25X1

TOP SECRET

RCA-03/0016/69

Basic Imagery Interpretation Report

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

25X1

NIKOLAYEV RADCOM STATION (NIKOLAYEV HIGH-FREQUENCY BROADCAST FACILITY)

25X1

DEPLOYED COMM/ELEC/RADAR FACILITIES

USSR

MAY 1969

2/3548

COPY NO. 103

8 PAGES

GROUP 1: EXCLUDED FROM AUTOMATIC DOWNGRADING AND DECLASSIFICATION

TOP SECRET

Approved For Release 2007/10/23 : CIA-RDP78T04563A000100010028-2

Next 1 Page(s) In Document Denied

INSTALLATION OR ACTIVITY NAME	COUNTRY
Nikolayev Radcom Station (Nikolayev High Frequency Broadcast Facility)	UR

UTM COORDINATES	GEOGRAPHIC COORDINATES
NA	46-49-17N 032-12-46E

MAP REFERENCE

25X1 ACIC. USATC, Series 200, Sheet 0250-9HL, 3d ed, Apr 63, Scale 1:200,000 (SECRET)

LATEST IMAGERY USED	NEGATION DATE (If required)
	NA

ABSTRACT

This facility contains two spherical arrays, three Sterba curtain arrays, two medium frequency (MF) vertical radiators, and 35 rhombic antennas. At least two new probable Sterba curtain arrays are under construction immediately south of the present operations area.

This facility has been considered a possible [redacted] over-the-horizon detection 25X1
25X1 (OHD) radar [redacted] and as a possible high-frequency (HF) broadcast or communications facility. Each of these possible functions is examined in the report. On the basis of detailed mensural analysis of the antenna parameters and internal features, the conclusion is reached that the function is principally international radio broadcast in the HF band. The MF antennas probably are for regional broadcasts, and one spherical array is probably used for internal HF broadcast.

INTRODUCTION

The Nikolayev High Frequency Broadcast Facility is 12.5 nautical miles (nm) southeast of Nikolayev, USSR (Figure 1). It is at an elevation of approximately 150 feet and situated on the alluvial flood plain of the Yuzhnyy river which slopes gently to the south-southeast toward the Black Sea. The terrain and vegetation present no obstacles to HF radio propagation and should provide a good ground reflector. There are no related installations in the immediate vicinity of the facility.

BASIC DESCRIPTION

Physical Feature

Within the operations area are two spherical curtain arrays, three Sterba curtain arrays, two MF vertical radiators, and 35 rhombic transmitting antennas. Three transmitter/control buildings, two power substations, and nine other structures are also in the operations area. The support area contains a tower on which are mounted two probable R-600 microwave antennas in a terminal configuration. Numerous buildings are also present (Figure 2).

A new operations area under construction immediately south-southeast of the established operations area appears to be normal expansion of the facility, not a replacement of existing facilities. It will contain at least one L-shaped transmitter building and two Sterba curtain arrays. An open feedline trench was noted on photography of
25X1 [redacted] (Inset, Figure 2). No significant change has been noted since that date, but construction probably continues. Useful mensuration could not be accomplished from the available photography.

The site gives no evidence of hardening or of the construction of revetments. Several of the antenna feedlines are being placed underground, probably for antenna engineering purposes rather than to decrease vulnerability.

OPERATIONAL FUNCTIONS

This facility is now identified as an HF broadcast facility that operates primarily in an international role. It has been reported in the past as a possible [redacted] OHD radar 25X1
25X1 [redacted] and also as an HF communications facility. The physical characteristics of the facility and the known Soviet design practices are examined below with each of these possible functions in mind.

Four principal features critical to analysis of the function of the installation are as follows:

1. Types of Antennas. A firm identification of each antenna type, its function as a transmitter or receiver, and its general characteristics can be made from available photography for all antennas at this installation except the spherical arrays. A physical analysis of the construction details of the spherical arrays has been published. 1/ and all other antennas conform to Soviet State Standards (GOST 8025-5b). Pertinent antenna features are summarized in Table 1.

