


O R I S E
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

September 18, 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: PROPOSED CONFIRMATORY SURVEY PLAN FOR BUILDING FOUNDATION SURVEYS AT THE MOLYCORP, INC., WASHINGTON FACILITY, WASHINGTON, PENNSYLVANIA (DOCKET NO. 040-08778, RFTA NO. 02-014)

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 proposed confirmatory survey plan for your review and comments. A confirmatory survey trip has been requested and is tentatively scheduled for September 23 through 27, 2002. Specific survey activities during this trip 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, smear/miscellaneous sampling, and soil 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.

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

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**PROPOSED
CONFIRMATORY SURVEY PLAN
FOR BUILDING FOUNDATION SURVEYS AT THE
MOLYCORP, INC.,
WASHINGTON FACILITY
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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—however, some of the thorium bearing slag was used as fill material over portions of the site (RSI 2001).

In 1972, some of the thorium-bearing slag and contaminated soil was disposed of at the West Valley, New York, burial site. The disposal was terminated when New York officials decided that the volume of waste was too large and the contamination level insignificant to use up valuable burial area. Molycorp then commenced to segregate and stabilize the remaining thoriated material in a capped pile containing about 27,700 cubic yards of slag on the south property. A 1975 Applied Health Physics (AHP) report indicated

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.

the average concentration of Th-232 in the slag pile was 1,250 pCi/g, with exposure rates within the 0.2 mR/h U.S. Nuclear Regulatory Commission (NRC) maximum level allowed at the time. This pile was eventually removed and disposed of (MACTEC 2002a).

In June 1981, an AEC compliance inspection revealed that thorium-bearing slag had been inadvertently buried onsite in violation of the terms and conditions of the Molycorp license and AEC regulations. A Notice of Violation, issued by the AEC, requested Molycorp to take remedial action to excavate these materials and dispose of them in accordance with AEC regulations and guidance documents.

In 1985, Oak Ridge Associated Universities (ORAU), an NRC contractor now operating through ORAU as the Oak Ridge Institute for Science and Education (ORISE), conducted a radiological survey of the site. The survey identified elevated (twice background or greater) levels of thorium in the dikes that separated the surface impoundments, and indicated the potential of subsurface thoriated slags in the western portion of the site (ORAU 1985).

In 1990, RSA, Inc. conducted a subsurface survey to characterize the thorium contamination across the western portion of the site (i.e., the impoundment area) and the areas immediately to the north, west, and northwest. RSA also conducted radiation exposure rate surveys within the study area. The findings indicated that subsurface concentrations of thorium were above those in surface soils in almost every drilled hole—however, the pattern indicated that underground radiation levels decreased to background at a depth of about ten feet. While a majority of the sampled holes exhibited concentrations of greater than 0.01 % thorium, in only a few holes did the thorium content exceed an average of 0.05% at some point below the surface of the ground (MACTEC 2002a).

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 were 21 buildings on the site—all have had final status surveys (FSS) performed and all but two buildings have been dismantled. The current phase of the decommissioning involves the dismantlement of the building foundations. Soil located around and adjacent to these building foundations has been determined to be radioactively contaminated. Most of the top surfaces of these building foundations 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). Several building foundation top surfaces are classified as affected and include the Buildings 21 and 35 foundations. All 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).

The NRC's Division of Waste Management has requested that Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) perform confirmatory survey activities on building foundations at the Molycorp, Inc. Washington Facility, in Washington, Pennsylvania for which the licensee has prepared FSS 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 [ha (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 were some 21 buildings on the site of which 19 have been dismantled. 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).

The scope of the building foundation confirmatory surveys include the foundations of Buildings 13, 14, 19, 21, 26, 35, 38, and 42. The building foundations consist of reinforced poured concrete. At

the discretion of the NRC site representative, soil samples from underneath the pad may be collected to determine if there is elevated thorium concentrations within the surface (0 to 15 cm) soils in areas exhibiting elevated gamma activity.

OBJECTIVES

The objectives of the confirmatory survey are to provide independent contractor field data reviews and measurement and sampling data for use by the NRC in confirming the radiological status of the building foundations and determining whether or not these foundations satisfy the guideline requirements for release for unrestricted use. This information is then used to determine the adequacy and accuracy of the licensee's procedures and FSS documentation and the conclusions reached as to the radiological status of each building foundation relative to established guidelines.

RESPONSIBILITY

Work described in this survey plan will be performed under the direction of Eric W. Abelquist, 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's historical site information and previous survey documentation to determine the adequacy and appropriateness of the radiological instrumentation and procedures (RSI 1999 and 2001 and MACTEC 2002a and b). ESSAP has reviewed survey data for the top surfaces of the foundations for Buildings 13, 14, 19, 21, 35, and 42 and will review the survey data for the other building foundations when the data become available (RSI 2001 and MACTEC 2002b, c and d).

