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ELECTRONIC FACILITIES AT HEXAGON-TYPE SURFACE-TO-AIR MISSILE SITES IN THE SOVIET BLOC

PIC/JR-1/60
JANUARY 1960

NAVY [redacted] CIA

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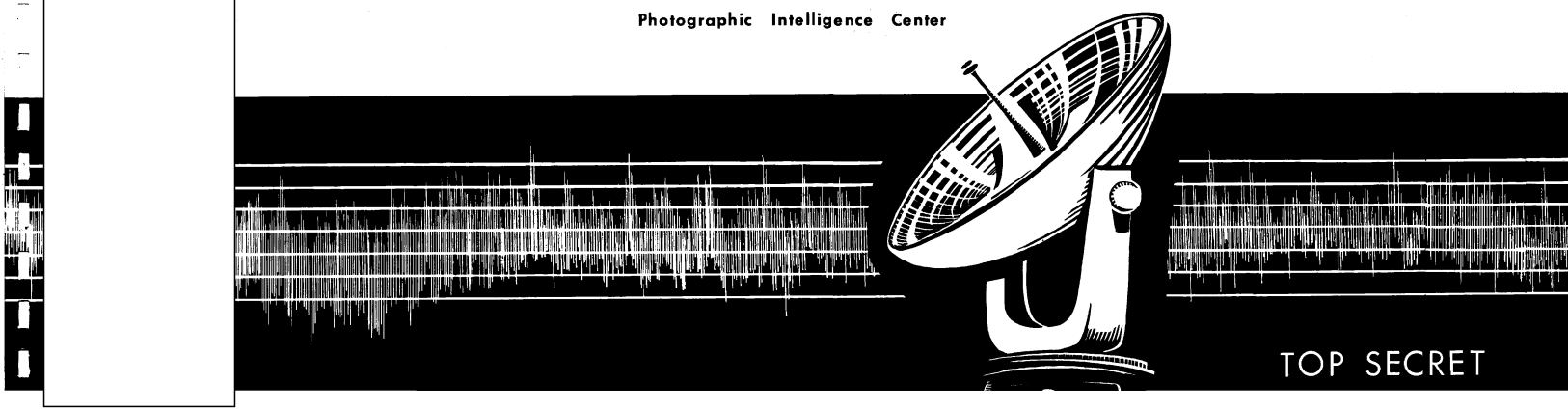

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ELECTRONIC FACILITIES AT HEXAGON-TYPE SURFACE-TO-AIR MISSILE SITES IN THE SOVIET BLOC

PIC/JR-1/60
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- PREFACE -

This joint photographic intelligence report has been prepared by the Navy and Central Intelligence Agency. It provides an analysis of the electronic facilities associated with hexagon-type surface-to-air missile (SAM) sites in the Soviet Bloc in response to Guided Missile and Astronautics Intelligence Committee (GMAIC) Requirement and CIA Requirement SI/R-31/59.

This report consists of a detailed photographic analysis of the electronic facilities at two hexagon-type SAM sites in the USSR . All measurements of the guidance radar at the site were made on the Nistri stereo-comparator and are considered to have a range of error of plus or minus 5 percent. Scale of the photography was determined from the dimensions of the ZIS-151 vans found at the site. Dimensions of the ZIS-151 were taken from a Russian export brochure 1/.

