

THRU : **File**
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March 20, 1968

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PETROTONICS COMPANY, CASPER, WYOMING - LICENSE NO. SUA-551
(Docket No. 40-6659) - HEALTH AND SAFETY EVALUATION
INSPECTION CONDUCTED MARCH 7 AND 8, 1968

Except for one change in process, wherein the licensee has converted from a batch magnesium precipitation process to a continuous precipitation process using anhydrous ammonia, the related facilities and process for separating the uranium from the ore remain basically the same as that noted during the previous inspection. The inspection of the licensee's program revealed two items of noncompliance. The licensee failed to perform any radiation surveys during the period covered by this inspection and was particularly cited for not performing such surveys coincident or immediately following the change to the anhydrous ammonia precipitation process. As this change has only been in effect since February 8, 1968, the absence of a radiation survey appraisal does not appear to offer any apparent threat to the health and safety of the public or the licensee's employees. The other item of noncompliance involved an annual release of an average of 5.3×10^{-6} uc/ml of Th-230 to the unrestricted area via a seepage stream that originates in the restricted tailings area. Although the quantity released is nearly 3 times the MPC, the item of noncompliance is not regarded as an immediate threat to the health and safety of individuals as the point at which the release occurs is not populated by man or animal. Also considered is the fact the three test wells drilled in the immediate area have shown no evidence of contaminants from this source.

The entire mill was in operation at the time of the tour and visual observations indicated good housekeeping and maintenance throughout. The crushing and grinding areas were free of ore agglomerates on the floor and there was negligible evidence of visible dust on equipment, ledges, etc. No dusting or airborne problems were observed in the yellow cake packaging area.

Based on the findings and observations made during this inspection, it appears that the licensee's program is administered in a manner such that there is no apparent threat to the health and safety of the public or the licensee's employees. The latter statement assumes that the licensee will implement the agreed upon, prompt corrective action regarding control of seepage from the tailings pond.

cc: J. R. Roeder, CO:HQ ✓

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PDR FOIA
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A/17

1. Petroatomic Company
P. O. Drawer 2450
Casper, Wyoming 82601
2. March 7 and 8, 1968
3. Reinspection (4)
4. 10 CFR 20 and 40
5. License No. SUA-551 (Docket No. 40-6654)
6. The inspection consisted of a tour of the mill and related ore processing areas; a tour of the tailings area; a review of all records pertinent to licensed material at the subject facility; and interviews with persons who administer and supervise the process and radiation protection program.

The following items of non-compliance were observed or otherwise noted:

10 CFR 20.106(a), "Concentrations in effluents to unrestricted areas."

During the period March 1967 to March 1968, the licensee released an average of 5.5 x 10¹⁰ dpm of Th-230 to the unrestricted area via seepage into the tailings pond whereas 10 CFR 20.106(a) states that the licensee shall not release to an unrestricted area radioactive materials in concentrations in excess of the limits specified in Appendix B, Table II, which defines the limit for Th-230 as 2 x 10¹⁰ dpm/ml. (See pages 29 and 30.)

10 CFR 20.20(b), "Surveys."

During the period June 1967 to March 1968, the licensee failed to make radiation surveys coincident with changes in process whereas 10 CFR 20.20(b) requires such surveys to be made to assure compliance with 10 CFR 20.106(a). (See page 38)

March 14, 1967

_____ DNL:fs	H. J. Prosser, Inspector	_____ Date
_____ DNL:fs	G. D. Brown, Reviewer	_____ Date

Inspection History

9. An unannounced reinspection (3) of the subject license was conducted on February 13 and 14, 1967. As a result of this inspection, Form AEC-592 was issued to the licensee in respect to the following described items of noncompliance:

- "a. During the period September through November, 1965, assays for uranium in the seepage effluent were not performed at a monthly frequency as required, contrary to Condition No. 13(A)3 of License Amendment issued 12/22/64.
- "b. A report was not submitted to the Commission no later than December 31, 1965, showing the results of the seepage liquid assays, contrary to Condition No. 13(A)4 of License Amendment issued 12/22/64.
- "c. During the period January 1 through December 31, 1965, assays for uranium in the potable water were not performed at a six month frequency as required, contrary to Condition No. 13(B) of License Amendment dated 12/22/64.
- "d. During the period January 1 through December 31, 1965, assays for uranium in RTH 1, 2, and 3 test wells were not performed at a twelve month frequency as required, contrary to Condition No. 13(C) of License Amendment issued 12/22/64.
- "e. During March and April, 1966, assays for uranium in the seepage liquid effluent were not performed and during the period May through December assays for Ra-226 and Th-230 were not performed in order to show compliance with 10 CFR 20.106, 'Concentrations in effluents to unrestricted areas', contrary to 10 CFR 20.201(b), 'Surveys'.