2. Direction of Propagation. The initial great circle bearings of all antennas except the Sterna arrays have been determined and are presented in Table 1, and the possibility of transmission on the reverse azimuth is also shown for the antennas that are switchable. All antennas are constructed on fixed bearings except one spherical curtain array in the northwest area (Figure 2, Antenna 3). Numerous details regarding configuration of feed and dissipation lines are also provided in Figure 2.

3. Power Input. The facility is served by two 35 kv powerlines, one from the northwest and one from the northeast, to ensure against power loss.

4. Soviet Design Practice. Usual Soviet practice is to confine each electronics facility to a single operational function. Long haul communications facilities are either governmental or military--not both. Communications facilities are separate from broadcast facilities, except for the necessary command and control link. Radar facilitiesare usually separate from communications facilities, and research and development facilities are usually separate from operational facilities. Some exceptions occur, most notably at

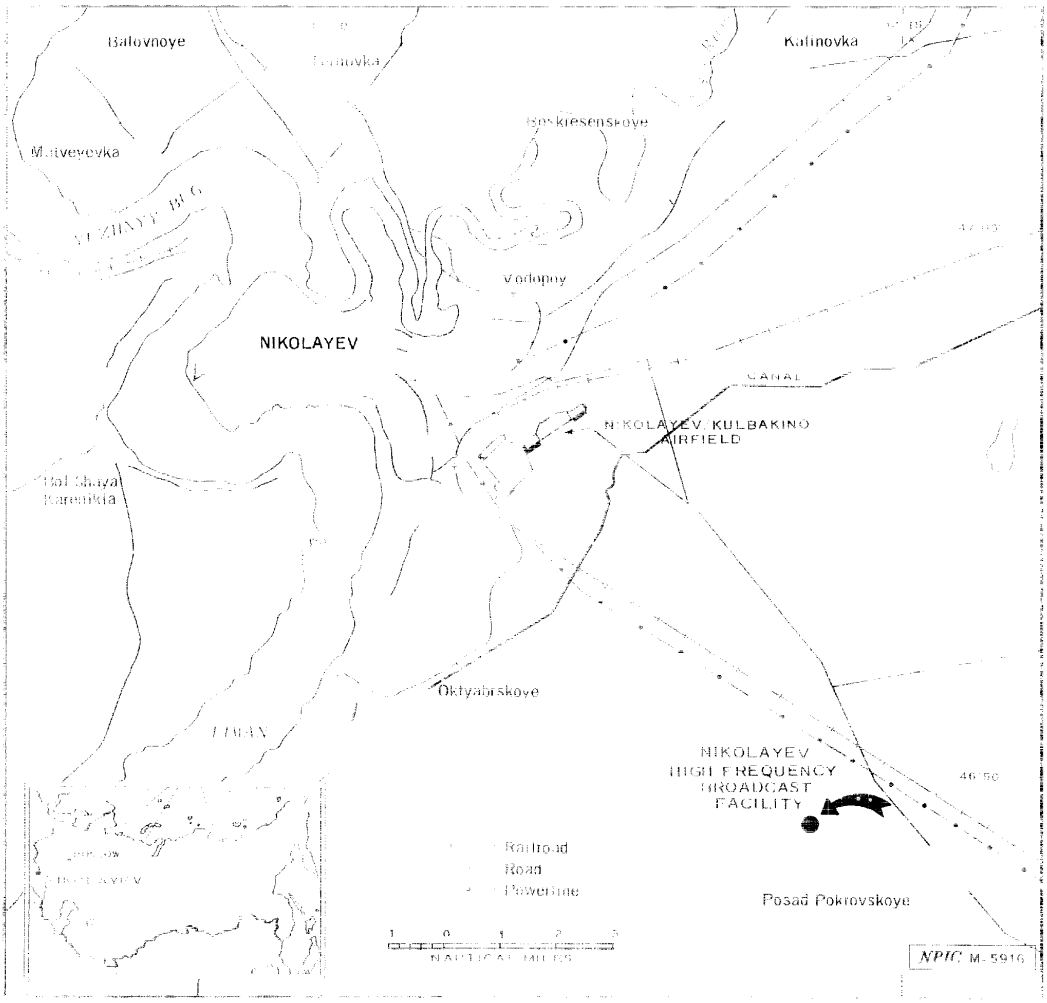

FIGURE 1. LOCATION MAP

facilities carrying out research and development programs concurrently with operational functions, particularly space-associated facilities such as Molniya and earth satellite vehicle facilities.

