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PHOTOGRAPHIC INTERPRETATION REPORT

CHRONOLOGY OF ROCKET ENGINE TEST FACILITY KURUMOCH, USSR

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FEBRUARY 1968

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PHOTOGRAPHIC INTERPRETATION REPORT

CHRONOLOGY OF ROCKET ENGINE TEST FACILITY KURUMOCH, USSR

FEBRUARY 1968

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

SUMMARY

The Rocket Engine Test Facility at Kurumoch, USSR, has 5 operational liquid propellant rocket engine test stands and has been operational since [redacted] The facility, initially, was made up of what is at the present time approximately the southern half of the facility. The expansion to the present size was essentially completed by [redacted]

A diffuser tube, first seen in [redacted] indicates an altitude simulation capability which makes possible an enlarged function for the facility.

INTRODUCTION

This report consists primarily of a chronology of the construction of the Rocket Engine Test Facility at Kurumoch, along with descriptions of the more significant structures within the facility. Also included in the report are descriptions and artist's conceptions of Test Stands 1, 2, 3, 4, and 5, and a limited analysis of the pipelines within the facility.

The Rocket Engine Test Facility [redacted] is located at Kurumoch, USSR, at 53-32N 049-51E, 24 nautical miles (nm) northwest of Kuybyshev, USSR (Figure 1). The installation consists of 5 rocket engine test stands and 2 air liquefaction plants, along with tankage and support structures.

Two areas near the test facility are not included in the chronology study. A separate support area containing a concrete batch plant, a substation, a secured barracks area with 4 barracks, and numerous support buildings is located approximately 0.3 nm south of the test facility. Numerous single-family dwellings are located west of the batch plant. In addition, a housing, possible engineering, and storage area, located 0.2 nm south of the test facility, contains approximately 50 barracks/apartment buildings, 2 possible engineering buildings and numerous warehouses under construction, and support buildings. A considerable number of single-family houses are also located nearby.

The Rocket Engine Test Facility was observed under construction on [redacted] At that time the facility consisted of an area which is approximately the southern half of the facility now present. The remains of the wall which was the northern boundary are still evident through the center of the facility. Subsequent [redacted] coverage of the plant up to [redacted] was often of small scale and poor interpretability. However, photography of [redacted] has provided larger scale coverage of good interpretability, permitting more definitive interpretations than had previously been possible (Figure 2). Figure 3 is a line drawing, color coded to show periods of significant construction; its associated table gives descriptions, dimensions, and construction chronology of the principal structures within the facility. This report updates information concerning this facility contained in an NPIC publication of [redacted] 1/ No attempt to color code the roads, railroads, or pipelines has been made due to the poor interpretability of much of the early coverage.

HIGHLIGHTS OF CHRONOLOGICAL DEVELOPMENT

The Rocket Engine Test Facility had a roof cover of 69,235 square feet when first observed on photography of [redacted] Square footage of roof cover increased steadily after [redacted] to the time of the photography of [redacted] as follows: during the period from [redacted] roof cover increased by [redacted] square feet; from [redacted] to [redacted] square feet; from [redacted] square feet; from [redacted] square feet; and from [redacted] by 12,520 square feet, making a total roof cover as of [redacted] of 546,390 square feet.

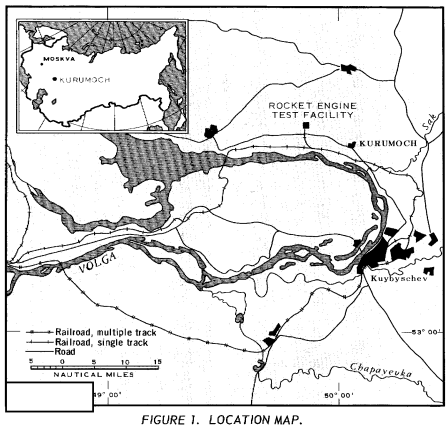

FIGURE 1. LOCATION MAP.

1959

[redacted] photography of good interpretability in [redacted] showed the facility in the early stages of construction. Test Stand 1 (item 60) was in the midstage of construction. A steamplant (item 101) was apparently complete. Eight support buildings and 4 small unidentified structures were complete. Numerous tanks were being emplaced. A probable engineering/administration building (item 107) near the main gate was complete.

1961

Coverage of small scale and poor interpretability showed that the area was being enlarged. The north edge of the area did not appear to be secured. Test Stand 1 appeared outwardly complete in [redacted] Construction activity was evident on the sites of Test Stand 2 (item 23), its associated assembly/checkout buildings (items 27, 28), and the northernmost air liquefaction plant (item 31). Test Stand 3 (item 58) was present and apparently complete. Test Stands 4 and 5 (items 49 and 51) along with their control building (item 50) and a pumphouse and support building for these 2 stands (item 52) were present and apparently complete. The other air liquefaction plant (item 70) and the assembly/checkout buildings (items 64, 65) on the south side of the facility were complete. Numerous support buildings and 1 semiburied tank (item 74) were complete.