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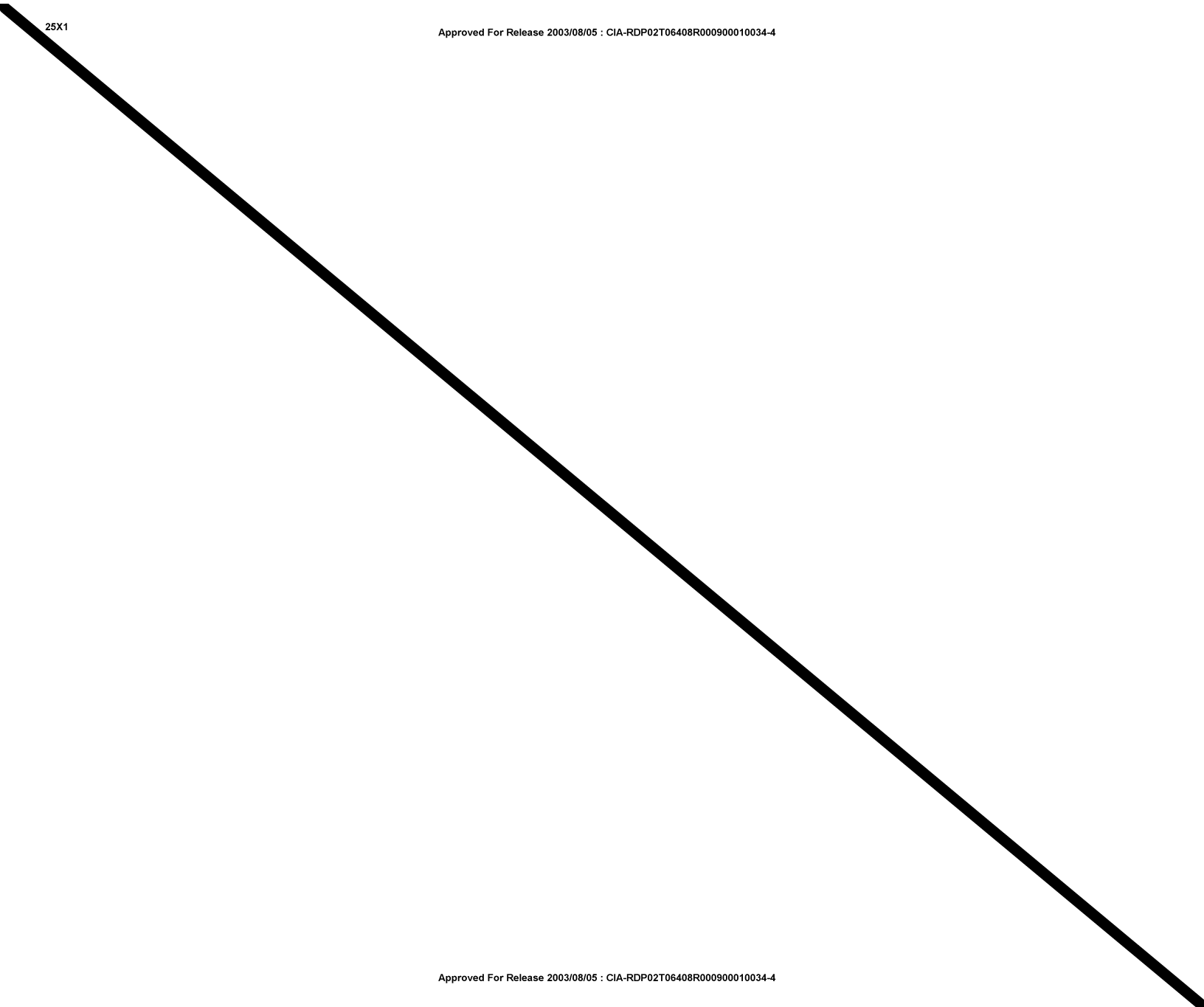

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SUMMARY

The electronic facilities identified at the hexagon-type SAM sites covered in this report (Magnitogorsk and Kiev, USSR, 25X1 consist of a track-while-scan missile-guidance radar, FRUIT SET; an acquisition radar, SPOON REST; a probable IFF radar, SCORE BOARD; and local communication facilities. The missile guidance equipment is contained in vans. The positioning of these vans, in the center of the sites, has been generally the same at all hexagon-type SAM sites identified from aerial photography. Complete electronic facilities have been observed at three hexagon-type SAM sites located at Magnitogorsk and Kiev, USSR; Elements of the missile-guidance radar system have been identified at four additional sites, two near Nizhnaya Tura, USSR, one near Odessa, USSR, and one The missile guidance system employed at the hexagon-type SAM sites is believed to be similar in function to the B-200 (YO-YO) system used at the herringbone-type SAM sites ringing Moscow 2/, 3/. No radar calibration devices, such as the bore sights associated with herringbone SAM sites, have been identified at the hexagon-type SAM sites. 25X1 25X1

