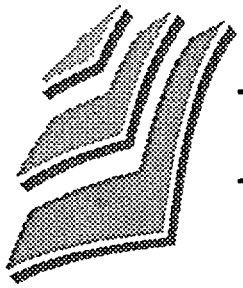
Final Status Survey Report for Buildings 14, 26, 28, 38 and 39 Slab, Buildings 21-22, 23, 25, 33, 35 and 42 Footer Concrete at the Molycorp Site

Washington, PA



MACTEC, Inc.

Revision - 0
Dated 10/25/02

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Reviews:

MACTEC Radiological Engineer — Date: 10/25/02

MACTEC Radiological Engineering/H&S Manager — Date: 10-25-02

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1.0 BACKGROUND INFORMATION

Molycorp, Inc.'s (Molycorp) predecessor, the Molybdenum Corporation of America, was formed from the Electric Reduction Company in Washington, Pennsylvania on June 16, 1920. The facility was purchased to manufacture ferroalloys.

Molybdenum manufacturing began in the 1920s. Processing of this material was idled in 1991. Although primarily manufacturing molybdenum products, the plant also produced ferrocolumbium (FeCb, 1964 to 1971), as well as other ferroalloys, e.g , tungsten.

In February 2002, site decommissioning and demolition was initiated for aboveground structures and buildings. Building final status surveys (FSS) were initiated in mid February, building demolition started in May 2002. Initially, each building or area located in a building was a single survey unit that included the foundation and shell/structure. After completing the FSS for the first set of buildings, it was realized that by combining the foundation and structure into a single survey unit, the completion of the NRC independent verification (IV) survey and release from radiological controls was delayed. In order to facilitate and expedite NRC IV surveys and the release of radiological controls, all subsequent building FSS consisted of independent surveys for the building's foundation and the shell/structure.

During subsequent visits by the NRC, IV surveys were performed of the building's shell and structural materials but not the foundations of the buildings.

Building shells/structures were demolished and the construction debris was removed from site or controlled as radioactive material

2.0 SITE INFORMATION

2.1 SITE DESCRIPTION

The Molycorp, Inc. project site (the site) is located in southwestern Pennsylvania on the outskirts of Washington County approximately 35 miles southwest of Pittsburgh. The site is separated from the populated City's urbanized area by the ramps and structures associated with Interstate 70 (I-70). The region is generally comprised of towns located close to transportation corridors surrounded by agricultural lands and open areas

The current work site consists of approximately 8 acres that is located inside a 20 acre fenced portion of the 59-acre parcel owned by Molycorp that lies entirely within Canton Township at 300 Caldwell Avenue, Washington, Pennsylvania, 15301. The fenced area is situated between 1,010 and 1,045 feet above mean sea level with relatively flat topography.

Molycorp's property has frontage along two dedicated public streets in Canton Township – Caldwell Avenue and Weirich Avenue. The site is transversed by Chartiers Creek that flows south to north through the property. The property is served by the CSX operated railroad via two lines that were formerly owned by the Tylerdale Connecting Railroad Company and the Baltimore and Ohio Railroad.

Adjacent property owners can be classified into three major categories on the current use of the land - residential, industrial, and public. The residential property lies to the east of the site on Green Street and to the west along Weirich Avenue. The industrial property is located predominately north of the site and includes property under the ownership of the Findlay Refractories Company and Allegheny Ludlum Corporation. Darrt Development Company owns several scattered parcels located to the south and east of the site. Land under public ownership includes the Canton Township Volunteer Fire Company property, the right-of-way for I-70, and other public streets. The Washington Institute of Technology owns a vacant 38-acre parcel adjacent to the southwestern property line.

2.2 SITE CONDITIONS AT TIME OF FOUNDATION SURVEY

As part of the past decommissioning activities, building structural materials have been removed and processed, either as clean construction debris or as radiological waste. Clean construction debris has been continually removed from site as building materials and concrete foundations have been cleared from radiological controls by the NRC. Radiological waste has been segregated and stored on-site for final disposal activities. Shipping of radiological waste began in early October, 2002. Radioactive waste shipments will continue through job completion.

2.3 GROUNDS

The Molycorp Washington, PA facility produced a ferrocolumbium alloy from Brazilian ore (pyrochlore) between 1946 and 1970. While the use of pyrochlore was commonplace by that time, this particular ore contained thorium as an accessory metal. The thorium was also in concentrations that required Molycorp to acquire a Source Materials License. This operation resulted in the production of a thorium-bearing slag. A portion of this slag was ball-milled (turned into a granular powder) and used as fill over portions of the site.

While significant amounts of this slag have been removed from the site, remaining slag in soil continued to play a significant role in the survey and release of buildings on-site. Building steel walls and concrete floors showed significant readings above "normal" background levels when surveyed by hand-held or portable detectors.