1962

[redacted] photography of fair interpretability revealed the outline of a security fence/wall on the north side of the facility. The assembly/checkout buildings that serve Test Stand 2 had been completed. Thirteen other buildings and 3 semiburied tanks appeared complete. The first blast mark from Test Stand 1 was seen in [redacted] of that year.

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1963

photography of fair interpretability in over snow-covered terrain made possible the first detailed observation of the facility since the coverage of

Test Stand 2 appeared to be outwardly complete along with all of the immediately associated buildings except the air liquefaction plant (item 31). The control building for Test Stand 1 (item 61) was first visible in this year; however, it was probably present earlier since Test Stand 1 had displayed evidence of test activity the previous year. Two large semiburied tanks (item 39) and numerous support buildings were completed.

1964

The most significant construction observed on photography of fair interpretability during 1964 was the completion of an engineering/laboratory building (item 55), 5 support buildings, and a probable cryogenic storage tank (item 68). An addition to the steamplant (item 101) was also completed.

1965

Photography of fair interpretability revealed that the northernmost air liquefaction plant (item 31) was complete. Two semiburied tanks (item 95) and their associated pumphouse appeared to be complete. By an unidentified facility, approximately 1,800 feet in length with a C-shaped earthen barricade at the north end and 6 linear earthen barricades along the sides, appeared to be complete in a location outside the north wall of the facility (Figure 2).

1966

Large-scale photography of fair interpretability showed the presence of 2 semiburied tanks (items 34, 38), 1 buried tank (item 29), 2 probable cryogenic tanks (items 30, 33), an unidentified tower (item 117), a water tower (item 105), and 2 minor support buildings.

1967

Large-scale photography of good interpretability allowed the identification of a diffuser tube on the west end of Test Stand 3. Several small support structures and 2 buried tanks were also evident. Trenching was evident northwest of Test Stand 1.

TEST STANDS

The test stands at the Kurumoch Engine Test Facility were discussed in detail in a previous NPIC publication 1/, and a portion of that same information is repeated in this report with updating to include the 1967 photographic coverage.

TEST STAND 1

Detailed dimensions and an artist's conception of Test Stand 1 are shown in Figure 4. The test stand appeared complete in No evidence of test activity had been observed by the first blast mark was seen at this stand in Subsequent photography has revealed blast marks on at least 21 different occasions. These blast marks are dark deposits on the snow in winter and burned or dead vegetation in the summer, and they vary in size and intensity. With the exceptions of blast marks in snow, and possibly a first test at a new stand, it is impossible to ascertain if blast marks are new or from previous tests.

Test Stand 1, a single position stand, is almost identical to stands at rocket engine test facilities near Perm and Krasnoyarsk in both its size and number and type of related support structures. It appears that the flame deflector is water cooled and that the article to be tested is suspended in the by approximately 60-foot high projection which overhangs the flame deflector and partially covers the width of the test stand. An access ramp enters the rear center of the stand at a level approximately below the top of the stand and apparently also on a level with the bottom of the partial width projection. The main structure of the stand is 85 by 70 feet, rises 130 feet above grade at the rear, and extends a total of above the foot of the flame deflector. A probable narrow-gauge rail line leads from an assembly/checkout building (item 64) located 550 feet to the rear of the stand, across the access ramp, into the rear of the stand. A possible missile component measuring was seen on this track in A control building (item 61) is situated on a cliff 215 feet west of the stand and is connected to the stand by a suspended cable tray. Two cylindrical possible tanks, measuring approximately 30 by 5 feet, are also visible at the base of the stand on photography of

TEST STAND 2

Test Stand 2 was not present on photography of 1959. In an excavation for the test stand and an access road to the site were present in an area north of the older portion of the facility. Although in the stand appeared to be outwardly complete, no blast mark in the snow was apparent on photography of Detailed dimensions and an artist's conception of this stand are shown in Figure 5.

Photography of revealed a pattern of burned vegetation and scarring that would indicate a previous test firing. Blast marks have been observed on several subsequent photographic missions, most notably in when dark blast marks were observed on the snow in front of all 5 stands and in when a very clearly defined blast mark was present at Test Stand 2. On an actual test may have been in progress on this stand at the time of the photography. Illustrations of the blast areas at Stands 1 and 2 can be found in document reference 1.

