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JOINT PHOTOGRAPHIC INTELLIGENCE REPORT

ELECTRIC POWER
IN THE
URAL REGION, USSR

MINICARD COPY

PIC/JR-7/61

July 1961

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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PREFACE

This joint photographic intelligence report is in answer to a request for basic information on electric power serving the Ural region of the USSR and for information on the status and alignment of two power lines believed to be under construction between Asbest and either Verkh-Neyvinsk or Kamensk. The request also asked for a study of the area between Sverdlovsk and Verkhniy-Ufaley for significant new industries which might account for the large power capacity in this area.

KEYHOLE photography of [REDACTED] was examined with TALENT photography of [REDACTED] in the preparation of the report. In addition, collateral information was used to provide as complete an overall analysis as possible of the availability of electric power to the Ural region.

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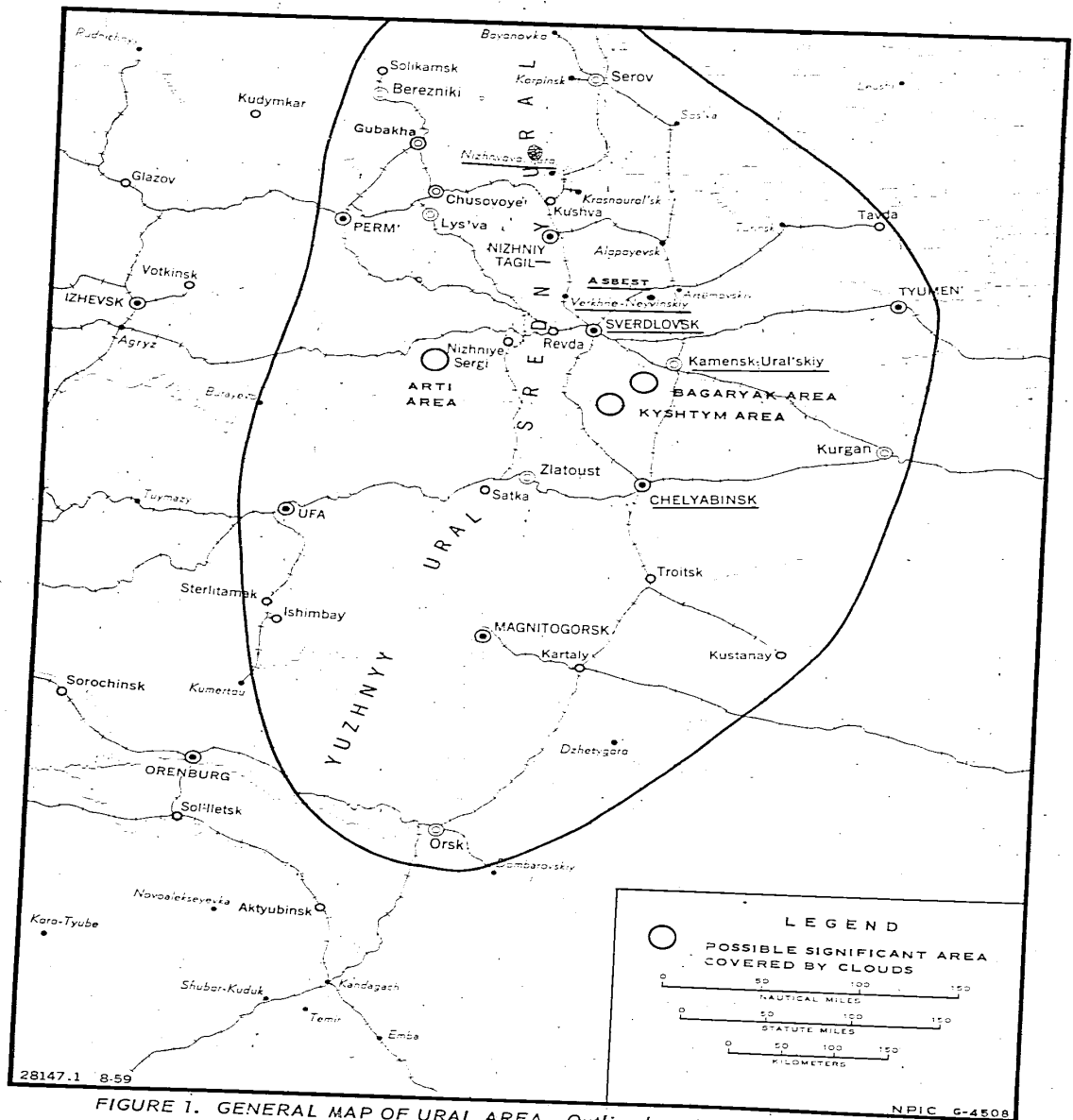


FIGURE 1. GENERAL MAP OF URAL AREA. Outlined portion is area of interest.

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INTRODUCTION

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Much of the Ural region covered by KEYHOLE photography is blanketed by heavy overcast or obscured by broken or scattered clouds, haze, and drifting snow. The area between Nizhnyaya Tura and Verkh-Neyvinsk is completely cloud covered. Between Sverdlovsk and Chelyabinsk, visibility is limited to a few openings in heavy clouds. These areas are also obscured by haze or drifting snow. Asbest, Kamensk, Kyshtym, Beloyarskaya Atomoelektrostantsiya (nuclear power plant), the northern unit of [REDACTED] and Chelyabinsk are all obscured by heavy overcast.

West of a line running from Verkh-Neyvinsk to Sverdlovsk to Zlatoust, KEYHOLE photography provides considerable data which supplement the analyses from earlier TALENT coverage. The limitations caused by cloud coverage in TALENT photography over the Ural region are delineated in ACSI-PIR-41-59, Military Aspects of the Urals Area. 1/

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GENERAL DISCUSSION

The study of the photography and the collateral material of the electric power in the Ural area reveals that an estimated 6,500 megawatts (MW) of power capacity was available in the area in [REDACTED] exclusive of the power transmitted over the 400(500)-kv power line from Volzhskaya GES, near Kuybyshev. An estimated 3,500 to 4,000 MW was either planned or in construction at that time.

KEYHOLE photography provides coverage, additional to TALENT photography, of power lines and electric-power installations serving the Ural region (see Figure 2). Of these, the power networks around the Pervoural'sk - Revda area, and Zlatoust (see Figure 3), and the Pavlovskaya GES, a hydroelectric power plant on the Ufa river at Pavlovka, are significant.

