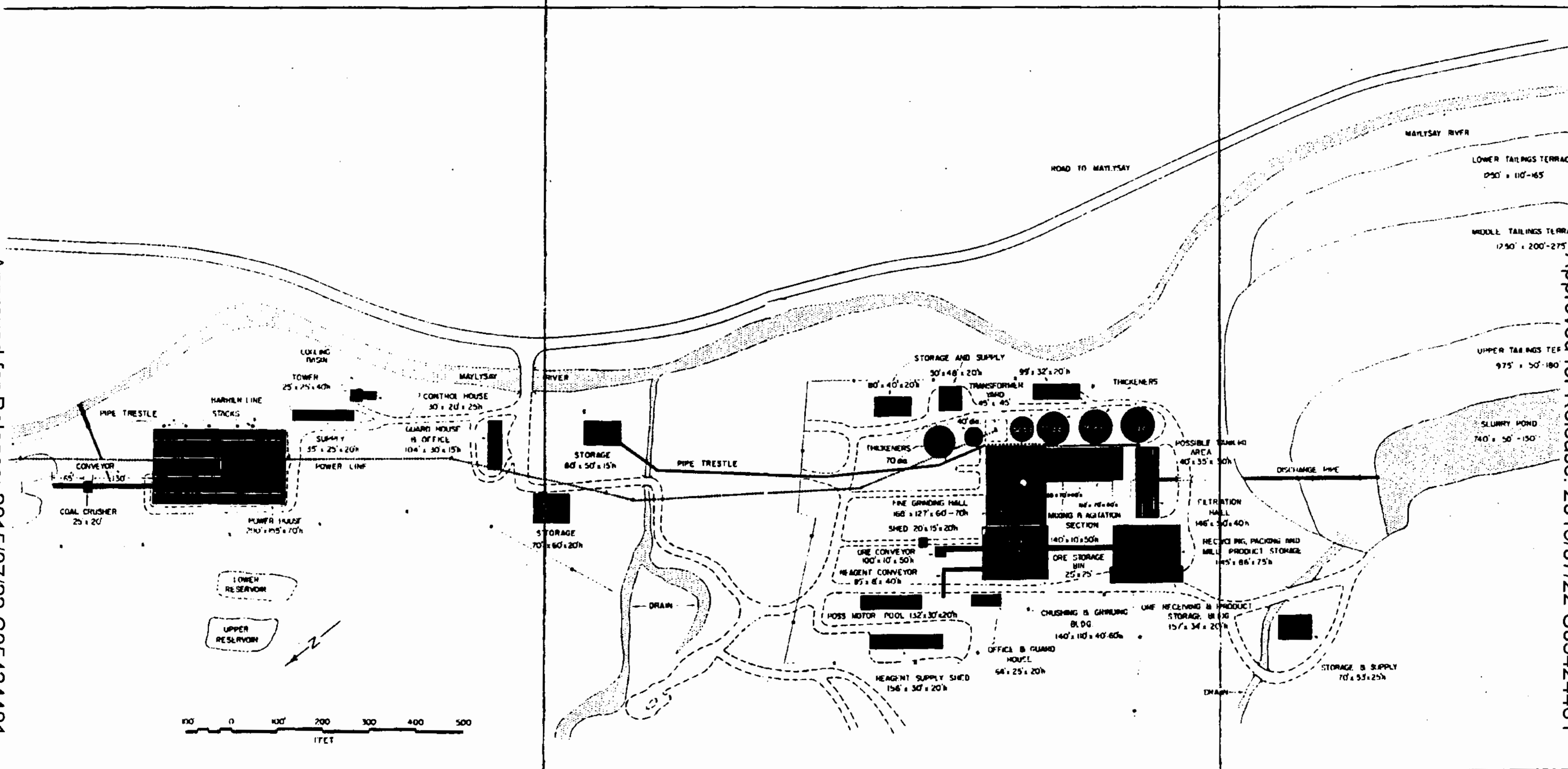

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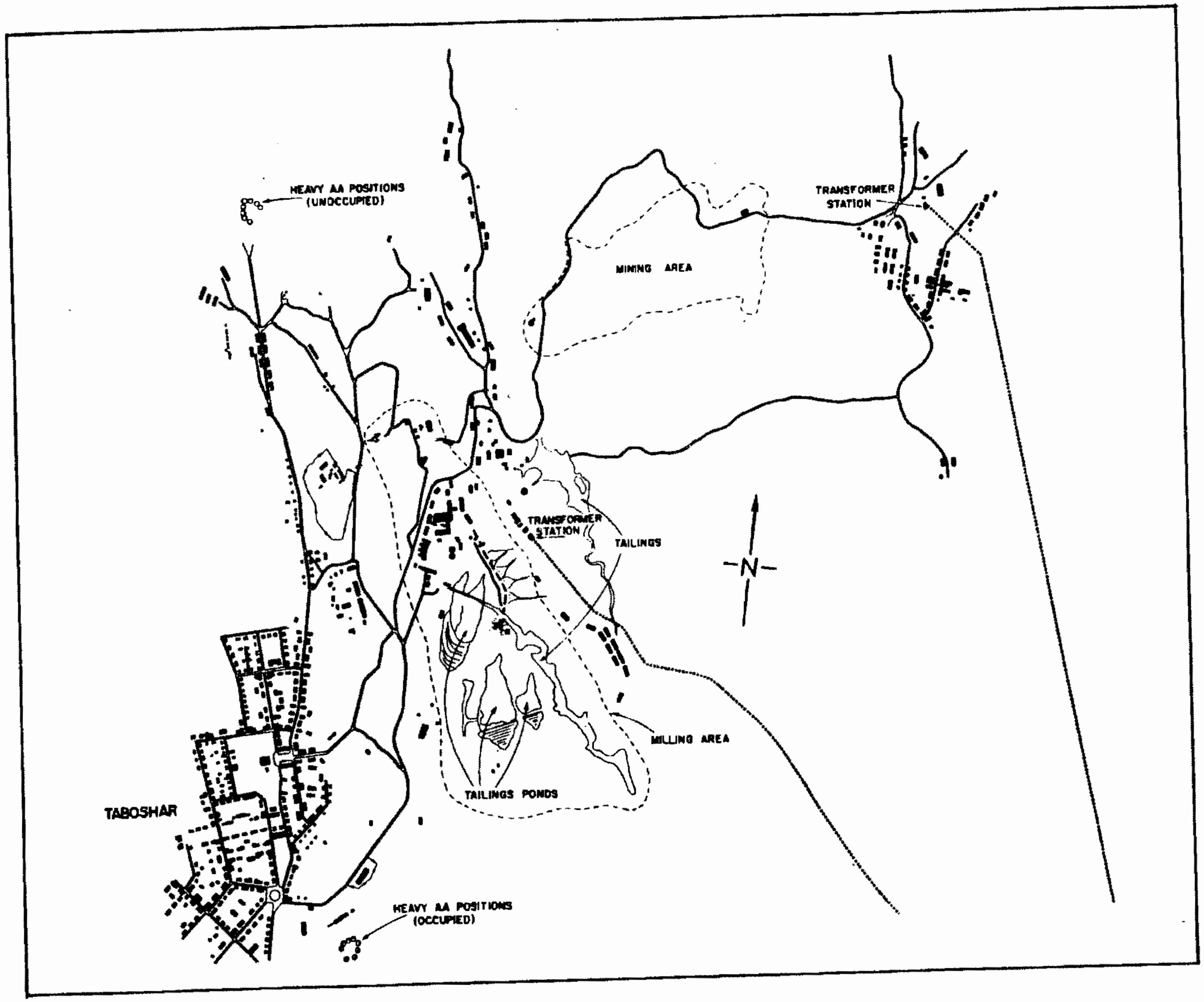
FIGURE 115

Taboshar mining and milling complex, August 1957.

