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CENTRAL INTELLIGENCE AGENCY

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1. The 7-Year People's Economic Plan envisioned an annual production of 4,000,000 tons of pig iron and 2,500,000 tons of sponge iron. To attain this goal, the NK government placed more stress on its mineral resources surveying program especially in such areas as Ullyul and Hasong on the west coast. In production facilities, the Kimch'aek and Hwanghae Ironworks, respectively capable of daily producing 400-500 tons and 700 tons in pig iron, and respectively expected to raise these figures to 700 tons and 1,000 tons in 1961, were supposed to be capable of annually producing 4,000,000 tons of pig iron together, provided that they should get sufficient supply in iron ore. In other words, whether or not the above two ironworks could achieve the above pig iron production goal depended upon the supply of iron ore. In actuality, the Hwanghae Ironworks had to interrupt its plan to reconstruct No. 2 Blast Furnace when it became certain that the anticipated production of iron ore in NK did not warrant the plan. In general, NK was believed to be adequately provided with facilities, technicians, and techniques for

pig iron production. On the contrary, NK lagged much behind in iron ore mining because most NK iron mines switched from the dry mining method to the wet mining method in 1957 for the purpose of preventing the high incidence of diseases (such as tuberculosis) among miners. This resulted in a sharp fall in the morale of miners as well as in the production amount. In 1960, most iron mines averaged about 60 percent of their pre-switch production amount of iron ore. The most advanced mines were operating at 80 percent. In order to cover up this production lag, some mines were secretly operating by the dry mining method.

2. Most steel produced in NK was obtained by eliminating carbon and other foreign matters from pig iron. Especially, NK was far behind in production of alloys, which could be ascribed to poor production facilities and techniques. NK had been trying to produce such alloys as tungsten steel, chrome steel, nickel steel, and nickel-chrome steel. Of these alloys, the Songjin Steel Mill succeeded in producing tungsten steel, whose production plan was said to be 100,000 tons annually in October 1959. As for nickel steel and chrome steel, some trial products had appeared. These alloys were said to be no match for foreign products in quality, since NK technicians were still unable to uniformly mix metals. For the development of NK steel production, the NK government had been annually sending six students to the Moscow Steel College in the Soviet Union and three students to the Metallurgical Department of the Ch'inghua University in Peip'ing, China. In NK, there were no facilities capable of smelting such metals as tungsten, chrome, nickel, and cobalt which were needed in alloying. The tungsten used at the Songjin Steel Mill for making ferro-tungsten was probably imported from the Soviet Union. The Hungnam Smelter, where efforts had been made to produce Pobedit (a Soviet brand for an unidentified type of high speed steel), succeeded in smelting a very limited amount of tungsten through some primitive methods for use in making Pobedit. For the production of the above listed alloying metals, the Hungnam Smelter had been engaged in research work without any notable result so far.

3. The following is information on such alloy metals as tungsten, chrome, nickel, cobalt, molybdenum, and vanadium:

A. Tungsten: Tungsten ores were mostly produced in the form of scheelite at such mines as the Mannyon, Kyongsu, Kumgang, and Poptong Mines all located in the north of Kangwon-do and northeast of Hwanghae-pukto. In the volume of ore deposits, the Mannyon Mine was leading the others. It was roughly estimated to have more than 100,000,000 tons of tungsten deposits, of which, according to a statistic made available towards the end of 1959, 15,000,000 tons were confirmed to be exploitable. The Kyongsu Mine was reported to have 8,000,000 tons in tungsten deposits. The tungsten content of the ores produced at the above two mines averaged three to four percent, sometimes reaching as high as 16 to 17 percent. For dressing, the Mannyon Mine was installed with a large underground dressing plant. Besides, it had expanded its surface dressing facilities, which are now enough to process its whole ore produce up to 40 percent concentrates. The Mannyon Mine was planning to improve its dressing facilities and techniques towards the goal of 50 percent concentrates. For this purpose, the Mining Research Center of the Ministry of Metals Industry had been engaged in developing a better dressing system. The Mannyon Mine had no particular plan as to the disposal of tailings, which had been put aside for the day when its ore mining lagged behind the schedule, thereby making it necessary to process the tailings for export. As of 1960, the Mannyon Mine was concentrating its efforts on the mining of ores rather than on the processing of tailings. Five research specialists from the above Mining Research Center were stationed at the Mannyon Mine for the improvement of dressing methods. The Kyongsu Mine was also provided with a flotation plant for ore dressing, and its efficiency was rated almost the same as that of the Mannyon Mine. However, the Kyongsu Mine was in the practice of sending its dressing technicians to the Mannyon Mine for training, along with those from the Poptong and Kumgang Mines, which set up their own dressing plants sometime after 1956. Nontheless, these two mines were required to send dressed tungsten ores to the Mannyon Mine for redressing when they were to be exported. The tungsten ores were mostly exported to the Soviet Union and

