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INFORMATION REPORT AIR REPORT

CENTRAL INTELLIGENCE AGENCY

S-E-C-R-E-T

COUNTRY USSR (Moscow Oblast)

SUBJECT Development Activities at Zavod 393, Krasnogorsk

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2. The following divisions were built up after 1949: an electrical laboratory, a mechanical shop, a drafting office, a laboratory for optical coatings, as well as laboratories for crystal growth and for photocells.

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The Soviets were all expert employees and trained optical personnel.

3. after 1949 the connection between the old and new laboratories became gradually cooler until they finally came to a standstill. Suddenly, orders were issued that the Germans could no longer enter any of the Soviet workshops in the old area and even consultations could only be carried on with permission of the director, since it was decided that the Soviets should work independently.

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4. Two Soviets visited the Krasnogorsk installation upon occasion. One was Gen. Dobrovolskiy, who was Chief of the Directorate for Optical and Precision Mechanics, and was responsible for the relocation of the Zeiss plant from

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Jena to the Soviet Union. Contrary to the opinion of scientific circles, he once stated that he could reestablish the Zeiss production in the USSR within a half a year or one year at the most. Dobrovolskiy visited the plant several times up to 1948, when he was dismissed from his position. The other Soviet visitor was Dmitriy F. Ustinov, the Minister of Armaments, who was Dobrovolskiy's chief. Ustinov visited the shops and laboratories three or four times, particularly those in the old area.

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5. a Soviet named Karbinskiy (fnu) was in charge of the entire installation, including both the old and new areas. After the separation of the old and new areas, Karbinskiy had nothing more to do with the new plant. Major General Nikolayev was in charge of SKB-1 (Construction and Development Bureau No. 1) and Belayev was in charge of SKB-2. Nikolayev had already been interested in the Kiel device in Jena.

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9. A member of the Leningrad Optical Institute, the same institute which ordered the spectrograph, came with production problems regarding these mirrors. They made their first inquiries for Kiel mirrors in 1948, but it was not until 1949-50 that they wanted the mirrors produced in quantity.

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10. Before the end of World War II, Zeiss had production line facilities for Juno lenses which had practically eliminated hand work.

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11. The Soviets must have had difficulties with these mirrors or they would not have come They wanted a large scale production for the 120 mm mirrors, which were produced by dropping over a master and subsequent polishing. The Soviet supervisor had evidently received the order from the Institute in Leningrad via the Armaments Ministry, and then requested prepare the production procedures.

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12. any work Ing. Otto Ritter may have done on the Juno was primarily of the nature of translating German to Soviet norms rather than to produce a new design. 25X1

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Black Bodies

13. Prior to 1949, no work done in Krasnogorsk on black bodies. 25X1
After 1949, the Germans received a military production order for about 20 to 30 black bodies. 25X1
(See Fig.1 page 8). They were in a wooden housing approximately 35 to 40 cm. The housings were painted field gray, identical in color with military aircraft cameras made at the same installation. There was a carrying handle on the top, which included a visor at the same time. An opening in the center, with a removable cover, represented the source of radiation. A plug for the heater current was located in the rear. a separate battery was 25X1
supplied with the unit. The black body was insulated from the wooden case. The units were not equipped with built-in thermometers 25X1
the Soviets inserted a thermometer in the center opening to measure temperature. 30 to 60 of these military black bodies 25X1 25X1
were produced for the Soviets, under the direction of Straubel, between 1950 to 1951. Difficulties were encountered during production and some of the units had to be returned by the Soviets for repair. This caused considerable concern, in as much as Nikolayev was responsible for the order covering these black bodies, which had the highest priority. Naturally, the plant management was very much interested in the completion of the order.

14 the black bodies were tested by the Soviets in the old area at a range of about 20 meters. When completed the black bodies were turned over to an Army field office, located in the old area, which accepted all military equipment produced at the Krasnogorsk installation. A Soviet Army colonel, with a staff consisting partly of Air Force officers, was in charge of this office. 25X1
Straubel had also worked on a requirement for a special 25X1
laboratory black body equipped with a cooling system.

