

UNITED STATES GOVERNMENT

## MO.4-5 Memorandum

TO : Files

DATE: September 25, 1962

MO.4  
MO.5FROM : *Robert L. Layfield*  
Robert L. Layfield, Source & Special Nuclear  
Materials Branch, Division of Licensing & RegulationSUBJECT: PRE-LICENSING VISIT TO THE CONTEMPORARY METALS CORPORATION  
PROPOSED FACILITY AT HAZELWOOD, MISSOURI, AND RESIDUE STOCKPILES  
AT ROBERTSON, MISSOURI, DOCKET NO. 40-6811

The Contemporary Metals Corporation was awarded a contract by the AEC for the removal of uranium-bearing residues from stockpile areas at Robertson, Missouri. These residues were generated by the Commission at its Destrehan Street Plant, St. Louis, Missouri. The applicant intends to process these residues at its Hazelwood facility which is about three (3) miles from the stockpile site. Attempts will be made to extract the associated minerals and other recoverable by-products for resale (e.g. copper nickel and <sup>coolant</sup> coolant). There is an estimated 125,000 tons of these residues. The uranium content ranges from 0.05% to 0.62% plus traces of ionium (thorium-230). The average source material content will be approximately 0.2% by weight.

FacilitiesResidue Stockpile - Robertson, Missouri

The residues have resulted from the processing of Belgian Congo pitchblende and domestic uranium ores from Colorado mining operations. The pitchblende raffinate consists entirely of residues dumped on the ground at the stockpile site. In addition to mounds of residues, the Colorado raffinate includes unleached barium sulfate cake and leached barium cake resulting from refinery operations, and miscellaneous residues stored in drums. These residues have been exposed to the elements for several years. The water content is estimated to be about 15 - 35%.

Processing Plant - Hazelwood, Missouri

The applicant has obtained approximately 6.6 acres of land situated in south St. Louis. This is an industrial zone. There is a large (35,000 square feet) steel and concrete factory building existing at this site. The applicants propose to adapt this building for their specific needs. The final facility will consist of a main processing area, chemistry laboratory, change room and office areas.

The process tanks will be of the wood stave type. These tanks will be enclosed and vented to an underground hold-up tank, Conveyance between processes will be accomplished via enclosed screw conveyors or pumps.

#### Scope of Operations

##### Residue Stockpile - Robertson, Missouri

The residues will be moved to the loading pit via lines and bull dozers. Enclosed bin, bottom dump type trucks will be loaded via automatic conveyor operation.

#### Remarks:

1. All personnel involved in these operations will be supplied with film badges and dosimeters for personnel monitoring.
2. Water spray equipment is available for adding water to operations with dry materials.
3. Air samples will be taken once during each eight hour shift. (Filter Queen or Staple\*.)
4. Trucks will be washed prior to leaving the stockpile site enroute to the processing facility.
5. Water resulting from decontamination of trucks will be monitored for radioactivity prior to release from an existing settling pond.

##### Receipt at Process Plant - Hazelwood, Missouri

Upon arrival at the processing plant, the residues will be deposited within a fenced-in area.

These residues will be moved to the loading pits via drag lines and bull dozers. A continuous conveyor belt will supply the residues into a grizzly for classification and rejection of foreign materials (rocks, wood, etc.). Rejects will be taken to an on-site dump for storage. There will be no crushing or grinding.

#### Remarks:

The same procedures and precautions for personnel safety will be observed during these operations as those established in the initial loading operation. In addition, continuous monitoring of feed will be performed to detect abnormal radium content. Airborne radioactivity should be a minimum due to water content of residues.

### Main Process

The feed material will be routed into one of two cycles for processing - the raffinate cycle or the barium sulfate cycle - depending on the nature of the respective feed materials.

### Raffinate Cycle

The raffinate feed material undergoes an initial dissolution in an ammonia-water mixture. The resultant mixture will then be dumped into a drum filter. The residues from this filtration process will be pumped into an acid leach tank (all uranium should be in this residue), then transferred into the barium sulfate cycle for removal of the uranium.

The pregnant solution from the afore mentioned drum filter operation will be pumped through an acid leach tank into another drum filter. During this filtering operation, the thorium (ionium) and rare earths will be received. The filtrate from this operation should contain only trace quantities of radioactive materials. It is from this solution that the copper, nickel, cobalt are obtained. Also, the remaining solution will be sold as fertilizer.