Test Stand 2, a single position stand, is almost identical to test stands at the Voronezh and Omsk Rocket Test Facilities. The flame deflector is probably water cooled and the test article is suspended in a projection that extends across the full width of the test stand. An access ramp enters the side of the stand at a level feet below the top of the stand and approximately on a level with the bottom of the overhanging projection. The highest part of the superstructure of the stand is and rises above grade at the rear and above the blast pit or sump. An assembly/checkout building (item 28) is situated approximately 295 feet south of the stand, and the control building (item 20) for Test Stand 2 is approximately 230 feet east of the stand. A crated possible missile component was visible near the assembly/checkout building on photography. When seen on photography of a possible missile com-

Table 1. Descriptions and Dimensions of Major Items in the Kuranoch Engine Test Facility
(Item numbers are keyed to Figure 3)

Item	Function/Description	Dimensions (ft)* L	W	H	Roof Cover (sq ft)	Date First Observed**	Comments
1	C/I bldg						Measurements aprx; located outside N wall of facility; storage-type bldg com- pleted on N side of bldg by [redacted]
2	Settling ponds						Measurements aprx
3	Poss fluid treatment facility						Association of items 3-5 with items 2 & 9 suggests a fluid treatment facility; small prob construction bldg on S side of item 3 on [redacted] photography
4	Semiburied tank/structure						Measurements aprx
5	Semiburied tank						Measurement aprx
6	Poss earth-walled tank						
7	Support bldgs						
8	Support bldgs						Measurements aprx
9	Settling ponds						Measurement aprx; complete by [redacted]
10	Poss pumphouse						Measurements aprx
11	Support bldgs						Height measurement aprx; located outside secured area; may be supply point for poss fluid treatment facility; has small bldg near NW corner
12	Settling ponds						Measurements aprx; trenching in vicinity may indicate future construction
13	Support bldg						Height measurement aprx
14	Support bldg						
15	Poss pumphouse						Measurements aprx
16	Poss fuel handling facility						Rail served; prob for a/t fuels
17	Poss fuel handling facility						Rail served
18	Poss shipping/receiving bldg						Rail served
19	Prob settling basins a/o						Measurements aprx; gradual area on E side
20	Control bldg for Test Stand 2						
21	Support bldg						
22	Support bldg						
23	Test Stand 2						Externally complete by [redacted] 2 horizontal tanks evident on NE side on [redacted]
24	Support bldg for Test Stand 2						
25	Pumphouse						Prob for water to cool blast deflector, Test Stand 2
26	Poss oxidizer bldg for Test Stand 2						Complete by [redacted] pressure tanks on N end
27	Assembly/checkout bldg						Complete by [redacted]
28	Assembly/checkout bldg						Complete by [redacted] connected by covered walkway to item 27
29	Buried tank						Measurement aprx; includes earth mound
30	Prob cryogenic storage tank						Complete by [redacted]
31	Air liquefaction plant						Complete by [redacted]
32	Prob cryogenic storage tank						
33	Prob cryogenic storage tank						
34	Prob semiburied tank						Measurement aprx; includes earth mound
35	Service bldg						Three vertical tanks on S side visible [redacted]
36	Prob storage & handling bldg						Complete by [redacted]
37	Prob pumphouse						Measurements aprx
38	Semiburied tank						Measurement aprx; includes earth mound
39	Semiburied tanks (24)						Measurements aprx; includes earth mound 12 tanks in same mound; prob for fuel; a/t trench/excavation on NW side
40	Two fan cooling tower						Measurements aprx
41	Two fan cooling tower						Measurements aprx
42	C/I bldg						
43	Support bldg						Measurements aprx