Because this elevated background condition exists at the Molycorp site, MACTEC devised instrument detector windows for some of their instruments and used them in areas where thorium slag in soil created a background nuisance during survey activities.

2.4 FOUNDATION CLASSIFICATION

All foundations do not have the same potential for residual contamination and therefore do not require the same level of survey coverage. For purposes of establishing the degree of survey effort required, building foundations have been segregated into affected and unaffected foundations

- Affected foundation: Foundations that have a potential for surface residual contamination from contact with underlying soils.
- Unaffected foundation: Foundations not classified as affected.

TABLE 1 - CLASSIFICATION OF BUILDING FOUNDATION

Foundation Classification[1]	Building Number	Radiological Information
U	1	Concrete floor. Underside of slab identified as contaminated above release limits.
U	2	Concrete floor. Not yet released by NRC. Building foundation is not located on contaminated fill.
U	2W	Concrete floor. Not yet released by NRC. Building foundation is not located on contaminated fill.
U	2 Train Bay	Concrete floor. Not yet released by NRC. Building foundation is not located on contaminated fill.
U	13	Slab final status surveyed and released by NRC.
U	14	Concrete floor. Not yet released by NRC. Building foundation is not located on contaminated fill.
U	19	Concrete floor. Not yet released by NRC. Building foundation is not located on contaminated fill.
U	21	Slab final status surveyed and released by NRC.
U	22	Concrete floor. Underside of slab identified as contaminated above release limits.
U	23	Slab final status surveyed and released by NRC.
U	25	Slab final status surveyed and released by NRC.
U	26	Concrete floor. Not yet released by NRC. Building foundation is not located on contaminated fill.
A	28	Concrete floor. Not yet released by NRC. Building foundation is located on contaminated fill.
U	29	Concrete floor. Underside of slab identified as contaminated above release limits.
U	31	Concrete floor. Topside of slab identified as contaminated above release limits.
A	32	Concrete floor. Underside of slab identified as contaminated above release limits.
A	33	Slab final status surveyed and released by NRC.
A	34	Concrete floor. Underside of slab identified as contaminated above release limits.
A	35	Slab final status surveyed and released by NRC.

A	36	Slab final status surveyed and released by NRC.
U	37	Concrete floor. Underside of slab identified as contaminated above release limits.
A	38	Concrete floor. Not yet released by NRC. Building foundation is located on contaminated fill.
A	39	Concrete floor. Not yet released by NRC. Building foundation is located on contaminated fill.
A	42	Slab final status surveyed and released by NRC.

(1) Building foundation classification is derived from building location, obtained from Molycorp's Material License, Amendment No. 5, SMB-1393.

2.5 SURVEY UNITS

Each building foundation was considered an individual survey unit for final status survey purposes. Determination of compliance with the average unrestricted use limits was evaluated on a survey unit basis. Each survey unit must be shown to meet the average surface contamination and exposure rate limits at a 95% confidence.

3.0 DECOMMISSIONING ACTIVITIES

Decommissioning activities of the buildings on site were performed as a "first step" to release the site for unrestricted future use. The scope of work during this phase includes D and D of all above surface structures.

3.1 OBJECTIVES

The objectives for this phase of D and D activities included:

- Removal of equipment and surplus supplies from buildings
- Characterization of hazards associated with the buildings (performance of effective radiological surveys)
- Remediation or disposal of hazards identified in the characterization process
- Completion of Final Status Survey
- Unrestricted release of buildings
- Demolition of buildings

3.2 RESULTS OF PREVIOUS SURVEYS

Numerous radiological studies and surveys have been conducted at the Molycorp Washington, PA site. Since the late 1960s, regulatory requirements and pressure from local agencies have driven surveys and studies of the hazards associated with the production of various ferroalloys. Listed below is a brief history of the previous surveys performed on the Molycorp site:

Applied Health Physics, Inc. was contracted by Molycorp to conduct a series of leaching studies on ferrocolumbium slag during the late 1960s. These studies indicated that radioactive materials were fixed and would not leach into the groundwater in excess of prescribed limits. During this period, Molycorp applied unsuccessfully to the Pennsylvania Department of Health's Industrial Wastes Section and AEC for an onsite burial permit. Ferrocolumbium slag cleanup was concentrated in the early to mid-1970s time frame.

In June 1971, an AEC compliance inspection revealed that thorium-bearing slag had been inadvertently buried onsite in violation of the terms and conditions of their license and AEC regulations. The AEC issued a Notice of Violation and requested Molycorp to take remedial action to excavate these materials and dispose of them in accordance with AEC regulations and guidance documents. Applied Health Physics was contracted to perform a thorough radiological survey of the site and to provide health physics and waste disposal services necessary to comply with AEC's request. Survey measurements indicated exposure levels at 1.2 mR/hr in some areas

In 1972, thoriated material from the site 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 performed cleanup operations 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, Inc report indicated the average concentration of thorium-232 in the slag pile was 1,250 pCi/g, with exposures within the 0.2 mR/hr Nuclear Regulatory Commission maximum level allowed at the time (AEC was reorganized as the NRC in 1974). This pile was eventually removed and disposed of.