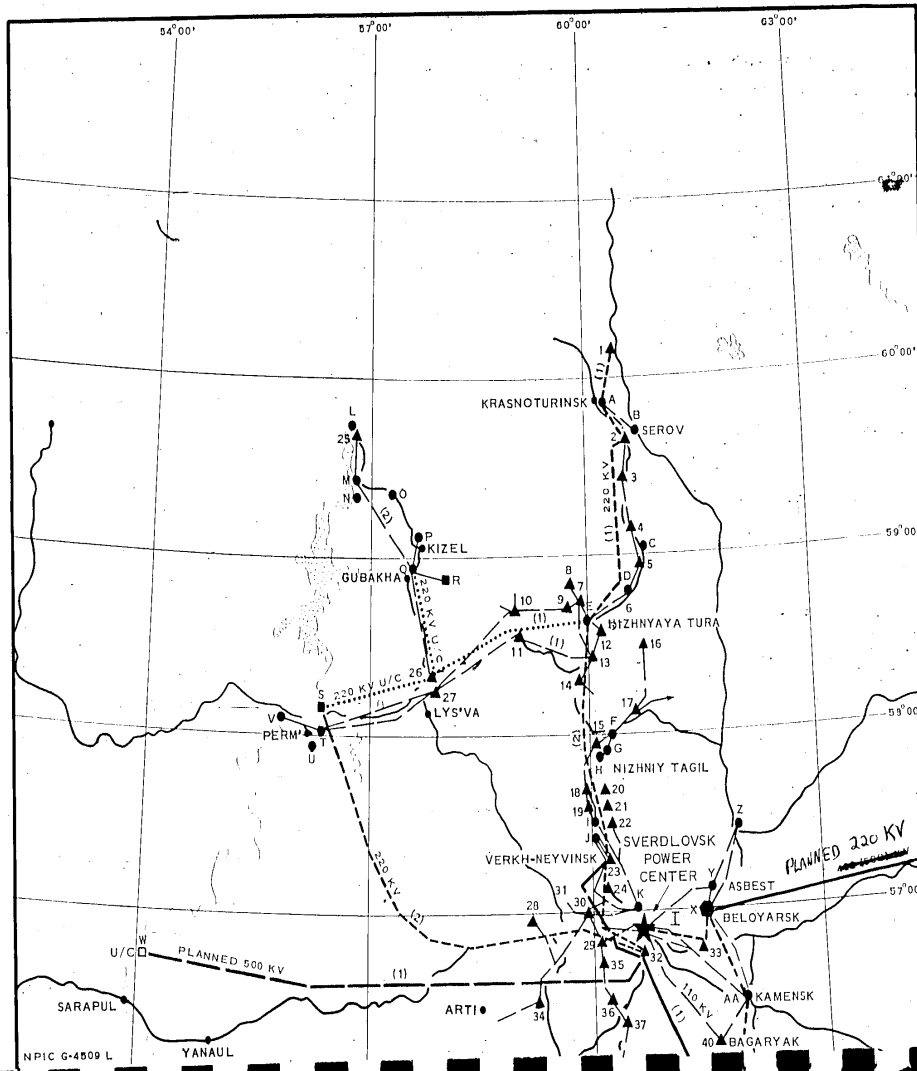
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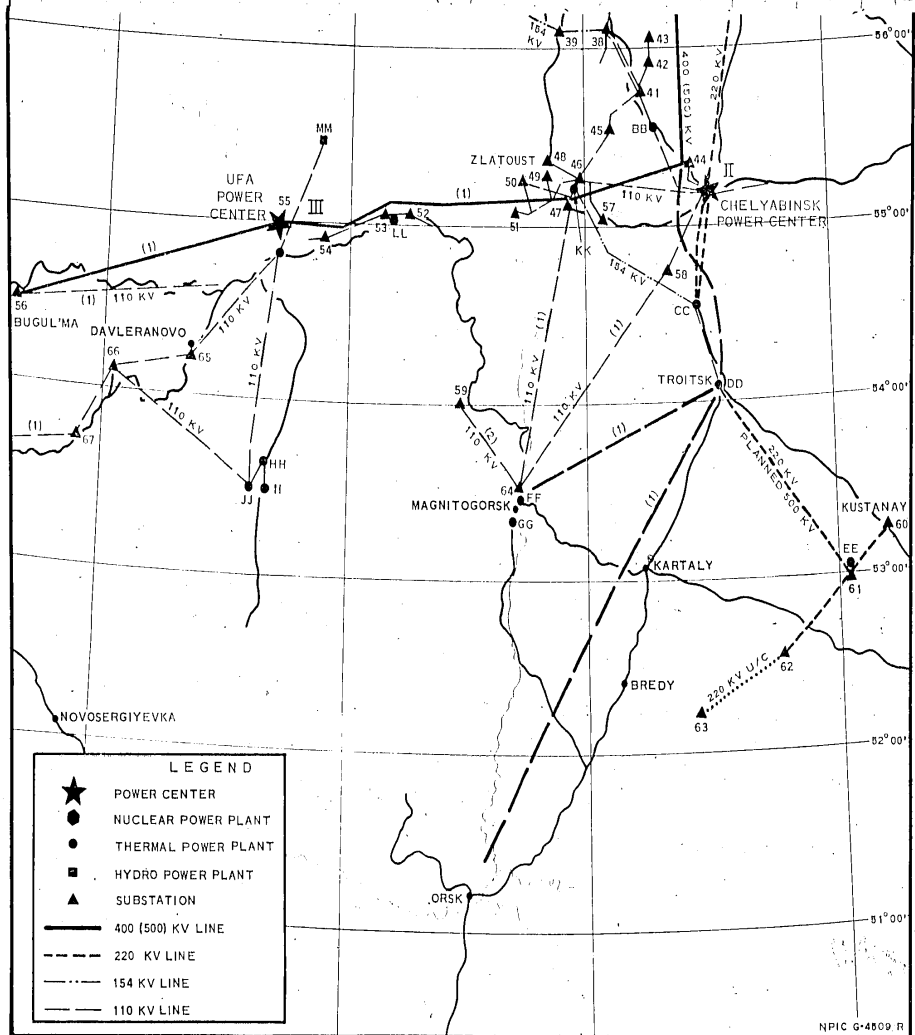


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FIGURE 2. URAL AREA POWER LINES AND ELECTRIC POWER INSTALLATIONS. The letters and numbers designating power plants and substations key this drawing to Tables 1 and 2.

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Analysis and plotting of identifiable power-line circuits also suggest areas for further study which are cloud covered on either KEYHOLE or TALENT photography or on both. One of these is in the vicinity of Arti. A second is around Bagaryak, which is barely visible in a hole in the cloud deck. A third is the Kyshtym area.

KEYHOLE discloses the probable electrification of the visible eastern portion of the Sverdlovsk-Perm' railroad.

A 400(500)-kv power line seen under preliminary construction for a short distance out of Yuzhnaya substation on TALENT is revealed on KEYHOLE as being apparently extended in a southwesterly alignment. The observed trace is probably intended for the 500-kv power line reported under construction between Votkinskaya GES, under construction on the Kama river, and Sverdlovsk.