Item	Function/Description	Dimensions (ft)* L	W	H	Roof Cover (sq ft)	Date First Observed**	Comments
44	Support bldg						
45	Prob engineering/lab bldg						
46	C/I structures						Measurements aprx
47	C/I structures						Measurements aprx
48	Support bldg for Test Stand 5						Measurements aprx
49	Test Stand 5						Prob buried tank on N side, aprx [redacted] diam
50	Control bldg for Test Stands 4 & 5						
51	Test Stand 4						
52	Pumphouse & support bldg for Stands 4 & 5						Prob used for water and/or oxidizer han- dling
53	Support bldg						
54	Support bldg						
55	Engineering/lab bldg						
56	U/I structure						Measurements aprx
57	U/I structure						Measurements aprx
58	Test Stand 3						Diffuser bldg identified on W end of stand by [redacted]
59	Support bldg						Poss pumphouse
60	Test Stand 4						Small bldg on S side, later removed; a/t excavation on NW side; stand complete [redacted]
61	Control bldg for Test Stand 1						
62	Support bldg						
63	Vertical tanks						Measurements aprx; poss pumphouse
64	Assembly/checkout bldg						Complete by [redacted]
65	Assembly/checkout bldg						Complete by [redacted]
66	Support bldg						
67	Support bldg						
68	Prob cryogenic storage tank						Measurement aprx
69	Prob missile components han- dling bldg						Complete by [redacted] rail served
70	Air liquefaction plant						Complete by [redacted]
71	Prob cryogenic storage tank						
72	Semiburied tank						Measurement aprx, includes earth mound; prob used for fuel
73	Pumphouse						Complete by [redacted]
74	Semiburied tank						Measurement aprx, includes earth mound; complete by [redacted] prob used for fuel
75	Poss firehouse						
76	Support bldg						
77	Prob cryogenic storage tank						Complete by [redacted]
78	Two-fan cooling tower						Complete by [redacted] excavation on S side
79	Two-fan cooling tower						Complete by [redacted]
N0	Support bldg						
N1	Prob storage shed						
N2	Pumphouse & buried tanks (4)						Two tanks on each side, uncovered when first seen; covered by [redacted] prob used for fuel; pumphouse measurements aprx
N3	Small tanks (5)						Large horizontal tank is directly W of three tanks; measurement aprx
N4	Support bldg						
N5	Support bldg						
N6	Support bldg						Height measurement aprx; 3 small bldgs on N side complete on [redacted]
N7	Support bldg						Has small bldg on N side uncovered by [redacted] aprx 30 ft, first seen [redacted]
S8	Support bldg						
S9	Support bldg						
90	Support bldg						
91	Support bldg						
92	Support bldg						
93	Support bldg						
94	Pumphouse						
95	Semiburied tanks (2)						
96	Support bldg						
97	Support bldg						
98	Support bldg						
99	Prob engineering/admin bldg						
100	Prob shipping/receiving bldg						
101	Steamplant						
102	Support bldg						
103	Buried tanks (2)						
104	Tank						
105	Water tower						
106	Poss shipping/receiving bldg						
107	Prob engineering/admin bldg						
108	U/I structure						
109	Semiburied tank						Measurements aprx, includes earth mound; poss used for water or fuel
110	Semiburied tank						Measurement aprx, includes earth mound; poss used for water or fuel
111	Poss water supply system bldg						Complete by [redacted] small bldg on SE of [redacted] later razed
112	Support bldg						
113	Support bldg						
111	Support bldg						
115	Support bldg						
116	Prob security bldg						
117	U/I tower						
118	Prob vehicle storage & repair bldg						
119	Storage bldg						
120	Storage bldg						
121	Storage bldg						
122	U/I bldg						
123	Prob garage						
124	Support bldg						
125	Support bldg						
126	Prob barracks						
127	Support bldg						
128	Prob barracks						Similar bldg on S side razed by [redacted]
129	Prob barracks						Small bldg on W side

Measurements aprx

Measurements aprx

Measurements aprx
Height measurement aprx; complete by [redacted]
Measurement aprx, includes earth mound; prob used for fuel; complete by [redacted]
[redacted]
Small structure on N side apparent [redacted]

Rail served
Appeared complete in [redacted] but was expanded by [redacted] small bldg on E side & on W side; rail served
Measurements aprx
Measurement includes earth mound; tanks no longer visible
Measurement aprx; small bldg on NE side; earth walled
Diam measured at top of tower
Complete by [redacted] small struc- ture on N side in [redacted] later razed; buried tank & u/t structure on S side
Small bldg on N side in [redacted] later razed
Measurements aprx
Measurements aprx, includes earth mound; poss used for water or fuel
Complete by [redacted] small bldg on SE of [redacted] later razed
Measurements aprx
Several small structures closer razed; were evident S of here on [redacted]
Measurements aprx; poss tanks near bldg
Measurement aprx; poss tanks near bldg
Complete by [redacted]
Complete by [redacted]
Three bldgs similar to item 120 were razed by [redacted]
Two large bldgs on S side & aprx 11 others on S side were razed prior to [redacted]
Similar bldg on S side razed by [redacted]
Small bldg on W side

* All lengths and widths are overall measurements, and all heights are to the highest part of the structure. Test stand heights are of the super-structure only. Unless noted as approximate, horizontal measurements are accurate to within ± 5 ft or 3%, whichever is greater; vertical measurements are accurate to within ± 10 ft or 10%, whichever is greater.
**Structures were complete when first observed unless otherwise noted.

