


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

July 3, 2002

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

**SUBJECT: LETTER REPORT—CONFIRMATORY SURVEY OF
BUILDING 29, 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) performed confirmatory survey activities at the subject facility on two separate occasions. The first survey was performed on April 17, 2002 and the follow-up survey was conducted during the period May 20 through 22, 2002. Enclosed is the letter report describing the survey procedures and results.

Please contact me at (865) 576-0065 or Timothy J. Vitkus at (865) 576-5073 should you have any questions or require additional information.

Sincerely,



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

WCA:ar

Enclosure

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**LETTER REPORT
CONFIRMATORY SURVEY OF BUILDING 29
MOLYCORP, INC., WASHINGTON FACILITY
WASHINGTON, PENNSYLVANIA
(DOCKET NO. 040-08778, RFTA NO. 02-007a)**

INTRODUCTION AND SITE HISTORY

Since the mid 1920s, Molybdenum Corporation of America (Molycorp) 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 natural thorium.

In the late 1960s, new federal requirements necessitated that Molycorp 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 1 to 1.5% thorium. 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).

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 to the U.S. Nuclear Regulatory Commission (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.

Currently, there are 21 buildings on the site for which decommissioning activities are being performed. All have been characterized for radiological contamination. 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 were stripped of coatings by grit blasting or use of chemical agents. Contaminated surfaces identified by the characterization survey were cleaned or removed. These remediation activities were

performed under the Decommissioning Plan for the Washington, PA facility which implemented final status survey (FSS) guidance from draft NUREG/CR-5849 (RSI 1999 and NRC 1992a). Soil areas located underneath and around the buildings have not been addressed and are radioactively contaminated.

Through historical site assessments and characterization surveys, the licensee or their contractor classified each site building as either radiologically affected or unaffected. Although there was no history of radiological materials present within this building, localized elevated levels of activity were detected in multiple areas on the concrete floor and on several structural support components (purlins) of the building during the FSS. Molycorp's decontamination and decommissioning (D&D) contractor, MACTEC, determined that the elevated activity was fixed into the concrete and required removal of that portion of the concrete. The radioactivity identified on the purlins was also determined to be fixed contamination. Therefore, the building's classification was changed from unaffected to affected and MACTEC personnel performed affected FSS activities within the building (MACTEC 2002a).

MACTEC personnel performed remediation activities on the concrete floor and the FSS data indicated that the remediation efforts were successful in removing the contamination (MACTEC 2002a). The structural integrity of the building was then evaluated and it was determined that the purlins should remain in place until building demolition—areas identified as being contaminated were marked with a bright fluorescent paint and recorded in a logbook.

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 for which the licensee and their current decontamination and decommissioning (D&D) contractor, MACTEC, have prepared final status survey reports.

ESSAP's initial confirmatory survey (ICS) activities indicated that residual contamination above the maximum guidelines remained within the building on unmarked/unidentified building surfaces

(ORISE 2002a). Based on ESSAP's ICS, MACTEC performed additional FSS procedures and presented the new data to ESSAP and the NRC.

SITE DESCRIPTION

The Molycorp, Inc., Washington site is located in southwestern Pennsylvania on the outskirts of Washington County approximately 56 kilometers (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 (Figure 1). In addition to the land area, there were approximately 21 buildings which remained on the site; however, dismantlement of some of the buildings has commenced. The site is bounded by two streets in Canton Township—Caldwell Avenue and Green Street. 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 2002b).

Building 29 is 24 meters (m) long by 16 m wide with a 5 m high prefabricated metal structure with a steel frame, corrugated exterior metal walls and roof panels, and a reinforced concrete floor. The building runs from north to south and has large roll top doors on the north, east and west walls and personnel doors on the east, south, and west walls (Figure 2).

DOCUMENT/DATA REVIEW

ESSAP reviewed the D&D contractor's survey documentation to determine the adequacy and appropriateness of the FSS radiological instrumentation and procedures (MACTEC 2002b). The licensee's initial FSS results for Building 29 were provided for review prior to ESSAP's ICS activities (MACTEC 2002a). After the ICS activities identified residual activity in excess of guideline values, the licensee performed additional FSS activities. The additional FSS results were not provided for review until ESSAP arrived on site for the final confirmatory survey (FCS) (MACTEC 2002c).