KEYHOLE photography does not disclose any visible evidence in cloud-free areas of the two power lines reported to be under construction between Asbest and either Verkh-Neyvinsk or Kamensk. 5/ A positive analysis of power lines, faintly visible south of the conjectural site of Beloyarskaya AES (see Figure 2, item X) is prevented by cloud and haze conditions. One of these might be tied to Kamensk and be a section of one of the reported power lines.

The search for significant new industries which might account for the large amount of power in the area proved fruitless. No significant industry was disclosed on the KEYHOLE photography in the cloud-free areas between Sverdlovsk and Verkhniy-Ufaley.

ELECTRIC POWER INSTALLATIONS

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25X1D An estimated 6,500 MW of power capacity was available in [REDACTED] in the Urals area, exclusive of power transmitted over the 400(500)-kv power line from Volzhskaya GES, near Kuybyshev. An estimated 3,500

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to 4,000 MW additional was either planned or under construction. About 400 MW additional installed capacity could be made available to the area from the Votkinskaya GES when both power plant and the tying power line to Sverdlovsk are in service. Significant installations of the Ural power grid which are disclosed by KEYHOLE materials and briefly discussed below are cross-referenced to the power plants and substations illustrated in Figure 2 and listed in Tables 1 and 2.

Power Centers

Three urban areas in the Ural region can be considered both electric-power generating and electric-power using centers. Power-line networks within these areas are too complicated to trace on the map of the Ural power grid (Figure 2). Of the three, Sverdlovsk has KEYHOLE-TALENT coverage; Chelyabinsk only partial TALENT coverage; and Ufa neither KEYHOLE nor TALENT.

Sverdlovsk Power Center

The Sverdlovsk urban area (see Figure 3) contains three thermal power plants having generating capacities reported at 75, 25, and 24 MW (124 MW total). 1/ All three are tied to the Ural 110-kv power grid, which is also served by an important substation in the center of the built-up area of Sverdlovsk. KEYHOLE photography, which is partially cloud covered, does not disclose any changes in the local power-line network.

Chelyabinsk Power Center

The Chelyabinsk urban area contains two thermal power plants, each reported to have a generating capacity of 150 MW (300 MW total). 1/ Power lines in the urban area can only be partially identified and plotted from TALENT photography covering Chelyabinsk.

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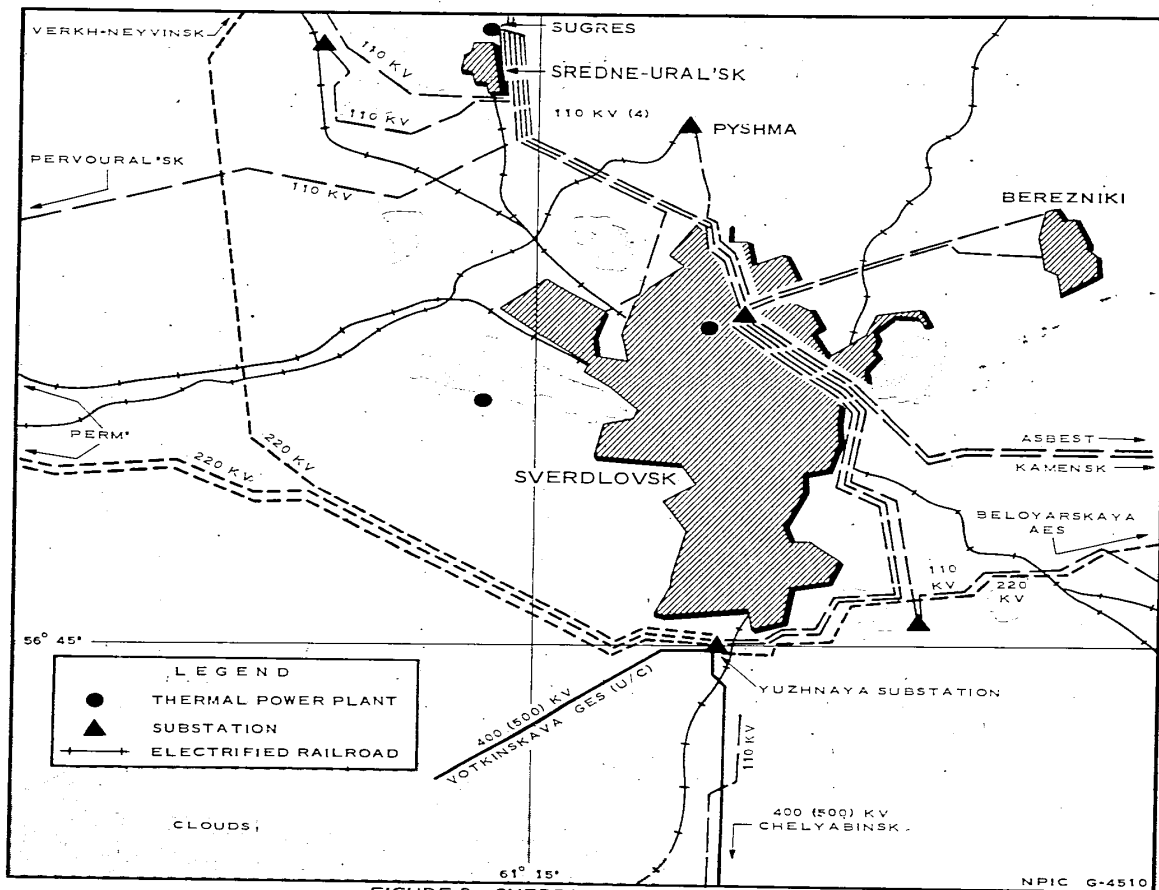


FIGURE 3. SVERDLOVSK POWER CENTER

Ufa Power Center

Collateral information reports five thermal power plants with a combined generating capacity of 288 MW located in Ufa.

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Power Plants

KEYHOLE photography discloses only one significant additional power plant and no observable changes to power plants disclosed by TALENT in the Ural region between Verkh-Neyvinsk and Chelyabinsk. 1/ The only significant additional power plant disclosed serving the Ural grid is Pavlovskaya GES on the Ufa river (item MM, Table 1). Table 1 locates and describes the power plants on the Ural grid, and estimates their capacity.

Substations

KEYHOLE photography discloses a number of substations not identified on TALENT material because of atmospheric conditions. Some of these have considerable significance, including two at Zlatoust (see Figures 2 and 4 and Table 2).