SECRET



SECRET

FIGURE 116

Taboshar Uranium Plant, August 1957. Note the large multi-story ore dressing building near the middle of the sketch.

FIGURE 117

Layout of the Taboshar Uranium Plant, August 1957. Comparison of this line drawing with the perspective, Figure 116, is made difficult by the difference in orientation. The view in the perspective is in a general southerly direction, roughly the opposite of the orientation in the layout.

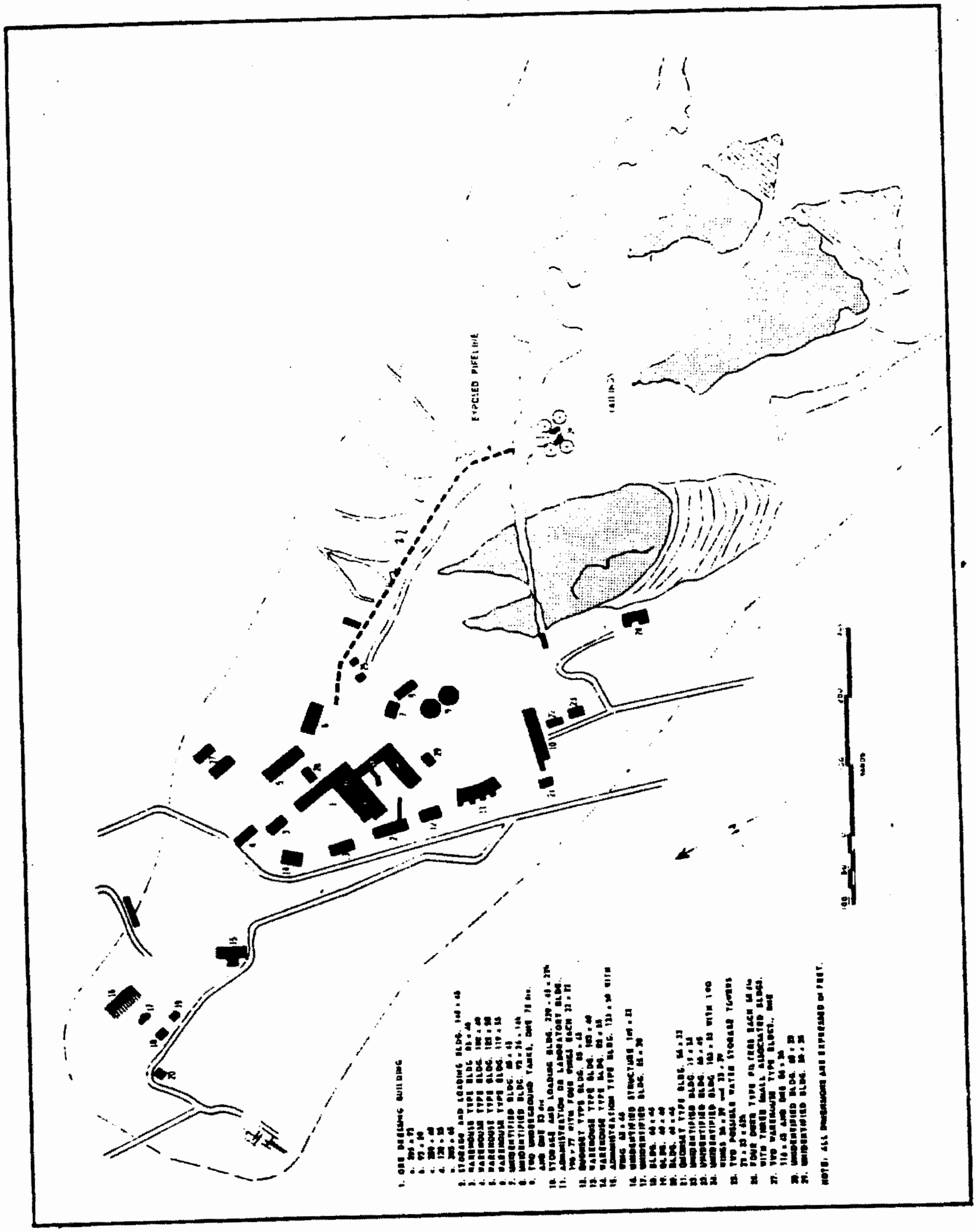


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FIGURE 118

Facilities associated with the Ispisar Uranium Plant and nearby installations, August 1957. Note the flat topography and the sharp boundary between the darker-toned irrigated land and the adjoining desert.

SECRET

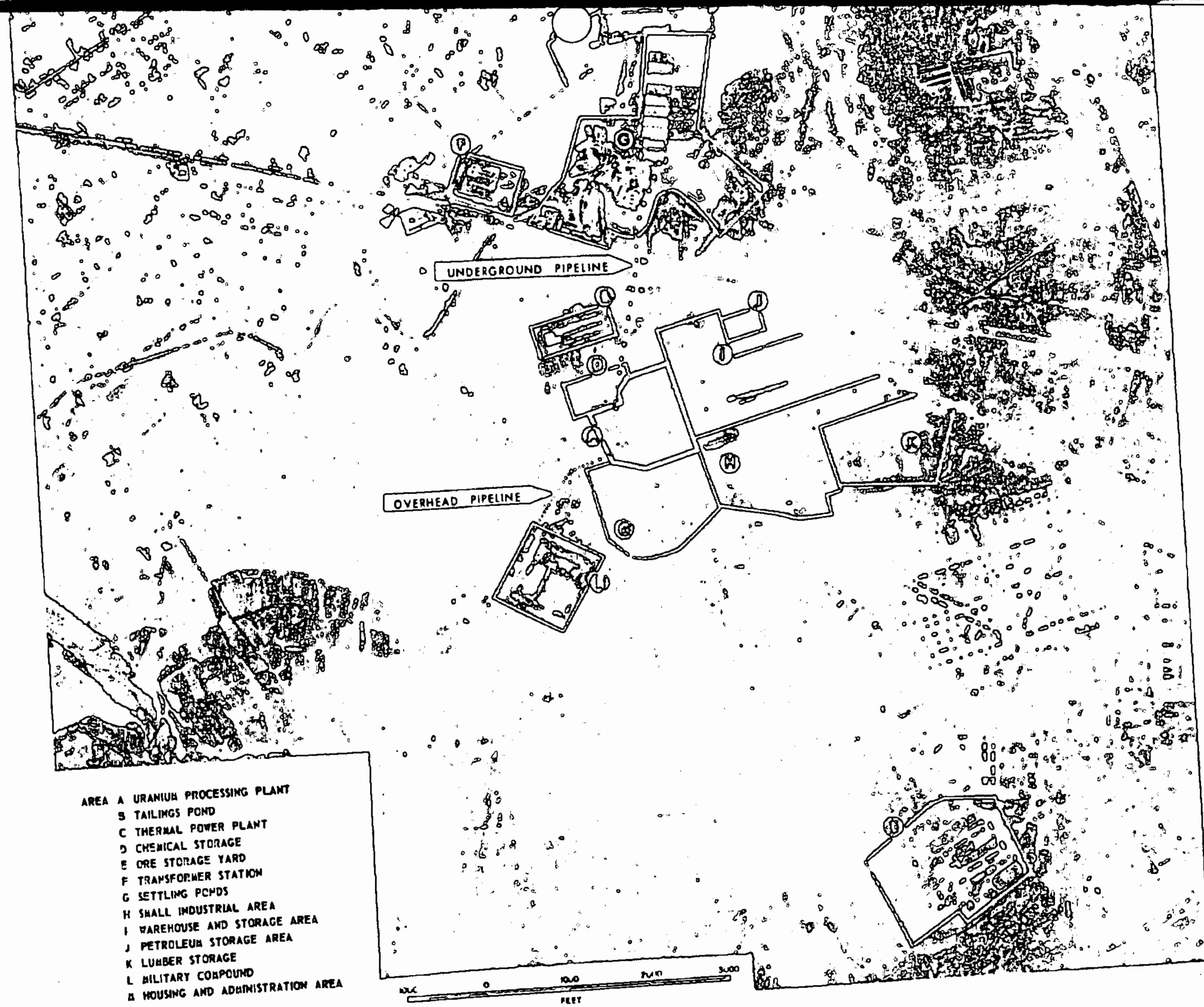

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FIGURE 119

Layout of the Ispisar Uranium Plant, August 1957.