It should be noted that four of these items of noncompliance referred to a license amendment issued 12/22/64 which expired on December 31, 1965. During the course of this inspection it was determined that the licensee was in compliance with the items 1-e which he was previously cited.

Current Inspection

10. An unannounced reinspection (4) was conducted on March 7 and 8, 1968. The writer was accompanied by G. H. Smith, CO:IV, throughout the inspection. The Wyoming State Health Department was invited to participate in this inspection but declined the invitation due to lack of personnel.

Persons contacted during the course of the inspection included Mr. Gene Cooley, Mill Manager; Mr. C. E. Wolff, Acting Mill Superintendent; and Mr. Jack Whirman, Acting Manager. Mr. Cooley was the principal interviewee and accompanied the inspector throughout the entire course of the inspection.

Organization

11. A partnership between Tidewater Oil Company and Getty Oil Company with Getty Oil Company as the managing corporation was consummated during late 1967 and as a result changed the financial partnership structure of the Petroleum Company. Presently the partners, Korte-McGee Corporation, owned 50% of the partnership and the ownership is split equally divided between Tidewater Oil Company, Skelly Oil Company, and Getty Oil Company, on an equal basis.

The merger of Tidewater Oil Company and Getty Oil Company resulted in Getty Oil Company owning 33% of the Petrobrum Company. In correspondence between the licensee and DML dated August 8, 1967 and September 19, 1967, it was established that this merger did not constitute a license transfer as defined by Section 40.46 of 10 CFR 40 and it was established that an amendment to License No. SUA-551 (Docket No. 40-6659) to reflect the proposed merger was not required.

13. C. E. Wolff stated that effective March 4, 1968, Mr. G. K. Coates, Manager, Petrobrum Company, was replaced by Mr. Judd Whitman, who currently serves in this capacity as Acting Manager. Mr. Coates now has the position of Senior Staff Metallurgist in the Getty organization. Prior to his assignment at Petrobrum Company, Mr. Whitman was in the Getty organization in the capacity of Manager, Minera Galaz Plant, Sonora, Mexico.
14. Mr. Gene Cooley, formerly manager of Siskiyouna-Western ore processing mill, Fall City, Texas, joined Petrobrum Company in August 1967 in the capacity of mill metallurgist. Mr. Cooley has the responsibility for the entire radiation protection program, including record keeping, at the Petrobrum Company.

Extraction and Milling Process

15. The mill workings are located in the company of Mr. Cooley. Mr. Cooley stated that the mill continues to process about 500 tons of ore daily at an overall recovery of approximately 97%. The ore continues to run approximately 0.2% U^{238} . Mr. Cooley stated that the number of employees at the mill has remained relatively constant during the period covered by this inspection and that that part of the process involving mining, crushing, grinding, and leaching has not changed since the last inspection.
16. It was observed that the licensee had completed the installation and was using two new vaporizers for precipitation with anhydrous ammonia. Mr. Cooley stated that this change in equipment was effected on February 8, 1968 and is part of a planned program that will involve the conversion from batch magnesium precipitation to continuous precipitation using anhydrous ammonia. It should be noted that this process change was described by the licensee in the application for renewal of Source Material License No. SUA-551 dated December 8, 1967.
17. It was observed that the facility is in the midst of a major expansion and construction program directed toward increasing the throughput to more than 5,000 tons per day. Mr. Cooley stated that the mill crushing and grinding facilities should have the capacity for 4,000 tons per day. The expansion program involves construction of additional processing facilities related to the slurry or liquid phases of the process of U²³⁸ extraction. Specifically noted during the course of the tour was the additional work in the liquid extraction construction of an entire duplicate solvent extraction circuit, construction of a third stage extraction and

stripping building. It should be noted that the subject licensee has applied for an amendment to License No. SLA-551 regarding the expansion of processing facilities.

18. The tailings area, dammed seep area, and the seepage stream were observed to be near identical in volumes and structure as those described in previous inspection reports of this series. Mr. Cooley stated that recent calculations performed by Petrotonics indicate that the tailings area comprises 86.3 acres of solid material and 9 acres of liquid material.