K R S - 5 Optical Work

15. Straubel came to Zeiss after the end of World War II and took over the crystal laboratory there as successor to Smakula (fnu). His work covered the growth of KRS-5 crystals and rocksalt crystals. The ovens were repaired in 1945 and set up in the so-called Eulengebauede in Jena. The first experimental crystals 25X1
were grown when Straubel was required to dismantle the equipment in Jena and to reassemble it in Krasnogorsk, primarily for KRS-5 production. He reestablished the laboratory at Krasnogorsk, with four or six ovens, in the old building. 25X1
the quality of the crystals grown at Krasnogorsk was inferior to those formerly made at Zeiss in Jena. They were softer and difficulties were experienced in working these crystals.

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17. From the spring of 1947 on, made at least 10 lens sets of the Juno type 25X1
at a rate of about two sets monthly. After this, more KRS-5 lenses were made but not of the Juno type, apparently merely for the purpose of training the Soviet workers. 25X1

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18. the Soviets were not satisfied with the KRS-5 lenses produced by the Soviet group and sent for a German by the name of Betz, who was not a technician but just an ordinary worker. Apparently he had had some previous experience along this line at Zeiss in Jena. Betz was employed at the Progress Optical Instrument Factory No. 357 in Leningrad at that time. Betz told their KRS-5 lenses were not made in Leningrad. He was transferred to Krasnogorsk for a period of three to four months and worked with the Soviets in the old building so that he would not be under the influence of the Germans. The Soviets hoped to prove through him that the quality of the KRS-5 lenses they were producing there could be improved. Betz was not able to better the quality, since the problem lay in the impurity of the raw material which resulted in poor transmission qualities. When the first KRS-5 was grown at Krasnogorsk, they still had Merek material from Jena, and no difficulties were encountered until this material was expended and the Soviets started to furnish their own raw material.

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19. Krasnogorsk was the main KRS-5 production center in the USSR, although there might have been scientific research and experimental work in this field going on elsewhere. there might be KRS-5 work going on in Leningrad, in view of the optical industry located there.

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20. A coating for KRS-5 lenses was developed at Krasnogorsk by a Heinz Fuchs, was better than that used at Jena in 1945. The Jena coating had been spotty and cloudy and was never considered satisfactory.

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Gen. Nikolayev came directly with an order for special lenses in 1950. The order was for an annular type lens with a radius of curvature of approximately 25 to 30 mm, for which fabrication procedure was to be developed and tests were to be made to determine the quality of the lens (see Fig. 2, page 8). Nikolayev was very persuasive in requesting the work this was a very special order. several preliminary experiments regarding the possibility of putting the lenses together, and finally worked out a satisfactory procedure.

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made the lens from eight parts in a matter of eight days.

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23. [redacted]

24. [redacted] Goerlich established an optical experimental shop in the old laboratory, where necessary optical components were made for devices under experimentation and development. Measurement equipment from Zeiss in Jena, which arrived in the Soviet Union as reparations, was set up in this shop. This equipment arrived partly in good operating condition, partly inoperative caused by the fact that important components, which could be put to personal use, had disappeared. Subject gave a detailed description of this shop, including equipment, in a previous report.

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25. [redacted] Goerlich was assigned his present position at Zeiss, as scientific director, for political reasons. He does not consider him to be the top level scientist he has often been labelled. [redacted]

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26 [redacted]

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Photocells

27. [redacted], in 1947, that Goerlich immediately went to work on PbS photocells of the Elac type. The sensitive surface was about 3 x 3 mm in diameter in size. Goerlich was requested, in 1949-50, to reduce the area to 1 mm; he did not succeed in accomplishing this. From 1947 to 1949, Goerlich had continued his production of photocells in Krasnogorsk which he had started in Germany during the war. Following Goerlich's move from Dresden to Jena, he started to fabricate Elac-type cells which he had never fabricated before with a team of several of his former collaborators from Dresden. Goerlich previously fabricated evaporated button-type cells (Gudden cells). Goerlich used liquid air in conjunction with his vacuum systems in 1947 and he might have used liquid air for cooling of photocells. [redacted]