C05424481

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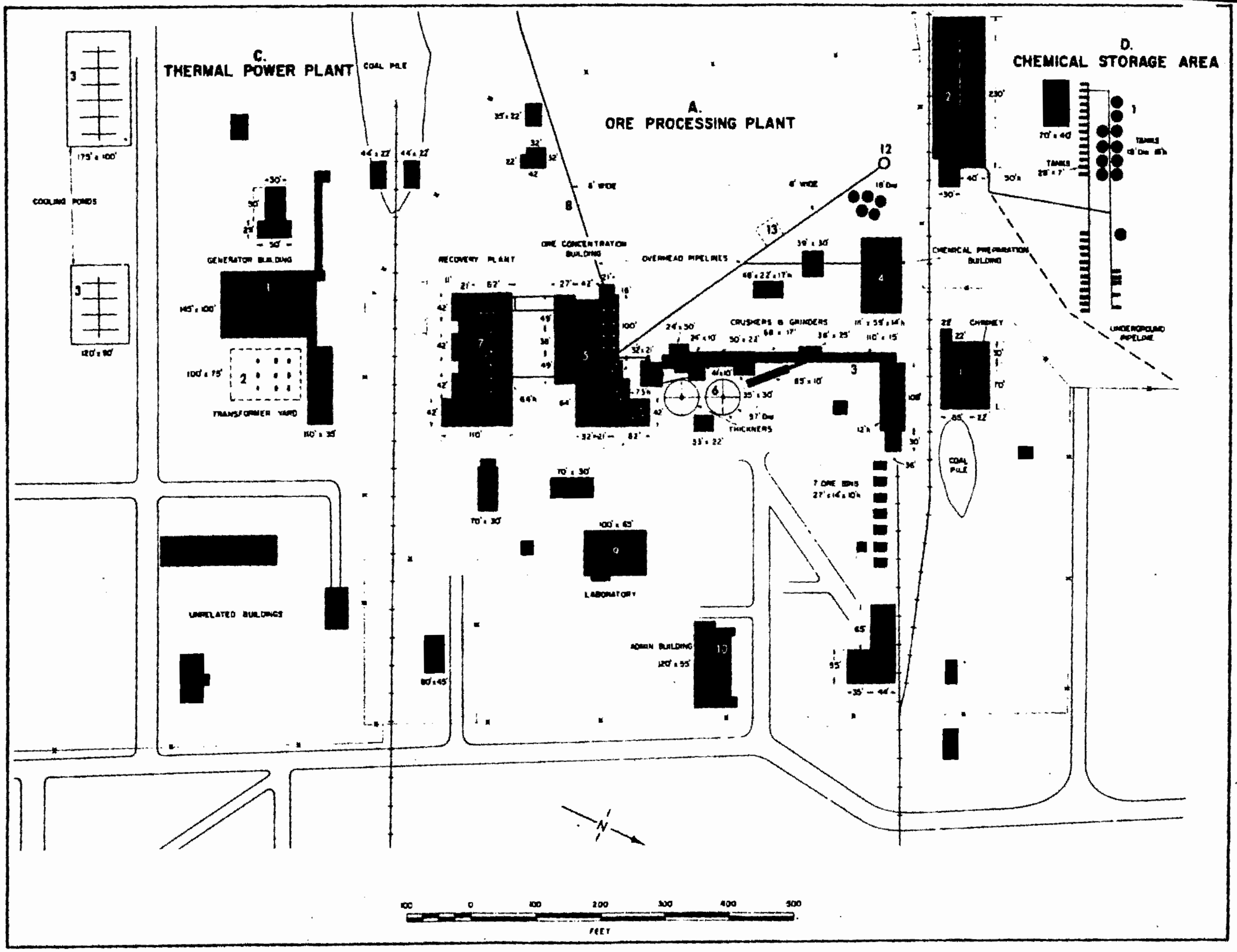
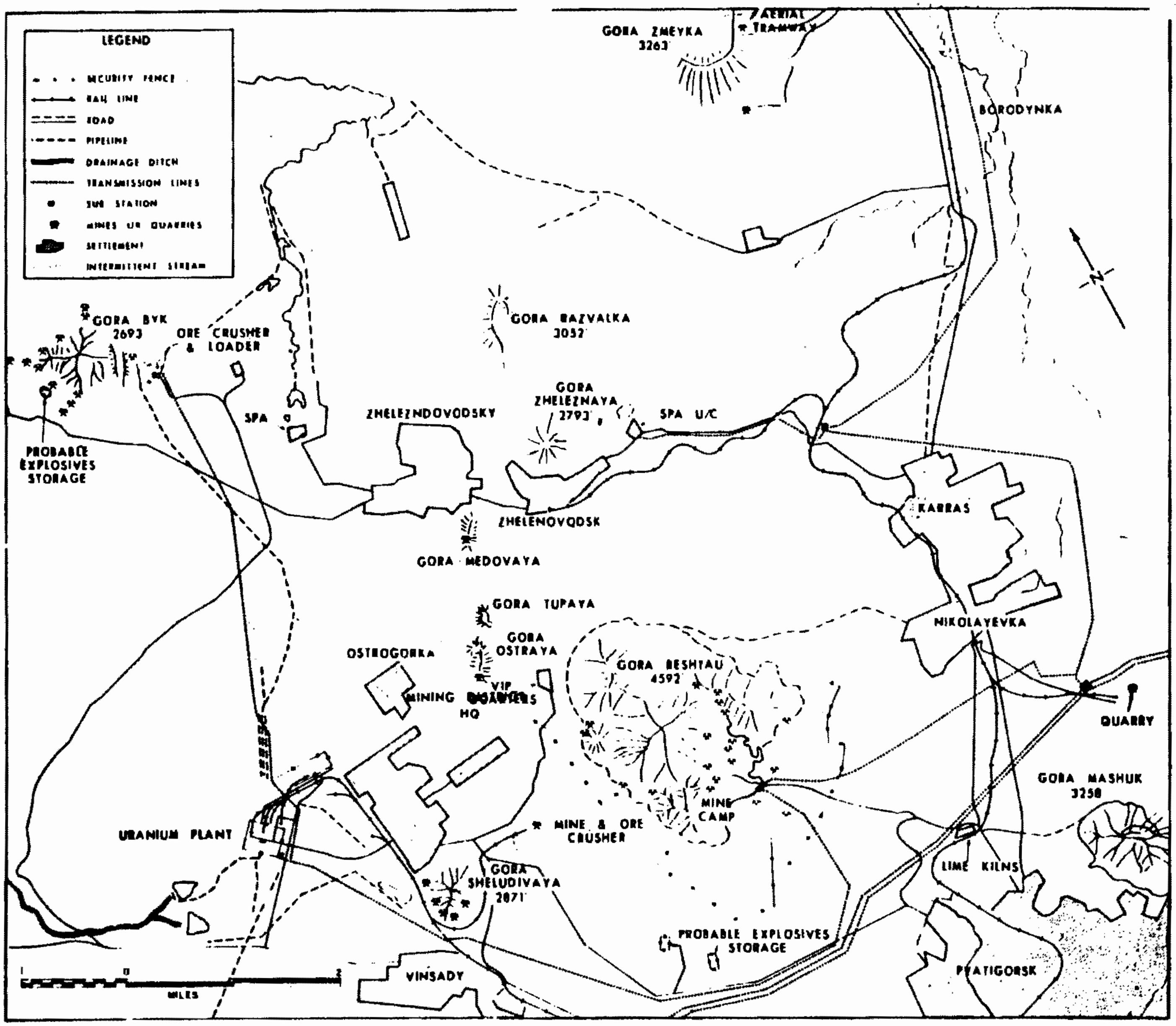