In 1978, one of two molybdenum-roasting furnaces was shut down as part of a consent decree with the Pennsylvania Department of Environmental Resources (PADER) Air Quality Agency due to exceedances of SO_2 standards. All remaining processes continued until 1991.

Oak Ridge Associated Universities, an NRC contractor, conducted a radiological survey of the site in 1985. 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.

RSA, Inc. conducted a subsurface survey for Molycorp in 1990 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. Thirty-two holes were drilled on the site and radiation measurements were logged at every six inches of depth from the surface down to bedrock, both above and below water table. Radiation levels were also logged in monitoring wells previously drilled on the site. In addition to the subsurface survey, RSA, Inc. conducted a survey of the radiation exposure rates inside the study area This survey consisted of approximately 400 measurements of the gamma radiation field at a height of one meter above

ground level. Findings reveled that; in general, the subsurface concentrations of thorium were above those in the surface soils in almost every hole drilled. A general pattern was that the underground radiation levels decreased to background at a depth of about ten feet. While a majority of the holes exhibited concentrations of greater than 0.01 percent thorium, in only a few holes did the thorium content exceed an average of 0.05 percent at some point below the surface of the ground.

Foster Wheeler Environmental Corporation conducted a site characterization of the Molycorp Washington, PA site in 1994 and published its report titles "Site Characterization Report for License Termination of the Washington, PA Facility, 1995." This three-volume report was conducted to meet the Site Characterization Plan's objectives:

- To determine the extent of the distribution of thoriated residues on the site, in the structures and in the environmental media.
- To determine the rate(s) of migration, if any, of thorium or its daughters through various pathways to man.
- To assess associated non-radiological constituents and determine their affects on the radiological constituents and potential impacts on decommissioning
- To quantify parameters that affect potential human exposure to existing site radiological materials.
- To support evaluation of alternative decommissioning actions and detailed planning of a preferred approach for decommissioning, decontamination, and waste disposal.

3.3 DECONTAMINATION PROCEDURES

Building foundations and equipment footings found to contain radioactivity above the release limits were not normally decontaminated. Concrete and foundation materials found to have elevated levels of radioactivity were controlled as radioactive material and will ultimately be disposed of as radioactive waste.

4.0 FINAL SURVEY PROCEDURES

The basis of the Molycorp radiological survey design conformed to NUREG/CR 5849, "Manual for Conducting Radiological Surveys in Support of License Termination," RSI's "Decommission Plan for the Washington, PA Facility, Part 1 Revision," and the requirements of Molycorp's "U.S. Nuclear Regulatory Commission Material License, Amendment No. 5, SMB-1393." These references provide adequate information and sampling requirements to ensure a proper survey had been planned and performed. The requirements listed in these references were compiled into a sampling plan (MACTEC's "Concrete Sample and Management Plan") and used as the guidance document for sampling instructions.

4.1 SAMPLING PARAMETERS

Sampling parameters were identified from NUREG/CR 5849, "Manual for Conducting Radiological Surveys in Support of License Termination," RSI's "Decommission Plan for the Washington, PA Facility,

Part 1 Revision," and the requirements of Molycorp's "U.S. Nuclear Regulatory Commission Material License, Amendment No. 5, SMB-1393."

Survey results were obtained and used for comparison against the limits for unrestricted release, as defined in the site's NRC License.

Table 2 identifies the release limits of the license.

TABLE 2 - ACCEPTABLE SURFACE CONTAMINATION LEVELS (DPM/100CM^2)

Radionuclide [1]	Average	Maximum	Removable
U-nat, U-235, U-238, and associated decay products	5,000 α	15,000α	1,000α
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000	3,000	200
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000	15,000	1,000

(1) Where surface contamination by both alpha and beta-gamma emitting nuclides exist, the limits established for alpha and beta-gamma emitting nuclides should apply independently.

Even though limited quantities of natural uranium has been identified at the Washington, PA site, and is included as a part of the site's NRC License, the more restrictive limits for release (for surface activity) are for the natural thorium radionuclide, which is the significant radionuclide of concern Therefore, the limits for release are due to the natural thorium radionuclide, and the limits are 1,000 dpm/100cm^2 average, 3,000 dpm/100cm^2 maximum and 200 dpm/100cm^2 removable.

Because both alpha and beta radiations are a product of the decay of natural thorium (in equilibrium), the limits listed above apply independently to both alpha radiation and beta radiation.