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[redacted] Goerlich made photocells primarily by chemical deposition at that time. [redacted]

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28. Goerlich was experimenting with lead selenide and lead telluride cells, as a result of a Soviet requirement, sometime between 1949 to 1951. Source felt that Goerlich had already started work on this problem in the old building but continued to work in the new building on it. Goerlich had been originally working on evaporated cells in the old building but later discontinued this work and switched to chemical disposition when the Soviets required it.

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29. evaporated cells were later made in the Soviet laboratory, in the old building, since Goerlich once had to assist when the number of cells delivered per month was inadequate. approximately 60 to 100 evaporated cells per month were made by the Soviets, and that 50 to 60 Elac-type cells per month were made by Goerlich after 1949-50.

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30. there was simultaneous work going on with evaporated and chemically deposited cells in the Soviet laboratory but rather that one or the other type was made at any one time. an evaporated cell which looked different than the Elac cell and was actually a square glass plate. The cell had afterwards received a metal frame by evaporation (probably electrodes). over the glass plate a glass cylinder was placed as a protection. The cell was approximately 25 mm in diameter and about 60 mm long. It was not evident that the cell could be cooled, since there was no flask type space for a cooling agent; (Figure 3, page 9, shows the cell.) The surface was a velvet gray layer. Goerlich's laboratory when the Soviets could not fulfill their requirements - in which case the new laboratory had to assist in production. lead telluride or lead selenide cells. Goerlich was working on these because discussions were held about obtaining raw materials for these cells. Goerlich was requested to make cells with new sensitive surfaces but not much came of this since the raw material were lacking.

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31. a Soviet PbS photocell when a spectrograph or similar device was developed at Krasnogorsk. This device was ordered by a Moscow Institute of physics and the cells were furnished for this equipment by the Soviets. The Soviet cells were never directly compared with those of Goerlich but collaborators of Goerlich, Dr. Paul Gaenswein particularly, pointed out that the Soviet cells were substantially better than those which the Germans themselves were making at that time. . The Soviet cells were used in the spectrograph. They were a little larger than the evaporated Krasnogorsk type and were fitted with a different base (see Figure 4, page 9). a quartz prism was to be used in the spectrograph but was not certain whether the quartz prism was the only one used in the equipment. The Krasnogorsk laboratory had refused to furnish rocksalt and quartz prisms because they were not in a position to orient quartz prisms, having no equipment for this, nor did they have facilities to work rocksalt. Such prisms were furnished from somewhere else.

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Soviet Optical Industry

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Soviet optical industry had now been in existence for 30 to 35 years, starting after the Revolution of 1917-18, and was presently so far advanced that it was capable of reproducing, in the comparatively short period of approximately one year, excellent Sonnar objectives of equal quality to those made by Zeiss. The Soviets have fine institutes which have developed some excellent devices. The western world has one great advantage over the USSR in that the Soviets have not yet mastered the principles of transferring the results of research and development into production. 25X1

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the Soviets have developed a synthetic lens cement which even the German optical industry did not possess. 25X1

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34. Optical devices built by the Soviets are excellent. Equipment built in Leningrad had excellent performance and was on par with German and English devices. Several Soviet optical devices of recent manufacture were in use at Krasnogorsk. a bolometer allegedly originating in Leningrad used in Goerlich's laboratory. 25X1

35. Zeiss in Jena had demonstrated a spectrophotometer at the Leipzig Fair in 1954 and that this means that evidently problems of making satisfactory thermal detectors had been overcome. 25X1

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Krasnogorsk was the center in the USSR for infrared, especially for the production of military infrared devices. 25X1