INTRODUCTION

A total of 26 hexagon-type SAM sites have been identified from 1959 aerial and ground photography of the Soviet Bloc.* Twenty-four of these sites are located in the USSR 25X1 In the USSR there are 19 sites 25X1 located in the Ural Mountains area 4/, two sites near Moscow 5/, one site near Rostov 6/, one near Kiev 7/, and one near Odessa 8/. 25X1 25X1 25X1

A study of the photography reveals that only 7 of the 26 hexagon-type SAM sites have complete or nearly complete electronic facilities. Similar electronic equipment is located on Moscow/Fili Airfield although no SAM site is located in the vicinity. The other 19 SAM sites are in varying stages of construction and no electronic facilities can be identified.

The 7 sites having complete electronic facilities 3 located in the Urals, one near Kiev, and one near Odessa. Since the 3 sites in the Urals and the site near Odessa contain the same similarly-positioned electronic equipment, only one of these sites, located south of Magnitogrosk, is described in this report.

The Kiev site is described because of its unique guidance area enclosed in a large keyhole-shaped revetment. Locations of the 3 sites described in this report are shown on the general orientation map, Figure 1.

The layout of the missile-guidance equipment found in the center of the operations area is generally the same at all hexagon-type SAM sites. Minor differences exist in construction of the revetments which house the guidance vehicles. The majority of sites have both single- and double-vehicle revetments while a few sites have only a single, large circular revetment or two large revetments. A complete missile-guidance system generally consists of a missile guidance radar, acquisition radar, probable IFF radar, communication facilities, eight vans, and four trailers. 25X1 25X1 25X1

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*Analysis for this report was completed prior to mission on which an additional 20 hexagon-type SAM sites have been identified, but which are not included herein. 25X1 25X1

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ELECTRONIC FACILITIES AT THE SAM SITE SOUTH-SOUTHWEST OF MAGNITOGORSK

Two hexagon-type SAM sites are located near Magnitogorsk, USSR. The site discussed in this report is located 10 nautical miles south-southwest of Magnitogorsk at 53°15'N/58°58'E (Figure 10). This fenced site, which is in the later stages of construction, is situated on relatively flat terrain (Figure 11). In addition to the electronic facilities the site consists primarily of six drive-through launch revetments with missile launchers emplaced in five of the six revetments, three missile-hold revetments, a vehicle parking area, and a support area. A complex network of gravel-surfaced roads serves the site. There has been no attempt to camouflage this site.

The electronic facilities observed at the Magnitogorsk site consist of a missile guidance radar, with ten support vehicles; a possible acquisition radar; and probable local communication facilities. All of the electronic equipment and missile launchers are probably connected by a cable net.

