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TOP SECRET CHESS RUFF [redacted] 25X1

M/EB 430/64
26 August 1964
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MEMORANDUM FOR: Chief, Forces Division, ORR

ATTENTION: [redacted] Defensive Missiles Branch 25X1

THROUGH: Chief, Requirements Branch, Reconnaissance Group, CGS

FROM: Chief, CIA/PID (NPIC)

SUBJECT: Angarsk Electronics Site

REFERENCES: (a) Requirement C-RR-4-81,377
(b) CIA/PID Project C 815-64

1. This memorandum is in response to your requirement dated 7 May 1964 which requested: (1) Annotated photo of the Angarsk facility as noted on [redacted] (2) Description and mensuration of linear installations and 25X1
associated structures; (3) Line drawings of linear installations and associated structures, indicating roads, trails, power lines, security fencing, ground scarring, etc; (4) Indication of status of construction of each of the linear installations and nature and extent of progress [redacted] 25X1
(5) Detailed description of face of structure including angle of slopes, length and width of possible faces; (6) Determination of nature and status of third linear installation reported.

2. Mensuration presented in this report was in most part accomplished by the photo analyst, utilizing scale factors derived from specific mensuration performed by the Technical Analysis Branch, TID/NPIC. All dimensions are approximate.

3. Introduction

a. The Angarsk Electronics Site (52-53N 103-15E), consisting of Dual Hen House type antennas with adjacent support areas, is one of three known installations of this type under construction in the Soviet Union as of this date. The other two are located at Sary Shagan Antimissile Test Center (SSATC), Instrumentation Site 13 (46-36N 074-32E) and at Olenegorsk (68-06N 033-54E), in the Murmansk area. Though this report is primarily concerned with Angarsk, certain information on the other two sites and the original Hen House installation at Sary Shagan Radar Site No. 1 will be included.

b. The description of the Angarsk electronics site in this report is based primarily on an analysis of the KH-7 photography accomplished on [redacted] 25X1
which is the latest available photography as of August 1964. The April 1964 Angarsk coverage is the only KH-7 cover available of any of the Hen House antennas. Being the first and only coverage of relatively large scale, it permits detailed analysis of many features which are newly identified, though not necessarily new activity.

c. To facilitate discussion of specific site components, the Dual Hen House facilities at each site are identified alphabetically in the sequence of their appearance. Individual Hen House antenna structures are numbered 1 and 2, with the former being the most northerly antenna. Where support facilities occupy more than a single area, the areas are numbered sequentially.

4. History of the Hen House Installations

a. Radar Site No. 1, Sary Shagan Antimissile Test Center, USSR

(1) Prior to the discovery of the Angarsk activity in January 1964, the only known Hen House antenna in the Soviet Union was located at Radar Site 1, SSATC (45-59N 073-39E). The activity at Angarsk could not at that early date be confirmed as electronics, though there were some strong suspicions regarding the unusually long excavations for probable structure foundations. In April 1960 the original Hen House consisted of a single antenna structure, 890 feet long, [redacted] housing 40 light toned panels, 25X1
each [redacted] in a face 780 feet long, having 25X1
a 25-degree bore-sight angle of elevation. Attached to the left side of this antenna structure was a control building, 350 feet long, 50 feet high

[redacted] 25X1

and 60 feet wide. A 100 by 70-foot addition, approximately 55 feet high, was constructed sometime between the fall of 1962 and spring of 1963. This facility was first photographed [redacted] the only TALENT coverage of Sary Shagan. Subsequent KEYHOLE photography has revealed two additional developments:

(a) September 1961 photography [redacted] revealed construction work on a new triangular shaped installation adjacent to the Hen House control building. Additional missions in the following months revealed that the new installation consisted of a low, 60 by 95-foot possible equipment building and a smaller suspect "feed house" at the apex of a flat, suspect ground plane. (See Figure 1 below).

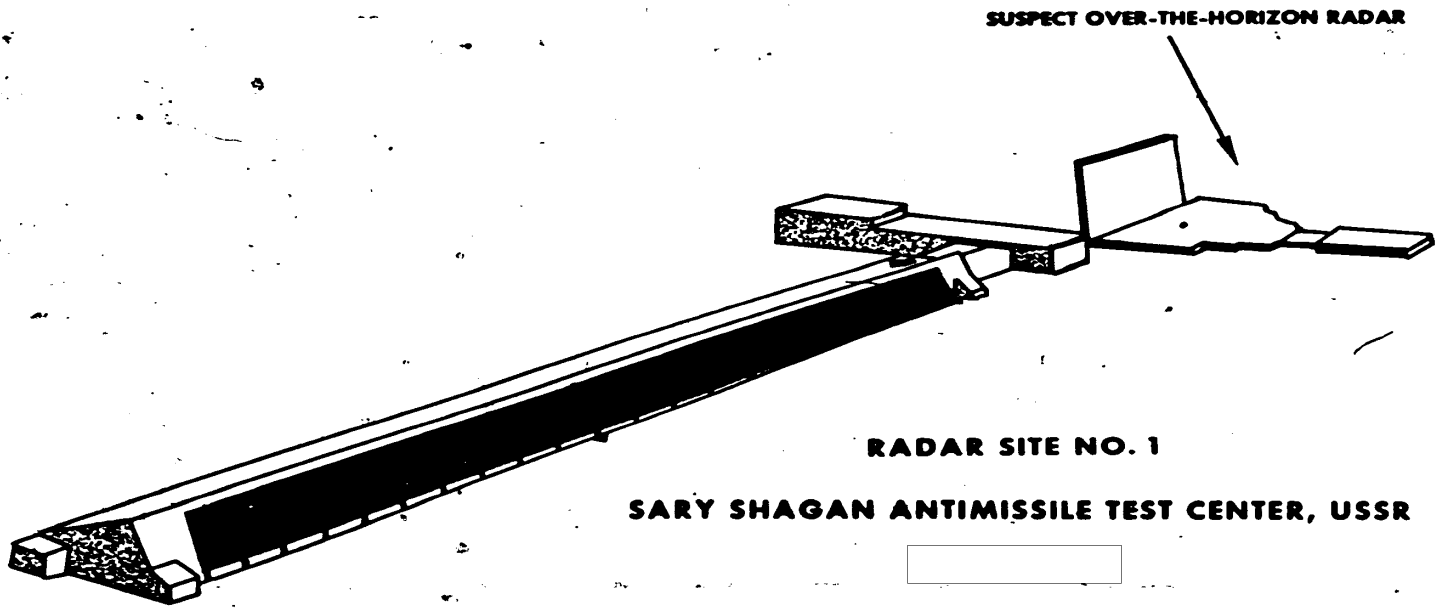

Figure 1.

In plan view, the suspect ground plane appears triangular with stepped or notched sides. Its surface is very light in tone and is raised possibly five to ten feet above the ground. Erected approximately 240 feet away, at the opposite side of the suspect ground plane, is a rectangular suspect reflecting surface approximately 200 feet wide by 100 feet high. The suspect reflecting surface faces on the same azimuth as the adjacent Hen House antenna face. It is suspected that this new addition is an over-the-horizon type radar device, possibly being tested against missiles launched from Chelkar, Makat or Kapustin Yar MIR to the Sary Shagan impact area.(*) No changes have been noted in this unique facility since [redacted] up to and including the latest mission, [redacted]

(b) Probable modification of the Hen House antenna face, the second development, was first noted [redacted], when a 190-foot section of the antenna face appeared black. The black section consisted of six regularly spaced panels whose dimensions suggested the replacement of previously installed light toned panels with larger black panels. (Note Figure 2 next page).

(*) Refer to Project Wedding Ring Report No. 30 (EDL-M626)

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Electronics Site

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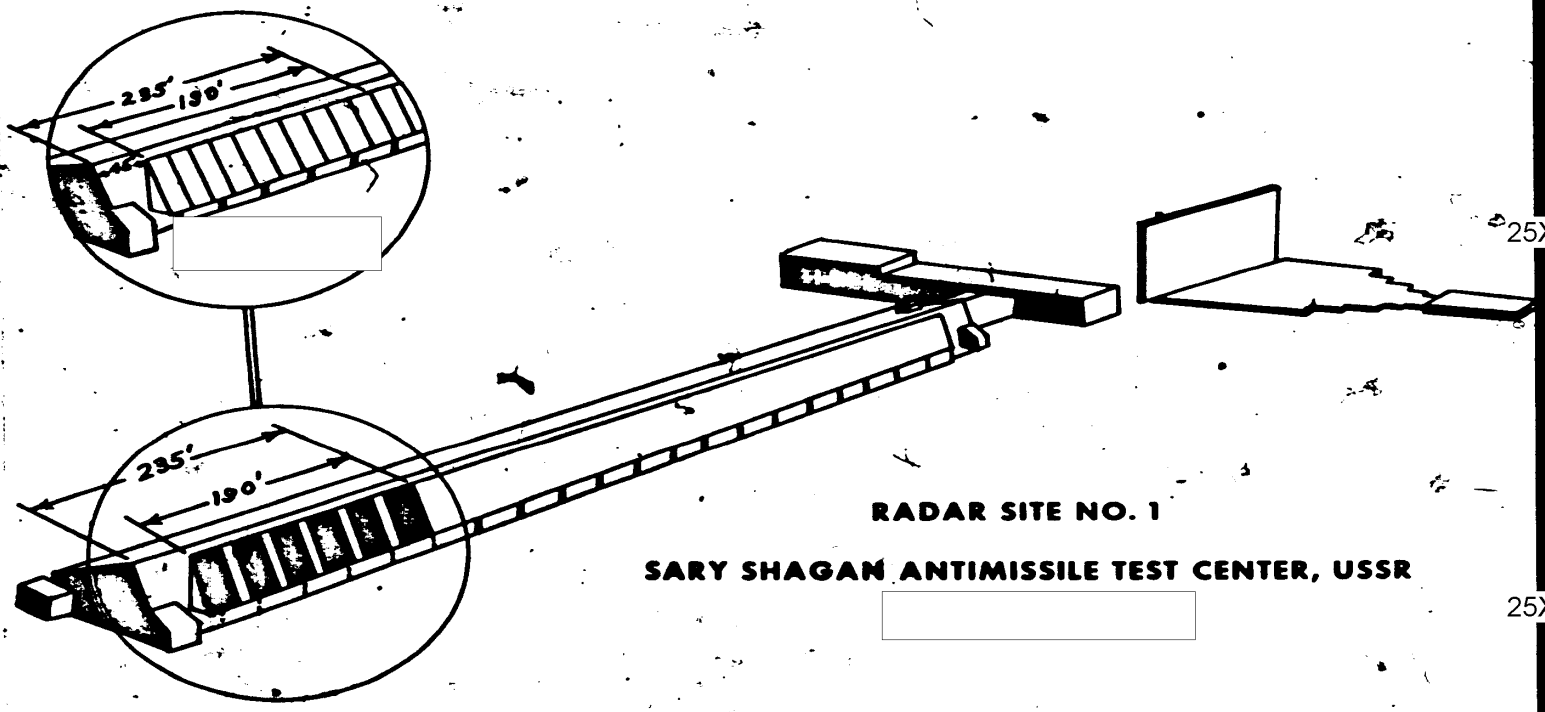

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RADAR SITE NO. 1

SARY SHAGAN ANTIMISSILE TEST CENTER, USSR

25X1

Figure 2.

confirmed that the entire face was black, though it is possible the entire face was black when photographed 25X1 25X1 Missions between June 1963 and February 1964 did not reveal the face of the Hen House due to unfavorable angles of view and relatively poor ground resolution. revealed no change, the face remaining black. Though the 13 June 1963 photography revealed separations between individual black panels, the more recent photography does not permit confirmation of sectionalized paneling, despite relatively excellent KH-4 photo quality. 25X1 25X1

b. Instrumentation Site 13, Sary Shagan Antimissile Test Center (SSATC), USSR

(1) Instrumentation Site 13, located on the shores of Lake Balkhash, approximately 52 nautical miles northeast of the SSATC Support Base, did not exist on photographed the area. First evidence of activity was secured by photography This mission revealed construction activity on a triad of buildings, which following missions confirmed as one of four unique installations having a counterpart around the city of 25X1 25X1

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Moscow, and believed to be possibly AMM associated.(*) For nearly two years, while construction activity continued, this possibly AMM associated triad of buildings and a small support area constituted the only significant features at Instrumentation Site 13.

(2) [redacted] revealed that what appeared to be a borrow pit for the past two years was now being expanded by extensive excavation activity. As this new activity coincided with the construction of a new support area south of the building triad, and as the Angarsk facility had not yet been discovered, this new excavation activity was reported without other speculation regarding its possible purpose. Photography [redacted] revealed further expansion of this excavation activity. [redacted] Memorandum Report [redacted] reported the correlations between this excavation activity and the Hen House facility at Radar Site No. 1, SSATC.(**)

(3) Photography [redacted] revealed that the Instrumentation Site 13 construction activity had continued at a rapid pace. What is now recognized as Dual Hen House Radar Installation A, was under construction approximately 1,000 yards northwest of the possible AMM associated Building Triad, with a second, similar installation (Facility B) under construction in line with and just south of the first Dual Hen House. A portion of the control house superstructure was erected at Dual Hen House A , while footings for a probably similar building could be seen at the more southern facility. Probable superstructure could be seen at antenna A-1, while footings were probably in place for antenna A-2 and possibly for antenna B-1. The control building for the second Dual Hen House was being constructed approximately 1,000 feet west of the possibly AMM associated Building Triad facility.

(4) The correlation of unusual construction activity northwest of Angarsk, USSR with the Instrumentation Site 13 activity was reported to the intelligence community early in January 1964. The Hen House construction activity at Instrumentation Site 13, which began sometime [redacted] continued throughout the remainder of 1963 and through the winter and spring of 1963-64.(***) Construction of a third Dual Hen House facility (Facility C) was initiated between [redacted].

(5) Photography [redacted] revealed that a dark toned surface was being installed on the face side (the west side) of Hen House A-1. It is suspected that this surface is made up of dark panels similar to those installed on the original Hen House antenna at Radar Site No. 1 in 1963. Boresight from this face would be on an azimuth [redacted].

(6) Construction progress on antenna A-2 is less advanced. Its appearance [redacted] suggested the face would be on the east side of the structure, however, the opposite is true on [redacted], though of poor quality in this area, reveals the probability that the west side of Hen House A-2 is also receiving black paneling. Thus, boresight from both antennas at Dual Hen House A probably fall to the west.

c. Olenegorsk Electronics Site, USSR

(1) Most recent of the Dual Hen House facilities to be discovered is located at 68-06-30N 033-54-30E, approximately 11 nautical miles east-northeast of Olenegorsk Airfield and 55 nautical miles south-southeast of Murmansk. (See Attachment 7). This facility has been negated on August 1962 photography [redacted] while first signs of construction activity were observed in the support area in June 1963 [redacted]

(*) See Reports: NPIC/R-147/63, NPIC/R-103/64, NPICR-280/64, CIA/PID-13/64 and Memorandum Report [redacted]

(**) See paragraph 4b and Attachment 3 to Memorandum Report [redacted]

(***) Memorandum Report [redacted] NPIC/R 125/64, NPIC/R213/64, and subsequent KEYHOLE Mission OAKS.

[redacted]

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(2) As can be seen in Attachment 7, the Dual Hen House facility at Olenegorsk differs from the others in that the individual Hen House type antennas are not in alignment. The boresight azimuths (perpendiculars to the long side of each structure) form an angle of 30 degrees.

d. Angarsk Electronics Site, USSR

(1) Late in December 1963, an unusual unidentified facility was discovered under construction near the banks of the Belaya River, approximately 35 nautical miles northwest of Angarsk and 17 nautical miles south-southeast of the city of Cheremkhovo, at 52-53N 103-15E. Correlation of this activity with Instrumentation Site 13, SSATC, was established and reported to the intelligence community by cable [redacted] 25X1

(2) Analysis of previous photography of the area revealed that 1 September 1962 coverage [redacted] probably negated the facility. However, partial cloud cover of what is now Support Area 2 precludes positive negation on this mission. Poor quality of earlier photographic coverage also prevents positive negation. Probably the first indication of construction activity was photographed [redacted] The photo quality was poor, however, initial clearing and suspect early construction activity in Support Area 2 could be detected. 25X1

(3) The first positive confirmation of construction activity resulted from good quality KEYHOLE coverage [redacted]. This photography revealed that construction of Dual Hen House Installation A had progressed to probable early stages of superstructure erection on the control building, and foundation excavations along the entire length of both antenna structures. At this time there was no evidence of construction or clearing activity for Dual Hen House Installations B, C, or D. 25X1

(4) The progress of construction through [redacted] is documented by previously published reports.(*) To provide for consistent annotations should additional facilities be constructed, the area designation system used in previous reports is changed to permit alphabetical designation of the Dual Hen House installations and numerical designation of support areas, as shown in Attachment 2. The sequence of designation will, where possible, follow the chronological development of facilities. 25X1

(5) Photographic coverage [redacted] was accomplished with the KH-7 system, resulting in relatively large scale photography. (See Attachment 1). Though light conditions during the pass over Angarsk were less than optimum, the larger photo scale has permitted a far more detailed analysis than was previously possible. Most line drawings in this report have been made from this photography. 25X1

(6) [redacted] photographed Angarsk [redacted] This KH-4 mission was received for analysis as major portions of this report were being finalized. As this mission revealed important new developments, the cut-off date for this report was moved up accordingly. 25X1

5. The Angarsk Electronics Site

a. General

(1) This Dual Hen House facility occupies approximately 3,000 acres of flood plane in a bend of the Belaya River. (See Attachment 1). It consists of a fenced operations area, with three Dual Hen House radar installations under construction, with three closely grouped support areas about one nautical mile to the northeast. (See Attachment 2). [redacted] revealed a 2,130 by 200-foot area had been cleared for a 4th Dual Hen House installation. 25X1

(2) The only cultural features visible at this site prior to commencement of construction activity were a few probable dwellings along the river and a series of straight earth scars. These scars, consisting mostly of suspect survey lines, form a grid pattern in an area covered with medium to sparse vegetation. The grid pattern is formed by parallel lines oriented north-south, spaced approximately 1,000 meters apart, and intersected by east-west oriented parallel lines approximately 2,000 meters apart. Three straight, non-parallel, unidentified earth scars cross the area southwest of the site. These more prominent lines are generally oriented northeast-southwest.

