

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 040-08794/93-001  
Docket No. 040-08794  
License No. SMB-1408  
Licensee: Molycorp, Inc.  
P.O. Box 54945  
Los Angeles, California 90054  
Facility Name: Molycorp, Inc.  
Inspection at: 350 East Sherman Street  
York, Pennsylvania 17403  
Inspection Conducted: November 16, 1993

Inspector:

Duncan White  
Duncan White, Health Physicist

1/4/94  
date

Approved by:

John D. Kinneman  
John D. Kinneman, Chief  
Site Decommissioning Section

1/5/94  
date

Inspection Summary: Routine announced inspection on November 16, 1993 (Inspection No. 040-08794/93-001).

Areas Inspected: Organization and scope of activities; site tour; surveys; personnel monitoring; instrumentation; transportation; and independent measurements.

Results: No violations were identified. Soil samples taken at one location in an unrestricted area had Th-232 concentrations higher than the maximum allowable concentration for unrestricted use.

## DETAILS

### 1. Persons Contacted

- \* Robert Brown - Plant Manager, Radiation Safety Officer
- \* John Benfield - Chief Chemist
- \* Alan Eisenhart - Production Superintendent
- Hamid Arabzadeh - Corporate Manager of Industrial Hygiene, Unocal  
(by telephone)

\* indicates those present at exit interview

### 2. Licensee Action on Previous Violations, Licensee Event Reports and NRC notices

(Closed) Violation, Inspection No. 040-08794/91-001

During an NRC inspection conducted November 18 and 19, 1991, a violation was identified regarding the failure of the licensee to evaluate air samples in that the instrument used to count the samples had not been calibrated for several years and the licensee was unaware of its efficiency and was, therefore, unable to convert counts per minute (cpm) to microcuries per cubic centimeters. In a letter dated January 24, 1992, the licensee described corrective actions which included revision of the facility's Radiation Health and Safety Plan and calibration of all instruments bi-annually. During the course of this inspection, the inspector noted that the licensee was still recording air sampling results in cpm, but that the instrument had been calibrated by the manufacturer at the required frequency and the licensee counted a National Institute of Science and Technology (NIST) traceable standard before each set of air samples were counted. The results have been forwarded to Unocal's Corporate Safety Office where the results were evaluated and compared against the applicable NRC requirements.

No safety concerns were identified.

### 3. Organization and Scope of Activities

Molycorp, Inc. has been operating the York facility since the mid-1960's for the production of rare earths materials, primarily cerium and yttrium. Operations ceased in March 1993 with the transfer of material to Molycorp's Mountain Pass, California facility. The raw materials used at this facility included bastnasite ore and concentrated cerium ore. Both of these ores contain low levels of naturally occurring thorium and uranium. The concentration of thorium in these ores were usually less than 0.25% by weight.

Until the late 1980's, the licensee stored contaminated residues from plant operations on-site in approximately 14,000 drums (approximately 3,000 m<sup>3</sup>). Most of the drums were stored in the northeast and northwest portions of the property. Previous inspections and a radiological survey by Oak Ridge Associated Universities' (ORAU) Radiological Site Assessment Program in July 1985 noted that many of the drums were badly deteriorated. In addition to these containerized residues, the licensee stored approximately 460 to 690 m<sup>3</sup> of contaminated residues in a pile located in the southeast corner of their property. The pile of contaminated residues in the southeast corner of the licensee's property has been remediated. Prior to the closure of operations earlier this year, the licensee processed the residual waste on the site by blending it with soda ash and shipping to their Mountain Pass facility where additional rare earths were recovered. This was carried out in accordance with the procedures in the NRC license for this site.

During August and September 1993, the licensee's radiological contractor, Radiation Surveillance Associates (RSA), conducted a radiological survey of the York facility and performed limited remedial action in support of preparing the licensee's site characterization and decommissioning plan. RSA has not completed their report at the time of the inspection, but has submitted a draft to the licensee for review. The licensee plans to prepare the decommissioning plan for NRC review in conjunction with the site characterization.