SURVEY PROCEDURES

ESSAP performed ICS activities for the shell and floor of Building 29 on April 17, 2002 and FCS activities during the period of May 20 through 22, 2002. Survey activities consisted of alpha plus beta surface scans, alpha and beta surface activity measurements, and removable activity measurements during both surveys, and also included residue sampling and visual inspections during the FCS. A letter report, documenting the findings of the April 2002 ICS, was submitted to the NRC (ORISE 2002a). These activities were conducted in accordance with a site-specific survey plan, submitted to and approved by the NRC and the ORISE/ESSAP Survey Procedures and Quality Assurance Manuals (ORISE 2002b, 2000, and 2001/2002c).

REFERENCE SYSTEM

The reference grid system, previously established by MACTEC, was used by ESSAP for referencing measurement and sample locations.

SURFACE SCANS

ESSAP confirmatory survey coverage was determined by MACTEC's radiological classification of the building—Building 29 was classified as affected. ESSAP initially conducted systematic and judgmental alpha plus beta activity scans during the ICS on the floors and the lower walls. Gamma scans were also performed on accessible floor surfaces during the ICS. Survey coverage and scope was adjusted depending on findings as the survey progressed. In situations where significant residual contamination was identified, the scan coverage was limited and emphasis was placed on the documentation of the identified areas. Surface scans during the FCS were judgmental and focused on previously identified and/or similar areas or structures (excluding the floor), and on the upper surfaces and exterior walls. Alpha plus beta surface scans were performed using gas proportional detectors coupled to ratemeter-scalers with audible indicators. Gamma surface scans were performed using NaI scintillation detectors coupled to ratemeters with audible indicators.

SURFACE ACTIVITY MEASUREMENTS

Alpha and beta surface activity measurements were performed at three ICS locations on the floor and two locations on the lower walls. ESSAP performed beta activity measurements at each measurement location and alpha activity measurements at four of the five direct measurement locations. Additional measurements were made at 20 locations on the ceiling and on the lower, upper and exterior walls during the FCS. Direct measurements were performed using gas proportional detectors coupled to ratemeter-scalers. Smear samples, for determining removable activity levels, were collected from each of the direct measurement locations. Measurement locations are shown on Figure 2.

RESIDUE SAMPLING

A residue sample was collected from a horizontal overhead surface; the sample location is shown on Figure 2.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and survey data were returned to the ORISE/ESSAP laboratory in Oak Ridge, Tennessee for analysis and interpretation. Sample analyses were performed in accordance with the ORISE/ESSAP Laboratory Procedures Manual (ORISE 2002d). Smears were analyzed for gross alpha and gross beta activity using a low-background gas proportional counter. Smear sample results and direct measurement data were reported in units of disintegrations per minute per 100 square centimeters (dpm/100 cm²). Residue samples were analyzed by solid-state gamma spectroscopy and results reported in units of picocuries per gram (pCi/g).

The survey results were interpreted and compared with the site's decommissioning criteria. The applicable NRC surface activity guideline 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

Thorium is the predominant contaminant and has the more restrictive guideline—therefore, the D&D contractor 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 beta activity level corresponding to 1,000 alpha dpm/100 cm² is 670 beta dpm/100 cm². Therefore, a beta activity measurement that is greater than 670 dpm/100 cm² or 2000 dpm/100 cm² would exceed the alpha average or maximum activity guideline for thorium, respectively.

FINDINGS AND RESULTS

DOCUMENT REVIEW

ESSAP reviewed the licensee's final status survey documentation for Building 29. The review and subsequent ESSAP surveys indicated that there were basic issues concerning MACTEC's radiological survey procedures. These concerns included:

- instrument calibration
- surface scanning procedures/techniques
- the need for better internal quality assurance document reviews

SURFACE SCANS, SURFACE ACTIVITY LEVELS AND RESIDUE CONCENTRATION

During the ICS, alpha plus beta surface scans of the floor and lower walls identified numerous areas of elevated alpha plus beta radiation on the floor and several locations on the lower walls. Gamma surface scans of the floor also detected several areas of elevated radiation. These locations were marked for further investigation. Total and removable surface activity levels for Building 29 during the ICS are presented in Table 1. Alpha surface activity levels ranged from 710 to 2,300 dpm/100 cm² and beta surface activity levels ranged from 3,100 to 21,000 dpm/100 cm². Removable activity levels for all measurement locations ranged from 0 to 3 dpm/100 cm² for alpha and -4 to 3 dpm/100 cm² for beta.