(*) NPIC/R-213/64 and NPIC/R-125/64

[redacted] 25X1

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(3) It is not possible to negate these earth scars, nor is it possible to establish any relationship to the Dual Hen House facility, other than their geographic proximity and the orientation of the grid with reference to true north. The northwesternmost of the three more prominant scars runs through the area now occupied by the operations area, and more specifically, by the control building of Dual Hen House A. The latter is possibly coincidental.

b. Communications

(1) The facility is served by a possibly gravel-surfaced road which enters Support Areas 3 and 2 from the south, then turns to the southwest toward the operations area. There is no other prominent access to the facility as of August 1964. From the site support area the road leads south to join a road which connects Mishelevka on the west to Malta and Tayturka on the east. The latter communities are served by hard-surfaced roads and a double track railroad which connects Irkutsk, Angarsk, and Cheremkhovo with points to the northwest and east. The airfield possibly serving this site would be Belaya Airfield, a medium bomber base, [redacted] 25X1 located approximately 10 nautical miles to the east.

c. Defenses

(1) The general area is defended by Cheremkhovo SA-2 SAM Site B18-2, located approximately six nautical miles southwest of the Dual Hen House facility, by Cheremkhovo SA-2 SAM Site C10-2, located approximately 12 nautical miles north-northeast of Belaya Airfield, and the northwestern SAM sites in the Irkutsk Angarsk SAM defense complex.

d. Utilities (See Attachments 3A and 23)

(1) Two parallel earth scars, which enter the area from the west, are possible evidence of power and telephone lines serving the support areas during the early construction period. Sometime between [redacted] 25X1 [redacted] 25X1 construction work began on an electric power substation in an area approximately 220 by 360 feet located between the operations area and Support Area 2. During the same period, work began on a water treatment plant located between the power substation and Support Area 2. Concurrent with this activity, a trench for a pipeline from the Belaya River to the water treatment plant was dug.

(2) During the period [redacted] 25X1 [redacted] 25X1 vegetation was cleared from a 110-foot wide strip, forming a power trace leading southward toward the electric power substation from an area north of Support Area 2. The power substation was still in very early stages of construction, with no evidence of structures visible. Initial construction on a probable sewage treatment plant was also initiated during this period.

(3) Photography [redacted] reveals construction 25X1 progress on all utilities. In the electric power substation area, footings for possibly two step-down, three-phase, low-voltage transformers are under construction while wall-bearing construction on [redacted] substation control house has reached the 25X1 superstructure stage. [redacted] the substation control 25X1 house and an adjacent building [redacted] were roofed. [redacted] 25X1 a probable stack of canvas covered building material [redacted] was 25X1 located approximately 200 feet northeast of the substation control house. This stack of material was not in evidence [redacted] Foundations for electric power 25X1 transmission towers for two probable 110 KV power lines with heavy three-phase conductors can be seen along the power trace extending north from the substation. Photography [redacted] revealed continuing work on the power 25X1 line with power transmission tower footings newly identified northeast of the Belaya river. The power trace is thus being extended toward the electrified railroad near the town of Mikhaylovka. (See Attachment 1).

(4) A probable sewage treatment plant is being constructed north of Support Area 3 and downstream from the water intake point. It consists of two earth embanked, [redacted] probable digesters and a sewage treatment and pumping 25X1 station under construction. Between [redacted] the sewer pipe- 25X1 line from the sewage treatment plant was extended to Support Area 2 and to the river Belaya.

(5) The water treatment plant, consisting single story, flat-roofed building and two 45-foot diameter semi-buried presedimentation basins, will be fed by a buried water pipeline from the Belaya River. Photography reveals the circular basins have probably been covered. The intake end of the water pipeline ends at a slip-off slope north of Support Area 2. It is suspected that infiltration galleries are being constructed at that point. Such intakes are designed for drawing water from very turbid rivers and water bodies subject to wide fluctuations in water level. The intake line would normally be enclosed in masonry caissons, extending down to water-bearing gravel, which serves to remove much of the solids in suspension. These galleries are usually located on the shore near the high water line. The water would then be pumped to the presedimentation basins, which are constructed in parallel units so that one will be operating while the other is being cleaned.

From the water treatment plant, water pipeline trenches lead along the access road toward the operations area and toward Support Area 2. A number of trenches for water and sewer pipelines can be seen in Support Area 2. Probable pipe sections can be seen strung along the side of the access road between Support Area 2 and Support Area 3, probably in preparation for trench digging.

e. Motor Pool

(1) The motor pool area contains a single story probable shop type garage and four smaller possible storage buildings. The possible storage buildings have a total of 12,440 square feet of floor space. The motor pool contains eight possible tank semitrailers, 16 possible van semitrailers, 12 possible cargo trucks, 27 probable dump trucks, 40 probable vehicles, 10 possible vehicles, and 10 suspect vehicles for a total of 123 vehicles. The possible tank semitrailers and most of the possible van semitrailers are parked closely together in the western corner of the motor pool, suggesting they are not currently active. The photography reveals an expansion of approximately 15 percent to the northern side of the motor pool area (see Attachment 23).

f. The Operations Area

(1) The operations area occupies approximately a 400-acre triangular area one nautical mile southwest of Support Area 3. Photography revealed the area was bounded on the north, west, and possibly the east, by a double security fence. Photography confirmed the presence of a security fence around the entire operations area. Clearance between the western side of Dual Hen House installations A and B, and the security fence to the west varies between 300 and 900 feet. A possibly gravel surfaced road connects the operations area with the support areas to the northeast.

(2) Located within the operations area are three Dual Hen House radar antenna structures in various stages of construction. (See Attachment 3). Dual Hen House A is the most complete of the three, while installation C is least advanced. Dual Hen House A occupies the southernmost corner of the triangular area, with the long axis of the structure oriented 350 and 170 degrees. Dual Hen House B, at an earlier stage of construction, is located north of Dual Hen House A, with their control buildings approximately 2,400 feet apart. The long axes of Dual Hen House installations A and B are parallel and separated by 320 feet. Their control buildings are similarly oriented. Dual Hen House C control building is located approximately 1,800 feet east of Dual Hen House B control building, and approximately 3,100 feet north-northeast of the Dual Hen House A control building.

(3) A clearing for a probable fourth Dual Hen House installation, parallel to Dual Hen House C, was revealed by photography accomplished (See Attachments 22 and 23).

g. Dual Hen House A

(1) This installation consists of two Hen House type radar structures under construction, one on each side of a massive control building. The two Hen House antenna structures are being constructed along the same longitudinal axis, with the mass of the control building located east of the line.

Dual Hen House A measures 2,295 feet from end to end. Photography reveals the probable addition of a small structure to the north end of Hen House A-1. If the dimensions of this addition are similar (*) to that of the structure off the south end of Hen House A-2, the total length of the Dual Hen House would be approximately 2,340 feet.

(2) The Control Building, Dual Hen House A

The flat-roofed control building is massive and probably constructed of reinforced concrete. (See Attachments 3, 4, and 4A). It consists of a 25-foot high central section three wings on the north, south, and west, and two probable 10-foot high wings on the east. The north and south wings measure 140 by 40 feet, the west wing and each of the two probable wings on the east measure 25 by 20 feet. The entire control building is located east of a line connecting the western sides of the two Hen House antenna structures.

The control building, which has approximately 44,000 square feet of roof area, did not appear complete Finishing work on the roof appeared to be in progress with a suspect asphalt plant in operation on the east side of the building. Building material, pipe sections and five probable vehicles could be seen in the area (See Annotation 12, Attachment 3). Photography does not permit confirmation of construction status, though the building appears complete.

(3) Hen House Radar Antenna Structure A-1

This structure, located north of the control building, has its long sides parallel to the eastern and western sides of the control building. its southern end was separated from the main control building section by 85 feet. (See Attachment 4). Photography reveals the possible addition of a small structure between the Hen House structure and the control building. The western side of the Hen House structure is approximately 40 feet forward of the control building.

Photogrammetric analysis of coverage has confirmed that the pitch of the trusses is not similar, with the greatest angle of pitch being on the side facing west. Mensuration indicates that the slant height of the western side of each truss and the slant height of the east side Possible margins of error on these calculations are: up to a maximum of plus 15 feet for the western slope and down to a maximum of minus 15 feet for the eastern slope. Should the maximum possible error be applied to each side, the ridge line would still be located west of the central longitudinal axis of this structure. Photo quality and available information did not permit computation of the structure height or the angles of elevation of the pitched roof. However, by visual inspection, the ridge line appears to be over a line located approximately two-thirds the distance of the building width, and west of the central longitudinal axis of the structure. (See Figure 3 next page).

The ridge of the Hen House structure appears to be approximately 2.5 times higher than the roof of the control building.

Photography revealed 44 trusses, spaced approximately 20 feet apart, erected over 860 feet of the structure's length, with probably two trusses still to be erected on the north end. (See Attachment 4). roofing material covered approximately 3½ structural bays east of the ridge line, as shown in Attachments 4 and 4A. A dark striation could be seen through the trusses, running most of the length of the structure and located parallel to and approximately from the east side of the structure. Location of the striation is shown in Figure 3 (next page). Photography reveals that the roof has probably been covered and that a small structure has probably been added to the north end of the Hen House.

(*) Though the structures are approximately similar in size, the ground resolution of KH-4 does not permit a meaningful measurement.

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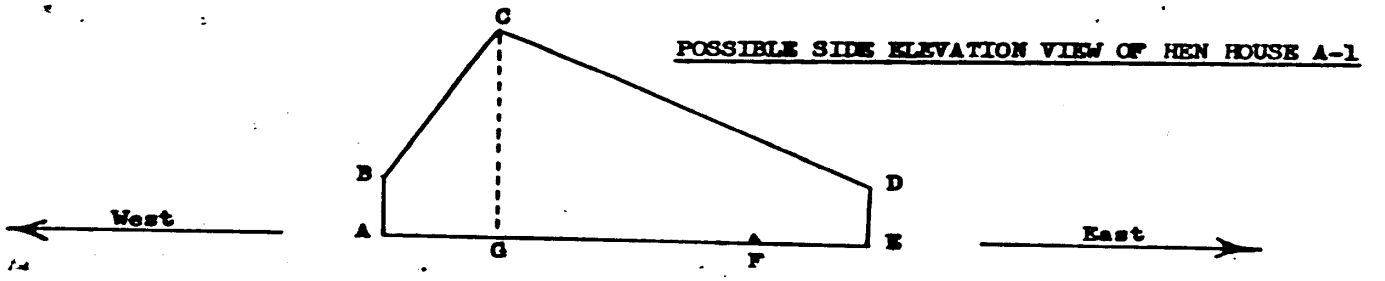


POSSIBLE SIDE ELEVATION VIEW OF HEN HOUSE A-1

(No angles can be computed)

FROM	TO	DISTANCE IN FEET
B	C	[redacted]
C	D	
A	E	
F	E	
E	G	Approx 2/3 of E-A
B	A	Undetermined
D	E	Undetermined
C	G	Probably 50 to 70 feet

(F is the axis of a dark striation running lengthwise along the building, probably at ground level.)

Possible margins of error

up to plus 15 feet

down to minus 15 feet

[redacted]

plus or minus 5 feet

Figure 3.

(4) Hen House Radar Antenna Structure A-2

[redacted] the footings for Hen House A-2, located south of the control building, indicated it would be similar in size to antenna structure A-1 to the north. Dimensions and location of footings with reference to the control building are shown in the rectified line drawing in Attachment 4. [redacted] suspect transmitter house is located just off the south end of the footings at Hen House A-2. It is possibly similar to structures which appear off each end of both Hen House structures at Dual Hen House A at Sary Shagan Instrumentation Site 13. It is suspected that the structure on one end of a Hen House could be a transmitter house while the structure on the opposite end could be a terminal house. Three roughly circular possible excavations, with small unidentified objects centered inside, were located between the antenna structure foundation and the control building [redacted] The location of these features corresponds to the location of a suspect terminal house which is located between the Hen House structure and the control building at Dual Hen House A, Sary Shagan Instrumentation Site 13. Photography of [redacted] reveals the possible addition of a small structure between Hen House A-2 and the control building.

Within the outer rows of column footings and parallel to them is a line of possible footings and footing holes, arranged in a straight line and spaced approximately 10 feet apart. This inner row of possible footings is not centered but is [redacted] the easternmost row of column footings.

[redacted]

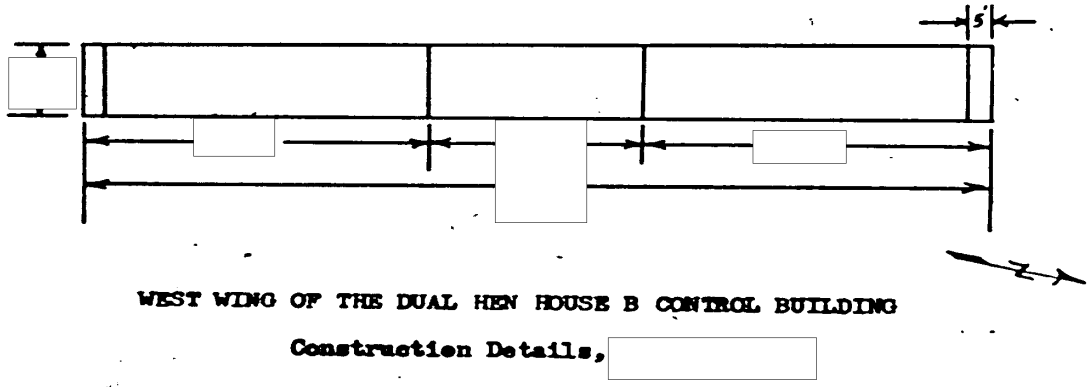
Unidentified structural members, roughly grid shaped striations and other scars can be seen along the length of the structure. These are shown in the line drawings on Attachments 4 and 4A. Photography [redacted] reveals that the superstructure has been erected and that probably some roofing material is being applied.

h. Dual Hen House B

Dual Hen House B, located north of Dual Hen House A, is in an earlier stage of construction. [redacted] it consisted of a cleared area approximately 2,400 by 300 feet, in the center of which a control building was in early stages of construction. A large amount of construction material was stacked in the area west of the control building and in the cleared area to the south. (See Annotation 4, Attachment 3). Initial excavation activity had commenced in the southern end of the cleared area south of the control building. Photography of [redacted] reveals excavation and possible footings for both Hen House structures and construction progress on the control building.

(1) The Control Building, Dual Hen House B

The control building at Dual Hen House B is oriented in a manner similar to that of the Dual Hen House A control building, and will probably have a similar configuration. [redacted] the walls of the west and south wings were being erected and a small portion of the roof on the south wing was in place. The [redacted] west wing appeared to be divided internally by two walls as shown below in Figure 4.



WEST WING OF THE DUAL HEN HOUSE B CONTROL BUILDING

Construction Details, [redacted]

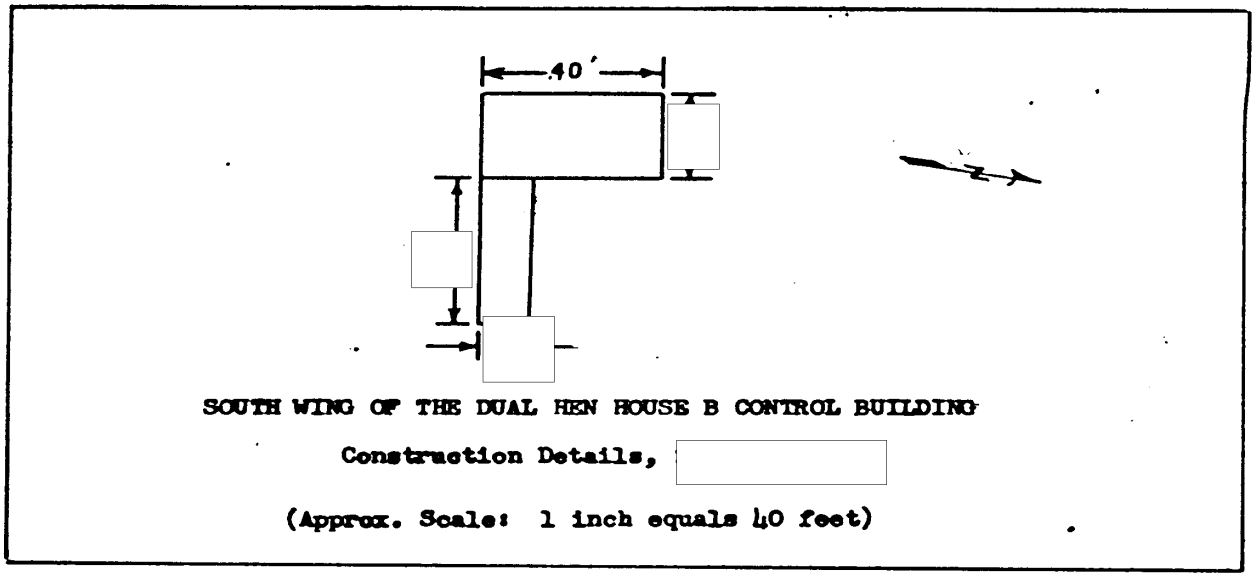
(Approx. Scale: 1 inch equals 40 feet)

Figure 4.

The extreme ends of the narrow west wing were either covered by a five-foot wide strip of roofing, or the walls at this point are five feet thick.

[redacted], the south wing of the control building had a [redacted] section of its roof in place while [redacted] section, noticeably lower than the roof, protrudes as shown in Figure 5.

1/ [redacted]



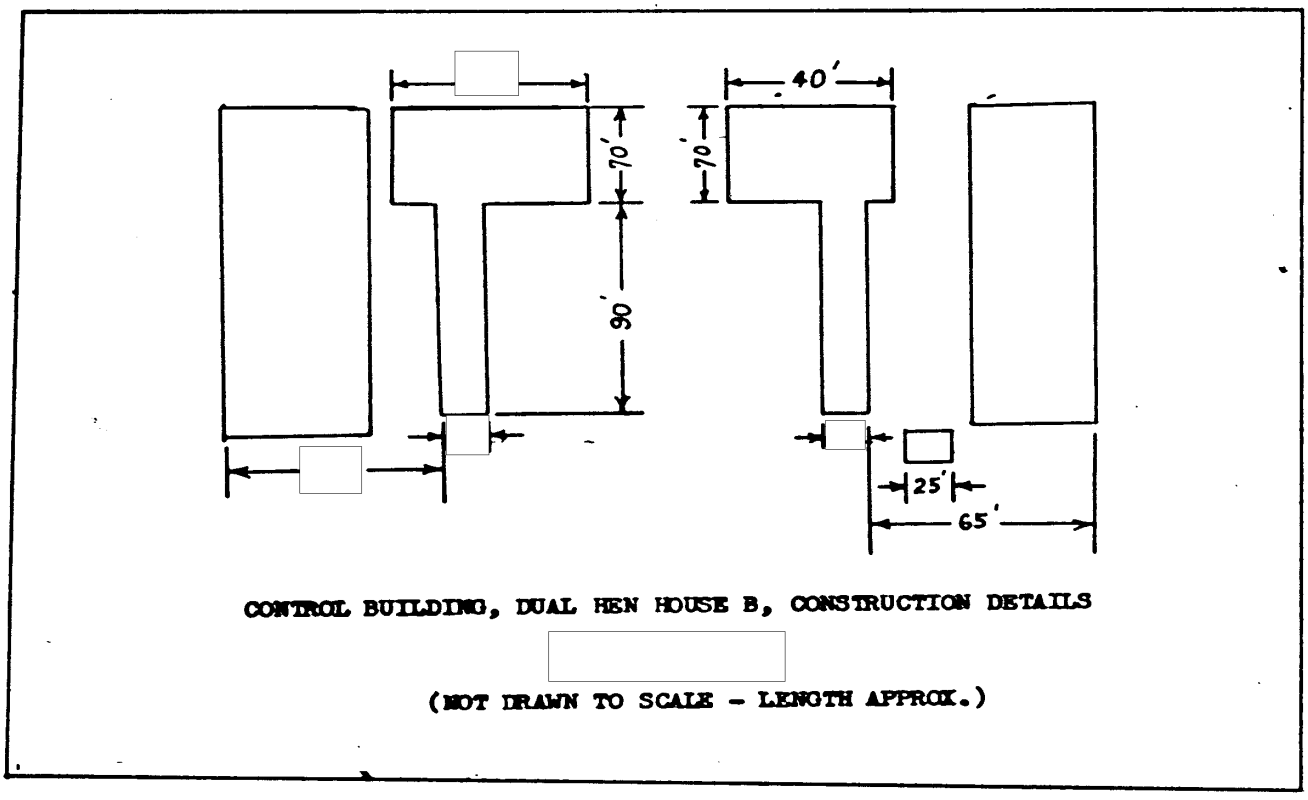
SOUTH WING OF THE DUAL HEN HOUSE B CONTROL BUILDING

Construction Details, [redacted]

(Approx. Scale: 1 inch equals 40 feet)

Figure 5.