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36. the Leningrad Institute, known as GOI (State Optical Institute), which comprised about 15 subsections and covered all aspects of glass techniques and the computation of lenses. 25X1

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Fifilov, a professor at both the Leningrad Institute and a Moscow Institute of physics, was technical editor of Goerlich's book. 25X1

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there was a large optical development center at the Leningrad Institute where such personalities are employed as Yachendov, who works on photo objectives; Kummanyen, who is chief of a group for equipment development for the optical industry; Aleksandrov, in charge of optical apparatus development; as well as such scientists as Maksutov, Joffe, and Herzberg. 25X1

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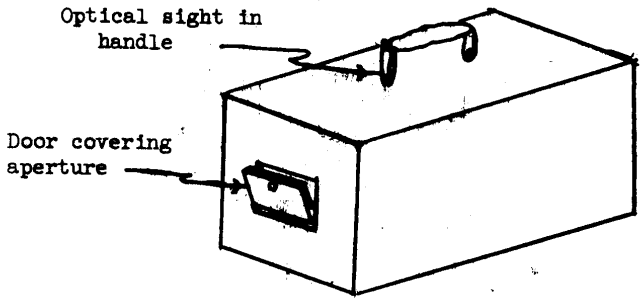

Figure 1.

BLACK BODY

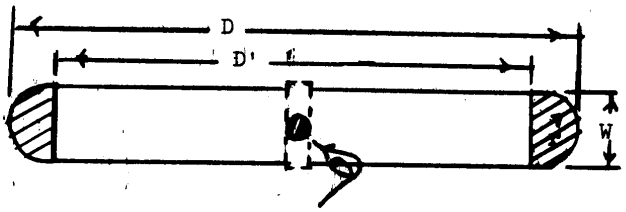

Figure 2.

Tubular photocell required for axial mounting in conjunction with annular lens.

Approx. dimensions:
D = 190 mm
D' = 170 mm
r = 25 to 30 mm
W = 20 to 25 mm

Note: The dimensions given do not quite check out, structurally, but are indicative of the order of magnitude.

SPECIAL ANNULAR LENS

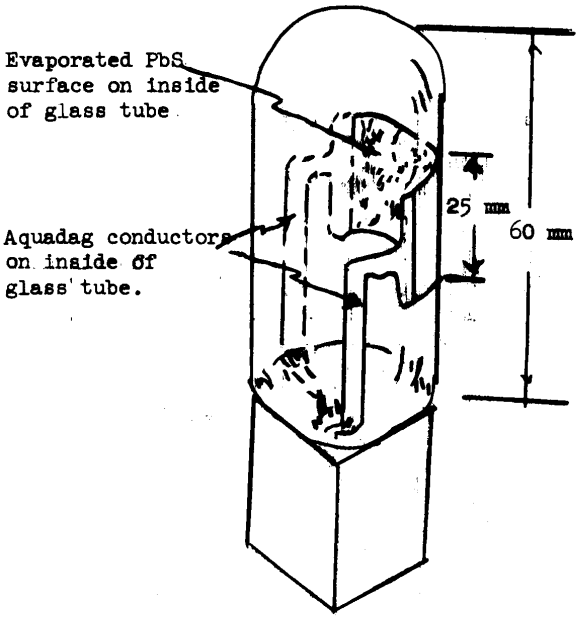

Figure 3.

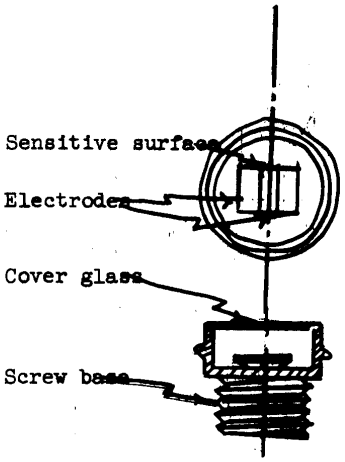

Figure 4.

SOVIET CELL