Due to the inherent difficulty of properly quantifying the alpha radiation component during the decay of natural thorium when using a hand-held instrument, a ratio of alpha decays to beta decays was identified and beta radiation was used as a surrogate to quantify the alpha activity. This was not the case for determining removable contamination. The Ludlum 2929 was calibrated and set up for the measurement of both alpha and beta radioactivity.

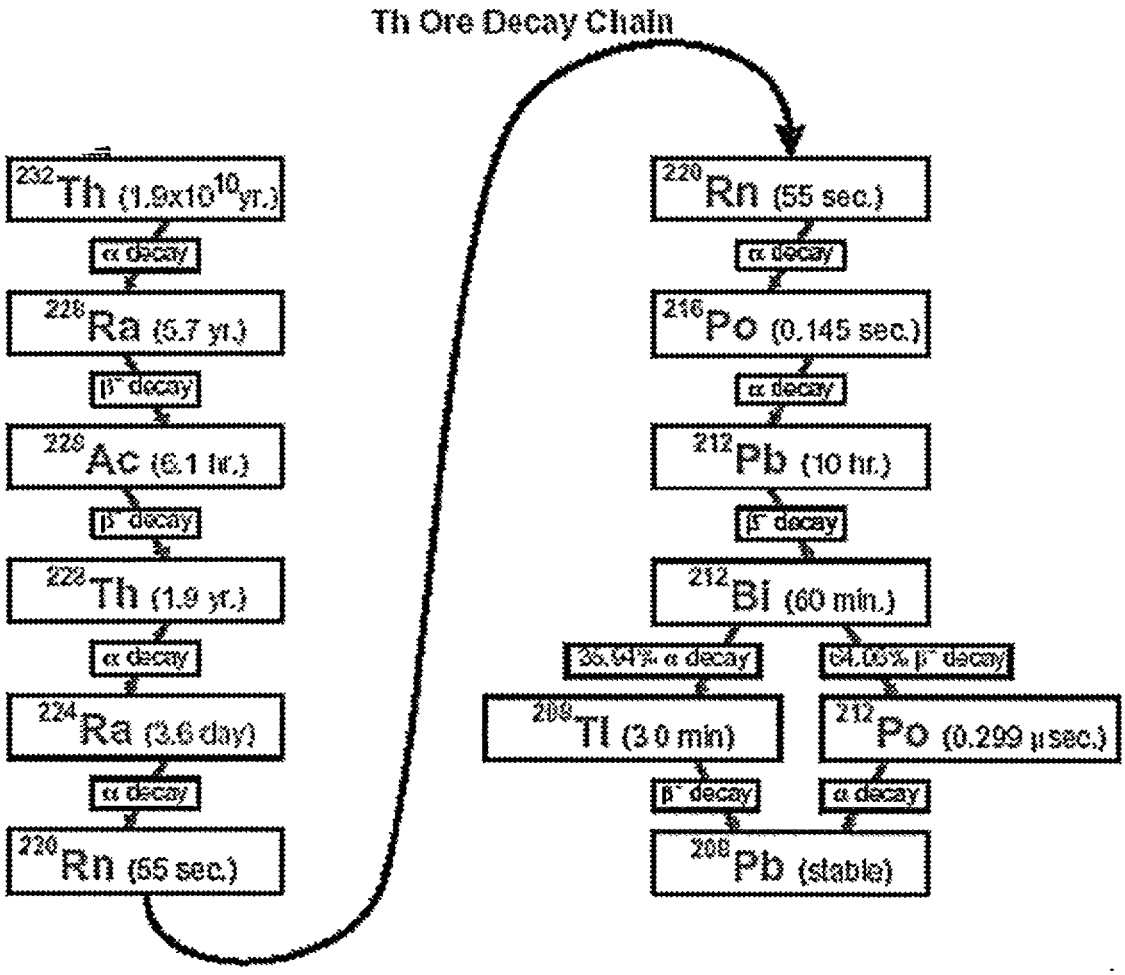
The detectable ratio of alpha to beta is a 2:1 for natural thorium decay. In actuality, the decay of natural thorium produces 6 alphas and 4 betas to reach stable lead. However, one of the betas emitted during the decay process (from Ra-228) is not detectable (39 keV E-max). The other three betas emitted are detectable and are suitable as a surrogate.

The alpha readings recorded on the various data forms and record sheets were actual instrument readings, obtained from the instrument during the survey, and do not represent this ratio factoring The use of alpha

to beta ratio factoring is incorporated in the data set just prior to statistical analysis and comparison to limit values.

Figure 1 is a graphical representation of the decay of natural thorium

FIGURE 1 - NATURAL THORIUM DECAY CHAIN



5.0 SURVEY PROCEDURE

5.1 GENERAL

Approved SOPs and/or field procedures were followed for activities described in this plan.

5.2 SURFACE SCANS

Scanning of surfaces to identify locations of elevated residual surface activity were performed according to Table 3.