Though photography of [redacted] does not resolve the small and narrow west wing, it reveals that superstructure and roof on the north and south wing have been erected and that construction on the large central section is progressing. Figure 6 below shows the peculiar appearance of this phase of the construction as it was revealed on [redacted]



CONTROL BUILDING, DUAL HEN HOUSE B, CONSTRUCTION DETAILS

[redacted]

(NOT DRAWN TO SCALE - LENGTH APPROX.)

Figure 6.

[redacted]

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(2) Hen House Radar Antenna Structures at Dual Hen House B

The area cleared to the north and south of the control building under construction is sufficiently large to accommodate Hen House type radar antenna structures; however, only initial excavation activity is visible in the southern end of this area. Photography reveals excavation and possible footings at both Hen House sites.

i. Dual Hen House C

(1) This installation is least advanced of the three Dual Hen House installations being constructed in the operations area. concrete footings for the control building were in place and stacks of construction materials were lying on the ground in the vicinity. (See Attachment 3). The pattern formed by the control building footings strongly suggested that the control building for Dual Hen House C would have the same dimensions and configuration as the control building at Dual Hen House A. This was partially confirmed by the coverage This photography revealed the superstructure of the narrow, pro- wing and the other two wings being erected.

(2) The cleared area to each side of the control building construction is sufficiently large to accommodate Hen House type radar antenna structures; however, as there was no sign of excavation activity in the cleared area. Photography revealed that excavation for the Hen House foundations had begun.

j. Dual Hen House D

(1) The approximately 2,200 by 200-foot clearing for probable Dual Hen House D is located south of Dual Hen House C and east of Dual Hen House A. The long axis of this clearing is parallel to the long axis of Dual Hen House C. The appearance of this clearing gives the entire operations area a double "V" or chevron configuration.

k. Other Structures and Activity in the Operations Area

(1) a number of foundations containing footings for unidentified structures were located in the approximate center of the operations area. (See Annotations 7 through 10, Attachment 3). A standpipe with a capacity of approximately 153,000 U.S. gallons was seen just west of the control house construction at Dual Hen House C, however, there was no evidence of connecting pipelines .

(2) Photography reveals earth scars connecting the two control buildings at Dual Hen House B and C and possibly the standpipe located just west of the Dual Hen House C control building. Earth scars also connect the control building at Dual Hen House A and construction activity located between the control house and the center of the cleared strip for Dual Hen House D.

(3) This construction activity, consists of a cleared area measuring approximately 190 by 150 feet and containing probable footings and some superstructure. Figure 7 below shows the appearance of superstructure visible

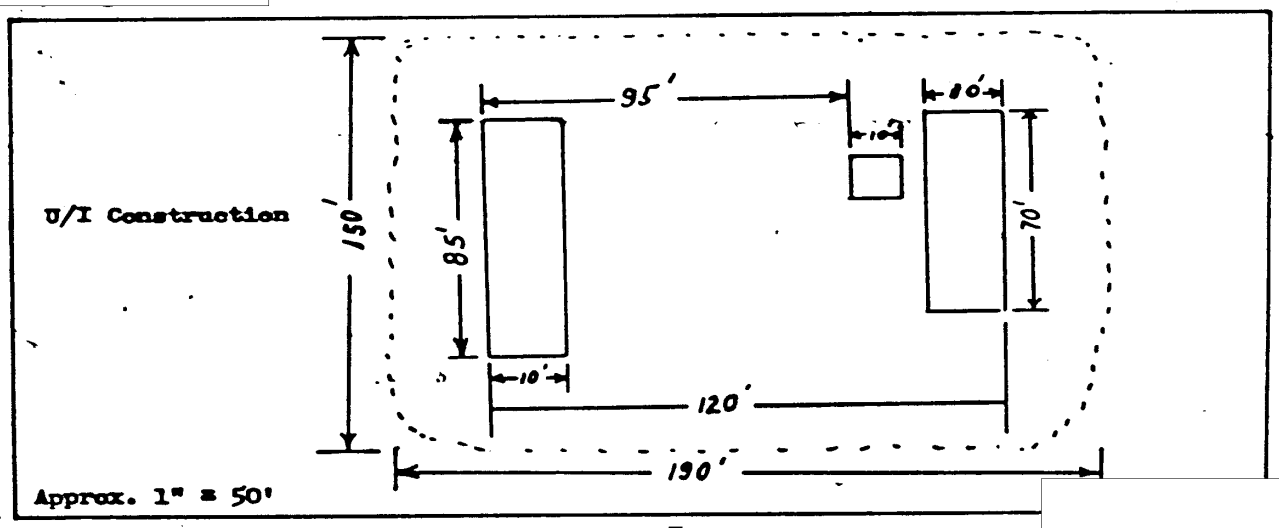

Figure 7.

(4) Approximately similar construction activity, also new since , is located half way between the control building of Dual Hen House B and Dual Hen House C, and adjacent to the connecting earth scar.

(5) The approximate distance between the center of the control building at Dual Hen House A and the center of the cleared area for probable Dual Hen House D is 1,000 feet. The corresponding distance between the control buildings at Dual Hen Houses B and C is 1,800 feet.

1. The Support Areas

(1) Attachment 2 shows the relationship of support areas to the operations area and Attachment 3A is a line drawing of all three support areas with information regarding floor space and construction progress.

(2) The buildings in Support Area 1, Support Area 3, and the western half of Support Area 2 appear to be wooden temporary type barracks and associated buildings. No effort has been made to construct a surfaced road to Support Area 1 or to the western half of Support Area 2. Though track activity indicates that access to these building areas has been primarily by foot, it also reveals that vehicles have probably been in these areas.

(3) Intensive construction activity is visible in the central and southeastern end of Support Area 2. Two, and possibly three, tower type construction cranes were photographed in the area One was located adjacent to the construction activity in the steam plant area, and the second, and a possible third were at work in the multi-story building construction area. The dark buildings shown on line drawings in Attachment 2 and 3A represent buildings which were either complete or had walls and roof in place as The structures outlined and not filled in represent buildings in earlier stages of construction, some with only footings in place. Most of the buildings in the central and southeastern half of Support Area 2 appear to be permanent type buildings and construction activity continues on and near most of them. Trenches, construction materials, and approximately 20 vehicles can be seen in the area. Photography reveals progress in the erection of superstructure in Support Area 2. Superstructure is now visible on the steam plant, two adjacent structures and an additional multi-story permanent probable quarters in the southeastern end of Support Area 2.

6. Azimuths of Propagation

a. Analysis of correlations between the configuration and size of Angarsk Hen House A-1 (See Figure 3 and Attachment 4 and 4A) and the original Hen House at Sary Shagan Radar Site 1, permitted identification of the west side of Angarsk Hen House A-1 as probably the antenna face side.

Initial analysis of the footings at Angarsk Hen House A-2 resulted in a hypothesis that the internal footings might be located directly under the ridge line of the Hen House structure. This suggested that the antenna face on Hen House A-2 might face to the east. Though this supposition seemed to be further supported by the linear non-alignment of excavations seen , there were considerations which did not support this hypothesis.

Further analysis of the Angarsk KH-7 coverage revealed a dark striation along the length of and probably inside Hen House A-1. It was located approximately the same distance from the east side of the structure as the distance separating the two easternmost rows of footings at Hen House A-2. If this striation corresponds to the internal footings at A-2, it would follow that the internal footings at Hen House A-2 need not necessarily fall under the ridge line.

Another consideration is masking. If Angarsk Hen House A-2 were to propogate in an easterly direction, Dual Hen House C would cause interference. Furthermore, if similar construction at all other Dual Hen Houses were to follow, it seems that serious masking problems would probably be experienced there as well. Consequently, a re-evaluation of structural features and their relationship was conducted.

If both antenna faces at Angarsk Dual Hen House A were on the west side of their respective structures, there would be no masking problem. Assuming, for the sake of this hypothesis, that this will indeed be the method of construction at Angarsk Dual Hen House A, the other Angarsk installations were examined to determine possible correlations, assuming their construction pattern would be similar to Installation A. This examination revealed that it would be reasonable to expect that both Hen House antennas would be on the same side and have their boresight azimuths in parallel planes.

The face side of Hen House structures could possibly be predicted by noting the position of the control house with reference to a line joining the two Hen House structures. Thus, if the face of each antenna at Angarsk Dual Hen House A is on the west side, the entire control building would be to the rear of all propagating surfaces. If the same concept of construction is being followed at Sary Shagan Instrumentation Site 13 (and it probably is at Dual Hen House A, as revealed [redacted]), one can postulate that Dual Hen Houses here would 25X1
also have their antenna faces on the same side, and have boresight azimuths in parallel planes. This postulation is reasonable because, in each case, the side of the structure likely to receive the face would be in front of the control building and this would eliminate masking problems from adjacent structures.

Consequently, the second hypothesis is considered the more reasonable, and on the basis of this line of reasoning, it is believed that boresight azimuths at all Dual Hen House antennas will possibly be as follows: (Also see Attachments 3, 6, and 7).

Site Location	Hen House	Possible Boresight Azimuth
Angarsk	A-1, A-2, B-1, & B-2	260 degrees
Angarsk	C-1, C-2, & probable D	[redacted] 25X1
Sary Shagan	A-1, A-2, B-1, & B-2	
Sary Shagan	C-1 & C-2	
Olenegorsk	A-1	
Olenegorsk	A-2	

The arrangement of structures at the Angarsk Electronics Site and the new additions revealed by photography [redacted] removed 25X1
more of the doubt regarding the direction of propagation at Angarsk. Therefore, the 260 [redacted] degree azimuths out of Angarsk are changed from possible to probable. 25X1

Attachment 8 shows the location of azimuths with reference to each site and other geographic features, plotted on a Gnomonic chart.(*) In addition to the azimuths from Dual Hen House installations, this map also shows the boresight azimuth from the original Hen House at Sary Shagan Radar Site 1 and the possible azimuth from the Moscow "A Frame" suspect phased array radar, assuming that both faces of the "A Frame" will contain radar antennas. Certain missile ranges and other installations have also been added to the chart.

Though these azimuths have been computed to an accuracy of one degree, most of them are only possible azimuths (**) until photographic or other evidence can confirm the location of each antenna face. Consequently, for research purposes, a list of geographic coordinates along each conceivable azimuth from the Hen House structures has been computed and is attached as Attachments 9 through 21. These geographic coordinates have been computor-determined at regular intervals (usually every 60 nautical miles) along each of the listed azimuths, for a distance of 5,000 nautical miles from the given installation.

(*) A straight line on a Gnomonic chart represents a great circle arc.
(**) The exceptions: Radar Site No. 1, Sary Shagan azimuth is confirmed and Angarsk Dual Hen House azimuths are probable azimuths.

[redacted] 25X1

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b. A study of Attachment 8 reveals that boresight azimuths (and some back azimuths) go near or through certain related installations. For example, the boresight azimuth from Angarsk Dual Hen House A and B passes very close to Sary Shagan and that from Sary Shagan Dual Hen House C passes close to Angarsk. Consequently, a second computor analysis was initiated to determine the exact distances and azimuths between possibly related points. Attachment 21-A shows the result of this computor analysis.

A study of these azimuths shows that there is a high degree of probability that:

(1) Angarsk Dual Hen Houses A and B are oriented to place their probable boresight azimuth through Sary Shagan Instrumentation Site 13.

(2) Sary Shagan Dual Hen Houses A and B are oriented to place their possible boresight azimuth through Tyuratam.

(3) Sary Shagan Dual Hen House C is oriented to place its possible boresight azimuth through the Angarsk Electronics Site.

(4) Olenegorsk Hen House A-2 is oriented to place its possible back-azimuth through Sary Shagan Instrumentation Site 13.

If we should hypothesize that the above probablities are indeed fact, then one of the following conclusions would have to be accepted as correct:

(1) The Soviets surveyed these installations accurately, to have the boresight azimuths line up as suggested in the above stated probabilities and the azimuths computed for Attachment 8 have a slightly higher margin of error than supposed.

(2) The azimuths computed for Attachment 8 are accurate to within one degree and the Soviets did not survey these installations accurately (assuming an intent to have boresight azimuths line up as suggested above).

(3) The azimuths computed for Attachment 8 are accurate to within one degree, the Soviets surveyed their installations accurately, and the proximity of boresight azimuths to the listed installations is simply coincidental (implying no intention to line up the boresight azimuths exactly with the given installations).

(4) The azimuths compiled for Attachment 8 are accurate to within one degree, the Soviets surveyed the installations accurately, to have the boresight azimuths line up approximately as suggested in the above stated probabilities (implying no intention to have pin-point accuracy).

Of the four possible conclusions listed, the first and the fourth appear to be the most reasonable.

7. Discussion

a. Type of Radar

It is generally believed that the Hen House structures house some type of phased array radar. As the result of one hypothesis, it is suspected that one of the small structures attached to the end of a Dual Hen House serves as a transmitter house and the other as a terminal house. It is possible that such an arrangement would be compatible with a frequency scanned phased array radar.

Another hypothesis concludes that the bulk of the Hen House structure behind the face suggests the use of an array of lenses in the antenna face, with the feed elements mounted internally a given distance behind each of the lens panels. The internal footings at Angarsk Hen House A-2 and the striation inside A-1 could possibly be the location of support elements for the feed of such a lens type system.

The size of the original panels at Sary Shagan's original Hen House was approximately [redacted] according to analysis of TALENT photography flown in April 1960. Photography [redacted] revealed that possibly larger panels were being installed (see Figure 2), however, it was not possible to determine the exact size of these panels due to the limitations imposed by relatively poor ground resolution. The fact that a space can be detected between six separate panels would at first suggest that the distance between panels must be between 10 and 20 feet, the probable range of ground resolution for this coverage. However, linearity (considering a probable panel length of 40 feet) would make it possible to detect a smaller separation. The numerical coefficient in this relationship is not known; therefore, it is not possible to determine panel width. Later photography with superior interpretability revealed the entire face as black, however, individual panels could not be detected. This suggests one of three possibilities:

(1) Wider panels were installed, with distance between panels too small for photo resolution.

(2) Wider panels were installed with no space between panels.

(3) The entire face was covered by a continuous sheet of dark material.

b. Back Azimuths

Though the probable and possible azimuths from all these installations are shown on Attachment 8, it is interesting to note that some "back-azimuths" pass through or near some important places. As an example, a back-azimuth from Angarsk Hen House A and B passes near Chita while a back-azimuth from Olenegorsk Hen House A-2 passes near Sary Shagan. Attachment 21A should provide valuable data in regard to azimuths between specific points.

c. Function of the Dual Hen Houses

The location of the Dual Hen House sites at Angarsk and at Sary Shagan suggests that these installations are possibly part of a satellite fence. The original Hen House at Sary Shagan Radar Site 1 was the R and D version; therefore, it is hardly likely that the extensive Dual Hen House installations at Sary Shagan and northwest of Angarsk would be for Research and Development purposes. Furthermore, their location does not appear optimum for an early warning role against ballistic missiles.

The [redacted] azimuth from Sary Shagan Instrumentation Site 13 passes through Launch Complex A at Tyuratam and the [redacted] azimuth passes within 250 and 275 nautical miles of the centers of Soviet Pacific impact Areas 1 and 2, respectively. These impact areas are approximately 900 and 600 nautical miles south-southeast of Johnston Island. These facts suggest a possibility that Sary Shagan Instrumentation Site 13 Dual Hen House might also be employed in the Soviet space and ICBM test program.

The location of the Olenegorsk Dual Hen House facility, with its possible azimuths of propagation shown on Attachments 7 and 8, suggests either a ballistic missile early warning role or an anti-satelite roll. Though the former is perhaps favored, the latter cannot be ruled out due to orbits we might conceivably use in the future. It is not inconceivable that the site is intended for a dual role.

As regards the possibility of the site at Olenegorsk being part of a ballistic missile early warning system, it is argued, that if true, we must find more installations of the same type going up simultaneously along the northern reaches of the Soviet Union. This is not necessarily true. If we were willing to accept the installation of possible antiballistic missile launch complexes around only two major Soviet cities (Moscow and Leningrad), why wouldn't it be equally logical to accept the idea of an early warning site, so located as to provide warning against missile attack from North America against these and other targets? The political

gain from establishment of an operational system for even a limited number of important targets would be tremendous. It is therefore possible that the Soviets would press forward to the early realization of such a system, even though its operational effectiveness might initially be rather limited.

d. Relation of the Dual Hen House and the Building Triad at Instrumentation Site 13, Sary Shagan

A functional relationship between the building triad at Sary Shagan Instrumentation Site 13 and the nearby Dual Hen House installation cannot be identified. However, there are some interesting points to consider.

The co-location of the building triad and the Dual Hen House installations may not be coincidental. With the appearance of construction activity at Dual Hen House Installation B, [redacted] revealed a straight earth scar between the building triad area and the vicinity of construction on the control building of Dual Hen House B. This earth scar was still very prominent [redacted]. It appeared to run from an area adjacent to the south side of the large building in the triad toward the control building at Dual Hen House B. It is suspected that this scar is a buried conduit to the control house, passing under the road which runs behind the Hen House construction.

[redacted] a straight earth scar could be seen leading toward the Dual Hen House B construction from the north side of the large building in the triad. Partial cloud cover did not permit observing its terminous. The same mission revealed a straight earth scar south of the entire triad, oriented approximately east-west and skirting the southern side of the southern small building of the triad. Photography [redacted] confirmed the presence of the two scars seen [redacted] The scar seen leaving the area adjacent to the south side of the large triad building on December 1963 and February 1964, could no longer be detected. The shorter of the two scars still visible has its termini at points south of the large triad building and southeast of Dual Hen House B control building. The longer of the two scars possibly has its termini at points north of the large triad building and close behind the east side of the Dual Hen House B control building. (See photo in Attachment 6). Of course, it is possible that these earth scars are simply signatures of water lines, and thus need not imply functional relationship.

The building triads in the Moscow area have been considered possibly AMM associated, though their use in a pure air defense role has been receiving strong consideration. Their presence at Sary Shagan, which has been repeatedly associated with AMM activity by COMINT, and their installation around Moscow, already heavily defended by a variety of SAM systems, causes retention of the term "possible AMM associated." It is believed this term must be retained until such time as evidence reveals that the Soviets do not plan to introduce an AMM into the Moscow defense system concurrent with the completion of the building triad sites, or evidence reveals that the building triads at Sary Shagan are being tested in a role other than AMM.