C. THERMAL POWER PLANT
COAL PILE
A. ORE PROCESSING PLANT
D. CHEMICAL STORAGE AREA
COOLING PONDS
175' x 100'
120' x 90'
GENERATOR BUILDING
145' x 100'
100' x 75'
TRANSFORMER YARD
110' x 35'
44' x 22'
RECOVERY PLANT
ORE CONCENTRATION BUILDING
OVERHEAD PIPELINES
CRUSHERS & GRINDERS
THICKNERS
CHEMICAL PREPARATION BUILDING
CHIMNEY
UNDERGROUND PIPELINE
TANKS
COAL PILE
7 ORE BINS 27' x 14' x 10'h
LABORATORY
100' x 65'
70' x 30'
ADMIN BUILDING 120' x 55'
80' x 45'
UNRELATED BUILDINGS
FEET

FIGURE 120

Pyatigorsk mining and milling complex, September 1957.


LEGEND
SECURITY FENCE
RAIL LINE
ROAD
PIPELINE
DRAINAGE DITCH
TRANSMISSION LINES
SUB STATION
MINES OR QUARRIES
SETTLEMENT
INTERMITTENT STREAM
GORA ZMEYKA
3263
AERIAL TRAMWAY
BORODYNKA
GORA RAZVALKA
3052
GORA BYK
2693
ORE CRUSHER & LOADER
PROBABLE EXPLOSIVES STORAGE
SPA
ZHELEZNOVODSKY
GORA ZHELEZNAYA
2793
SPA U/C
ZHELENOVODSK
GORA MEDOVAYA
KARRAS
GORA TUPAYA
GORA OSTRAYA
NIKOLAYEVKA
OSTROGORKA
GORA BESHTAU
4592
VIP QUARTERS
MINING DISTRICT HQ
QUARRY
GORA MASHUK
3258
MINE CAMP
URANIUM PLANT
MINE & ORE CRUSHER
LIME KILNS
GORA SHELUDIVAYA
2871
PROBABLE EXPLOSIVES STORAGE
VINSADY
PYATIGORSK
MILES

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SECRET

FIGURE 121

Geologic structures in the vicinity of Pyatigorsk. Location of the profiles, though identified on the contour map, can be found most easily by comparing the peak or peaks labeled on the profile with the same feature named on the geologic map. Once this orientation has been accomplished, the identifications made on the contour map can be discerned quite readily.

SECRET

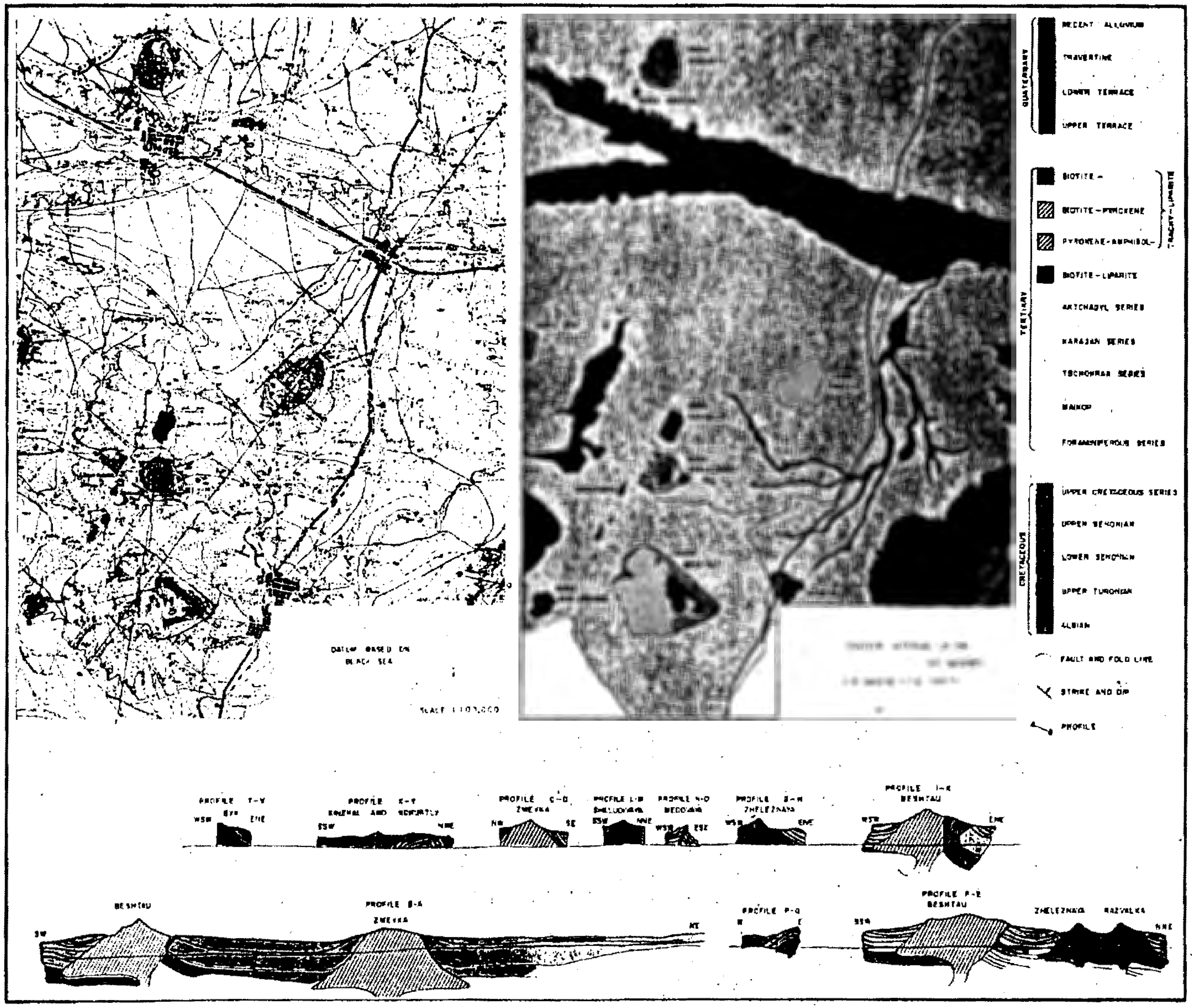

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FIGURE 122

Layout of the Pyatigorsk Uranium Plant, September 1957.