### Barium Sulfate Cycle

The barium sulfate feed material will be initially dissolved in an acid-water mixture. This solution will then be pumped into a drum filter. The barium ( $\text{BaSO}_4$ ) will be separated as a solid for shipment to market. (Radium should accompany the  $\text{BaSO}_4$ .) A letter from St. Louis Operations Office indicated that their records showed about 17 grams of radium would be contained in the total 10,000 tons of barium material or about  $2 \times 10^{-3}$   $\mu\text{g}/\text{gm}$ . (Reference letter dated June 8, 1962, F. H. Belcher.)

The pregnant solution from this operation will be pumped into a hold-up tank prior to pumping into a  $\text{NH}_4\text{OH}$  mixture to precipitate the uranium which will be separated via a drum filter. (The uranium bearing slurry from the raffinate cycle enters the  $\text{BaSO}_4$  cycle at this step in the process.) The residue from the filtering operation will contain the uranium as  $\text{UO}_2(\text{OH})_2$ . The basic solution should be relatively free of radioactivity and will be sold as fertilizer.

### Remarks:

1. All of these processes will be accomplished in closed tanks which will be vented to an underground hold-up tank. The applicant states that the condensate from this hold-up tank will be returned to the process. Thus, there should not be any gaseous effluent except as noted below on the  $\text{UO}_2(\text{OH})_2$  bagging operation.

2. Drum filters are the enclosed type.
3. The St. Louis Testing Laboratory of St. Louis (or equivalent laboratory) will perform all product quality control analyses for radioactivity content.

#### UO<sub>2</sub>(OH)<sub>2</sub> Bagging Operation

This operation has been placed within a partitioned room. The UO<sub>2</sub>(OH)<sub>2</sub> from the drum filter operation is fed into a semi-automatic bagging machine via an enclosed screw conveyor. Poly-ethylene bags in steel drums will be used to contain this material shipment. An operator is required to enter the room only to heat seal the bags.

#### Remarks:

1. This material will be relatively wet since there are not any drying processes preceding the bagging operation.
2. A mechanical ventilator will be installed at the discharge end of the bagging machine. The effluent from this vent will pass through a filter before being discharged.
3. The effluent will be monitored via permanently mounted air filters. Filter paper will be analyzed each eight hour shift.
4. Ambient air in the plant will be continuously monitored for concentrations of airborne radioactivity. Staplex (or equivalent) will be used.

#### Shipment of Marketable Products

The St. Louis Testing Laboratory will test and certify the radioactive material content in all marketable products. The quality control limits appear conservative with respect to 0.05% source material.

#### General Health and Safety Procedures

There will be four general air sampling devices (Gast, Filter Queen or equivalent) continuously monitoring the air in the main process building. They will be situated at the geometric center of the four quadrants of the main building.

Concentrations of airborne radioactivity in the vicinity of the loading operations at the stockpile site and at the main plant will be measured once each eight hour shift. Gast, Filter Queen or equivalent air samplers shall be used.

Air samples shall be taken in the UO<sub>2</sub>(OH)<sub>2</sub> bagging room once each eight hour shift. Staplex (or equivalent) sampler will be used.

Proportional counting system will be used to analyze air samples.

Smear Surveys

Surveys to determine the concentration of radioactive materials on the surfaces of floors and equipment shall be performed daily. The smear-type survey will be employed. Smear papers will be counted on a proportional counting system.

Gaseous Effluent Discharge

There will not be any gaseous effluent except from the  $UO_2(OH)_2$  bagging operation. This effluent will be filtered and monitored continuously. The gases from the process tanks will be vented to an underground hold-up tank.

Liquid Effluent Discharge

All liquid process wastes will be collected and sold as fertilizer. Source material content must be less than 0.01% for transfer according to the applicant.

Protective Clothing and Equipment

All working personnel will be required to wear coveralls and safety shoes in the restricted area. P.C. clothing shall be maintained in separate lockers in change room.

Health and Safety Instructions

The applicants have submitted copies of written health and safety requirements and precautions. Personnel hygiene and good house-keeping are stressed.

Recommendations

The applicants have provided a fairly extensive health and safety program for the protection of the public health and to minimize danger to life or property. However, in view of the fact that the applicants do not have their facility or procedures established, I feel that the license should be issued with certain qualifications and the following conditions appended:

"The licensee shall not receive for processing, any material other than that presently stored at the stockpile site, Brown Road, Robertson, Missouri."

Further, the license should be so worded that the licensee must employ the St. Louis Testing Laboratory as their quality control laboratory and Mr. Denning as their Director of health and safety or the licensee must notify us of any changes in these services.

Files

The licensee should be exempted from Section 20.203(e) and 20.203(f) "Labeling" provided that all plant entrances are properly labeled.