A published USSR report states that Nizhne Tagil'skaya Substation was "completed" and placed in service as of December 1960, adding that it was one of the largest in the country. Power was being received from Volzhskaya GES near Kuybyshev, the report states. KEYHOLE photography does not disclose any new 220-kv or 400(500)-kv power lines or traces tying into the area of Nizhne Tagil' from any observable 220-kv or 400(500)-kv power lines in cloud-free areas. There may be a tie power line off the two 1-circuit 220-kv power lines from Verkh-Neyvinsk to Nizhnyaya Tura disclosed in TALENT, which pass west of the substation (item 15 on Table 2) in Nizhne Tagil'. Haze prevents detailed analysis of equipment in the substation's enclosed area.

Details of the substations are given in the list comprising Table 2.

Power Lines

A number of power-line traces are seen on KEYHOLE photography. Some of them extend the alignments of those visible on TALENT.

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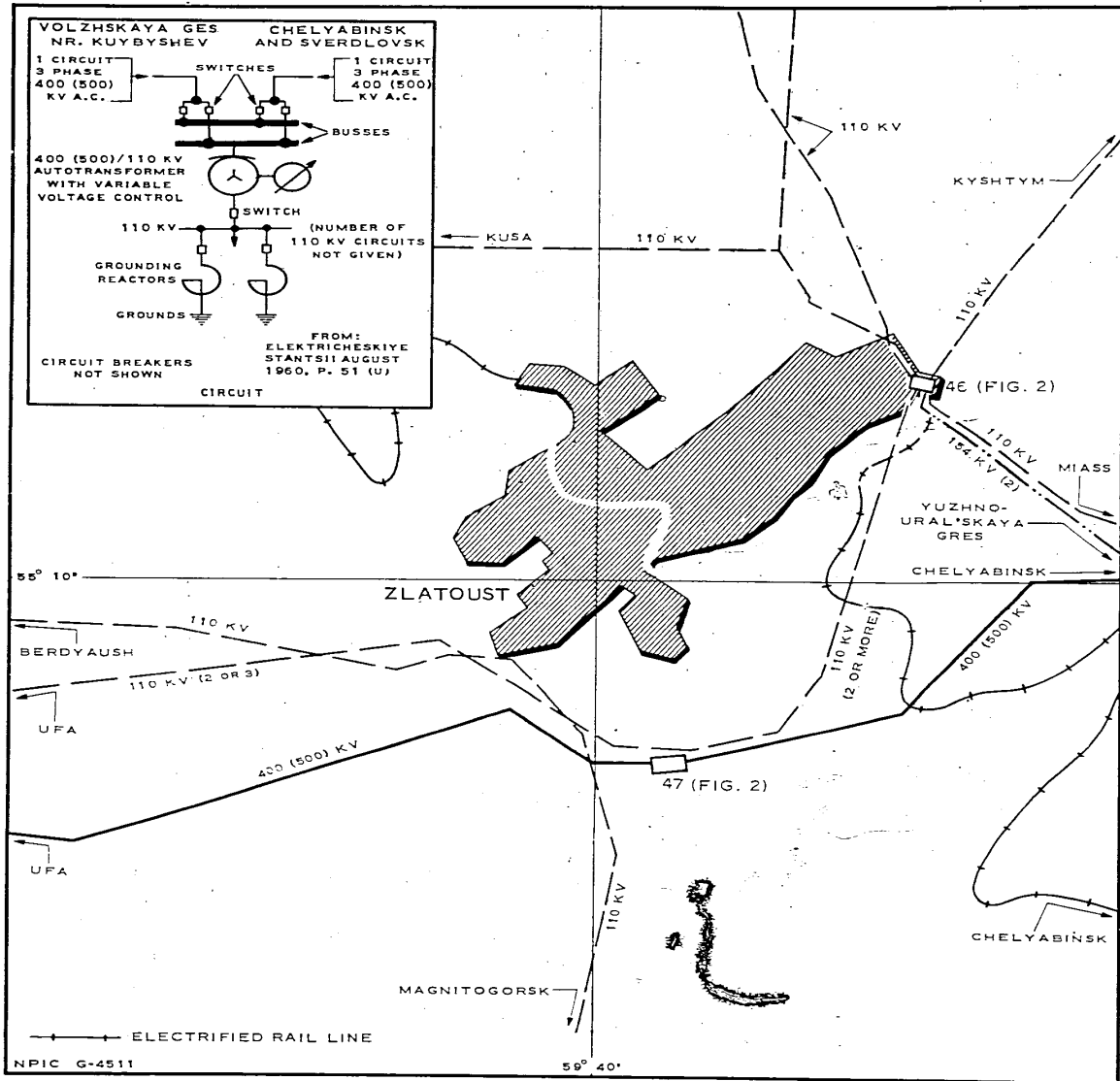


FIGURE 4. POWER LINES IN VICINITY OF ZLATOUSTINSKAYA, Inset shows schematic diagram of Zlatoustinskaya substation.

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Power Lines Serving Arti Area

Two probable 110-kv power line traces, not discernible on TALENT material, can be seen entering a cloud-covered area southwest of Arti and south of the northernmost bend of the Ufa river. One trace originates at the substation in Mikhaylovskiy (No 34, Figure 2); the second originates at the substation in Nyazepetrovsk (39). Limited collateral suggests that a chemical industry may be located in or near Arti. However, the visible evidence that two 110-kv power lines serve this cloud-covered area suggests that power may be used for some purpose not disclosed in available source material, especially since available mapping provides no indication of any industry or other installation necessitating such a power supply. The clear KEYHOLE photography of the perimeter of this cloud-covered area does not disclose any other traces which might be for power lines.

Power Lines from Pavlovka to Ufa

Two power lines can be traced on KEYHOLE photography leaving the site of Pavlovskaya GES (item MM, Table 1) in the direction of Ufa until they disappear under a heavy cloud cover. They are estimated to be for two, 3-phase, 110-kv power lines of either one or two circuits each. Since Pavlovskaya GES is reported completed, it is estimated that at least one power line is in service. These power lines are not believed to carry 220 kv, since available USSR circuit diagrams of 220-kv and higher voltages for the national grid do not indicate any plans for 220-kv circuits to be tied into this power plant.