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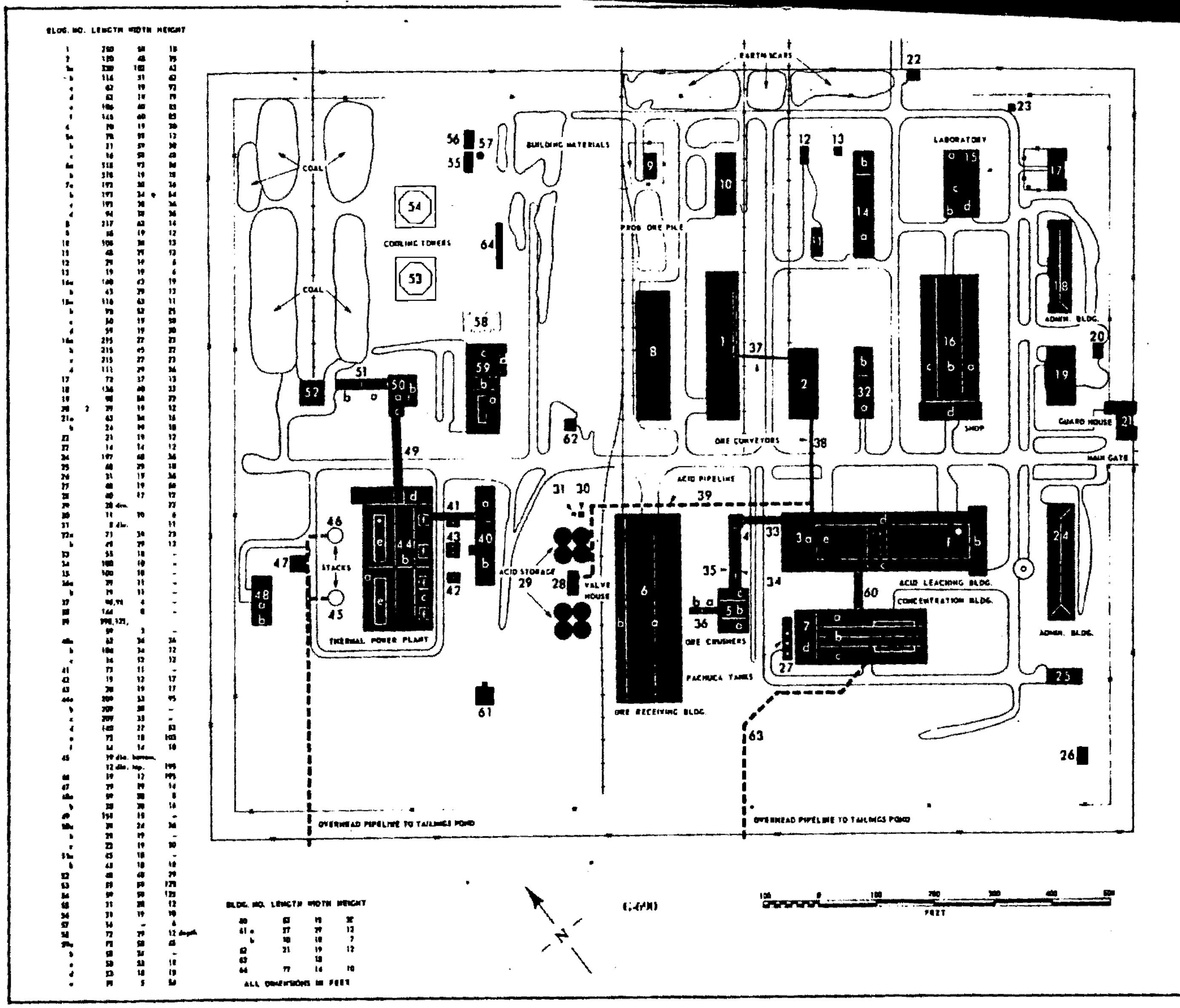

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FIGURE 123

Artist's concept of the Pyatigorsk Uranium Plant, September 1957. Note the "concentration building" with the pachuca tanks in front of it near the far right.

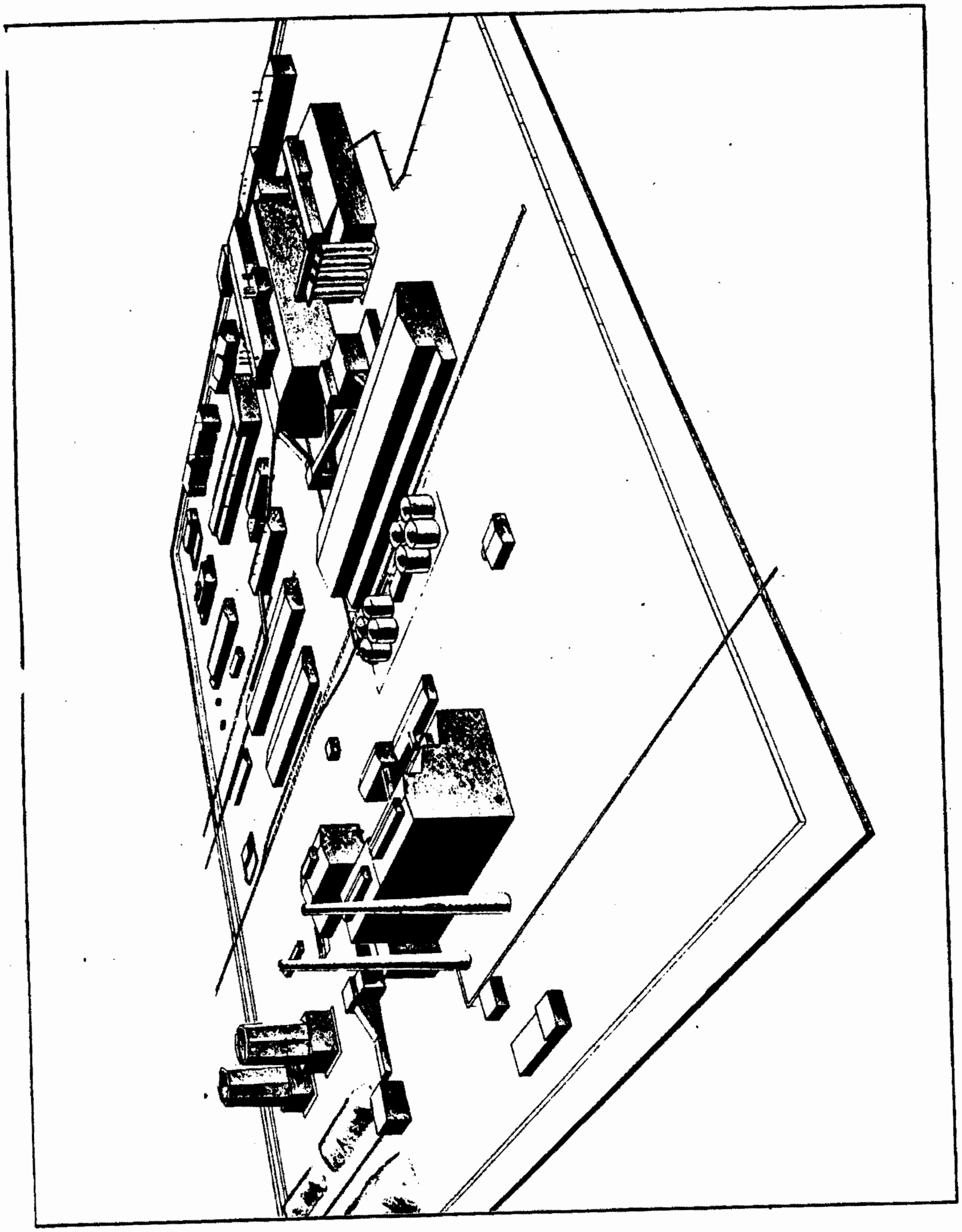

FIGURE 124

Layout of the Crossen Uranium Plant, July 1956. Numeral and letter designators refer to a table in Figure 125. Note that south is at the top of this line drawing.

