

UNITED STATES GOVERNMENT

# Memorandum

TO : Files

DATE: February 28, 1962

FROM : Don Harmon *Don Harmon*

SUBJECT: RADIATION SAFETY ANALYSIS OF PETROTOMICS COMPANY URANIUM MILL,  
DOCKET NO. 40-6659.

DLR:DFH

## Conclusions

It appears that the Petrotomics Company has adequate personnel, facilities, equipment and operating procedures to conduct the proposed uranium milling operations in accordance with the Commission's rules and regulations. This analysis is based on a application dated October 10, 1961, and supplemented January 12, and February 14, 1962. In addition, a pre-licensing visit was made by D. F. Harmon and D. A. Nussbaumer.

## Analysis and Findings

### Location of Mill, Description of Area and Mill Process:

The Petrotomics uranium mill is located in Shirley Basin, a remote, semi-arid area approximately 32 air miles (62 by road) south of Casper, Wyoming. The nearest inhabited area is a uranium mining camp (Utah Construction Company) approximately 5 miles north of the plant site. An overnight motel type accommodation located adjacent to the plant will be available for non-commuting employees. There will be no other residential area associated with the mill.

The mill will use the solvent extraction method and has a designed ore input of 500 tons per day. Operations involved in this process are; primary and secondary crushing, grinding, acid leaching, counter current decantation, clarification, solvent extraction, precipitation, filtration, drying and barreling.

### Ventilation Equipment:

A flow diagram of the mill process has been submitted by the licensee showing points in the operation which may produce gases, mists, dusts or fumes. The three main areas of interest in this operation with regard to airborne radioactivity are the crushing area, the final

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products area, and the bucking room.

The crushing area, including crushers, hoppers, transfer points, etc., is completely enclosed. However, no dust collecting or air cleaning equipment has been provided at this time, since available data indicate a high moisture content of the ore (6-12%). Also, the sandy nature of the Petrotomics ore produces a product wherein only 10 percent of the mined ore will require crushing. In order to facilitate the installation of dust collecting and air cleaning equipment in case of a change in ore characteristics or dust producing operations, all chutes, hoppers, etc., include dust plenum locations.

Past experience indicates that dust concentrations in these areas may produce problems. This was pointed out to the ~~licensee~~ <sup>licensee</sup> in previous correspondence and during the pre-licensing visit. The licensee is aware of this but still feels that adequate provisions have been made. Considering his provisions for installing ventilation and air cleaning equipment if necessary, we feel that no further action is justified at this time other than to require adequate sampling. This is being done.

The ventilation equipment in the final products area consists of an American Air Filter Skimmer Centrifugal Precipitation preceding and in series with an American Air Filter Roto-Clone hydrostatic-precipitator. The barreling, hammer mill, and sampling operations are completely automatic and enclosed. This entire operation has been copied from the final products area of Anaconda Company where the efficiency of this equipment has been adequately demonstrated. In addition, this entire area is enclosed from the remaining portions of the mill.

All sample preparation operations conducted in the bucking room are carried out under hoods connected to the bucking room ventilation system. These hoods are vented to the atmosphere at 1500 CFM by an exhaust fan. In addition a wet scrubber will be installed if needed to reduce airborne effluents to acceptable limits. However, it should be noted that very little crushing will be conducted since control samples will be pulp rather than ore. This appears adequate.

Fumes resulting from leaching operations are vented by gravity through plywood ducts to the atmosphere.

#### Mill Discharge Stacks:

Airborne radioactivity may be released to the environs from three

locations during operations. One will be the stack from the product dryer, one from the ducts in the acid leach area, and one from the bucking room. The effluent from the product dryer passes through a dry cyclone and then through a roto-clone scrubber. This stack is sampled weekly by passing a measured volume of air through a filter paper. The volume of air discharged through the stack is measured by a venturi tube. If concentrations exceed MPC to unrestricted areas, then additional sampling will be conducted around the mill property. Significant quantities of airborne radioactivity are not expected from the acid leach area or the bucking room. In any case, there does not appear to be any problem due to the remoteness of the area.