Power Lines Serving Bagaryak

Possible power lines tied to a possible substation (Item 40, Table 2) in the northern section of Bagaryak (56-13N 61-30E) are seen on KEYHOLE photography (see Figure 5). Considerable activity is indicated by the many tangential traces radiating from this small community. Limited

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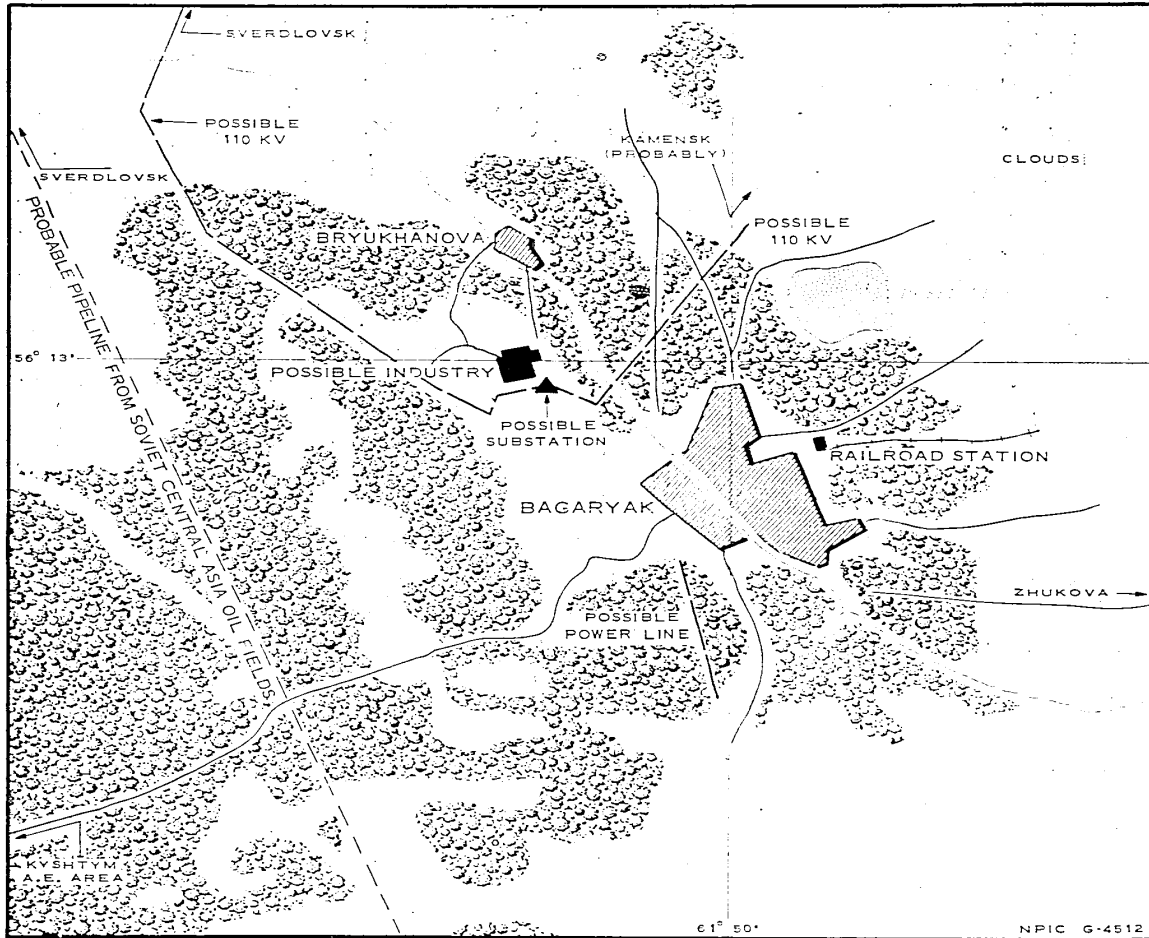


FIGURE 5. POWER LINES IN BAGARYAK AREA.

collateral information indicates the production of graphite in the vicinity of Bagaryak. Clouds and haze, however, prevent analysis. There are indications that a large structure is situated south of the possible substation site.

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Railroad Electrification

Several substations serving electrified sections of railroads in the Ural region additional to those identified from TALENT are now identified on KEYHOLE. These railroads include the north-south line generally paralleling the eastern flank of the Ural range and the east-west line between Chelyabinsk and Ufa (Figure 2). Also, there are visible indications that electrification is under way or possibly completed on the eastern cloud-free portions of the Sverdlovsk-Perm' line as far west of Sverdlovsk as Kuzino (57-01N 59-27E).

TABLE 1. POWER PLANTS ON URAL GRID
(These power plants are keyed to Figure 2.)

Source: T = TALENT; K = KEYHOLE; Co = Collateral.
rep - reported; est - estimated

Item	Name, Description, and Location	Capacity (MW)	Source
A	Krasnoturinskaya TETS. Thermal power plant in Bogoslovsk (on far oblique). 59-46N 60-13E *	325 (rep)	T, Co
B	Serovskaya GRES. Thermal power plant (on far oblique, mostly obscured by clouds). 59-37N 60-47E *	400 (rep)	T, Co
C	Thermal power plant in Novaya Iyalya. 59-03N 60-39E *	12-13 (est)	T
D	Thermal power plant in Korelino. 58-43N 60-23E *	11 (est)	T

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Item	Name, Description, and Location	Capacity (MW)	Source
E	Nizhnyaya Turinskaya GRES. Important thermal power plant in north Ural region. Switching yard also serves as switching substation for north Ural 220-kv power lines. Power plant also serves Nizhnyaya Tura AE installation. <u>1</u> / 58-37N 59-51E	550 (est)	T, Co
F	Nizhniy Tagil'skaya TETS. Thermal power plant in Novo Tagil attached to Kaganovich' Railroad and Car and Tank Plant. Probably tied into 110-kv power lines. 57-56N 60-04E	87 (rep)	T, Co
G	Nizhniy Tagil'skaya TETS-1. Thermal power plant probably tied to 110-kv power lines. (partially obscured by clouds) 57-54N 60-02E	100 (rep)	T, Co
H	Nizhniy Tagil'skaya TETS, Kuybyshev. Small thermal power plant serving Nizhniy Tagil. Probably tied to 110-kv power lines. (haze) 57-54N 59-57E	15 (est)	T, Co
I	Small thermal power plant in Kirovgrad. Tied to 110-kv power lines through adjacent substation (not listed in List of Substations). 57-25N 60-04E	under 25 (rep)	T, Co
J	Verkhne-Tagil'skaya GRES. Significant thermal power plant principally serving Verkh-Neyvinsk Gaseous Diffusion Plant. Tied to 110-kv power lines. 57-21N 59-57E	800 plus 200 u/c	T, Co [REDACTED]

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Item	Name, Description, and Location	Capacity (MW)	Source
K	SUGRES. Important thermal power plant in Sredne-Ural'sk serving Sverdlovsk and Verkh-Neyvinsk plant through 110-kv power lines. No change indicated on KEYHOLE coverage. 57-00N 60-29E	234 (est)	K, T Co
	Sverdlovsk Power Center power plants, (see text). (56-50N 60-23E)	124 (total)	K, T Co
L	Solikamskaya TETS, small thermal power plant attached to cellulose plant in Borovsk. Tied to 110-kv power lines. 59-41N 56-40E	24 (rep)	Co
M	Bereznikovskaya TETS. Thermal power plant in Berezniki. Tied to 110-kv power lines.** 59-24N 56-44E *	105 (rep)	Co
N	Bereznikovskaya TETS, BMZ. Thermal power plant in Berezniki. Tied to 110-kv power lines.** 59-24N 56-44E *	100 (rep)	Co
O	Yayvinskaya GRES. Important thermal power plant reported under construction.** 59-18N 57-18E (Yava)	300 to 600 u/c	Co (1959)
P	Thermal power plant in Kizel. Tied to 110-kv power lines.** 59-03N 57-36E *	60 (rep)	Co
Q	Kizelskaya GRES-1. Thermal power plant in Gubakha tied to 110-kv power lines. 1958 Seven Year Plan indicates planned construction of 220-kv power line from Chusovoy to Gubakha.** 58-52N 57-33E	98 (rep)	Co (1958)