SURVEY PROCEDURES

ESSAP personnel will visit the Molycorp, Inc. Washington Facility and perform visual inspections and independent measurements and sampling of building foundations 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 2002a). Specific survey procedures applicable to this survey are listed on pages 9 through 11 of this survey plan.

The following radiological survey procedures will be used by ESSAP to conduct confirmatory survey activities on various building foundation surfaces that have been evaluated by RSI/MACTEC and are to be released for unrestricted use. Specific building foundations 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 on each building foundation with a minimum coverage of 25% on affected building foundations and 10% on unaffected building foundations. The percentage of confirmatory survey activities conducted for each classification may increase or decrease based on findings as the confirmatory survey progresses and/or at the discretion of the NRC site representative.

REFERENCE GRID

Measurement and sampling locations will be referenced on floor plan/building footprint maps previously prepared by ESSAP personnel during previous survey activities or MACTEC personnel during FSS. Measurement and sampling locations on other surfaces will be referenced on maps/figures prepared by ESSAP.

SURFACE SCANS

Alpha plus beta and gamma radiation surface scan coverage will be based on the RSIM/MACTEC building classification. Scan coverage for building foundations classified as affected will be 100% for gamma scans and 25% for alpha plus beta scans. Scan coverage for building foundations classified as unaffected will be 100% for gamma scans and 10% for alpha plus beta scans. Particular attention will be given to the undersides and edges of the dismantled foundation pieces and at other judgmental locations where surfaces may have had contact with contaminated soils. 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 building footprint. Based on the building's classification, direct measurements for beta surface activity will be performed at a minimum of 30 locations in affected building footprints and 15 locations in unaffected building footprints. 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. Direct measurements of surface activity will also be performed at locations of elevated direct radiation identified by surface scans—to include additional direct measurements as deemed necessary to delineate contamination boundaries and for the determination of 1 m² averages. 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, may be collected from direct measurement locations that exhibit elevated beta activity levels.

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

A minimum of six locations for area background exposure rate measurements will be selected within a 0.5 to 10 km radius of the site. Site exposure rates will be measured at each soil sample location and at locations of elevated direct gamma radiation identified by surface scans within surveyed building footprints. Exposure rates will be measured at one meter above the surface using a microrem meter.

SOIL SAMPLING

Background soil samples will be collected from each location of external background exposure rate measurement. Surface (0 to 15 cm) soil samples will be collected at locations of elevated direct radiation identified by surface scans and/or judgmental locations based on licensee FSS data. Subsurface samples may also be collected if elevated radiation is suspected to be present below the initial 15 cm of exposed soils.

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 2002b). Soil 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 (μ R/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

The primary contaminants at this site are thorium and uranium. The applicable NRC guidelines for natural thorium surface activity levels are (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

Since thorium is the predominant contaminant and has the more restrictive guideline, 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.

A site-specific soil guideline for thorium has not been provided. ESSAP will compare on-site soil samples with the off-site background soil samples to determine if thorium contamination exists on the soil surface underneath the building foundations.

The NRC guideline for exposure rates at one meter above soil/exterior surfaces is 10 µR/h above background (NRC 1991).

TENTATIVE SCHEDULE

Field Measurements	September 23 to 26, 2002
Sample Analyses	October 2002
Draft Letter Report	October 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 (ORISE 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
 - 5.16 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
 - 8.1 Surface Soil Sampling
 - 8.2 Subsurface Soil Sampling
 - 8.7 Determination of Removable Activity
 - 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 (ORISE 2002a) include:

- Section 1 ESSAP Quality Assurance Responsibilities
- Section 3 Training and Certification
- Section 4 Instrument Quality Control
- Section 5 Sample Chain-of-Custody
- Section 6 Analytical Quality Control
- Section 7 Data Quality Control
- Section 11 Critical Record Handling and Storage

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.

MACTEC, Inc. Final Status Survey Report for Buildings 2, 2W, 19, 21, 22, 23, 31, and 37 at the Molycorp Site, Washington, PA. Grand Junction, Colorado; Revision 0, May 16, 2002c.

MACTEC, Inc. Final Status Survey Report for Buildings 25, 29, 32, 33, 35, 36 and the Soil Sample Room (Building 19) at the Molycorp Site, Washington, PA. Grand Junction, Colorado; Revision 0, April 15, 2002d.

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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; April 30, 2002a.

Oak Ridge Institute for Science and Education. Laboratory Procedures Manual for the Environmental Survey and Site Assessment Program. Oak Ridge, Tennessee; January 25, 2002b.

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

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U.S. Nuclear Regulatory Commission. 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.

REFERENCES (continued)

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.