TABLE 3 - SURFACE SCAN SCHEDULE

Foundation Classification	Survey Location	Surface Scan
All Previously Surveyed Foundation Tops	Top surface of foundation.	5 - 10% cursory beta-gamma scan (at random locations) on top surface of previously surveyed foundations prior to lifting foundation.
Affected Foundations	Underside surface of foundation.	100 % beta-gamma scan of underside of foundation when foundation is lifted.
Unaffected Foundations	Underside surface of foundation.	10 % beta-gamma scan of underside of foundation when foundation is lifted.
Result Requirements		Locations of surface activity exceeding twice background will be marked for further evaluation by direct measurement.

The instruments that were used for scanning are listed in Table 7. For hand-held instrumentation, the detector was kept as close as possible to the surface and moved across the surface at a slow speed. Scan surveys were performed by moving the detector over the surface area at a maximum speed of 1-2 inches per second and a distance of approximately 1/2 inch for beta. If the count rate increased, the rate of movement of the detector was decreased or stopped. If the increase in count rate was real (approximately twice background and not a random variation in the background count rate), a static 60-second measurement was performed over the area to quantify the activity. Audible indicators (headphones or instrument speaker) were used to identify locations having elevated activity levels. All scanning results were noted on standard survey forms and locations of elevated radiation were identified for later investigation.

5.3 DIRECT SURFACE MEASUREMENTS

Direct measurements were performed according to Table 4.

TABLE 4 - DIRECT SURFACE MEASUREMENT SCHEDULE

Foundation Classification	Survey Location	Direct Measurement
All Previously Surveyed Foundations	Top surface of foundation.	Measurements will be performed at each location of elevated activity identified by surface scan measurements.
Affected Foundations	Underside surface of foundation.	Measurements will be performed at a minimum of 30 locations for the entire foundation (survey unit) and sufficient additional locations to provide coverage at a minimum of approximately one location per 20 m^2 of the underside surface of the foundation
Unaffected Foundations	Underside surface of foundation	Measurements will be performed at a minimum of 30 locations for the entire foundation (survey unit) and sufficient additional locations to provide coverage at a minimum of approximately one location per 50 m^2 of the underside surface of the foundation
Result Requirements		If measurement indicates residual activity above guideline limits, the affected area is identified and controlled as radioactive material.

Direct surface measurements were performed at the identified locations using the instruments described in Table 7. Direct surface measurements were conducted by integrating counts over a 1-minute period.

Due to the inherent difficulty of properly quantifying the alpha radiation component of the decay of natural thorium when using a hand-held instrument, a derived ratio of alpha decays to beta decays was used. The detectable ratio of alpha to beta is 2:1 for natural thorium decay. In actuality, the decay of natural thorium produces 6 alphas and 4 betas to reach stable lead. However, one of the betas emitted during the decay process (from Ra-228) is not detectable (39 keV E-max). The other three betas emitted are detectable and are suitable as a surrogate. Beta radiation was used as a surrogate to quantify alpha activity when performing direct measurements.

Alpha readings obtained during the surveying process were recorded on the proper data form(s) and/or record sheet(s) but were not be used to quantify the alpha activity component for direct measurements.

Alpha to beta ratio factoring was incorporated in the data set just prior to statistical analysis and comparison to limit values

5.4 SMEAR SURVEYS

Smear surveys were conducted according to Table 5.

TABLE 5 - LOOSE SURFACE MEASUREMENT SCHEDULE

Foundation Classification	Survey Location	Removable Surface Activity
All Previously Surveyed Foundations	Top surface of foundation.	Collected from each location where a direct surface activity measurement is made (alpha and beta analysis).
Affected Foundations	Underside surface of foundation.	Collected from each location where a direct surface activity measurement is made (alpha and beta analysis).
Unaffected Foundations	Underside surface of foundation.	Collected from each location where a direct surface activity measurement is made (alpha and beta analysis).

Smear sampling was performed in accordance with applicable procedures. Smears were counted for gross alpha and beta with the appropriate instrument described in Table 7.

5.5 EXPOSURE RATE MEASUREMENTS

Exposure rate measurements were performed according to Table 6.

TABLE 6 - EXPOSURE RATE MEASUREMENT SCHEDULE

Foundation Classification	Survey Location	Exposure Rate Measurement
NA	Eternal surface of "clean" concrete waste pile.	Gamma exposure rates measured 1 meter perpendicular to the piled concrete surface at 1 measurement per 50 m^2 of surface area.

Exposure rate measurements were performed at the identified locations using the instruments described in Table 7. Pile exposure rate measurements were not be taken at locations greater than seven feet above ground level.