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Item	Name, Description, and Location	Capacity (MW)	Source
R	Shirokhovskaya GES. Small hydroelectric power plant on Kos'va River. Tied to 110-kv power lines. ** 58-50N 57-33E *	28 (rep)	Co
S	KamGES. First major hydroelectric power plant completed on Kama River. Tied to 110-kv power lines and to Yuzhnaya Substation, Sverdlovsk, by two 1-circuit 220-kv power lines in parallel traces. ** 58-08N 56-20E	504 (rep)	Co
T	Permskaya TETS ACP. Reported tied to 110-kv power lines. ** 57-59N 56-14E	n.a.	Co
U	Permskaya GRES-2. Reported tied to 110-kv power lines. ** 58-01N 56-10E	6.5 (rep)	Co
V	Krasnokamskaya TETS, Zakam. Important thermal power plant serving Krasnokamsk and Perm' area. Tied to 110-kv power lines. ** 58-05N 55-40E	150 (rep)	Co
W	Votkinskaya GES. Second major hydroelectric power plant under construction on Kama River. Planned to be tied to Yuzhnaya Substation, Sverdlovsk, by 1-circuit, 500-kv power line. 56-46N 54-00E *	1,000 u/c	Co (1961)
X	Beloyarskaya AES. Significant nuclear power plant under construction. To be tied to Sverdlovsk and Chelyabinsk power centers by 1-circuit 220-kv powerlines: *** 56-51N 61-23E *	200 u/c plus 200 planned	Co (1961)

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Item	Name, Description, and Location	Capacity (MW)	Source
Y	Small thermal power plant in Asbest. Probably tied to 110-kv power lines. *** 57-01N 61-30E *	under 25	Co (1959)
Z	YeGRES. Thermal power plant in Yegorshino, north of Artemovsk. Probably tied to 110-kv power lines. 57-22N, 61-52E *	46 (rep)	Co (1959)
AA	Kamensk-Ural'skaya TETS. Significant thermal power plant tied to 220-kv and 110-kv power lines. Probably provides the area around Bagaryak with power through 110-kv power line. *** 56-21N 61-59E	400 (rep)	Co
BB	Argayashskaya TETS. Important thermal power plant tied to 220-kv and 110-kv power lines. *** 55-28N 60-53E *	300 (rep)	Co
	For Chelyabinsk Power Center power plants, see text. 55-10N 61-24E	300 (total)	T, Co
CC	Yuzhno-Ural'skaya GRES. Thermal power plant in south Ural area. Tied to 220-kv and 110-kv power lines; also by a 2-circuit 154-kv power line to Zlatoust. A future 1-circuit 500-kv power line reported transmitting 220 kv. 54-53N 61-18E *	600 (1959) plus 400 u/c (rep)	Co
DD	Troitskaya GRES. **** Significant thermal power plant reported under construction to serve 500-kv and 220-kv power lines. *** 54-03N 61-34E *	1,300 u/c	Co

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Item	Name, Description, and Location	Capacity (MW)	Source
EE	Rudnaya TETS. Thermal power plant reported under construction and to be tied to south Ural power lines through large substation (67). Whether this power plant will be completed is questioned in some collateral.	100 u/c	Co
FF	Magnitogorskaya TETS. Thermal power plant attached to Magnitogorsk Metallurgical Combine. Tied probably to 110-kv and possibly to 220-kv power lines through 35-kv power lines and substation in north Magnitogorsk (64). 53-26N 59-02E	273 (rep)	T, Co
GG	Magnitogorskaya TETS. Thermal power plant attached to Magnitogorsk Metallurgical Combine. Tied to TETS, item FF, by 35-kv power lines and to substation, item 64. 53-23N 59-02E	100 (rep)	T, Co
HH	Sterlitamakskaya TETS, New. Thermal power plant tied to Ural area through 110-kv power line to Ufa power center. 53-37N 55-58E	50 (rep)	Co (1959)
II	Small thermal power plant at Ishimbay. Probably tied to Sterlitamakskaya TETS (HH) through 110-kv power line. 53-28N 56-02E *	under 25	Co
JJ	Salavatskaya TETS. Thermal power plant tied to Ural area by 110-kv power line to Ufa power center. 53-21N 55-55E	150 (rep)	Co (1959)

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Item	Name, Description, and Location	Capacity (MW)	Source
KK	Zlatoustovskaya TETS. Small thermal power plant, possibly tied to 110-kv power lines (haze). 55-12N 59-40E	25 (rep)	K, Co
LL	Small thermal power plant in Asha. Possibly tied to 110-kv power lines (haze). 55-00N 57-16E	4 (est)	K
MM	Pavlovskaya GES. Hydroelectric power plant on Ufa River. Tied to Ufa power center by two probably 110-kv power lines. 55-24N 56-34E	170 (rep)	K, Co
	Ufa power plants, see text. 54-44N 55-57E	288 (total)	Co

- * Approximate geographic coordinates (plus or minus 2 minutes).
- ** Cloud covered on TALENT.
- *** Cloud covered on KEYHOLE.
- **** Cloud covered on TALENT and KEYHOLE.

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TABLE 2. SUBSTATIONS ON URAL GRID
(Items refer to numbers on Figure 2.)