As a result of analyzing these factors, the antenna parameters presented in Table 1, and the physical configuration of the facility, the following determinations have been made:

1. This is a transmitting facility. Indications of this include the presence of high power input, cooling ponds, MF vertical radiators and Sterba curtain arrays (which are exclusively transmitting antennas), and dissipation lines on all the active rhombic antennas.

2. Five of the antennas are types used worldwide for radio broadcast but seldom used for communications. These antennas are the two MF vertical radiators (Antennas 8 and 32) and the three Sterba curtains (Antennas 5, 6, and 7).

3. Of the 35 rhombic antennas, 27 are oriented to transmit outside the Soviet Union. Two rhombics (Antennas 1 and 41) are oriented to transmit within the Soviet Union, but Antenna 41 is probably abandoned. Six switchable rhombics (Antennas 14 through 19) are so constructed that one of the two operational directions transmits into the Soviet Union and the other out of the country. However, the path over the Soviet Union may be used for around-the-world communications on the same correspondents as the short-path transmission.

4. The two spherical curtain arrays have different functions, Antenna 2 being designed to transmit outside the Soviet Union and Antenna 3 within the country. The feed tower of Antenna 3 is movable along a chord of the array and probably allows limited changes in azimuth. The boresight, with the feed centered, is The total angular change possible cannot be determined because the precise shape of the antenna (circular or parabolic segment) cannot be determined from available photography. Any change in azimuth would entail moving the feed away from the focal point of the antenna, thus decreasing antenna aperture, gain, and efficiency. 25X1

5. Support components of the facility are compatible with any of three possible functions: HF radio broadcast, HF communications, or OHD radar. The two probable R-600 microwave antennas at the microwave terminal (Figure 2) are capable of receiving program material or messages, or of passing radar data 25X1
25X1

Based on the above facts, collateral information, and knowledge of similar facilities, the following cases have been prepared for each of the three possible functions.

Case 1. High Frequency Radio Broadcast

Examination of the facility as a whole reveals a pattern characteristic of shortwave broadcast facilities in both the Soviet Union and the United States. This overall impression is reinforced, upon detailed examination of the facility, by the presence of the three Sterba curtains; the two MF vertical radiators, which are almost always broadcast antennas; and by the orientation of the majority of the rhombics. Examination of the great circle bearings of the 33 rhombics transmitting outside the Soviet Union (Table 1) reveals that they probably broadcast to major capitals and population centers in Europe, the Middle East, and to a lesser extent, China. Antennas of the Sterba curtain arrays may broadcast into the Soviet Union to provide programs to remote areas; however, they probably broadcast to the Middle East. Direction of propagation cannot be positively determined 25X1
25X1

Only the presence of the two spherical arrays remains unexplained. Examination of the larger of the two arrays (Antenna 2) reveals that it probably broadcasts into Poland and vicinity, or possibly to the east coast of the US, and the boresight of the smaller spherical array (Antenna 3) passes through Petropavlovsk, USSR. It is interesting to note that an identical antenna at Taldom 1/ also has a boresight passing through Petropavlovsk, indicating a high interest in transmitting to that area. The variable azimuth capability of Antenna 3 may be designed to provide program material to a wide area of northeastern Russia.

