

ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

April 12, 2002

Mr. Thomas G. McLaughlin
U.S. Nuclear Regulatory Commission
Division of Waste Management
11555 Rockville Pike
Mail Stop: T-7F27
Rockville, MD 20852

**SUBJECT: CONFIRMATORY SURVEY PLAN FOR BUILDING SURVEYS AT THE
MOLYCORP, INC., WASHINGTON FACILITY, WASHINGTON,
PENNSYLVANIA (DOCKET NO. 040-08778, RFTA NO. 02-007a)**

Dear Mr. McLaughlin:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) has enclosed the subject confirmatory survey plan for the Molycorp, Washington Facility. It is ESSAP's understanding that approximately four confirmatory survey trips will be requested, the first of which (Trip 1) is tentatively scheduled for April 15 through April 17, 2002. Specific survey activities during this and subsequent trips will be dependent upon the NRC site representative's need for confirmatory radiological data—these needs may be determined on site and will include surface scans, direct measurements, exposure rate measurements, and smear/miscellaneous sampling. Other activities not included in this plan may be performed at the request of the NRC site representative. Attachment A provides the spending plan for the proposed confirmatory survey activities of the initial 12 buildings planned for Trip 1.

If you have any questions, please direct them to me at (865) 576-0065 or Tim Vitkus at (865) 576-5073.

Sincerely,



Wade C. Adams
Project Leader/Health Physicist
Environmental Survey and
Site Assessment Program

WCA:ar

Enclosure

cc: G. Purdy, NRC/NMSS/TWFN 7F27
 E. Knox-Davin, NRC/NMSS/TWFN 8A23
 R. Ragland, NRC/Region I
 W. Beck, ORISE/ESSAP
 E. Abelquist, ORISE/ESSAP

T. Vitkus, ORISE/ESSAP
L. Mashburn, ORISE/ESSAP
T. Brown, ORISE/ESSAP
D. Condra, ORISE/ESSAP
File/812

P. O. BOX 117, OAK RIDGE, TENNESSEE 37831-0117

Operated by Oak Ridge Associated Universities for the U.S. Department of Energy



**CONFIRMATORY SURVEY PLAN
FOR BUILDING SURVEYS AT THE
MOLYCORP, INC.,
WASHINGTON FACILITY
WASHINGTON, PENNSYLVANIA
(DOCKET NO. 040-08778, RFTA NO. 02-007a)**

INTRODUCTION AND SITE HISTORY

Since the mid 1920's, Molybdenum Corporation of America (Molycorp) has operated a plant in Washington, Pennsylvania for the primary production of molybdenum products—the plant also produced ferro alloys such as ferrocolumbium and tungsten. The raw material for this ferrocolumbium operation, columbite ore, contained licensable concentrations (1 to 1.5%) of natural thorium which was retained onsite in the form of a process slag.

In the late 1960s, new federal requirements necessitated Molycorp to obtain a Source Material License (SMB-1393, Docket No. 040-8778) from the Atomic Energy Commission (AEC) for possession and use of materials containing 0.05% or greater by weight, uranium, thorium, or a combination of both. Most of the material that was processed by the corporation for the ferrocolumbium contained thorium above the 0.05% limit. The slag resulting from this production was in a glass/ceramic form containing an average of 1.2% thorium. Operations that used thorium-containing ores were discontinued about 1970 (RSI 2001).

Currently, much of the slag produced during operations is located in two stabilized, soil-capped, piles. A larger one on the south side of the site and the second smaller pile on the northern portion of the site. Additionally, some of the thorium bearing slag was used as fill material over portions of the site.

Prepared by the Environmental Survey and Site Assessment Program, Radiological Safety, Assessments and Training, Oak Ridge Institute for Science and Education, under interagency agreement (NRC FIN No. J5403) between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy.

Molycorp renewed its Source Material License (SMB-1393) in 1992 and added an amendment incorporating a schedule for decommissioning the site. In November 1992, Molycorp submitted a Site Characterization Plan (SCP) to the NRC for approval—the scope of the survey plan was limited to buildings and structures on the Molycorp site and did not include the soil.