Czechoslovakia, and their tungsten content varied with the requirement of each importing country. In 1959, NK exported a total of 500,000 tons of tungsten ores averaging 10 to 15 percent in tungsten content. Tungsten, being an important element in metal alloying, was in great demand by many foreign countries as well as domestic industries. Therefore, NK was trying to find a way of smelting tungsten ores. Especially, the Hungnam Smelter had been long engaged in research work for the purpose, without any notable result so far. Nontheless, the NK government was planning to establish by the end of 1964 tungsten ore smelting facilities large enough for the processing of the whole NK tungsten ore produce, probably at the Hungnam Smelter or the Namp'o Smelter. The Hungnam Smelter was capable of smelting a limited amount of tungsten for use in making Pobedit, whose production quota of ten tons a year in 1959 was far from being met due to too many off-grade products. The tungsten smelted by the Hungnam Smelter was not metallic tungsten, but tungsten oxide (WO_3). The off-grade Pobedit could be eliminated only by improving the quality of tungsten. This problem was solved by a technician by the name of CH'OE (1508/fnu) who had returned from the Soviet Union in 1958 after training there. However, his solution had not been translated into a production system.

B. Chrome: The main producer of chrome ores was the Ch'ongam Mine in Hamgyong-pukto, where chrome ores were mined in the form of beryl whose chrome content averaged one percent, sometimes coming up to three to four percent. The Ch'ongam Mine was estimated to have about 15,000,000 tons in exploitable chrome ore. However, its ore production, as compared with the estimated deposits, was much limited. The Ch'ongam Mine was provided with a flotation for dressing, where only high grade ores from which poor grade ores had been visually sorted out by experienced miners, were dressed up to 20 percent concentrates. The chrome ores were mostly sent to the Soviet Union and Czechoslovakia, since there were no smelting facilities for them in NK. The Hungnam Smelter was experimenting in chrome smelting without any result. NK had no plan to install smelting facilities for chrome ores for the reason that the

limited production amount of chrome ores did not warrant it. The Songjin Steel Mill was experimenting in order to produce chrome-nickel steel by importing the required chrome from abroad.

C. Nickel: Nickel ores were produced by such mines as the Sokkye, Puhoe, and P'an'gyo Mines. In 1959, the Sokkye and Puhoe Mines were virtually closed down because of their poor production. In 1959, the P'an'gyo Mine produced a total of about 800,000 tons in nickel ore whose content averaged less than one percent. The ores produced at the P'an'gyo Mine was said to contain sulphides, and therefore, they were dressed through a flotation system which was installed at the mine. By this method, the ores were dressed up to five percent concentrates. In order to raise this percentage to a ten percent, the aforementioned Mining Research Center was experimenting. However, five percent nickel concentrates were said to be exportable. In 1959, when the production of nickel ores lagged so behind the export schedule, the P'an'gyo Mine had to redress its tailings, thereby collecting a total of 500,000 tons of nickel ores. Even this redressing had to be interrupted due to its prohibitive cost. In the meantime, geological surveying groups operating under the Ministry of Metals Industry discovered a promising nickel mine in the vicinity of Ch'ongjin in Hamgyong-pukto, where strip mining was already in progress. Originally, this mine was discovered by Japanese prospectors during the Japanese rule. Its ores reached as high as 20 percent in nickel content, mostly exceeding in nickel content the nickel ore concentrates of the P'an'gyo Mine. In December 1959 or in early 1960, NK exported 300,000 tons of nickel ore to the USSR, all of which was produced at the Ch'ongjin Mine over an unknown period of time. At that time, the chemical analysis showed that the exported nickel ores contained nickel up to 26 percent. Consequently, the nickel ores produced by the Ch'ongjin Mine were expected to occupy an important position in the 1960 NK mineral export plan. As of March 1960, it was still to be determined how much nickel was deposited in the vicinity of Ch'ongjin. For this purpose, some Soviet surveying technicians were working there. NK had no smelting facilities for nickel ores, except