The facility is currently staffed by three individuals: the plant manager, chief chemist and production superintendent. The plant manager at York reports to the Manager of Specialty Chemicals at Molycorp's corporate office in Los Angeles, California. Molycorp is a wholly-owned subsidiary of Unocal. The York facility also receives technical support from Unocal's Corporate Safety Office in Los Angeles.

No safety concerns were identified.

#### 4. Site Tour

The inspector toured the facility with the plant manager to observe the current conditions of the facility, to take photographs, and make independent measurements (see Section 9). The site is situated on approximately 2.4 hectares and contains 8 structures along with additional above ground structures such as tanks, clarifiers and storage vessels. Three of the structures appear to contain a majority of the residual contamination: Tank Room, Rare Earth Chloride (REC) Building, and the Waste Treatment Building. Residual contamination was observed inside some process vessels. Additional buildings which were also used in the storage or processing of licensed materials included the Moly Building, Final Products Storage and the warehouse. The site also contains buildings used for the main office, laboratory, lunch room, and machine shop.

Nearly all containerized residual waste had been removed from the site at the time of this inspection. Packaged contaminated waste observed by the inspector included 10 "sling" bags stored near the Waste Treatment Building and three partially filled barrels of contaminated soil excavated by the RSA stored inside the warehouse.

In addition to the southeast corner of the property once used to store residue (see Section 3), a portion of the landfill area located east of the Waste Treatment Building had been excavated in order to remove residue contamination. Limited soil removal was also performed in the northwest corner of the site where drums were once stored. The northwest section of the site was also used by the licensee's radiological contractor to perform preliminary investigations on soil remediation techniques. According to the licensee, the depth of contaminated soil in this portion of the property appears to be limited to the top 5 centimeters (cm).

The old surge pond located between the Moly and Waste Treatment Buildings was remediated sometime in 1983 or 1984. The residues from this pond were removed and the area filled and paved over. A NRC trip report dated January 3, 1985 written in conjunction with an inspection of the facility conducted on December 4, 1984 stated with regard to the remediated surge pond: "No data appears to be available to judge the presence or absence of contamination remaining in the area". The licensee will need to confirm the lack of residual contamination at this location prior to license termination.

A catch basin is located at the north end of the site on the east side of the Olive Street gate. At the time of the inspection, the licensee was treating the near surface groundwater from three on-site wells for non-radiological contaminants (sodium, chlorides and sulfates).

No safety concerns were identified.

## 5. Surveys

The inspector reviewed the records of gamma exposure rate measurements from June 1991 to November 1993. The licensee performs a monthly gamma radiation survey of the landfill area in the southeast corner of the site. Prior to remediation, one meter exposure rate measurements ranged up to 95 microroentgens per hour (uR/hr). After remediation of the landfill area in the fall of 1992, the exposure rate measurements in this area ranged up to 71 uR/hr. Four times a year (in January, April, July and October), the licensee performs a more extensive gamma radiation survey of the entire facility, including those areas where licensed material was once processed and stored. Measurements are taken at contact and at one meter at 16 specific locations plus 21 specific tanks. Prior to closure of operations, the highest contact exposure rate measurement was 1600 uR/hr in the Tank Room. Since closure in March 1993, the highest exposure rate was 280 uR/hr in the Final Products Storage building.

The inspector reviewed the licensee's air sampling results for the period September 1991 through February 1993. The licensee's air sampling program includes a series of grab air samples over a week long period in the Tank Room. After collection of the air sample, the licensee counts the sample later that day and then 72 hours later to allow for the decay of radon and thoron progeny. The air samples were taken on filter paper 2.5 cm in diameter with an Eberline Model RAS-1 regulated air sampler. The air sampler was calibrated to a SKC Soap Flowmeter. The results are recorded in cpm and the results sent to Unocal's Corporate Safety Office for evaluation. No air measurements have been performed since operations ceased in March 1993.