Case 2. High Frequency Communications

The overall configuration of the facility is unlike the typical HF communications facility. The most obvious unusual features are the spherical arrays, the Sterba curtain arrays, and the MF vertical radiators. A plausible explanation for the spherical arrays and Sterba curtains is that a high power output is required to provide reliable communications 25X1

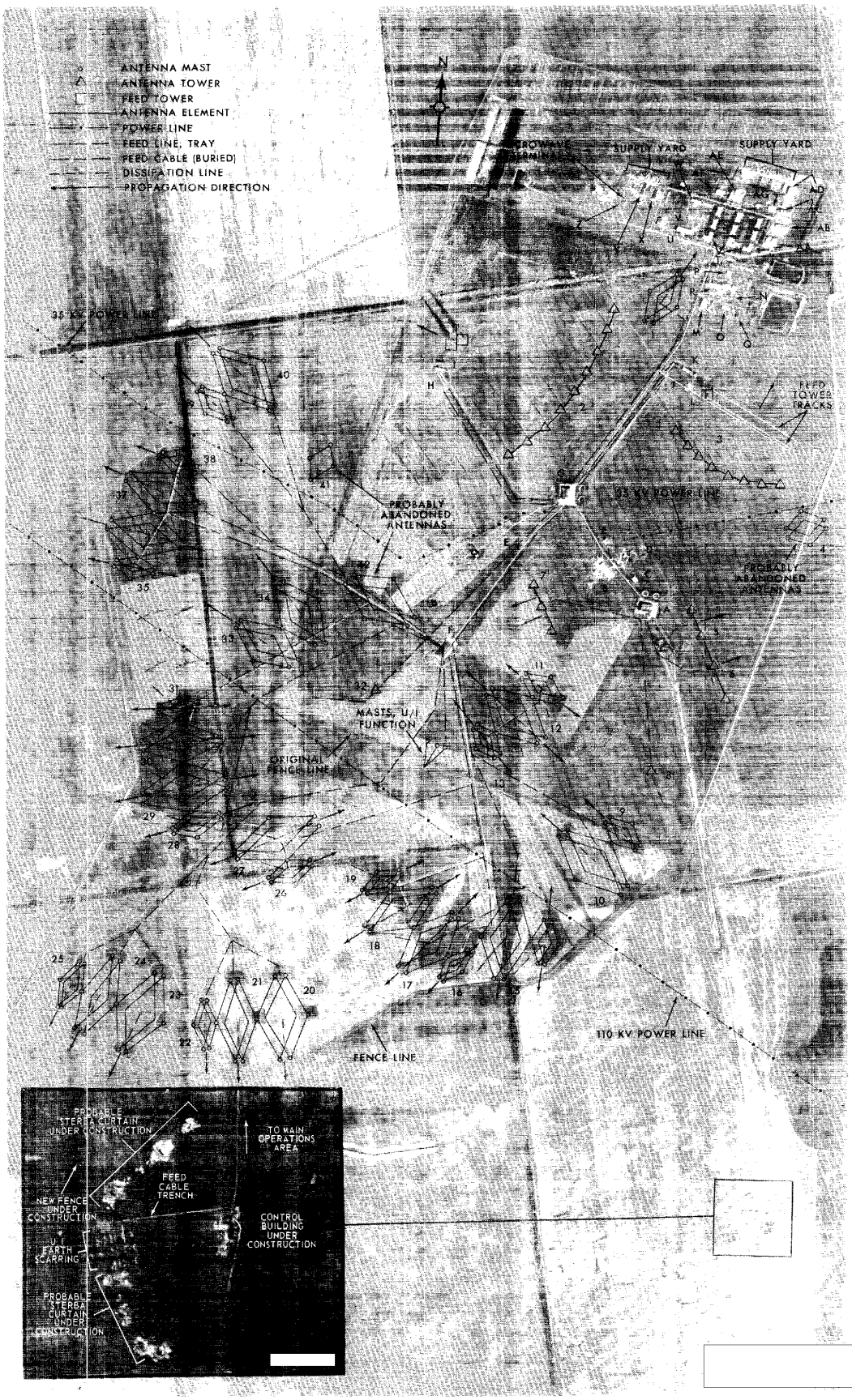

FIGURE 2. NIKOLAYEV HIGH-FREQUENCY BROADCAST FACILITY, USSR.