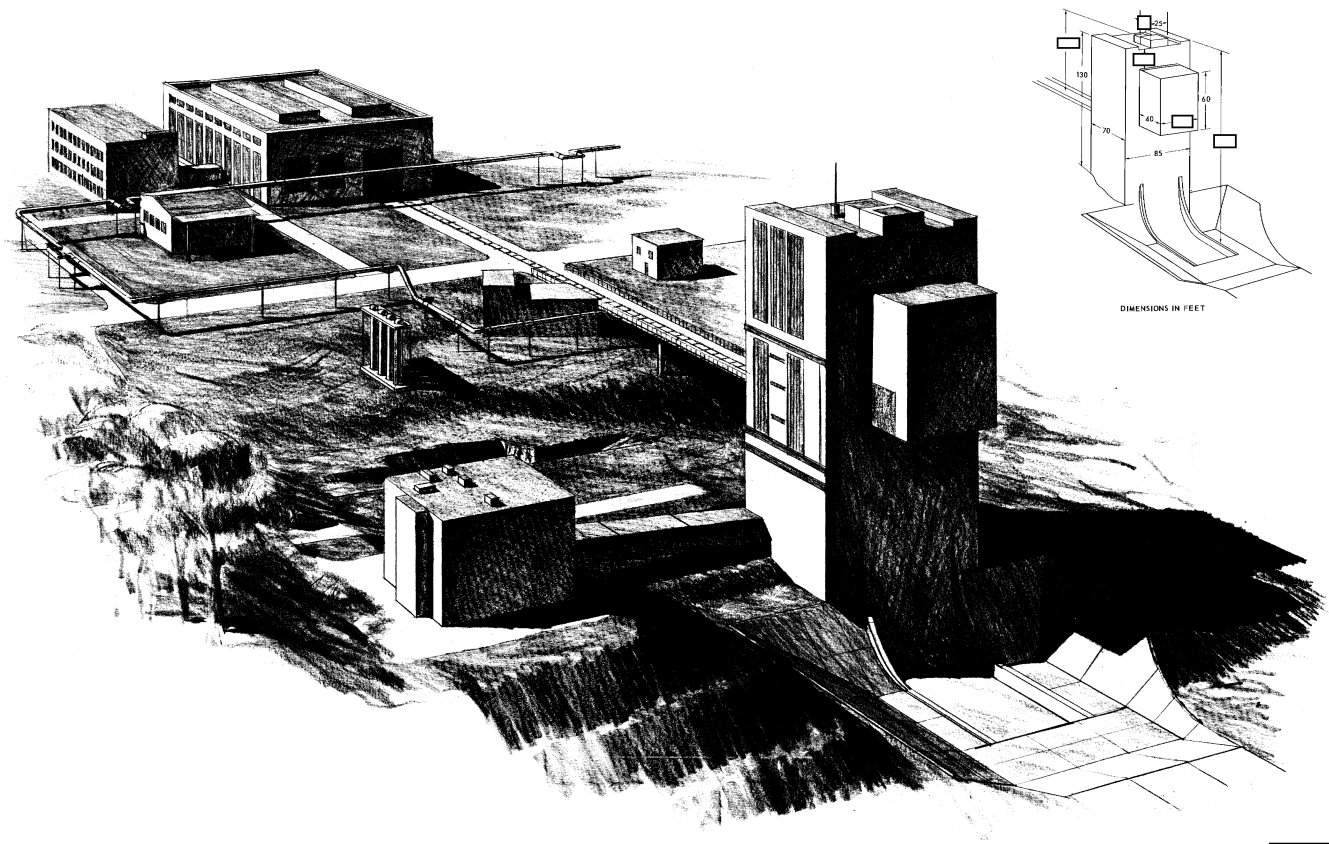

FIGURE 4. ARTIST'S CONCEPTION OF TEST STAND NO 1.