No safety concerns were identified.

6. Personnel Monitoring

Personnel monitoring devices are assigned to individuals who work in the vicinity of licensed material. The monitoring devices are obtained from a NVLAP certified commercial vendor and exchanged quarterly. Dosimetry records were reviewed from June 1991 through September 1993. During the second half of 1992 and early 1993, the dosimeters were accidentally stored near laboratory stock of thorium nitrate, resulting in quarterly whole body doses of 40 to 60 millirem (mrem). Dosimeters are now stored in a low background area. The erroneous readings were brought to the attention of the vendor by the licensee and have been corrected. Quarterly readings were usually below the detection limit of the dosimeter. The highest quarterly reading for the period reviewed by the inspector was 20 mrem.

No safety concerns were identified.

7. Instrumentation

The inspector reviewed the instrumentation and calibration records for the period June 1991 to present. The licensee uses a Ludlum Model 19 for gamma exposure rate measurements. This instrument was last calibrated on June 28, 1993 by the manufacturer. Air samples were counted with an Eberline Model PRS-1 ratemeter/scaler (RASCAL) coupled to an Eberline Model SPA-1 alpha scintillation detector. This instrument was last calibrated on August 19, 1993 by the manufacturer. In addition to the manufacturer's calibration, the licensee counts a NIST traceable Thorium-230 standard (Eberline Model DNS-4) for each set of air samples. The licensee also has an energy compensated Geiger-Mueller detector (Eberline Model 270) that can be used with the RASCAL.

No safety concerns were identified.

8. Transportation

The inspector reviewed a portion of the shipping papers prepared by the licensee in 1992 to ship residual material to Molycorp's Mountain Pass facility. The licensee shipped approximately 340 "sling" bags in 20 tractor trailers by rail as exclusive use shipments during July 1992. As required by U.S. Department of Transportation requirements, the licensee took and documented radiation measurements of the surface of the vehicle and at a distance of 2 meters from the vehicle's surface. The licensee stated that the bills of lading for these shipments were completed, but these records were in storage at another location and not available at the time of the inspection.

The licensee described the latching and bracing of the bags of material to the inspector. Each tractor trailer could hold either 16 or 18 bags which were placed two across in the trailer and tied together in groups of 8 or 10 with rope and the handles on the bag. In addition, a wooden wall was constructed for each of these groups to prevent further shifting of the bags.

No safety concerns were identified.

9. Independent Measurements

a. Gamma Exposure Rate Measurements

The inspector took gamma exposure rate measurements at selected locations throughout the various buildings on-site and along the entire perimeter of the site at the fence. The measurements were made with a Ludlum Model 19 micro-R meter (NRC Serial No. 033513) calibrated to Cesium-137 on October 1, 1993. The background exposure rate for this instrument was 10 uR/hr. The background measurement was taken approximately 1 mile northeast of the site near the intersection of Eleventh Street and Whiteford Road in York, Pennsylvania. Appendix A summarizes the results of the gamma radiation survey.

The highest gamma exposure rate measured in a restricted area was 220 uR/hr. Assuming that one microroentgen equals one microrem for gamma radiation, the highest dose rate was 0.22 millirem per hour (mrem/hr). The highest exposure rate in an unrestricted area was 35 uR/hr or 0.035 mrem/hr. This dose rate meets the requirements of 10 CFR 20.105.

No safety concerns were identified.

b. Soil Sampling

Five soil samples were taken by the inspector. Two samples were taken adjacent to each other outside the perimeter fence along Olive Street at the location of the highest gamma exposure rate measurement. The third sample was taken in the northeast corner of the site where drums were once stored. The fourth sample was taken a few feet from the third sample in a test area excavated by RSA where the top 10 centimeters (cm) of soil were removed. The fifth sample was a background sample taken at the same location where the background gamma radiation measurement was taken.