Table 2. Support Facilities (Keyed to Figure 2)

Bldg	Description	Length (ft)	Width (ft)	Stories
A	Transmitter bldg for 2 Sterba curtains & 1 MF antenna			
B	Adm in bldg			
C	Support bldg			
D	Support bldg			
E	2 power transformer & switching bldgs			
F	High-bay transmitter bldg for HF antennas			
G	Transmitter bldg for 1 MF & 2 spherical arrays			
H	Feed fields			
I	Coupling/tuning bldg			
J	Feed fields			
K	Coupling/tuning bldg			
L	Support bldg			
M	Admin bldg			
N	Garage			
O	Storage bldg			
P	Support bldg			
Q	Probable pumphouse			
R	Vehicle maint bldg			
S	6 barracks			
T	3 L-shaped barracks			
	Main wing			
	Short wing			
U	Admin bldg			
V	Support bldg			
W	T-shaped quarters			
	Top of T			
	Base of T			
X, Y	Warehouses			
Z	Microwave control bldg			
AA	T-shaped headquarters bldg			
	Base of U			
	Wings			
AB	Support bldg			
AC	Support bldg			
AD	Support bldg			
AE	E-shaped messhall (overall)			
AF	Support bldg			
AG	2 warehouses			

with correspondents that are difficult to reach. This theory appears untenable, however, because properly designed and located rhombic antennas can provide the same reliability at lower cost. There is no logical explanation for the MF vertical radiators in a long-haul communications facility, especially in view of the known Soviet practice of physically separating electronics facilities that perform different functions.

25X1

25X1

Case 3. Over-the-Horizon Detection Radar

25X1

25X1

Examination of this facility reveals that only the small spherical array with the movable tower (Antenna 3) could perform an OHD function 25X1
25X1 However, the boresight of the spherical array with the tower centered does not pass over the powered portion of the flight path from any ballistic missile range.

It might be possible to cover the powered portion of the launch trajectory by traversing the feed, but this decreases antenna efficiency as discussed above. In the event powered launch could be tracked from this antenna, it appears probable that tracking in azimuth would involve traversing the feed. It is unfeasible to track a missile by traversing a 150-foot steel tower weighing several tons.

The absence of any special security around Antenna 3 and its transmitter building, and the fact that the transmitter building serves the other spherical array and an MF vertical radiator further lessen the likelihood of a sensitive OHD role for the antenna.

Assuming that spherical Antenna 3 does perform in an OHD role, it would still be necessary to explain the remainder of the facility. The only other apparent explanations for the other antennas are discussed in Cases 1 and 2 above, but the location of a research and development or an operational OHD radar within an HF broadcast facility appears inconsistent with normal Soviet design practice.

Even if this antenna is performing in an OHD role, it must be concluded that the antenna was not designed for the task. Three arrays have been observed at Taldom that are physically similar to this one, 1/ 25X1
25X1

From all available evidence, it appears that the primary function of the facility is HF international radio broadcasting. 25X1
25X1

Security

The entire operations area, including the antenna field, is fenced. The original operations area containing the transmitter buildings, the spherical arrays, the Sterba curtains, the MF radiators, and portions of the rhombic field is separately fenced, as is the support area. A separate fence is under construction around the new operations area. There is no
25X1

Related Installations

There are no installations in the vicinity which can be related to this facility.

Associated Objects

Poor interpretability of recent photography precludes identification of vehicles or equipment within the storage and support areas. No mobile equipment has been observed in the operations area recently.

Electric power is provided by two 35-kv power lines as shown on Figure 2. A 110-kv power line passes through the antenna field but does not serve the facility.

Cooling ponds, water reservoirs, and the associated pumphouse are shown on Figure 2.

25X1

REFERENCES

IMAGERY

MAPS OR CHARTS

AGIC. US Air Target Chart, Series 200, Sheet 0250-9HL, 3d ed, Apr 63, Scale 1:200,000 (SECRET)

DOCUMENTS

1. NPIC. R-901/64, Unusually Configured Antennas at Facilities near Taldom and Nikolayev, USSR. Oct 64 (TOP SECRET

2.

3.

REQUIREMENT

COMIREX BR-C/005-69

NPIC Project 210641