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CENTRAL INTELLIGENCE AGENCY  
Office of the Chief, Economic Research  
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Current Support Memorandum

, ORR

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SUBJECT: Construction Progress Indicates Soviet Kuybyshev  
Hydroelectric Project will not be Completed on Schedule\*

The Kuybyshev hydroelectric project is the most publicized of the "great construction projects of Communism" \* and the subject of much propaganda comparing the "peaceful construction activities of the USSR" with the "warmongering activities of the US." However, it is believed that it will not be in operation at full capacity by the end of 1955 as planned, although a "face-saving" commissioning in 1955 at partial capacity is expected. Full capacity will not be attained until 1956 or later. The Soviets have not publicly admitted this fact, but an analysis of reports on the amount of earth-moving and concrete work accomplished and on the manufacture of generating and transmission equipment leads to this conclusion. This does not necessarily infer that Soviet engineering and production capabilities are grossly inefficient, but that they were probably overrated by the planners and little thought was given to contingencies in allotting the relatively short construction period of five years for a project of such scope.

In 1950 Soviet planners evidently included in their estimates the 2,100,000 kilowatt capacity planned for Kuybyshev when they envisioned an increase of 100 percent in the total installed generating capacity in the USSR during the Five Year Plan. A statement in an April 1954 election speech by M. G. Pervukhin, former minister of the Ministry of Electric Power Stations and Electrical Industry, is interpreted to infer that the electric power capacity goal has been reduced to a 75 percent increase.\*\* It may be speculated that Soviet officials realized by April 1954 that the entire block of Kuybyshev generating capacity, representing about 10 percent of the planned capacity increase, could not be counted on until after 1955. This, coupled with underfulfillment of the plans for installing new capacity in 1951, 1952, and 1953 \*\* may have led them to revise the goal and to enlist Pervukhin to tacitly acknowledge the fact.

\* Other large hydroelectric projects now under construction include:

Stalingrad on the Volga		1,700,000 kilowatts
Gorodets on the Volga	approximately	400,000 "
Molotov on the Kama	"	400,000 "
Kakhovka on the Dnieper	"	250,000 "
Irkutsk on the Angara	"	600,000 "
Novosibirsk on the Ob	"	200,000 "
Bukhtarma on the Irtvsh	"	500,000 "

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The Kuybyshev project, planned to be the largest in the world in terms of rated generating capacity, will, according to Soviet claims, generate 10 billion kilowatt hours annually (7.5 percent of total 1953 production), improve shipping by raising the level of the Volga, and irrigate 2.5 million acres of arid land. The project may be divided into several construction sectors such as: concrete spillway dam, earthen dams, powerhouse, navigable canal (6 kilometers long), shipping locks, the erection of 1,000 kilometers of 400-kilovolt and 2,000 kilometers of 220-kilovolt transmission lines, and the installation of 20 large turbo-generator units, with auxiliary equipment. Little has been mentioned concerning the planned irrigation canals and it is believed that they will be constructed at a later date, possibly after the completion of the main installations.

One of the methods of evaluating the progress of construction is to compare the amount of earthwork and concreting accomplished with the total volume estimated to be required for completion of the major installations. Out of the estimated required 165 to 200 million cubic meters of earthwork 1/ (probably excavation plus fill) about 60 million cubic meters had been reported completed by the end of 1953. 2/ During 1954 a volume of 35 million cubic meters was planned. 3/ However, in August 1954, after four years of construction, it was claimed that a total of "67 million cubic meters of earth had been dug and placed into various structures." 4/ Although the above quoted statement is ambiguous, most previous figures on earthwork have included both excavation and fill (as in the plan data), and the above figure has been so interpreted. If this is true, then only 7 million out of a total of 35 million cubic meters planned for 1954 had been accomplished in more than seven months of this year. Thus after four years of construction, with little more than one year remaining before the planned completion date, approximately one-third of the estimated required volume of earthwork had been accomplished. Although percentage of total planned earthwork completed cannot be relied upon as an index of a definite stage of construction, due to incomplete and occasionally inconsistent reporting, and possible revision of plans, it seems certain that the schedule for earthwork has not been met.

Concreting, also, seems to be lagging behind schedule. A cable-way, to be used for transporting cement, concrete, and other construction materials from both river banks to the construction sites, was planned to go into operation in October 1953, but was not completed until May 1954, six months later. 5/ There have been several criticisms in the Soviet press concerning the unsatisfactory operation of the concrete mixing plants and the quality of the concrete. 6/ The 1953 concreting plan was only half fulfilled, 7/ and that for the first quarter of 1954 was also reportedly far from fulfilled. 8/ The results of an analysis of fragmentary information concerning concreting during 1953 and 1954 are presented in Table 1. This represents an estimate of the current situation with respect to three key sectors of construction.

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Table 1.

PROGRESS OF CONCRETING MAJOR INSTALLATIONS AT KUYBYSHEV HYDROELECTRIC PROJECT

Construction Sector and Date Concreting Started	Volume of Concrete in Million Cubic Meters			Total Volume Required for Completion	Estimated Degree of Completion at end 1954*
	Placed 1953	Planned 1954	Total		
(A)	(B)	(C)	B + C	(D)	$\frac{B + C}{D}$
Spillway Dam (Nov 53)	0.1 <u>2/</u>	0.6 <u>12/</u>	0.7	2.5 <u>15/</u>	28%
Powerhouse (Jul 53)	0.2 <u>10/</u>	1.0 <u>13/</u>	1.2	2.7 <u>16/</u>	45%
Lower Locks (Jan 53)	0.2 <u>11/</u>	0.4 <u>14/</u>	0.6	0.6 <u>17/</u>	100%
Total of 3 Sectors **	0.5	2.0	2.5	5.8	43%

\* Predicated on fulfillment of the 1954 plan. (see text)  
\*\* Total of 7.0 million cubic meters required for entire project,  
of which at least 83% will be accounted for by the three sectors.