There are 21 buildings on the site for which decommissioning activities are being performed. All have been characterized for radiological contamination. Fifteen buildings have been characterized as unaffected, of which six have had final status surveys performed and nine are currently being surveyed and/or final status reports are being prepared. Six buildings have been identified as affected and are currently being surveyed and/or final status reports are being prepared.

As part of the decommissioning activities, process equipment and supporting fixtures were removed, cleaned, and released or disposed of as low-level radioactive waste. Potentially contaminated structural surfaces have been stripped of coatings by grit blasting or use of chemical agents. Contaminated surfaces identified by the characterization survey have been cleaned or removed. The remediation activities have been performed under the Decommissioning Plan for the Washington, PA Facility which implemented final status survey guidance from draft NUREG/CR-5849 (RSI 1999 and NRC 1992a).

Molycorp and their previous contractor, Radiation Sciences, Incorporated (RSI), have submitted the final status survey results for Buildings 39 and 42. Although there were no radiological materials present within these two buildings, soil located around and adjacent to the buildings has been determined to be radioactively contaminated. The top surfaces of the floors are expected to be clean and are classified as unaffected—however, the undersides of the concrete floors that are in contact with the soil will have to be surveyed prior to release (RSI 2001). The current contractor, MACTEC, has submitted the final status survey results for Buildings 13, 14, 28, and 34.

The NRC's Division of Waste Management has requested that the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) perform confirmatory survey activities on buildings at the Molycorp, Inc. Washington Facility, in Washington, Pennsylvania for which the licensee has prepared final status survey reports.

SITE DESCRIPTION

The Molycorp, Inc., Washington Site is located in southwestern Pennsylvania on the outskirts of Washington County approximately 56 kilometers [km (35 miles)] southwest of Pittsburgh. The site consists of approximately 8 hectares (20 acres) which represents the fenced portion of the 24 ha parcel of land owned by Molycorp that lies entirely within Canton Township at 300 Caldwell Avenue, Washington, Pennsylvania. In addition to the land area, there are some 21 buildings which remain on the site. The site is bounded by two dedicated streets in Canton Township—Caldwell Avenue and Weirich Avenue. The site is also transversed by Chartiers Creek that flows south to north through the property. The property is served by the CSX Railroad via two lines that were formerly owned by Tylerdale Connecting Railroad Company and the Baltimore and Ohio Railroad (MACTEC 2002a).

Building 39, a Maintenance and Storage Warehouse, is a 31 meter (m) long by 12 m wide with an approximately 6 m high wood frame and wood truss structure with exterior corrugated metal walls and roof panels, and a concrete slab floor. The building runs from east to west and has a large sliding door at either end. Personnel doors are located on the east end of the north wall and the north end of the west wall.

Building 42 (north end), a Storage Warehouse, is a 37 m long by 15 m wide with a 9 m high prefabricated metal structure with a steel frame, corrugated exterior metal walls and roof panels and a reinforced concrete floor.

Descriptions for the remaining buildings have not been provided within the MACTEC survey data—however, the building status data indicate that the remaining 19 buildings have concrete floors, steel and/or brick walls, and some corrugated steel walls and roofs.

OBJECTIVE

The objectives of the confirmatory survey are to provide independent contractor field data reviews and radiological data for use by the NRC in evaluating the adequacy and accuracy of the licensee's procedures and final status survey results, relative to established guidelines.

RESPONSIBILITY

Work described in this survey plan will be performed under the direction of William L. (Jack) Beck, Program Director; Timothy J. Vitkus, Survey Projects Manager; and Wade C. Adams, Project Leader of ESSAP. The cognizant site supervisor has the authority to make appropriate changes to the survey procedures as deemed necessary. After consultation with the NRC site representative, the scope of the survey may be altered based on findings as the survey progresses. Deviations to the survey plan or procedures will be documented in the site logbook.

DOCUMENT/DATA REVIEW

ESSAP has reviewed the available RSI and MACTEC historical site information and previous survey documentation to determine the adequacy and appropriateness of the radiological instrumentation and procedures (RSI 1999, 2001 and MACTEC 2002a and b). ESSAP has reviewed survey data for Buildings 13, 14, 28, 34, 39, and 42 and will review the survey data for the other buildings when the data become available.

