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Spencer Chemical Company

DWIGHT BUILDING

Kansas City 5, Missouri

L&R File Copy

May 14, 1962

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

Attention: Mr. Eber R. Price

Gentlemen:

This is in response to your letter of 17 April 1962 regarding the inspection conducted at our **Jayhawk** Works at **Pittsburg**, Kansas on May 2-5, 1961 under Source Material License C-4352 and Special Nuclear Material Licenses No. **SNM-154** and **SNM-329**.

Replying to your items as listed in your letter, we submit the following information for your consideration:

I. Time-occupancy studies have been made in the area where high air-borne dust samples were observed.

A. Incidents Involving Thorium

Six incidents have been noted involving thorium, natural isotopic assay. The counts of the air samples in these six samples are as follows:

Microcuries
per ml of Air

3×10^{-10}

4×10^{-10}

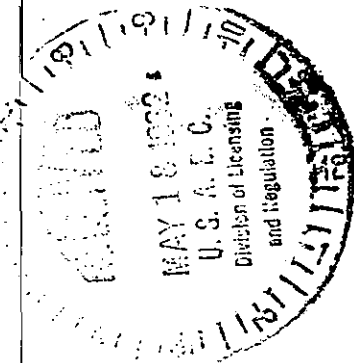
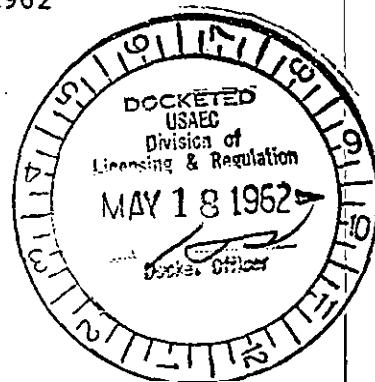
2×10^{-10}

2×10^{-10}

2×10^{-10}

5×10^{-11}

In all cases, these were 30-minute air samples taken at a position between the man and the hooded operation where the material was being utilized. The air samples therefore represent the absolute maximum that the man could have achieved. Time studies on the operation have indicated that the man is in the operating



position less than 7.5 minutes during an 8-hour normal shift of operation. During the rest of the time the man would be in other parts of the room or hallways or the building where the air has consistently been 10^{-12} microcuries per ml or less. Therefore, the overall daily exposure would be less than the limits of Part 20.

B. Normal Uranium

Seven instances were observed where the air-borne concentration of normal uranium was in excess of the Part 20 limit. These were as follows:

Microcuries
per ml of Air

1.3 x 10^{-10}

9 x 10^{-11}

1 x 10^{-10}

1 x 10^{-10}

2 x 10^{-10}

1 x 10^{-10}

9 x 10^{-11}

These instances all occurred at the fusion operation, samples being taken for a 30-minute period at a position approximately head high between the man and the hood where the material was being utilized. Again it was determined that the man was in this operating position less than 25 minutes during an 8-hour shift. At other times he would be in air-borne concentrations ranging from 10^{-12} to 10^{-14} , so that his overall daily exposure was less than prescribed limits.

C. 9% Enriched Uranium

Instances involving 93% enriched uranium have revolved around two pieces of equipment. One was a dry sample splitter where the samples had to be taken between the machine and the man. These were as follows:

Microcuries
per ml of Air

4 x 10⁻⁸

4 x 10⁻⁸

4 x 10⁻⁸

8 x 10⁻⁹

2 x 10⁻⁹

8 x 10⁻¹⁰

1 x 10⁻⁹

4 x 10⁻⁹

The other was a green salt unloading hood where the air samples encountered were as follows:

Microcuries
per ml of Air

5 x 10⁻⁹

3 x 10⁻⁹

8 x 10⁻¹⁰

1 x 10⁻⁹

7 x 10⁻¹⁰

1 x 10⁻⁹

1 x 10⁻⁹

3 x 10⁻⁹

5 x 10⁻⁹

8 x 10⁻⁹

These samples were half-hour samples taken at a position between the man and the hood where the operations were taking place. Therefore this also represents maximum possible exposure to the man.

The operator was in position at the sample splitter once during an 8-hour shift for not more than five minutes during the loading and unloading of the sample splitter. Since the dust samples were on the average of less than 100 times the limit for 93% uranium, and since the man's occupancy is approximately 1/100 of the 8-hour working day, the rest of the time being exposed to air samples of less than 10^{-12} , the daily exposure to any of the operators handling this equipment would not exceed the limit s.