5.6 BACKGROUND LEVEL DETERMINATION

Background levels were determined for concrete surfaces by taking a minimum of 10 measurements at locations of similar construction, but without a history of radioactive materials use (off-site locations)

5.7 DOCUMENTATION

All survey and sampling efforts were documented by sampling personnel. One member of the sampling team was assigned as a document coordinator and was responsible for recording all required information during survey and sampling activities, other than the normal sampling information commonly performed by the individual obtaining the sample. Samples that were sent to an off-site processing facility were transferred from sample collection personnel to the designated counting technician for handling and custody control. This technician was responsible for documentation, sample identification, packaging, and shipping of samples, as required. A standard chain-of-custody record was used to record sample transfers to offsite facilities. Samples were held in the custody of the document coordinator until being shipped to the laboratory.

All survey data was documented on the appropriate radiological survey form, map, and/or data sheet. Information included, but was not limited to:

- Date, time and purpose of the survey
- General and specific location of the survey
- Name and signature of the surveyor
- Instrument model, serial number, and calibration due date
- Survey results for radiological contamination (recorded in dpm/100 cm^2)

Survey documentation was completed and reviewed in a timely manner. Errors identified during the review process were brought to the Health Physics Technician (HPT) for correction

6.0 INSTRUMENTATION

6.1 INSTRUMENT OPERATION AND CALIBRATION

All instruments were operated, maintained, and calibrated according to the manufacturer's recommendations and/or the specifications of ANSI N323-1978.

- Survey instruments were calibrated before initial use, at least semi-annually and following maintenance or repair that could affect calibration. Calibration sources were National Institute of Science and Technology (NIST) traceable.

- Meters need not be calibrated for readings above 1,000 mR/hr.

- Daily functional checks were conducted on each instrument to verify that the equipment is functioning properly.

- When not in use, instruments were stored at a central location and protected from harsh environments.

- Records of instrument calibration and daily functional checks are maintained for inspection.

- Calibration stickers which include, sources used to calibrate, correction factors or efficiencies for each scale or decade calibrated, the date calibrated and due date, were attached to each instrument.

6.2 MINIMUM DETECTABLE ACTIVITY

The detection sensitivity of a measurement system refers to the statistically determined quantity of radioactive material or radiation that can be measured or detected at a pre-selected confidence level. This sensitivity is a factor of both the instrumentation and the technique or procedure being used. Typically, detection sensitivity has been defined (EPA 1980) as the level above which there is less than a 5% probability that radioactivity will be reported present when it is really absent (Type I error) or reported absent when it is really present (Type II error)

Minimum detectable activity (MDA) is an *a priori* estimate of the minimum activity level which is practically measurable with a specific instrument and sampling and/or measurement technique. The basic equation for determining field instrument MDA (NUREG/CR-5849) is:

FIGURE 1 - BASIC MDA EQUATION

$$MDA = \frac{2.71 + 4.65\sqrt{B_R * t}}{E * \frac{A}{100}}$$

Where:

B_R	=	background count rate
t	=	background count time (min)
E	=	efficiency
A	=	area of probe

6.3 INSTRUMENT SELECTION

During the final status survey of building foundations at the Molycorp site, several radiological instruments were used to identify and quantify the radioactivity of building surfaces. The instruments identified in Table 7 are commonly used for measuring surface deposited radioactive levels from thorium series source of radioactivity. These instruments are reliable, readily available, and reasonably easy to use by trained personal. As necessary, instruments were substituted with an equivalent, or better, instrument. Prior to instrument substitution, the site radiological engineer was notified and approved of the substitution.

TABLE 7 - INSTRUMENTATION GUIDE

Instruments	Probe	Radiation	MDA (dpm/100 cm^2)	Use
Ludlum, Model 2360	43-89	Alpha	67	Static Surveys
Ludlum, Model 2360	43-89	Beta	520	Static Surveys
Ludlum, Model 2350-1	43-68/106	Alpha	66	Static Surveys
Ludlum, Model 2350-1	43-68/106	Beta	319	Static Surveys
Ludlum, Model 2929	43-10-1	Alpha	29	Counter Scaler
Ludlum, Model 2929	43-10-1	Beta	182	Counter Scaler
Ludlum, Model 2350-1	43-68/106	Alpha	105	Scan Surveys
Ludlum, Model 2350-1	43-68/106	Beta	625	Scan Surveys
Ludlum, Model 239-1F	43-37	Alpha	64	Floor Monitor
Ludlum, Model 239-1F	43-37	Beta	1186	Floor Monitor
Ludlum, Model 19	Internal	Gamma	NA	Exposure Rates

6.4 INSTRUMENT USE TECHNIQUES

Instruments selected for performing final status surveys were provided by GTS Duratek, Field Engineering and Field Services group, Kingston, TN. Prior to delivery, instrument calibrations and operations were verified by the vendor, and shipped to Washington, PA. Upon arrival, the instruments were inspected and verified operational. Instrument backgrounds were preformed. QC check control limits were established and Chi-squared tests were performed, as necessary.