SURVEY PROCEDURES

ESSAP personnel will visit the Molycorp, Inc. Washington Facility and perform visual inspections and independent measurements and sampling of portions of the site that MACTEC has deemed ready for release. The NRC site representative may also request additional side-by-side measurements and samples with MACTEC personnel. Survey activities will be conducted in accordance with the ORISE/ESSAP Survey Procedures and Quality Assurance Manuals (ORISE 2000 and 2001a). Specific survey procedures applicable to this survey are listed on pages 10 and 11 of this survey plan.

The following radiological survey procedures will be used by ESSAP to conduct confirmatory survey activities on various building surfaces that have been evaluated by RSI/MACTEC and are to be released for unrestricted use. Specific buildings will be surveyed based on RSI/MACTEC's classifications of affected and unaffected. These classifications were based on the potential and extent of the area of origin's radiological hazards based on historical process knowledge and on previous characterization survey findings. ESSAP will perform confirmatory surveys within each building with a minimum coverage of 25% within affected buildings and 5% within unaffected buildings. The percentage of verification surveys conducted for each classification may increase or decrease based on findings as the confirmatory survey activities progress and/or at the discretion of the NRC site representative.

REFERENCE GRID

Measurement and sampling locations will be referenced to the grid system that RSI/MACTEC has established on the floors and lower walls within each building. Measurement and sampling locations on ungridded surfaces will be referenced to the floor or wall grid, or to prominent building features and will be documented on figures prepared by ESSAP.

SURFACE SCANS

Alpha plus beta and gamma radiation surface scan coverage will be based on the RSI/MACTEC building classification. Scan coverage for buildings classified as affected will be as follows: up to 100% gamma scans of the floors, up to 25% alpha plus beta scans of the floors, up to 10% alpha plus beta scans of the lower walls and up to 1% alpha plus beta scans of the upper walls and ceilings. Scan coverage for buildings classified as unaffected will be as follows: up to 100% gamma scans of the floors, up to 10% alpha plus beta scans of the floors, and up to 5% alpha plus beta scans of the lower walls and judgmental locations on upper walls or ceilings. The scans will start out at the higher percentage coverage of judgmental areas, and if those surveys do not detect residual activity, the scan coverage will be reduced accordingly within other areas of the surveyed building. Particular attention will be given to cracks or joints where material may have accumulated. Scans of the exterior walls and roofs also will be performed at judgmental locations. Scans will be performed

using gas proportional, GM, and NaI scintillation detectors coupled to ratemeters or ratemeter-scalers with audible indicators. Any location of elevated direct radiation detected by surface scans will be marked for further investigation—to include additional surface scans, as deemed necessary to delineate contamination boundaries. The percentage of surface scan coverage may increase or decrease based on findings as the survey activities progress and/or at the discretion of the NRC site representative.

SURFACE ACTIVITY MEASUREMENTS

Construction material specific backgrounds, performed in areas of similar construction but without a history of radioactive material use, will be used to correct gross surface activity measurements. Ambient background measurements will also be performed within each surveyed building. Based on surface scan results, direct measurements for beta surface activity will be performed at any residual activity locations identified by scans, up to a maximum of 30 locations within each building. If no elevated locations are detected by surface scans, a minimum of ten direct measurements will be performed within the surveyed building at randomly selected locations and/or RSI/MACTEC measurement locations for direct data comparison. Direct measurements for alpha surface activity may be performed at up to 10% of the beta surface activity measurement locations depending upon surface scan results. Additional direct measurements will be performed as deemed necessary to delineate contamination boundaries and for the determination of 1 m² average grid block values. The majority of the direct measurements will be performed using gas proportional detectors—GM and ZnS scintillation detectors will be used in areas that are inaccessible to the gas proportional detectors. All detectors will be coupled to ratemeter-scalers with audible indicators. Smear samples, for determining removable gross alpha and gross beta activity levels, will be collected from each direct measurement location.