that the Hungnam Smelter was conducting experiments on the subject. Therefore, most nickel ores were exported to the USSR in the form of nickel concentrates. If the Ch'ongjin Mine was capable of producing nickel ores as much as expected, they would be also exported to Czechoslovakia. The NK government would expedite its plan to set up facilities for nickel smelting, so that the Songjin Steel Mill could use nickel for making alloys. The Songjin Steel Mill imported 100 tons of nickel from the USSR for use in experimenting on chrome-cickel alloy. The problem of developing nickel smelting method by 1964 was assigned to the Hungnam and Namp'o Smelters.

D. Cobalt: Cobalt ores were mostly produced at the Hoeryong Mine in Hamgyong-pukto, and their cobalt content averaged below one percent, rarely coming up to three percent. The Hoeryong Mine was said to have a 1,500,000 tons of exploitable cobalt ore deposits excluding bismuth ores. In view of the fact that a number of foreign countries wanted to import cobalt ores from NK, all the cobalt ores would be mined. The major importers were the USSR and Czechoslovakia. At the [redacted] 50X1-HUM request from East Germany for cobalt ores, NK was planning to export cobalt tailings after dressing, for the purpose of which the Mining Research Center was conducting experiments. The Munp'yong and Namp'o Smelters were smelting a very limited amount of cobalt, while the Tokch'on Automotive Factory was engaged in developing cobalt alloys. The Hungnam and Namp'o Smelters had been assigned a task to develop a method of cobalt smelting by the end of 1964.

E. Molybdenum: Molybdenum ores were mostly produced in the Kumgang area in Kangwon-do, along with tungsten ores. The molybdenum content ranged from 0.3 to 1.0 percent. The amount of exported molybdenum ores was much limited. In 1959, 200,000 tons of molybdenum ores with a 25 to 26 percent ore content were exported to the Soviet Union. There was no definite plan as to the development of molybdenum smelting method, nontheless the Hungnam and Namp'o Smelters were experimenting for the purpose.

F. Vanadium: Vanadium ores were mostly produced in the Tanch'on area of

Hamgyong-namdo. In 1959, NK exported 3,200 tons of vanadium ores to the Soviet Union, which contained vanadium 0.6 to 0.8 percent. For the dressing and smelting of vanadium ores, NK had no particular plan

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4. Major manufacturers of steel products included the Ch'ongjin, Songjin, and Kangson Steel Mills. In addition, the Kimch'aek and Hwanghae Ironworks were also engaged in producing steel products. The Ch'ongjin, Songjin, and Kangson Steel Mills respectively consumed steel 250 tons, 500 tons, and 250 tons daily. The Kimch'aek Ironworks did not produce finished steel products, but steel ingots, which were supplied for various machine manufactories. The Kimch'aek Ironworks was engaged in producing castings at request from individual machine manufactories and other enterprises. Its daily casting capacity was allegedly 50 tons. The Songjin Steel Mill produced steel ingots and steel alloys, most of which were supplied for various machine manufactories incl ding the Huich'on, Nagwon, and Yongsong Machine Manufactories. For these manufactories, the Songjin Steel Mill also produced castings. Its rolled steel plate production amounted to 300,000 tons a year in 1959, of which about 150,000 tons was plated with zinc. The produced steel plates were mostly three to six millimeters thick. Steel bars varying from one to three centimeters in diameter with the specifications of each consumer, were annually produced 300,000 tons at the Songjin Steel Mill. The production amount of rolled steel plates and steel bars could be considerably raised if to produce them in larger sizes. In addition to such basic steel items as mentioned above, the Songjin Steel Mill received orders from individual enterprises for various steel items such as construction materials and machine parts, including iron frames, steel beds, and steel gates. The Kangson Steel Mill was chiefly engaged in manufacturing steel beams for bridge construction and other steel structures, including bolts, nuts, wires, nails, screws, etc. Its casting plant, which was rather limited in size, produced various machine parts for individual machine manufactories and other enterprises. The Hwanghae Ironworks , the largest of all iron and steel production facilities in NK, produced steel as well as pig iron. Its major steel products included rails, rolled steel plates, steel bars, and seamless pipes. The rails, though not sufficient to