Prior to daily use, instruments were response checked and compared against their two and three sigma warning and control limit values. For scaler instruments, daily backgrounds were determined and MDCs were calculated in addition to their response checks. After daily use, hand-held instruments were once again source response checked to ensure that the instrument did not fail during the day's work. All instrument "daily checks" data was logged in the appropriate data log record.

Qualified HP technicians were trained on the use of the instruments, and provided access to the instrument's User Manuals. Surveys were performed in accordance with approved radiological survey procedures on site. Survey results were reviewed by the Radiological Engineer for accuracy and completeness.

7.0 SURVEY FINDINGS

Detailed data reports (Survey Findings Report) for each survey unit sampled are provided as an appendix to this report. Field data collection forms, survey report forms, instrumentation information (background, QC, MDA, and source response data forms), statistical test results, and comparisons to release limits are all provided as a single package. Each package also contains a summary of the final status survey for that survey unit and includes information on anomalies discovered during the survey process. Where significant differences existed between final status survey results and results of previous surveys for the survey unit, explanations are provided.

Raw survey data was compiled into survey data tables, where appropriate, and presented with calculational results and comparisons

7.1 TECHNIQUES FOR REDUCING/EVALUATING DATA

Survey information was obtained from the instrument's meter face used at the time of the survey. This data was recorded on a Radiological Survey Location Indicator data sheet, in the instrument's units. For scans and static measurements, the units were in counts per minute (cpm) Smear data was recorded after counting, subtracting background, and converted to units of disintegrations per minute per 100 square centimeters (dpm/100cm^2). Dose rate measurements were recorded in units of micro-Roentgen per hour (uR/hr) and taken directly from the instruments meter face. Information used in the conversion from cpm to dpm (instrument efficiencies) was recorded on the Radiation Protection Survey Report form. For scans, the highest reading for the given immediate scan area was recorded in cpm.

Where "hot spots" needed to be evaluated, additional readings were taken and the average hot spot activity was calculated in accordance with NUREG/CR-5849, Section 8.5.2 - Elevated Areas of Activity.

7.2 STATISTICAL EVALUATION AND COMPARISON TABLES

The statistical methodology used to provide the true representation of the data in relationship to the applicable limits is found in Sections 2.0 and 8.0 of NUREG/CR-5849. Comparison tables and tests used in the analysis are presented as part of each survey unit's Survey Findings Report package, as an appendix to this report.

8.0 SUMMARY

Final status survey of the building foundations located at the Molycorp Washington, PA site were performed in accordance with the requirements listed in NUREG/CR 5849, "Manual for Conducting Radiological Surveys in Support of License Termination," RSI's "Decommission Plan for the Washington, PA Facility, Part 1 Revision," Molycorp's "U.S. Nuclear Regulatory Commission Material License, Amendment No. 5, SMB-1393," and MACTEC's "Concrete Sample and Management Plan."

According to the findings of the final status surveys performed at the Molycorp Washington, PA site, all release criteria have been met. Results of the final status survey demonstrate that the residual radioactivity is below the unrestricted use criteria and confirm that the building foundations are suitable for unrestricted use.

9.0 REFERENCES

1) *Manual for Conducting Radiological Surveys in Support of License Termination*, NUREG/CR-5849, Draft, December 1993.

2) *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Revision 1*, NUREG-1575, Rev. 1, US Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, Washington, DC, August 2000.

3) *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs*, American National Standard, ANSI/ASQC E4-1994.

4) *Quality Assurance for Radiological Monitoring Program - Effluent Streams and the Environment*, NRC Regulatory Guide 4.15, 1979.

5) *Termination of Operating Licenses for Nuclear Reactors*, Nuclear Regulatory Commission, Regulatory Guide 1.86, 1974.

6) *Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions*, NUREG/CR-1507, Final, 1997.

7) *Statistical Methods for Evaluating the Attainment of Cleanup Standards*, Pacific Northwest Laboratory, Richland, WA, December 1992.

8) *Radiation Detection and Measurement*, Knoll, 1979.

9) *Washing, PA Facility, Decommissioning Plan, Part 1 Revision*, June 30, 1999, Radiological Services Inc.

10) *Radiation Protection Program, Health Physics Procedures*, June 1999, Radiological Services Inc.

11) *Site Characterization Report for License Termination of the Washington, PA Facility*, January 1995, Radiological Services Inc.

12) *U.S. Nuclear Regulatory Commission Materials License*, Molycorp, Inc, SMB-1393, Docket No. 040-08778, Amendment 5.

13) Antech Ltd. - Waltz Mill, Project No. 02-0284W, Analytical *Survey Results for Composite Tile Sample at Molycorp, Washington, PA*, May 13, 2002.