Areas of residual activity, in excess of the site criteria, will be brought to the immediate attention of the MACTEC and NRC site representatives. If additional remediation is performed during the ESSAP survey, follow-up measurements will be performed.

EXPOSURE RATE MEASUREMENTS

Background exposure rates will be determined for the building interiors at a minimum of five locations of similar construction but without a history of radioactive materials use. Facility exposure rates will be measured within each affected and unaffected building that ESSAP surveys. Exposure rates will be measured at one meter above the surface using a microrem meter.

MISCELLANEOUS MEASUREMENTS AND SAMPLING

At the discretion of the NRC site representative, samples of miscellaneous material such as construction material, paint, sediment, drain, and dust residues may be collected from random locations, areas that are not accessible for direct survey, or from locations of elevated direct radiation detected by surface scans.

IN-PROCESS INSPECTION

ESSAP will review the licensee's documentation, data quality assessment, statistical analyses, and findings in support of its final status surveys. Furthermore, comments will be developed from the field operation and data package reviews addressing any deficiencies that may exist in the licensee's decommissioning program.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data will be returned to ORISE's ESSAP laboratory in Oak Ridge, Tennessee for analysis and interpretation. Sample analyses will be performed in accordance with the ORISE/ESSAP Laboratory Procedures Manual (ORISE 2001b). Miscellaneous/residue samples will be analyzed by solid state gamma spectroscopy; spectra will be reviewed for Th-232, Th-228 and any other identifiable photopeaks, and the results reported in units of picocuries per gram (pCi/g). Smears will be analyzed for gross alpha and gross beta activity using a low-background gas proportional counter. Direct measurement data and smear data will be converted to units of disintegrations per minute per one hundred square centimeters (dpm/100 cm²). Exposure rates will

be reported in microroentgens per hour ($\mu\text{R}/\text{h}$). The data generated will be compared with the licensee's documentation and NRC guidelines established for release for unrestricted use. Results will be presented in a draft report and provided to the NRC for review and comment. Data and samples collected as part of this survey will be archived by ESSAP.

SITE RELEASE CRITERIA

SITE GUIDELINE CRITERIA

The primary contaminants at this site are thorium and uranium. The applicable NRC surface activity guideline levels (NRC 1987):

Natural Thorium

1,000 dpm/100 cm², averaged over a 1 m² area

3,000 dpm/100 cm², total, maximum in a 100 cm² area

200 dpm/100 cm², removable

Natural Uranium

5,000 α dpm/100 cm², averaged over a 1 m² area

15,000 α dpm/100 cm², total, maximum in a 100 cm² area

1,000 α dpm/100 cm², removable

Thorium is the predominant contaminant and has the more restrictive guideline. Therefore, RSI/MACTEC elected to use the thorium guidelines for the site. Natural thorium emits both alpha and beta radiations, therefore, either alpha or beta activity may be measured for determining the residual activity of the thorium contaminant. As interpreted by the NRC, the average 1,000 dpm/100 cm² and maximum 3,000 dpm/100 cm² should apply independently to both alpha and beta measurements for surface contamination involving natural thorium (NRC 1992b). ESSAP's experience has shown that beta measurements typically provide a more accurate evaluation of thorium contamination on structure surfaces, due to problems inherent in measuring alpha contamination on rough, porous, and/or dirty surfaces. For the thorium series in secular equilibrium,

the activity level providing 1,000 alpha dpm/100 cm² would result in about 670 beta dpm/100 cm². ESSAP will perform beta-only activity measurements at each measurement location and alpha activity measurements at 10 percent of the direct measurement locations. Therefore, a beta activity measurement that is greater than 670 dpm/100 cm² would exceed the alpha activity guideline for thorium.

The NRC guideline for exposure rates at one meter above building surfaces is 5 μ R/h above background (NRC 1991).

TENTATIVE SCHEDULE

Field Measurements	April 15 to April 17, 2002
Sample Analyses	April 30, 2002
Electronic Data Tables	May 3, 2002
Draft Letter Report	May 21, 2002

The final letter report will be issued within 10 days of the receipt of the NRC comments on the draft letter report.