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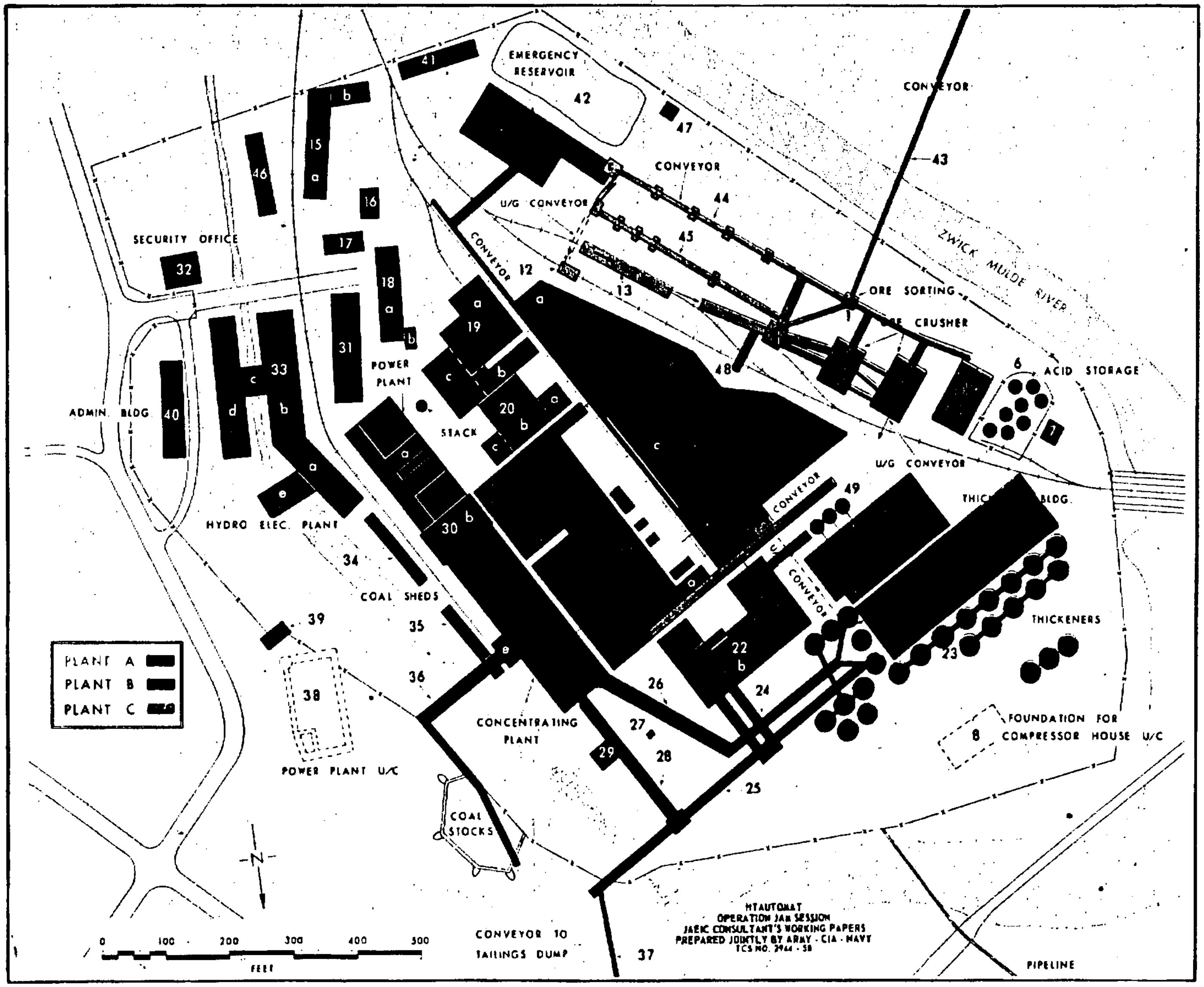

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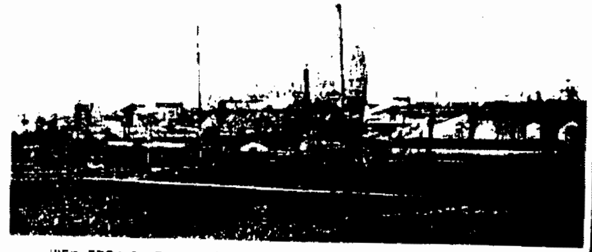
FIGURE 125

Ground views, Crossen Uranium Plant, April 1957. Building numbers in the table below the photographs refer to annotations on the plant layout, Figure 124.

WASTE DUMP LOOKING EAST FROM MAIN RAIL LINE.

VIEW FROM SW OF BLDG. 9 (LEFT) AND BLDG. 10 (RIGHT).



VIEW FROM SW TAKEN FROM MAIN LINE OF RAILROAD. ORE DUMPS AND BUILDINGS OF PLANT A APPEAR IN MIDDLE DISTANCE.

PLANT DIMENSIONS
IN FEET

BLDG. NO.	PLANT NO.	LENGTH	WIDTH	HEIGHT
1	A	20	15	15
2	A	35	30	15
3	A	65	45	15
4a	A	65	50	15
4b	A	50	20	25
5a	A	50	35	15
5b	A	60	50	15
6		25 dia.		
7		30	20	10
8		105	50	
9	B-5	330	105	15
10	C	210	100	15
11a	B	50	70 av.	15
11b	C-10	180	130	15
11c		180	100	15
11d	B-4	120	100	15
11e	B-4	150 av.	100	15
11f	B-4	270 av.	80	15
11g	A & B	35	30	15
11h	C-8	110	80	15
12	A	30	20	
13	A	150	20	
14a	C-10a	155	90	20
14b	C-10a	80	35	15
14c	A	25	25	25
14d	C-10a	215	30	15
15a		175	30	15
15b		65	30	15
16		45	30	
17		60	30	
18a		145	35	
18b		35	20	
19a		110	105	15
19b		105	30	15
19c		95	55	15
20a	C	40	35	15
20b	C	90	75	15
20c	C	35	30	15
21a	B	50	30	70
21b	C-4,C-7	350	75	70
21c	C	55	15	70
21d	C-6	130	80	70
21e	B-2	205	80	70
21f	A	235	15	
21g	B			
22a	C-8	130	70	15
22b		80	70	15
22c	C-7	130	60	15
22d	C	90	15	
23	B	30 dia.		15
24		90	15	
25		550	15	
26		525	15	
27		15	10	
28		300	70	
29		35	30	
30a		200	90	85
30b	B-1	100	60	85
30c	B-1	225	90	80
30d	B-1	105	90	15
30e		40	20	65
31		170	45	
32		60	50	
33a		145	45	
33b		700	50	
33c		45	35	
33d		220	40	
33e		95	40	
34		135	20	
35		135	20	
36		155	20	
37			5	
38		170	90	
39		45	20	
40		150	35	
41		125	30	
42		240	100	
43		490	5	
44		400	5	
45		300	5	
46		125	25	
47		25	25	
48		70	15	
49	C	22 dia.		

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FIGURE 126

Bukhovo mining and milling complex, December 1956.

