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SPENCER

Spencer Chemical Company

DWIGHT BUILDING

Kansas City 5, Missouri

KS.0-01-1

June 22, 1959

Mr. J. C. Delaney
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Delaney:

We are submitting herewith three copies of our license application covering a facility for handling uranium up to and including 5% enrichment in U-235. The system is designed to process either UF_6 or scrap to an oxide, nitrate or sulfate.

At the present time we are operating a similar but smaller facility under license No. SNM-154, and plan to continue its operation. The plant covered in this application also is to be located at our Jayhawk Works, but is physically located approximately one quarter mile from the smaller plant. Therefore, we are requesting a new license for the facility described in this application. The same laboratory facilities will serve both plants. Our current plant superintendent will have responsibility for both plants.

The new facility is under design and construction and we are planning to have it ready for operation by August 1, 1959. On that date depleted UF_6 will be used as feed for the startup operation. If there is any further information required, please contact us immediately by collect telegram or telephone in order to prevent any undue delay in the consideration of this application.

Yours very truly,

Nuclear Fuels Department

Harold Lambertus

Harold Lambertus
Manager

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Enclosures: ~~Four~~ Three copies of license application, as noted.

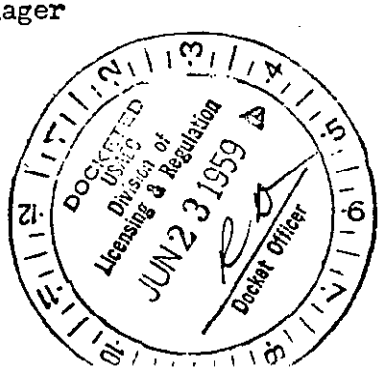

TABLE OF CONTENTS

APPENDIX

I

INTRODUCTION AND APPLICATION

1. This application for a special nuclear material license is submitted by Spencer Chemical Company. The company is incorporated in the state of Missouri and has its principal office in the Dwight Building in Kansas City, Missouri. The principal officers of the Company are:

   K. A. Spencer - President

   C. Y. Thomas - General Vice President (Operations)

   J. P. Miller - General Vice President (Finance)

   J. E. Culpepper - General Vice President (Marketing)

   E. V. Friedrich - Vice President, Administration, and Assistant Secretary

   J. C. Denton - Vice President, Agricultural Chemical Division

   H. R. Dinges - Vice President, Industrial Chemicals Division

   F. L. Pyle - Vice President, Plastics Division

   N. C. Robertson - Vice President, Research and Development Division

   E. W. Morgan - Treasurer

   A. Mag - Secretary

2. All these officers have their offices in the Dwight Building except for Mr. Mag whose address is 9 West Tenth Street, Kansas City, Missouri. All are natural born citizens of the United States. The company is not controlled by any alien, foreign corporation or foreign government.

3. This license is requested for the processing of any enrichment of uranium up to and including 5%. The uranium in the form of UF_6 or scrap is to be converted to the oxide. The processing will be done at the Jayhawk Works of the Spencer Chemical Company located between Pittsburg, Kansas, and Joplin, Missouri, with a freight shipping designation of Military, Kansas.

4. The license is requested for ten years.

5. The product of the process normally will be finely divided UO_2 powder. Oxides other than UO_2 may also be produced as finely divided powders. Nitrates and sulphates may also be produced.

6. The uranium will be processed for other licensees. Plant start-up is schedule for July 20, 1959. The maximum design processing rate is 300 pounds of uraniu per day. The actual processing rate will depend upon the exact nature of the feed material and upon customer demand. Inventory of U-235 at the plant will not exceed 1,000 kilograms. Processing losses generally will be held to less

than one percent, but may exceed this for small lots.

7. The Spencer Chemical Company is currently engaged in the manufacture of ammonia, nitric acid, ammonium nitrate, polyethylene, nylon, urea, methanol and other similar products. Since December 1, 1957, Spencer has been operating a uranium oxide pilot plant (under license No. SNM-154) and has gained much valuable experience in the handling and processing of enriched uranium.

II

QUALIFICATIONS OF PERSONNEL

1. The processing of uranium is the direct responsibility of Harold Lambertus, Manager, Nuclear Fuels. Mr. Lambertus reports directly to H. R. Dinges, Vice President, Industrial Chemicals Division.

2. Mr. Dinges received a B. S. degree in chemistry from College of William and Mary in 1938, where he also served as instructor from 1939 to 1941. He was employed by E. I. duPont de Nemours and Company 1941-42, and Olin Mathieson Chemical Company 1942-47 before joing Spencer Chemical Company in February, 1947. Since February, 1957, Mr. Dinges has been Vice President, Industrial Chemicals Division.