-

LIST OF CURRENT PROCEDURES

Applicable Sections of the ORISE/ESSAP Survey Procedures Manual (September 28, 2000) include:

Section 4.0 Quality Insurance and Quality Control

- 4.1 General Information
- 4.2 Training and Certification
- 4.3 Records and Reports
- 4.4 Equipment and Instrumentation
- 4.5 Sample Handling

Section 5.0 Instrument Calibration and Operational Check-Out

- 5.1 General Information
- 5.2 Electronic Calibration of Ratemeters
- 5.3 Gamma Scintillation Detector Check-Out and Cross-Calibration
- 5.4 Alpha Scintillation Detector Calibration and Check-Out
- 5.5 GM Detector Calibration and Check-Out
- 5.6 Proportional Detector Calibration and Check-Out
- 5.9 The Bicron Micro-Rem Meter Check-Out
- 5.11 Floor Monitor Check-Out
- 5.14 Field Measuring Tape Calibration
- 5.16 Job Hazard Analysis - Instrumentation Calibration and Setup

Section 6.0 Site Preparation

- 6.2 Reference Grid System

Section 7.0 Scanning and Measurement Techniques

- 7.1 Surface Scanning
- 7.3 Alpha Radiation Measurements
- 7.4 Beta Radiation Measurements
- 7.5 Gamma Radiation (Exposure Rate) Measurement
- 7.6 Job Hazard Analysis - Surface Scanning and Surface Activity Measurements

- Section 8.0 Sampling Procedures
 - 8.7 Determination of Removable Activity
 - 8.8 Miscellaneous Sampling
 - 8.15 Sample Identification and Labeling
 - 8.16 Sample Chain-of-Custody
- Section 9.0 Integrated Survey Procedures
 - 9.1 Background Measurements and Sampling
 - 9.2 General Survey Approaches and Strategies
- Section 10.0 Safety and Contamination Control

Applicable procedures from the ORISE/ESSAP Quality Assurance Manual (June 1, 2001) include:

- Section 1 ESSAP Quality Assurance Responsibilities
- Section 3 Training and Certification
- Section 4 Instrument Quality Control
- Section 7 Sample Chain-of-Custody
- Section 8 Data Quality Control
- Section 11 Critical Record Handling and Storage

2

REFERENCES

MACTEC, Inc. (MACTEC), Survey Plan for Determining the Final Status of Buildings at the Molycorp Site, Washington, PA. Grand Junction, Colorado; Revision 0, February 1, 2002a.

MACTEC, Inc. Final Status Survey Report for Buildings 13, 14, 28, and 34 at the Molycorp Site, Washington, PA. Grand Junction, Colorado; Revision 0, March 14, 2002b.

Radiological Services, Inc. (RSI). Molycorp, Inc., Washington, PA Facility Decommissioning Plan, Part 1 Revision. New London, Connecticut; June 30, 1999.

Radiological Services, Inc. Radiological Final Status Survey Report Building 39 and 42 (North End), Molycorp, Inc. Washington, PA. New London, Connecticut; December 2001.

Oak Ridge Institute for Science and Education (ORISE). Survey Procedures Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; September 28, 2000.

Oak Ridge Institute for Science and Education. Quality Assurance Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; June 1, 2001a.

Oak Ridge Institute for Science and Education. Laboratory Procedures Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; May 1, 2001b.

U.S. Nuclear Regulatory Commission (NRC). Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproducts, Source, or Special Nuclear Material. Washington, DC; August 1987.

U. S. Nuclear Regulatory Commission. Policy and Guideline Directive FC91-2, Standard Review Plan: Evaluating Decommissioning Plans for Licensees Under 10 CFR Parts 30, 40, and 70. Washington, DC; August 1991.

U. S. Nuclear Regulatory Commission. Draft—Manual for Conducting Radiological Surveys in Support of License Termination. NUREG/CR-5849; Washington, DC; June 1992a.

U.S. Nuclear Regulatory Commission. Memorandum from J. Hickey (U.S. Nuclear Regulatory Commission, HQ) to D. Collins (U.S. Nuclear Regulatory Commission, Region II), RE: “Interpretation of Thorium Surface Contamination Limits”, February 20, 1992b.