Housekeeping

19. The entire mill was in operation at the time of the tour and visual observations indicated good housekeeping and maintenance throughout. The crushing and grinding areas were free of ore agglomerates on the floor and there was negligible evidence of visible dust on equipment, ledges, etc. No dusting or airborne products were observed in the yellow cake packaging area.

Airborne Radioactive Materials - Restricted Area

20. A review of the records maintained by Mr. Cooley revealed that monthly air samples are taken at approximately 40 locations in the operating area. Approximately 50% of the samples are taken as breathing zone samples and the remainder are general area samples. It was noted that the number of breathing zone samples increased in 1967 as compared to 1966, due to the frequency of cleaning operations. It was noted that the results of the breathing zone samples contribute to higher than average airborne concentrations. The results of the general area samples are incorporated into a record system that is maintained by each employee. The record the employee's job exposure is determined from calculations performed from the monthly studies for the particular area. The summary data for an individual employee will show the concentrations to which he was exposed during the month and the percentage relationship of this exposure to the established MPC for the employee assigned.

21. A review of the monthly exposure records for individual employees for the period covered by this inspection showed that during 1967, in the maximum cases exposure to workers were on an average of 1.76×10^{11} uc/ml and that most of the workers (sample preparation and packaging) were exposed to 3.5×10^{11} uc/ml. During the two months reviewed in 1966, the maximum values were 7.9×10^{12} uc/ml and 1.87×10^{11} uc/ml. It was noted that the breathing zone concentration was 2.5 times the established MPC for the employee assigned. The exposure data for 1967 showed 75% of the workers were below the established MPC.

22. The 18 sampling points shown on the diagram of the mill are shown on the attached MPC diagram. The only sampling point not shown in the records was a breathing sample taken in February 1968 during the cleaning of the MC

tailings area includes the main tailings pond and the dammed seep area. Casual inspection, influenced by surface snow, revealed apparent integrity of the containment diking and damming except for a small seepage stream which was observed flowing underground below the restricted area fence at the northwest corner of the general tailings area. This seepage stream has been observed during previous inspections and the origin, status, and related sampling results have been described in previous reports of this series (par. 26, reinspection (1), and par. 28, reinspection (2)).

28. Effluent discharged via this stream to the unrestricted area was observed to be flowing at an estimated 15 gallons/minute. The arroyo formed by this discharge extends for an estimated 300 feet downstream where the effluent disappears underground. Approximately 150 feet downstream from the point of discharge, the licensee has partially dammed the arroyo with limestone. Mr. Cooley stated that the limestone was inserted in the stream for purposes of precipitating out the Th-230 from a more basic media. Mr. Cooley stated, and his records later confirmed, that 40 tons of limestone were added to the dam on August 16, 1967 and another 75 tons of limestone added on October 1, 1967.
29. The licensee has constructed a conventional V-type sampling weir at a location estimated to be about 25 feet downstream from the limestone dam. The records revealed that except for those periods during the year when the stream is frozen, the licensee obtains monthly samples at the weir and analyzes them for uranium, Ra-226, and Th-230. The results of these measurements, as compiled from the licensee's records for the period covered by this inspection, are as follows:

Date	U Nat. x 10 ⁻⁵ uc/ml	Ra-226 x 10 ⁻⁸ uc/ml	Th-230 x 10 ⁻⁶ uc/ml	Flow-Gal./Minute	
				Max.	Min.
3/31/67	0.063	3.42	0.05	9.62	
4/28/67	0.064	0.04	6.8	24.1	12.5
5/26/67	0.064	< 0.001	8.1	24.1	12.5
6/30/67	0.12	9.0	2.8	24.1	12.5
7/28/67	0.097	0.08	5.34	24.1	19.7
8/25/67 *	0.085	1.68	5.90	19.7	19.7
9/29/67	0.08	0.15	5.78	24.1	15.9
10/27/67 *	0.034	< 0.001	8.59	24.1	15.9
10/27/67 **	0.034	1.31	7.01	24.1	15.9
11/24/67	0.076	0.14	7.10	24.1	19.7
11/24/67 **	0.076	24.6	7.37	24.1	19.7

* 40 tons of limestone added on 8/16/67 and 75 tons added on 10/1/67.

** Samples collected on these dates were split and submitted to private laboratories for analyses under different sample identification numbers.

It should be noted that upon inquiry, Mr. Cooley was unable to explain the reasons for the discrepancies in the Ra-226 analysis for the duplicate samples that were submitted to the outside laboratory representing the dates of October 27, and November 24, 1967. The licensee's records from which the above data were extracted also showed that samples were not collected in January and February 1967 and 1968 because the arroyo was frozen at the sampling location.