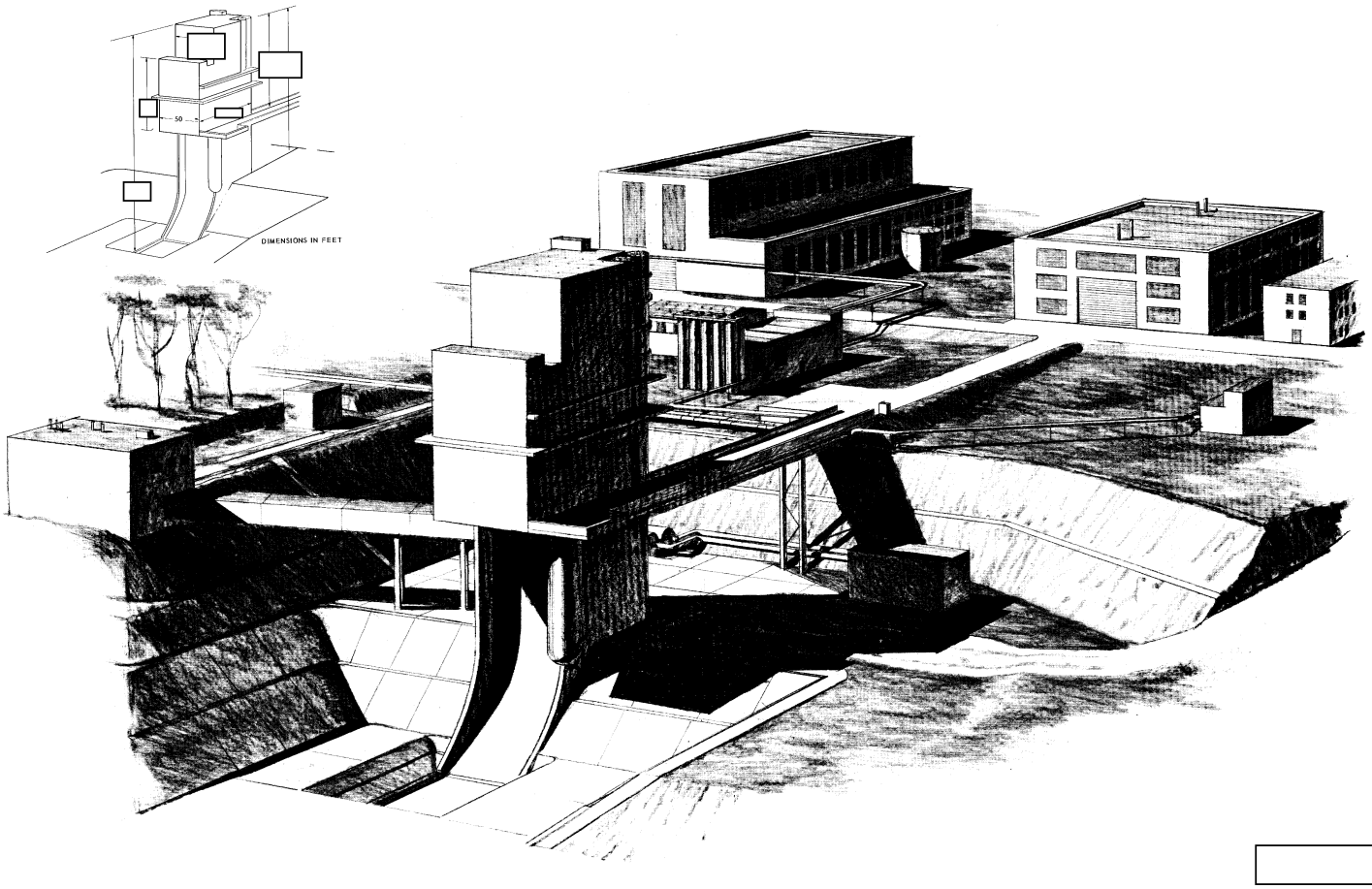

FIGURE 5. ARTIST'S CONCEPTION OF TEST STAND NO 2.

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ponent measuring approximately 25 feet long and wide was located between Test Stand 2 and its associated air liquefaction plant (item 31), and a possible tank or tank-like structure had been suspended under the access ramp of this test stand. Photography does not permit an assessment of the means by which it is supported.

TEST STAND 3

Test Stand 3 was not present in and was first seen in Poor photography and the small size of the stand precluded an accurate determination of the completion date of the stand; however, it appeared outwardly complete when it was first observed. The first evidence of a test firing was observed in The stand contains 2 small probable vertical test positions separated by a control section. The entire test stand extends for 135 feet along a 70-foot-deep embankment. The tops of the test cells are above grade. Small blast pits are located beneath each test position.

Photography of was of sufficiently good interpretability to confirm the addition of a tapered diffuser tube on the western position of Test Stand 3. This diffuser tube, approximately 80 feet long and 20 feet wide at its widest point, had become apparent on photography of The presence of the diffuser tube provides the first evidence of an altitude simulation capability at this facility. An artist's conception and dimensions of Test Stand 3 are shown in Figure 6.