The degree of completion of the various sectors by the end of 1954 as given in Table 1 was predicated on the fulfillment of the 1954 plan, and therefore probably represents maximum possible attainments, since the 1953 and first quarter 1954 plans were not fulfilled. In mid-August 1954 it was reported that a total of 1.57 million cubic meters of concrete had been placed since concreting had started. 18/ This would mean that, according to Table 1, about one million cubic meters had been placed during nearly eight months in 1954, against a plan figure of over 2.0 million cubic meters for the entire year. Construction of the canal and locks should be completed in 1954 so that (1) shipping will not be interrupted during the 1955 navigation season and (2) work can proceed on the earthen dam. 19/ It was originally planned that the concreting of the powerhouse also be completed by the end of 1954 in order to permit construction of the earth dam and filling of the reservoir by the spring of 1955. 20/ An engineer engaged in planning the project emphasized during a public lecture in Moscow in July 1951 that the biggest job will be to complete the concreting of the powerhouse on time. 21/ The time schedule, he said, requires work of a scope and rapidity never before attempted in any country.

The generating equipment consists of twenty 105,000 kilowatt generating units. Each unit is composed of a hydroturbine (waterwheel) and a generator which, in this case, are manufactured at separate Leningrad plants, and all must eventually be assembled in the powerhouse. For the scheduled full capacity operation, all of these units would have to be installed by the end of 1955.

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The Leningrad Metal Works (LMZ) began planning details of the production of the 20 turbines in September 1951, and designing work was nearing completion in January 1953. 22/ Production of the first turbine was reported in March 1954, and by the end of June three had been completed. 23/ It was planned to complete seven of them by the end of 1954. 24/ Generators are being manufactured at the Elektrosila plant in Leningrad, the first being completed in January 1954, and the fourth in August. 25/ It was claimed that a total of six generators will be manufactured by the end of 1954. 26/

Actual installation of the turbines was planned to start during the second half of 1954. 27/ However, that will depend upon the progress of concreting. Concrete work for the first six units was reported to have started in August 1953, indicating that six units will probably be installed for the first phase. 28/ In August 1954, two turbines were reported to be at the construction site but installation had not yet started. 29/ Installing and testing generating units of this size requires much technical skill and a considerable period of time. It is not unusual, even in the US, for defective parts to become evident during installation, or testing, and often large components must be transported back to the factory for correction, causing considerable delay. Even if installation began as early as October 1954, the installation of ten units by the end of 1955 would require ideal circumstances throughout, and a more realistic estimate is six out of the planned 20 units, in that time. Probably the installation of all 20 units will not be completed until some time in 1956 or 1957.

Construction of the 925-kilometer Kuybyshev to Moscow 400-kilovolt transmission line represents an ambitious undertaking. Its voltage and length are slightly greater than the Swedish Harspranget-Hallsberg line completed in 1952. East German engineers have contributed greatly toward research on this project since 1946 and some of the unique electrical equipment may be manufactured in East German plants. A German engineer who had worked with Soviet engineers up to 1951 claimed that the production of 400-kilovolt transformers by the Russians was then impossible and that consideration was being given to purchasing such equipment abroad. 30/ Another source thought that the Russians would be able to copy the Swedish 400-kilovolt equipment designs for Russian manufacture. 31/ In any event, the Soviets claimed that a 400-kilovolt transformer was built at the Leningrad Elektroapparat plant in April 1953, and that serial production would begin shortly. 32/ In 1954, insulators, circuit breakers, synchronous condensers and cable were reported being produced in Soviet plants for the transmission line. 33/ Steel towers for the double-circuit line are now being erected and by May 1954 about half of the required number of towers had been placed. 34/ The production and erection of approximately 10,000 kilometers of steel-aluminum cable may be one of the limiting factors in putting the line into operation on schedule.

One of the last phases will be the filling of the reservoir, which must be completed before the generating units can begin full operation. In turn, the filling of the reservoir must await the completion of work on the earth dam, which cannot be completed until after the 1955 spring floods recede. Therefore, filling the reservoir may not commence until late summer or autumn 1955. The reservoir, known as "Kuybyshev Sea," will be 500 kilometers long, with an average width of 10 kilometers and will cover an area of 5,000 square kilometers. 35/ Its capacity when full will be about 19.5 cubic kilometers. Although the average river flow at Kuybyshev is reported

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to be about 240 cubic kilometers per year <sup>36/</sup>, 65 percent or 156 cubic kilometers of this flow occurs during the months of April, May and June. <sup>37/</sup> The average monthly flow during the remaining nine months is therefore 9.3 cubic kilometers. Since it is not likely that the filling operation will be started until late summer or autumn of 1955, it would take from two to three months to fill the reservoir provided the flow was completely cut off at Kuybyshev. However, it will be necessary to allow a large proportion of the water to flow past the dam site since the Soviets have claimed that river navigation will not be interrupted during construction. <sup>38/</sup> This proportion cannot be reasonably estimated, and due to other unknown factors, it can only be guessed that the reservoir can be filled in three to six months with the possibility that the operation will not be entirely completed until the early part of 1956.

All of the above mentioned factors considered, it appears that operation at full capacity by the end of 1955 is very unlikely considering the present status of the earthwork, concreting, production of generating equipment, erecting the Kuybyshev-Moscow transmission line, and the many difficult tasks which lie ahead. Five years is a very short period of time for such accomplishments, especially when construction of several other major hydroelectric stations is simultaneously in progress. It is conceivable that partial capacity with six to ten units in operation could be attained by the end of 1955.

Coordination:

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