[redacted]

9. As this report will be published for maximum distribution, this project is not considered complete.

[redacted]

Enclosures:
Twenty-six (26) (See List of Attachments)

[redacted]

WORKING PAPER

LIST OF ATTACHMENTS

Number	Material	CIA/PID/MEB-P-
1	Angarsk Map & Annotated Photo	619
2	Angarsk Electronics Site (Line Drawing)	620
3	Angarsk Electronics Site, Operations Area (Line Drawing)	632
3A	Angarsk Electronics Site, Support Areas	633
4	Dual Hen House A, Angarsk (Rectified Line Drawing)	678
4A	Dual Hen House A, Angarsk (Perspective View)	680
5	Original Hen House, SSATC, Map & Annotated Photo	674
6	SSATC Instrumentation Site 13, Map & Annotated Photo	675
7	Olenegorsk Dual Hen House Facility	676
8	Possible Azimuths From Hen House Radars U/C	677
9	Sary Shagan ATC Instrumentation Site 13,	(none)
10	Sary Shagan ATC Instrumentation Site 13,	(none)
11	Sary Shagan ATC Instrumentation Site 13,	(none)
12	Sary Shagan ATC Instrumentation Site 13,	(none)
13	Olenegorsk,	(none)
14	Olenegorsk,	(none)
15	Olenegorsk,	(none)
16	Olenegorsk,	(none)
17	Angarsk, 80° Azimuth	(none)
18	Angarsk	(none)
19	Angarsk, 260° Azimuth	(none)
20	Angarsk,	(none)
21	Sary Shagan ATC Radar Site 1,	(none)
21A	Distances and Azimuth Between Possible Related Points	(none)
22	Angarsk Electronics Site, Operations Area	697
23	Annotated Mosaic of Angarsk Elec. Site	698

25X1

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SARY SHAGAN INSTRUMENTATION SITE 13
GEOGRAPHIC COORDINATES [redacted]

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	46-35N	74-31E	1880	37-57N	33-20E	3740	19-07N	5-00E
80	46-32N	72-32E	1940	37-27N	32-14E	3800	18-25N	4-14E
140	46-30N	71-05E	2000	36-57N	31-09E	3860	17-44N	3-28E
200	46-26N	69-39E	2060	36-26N	30-05E	3920	17-02N	2-43E
260	46-21N	68-12E	2120	35-55N	29-02E	3980	16-20N	1-58E
320	46-14N	66-46E	2180	35-22N	28-00E	4040	15-38N	1-14E
380	46-07N	65-20E	2240	34-50N	26-58E	4100	14-56N	0-29E
440	45-59N	63-56E	2300	34-17N	25-58E	4160	14-13N	0-15W
500	45-49N	62-30E	2360	33-43N	24-58E	4220	13-31N	0-58W
560	45-39N	61-05E	2420	33-09N	23-59E	4280	12-48N	1-42W
620	45-27N	59-42E	2480	32-35N	23-00E	4340	12-05N	2-25W
680	45-14N	58-19E	2540	32-00N	22-03E	4400	11-23N	3-08W
740	45-01N	56-56E	2600	31-24N	21-05E	4460	10-40N	3-51W
800	44-47N	55-34E	2660	30-47N	20-09E	4520	9-56N	4-34W
860	44-31N	54-13E	2720	30-10N	19-14E	4580	9-13N	5-16W
920	44-15N	52-53E	2780	29-33N	18-19E	4640	8-30N	5-58W
980	43-57N	51-33E	2840	28-56N	17-25E	4700	7-47N	6-40W
1040	43-39N	50-14E	2900	28-21N	16-32E	4760	7-03N	7-22W
1100	43-20N	48-56E	2960	27-43N	15-39E	4820	6-20N	8-04W
1160	43-00N	47-38E	3020	27-05N	14-46E	4880	5-36N	8-46W
1220	42-39N	46-22E	3080	26-27N	13-55E	4940	4-53N	9-27W
1280	42-17N	45-06E	3140	25-48N	13-03E	5000	4-09N	10-09W
1340	41-54N	43-52E	3200	25-09N	12-13E			
1400	41-31N	42-38E	3260	24-30N	11-23E			
1460	41-07N	41-25E	3320	23-50N	10-34E			
1520	40-42N	40-13E	3380	23-11N	9-45E			
1580	40-16N	39-02E	3440	22-31N	8-56E			
1640	39-49N	37-52E	3500	21-50N	8-08E			
1700	39-22N	36-42E	3560	21-10N	7-20E			
1760	38-55N	35-34E	3620	20-29N	6-33E			
1820	38-26N	34-26E	3680	19-48N	5-46E			

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SARY SHAGAN INSTRUMENTATION SITE 13
GEOGRAPHIC COORDINATES [redacted] 25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Deg Min	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	46-35N	74-31E	1860	38-59N	115-53E	3720	20-35N	144-57E
60	46-36N	75-58E	1920	38-30N	117-01E	3780	19-54N	145-44E
120	46-35N	77-25E	1980	38-01N	118-07E	3840	19-13N	146-30E
180	46-33N	78-52E	2040	37-32N	119-13E	3900	18-31N	147-16E
240	46-30N	80-19E	2100	37-01N	120-18E	3960	17-50N	148-02E
300	46-27N	81-46E	2160	36-30N	121-22E	4020	17-08N	148-47E
360	46-21N	83-12E	2220	35-59N	122-26E	4080	16-26N	149-32E
420	46-15N	84-38E	2280	35-27N	123-28E	4140	15-44N	150-17E
480	46-08N	86-04E	2340	34-54N	124-30E	4200	15-02N	151-01E
540	46-00N	87-29E	2400	34-22N	125-31E	4260	14-19N	151-45E
600	45-51N	88-54E	2460	33-48N	126-30E	4320	13-37N	152-29E
660	45-40N	90-19E	2520	33-14N	127-30E	4380	12-54N	153-12E
720	45-29N	91-43E	2580	32-40N	128-28E	4440	12-12N	153-56E
780	45-17N	93-06E	2640	32-05N	129-26E	4500	11-29N	154-39E
840	45-03N	94-29E	2700	31-29N	130-23E	4560	10-46N	155-22E
900	44-49N	95-51E	2760	30-54N	131-19E	4620	10-03N	156-04E
960	44-33N	97-12E	2820	30-17N	132-15E	4680	09-19N	156-47E
1020	44-17N	98-33E	2880	29-41N	133-10E	4740	08-36N	157-29E
1080	44-00N	99-53E	2940	29-04N	134-04E	4800	07-53N	158-11E
1140	43-42N	101-12E	3000	28-27N	134-57E	4860	07-09N	158-53E
1200	43-23N	102-30E	3060	27-49N	135-50E	4920	06-26N	159-35E
1260	43-03N	103-47E	3120	27-11N	136-43E	5000	05-28N	160-30E
1320	42-42N	105-04E	3180	26-33N	137-35E			
1380	42-20N	106-20E	3240	25-54N	138-26E			
1440	41-58N	107-34E	3300	25-15N	139-16E			
1500	41-34N	108-48E	3360	24-36N	140-06E			
1560	41-10N	110-01E	3420	23-56N	140-56E			
1620	40-45N	111-13E	3480	23-16N	141-45E			
1680	40-20N	112-25E	3540	22-36N	142-34E			
1740	39-53N	113-35E	3600	21-56N	143-22E			
1800	39-26N	114-44E	3660	21-16N	144-10E			

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SARY SHAGAN INSTRUMENTATION SITE 13
GEOGRAPHIC COORDINATES

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	46-35N	74-31E	1880	26-00N	44-54E	3740	1-25N	25-08E
80	45-57N	73-02E	1940	25-14N	44-11E	3800	37N	24-33E
140	45-25N	71-49E	2000	24-28N	43-28E	3860	12S	23-57E
200	44-52N	70-38E	2060	11-34N	15-32E	3920	1-01S	23-22E
260	44-19N	69-29E	2120	22-56N	42-03E	3980	1-49S	22-46E
320	43-44N	68-20E	2180	22-10N	41-22E	4040	2-38S	22-11E
380	43-09N	67-13E	2240	21-24N	40-41E	4100	3-27S	21-35E
440	42-34N	66-08E	2300	20-37N	40-00E	4160	4-15S	21-00E
500	41-58N	65-03E	2360	19-50N	39-20E	4220	5-04S	20-24E
560	41-21N	64-00E	2420	19-03N	38-40E	4280	5-52S	19-48E
620	40-43N	62-58E	2480	18-16N	38-01E	4340	6-41S	19-13E
680	40-05N	61-57E	2540	17-29N	37-22E	4400	7-29S	18-37E
740	39-27N	60-57E	2600	16-41N	36-43E	4460	8-18S	18-00E
800	38-48N	59-58E	2660	15-54N	36-04E	4520	9-06S	17-24E
860	38-08N	59-01E	2720	15-06N	35-26E	4580	9-54S	16-48E
920	37-29N	58-04E	2780	14-19N	34-48E	4640	10-43S	16-11E
980	36-48N	57-08E	2840	13-31N	34-11E	4700	11-31S	15-34E
1040	36-07N	56-14E	2900	12-43N	33-33E	4760	12-19S	14-57E
1100	35-26N	55-20E	2960	11-55N	32-56E	4820	13-07S	14-20E
1160	34-45N	54-27E	3020	11-07N	32-19E	4880	13-55S	13-43E
1220	34-03N	53-35E	3080	10-19N	31-43E	4940	14-42S	13-05E
1280	33-20N	52-44E	3140	9-30N	31-06E	5000	15-30S	12-27E
1340	32-37N	51-54E	3200	8-42N	30-30E			
1400	31-54N	51-05E	3260	7-54N	29-54E			
1460	31-11N	50-16E	3320	7-05N	29-18E			
1520	30-27N	49-28E	3380	6-17N	28-42E			
1580	29-43N	48-41E	3440	5-28N	28-06E			
1640	28-59N	47-54E	3500	4-40N	27-30E			
1700	28-15N	47-08E	3560	3-51N	26-55E			
1760	27-30N	46-23E	3620	3-03N	26-19E			
1820	26-45N	45-38E	3680	2-14N	25-44E			

13763

TOP SECRET CHESS RUFF

ATTACHMENT 11

SARY SHAGAN INSTRUMENTATION SITE 13

GEOGRAPHIC COORDINATES [redacted] 25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0			1860	53-38N	122-26E	3720	40-54N	164-54E
60	47-05N	75-46E	1920	53-30N	124-06E	3780	40-16N	165-55E
120	47-35N	77-03E	1980	53-21N	125-45E	3840	39-38N	166-55E
180	48-04N	78-21E	2040	53-11N	127-24E	3900	38-59N	167-54E
240	48-32N	79-41E	2100	52-59N	129-01E	3960	38-19N	168-52E
300	48-59N	81-02E	2160	52-46N	130-38E	4020	37-40N	169-49E
360	49-25N	82-24E	2220	52-31N	132-13E	4080	36-59N	170-44E
420	49-50N	83-48E	2280	52-16N	133-48E	4140	36-18N	171-39E
480	50-14N	85-14E	2340	51-59N	135-21E	4200	35-37N	172-33E
540	50-36N	86-40E	2400	51-41N	136-54E	4260	34-55N	173-26E
600	50-58N	88-09E	2460	51-21N	138-25E	4320	34-13N	174-19E
660	51-19N	89-38E	2520	51-01N	139-54E	4380	33-31N	175-11E
720	51-38N	91-09E	2580	50-39N	141-23E	4440	32-48N	176-01E
780	51-57N	92-41E	2640	50-16N	142-49E	4500	32-05N	176-50E
840	52-13N	94-14E	2700	49-52N	144-15E	4560	31-22N	177-39E
900	52-30N	95-48E	2760	49-28N	145-39E	4620	30-38N	178-27E
960	52-44N	97-24E	2820	49-02N	147-02E	4680	29-55N	179-13E
1020	52-57N	99-01E	2880	48-35N	148-23E	4740	29-10N	180-00E
1080	53-09N	100-38E	2940	48-07N	149-43E	4800	28-26N	179-14W
1140	53-20N	102-17E	3000	47-38N	151-01E	4860	27-41N	178-29W
1200	53-29N	103-56E	3060	47-09N	152-18E	4920	26-56N	177-44W
1260	53-37N	105-31E	3120	46-38N	153-33E	4980		
1320	53-44N	107-16E	3180	46-07N	154-48E	5000	25-56N	176-45W
1380	53-49N	108-57E	3240	45-35N	156-00E			
1440	53-52N	110-38E	3300	45-02N	157-11E			
1500	53-55N	112-19E	3360	44-29N	158-21E			
1560	53-55N	114-01E	3420	43-55N	159-30E			
1620	53-55N	115-42E	3480	43-20N	160-37E			
1680	53-53N	117-24E	3540	42-44N	161-43E			
1740	53-49N	119-05E	3600	42-08N	162-48E			
1800	53-44N	120-46E	3660	41-31N	163-51E			

ATTACHMENT 13
M/EB 430/64

GLENCORSK

GEOGRAPHIC COORDINATES [redacted] 25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	68-06N	33-55E	3600	46-40N	98-17W			
120	69-41N	30-33E	3720	44-46N	99-11W			
240	71-11N	26-39E	3840	42-52N	100-02W			
360	72-36N	22-07E	3960	40-57N	100-49W			
480	73-53N	16-51E	4080	39-02N	101-34W			
600	75-02N	10-45E	4200	37-07N	102-16W			
720	75-59N	3-46E	4320	35-11N	102-57W			
840	76-43N	4-06W	4440	33-15N	103-35W			
960	77-10N	12-41W	4560	31-19N	104-12W			
1080	77-20N	21-41W	4680	29-22N	104-47W			
1200	77-09N	30-18W	4800	27-26N	105-21W			
1320	76-44N	38-56W	5000	24-11N	106-16E			
1440	76-04N	47-17W						
1560	75-07N	54-21W						
1680	74-00N	60-31W						
1800	72-43N	65-51W						
1920	71-19N	70-27W						
2040	69-49N	74-24W						
2160	68-15N	77-50W						
2280	66-37N	80-48W						
2400	64-56N	83-23W						
2520	63-12N	85-41W						
2640	61-27N	87-42W						
2760	59-39N	89-31W						
2880	57-51N	91-08W						
3000	56-01N	92-36W						
3120	54-10N	93-57W						
3240	52-19N	95-09W						
3360	50-27N	96-17W						
3480	48-34N	97-20W						

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TOP SECRET CHESS RUFF [redacted]

25X1

M/EB 430/64

OLENEGORSK

GEOGRAPHIC COORDINATES [redacted]

25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	68-07N	33-55E	2040	36-57N	58-09E	4080	3-48N	66-59E
80	67-18N	35-26E	2100	35-59N	58-29E	4140	2-49N	67-12E
120	66-29N	36-51E	2160	35-02N	58-49E	4200	1-50N	67-26E
180	65-38N	38-11E	2220	34-03N	59-08E	4260	0-52N	67-39E
240	64-47N	39-25E	2280	33-05N	59-27E	4320	0-07S	67-52E
300	63-56N	40-35E	2340	32-07N	59-46E	4380	1-06S	68-05E
360	63-03N	41-41E	2400	31-09N	60-04E	4440	2-05S	68-18E
420	62-11N	42-43E	2460	30-11N	60-22E	4500	3-04S	68-31E
480	61-18N	43-41E	2520	29-13N	60-39E	4560	4-03S	68-45E
540	60-24N	44-36E	2580	28-14N	60-56E	4620	5-02S	68-58E
600	59-31N	45-29E	2640	27-16N	61-13E	4680	6-00S	69-11E
660	58-36N	46-18E	2700	26-18N	61-29E	4740	6-59S	69-25E
720	57-42N	47-05E	2760	25-19N	61-46E	4800	8-01S	69-38E
780	56-47N	47-50E	2820	24-21N	62-02E	4860	8-57S	69-51E
840	55-52N	48-33E	2880	23-22N	62-17E	4920	9-56S	70-05E
900	54-57N	49-13E	2940	22-54N	62-33E	5000	11-13S	70-23E
960	54-01N	49-52E	3000	21-25N	62-48E			
1020	53-05N	50-29E	3060	20-27N	63-03E			
1080	52-10N	51-05E	3120	19-28N	63-18E			
1140	51-14N	51-39E	3180	18-30N	63-33E			
1200	50-17N	52-12E	3240	17-31N	63-47E			
1260	49-21N	52-43E	3300	16-33N	64-02E			
1320	48-24N	53-14E	3360	15-34N	64-16E			
1380	47-28N	53-43E	3420	14-36N	64-30E			
1440	46-31N	54-11E	3480	13-36N	64-44E			
1500	45-34N	54-38E	3540	12-37N	64-58E			
1560	44-37N	55-05E	3600	11-39N	65-12E			
1620	43-40N	55-31E	3660	10-40N	65-25E			
1680	42-42N	55-55E	3720	9-41N	65-39E			
1740	41-45N	56-19E	3780	8-42N	65-52E			
1800	40-48N	56-42E	3840	7-44N	66-05E			
1860	39-50N	57-05E	3900	-	-			
1920	38-53N	57-27E	3960	-	-			
1980	37-55N	57-48E	4020	-	-			

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OLENYOGORSK

GEOGRAPHIC COORDINATES [redacted] 25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	68-07N	33-55E	2000	59-12N	44-21W	3980	30-48N	69-17W
80	68-40N	30-21E	2060	58-27N	45-39W	4040	29-53N	69-44W
140	69-00N	27-45E	2120	57-42N	46-52W	4100	28-58N	70-11W
200	69-17N	25-05E	2180	56-55N	48-02W	4160	28-02N	70-37W
260	69-32N	22-20E	2240	56-08N	49-09W	4220	27-07N	71-03W
320	69-45N	19-32E	2300	55-20N	50-13W	4280	26-11N	71-29W
380	69-54N	16-41E	2360	54-32N	51-15W	4340	25-15N	71-54W
440	70-01N	13-48E	2420	53-43N	52-14W	4400	24-20N	72-19W
500	70-05N	10-53E	2480	52-54N	53-11W	4460	23-24N	72-43W
560	70-06N	7-58E	2540	52-04N	54-06W	4520	22-28N	73-07W
620	70-05N	5-02E	2600	51-14N	54-59W	4580	21-32N	73-31W
680	70-00N	2-08E	2660	50-24N	55-50W	4640	20-36N	73-55W
740	69-53N	45W	2720	49-33N	56-39W	4700	19-39N	74-18W
800	69-43N	3-36W	2780	48-42N	57-27W	4760	18-43N	74-41W
860	69-30N	6-23W	2840	47-50N	58-13W	4820	17-47N	75-03W
920	69-15N	9-07W	2900	46-58N	58-57W	4880	16-51N	75-26W
980	68-57N	11-47W	2960	46-06N	59-40W	4940	15-54N	75-48W
1040	68-36N	14-22W	3020	45-14N	60-22W	5000	14-58N	76-10W
1100	68-13N	16-52W	3080	44-21N	61-02W			
1160	67-49N	19-17W	3140	43-28N	61-42W			
1220	67-22N	21-37W	3200	42-35N	62-20W			
1280	66-53N	23-52W	3260	41-41N	62-57W			
1340	66-22N	26-01W	3320	40-47N	63-33W			
1400	65-49N	28-05W	3380	39-54N	64-08W			
1460	65-15N	30-03W	3440	39-00N	64-42W			
1520	64-40N	31-57W	3500	38-06N	65-16W			
1580	64-03N	33-46W	3560	37-12N	65-48W			
1640	63-25N	35-29W	3620	36-18N	66-20W			
1700	62-45N	37-09W	3680	35-23N	66-51W			
1760	62-05N	38-44W	3740	34-28N	67-21W			
1820	61-23N	40-14W	3800	33-34N	67-51W			
1880	60-40N	41-41W	3860	32-39N	68-20W			
1940	59-57N	43-04W	3920	31-44N	68-49W			