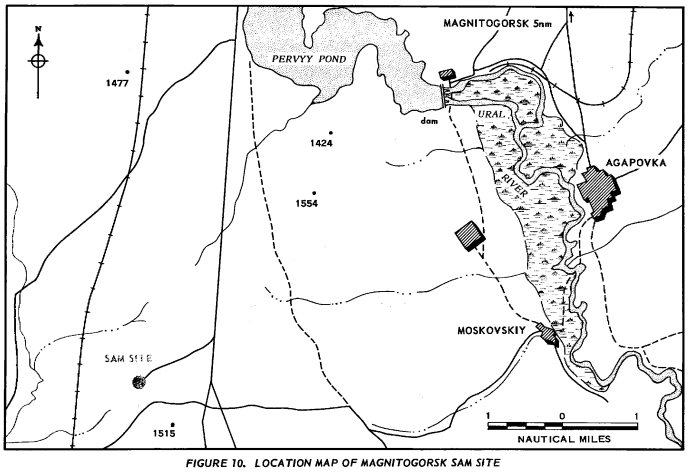

FIGURE 10. LOCATION MAP OF MAGNITOGORSK SAM SITE

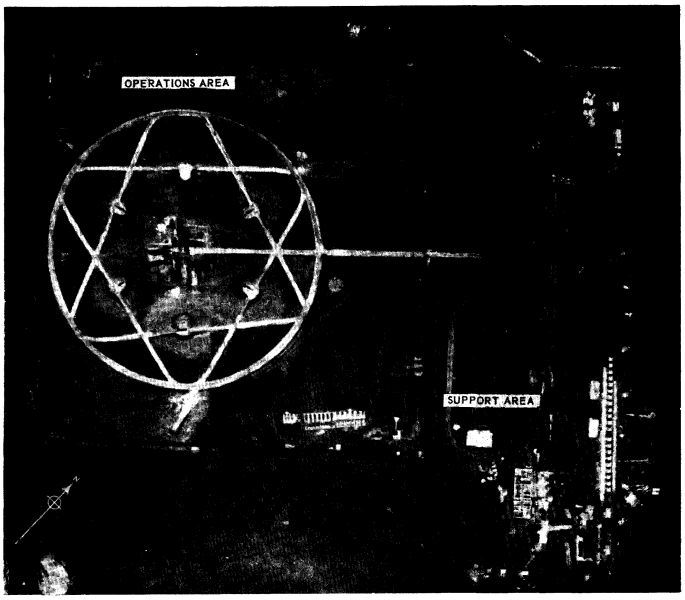

FIGURE 11. AERIAL PHOTOGRAPH OF MAGNITOGORSK SAM SITE. This site, which is in the later stages of construction, is situated on relatively flat open terrain 10 nm south-southwest of Magnitogorsk.

Missile-Guidance Area

The missile-guidance area is located near the center of the site (Figure 12, Item 1). The area contains a track-while-scan missile-guidance radar, probably FRUIT SET, and ten associated support vehicles positioned in seven revetments. The guidance radar is located on a small mound at the end of the gravelled service road which enters the site (Figure 13).

In the seven revetments which are located below the level of the guidance radar, are seven possible ZIS-151 vans and three trailers. The vans probably house the transmitter, receiver and computer equipment for the guidance radar and the three trailers probably provide the power for the missile-guidance system. Three of the seven revetments are double-bayed, each approximately 30 feet wide and containing one van and one trailer. Four of the revetments are single-bayed, each approximately [redacted] and containing one van.

No radar calibration device has been identified at or near the site.

Due to the poor resolution of the photography no heavy cables can be identified as connecting the guidance radar