T = TALENT K = KEYHOLE Co = Collateral

Item	Location and Coordinates	Description	Known Voltage (kv)	Source
1	Severoural'sk 60-07N 59-50E*	Transformer substation. Terminus of 1-circuit 220-kv power line from Nizhnyaya Tura (far oblique).	220	T, Co
2	Serov 59-37N 60-47E*	Transformer substation on Nizhnyaya Tura to Severoural'sk 220-kv power line.	220	T
3	Vagranskaya 59-19N 60-29E*	Transformer-rectifier substation, serving electrified railroad (454-b; 7/).	110	T
4	Lyalya 59-06N 60-33E*	Transformer-rectifier substation, serving electrified railroad (454-b; 7/).	110	T
5	Verkhotur'ye 58-52N 60-50E*	Transformer-rectifier substation, serving electrified railroad (454-b; 7/).	110	T
6	Karelino 58-43N 60-23E*	Transformer-rectifier substation, serving electrified railroad (454-b; 7/).	110	T
7	Nizhnyaya Tura 58-39N 59-47E	Transformer and switching substation, serving atomic energy complex.	110	T
8	Is 58-48N 59-43E	Transformer substation.	110	T
9	Nizhnyaya Tura 58-39N 59-40E	Transformer substation, serving atomic energy complex.	110	T

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Item	Location and Coordinates	Description	Known Voltage (kv)	Source
10	Promyskla 58-34N 59-10E	Transformer substation.	110	T
11	Stantsiya Yevropeyskaya 58-27N 59-16E	Transformer-rectifier substation serving Perm' - Kushva electrified railroad (452-a; 7/).	110	T
12	Stantsiya Vyva 58-35N 59-59E	Transformer-rectifier substation serving Sverdlovsk to Nizhnyaya Tura electrified railroad (454-a; 7/).	110	T
13	North of Verkhnyaya Tura 58-23N 59-51E	Transformer and switching substation; probably feeds 35-kv power to Sverdlovsk - Nizhnyaya Tura electrified railroad (454-b; 7/).	110 35	T
14	Kushva 58-17N 59-47E	Probable transformer substation (haze and far oblique).	110	T
15	Nizhniy Tagil 57-55N 59-55E	Large transformer substation; ties Nizhniy Tagil industrial complex to Ural 110-kv power lines. No visible tie to 220-kv Verkh-Neyvinsk - Nizhnyaya Tura power lines (haze).	110	T
16	Near Buksina 58-29N 60-34E *	Transformer substation. **	110	Co
17	Verkhnyaya Salda 58-06N 60-33E *	Transformer and switching substation.	110	T
18	Levikha 57-38N 59-55E	Transformer and switching substation; probably feeds 35-kv power to Sverdlovsk - Nizhniy Tagil electrified railroad (454-a; 7/).	110 35	T

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Item	Location and Coordinates	Description	Known Voltage (kv)	Source
19	Karpushika 57-30N 59-55E	Possible transformer substation; may possibly contain rectifiers to feed dc power to electrified railroad.	110	T
20	Stantsiya Byn'govskiy 57-35N 60-06E	Transformer-rectifier substation, serving Sverdlovsk - Nizhniy Tagil electrified railroad (454-a; 7/).	35	T
21	Tsementnyy 57-25N 60-10E	Transformer substation, serving cement plant.	35	T
22	Neyvo-Rudyanka 57-21N 60-10E	Transformer and switching substation, with possible rectifier equipment to serve Sverdlovsk - Nizhniy Tagil electrified railroad (454-a; 7/).	110	T
23	Verkh-Neyvinsk 57-16N 60-06E 25X1 25X1	Seven substations. Six transformer, switching, and rectifier substations [redacted] Seventh substation serves local industry, being fed 35-kv power.	220 110 35	K T Co
24	3 miles East of Taraskoye on Isetskoye Ozero 57-08N 60-10E	Transformer substation, with possible rectifier equipment for Sverdlovsk to Nizhniy Tagil electrified railroad (454-a; 7/).	110	K T
25	Solikamsk 59-41N 56-40E *	Transformer substation.	110	Co (1945)
26	Chusovoy 58-21N 57-49E *	Planned significant switching and probably transformer substation to serve planned 220-kv power lines for north Ural region.	220	Co (1958)

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Item	Location and Coordinates	Description	Known Voltage (kv)	Source
27	Chusovoy 58-21N 57-49E *	Transformer and switching substation tied to 110-kv power lines in north Ural area.	110	Co (1945)
28	Bizert' 56-52N 59-04E	Transformer substation.	110	K, T
29	Revda 60-48N 59-56E	Transformer substation. **	110	K
30	Pervoural'sk 56-56N 59-54E	Possible transformer and principal switching substation for 110-kv power lines west of Sverdlovsk in central Ural region.	110	T, Co
31	Bilimbay 56-57N 59-47E	Possible transformer-rectifier substation, serving electrified section of Pervoural'sk - Kuzino railroad; may be in process of electrification. Power line trace continues toward Kuzino (410-zh; 7/).	110	K Co (1958)
32	Sverdlovsk 56-44N 60-36E	Yuzhnaya substation. Principal transformer and switching substation for Sverdlovsk and central and north Ural areas. Terminus [redacted] of 400 (500)-kv power line from Volzhskaya GES (near Kuybyshev) through Bugul'ma, Ufa, Zlatoust, and Chelyabinsk, and of two 1-circuit, 220-kv power lines from KamGES (S).	400 (500) 220 110	K T Co

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Item	Location and Coordinates	Description	Known Voltage (kv)	Source
33	Stantsiya Kosulino (Dubrovinskiy) 56-45N 61-02E	Transformer substation with possible rectifier equipment for serving Sverdlovsk - Tyumen electrified railroad (410-z; <u>7/</u>).	110	T
34	Mikhaylovskiy 56-27N 59-08E	Transformer substation tied to 110-kv power lines. KEYHOLE discloses new trace in direction of Arti area.	110	K, T
35	Degyarka 56-43N 60-02E	Transformer substation.	110	K, Co
36	Polevsk'oy 56-29N 60-15E	Transformer and switching substation tied to 110-kv power lines southwest of Sverdlovsk.	110	T, Co
37	Stantsiya Poldnevaya 56-18N 60-17E	Probable transformer-rectifier substation serving Sverdlovsk - Chelyabinsk electrified railroad (462-g; <u>7/</u>).	110	K
38	Verkhniy Ufaley 56-03N 60-13E	Major transformer and switching substation tied to 110-kv power lines between Sverdlovsk and Chelyabinsk; possibly has rectifier equipment serving Sverdlovsk - Chelyabinsk electrified railroad (462-g; <u>7/</u>).	110	Co
39	Nyazepetrovsk 56-02N 60-17E	Transformer substation tied to 110-kv power lines. KEYHOLE discloses a new power line trace in direction of Arti area.	110	K

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Item	Location and Coordinates	Description	Known Voltage (kv)	Source
40	Bagaryak 56-13N 61-30E	Possible transformer substation tied to Kamensk and to Sverdlovsk by possibly 110-kv power lines.	110 (poss)	K
41	Kyshtym 55-42N 60-33E *	Important switching and probably transformer substation tied to 110-kv power lines between Sverdlovsk and Chelyabinsk. ****	110	Co (1958)
42	Kasli 55-53N 60-32E	Transformer and switching substation of possible significance to atomic energy installations in the Kyshtym area; tied to 110-kv power lines.	110	T, Co
43	Vermikulit 55-59N 60-40E *	Transformer substation; terminus of 110-kv power line from Kasli; serves Sungul' Institute through probable 35-kv power line.	110 35	T, Co
44	Stantsiya Shagol, 7 miles NW of Chelyabinsk 55-14N 61-17E	Chelyabinskaya substation. Principal transformer and switching substation in south Ural region on Kuybyshev to Sverdlovsk 400 (500)-kv power line; tied also to 220-kv and 110-kv power lines. Only partially in service (TALENT), some switching equipment and transformers not yet installed (surrounded by clouds in TALENT).	400 (500) 220 110	T Co (1958)
45	Karabash 55-29N 60-13E *	Transformer substation tied to 110-kv power lines (haze on TALENT). ***	110	T, Co