MACTEC and the NRC site representative were notified of these initial results. ESSAP recommended that MACTEC conduct thorough surveys of all remaining surfaces to include the overhead structures and MACTEC subsequently performed additional surveys and/or remediation of identified areas and marked those contaminated structural components that would not be remediated but rather, would be segregated for disposition as low-level waste. At the completion of the above activities, ESSAP remobilized to the site and performed the FCS. Visual inspections determined that MACTEC had marked for disposition structural components identified as contaminated during the ICS and their own subsequent surveys. The FCS surface scans concentrated on unmarked lower wall and upper surfaces (purlins and I-beams) within the building. The horizontal upper surfaces of I-beams and roof supports were again found to have surface activity levels exceeding the average and/or maximum guideline at locations 21C and 22C, which had beta activity levels of 2,100 and 4,400 dpm/100 cm², respectively (Figure 2). The FCS total and removable surface activity levels are also presented in Table 1. Beta surface activity levels, excluding locations 21C and 22C, ranged from -170 to 650 dpm/100 cm². Removable activity levels ranged from 0 to 1 dpm/100 cm² for alpha and -5 to 7 dpm/100 cm² for beta. The residue sample

concentration was 81 pCi/g for Th-228 and 82 pCi/g for Th-232. After collecting the residue sample from location 22C, the beta activity level decreased to 350 dpm/100 cm².

COMPARISON OF RESULTS WITH GUIDELINES

During the ICS, each of the five measurement locations in Building 29 had total beta activity levels in excess of the maximum guideline. During the FCS, two of the twenty measurement locations for Building 29 had total beta activity levels in excess of the maximum guideline. Guidelines for residue samples are not provided; however, the data showed that removable/loose contamination is on the horizontal upper surfaces within the building.

SUMMARY

During the periods of April 17 and May 20 through 22, 2002, the Environmental Survey and Site Assessment Program of the Oak Ridge Institute for Science and Education performed confirmatory survey activities on Building 29 at the MolyCorp, Inc. Washington facility in Washington, Pennsylvania. Survey activities consisted of alpha plus beta scans, alpha and beta surface activity measurements, and residue sampling.

Based on the confirmatory survey results, it is ESSAP's opinion that the building's support beams, floor and purlins did not meet the NRC guidelines for release for unrestricted use. MACTEC decided that the items that did not meet the release guidelines would be marked for disposal as low-level waste and each item marked was recorded in a MACTEC site logbook. These items are to remain in place until just prior to demolition/dismantlement of the building. ESSAP personnel walked through the building to visually inspect that all such equipment had been identified and marked accordingly. Confirmatory direct measurements on a portion of the lower south wall and on roof structural support beams identified residual contamination above guidelines. MACTEC personnel marked these and adjacent locations as contaminated. The remaining direct measurements on wall surfaces and building structural components were within guidelines.

Therefore, the outer shell walls, other than those sections that were marked, are within the guidelines. This report does not address the upper concrete floor surface (per agreement with the NRC and licensee) or the undersides of the concrete slab floor which will be surveyed by the licensee at a later date. Exposure rate measurements were not performed.