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CHELYABINSK

GEOGRAPHIC COORDINATES [redacted] 25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	68-07N	33-55E	2040	43-15N	78-19E	4080	11-55N	93-49E
60	67-41N	36-19E	2100	42-22N	78-57E	4140	10-59N	94-10E
120	67-14N	38-37E	2160	41-29N	79-34E	4200	10-02N	94-31E
180	66-45N	40-51E	2220	40-35N	80-10E	4260	9-06N	94-52E
240	66-14N	42-59E	2280	39-41N	80-44E	4320	8-09N	95-13E
300	65-41N	45-01E	2340	38-47N	81-18E	4380	7-12N	95-34E
360	65-06N	46-59E	2400	37-53N	81-52E	4440	6-16N	95-55E
420	64-31N	48-51E	2460	36-59N	82-24E	4500	5-19N	96-15E
480	63-53N	50-38E	2520	36-05N	82-56E	4560	4-22N	96-36E
540	63-15N	52-21E	2580	35-10N	83-27E	4620	3-26N	96-57E
600	62-35N	53-59E	2640	34-15N	83-57E	4680	2-29N	97-17E
660	61-54N	55-33E	2700	33-20N	84-26E	4740	1-32N	97-37E
720	61-12N	57-03E	2760	32-25N	84-55E	4800	0-35N	97-58E
780	60-30N	58-29E	2820	31-30N	85-24E	4860	0-21S	98-19E
840	59-46N	59-51E	2880	30-35N	85-52E	4920	1-18S	98-39E
900	59-01N	61-09E	2940	29-40N	86-19E	5000	2-34S	99-06E
960	58-16N	62-25E	3000	28-44N	86-46E			
1020	57-30N	63-37E	3060	27-49N	87-12E			
1080	56-44N	64-46E	3120	26-53N	87-38E			
1140	55-56N	65-52E	3180	25-58N	88-03E			
1200	55-08N	66-56E	3240	25-02N	88-29E			
1260	54-20N	67-57E	3300	24-06N	88-53E			
1320	53-31N	68-56E	3360	23-10N	89-18E			
1380	52-42N	69-52E	3420	22-14N	89-42E			
1440	51-52N	70-47E	3480	21-18N	90-05E			
1500	51-02N	71-39E	3540	20-22N	90-29E			
1560	50-11N	72-30E	3600	19-26N	90-52E			
1620	49-20N	73-18E	3660	18-30N	91-15E			
1680	48-29N	74-06E	3720	17-34N	91-37E			
1740	47-37N	74-51E	3780	16-37N	92-00E			
1800	46-46N	75-36E	3840	15-41N	92-22E			
1860	45-53N	76-18E	3900	14-45N	92-44E			
1920	45-01N	77-00E	3960	13-48N	93-06E			
1980	44-08N	77-40E	4020	12-51N	93-27E			

25X1

GEOGRAPHIC COORDINATES [redacted]

25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0			1980	46-35N	154-21E	3960	24-53N	174-26W
60	53-03N	104-53E	2040	46-40N	155-35E	4020	24-07N	173-43W
120	53-11N	106-32E	2100	46-38N	156-49E	4080	23-21N	173-00W
180	53-18N	108-11E	2160	46-01N	158-00E	4140	22-35N	172-18W
240	53-24N	109-51E	2220	44-28N	159-11E	4200	21-49N	171-37W
300	53-28N	111-31E	2280	43-54N	160-20E	4260	21-03N	170-56W
360	53-31N	113-11E	2340	43-20N	161-28E	4320	20-16N	170-15W
420	53-32N	114-52E	2400	42-49N	162-34E	4380	19-30N	169-35W
480	53-32N	116-32E	2460	42-09N	163-40E	4440	18-43N	168-55W
540	53-31N	118-13E	2520	41-33N	164-44E	4500	17-56N	168-15W
600	53-26N	119-52E	2580	40-57N	165-47E	4560	17-09N	167-36W
660	53-24N	121-33E	2640	40-19N	166-49E	46-20	16-22N	166-57W
720	53-18N	123-13E	2700	39-41N	167-49E	4680	15-34N	166-18W
780	53-11N	124-52E	2760	39-03N	168-49E	4740	14-47N	165-40W
840	53-03N	126-31E	2820	38-24N	169-47E	4800	13-59N	165-02W
900	52-53N	128-09E	2880	37-45N	170-45E	4860	13-12N	164-24W
960	52-42N	129-46E	2940	37-05N	171-41E	49-20	12-24N	163-47W
1020	52-30N	131-22E	3000	36-25N	172-37E	4980	---	---
1080	52-16N	132-58E	3060	35-44N	173-31E	5000	11-20N	162-57W
1140	52-01N	134-32E	3120	35-03N	174-25E			
1200	51-45N	136-06E	3180	34-21N	175-18E			
1260	51-28N	137-38E	3240	33-39N	176-09E			
1320	51-09N	139-09E	3300	32-57N	177-00E			
1380	50-49N	140-38E	3360	32-15N	177-51E			
1440	50-28N	142-07E	3420	31-32N	178-40E			
1500	50-06N	143-34E	3480	30-49N	179-29E			
1560	49-43N	145-00E	3540	30-05N	179-43W			
1620	49-19N	146-24E	3600	29-21N	178-56W			
1680	48-54N	147-47E	3660	28-37N	178-10W			
1740	48-28N	149-08E	3720	27-53N	177-24W			
1800	48-01N	150-28E	3780	27-08N	176-38W			
1860	47-33N	151-47E	3840	26-23N	175-54W			
1920	47-04N	153-05E	3900	25-38N	175-10W			

13763

TOP SECRET CHESS RUFF [redacted]

25X1

TOP SECRET CHESS PUFF [redacted] 25X1

GEOGRAPHIC COORD[redacted] [redacted] 25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	52-53N	103-15E	1880	[illegible]-29N	45-43E	3740	43-46N	01-39E
80	53-47N	101-13E	1940	[illegible]-15N	43-45E	3800	43-04N	00-45E
140	54-21N	99-49E	2000	[illegible]-00N	41-49E	3860	42-18N	00-09W
200	54-54N	98-23E	2060	[illegible]-43N	39-55E	3920	41-32N	01-01W
260	55-26N	96-55E	2120	[illegible]-24N	38-03E	3980	40-46N	01-52W
320	55-58N	95-24E	2180	[illegible]-04N	36-13E	4040	39-18N	03-30W
380	56-28N	93-51E	2240	[illegible]-42N	34-25E	4100	38-49N	03-54W
440	56-56N	92-16E	2300	[illegible]-19N	32-40E	4160	38-26N	04-17W
500	57-24N	90-38E	2360	[illegible]-54N	30-57E	4220	37-38N	05-04W
560	57-50N	88-57E	2420	[illegible]-28N	29-16E	4280	36-50N	05-49W
620	58-15N	87-15E	2480	[illegible]-01N	27-38E	4340	36-02N	06-34W
680	58-38N	85-30E	2540	[illegible]-32N	26-02E	4400	35-14N	07-16W
740	59-00N	83-42E	2600	[illegible]-03N	24-28E	4460	34-25N	08-01W
800	59-21N	81-53E	2660	[illegible]-32N	22-57E	4520	33-36N	08-43W
860	59-40N	80-01E	2720	[illegible]-00N	21-29E	4580	32-47N	09-24W
920	59-57N	78-07E	2780	[illegible]-27N	20-02E	4640	31-58N	10-04W
980	60-13N	76-11E	2840	[illegible]-52N	18-38E	4700	31-08N	10-44W
1040	60-27N	74-14E	2900	[illegible]-17N	17-17E	4760	30-18N	11-23W
1100	60-39N	72-15E	2960	[illegible]-41N	15-57E	4820	29-28N	12-01W
1160	60-49N	70-14E	3020	[illegible]-05N	14-40E	4880	28-38N	12-39W
1220	60-58N	68-13E	3080	[illegible]-27N	13-25E	4940	27-48N	13-16W
1280	61-05N	66-10E	3140	[illegible]-49N	12-11E	5000	26-57N	13-53W
1340	61-10N	64-07E	3200	[illegible]-09N	11-00E			
1400	61-13N	62-03E	3260	[illegible]-29N	09-51E			
1460	61-14N	59-59E	3320	[illegible]-56N	08-56E			
1520	61-13N	57-55E	3380	[illegible]-08N	07-38E			
1580	61-10N	55-51E	3440	[illegible]-26N	06-34E			
1640	61-06N	53-47E	3500	[illegible]-43N	05-32E			
1700	60-59N	51-45E	3560	[illegible]-00N	04-32E			
1760	60-51N	49-43E	3620	[illegible]-17N	03-33E			
1820	60-41N	47-42E	3680	[illegible]-33N	02-35E			

[redacted] 25X1

25X1

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ANGARIK

GEOGRAPHIC COORDINATES ALONG 260 DEGREE AZIMUTH

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	52-53N	103-15E	2060	36-59N	59-32E	4100	11-24N	34-17E
80	52-38N	101-07E	2120	36-14N	58-27E	4160	10-36N	33-40E
140	52-26N	99-31E	2180	35-33N	57-33E	4220	9-48N	33-03E
200	52-12N	97-43E	2240	34-52N	56-40E	4280	9-00N	32-27E
260	51-56N	96-22E	2300	34-11N	55-47E	4340	8-12N	31-50E
320	51-40N	94-49E	2360	33-29N	54-55E	4400	7-24N	31-14E
380	51-22N	93-17E	2420	32-46N	54-05E	4460	6-36N	30-38E
440	51-03N	91-47E	2480	32-04N	53-15E	4520	5-47N	30-01E
500	50-43N	90-17E	2540	31-21N	52-25E	4580	4-59N	29-25E
560	50-22N	88-49E	2600	30-37N	51-37E	4640	4-11N	28-50E
620	50-00N	87-22E	2660	29-54N	50-49E	4700	3-22N	28-14E
680	49-37N	85-57E	2720	29-10N	50-02E	4760	2-34N	27-38E
740	49-12N	84-33E	2780	28-26N	49-16E	4820	1-45N	27-02E
800	48-47N	83-10E	2840	27-41N	48-30E	4880	0-57N	26-26E
860	48-21N	81-49E	2900	26-57N	47-45E	4940	0-08N	25-51E
920	47-53N	80-29E	2960	26-11N	47-00E	5000	0-40S	25-15E
980	47-25N	79-11E	3020	25-26N	46-16E			
1040	46-56N	77-54E	3080	24-41N	45-33E			
1100	46-26N	76-38E	3140	23-56N	44-50E			
1160	45-56N	75-24E	3200	23-10N	44-07E			
1220	45-24N	74-11E	3260	22-24N	43-25E			
1280	44-52N	73-00E	3320	21-38N	42-44E			
1340	44-19N	71-50E	3380	20-51N	42-03E			
1400	43-45N	70-41E	3440	20-05N	41-22E			
1460	43-11N	69-33E	3500	19-18N	40-42E			
1520	42-36N	68-27E	3560	18-31N	40-02E			
1580	42-00N	67-22E	3620	17-44N	39-22E			
1640	41-24N	66-18E	3680	16-57N	38-43E			
1700	40-47N	65-15E	3740	16-10N	38-04E			
1760	40-08N	64-14E	3800	15-23N	37-26E			
1820	39-31N	63-13E	3860	14-35N	36-48E			
1880	38-53N	62-14E	3920	13-47N	36-10E			
1940	38-14N	61-16E	3980	13-00N	35-32E			
2000	37-34N	60-19E	4040	12-12N	34-55E			

13763

TOP SECRET CHESS RUFF

ATTACHMENT 19

25X1

TOP SECRET CHESS R JFF [redacted] 25X1

M/EB 430/64

GEOGRAPHIC COORDINATES [redacted] 25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0			1860	29-45N	131-28E	3720	02-57N	148-06E
60	52-16N	104-33E	1920	28-55N	132-06E	3780	02-05N	148-35E
120	51-39N	105-49E	1980	28-05N	132-44E	3840	01-12N	149-04E
180	51-01N	107-03E	2040	27-14N	133-21E	3900	00-19N	149-33E
240	50-22N	108-15E	2100	26-24N	133-57E	3960	00-34S	150-02E
300	49-42N	109-25E	2160	25-33N	134-33E	4020	01-27S	150-31E
360	49-02N	110-33E	2220	24-42N	135-08E	4080	02-20S	151-00E
420	48-21N	111-39E	2280	23-51N	135-43E	4140	03-12S	151-29E
480	47-40N	112-43E	2340	23-00N	136-17E	4200	04-05S	151-58E
540	46-57N	113-46E	2400	22-08N	136-51E	4260	04-58S	152-27E
600	46-15N	114-47E	2460	21-17N	137-24E	4320	05-51S	152-57E
660	45-31N	115-46E	2520	20-25N	137-57E	4380	06-43S	153-26E
720	44-48N	116-44E	2580	19-33N	138-30E	4440	07-36S	153-55E
780	44-03N	117-41E	2640	18-42N	139-03E	4500	08-29S	154-25E
840	43-18N	118-36E	2700	17-50N	139-35E	4560	09-21S	154-54E
900	42-33N	119-30E	2760	16-58N	140-06E	4620	10-14S	155-24E
960	41-48N	120-23E	2820	16-06N	140-38E	4680	11-06S	155-54E
1020	41-00N	121-15E	2880	15-13N	141-09E	4740	11-59S	156-24E
1080	40-16N	122-06E	2940	14-21N	141-40E	4800	12-51S	156-55E
1140	39-29N	122-53E	3000	13-29N	142-11E	4860	13-44S	157-25E
1200	38-41N	123-41E	3060	12-37N	142-41E	4920	14-36S	157-56E
1260	37-54N	124-28E	3120	11-44N	143-12E	4980	---	---
1320	37-06N	125-14E	3180	10-52N	143-42E	5000	15-46S	158-37E
1380	36-18N	125-59E	3240	09-59N	144-12E			
1440	35-30N	126-43E	3300	09-06N	144-41E			
1500	34-42N	127-26E	3360	08-14N	145-11E			
1560	33-53N	128-08E	3420	07-21N	145-40E			
1620	33-04N	128-50E	3480	06-28N	146-10E			
1680	32-14N	129-30E	3540	05-36N	146-39E			
1740	31-25N	130-10E	3600	04-43N	147-08E			
1800	30-35N	130-50E	3660	03-50N	147-37E			

SARY SHAGAT AIC RADAR SITE 1

GEOGRAPHIC COORDINATES [redacted] 25X1

Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min	Distance from Site	Latitude Deg Min	Longitude Deg Min
0	45-59N	73-39E	1880	46-09N	27-50E	3740	30-57N	7-12W
80	46-24N	71-38E	1940	45-46N	26-26E	3800	30-19N	8-05W
140	46-39N	70-14E	2000	45-28N	25-06E	3860	29-40N	8-59W
200	46-54N	68-50E	2060	45-09N	23-46E	3920	29-01N	9-51W
260	47-07N	67-24E	2120	44-48N	22-27E	3980	28-22N	10-43W
320	47-20N	65-58E	2180	44-26N	21-08E	4040	27-43N	11-34W
380	47-31N	64-31E	2240	44-04N	19-51E	4100	27-03N	12-24W
440	47-42N	63-04E	2300	43-41N	18-34E	4160	26-23N	13-14W
500	47-51N	61-36E	2360	43-16N	17-19E	4220	25-42N	14-04W
560	47-59N	60-08E	2420	42-51N	16-04E	4280	25-01N	14-52W
620	48-06N	58-39E	2480	42-27N	14-50E	4340	24-20N	15-41W
680	48-12N	57-09E	2540	41-59N	13-38E	4400	23-39N	16-28W
740	48-16N	55-40E	2600	41-32N	12-27E	4460	22-57N	17-15W
800	48-20N	54-10E	2660	41-04N	11-17E	4520	22-15N	18-02W
860	48-21N	52-40E	2720	40-35N	10-07E	4580	21-33N	18-48W
920	48-23N	51-10E	2780	40-06N	8-59E	4640	20-51N	19-34W
980	48-23N	49-40E	2840	39-35N	7-51E	4700	20-09N	20-19W
1040	48-22N	48-10E	2900	39-05N	6-45E	4760	19-26N	21-04W
1100	48-19N	46-40E	2960	38-33N	5-39E	4820	18-43N	21-49W
1160	48-16N	45-11E	3020	38-01N	4-35E	4880	18-00N	22-34W
1220	48-11N	43-41E	3080	37-29N	3-31E	4940	17-17N	23-18W
1280	48-05N	42-12E	3140	36-56N	2-28E	5000	16-34N	24-01W
1340	47-58N	40-43E	3200	36-22N	1-26E			
1400	47-50N	39-15E	3260	35-48N	0-26E			
1460	47-41N	37-47E	3320	35-12N	0-35W			
1520	47-30N	36-19E	3380	34-38N	1-33W			
1580	47-19N	34-53E	3440	34-02N	2-32W			
1640	47-06N	33-27E	3500	33-26N	3-29W			
1700	46-52N	32-01E	3560	32-49N	4-26W			
1760	46-37N	30-37E	3620	32-12N	5-22W			
1820	46-22N	29-13E	3680	31-35N	6-17W			

13763

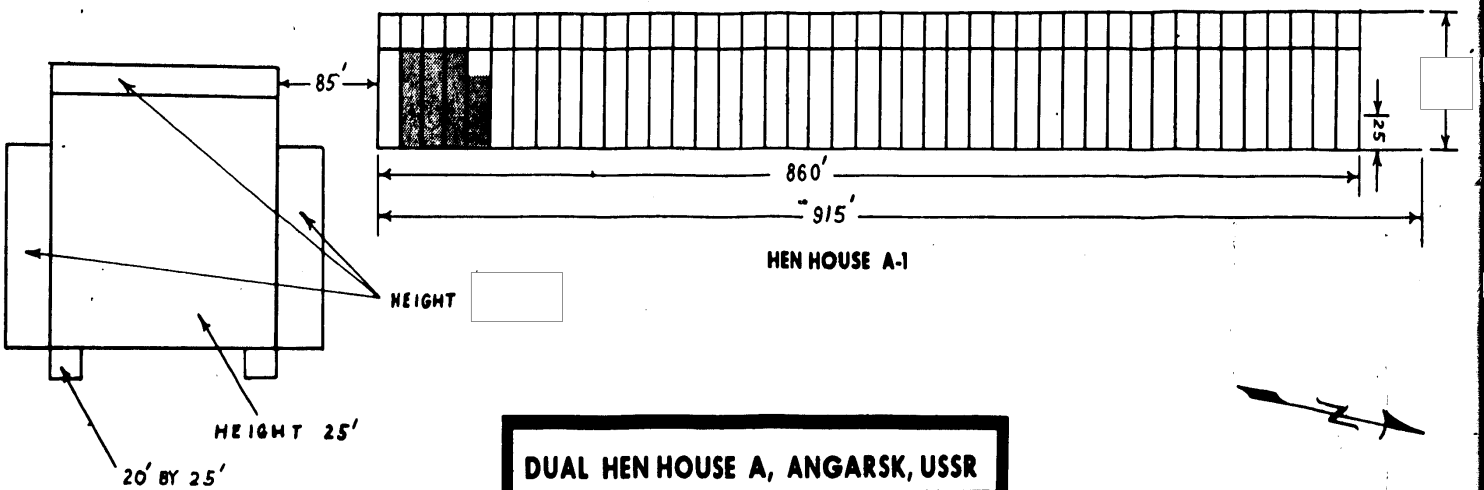
TOP SECRET CHESS RUFF [redacted] ATTACHMENT 21 25X1