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Item	Location and Coordinates	Description	Known Voltage (kv)	Source
46	Zlatoust (North of urban area) 55-10N 59-42E	Major transformer and switching substation on 110-kv power lines west of Chelyabinsk and tied to Yuzhno-Ural'skaya GRES (CC) by 2-circuit 154-kv power line; probably tied to Zlatoustinskaya Substation (47). **	154 110	K Co (1945) (1948)
47	Zlatoust (South of urban area) 55-09N 59-40E	Zlatoustovskaya Substation. Principal switching and transformer substation serving Zlatoust area on Kuybyshev to Sverdlovsk 1-circuit 400 (500)-kv power line. **	400 (500) 110	K Co (1958)
48	Kusa 55-17N 59-37E	Transformer substation. Terminus of probable 110-kv (possibly 35-kv) power line from Zlatoust (haze on KEYHOLE).	110	T, K
49	Stantsiya Tundush 55-11N 59-24E	Transformer-rectifier substation serving Ufa - Zlatoust electrified railroad (435-zh; 7/).	110	K
50	Near Stantsiya Zhukatau on Berdyash to Druzhino rail- road (452-b; 7/) 55-09N 59-12E	Transformer-rectifier substation serving Ufa to electrified railroad (435-zh; 7/).	110	K
51	Satka 58-02N 59-03E *	Transformer substation tied to 110-kv power lines west of Chelyabinsk. *** (cloud covered on KEYHOLE)	110	T Co (1945)

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Item	Location and Coordinates	Description	Known Voltage (kv)	Source
52	Raz'yezd (platform) Biyanka 55-04N 57-35E	Transformer-rectifier substation, serving Ufa - Zlatoust electrified railroad (435-zh; 7/).	110	K
53	Asha 55-00N 57-15E	Transformer-rectifier substation serving Ufa - Zlatoust electrified railroad (435-zh; 7/).	110	K
54	Tavtimanovo 54-54N 55-40E *	Possible transformer-rectifier substation serving Ufa - Zlatoust electrified railroad (435-zh; 7/).	110	K
55	Ufa	Planned principal transformer and switching transformer substation on Kuybyshev to Sverdlovsk 1-circuit 400 (500)-kv power line. Status not available; may be under construction, partially or completely in service.	400 (500)	Co (1958)
56	Bugul'ma 54-29N 52-45E	Principal transformer and switching substation on Kuybyshev - Sverdlovsk 1-circuit 400 (500)-kv power line, Bugul'ma oil field.	400 (500) 220	T, Co
57	Miass 54-59N 60-07E *	Transformer substation tied to 110-kv power lines west of Chelyabinsk. ****	110	Co (1945)
58	Kochkar' 54-27N 60-48E *	Transformer substation.	110	Co (1945)
59	Belgorod 53-55N 58-23E *	Transformer substation, terminus of 110-kv 1-circuit power line from Magnitogorsk (see item 64).	110	Co (1945)

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Item	Location and Coordinates	Description	Known Voltage (kv)	Source
60	Kustanay 53-16N 63-36E *	Significant transformer substation believed to be receiving 220-kv power from Troitsk over future 500-kv power line.	(500) 220	Co (1958)
61	Rudnyy (Sarbay area)	Large transformer and probable switching substation, believed to be receiving 220-kv power from Troitsk over 1-circuit future 500-kv power line.	(500) 220 110	Co (1960)
62	Lisakovka (near Raz'yezd Lisakovka) 52-32N 61-16E	Reported transformer substation on Sarbay-Dzhetygara 220-kv power line. Construction may have begun.	220	Co (1960)
63	Dzhetygara 52-13N 61-13E	Reported planned transformer substation to be terminus of Sarbay-Lisakovka-Dzhetygara power line. Construction may have begun.	220	Co (1960)
64	Magnitogorsk 53-28N 59-03E	Principal transformer and switching substation in Magnitogorsk tied to 110-kv power lines in south Ural region. (No evidence of any 220-kv equipment on TALENT).	110 35	T, Co
65	Davlekanovo 54-12N 55-04E *	Transformer substation tied to 110-kv power lines south of Ufa. May have rectifier equipment for Kinel'-Ufa electrified railroad (435-e; 7/).	110	Co (1959)

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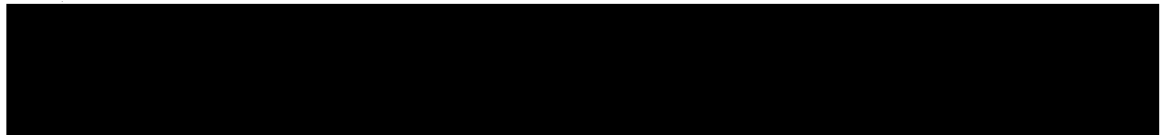
Item	Location and Coordinates	Description	Known Voltage (kv)	Source
66	Belebey 54-13N 54-07E	Same as 65.	110	Co (1959)
67	Abdulino 54-06N 54-07E *	Same as 65.	110	Co (1959)

- * Approximate geographic coordinates (plus or minus 2 minutes).
- ** Cloud covered on TALENT.
- *** Cloud covered on KEYHOLE.
- **** Cloud covered on TALENT and KEYHOLE.

REFERENCES

PHOTOGRAPHY

25X1D



MAPS AND CHARTS

The latest editions of the AMS maps Series N501 and N502 and Air pilotage charts covering this area were used in this report. In addition to Sheet No 41 of AMS series 1301, WACs 156, 164, and 165, and USAF Jet Navigation Charts, Sheet JN-11 were also used. The highest classification on these maps is CONFIDENTIAL.

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- 25X1C 2. CIA. SI 51-59, Availability of Electric Power to Soviet Atomic Energy Installations in the Urals, 4 Jun 59 (S/Noform [REDACTED]) 25X1C
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In addition, collateral data covering electrical developments during the current USSR seven-year plan, 1958-1965, including schematic circuit diagrams of power lines of 220 kv or higher voltages, from the files of USSR newspapers and magazines were studied.

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ERRATUM FOR PIC/JR-7/61

In Figure 2 (on page 6), the power line shown east of Beloyarsk as "400(500) KV" should be corrected to read "planned 220 KV."

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