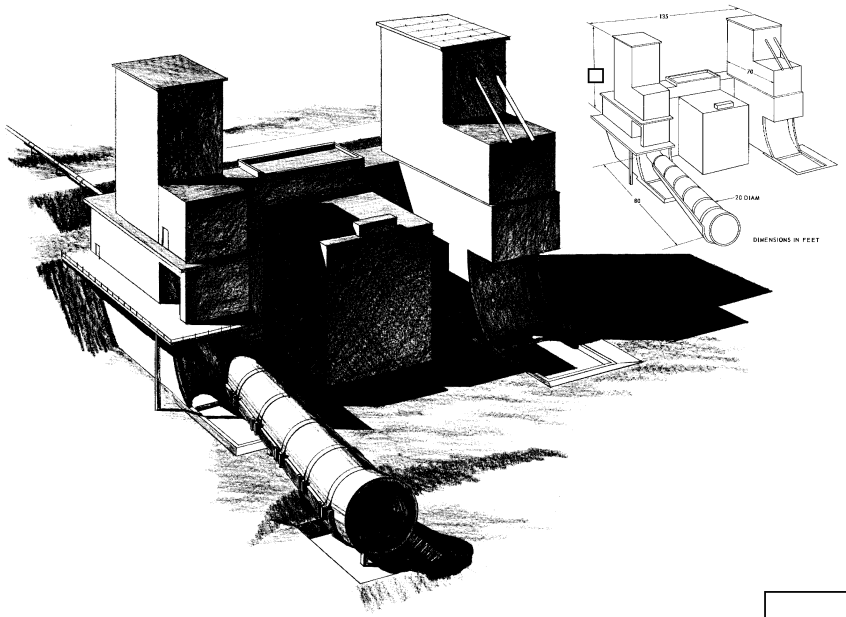


FIGURE 6. ARTIST'S CONCEPTION OF TEST STAND NO 3.

TEST STANDS 4 AND 5

Test Stands 4 and 5, not present in were first seen in when they appeared to be completed. Although blast marks were observed at both stands in and on numerous subsequent occasions, Test Stand 5 has shown the most activity. The 2 stands are similar, and although smaller, resemble the configuration of Test Stand 2. An artist's conception and dimensions of Stands 4 and 5 are shown in Figure 7.

Test Stand 4 is 60 by 35 feet and rises 70 feet above grade. Test Stand 5 is 70 by 35 feet and rises for about 70 feet above grade. Both stands have a high superstructure and a full width projection quite similar to Test Stand 2. Small sumps are in front of each test stand and a control building (item 50) is situated between the stands. Vehicles pulling a slightly tapered possible propellant carrier, were visible near these stands and near the older of the 2 air liquefaction plants (item 70) on and photography. Three similar objects, were seen on photography to be located near the stands and near the newer air liquefaction plant (item 31). On photography of and 2 possible liquid oxygen/propellant transporters which measure were visible behind the pumphouse and support building (item 52).

PIPELINES

Photography of is of sufficiently good interpretability to permit a limited analysis of the pipelines within the Kurumoch Rocket Engine Test Facility.

The 2 air liquefaction plants (items 31 and 70) are linked with 3 large pipes, 2 of which branch off to an apparent rail-loading facility. The pipelines could convey steam/oxidizer/nitrogen. Similar pipelines connect the northern air liquefaction plant (item 31) and the possible oxidizer handling facility (item 26) for Test Stand 2. A possible oxidizer line connects the possible oxidizer handling facility and Test Stand 2.