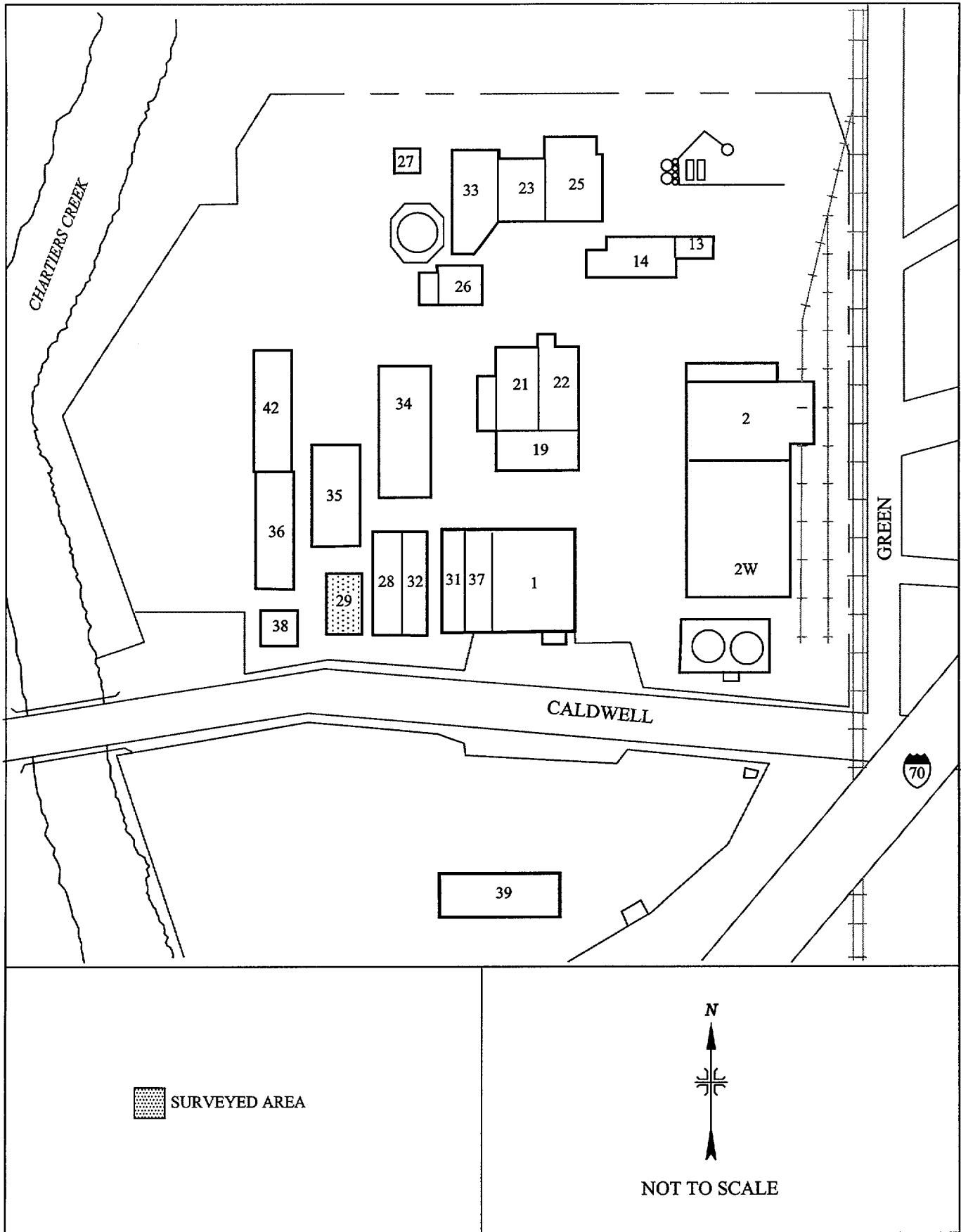


FIGURE 1: Plot Plan of Molycorp, Incorporated, Washington, Pennsylvania

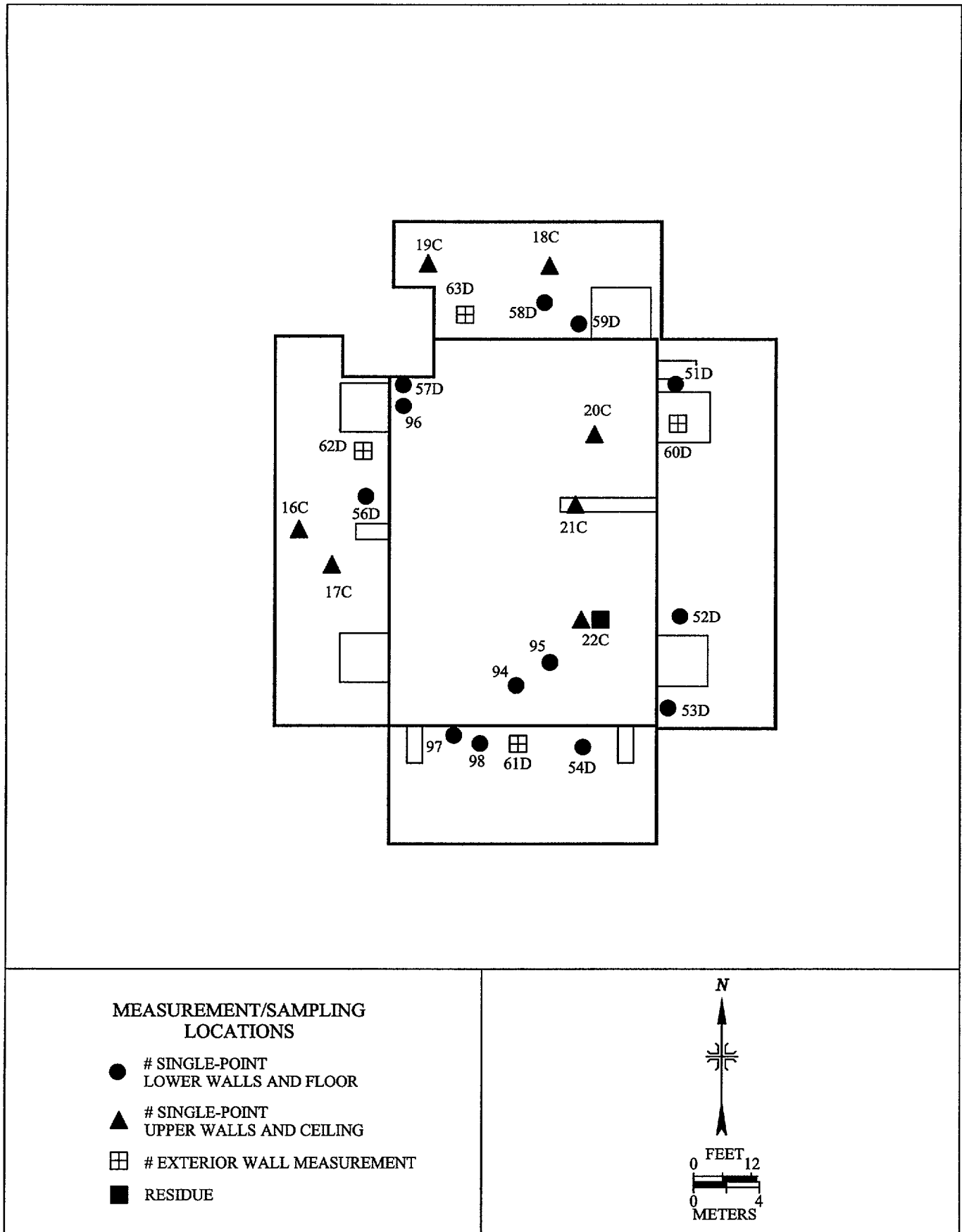


FIGURE 2: Building 29; Molycorp, Inc. Washington, PA - Measurement and Sampling Locations

TABLE 1
SURFACE ACTIVITY LEVELS
BUILDING 29
MOLYCORP INCORPORATED
WASHINGTON, PENNSYLVANIA

Location ^a	Surface ^b	Total Activity (dpm/100 cm ²)		Removable Activity (dpm/100 cm ²)	
		Alpha	Beta ^c	Alpha	Beta
Initial Confirmatory Survey					
94	F	2300	21,000 ^c	0	2
95	F	1200	10,000 ^c	1	-2
96	F	780	5,000 ^c	0	3
97	LW	710	3,100 ^c	0	1
98	LW	--- ^d	3,600 ^c	3	-4
Final Confirmatory Survey					
16C	UW	---	490 ^c	0	-2
17C	UW	---	-57	0	-1
18C	UW	---	640	1	-2
19C	UW	---	310	1	7
20C	C, I-beam	---	370	1	-1
21C	C, I-beam	---	2,100 ^c	0	-1
22C	C, I-beam	---	4,400 ^c	1	5

TABLE 1 (Continued)

SURFACE ACTIVITY LEVELS
 BUILDING 29
 MOLYCORP INCORPORATED
 WASHINGTON, PENNSYLVANIA

Location ^a	Surface ^b	Total Activity (dpm/100 cm ²)		Removable Activity (dpm/100 cm ²)	
		Alpha	Beta	Alpha	Beta
Final Confirmatory Survey (Continued)					
Post Sampling of 22C	C, I-beam	---	350	---	---