AZIMUTHS AND DISTANCES BETWEEN POSSIBLY RELATED POINTS (COMPUTOR DETERMINED)

FROM	TO	DISTANCE (NAUTICAL MILES) (+ or - 10 nm)
52° 53'N 103 15'E (Angarsk)	46 35'N 074 31'E (SSATC I.S. 13)	1,171
46 35'N 074 31'E (SSATC I.S. 13)	52 53'N 103 15'E (Angarsk)	1,171
46 35'N 074 31'E (SSATC I.S. 13)	45 55'N 063 20'E (Tyuratam)	467
45 55'N 063 20'E (Tyuratam)	46 35'N 074 31'E (SSATC I.S. 13)	467
68 06'N 033 55'E (Olenegorsk)	46 35'N 074 31'E (SSATC I.S. 13)	1,787
46 35'N 074 31'E (SSATC I.S. 13)	68 06'N 033 55'E (Olenegorsk)	1,787
52 53'N 103 15'E (Angarsk)	68 06'N 033 54'E (Olenegorsk)	2,107
68 06'N 033 54'E (Olenegorsk)	52 53'N 103 15'E (Angarsk)	2,107
68 06'N 033 54'E (Olenegorsk)	55 29'N 036 41'E (Moscow "A-Frame")	763
55 29'N 036 41'E (Moscow "A-Frame")	68 06'N 033 54'E (Olenegorsk)	763
55 29'N 036 41'E (Moscow "A-Frame")	42 50'N 045 15'E (Intersection "X") (*)	829
42 50'N 045 15'E (Intersection "X") (*)	55 29'N 036 41'E (Moscow "A-Frame")	829
42 50'N 045 15'E (Intersection "X") (*)	46 35'N 074 31'E (SSATC I.S. 13)	1,264
46 35'N 074 31'E (SSATC I.S. 13)	42 50'N 045 15'E (Intersection "X") (*)	1,264

(*) Intersection "X" is the intersection of the [redacted] azimuth out of the Moscow "A-Frame" and the 269° azimuth out of Sary Shagan Instrumentation Site 13.

CIA/PID-P-678/64



HEN HOUSE A-1

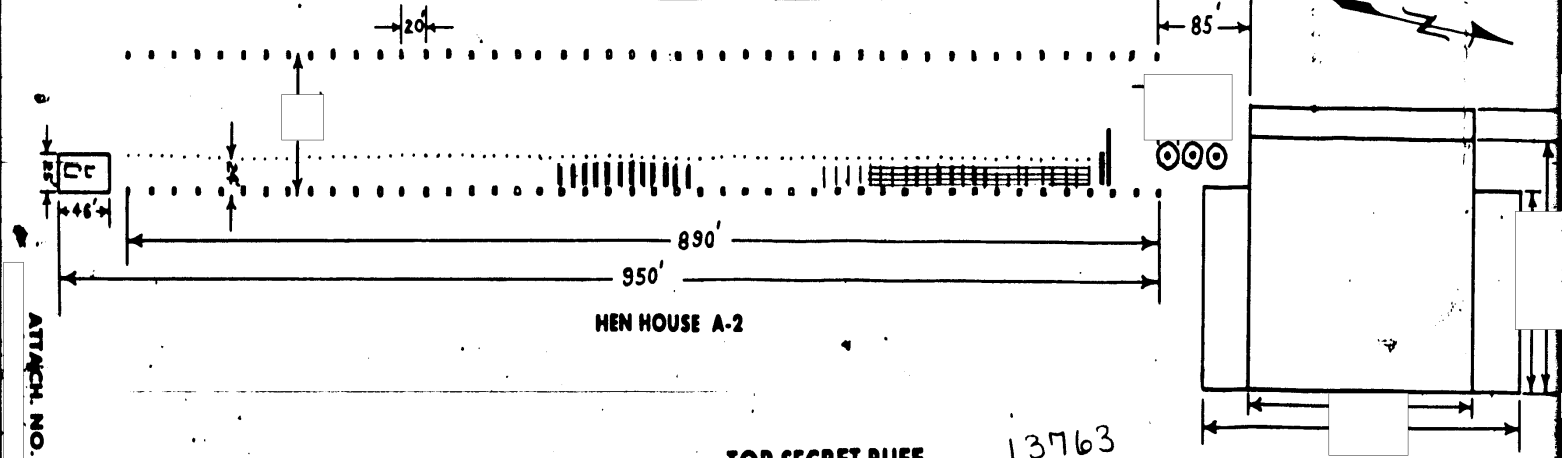
25X1

25X1

DUAL HEN HOUSE A, ANGARSK, USSR

APPROX. SCALE 1 INCH = 100 FEET

25X1



HEN HOUSE A-2

25X1
25X1
25X1
25X1
25X1

ATTACH. NO. 4

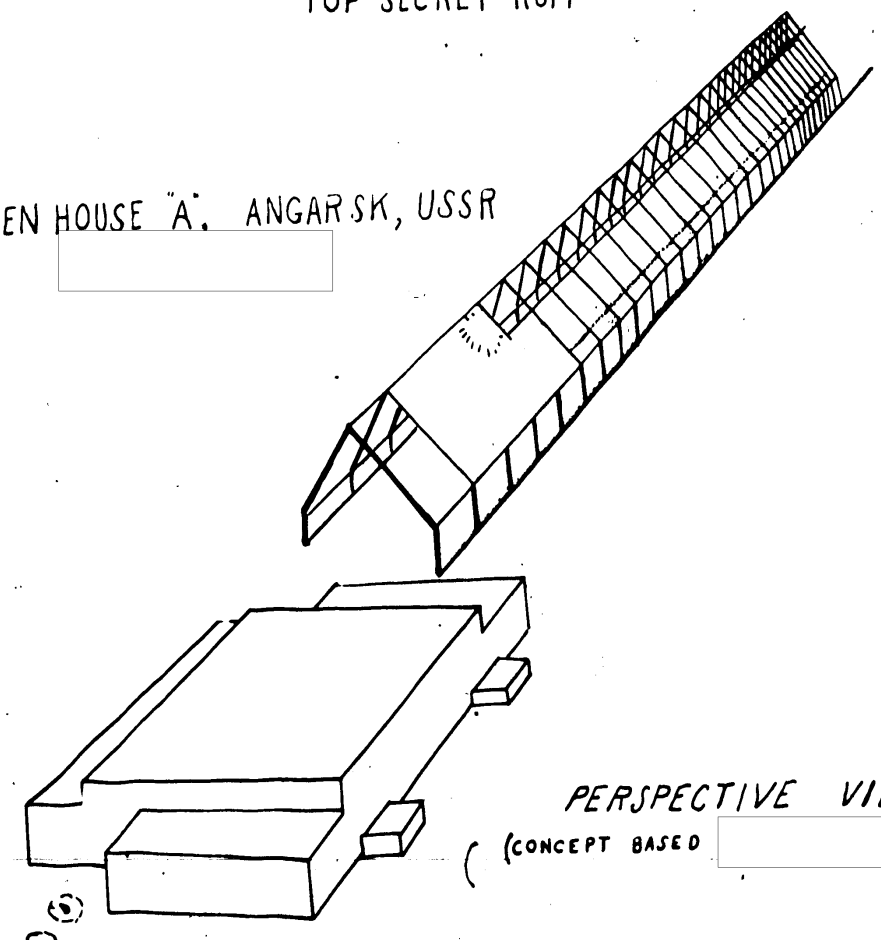
13763

TOP SECRET RUFF

CIA/PID-P-680/64

DUAL HEN HOUSE "A", ANGARSK, USSR

25X1



PERSPECTIVE VIEW

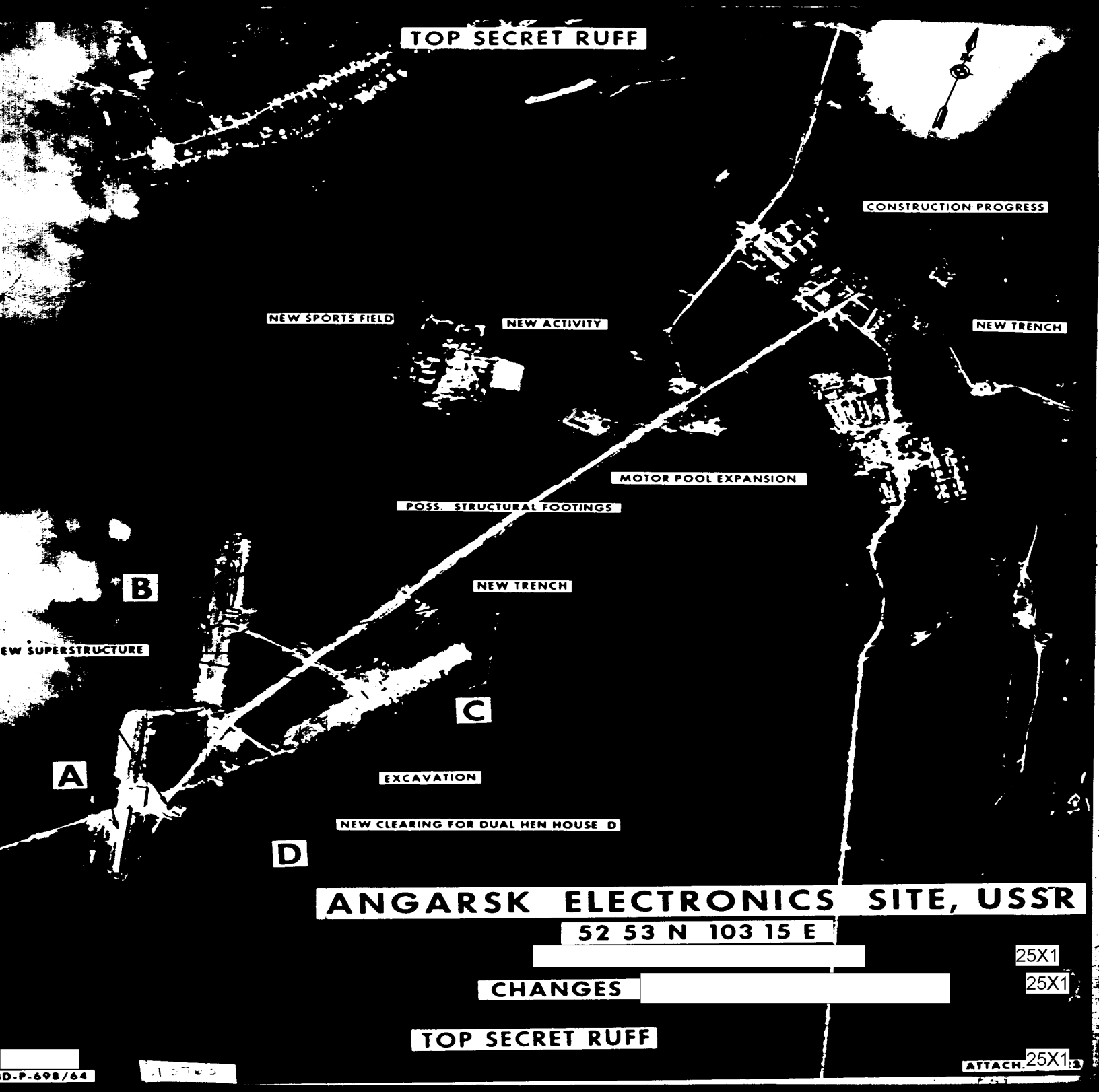
(CONCEPT BASED

25X1

ATTACH NO. 4A

TOP SECRET RUFF

13763



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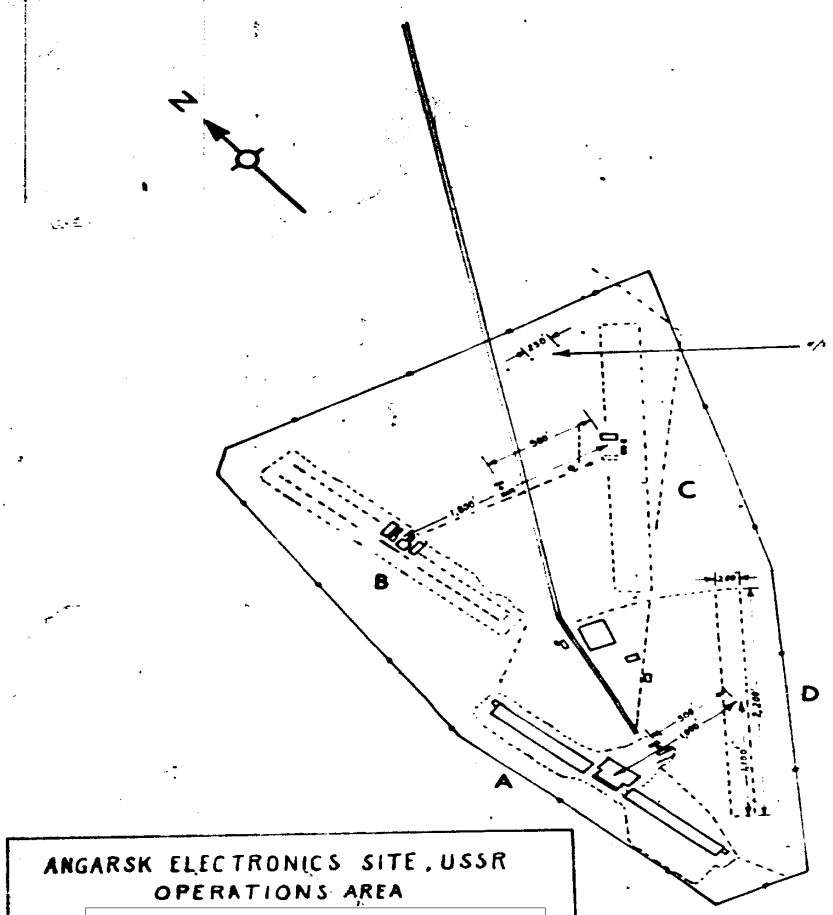

ANGARSK ELECTRONICS SITE, USSR
OPERATIONS AREA

[redacted]

25X1

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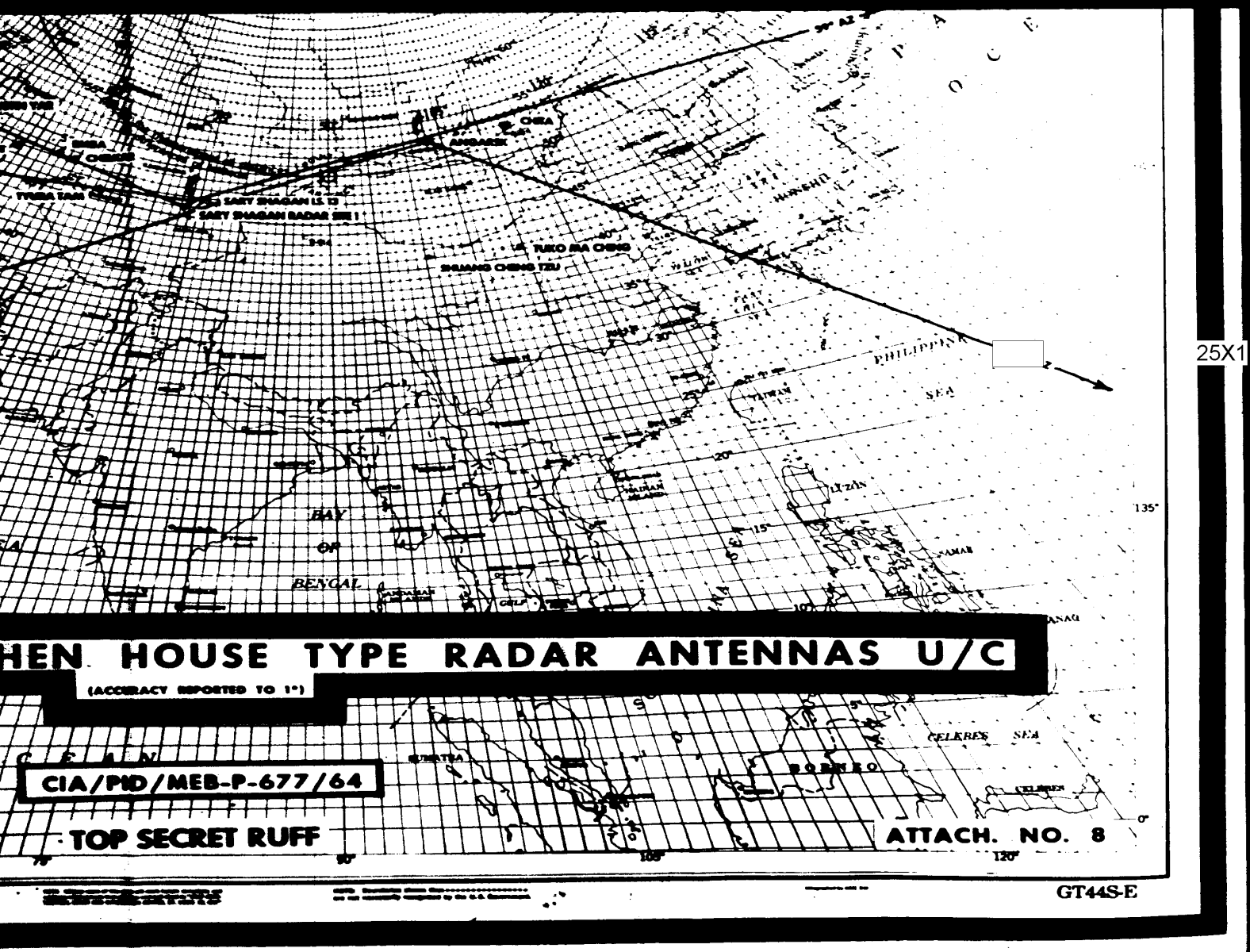
TOP SECRET RUFF