#### Airborne Radioactivity Surveys:

A schedule for airborne radioactivity surveys has been submitted by the licensee. Surveys will be conducted using a portable Gast pump air sampler and a MSA Fist-Flo air sampler. Forty-one locations covering all areas of the mill will be sampled monthly for the first six months. After the initial six-month survey the program will be revised to sample areas of low concentrations on an annual basis. The areas with significant concentrations will continue to be sampled monthly.

The procedure used in determining the average daily and weekly exposures to airborne radioactivity will include occupancy studies. Where the concentrations are low there will not be breathing zone sampling. However, if a particular area approaches MPC breathing zone samples will be conducted and used to determine average exposure based on occupancy time.

Determination of employee exposure to airborne radioactivity will not be based on respirator efficiency factors.

#### External Exposure:

Surveys will be made in all areas of the mill for external radiation. If time occupancy studies and exposure levels indicate that an employee is likely to receive a dose of 25% of the limits in 10 CFR 20, then he will be furnished a film badge.

#### Radiation Safety Instructions:

Written radiological safety instructions will be provided employees at the mill. These instructions cover provisions for personal hygiene, good housekeeping, film badges, etc. These appear adequate.

#### Tailings Control:

Liquid and solid tailings will be impounded behind an earth dam.

The dams' capacity is 779,000 tons, the final height will be 34 feet, top width is 40 feet, slopes have a 2:1 ratio and there will be a 2 foot freeboard when filled. Another feature of the dam includes a keyway which should add considerable strength to the structure. The Process Evaluation Branch has reviewed the information submitted by the licensee on construction, capacity, integrity, cross-sections, heights, top width, etc., and conclude that the dam is adequate for both present and proposed future extension. During the pre-licensing visit it was noted that the present dam was completed except for the surface runoff interception ditch and filled with water from a sudden thaw to the point of overflow, thus confirming the strength of the dam. Upon completion of the present dam the licensee had pumped in water to check for seepage. Unexpected warm weather (from a minus 50°F to 60°F in a two week period) had caused excessive runoff from melting snow which resulted in the filling of the dam. The licensee has subsequently submitted information to the effect that the pond would be drained, the dam raised at least 10 feet in height and the interceptor ditches completed and deepened. No problems are anticipated with future overflow or release of tailings material. As a precautionary measure, the licensee has constructed a second dam to trap any effluent that might get past the main dam.

It should be noted that if any liquid were released it would have to flow for five miles through a gully before reaching a live stream. Therefore, it appears unlikely that there are any problems associated with the tailings pond area.

#### Liquid Survey Program:

Liquids obtained from three test drill holes located on the down slope area of the tailings dam will be tested on a monthly basis for uranium, radium and thorium. This appears to be adequate to determine the degree of seepage and the nature of any material leaving the tailings pond by this route. The licensee stated during the pre-licensing visit that the well (located on the opposite slope of the dam) used for drinking and culinary purposes would also be sampled. This was to have been confirmed in his letter of February 14, 1962. It appears that the licensee inadvertently overlooked this matter. Therefore, the license has been conditioned accordingly.

#### Organization, Qualifications and Experience:

The licensee has submitted a detailed description of the organization, including authority and responsibility of each level of management. Mr. G. K. Coates, the mill superintendent, has the responsibility

of radiation safety. Mr. Coates was formally superintendent of the AEC uranium mill at Monticello, Utah. He has also been associated with the Winchester, Massachusetts laboratory group working on radiation safety problems associated with the uranium industry. Mr. Coates appears to be well qualified, for this function and has a good understanding of 10 CFR 20. He also has the authority to insure that the radiation safety program will be adequately administered. He will be assisted in the radiation safety program by Mr. B. Moulder, who holds a BS degree with a major in Math and Physics and has had short ~~time~~ experience in health physics.

Plant Security Measures:

The mill and tailings areas will be fenced. The ore storage section is not fenced but we do not believe this is necessary because the area is so lightly populated.

Sample Analysis:

Uranium analysis will be made using standard fluorometric procedures. Radium and thorium samples will be sent to a commercial laboratory for analysis. The licensee has submitted a list of companies from which one will be selected. We believe that any of the companies listed can make a proper and adequate analysis.