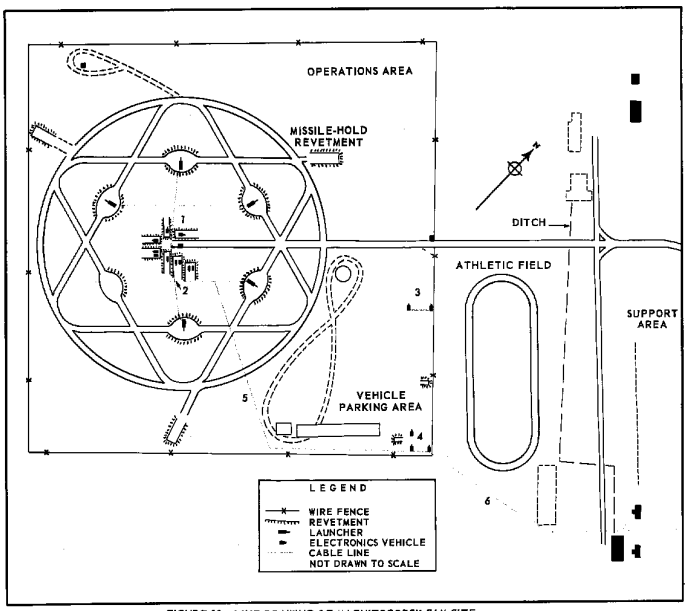

FIGURE 12. LINE DRAWING OF MAGNITOGORSK SAM SITE

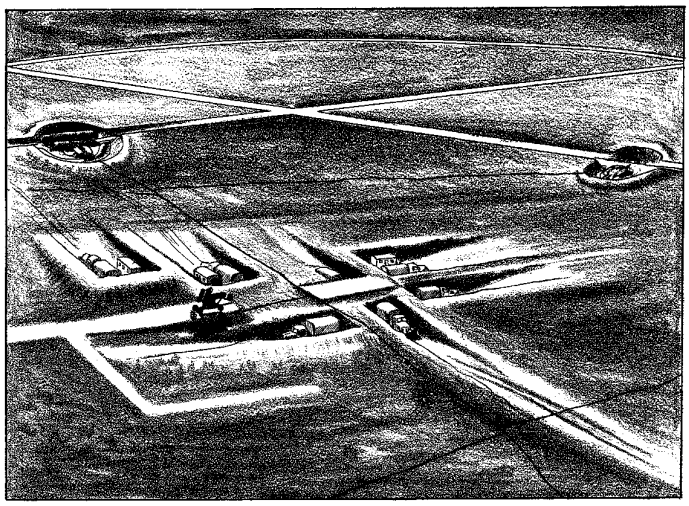

FIGURE 13. PERSPECTIVE DRAWING OF MAGNITOGORSK SAM SITE MISSILE-GUIDANCE AREA. This area contains a track-while-scan missile-guidance radar, probably FRUIT SET, and ten associated support vehicles positioned in seven revetments. The guidance radar is located on a small mound at the end of a gravelled service road. Cables radiate from the guidance area to six drive-through launch revetments.

with the vans and trailers, however, there are two lines of cables which extend northwest and southeast respectively from the guidance area. At a distance of approximately 135 feet from the guidance radar, each line separates into three lines of cables (Figure 12, Item 2) one of which extends to each of the six drive-through launch revetments. Each line probably contains a power cable from the generator trailers and a control cable from the operations vans. All cables appear to be underground.

ACQUISITION RADAR

A possible location for the acquisition radar (Figure 12, Item 3) is in the northeast portion of the site approximately 700 feet from the guidance radar. Two probable trailers connected by a cable are located in this area. No antenna and no cable line to the guidance area can be identified due to the poor resolution of the photography.

COMMUNICATIONS AND/OR POWER LINES

A probable communication facility (Figure 12, Item 4) is located in the easternmost corner of the site approximately 940 feet from the guidance radar. Two small buildings and one possible van are located in this area. No antennas can be identified. A cable line (Figure 12, Item 5) extends from the guidance area and probably terminates at this probable communication facility.

An overhead wire line leads away from the probable communication facility in a northeasterly direction (Figure 12, Item 6).

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ELECTRONIC FACILITIES AT THE SAM SITE SOUTH OF KIEV

25X1 A hexagon-type SAM site has been identified on late [redacted] small-format photography near Kiev, USSR. The site is located approximately 8.5 nautical miles south of Kiev in the vicinity of 50°18'N/30°34'E (Figure 14). The site is fenced and situated in flat wooded terrain near the west edge of the Dnepr River flood plain In addition to the electronic facilities, this site consists primarily of six drive-through revetments with a missile launcher emplaced in each revetment, three drive-through missile hold revetments, and support facilities. A complex network of gravel-surfaced roads serves the site. Camouflage netting supported by poles covers the six launch emplacements.

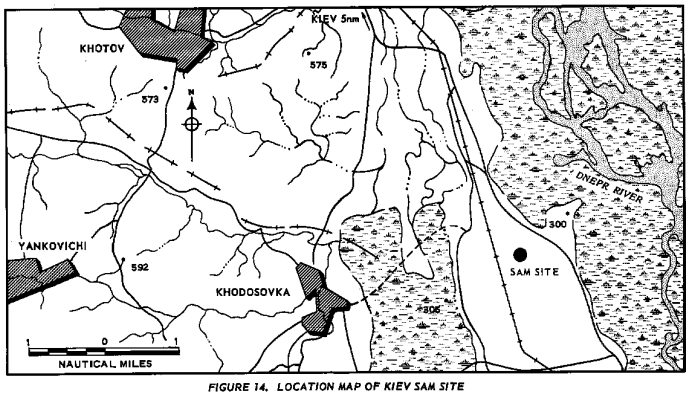

FIGURE 14. LOCATION MAP OF KIEV SAM SITE

The electronic facilities observed at the Kiev SAM site consist of a missile-guidance radar, FRUIT SET, with ten support vehicles; a probable acquisition radar, possibly SPOON REST, with one support vehicle; and a probable communication facility, with three vehicles and a probable stick mast.