meet the entire NK demand, were chiefly used in laying railroad branch lines. The rolled plates were daily produced about 30 tons in various sizes. The pipes were limited to larger diameters for use in water works. Besides these items, the Hwanghae Ironworks manufactured such steel products as beams for bridge construction, steel poles for street lighting, and others required for the construction of new factories and power plants. Its subsidiary products plant was engaged in manufacturing such household items as steel beds, buckets, basins, scissors, knives, grates, tongs, and pots. The construction materials which were produced by the Hwanghae Iron were mostly used for various construction projects in progress in Songnim-si.

5. Regarding the overall NK program for the expansion of steel production facilities, the interrupted reconstruction project of No. 2 Blast Furnace of the Hwanghae Iron would be resumed when those iron resources under prospection on the west coast were fully exploited, and when it was impossible for the Hwanghae Ironworks to handle the increased iron ore produce with its No. 1 Blast Furnace alone. Besides, the same Ironworks had a plan to expand itself into a universal steel mill where finished products such as bars, sheet metals, and pipes could be manufactured. In the steel rolling process, the work of picking up hot plates would be mechanized, along with other dangerous and labor-consuming works. The entire pipe manufacturing process would be mechanized and so expanded as to be able to produce pipes of various sizes. The Songjin Steel Mill would be equipped for production of steel alloys such as chrome steel and nickel steel, which, as of 1960, were mostly imported from abroad. The Kangson Steel Mill was expected to operate all of its five electric furnaces in 1960 in the face of the voluminous national demand for construction materials. The Ch'ongjin Steel Mill would make efforts to increase its sponge iron production. The Kimch'aek Ironworks [redacted] 50X1-HUM would reconstruct its war-time damaged blast furnace, [redacted] In local areas, small iron mills were trying to self-supply pig iron for their products by installing small blast furnaces. As of 1960, local industries had to rely on major steel mills for most steel products. They were planning to start production of simple steel products by themselves from 1964. The overall

NK steel industry expansion program required that the entire NK steel demand should be met domestically, and that the existing basic steel production facilities which were considered to be enough to provide various steel products, except steel alloys, should be installed with modern processing equipment of foreign make in order to improve their poor quality. For instance, the Hwanghae Ironworks had a plan to import from Czechoslovakia a new rolling steel system designed to automatically feed the roller with hot iron plates. This plan was not materialized until October 1959, but was presumed to have been completed by the end of 1960. [redacted] 50X1-HUM the pipe plant was waiting for the arrival from the USSR of an automatic pipe manufacturing system so designed as to hole (pipe) and temper them in a continued process. This system was said to come into operation by the end of 1960. The Hwanghae Ironworks had another plan to import from the Soviet Union an automatic machine capable of cutting and loading steel bars. This plan was discarded when one of its technicians designed such a system, whose technical possibility was still under consideration [redacted] For the Songjin Steel Mill, the USSR made a promise to 50X1-HUM establish a high frequency fusion plant, [redacted] 50X1-HUM [redacted] The Songjin Steel Mill was also planning to set up a galvanizing plant which was to be equipped with electrodes and other precision devices of Soviet make. [redacted] 50X1-HUM

6. [redacted] NK was basically self-sufficient in the supply of steel products. Some specific steel items such as rails, pipes, and automotive springs had to be annually imported from abroad. NK annually imported from the USSR 100,000 tons of rail until the construction of the Haeju-Hasong railroad line, where the rails manufactured by the Hwanghae Ironworks were used. The ironworks was then said to be able to supply rails for the laying of branch lines. Rails required for main railroad lines were still to be imported. The amount of imported special steel (such as for use as automotive springs) from the USSR amounted to 700 tons annually. Pipes were imported from China 70,000 tons each year until 1959 when the Hwanghae

Ironworks started to produce a limited amount of pipes. NK still had to send [redacted] pig iron to the Anshan Steel Works in Manchuria, China, and get it manufactured into large, seamless pipes, along with other steel products. In 1957 and 1958, NK annually exported 1,000,000 tons of pig iron to China. This export of pig iron had to be interrupted in 1959 when a number construction projects such as No. 2 Bridge over the Taedong-gang (a river in P'yongyang) had to be interrupted due to a critical shortage of steel frames.

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