Probable steam lines nearly encircle the main working

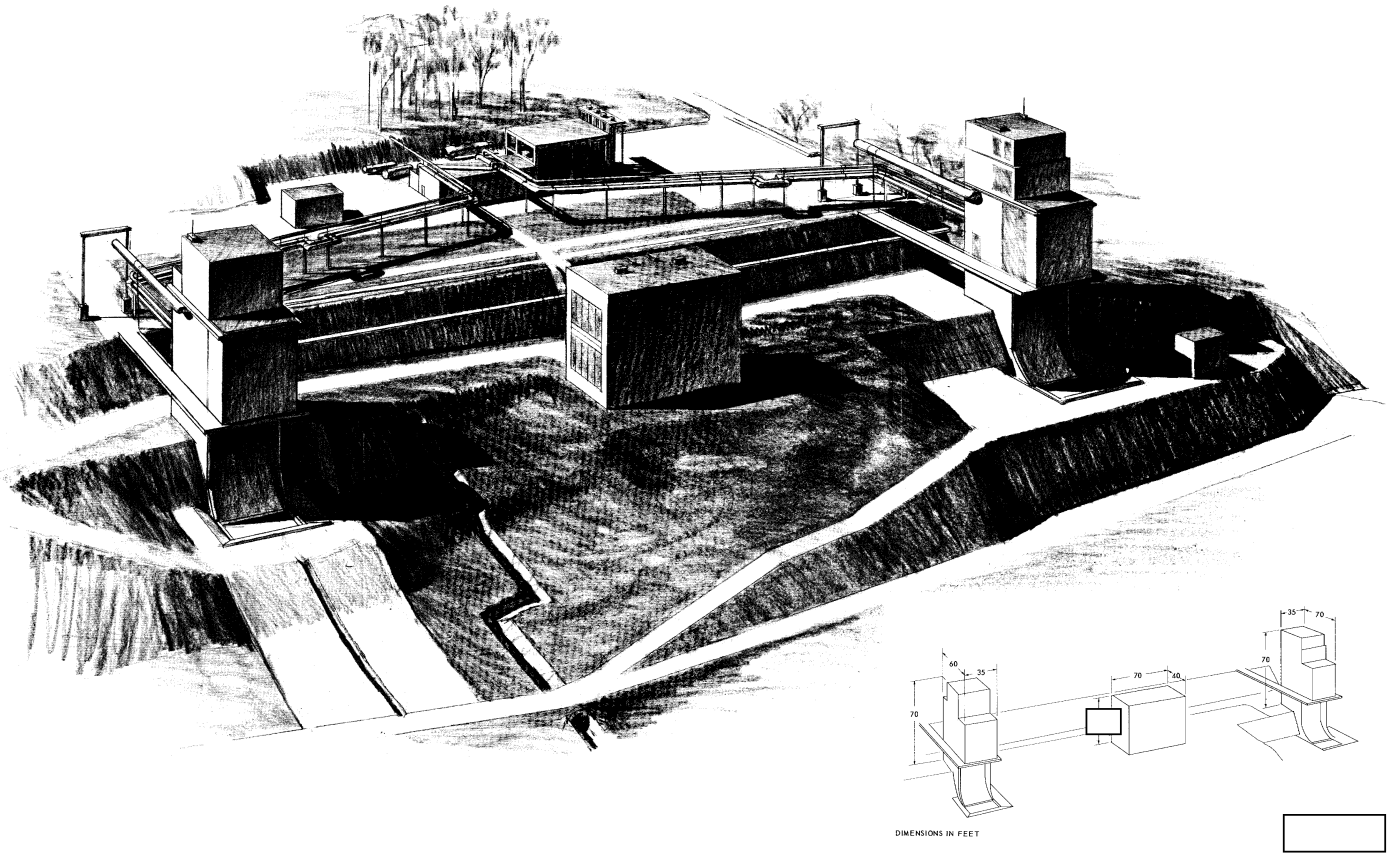


FIGURE 7 ARTIST'S CONCEPTION OF TEST STANDS NOS 4 AND 5.

area of the plant (Figure 3). The loop encompasses all 5 test stands and both air liquefaction plants, with the exception of a visible tie between Test Stands 3 and 4.

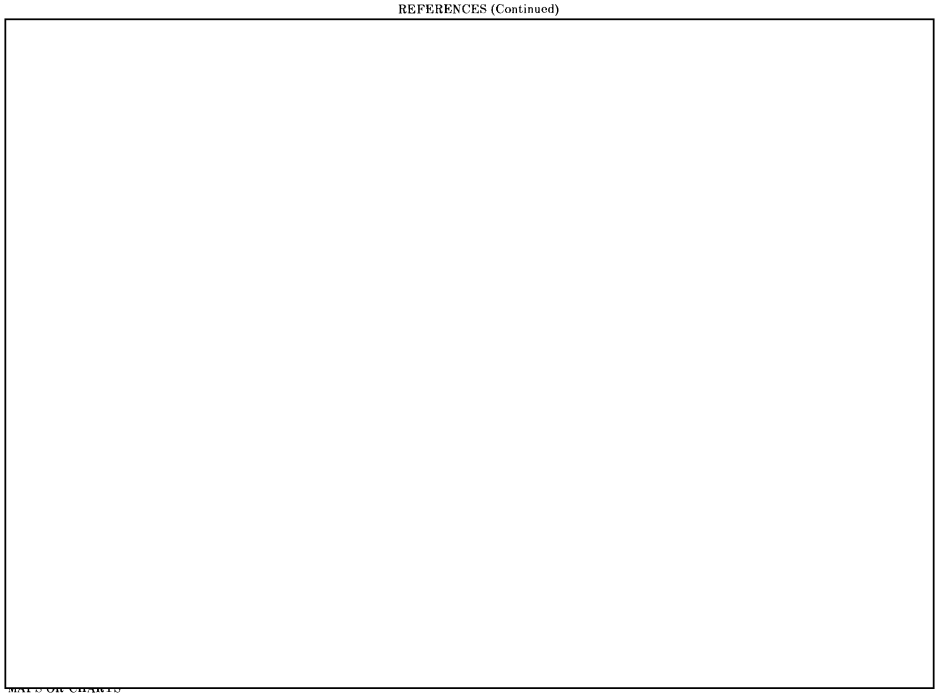
The possible fuel handling facilities (items 16 and 17) are served by numerous pipelines. A pipeline manifold system leads from a pumphouse (item 25) to Test Stand 2. This water system is probably used for cooling the blast deflector at the stand. Steam and cooling water for Test Stands 4 and 5 are probably provided through pipes (Figures 3, 7) which connect each stand to a common pumphouse (Item 52).

REFERENCES

25X1

[redacted]

REFERENCES (Continued)



MAPS OR CHARTS

ACIC. USATC Series 200, Sheet 0165-17

DOCUMENTS

1. NPIC. [redacted] *Comparison of Large Liquid Propellant Rocket Engine Test Facilities in the USSR*, Feb 67 (TOP SECRET [redacted]

REQUIREMENT

CIA. C-DI5-82,973

NPIC PROJECT

11212CE/66