MISSILE-GUIDANCE AREA

The missile-guidance area is located near the center of the operations area (Figure 15, Item 1). The guidance area contains a track-while-scan missile-guidance radar, FRUIT SET, and ten associated support vehicles. The unique feature of this area is the large keyhole-shaped revetment which surrounds the guidance area.

The FRUIT SET guidance radar is located in the center of the circular por-

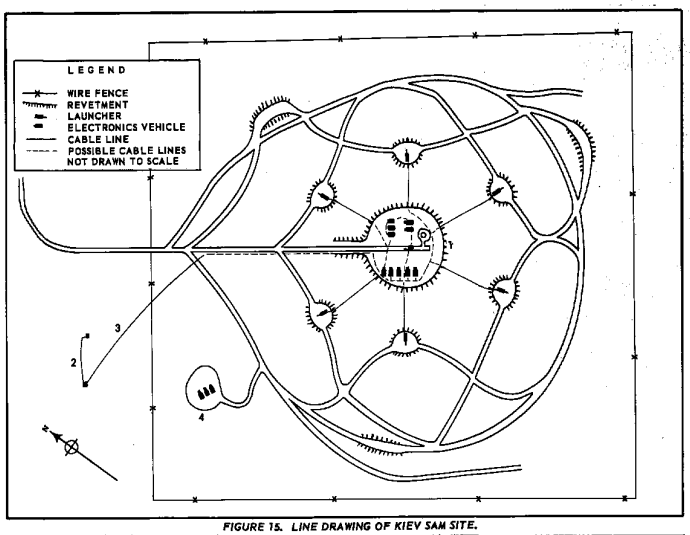

FIGURE 15. LINE DRAWING OF KIEV SAM SITE.

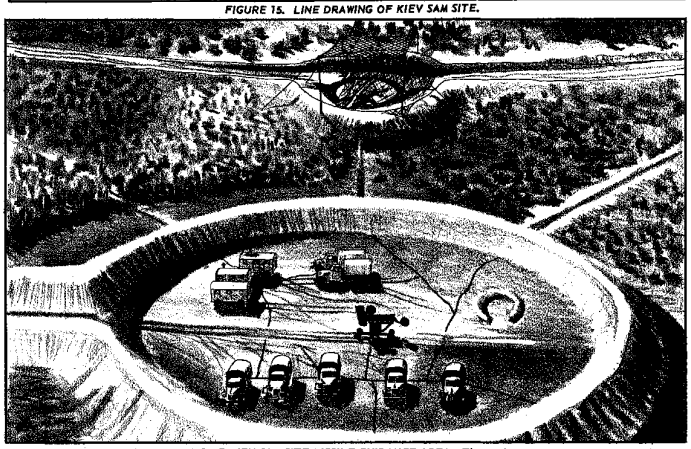
FIGURE 16. PERSPECTIVE DRAWING OF KIEV SAM SITE MISSILE-GUIDANCE AREA. The guidance area contains a track-while-scan missile-guidance radar, FRUIT SET, and ten associated support vehicles. The large keyhole-shaped revetment which surrounds the guidance area is the unique feature of this area. Cables extend between the guidance radar and the ten support vehicles and cables radiate from the guidance area to each of the six drive-through launch revetments.

25X1
25X1

tion of the revetment (Figure 16). The guidance radar consists of a small cab atop which are mounted horizontal and vertical trough-type antennas [redacted] The entire unit is mounted on a low, wheeled carriage. [redacted] tion of the photography. In the same circular revetment are two groups of five support vehicles, each positioned near the radar.

No radar calibration device has been identified on the photography.

Six lines of cables radiate from the guidance area one to each of the six drive-through launch revetments. These cables appear to be laid above ground. The number of cables which extends between the radar and the 10 vehicles cannot be determined.

ACQUISITION RADAR

The probable acquisition radar, possibly SPOON REST, is located northwest of the guidance area and outside of the fenced operations area (Figure 15, Item 2). This facility consists of two vans, one of which is probably the generator van while the other is probably the radar van. A probable cable extends between the two vans. Another probable cable extends between the probable radar van and the guidance area (Figure 15, Item 3).