At the green salt unloading operation, the exposure is less than 10 times that of the upper limit of Part 20. The unloading operation during which the dust is generated requires approximately 15 minutes during every 8-hour shift. The rest of the time the man would be in air of the room at 10^{-12} or less microcuries per ml of air. Therefore, his overall daily exposure would not exceed Part 20 limits. Operation of the sample splitter and green salt unloading was not carried out by the same operator during a single shift.

The corrective measures which have been taken to eliminate the high air-borne dust around this equipment are as follows:

- A. Thorium Operations. Additional lucite sliding baffles have been installed in these hoods to increase the air flow across the working opening. This has effectively trebled the air velocity and since their installation no high thorium air-borne dust readings have been observed.
- B. Normal Uranium Operation. The hoods where the high dust samples were observed have also been equipped with additional lucite baffles to increase the air flow into the hood at the operator's position. Since the installation of these lucite baffles, no high normal uranium air samples have been observed.
- C. Fully Enriched Uranium Operation. In the green salt unloading station a permanent lucite baffle with slotted arm holes has been installed to greatly increase the linear velocity of air into the hood at the operating position. Since the installation of this lucite baffle, no high readings have been observed at this station.

The sample splitter has been completely overhauled to insure dust tightness. Since the correction of this equipment, there have been no observed instances of high uranium concentrations around this equipment.

1-b. Concentration in Effluents to Unrestricted Area. During the inspection of May 1961, one effluent air sample on a stack indicated a discharge of 1 gram of normal uranium to the exterior air around the plant site. At the time the air-flow through this stack **was** so low that one gram over a **24-hour** period exceeded the limits of Part 20. Two corrections have **been** made to this stack:

(1) A filter has been installed downstream from the exhaust fan, and

(2) The effluent air has been increased by enlargement of the exhaust fan. No high samples have been observed at this point since this corrective measure.

Since the inspection of May 1961, a systematic study of the **stack** effluents from **all** operations have been **periodically** conducted, and no high samples have been observed to date.

- II. A. Position of the furnaces with respect to the hood in the T-room, Building 702: During the actual installation of this **equipment**, it **was** determined that the position described in the application would not lend itself to convenient installation **of** the ventilation exhaust **for** the furnaces. Therefore, the actual installation position was modified so that the exhaust stacks could be properly **positioned**. The spacing between the furnaces was still maintained as described in the license application, and the distance from the furnace to the hood was greater than two feet, which also maintained an adequate safety factor from criticality control. We did not feel that such a minor change **was** properly a subject for license modification.
- B. The loading of the furnace boxes is being conducted in accordance with the license application. Operators and supervisors have been **carefully instructed** to follow **exactly** the **provisions of** the license application.
- C. The hood in Room 16 of Building **702** has been equipped with a filter in accordance with the license application.
- D. The term "inert atmosphere" is a relative description. In the case of fused uranium dioxide, it has been determined that air, **CO2 and/or argon are** in fact inert to crystalline **UO2** at room temperature. We feel therefore that free substitution of any of these three gaseous atmospheres is in full compliance with the license;

AEC
Washington, D. C.

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In answer to your further requests, we are attaching as Appendix I the air survey program which was initiated in October 1961, and has been followed since that time.

If further information is desired, please advise.

Yours very truly,

Nuclear Fuels Department,


Harold Lambertus
General Manager

WML:el

Attach: Appendix I.

TABLE II

Assignment of Sampling Sequence by Area and Number

<u>Zone No. 1</u> <u>Sample Point</u>	<u>Air Samples</u>	<u>Smear Samples</u>
B6 - DMR office	90	39
K4 - Room 2 office	61	43
K-8 - G.S. office	33	79
A12)	67	62
A13)	11	75
A14)	38	71
B11)))))) Lunch Room	82	91
B11))))))	52	68
B14)	09	98
C11)	54	74
C14)	47	34
D11)	56	42
D12)	95	06
D13)	57	64
D14)		
G8 - Center hall office	16	13
C37)	77	89
D38) Dirty Change area	08	88
E37)	03	99
A42))	04	94
E42)) Center Hall storage	48	70
J27 - Met. Lab	17	01
J32)	45	25
J34) Clean Change area	22	20
L32)	27	96
K39 - Men's Room	28	93
K42 - Center hallway south	12	23

Total - 26