25X1

CIA/PID-P-697/64

ATTACH NO 22



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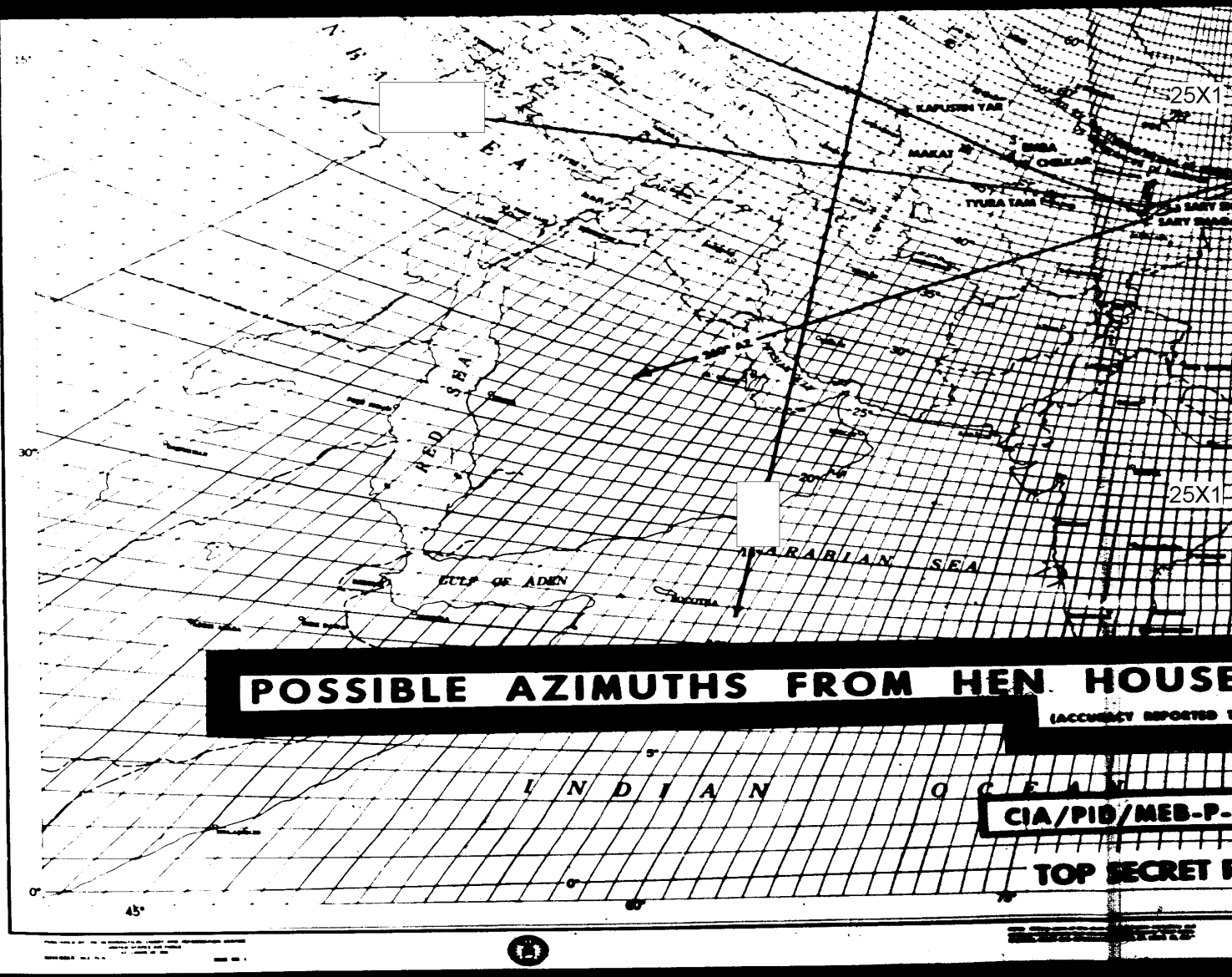
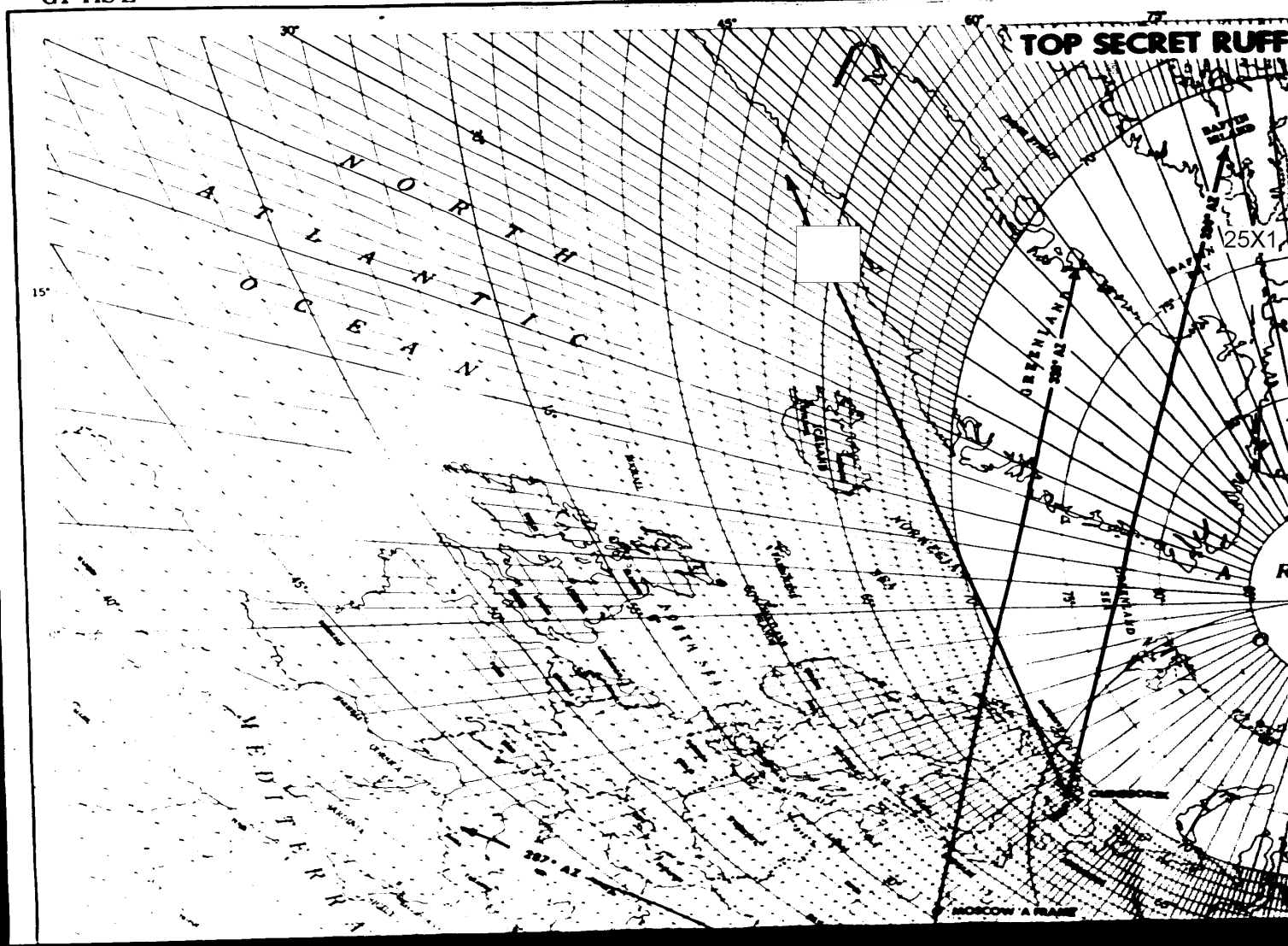


TCS

U. S. AIR FORCE

GT 44S-E

SPECIAL GNOMONIC TRACKI

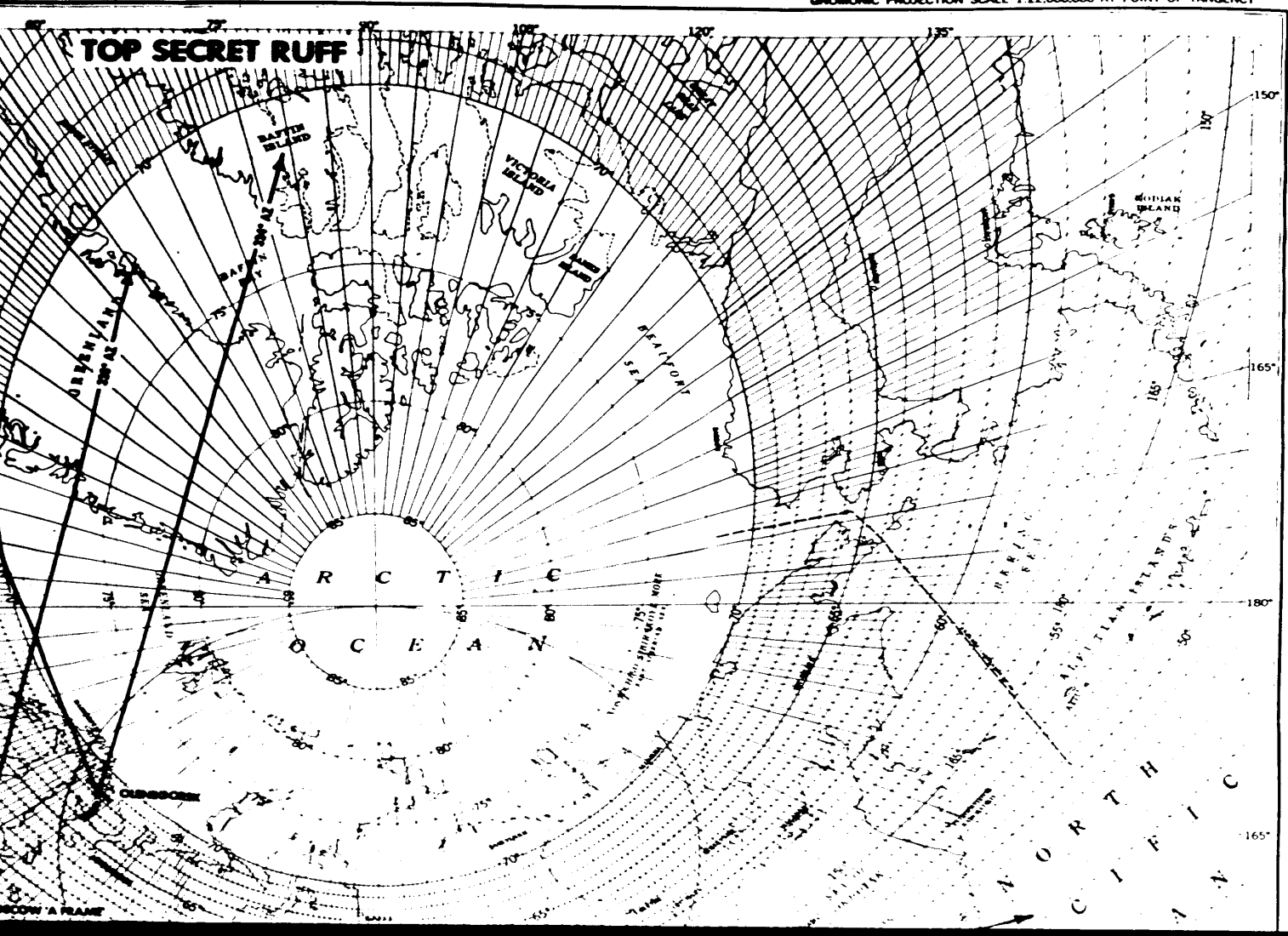


U. S. AIR FORCE

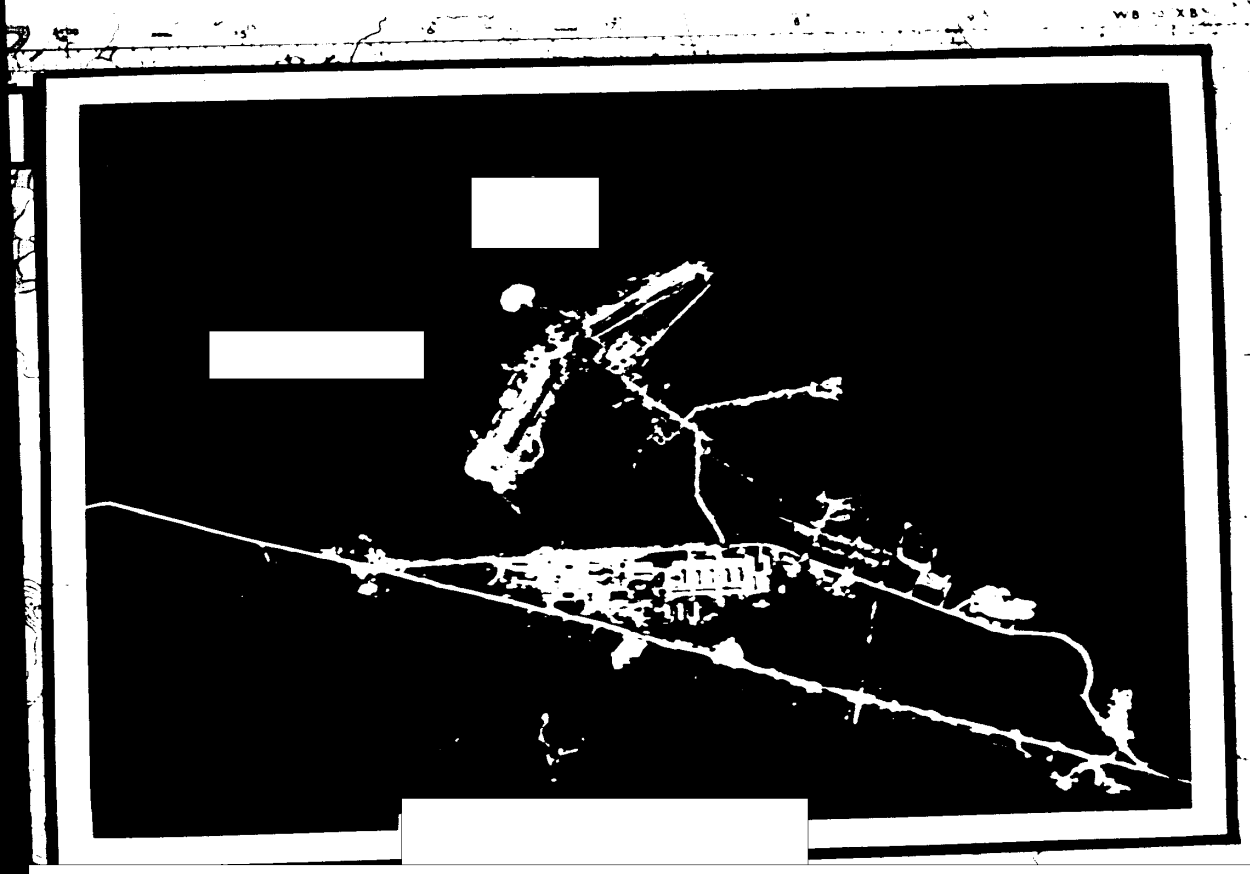
CIAL GNOMONIC TRACKING CHART

GNOMONIC PROJECTION SCALE 1:22,000,000 AT POINT OF TANGENCY

TOP SECRET RUFF



T RUFF



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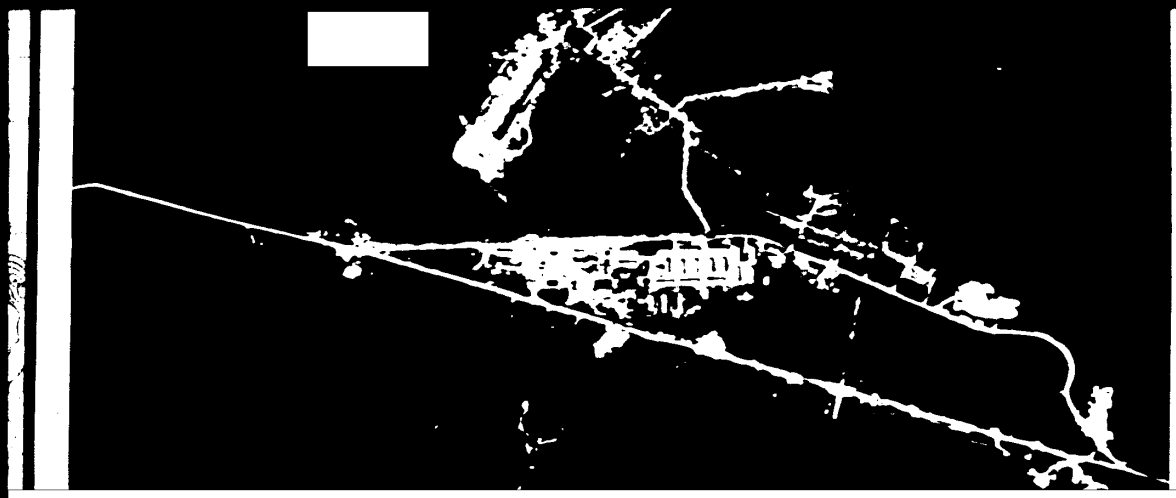

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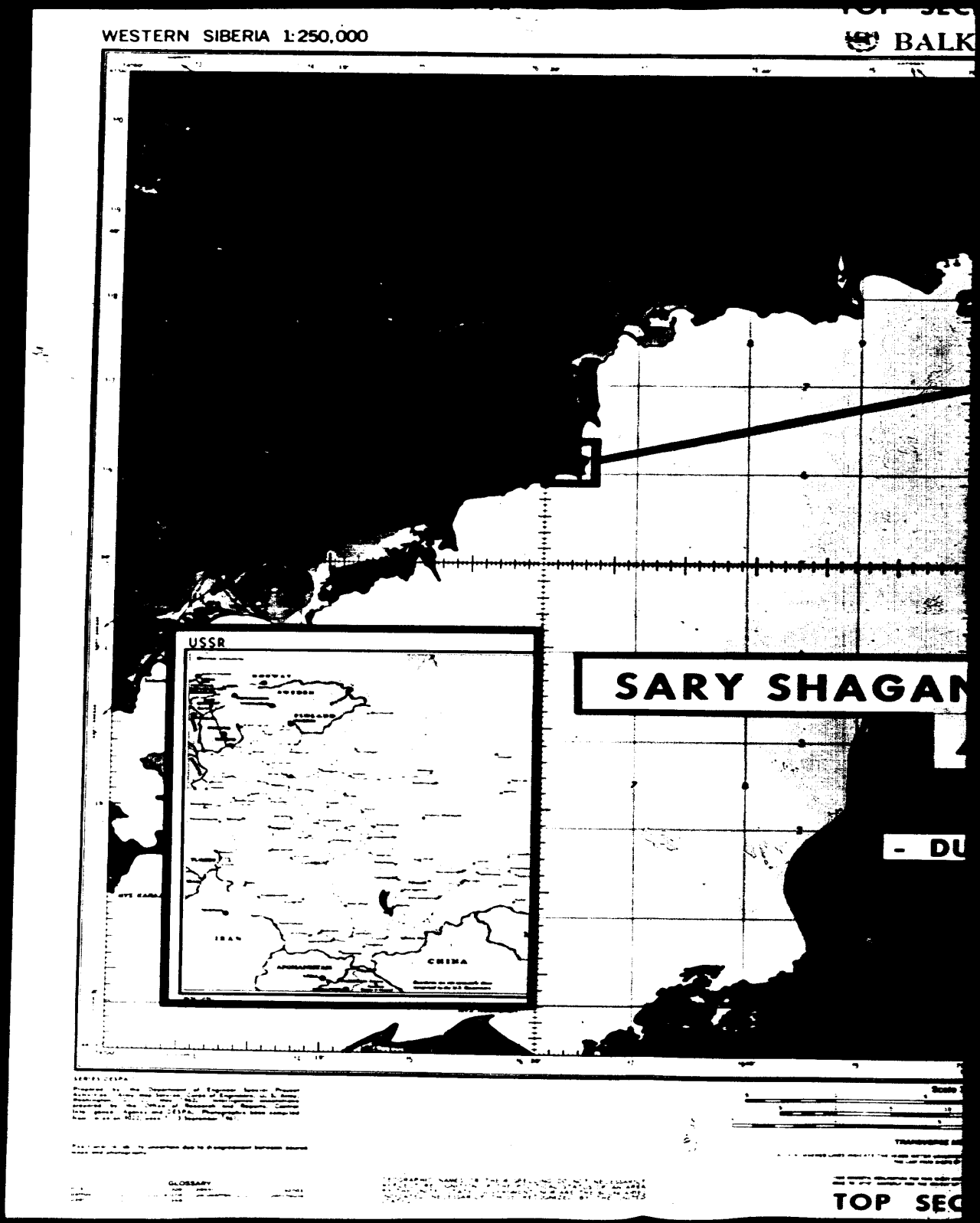