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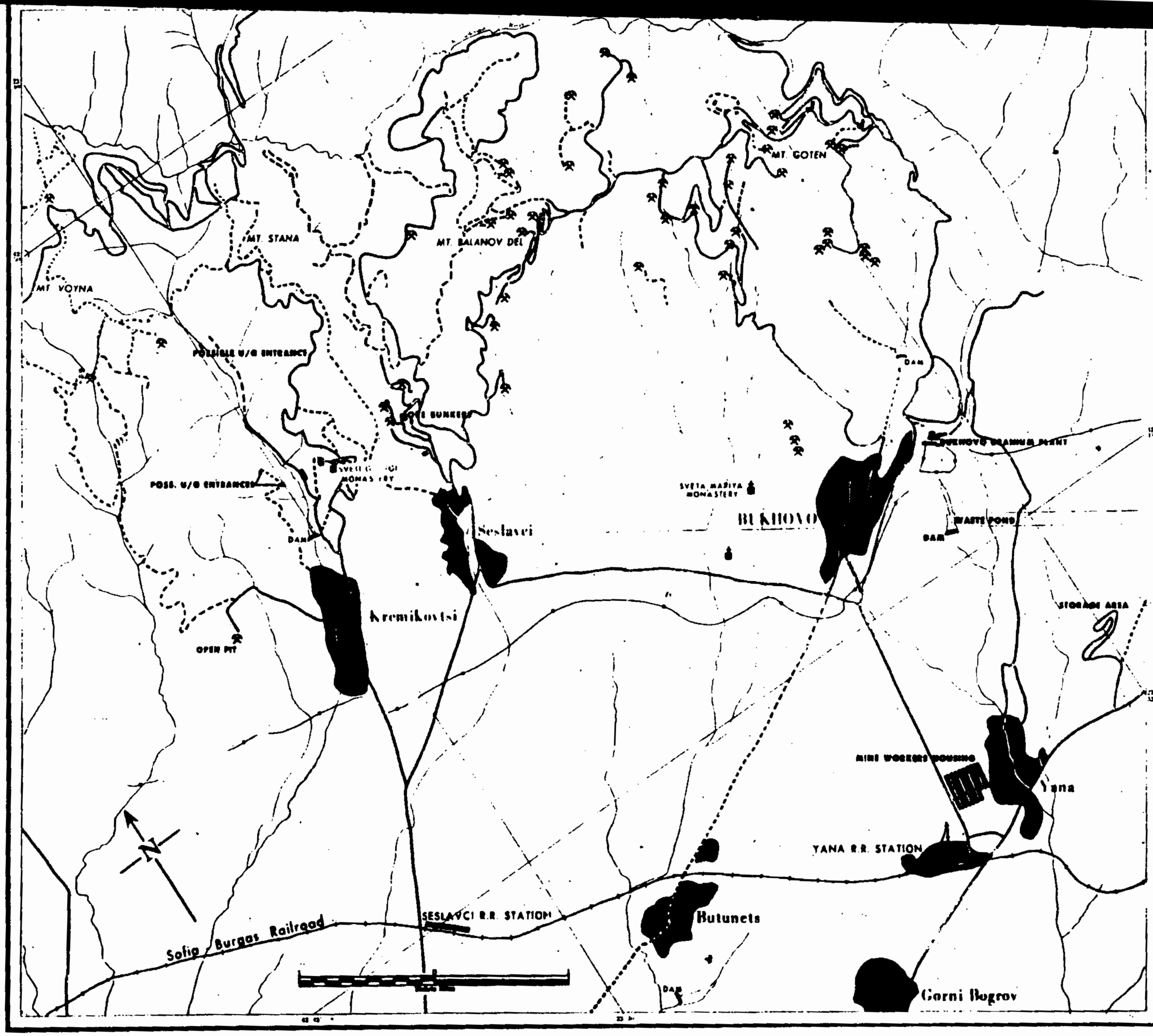

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FIGURE 127

Layout of the uranium concentration plant near Bukhovo, December 1956. Numbers and letters used to designate buildings refer to the tabulation on plant dimensions given in Figure 126.

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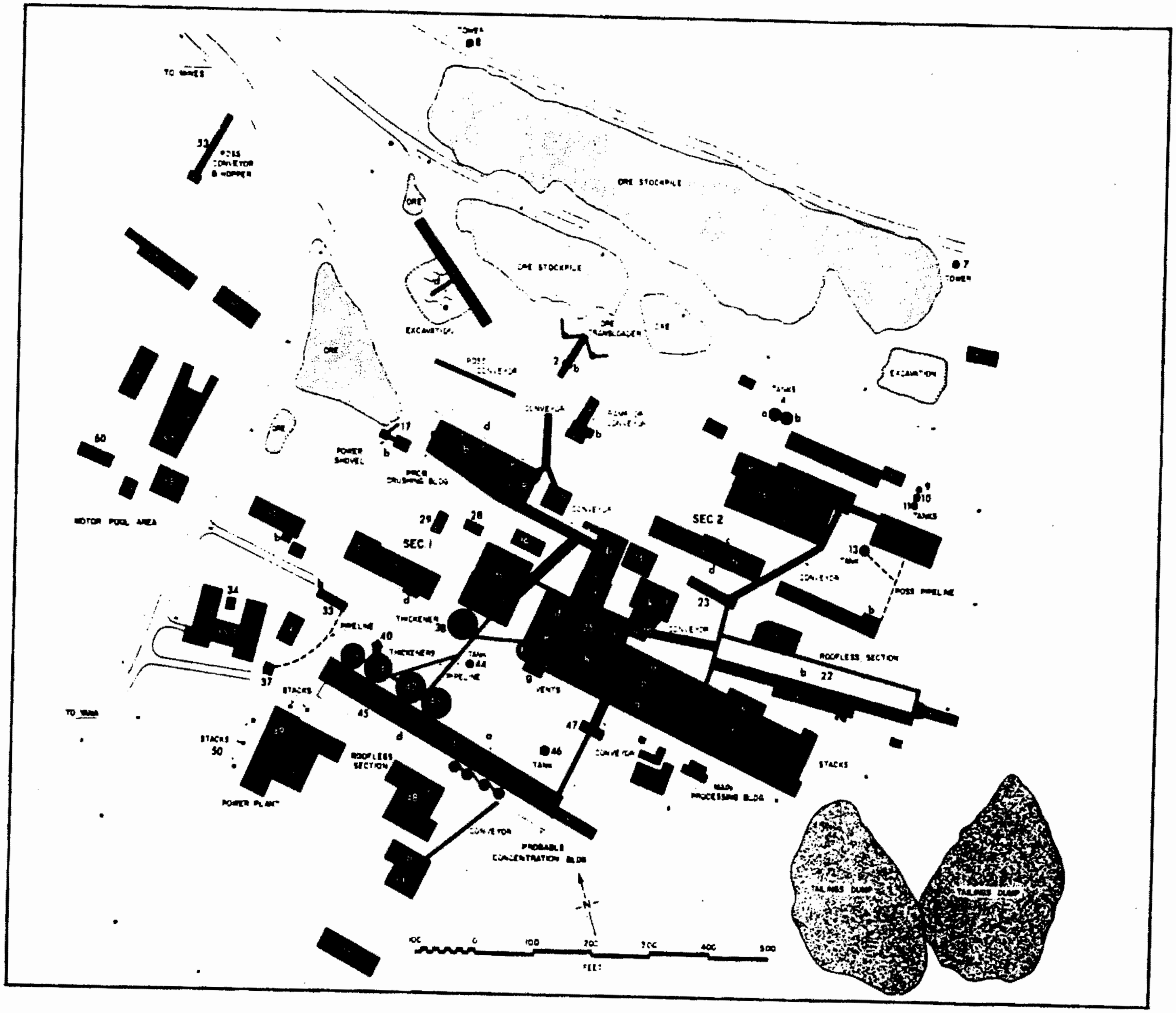

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FIGURE 128

Ground view, uranium concentration plant near Bukhovo, August 1956. Building numbers in the table below the panorama refer to those used in the plant layout, Figure 125.