[redacted]

COMMUNICATIONS AND/OR POWER LINES

The probable communication facility is located in the northwest portion of the site (Figure 15, Item 4). This facility consists of three vehicles and a probable stick mast within a cleared circular area. The antenna on top of the mast is possibly MERCURY GRASS, but the poor resolution precludes identification.

No overhead wire lines are visible in the area.

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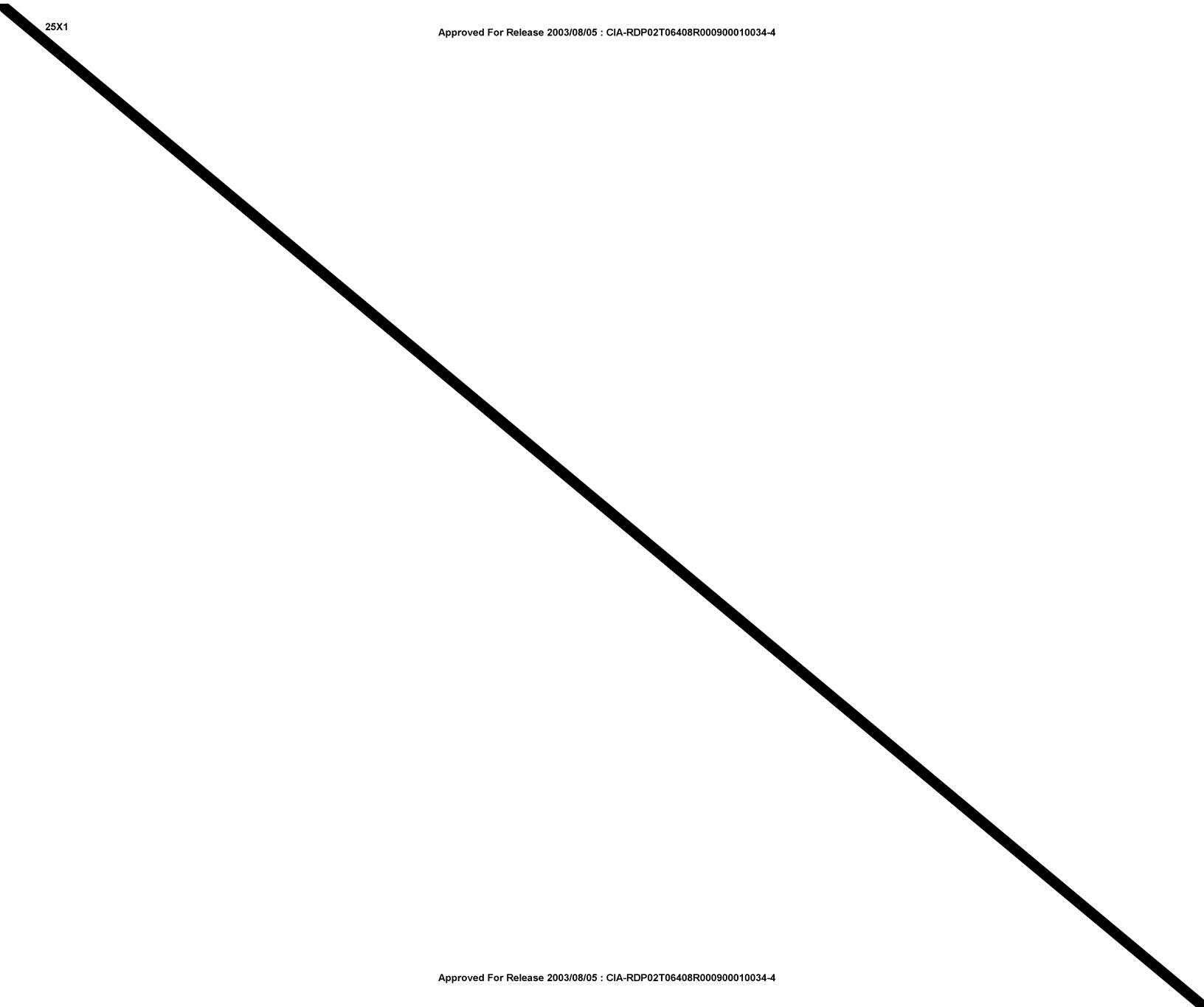

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