10. Mr. Cooley was informed that based on the sample results itemized in the above table, the release of an average of 5.3×10^{-6} $\mu\text{c}/\text{ml}$ of Th-230 to the unrestricted area was in excess of the limits specified in Appendix B, Table II, of 10 CFR 20, and that the release of Th-230 in these quantities was in noncompliance with 10 CFR 20.106, which states that the licensee shall not release to an unrestricted area radioactive materials in concentrations exceeding the limits specified in Appendix B, Table II. The occurrence of an occasional Ra-226 result in excess of the limit specified in Appendix B, Table II, was also brought to Mr. Cooley's attention, however, he was informed that this was not a citable item as the annual average for a one-year period showed a value of 2.74×10^{-8} $\mu\text{c}/\text{ml}$ as compared to an annual limit of 10^{-6} $\mu\text{c}/\text{ml}$. Mr. Cooley was also informed that it appeared likely that the annual average of Th-230 released to the unrestricted area could be higher than the annual average of Ra-226 from the licensee's monthly sampling program, as the sampling locations are located approximately 150 feet downstream from the point where the effluent enters the unrestricted area. The first sample has the benefit of the interim settling and precipitation effect which occurs before the sample is taken. Mr. Cooley stated that he realized that the concentrations of thorium in the unrestricted area exceeded the regulatory limits and he stated that he was aware that the concentrations of Ra-226 released to the unrestricted area were approaching the limits. He further stated that he had discussed this item with management and that Mr. Cooley was contemplating corrective action as required by 10 CFR 20.106, but he was not sure of the type of corrective action to be taken. It should be noted here that Mr. Cooley is the position of manager, Radiological Engineering Company, on March 4, 1968.

Three samples of the seepage stream were collected by the inspector from the location where the effluent enters the unrestricted area. These samples were submitted to ID Geochemical Company, Ra-226, and Th-230, and upon receipt the results will be made available to the licensee. Mr. Cooley was informed that ID Geochemical will convey the results of these analyses to the licensee.

Test Wells Below Dam

11. In accordance with License Condition No. 8, and in reference to the procedures described in the licensee's application dated October 14, 1964, the licensee has sampled the three test wells below the seepage dam at six month intervals. A review of the records showed that the

samples were analyzed for Ra-226, Th-230, and uranium and that all results were less than the MEC or the referenced isotope in unrestricted areas. A review of the results for the period covered by this inspection showed the following maximum measurements in this group of test wells: uranium = 8×10^{-9} uc/ml, Ra-226 = 1.4×10^{-9} uc/ml, and Th-230 = 5×10^{-7} uc/ml.

Tap Water

33. In accord with License Condition No. 8 wherein the licensee describes the procedure for sampling potable water at six-month intervals (application dated 10/14/64), samples of the potable water supply were collected and analyzed in March and September, 1967. The results obtained from the analysis for Ra-226, Th-230, and uranium showed all values to be below the respective MEC's. The analysis indicated no contribution in respect to radionuclides to the Ra-226 concentration in the samples. The value obtained during September 1967 analysis showed 5.8×10^{-9} uc/ml.

Waste

34. The licensee samples the effluent water at six-month intervals and analyzes the samples for Ra-226, Th-230, and uranium. The review of the records of these analyses indicated that the results were consistently less than 1×10^{-8} uc/ml.

Access to Restricted Areas

35. A review of the application of the licensee indicated that the licensee has not complied with the provisions of the license regarding restricted material handling or access to areas during the period covered by this inspection.

Personnel

36. The licensee participates in a bi-weekly badge exchange program provided by Environmental Health Services as a part of this program and four of the employees assigned to precipitation activities and two to sample preparation operations. A review of the results of this program for the year 1967 through January 10, 1968 revealed that the maximum annual exposure to an employee was 32 millirem, which was received by a precipitation operator. The licensee maintains these records on a form that partially satisfies the requirements of Form AEC-5; however, the fulfillment of Form AEC-5 conditions is not required as all exposures are less than 25% of the limits specified by paragraph 20.10(a).

Posting of Labels

37. In accordance with License Condition 9, the licensee participates in the compliance with the requirements of Section 20.2(a) by posting all entrances to the restricted areas with a sign stating "Any Area Or Container Within This Mill May Contain Radioactive Material." It was also observed that in accord with License Condition 8 (procedure described in the licensee's application dated April 22, 1963), the licensee has posted "Caution - Radiation Area"