Soil samples were counted for 3,000 seconds in 500-milliliter Marinelli beakers on a Princeton Gamma-Tech high purity germanium detector coupled to a Nuclear Data Accu-Spec multichannel analyzer at the Region I offices. The relative efficiency of this detector is 28%. The Uranium-238 (U-238) concentration reported is based on the concentration of the Bismuth-214 (Bi-214) decay progeny of U-238 (609 keV photon peak). The concentration of Thorium-232 (Th-232) reported is based on the concentration of the Actinium-228 (Ac-228) decay progeny of Th-232 (911 keV photon peak). Table 2 summarizes the concentrations of radionuclides identified in the soil samples. Results are reported in picocuries per gram (pCi/g) of soil. An uncertainty of one standard deviation is reported based on counting statistics alone.

The NRC's Branch Technical Position (BTP) "Disposal or Onsite Storage of Residual Thorium or Uranium from Past Operations" provides maximum concentrations permitted for a range of disposal and storage options. The most restrictive concentration for U-238 (in equilibrium with its progeny) is 5 pCi/g which indicates that unrestricted use of property would be permitted. A similar concentration for Th-232 (in equilibrium with its progeny) is 5 pCi/g.

Analyses of three of the four soil samples taken at the licensee's facility during the inspection indicate the presence of Th-232 above the BTP option for unrestricted use. The concentration of Th-232 measured in the samples collected near Olive Street, an unrestricted area, were approximately an order of magnitude higher than the BTP option for unrestricted use. The presence of elevated Th-232 concentrations outside the fence near Olive Street are probably the result of the past storage of contaminated residues or the migration of contaminated soil from the licensee's property.

A comparison of the Th-232 concentrations in the undisturbed portions of the northeast portion of the licensee's facility, a restricted area, to the adjacent test area appears to indicate that Th-232 concentrations in excess of the BTP option for unrestricted use may be limited to the top 10 cm of soil. The Th-232 concentration measured in the northeast corner in the undisturbed area was  $56.2 \pm 0.9$  pCi/g. The Th-232 concentration in the test area was less than 5 pCi/g above background.

The U-238 concentrations measured in all four samples taken at the facility were less than 5 pCi/g.

10. Exit Interview

The results of the inspection were discussed with the individuals indicated in Section 1 of this report.

APPENDIX A:  
GAMMA RADIATION MEASUREMENTS

	<u>Location</u>	<u>One Meter Exposure Rate (uR/hr)</u>
1.	Tank Room	10 to 120
2.	REC Building	10 to 220
3.	Waste Treatment Building	10 to 30
4.	Moly Building	8 to 10
5.	Warehouse	8 to 20
6.	Landfill - southeast section	50
7.	Landfill - east section	15 to 100
8.	Waste Residue Stored in Bags	100 to 150
9.	Tank and Clarifier near Waste Treatment	25 to 40
10.	Northeast Storage Area	20 to 45 Highest ground level: 70
11.	Perimeter Fence	
	Olive Street	12 to 35 Highest ground level: 75
	East Sherman Street	10 to 20
	Railroad Tracks	10
	Windsor Street	10 to 15
	Hudson Street	10 to 17

APPENDIX B:  
RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES

<u>Location</u>	<u>Depth (cm)</u>	<u>Radionuclide</u>	<u>Concentration (pCi/g)</u>
Olive Street #1	0 to 2	U-238	$2.3 \pm 0.2$
		Th-232	$44.9 \pm 0.8$
Olive Street #2	0 to 2	U-238	$2.3 \pm 0.2$
		Th-232	$45.6 \pm 0.8$
Northeast Storage Area undisturbed area	0 to 10	U-238	$0.7 \pm 0.06$
		Th-232	$56.2 \pm 0.9$
Northeast Storage Area RSA test area	10 to 12.5	U-238	$0.7 \pm 0.06$
		Th-232	$4.9 \pm 0.4$
Background	0 to 15	U-238	$0.7 \pm 0.06$
		Th-232	$1.2 \pm 0.18$