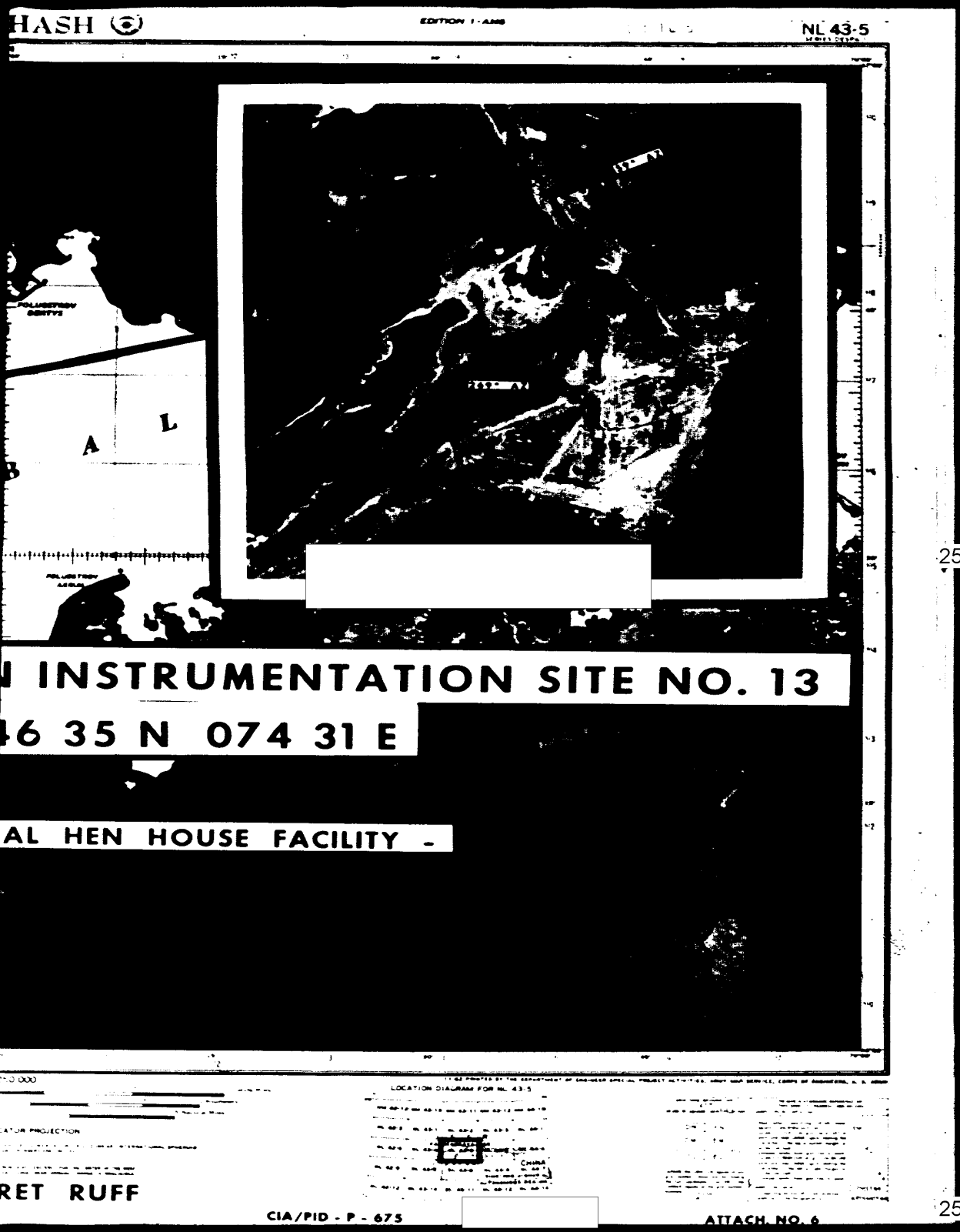

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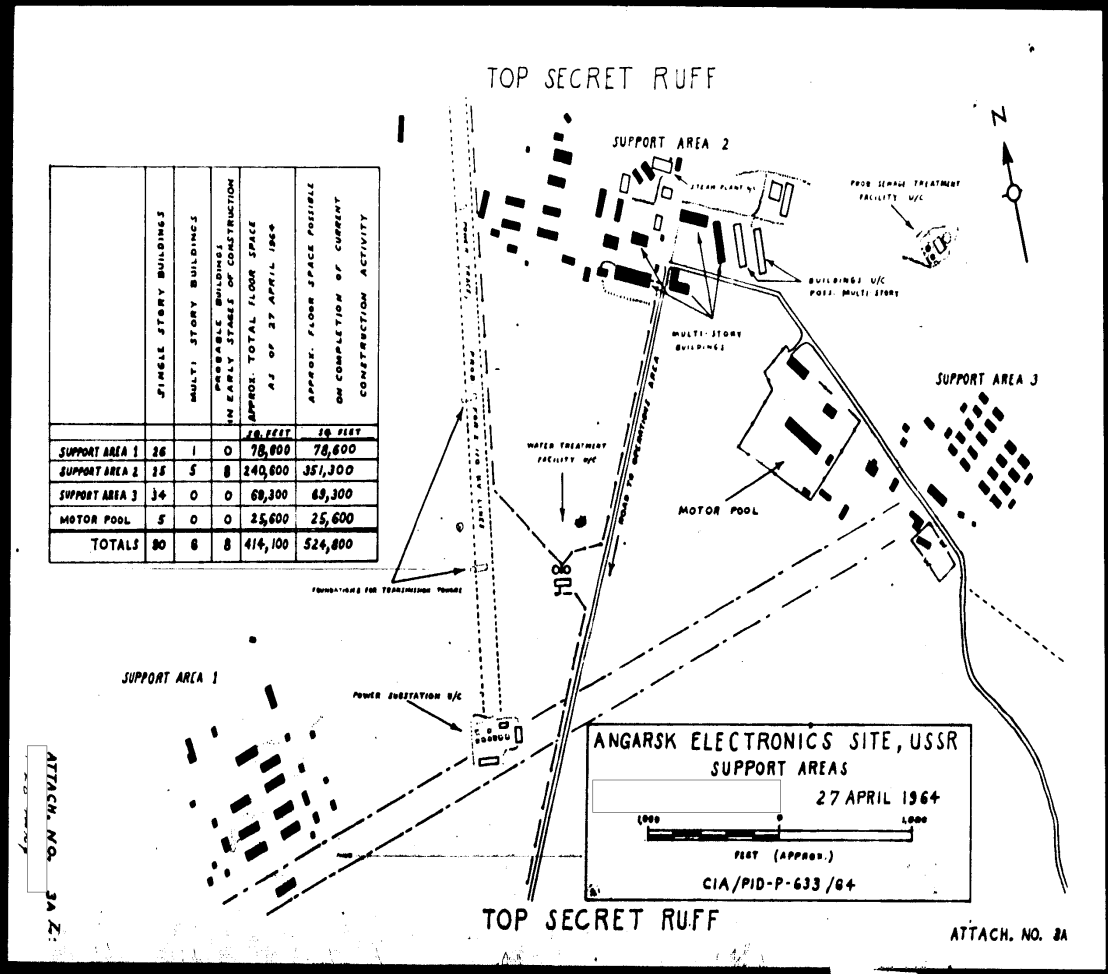
TOP SECRET RUFF

	SINGLE STORY BUILDINGS	MULTI STORY BUILDINGS	PROBABLE BUILDINGS IN EARLY STAGES OF CONSTRUCTION	APPROX. TOTAL FLOOR SPACE AS OF 27 APRIL 1964	APPROX. FLOOR SPACE POSSIBLE ON COMPLETION OF CURRENT CONSTRUCTION ACTIVITY
				SQ. FEET	SQ FEET
SUPPORT AREA 1	26	1	0	78,800	78,600
SUPPORT AREA 2	25	5	8	240,600	351,300
SUPPORT AREA 3	34	0	0	69,300	69,300
MOTOR POOL	5	0	0	25,600	25,600
TOTALS	90	6	8	414,100	524,800



TOP SECRET RUFF

ATTACH. NO. 3A

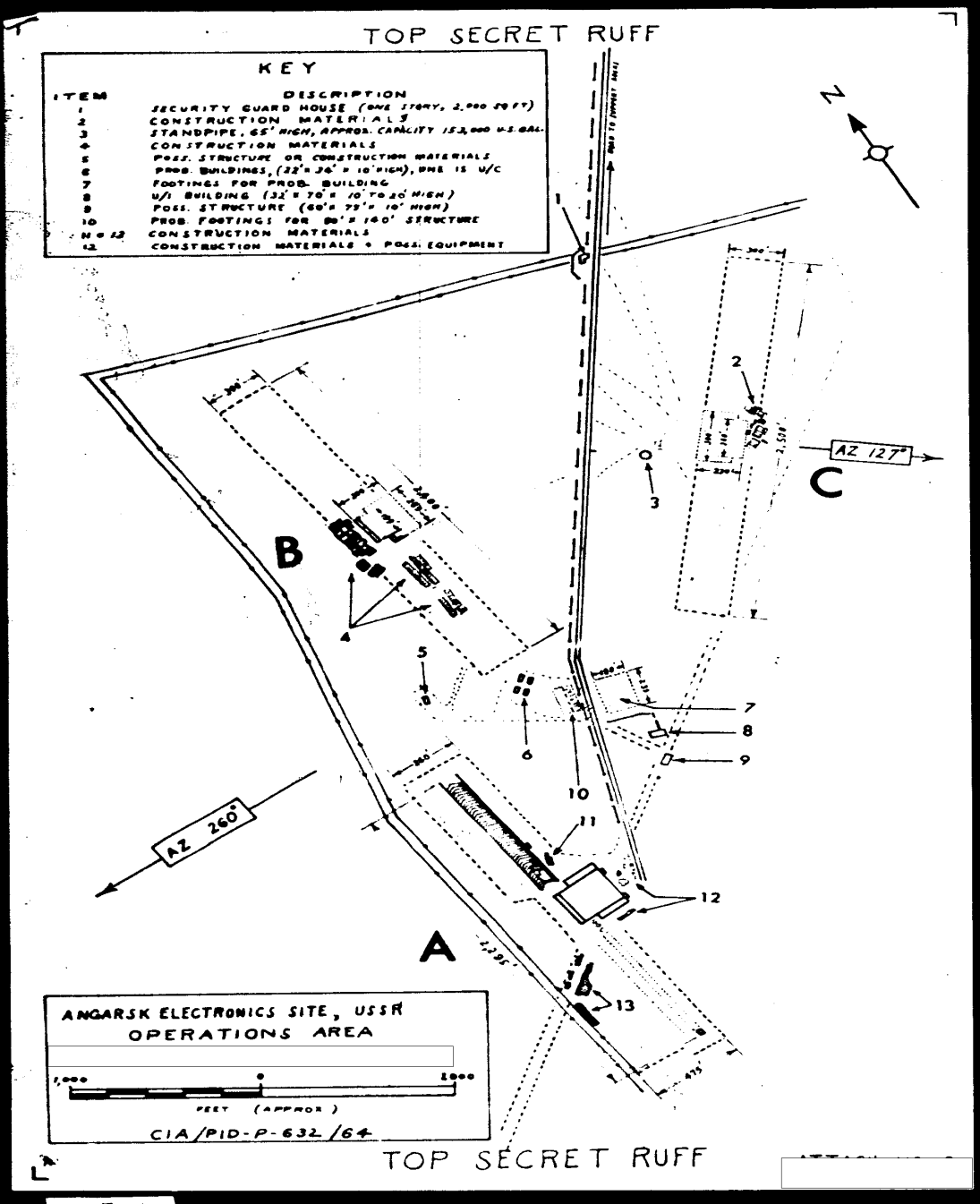
13763

25X1
25X1

TOP SECRET RUFF

KEY

ITEM	DESCRIPTION
1	SECURITY GUARD HOUSE (ONE STORY, 2,000 SQ FT)
2	CONSTRUCTION MATERIALS
3	STANDPIPE, 65' HIGH, APPROX. CAPACITY 153,000 U.S. GAL.
4	CONSTRUCTION MATERIALS
5	POSS. STRUCTURE OR CONSTRUCTION MATERIALS
6	PROB. BUILDINGS, (32' × 26' × 10' HIGH), ONE IS U/C
7	FOOTINGS FOR PROB. BUILDING
8	U/I BUILDING (32' × 70' × 10' TO 20' HIGH)
9	POSS. STRUCTURE (60' × 75' × 10' HIGH)
10	PROB. FOOTINGS FOR 80' × 140' STRUCTURE
11 & 12	CONSTRUCTION MATERIALS
13	CONSTRUCTION MATERIALS & POSS. EQUIPMENT



ANGARSK ELECTRONICS SITE, USSR
OPERATIONS AREA

1,000 0 1,000
FEET (APPROX)

CIA/PID-P-632/64

TOP SECRET RUFF

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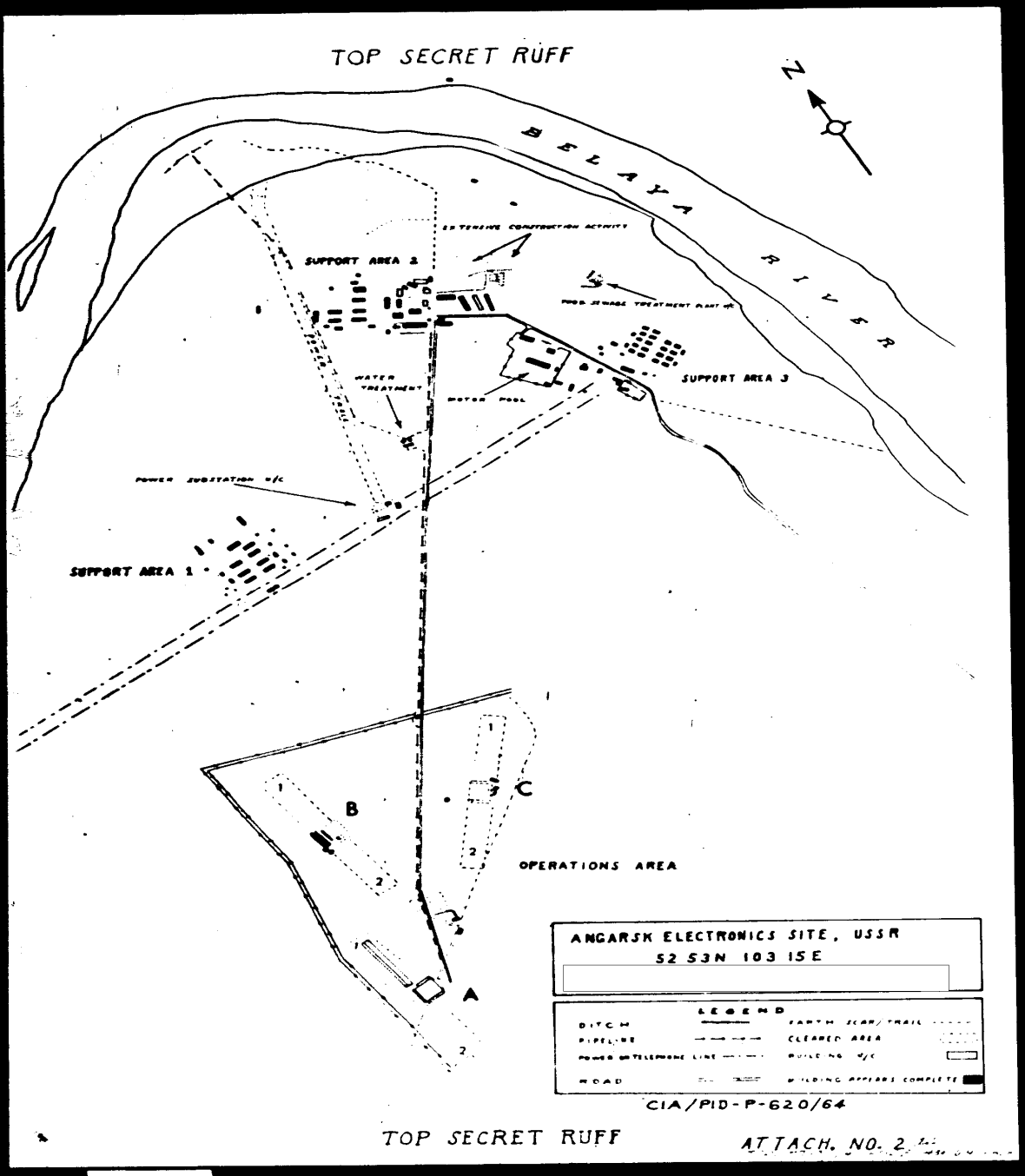
25X1

TOP SECRET RUFF

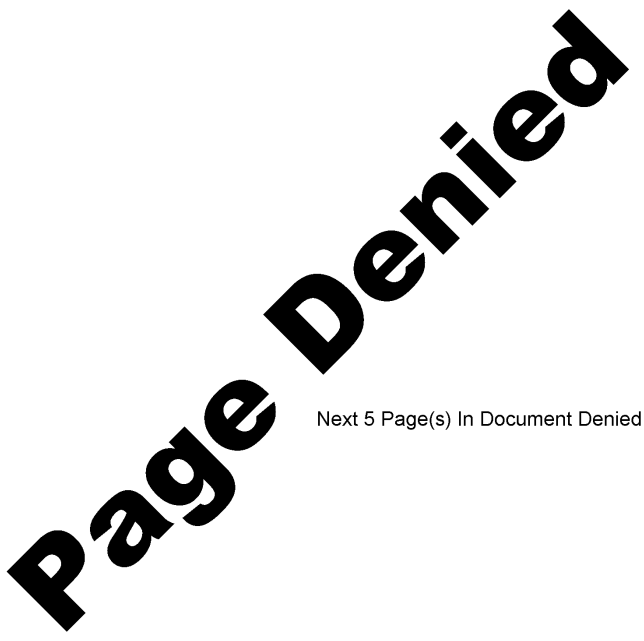


CIA/PID-P-620/64

TOP SECRET RUFF

ATTACH. NO. 2

25X1



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