51D	LW	---	390 ^c	0	4
52D	LW	---	400	1	-1
53D	LW	---	230	0	5
54D	LW	---	250	1	-3
55D	LW	---	580 ^c	0	1
56D	LW	---	420	0	-2
57D	LW	---	-170	0	-1
58D	LW	---	380	0	1
59D	LW	---	410	0	2
60D	EW	---	380	0	-5
61D	EW	---	650	0	4

TABLE 1 (Continued)

SURFACE ACTIVITY LEVELS
 BUILDING 29
 MOLYCORP INCORPORATED
 WASHINGTON, PENNSYLVANIA

Location ^a	Surface ^b	Total Activity (dpm/100 cm ²)		Removable Activity (dpm/100 cm ²)	
		Alpha	Beta	Alpha	Beta
Final Confirmatory Survey (Continued)					
62D	EW	---	230	1	3
63D	EW	---	120	1	-1

^aRefer to Figure 2.

^bF = floor, LW = lower wall, UW = upper wall, EW = exterior wall, and C = ceiling.

^cDue to elevated ambient gamma radiation from contaminated soil and/or adjacent contaminated I-beams, these measurements were calculated by determining the difference between unshielded and shielded beta activity measurements with Net Count Rates determined as follows: Net Count Rate=(Surface Counts_{unshielded}-Surface Counts_{shielded})-(BKG Counts_{unshielded}-BKG Counts_{shielded}).

^dMeasurement not performed.

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