PLANT DIMENSIONS
IN FEET

BLDG. NO.	LENGTH	WIDTH	HEIGHT
1a	74	15	7
b	24	15	4
c	104	15	–
d	52	47	–
e	40	7	–
2a	47	7	–
b	10	11	19
c	27	7	–
3	17	13	–
4a	24 dia	–	5
b	24 dia	–	5
5a	170	27	13
b	34	24	13
6	40	12	–
7	15 dia	–	19
8	20 dia	–	24
9	10 dia	–	5
10	13 dia	–	5
11	13 dia	–	5
12	108	50	15
13	17 dia	–	15
14a	34	20	15
b	172	47	20
c	165	25	*15
d	165	25	15
e	17	17	26
15	40	17	–
16a	54	17	–
b	50	20	19
c	34	12	–
17a	13	13	–
b	12	6	–
c	24	20	–
18a	188	57	20
b	161	7	22
c	13	5	22
d	10	5	22
e	40	15	24
19	40	40	19
20a	70	24	20
b	108	24	20
c	108	10	15
d	178	7	20
21a	168	20	7
b	34	13	–
22a	70	37	5
b	340	39	24–27
c	340	17	10
d	118	17	10
e	12	7	10
f	67	13	10
23a	44	10	20
b	40	10	20
c	12	10	20
24	50	47	4
25a	30	13	10
b	80	50	13
c	54	40	18
d	67	60	18
e	67	27	23
f	80	37	28
g	30	10	5
h	84	40	23
i	84	57	18
j	71	50	11
k	34	17	26
l	40	17	38
m	20	10	33
n	40	20	11
o	148	70	9
p	135	37	23
q	395	24	10
r	178	40	23
s	178	37	9
26	54	27	15
27a	84	24	23
b	84	30	38
c	87	50	19
28	34	13	26
29a	20	17	22
b	17	13	15
30a	167	44	20
b	47	13	24
c	47	13	24
d	27	7	–
31a	90	34	15
b	13	10	–
32	24	20	4
33a	54	13	7
b	10 dia	–	20
34	17	10	5
35a	97	37	18
b	37	37	16
c	97	37	16
36	44	27	13
37	17	13	5
38	50 dia	–	9
39	40 dia	–	16
40	13	13	7
41	47 dia	–	11
42	47 dia	–	11
43	47 dia	–	11
44	13 dia	–	11
45a	460	7	19
b	460	20	27
c	460	13	19
d	455	27	15
e	74	17	10
46	20 dia	–	9
47	40	17	–
48a	34	27	9
b	84	64	9
c	34	17	9
49a	74	30	–
b	67	50	–
c	140	47	27
50	5 dia	–	100
51a	34	17	19
b	68	50	19
52	105	34	19
53a	84	10	–
b	27	17	27
54a	34	13	–
b	107	27	–
55	78	30	20
56	80	34	22
57a	150	27	–
b	148	23	20
58	50	44	27
59	30	24	–
60a	34	26	11
b	27	28	9

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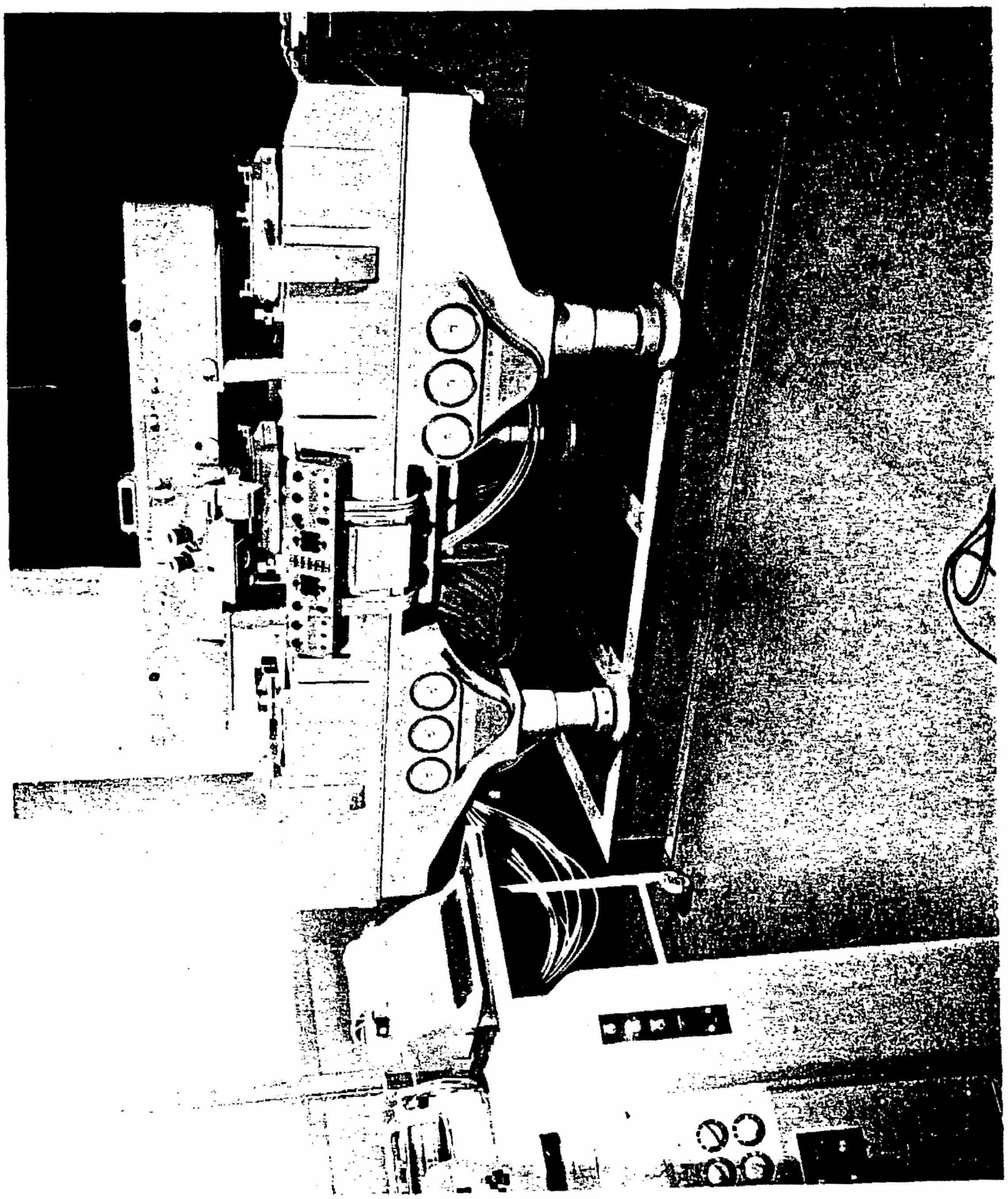
FIGURE 129

The Nistri TA-3 Stereocomparator. This instrument, which weighed 2963 pounds, was set on a special base fabricated by the Arlington Iron Works. The Telecordex unit, part of which is visible in the lower left hand corner of the photo photo, was not used with the Nistri. Probably it was hooked up with a Mann comparator which was located near the Nistri.



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