3. Mr. Lambertus received his B. S. and M. S. degrees in Mechanical Engineering from Purdue University and California Institute of Technology respectively. He was employed in 1946 by the American Bearing Corporation where he received a background in engineering, sales and production. He was a vice president at American Bearing prior to his leaving there in 1958, and was responsible for the planning, building and staffing of a nuclear fuel element manufacturing facility. Just prior to joining Spencer Chemical Company as Manager of the Nuclear Fuels Department in April, 1959, Mr. Lambertus served as a consultant to several manufacturers of nuclear fuel elements.

4. The operation of the uranium processing plant is the responsibility of George E. Chenoweth, Plant Superintendent. Mr. Chenoweth received a B. S. degree in chemical engineering from the University of Missouri in 1951. He was employed by Phillips Petroleum Company from 1951 to 1952, and joined Spencer Chemical Company in 1952. He has been responsible for much of the process equipment design for the experimental uranium facilities and has been in charge of the operation of the uranium pilot plant facility since January 1, 1959.

5. Mr. Sinesio A. Zagnoli has been responsible for a major portion of the process design. Mr. Zagnoli received his B. S. in chemical engineering from Purdue University and his M. S. in chemical engineering and M. S. in gas technology from Illinois Institute of Technology. He had some three years of industrial experience with petroleum and natural gas industry before his entry into

APPENDIX

I. PROCESS DESCRIPTION

1. This process is designed to produce primarily UO_2 from either UF_6 or scrap. With UF_6 as a starting material, a cylinder is weighed and then vaporized using steam heat. A vacuum pump preceded by a cold trap and a chemical trap permits evacuation and leak testing of the UF_6 piping.

2. The UF_6 is hydrolyzed by admitting the gas into a circulating stream of $AL(NO_3)_3$. Acid may also be added to adjust the acidity. The hydrolysis solution is transferred to rich acid storage.

3. With scrap UO_2 pellets, a weighed quantity of scrap is added to the empty dissolver and HNO_3 circulated through it and a rich acid storage tank until the desired concentration is reached. The dissolver vessel is jacketed to provide for heating or cooling.

4. Since "off-spec" product may be produced from time to time, provision is made for recycling it through the process. This scrap UO_2 powder is dissolved in a kettle using always mass safe batches, and then pumped to the rich acid storage tanks.

5. The rich acid is pumped to a countercurrent pulse extraction column. A solution of tri-butyl-phosphate in kerosene is used as the solvent. The rich organic phase from the extractor overflows to the scrub column. The raffinate flows to the waste storage tanks where it is sampled. From here it is either drained to the sewer or recycled to the system depending on the uranium concentration.

6. In the scrub column the rich organic is contacted with water. The water is recycled to the extraction column and the rich organic flows to the stripper where the uranium is stripped from it with water. The stripped organic phase overflows to a system which continuously cleans the solvent for reuse. The rich aqueous phase is fed to an evaporator to concentrate it and then precipitated with ammonia.

7. The ammonium diuranate precipitate is reduced to UO_2 in an electrically heated furnace. The UO_2 product is discharged through a mill to hoppers where it is sampled for moisture and other properties prior to being charged to the blender.

8. A dry atmosphere is maintained in the blender. Mass and moderation limits are used to determine the size of lots blended. After blending the UO_2 is discharged into approved shipping containers.

Appendix

II. PLANT LAYOUT AND EQUIPMENT DESCRIPTION

1. The building to house this facility is contained within the Jayhawk plant site. It is constructed of steel framework and covered with transite siding. All processing equipment is located along the east half of the building. High equipment such as the extraction columns is located in the 50' high bay in the center of the building. Layout of the equipment is shown on drawings 1-2600-4 and 1-2600-802.

2. The east wall behind the tanks and equipment is lined with stainless steel sheet to facilitate clean-up of spills and splashes. A stainless steel drip pan is provided along this wall under the equipment to contain leaks and spills. There are no floor drains to eliminate the possibility of a spill being lost to the sewer.

3. The UO_2 scrap pellet dissolver is 8.25" I.D. The dissolver for "off-spec" UO_2 powder is a kettle and will be used with mass safe batches. The cold trap is of 4" pipe and the evaporator is 8" Sch. 10 pipe. The pulse columns are 4" pipe with 8" pipe end section. All uranium-containing storage tanks are 10.25" maximum I.D.

4. The UF_6 cylinders are vaporized in a closed room. This room is provided with adequate forced ventilation. The exhaust air from the room is drawn through a scrubbing system to remove any UF_6 vapors. A fluorine detector is located in the duct carrying air from the room to detect any UF_6 leaks. The same fume scrubber system also is connected to a hood over the UO_2 powder dissolver to recover any uranium carry-over from the dissolutions.

5. Storage area is provided in the southwest quadrant of the processing building for feed materials and/or packaged product. Safe spacing will be maintained on all containers of uranium stored in this area. If more space is required, UF_6 cylinders may be stored outside in their bird cages on a concrete pad near the southwest corner of the building.