Appendix A

Building 14 Foundation Data Package

Molycorp Washington, PA

October, 2002

Building 14 Foundation Data Package

This data package contains final status survey information for Building 14, Molycorp, Washington, PA site. The underside of the building's foundation (slab and footers) was surveyed as an unaffected foundation. Because the building's footer system was intertwined with the building's slab, the building's footer was excavated as a part of the slab removal process. Both slab and footer data are compiled into one radiological survey and are presented as Appendix A.

Several sections of concrete were identified with elevated levels of activity and were segregated from the clean concrete. Clean concrete, surveyed and found to be below release limits, remains on the footprint of the building and awaits verification surveys. Concrete with elevated readings was segregated and will be treated and processed as rad waste.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 14 foundation provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the foundation (slab and footer) of Building 14 is suitable for unrestricted use and release.

10-7-02	DDO-138 Radiation Protection Survey Report	Site Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
~~10-8-02~~ 10-8-02	1630	Bldg 14	02-1233

RWP Number	Purpose of Survey	Page
N/A	☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other	1 of 3

Survey Title: FSS Slab (underside)

* Data Point were removed To R.M.A. To be shipped As Rad waste.

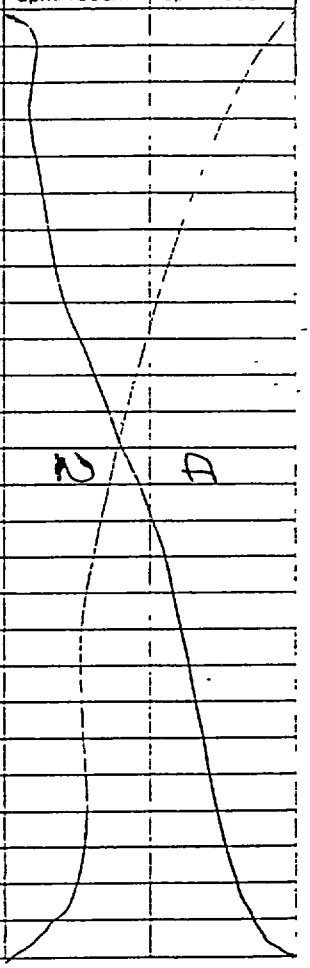
1 Minute STATIC's TAKEN ON Concrete

		BKG	MDA
INST #1	B⁻	144	253
	α	8	92
INST #2	B⁻	144	~~MDA~~ 244
	α	8	81

Model 19 #95453 Due 12-12-02

Bkgd Readings 7-8 uR/hr

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13	ND	A
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		



Legend

00 = mRem/h gamma | 00 C = mRem/h gamma contact | ⊙ = Smear Location | ▽ = Air Sample Location | -X-X-X- = Rope Boundary, or Barrier

00 β = mRem/h beta | 00 βC = mRem/h beta contact | –⊙– = Large Area Wipe | = Bulk Material Sample

Section 2: Instrument Used

	Instrument Model/SN		Cal Due Date	Probe Model/SN		Cal Due Date	Detector Eff B(cpm/dpm)	α	MDA B⁻	α	Other B⁻ BKG	α
INST-1	2350-1	126190	1-16-03	43-106	133871	12-14-02	.231	.172	645	85	249	2.4
INST-2	2350-1	129414	8-2-03	43-106	128914	2-2-03	.240	.195	612	65	242	1.8
	2929	115563	6-14-03	43-10	127216	6-14-03	.231	.347	~~1348~~	12.9	72	.2

Section 3: Review and Approval

Survey Performed By (Sign)	Area Posted and/or Barricaded	Date and Time
Mark Blanchard / Josh Baker	☐ Yes ☒ No ☐ Not Required	~~10-8-02~~ 10-8-02 / 1630

Radiation Safety Officer (Print Name & Sign)	Date and Time
Steve Kowalski / Steve Kowalski	10-8-02 / 1650

Survey # 02-1233

Radiological Survey Results - Survey Location Indicator

Survey Area Information: Bldg # 14 Underside FSS

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

	Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
*	1	920	14	818	368	16	8	-.57	82
	2	660	6	549	383	10	7	-.57	-13
*	3	810	8	766	444	9	7	-.57	4.3
	4	580	15	524	319	14	7	-.57	17
*	5	810	20	774	357	23	8	-.57	-22
	6	830	12	807	337	10	7	-.57	61
	7	700	8	586	372	6	7	-.57	Ø
*	8	620	11	600	316	7	7	-.57	17
	9	450	18	439	305	16	6	-.57	-26
	10	390	10	376	315	6	7	-.57	Ø
	11	420	13	399	338	12	7	2.3	87
	12	390	10	379	298	7	8	2.3	17
	13	410	10	386	345	8	7	-.57	8.7
	14	540	34	531	315	20	7	-.57	-22
	15	430	19	409	319	11	7	-.57	-4.3
	~~16~~								

Inst. # 1 * Hot

Survey #
02-1233

Radiological Survey Results - Survey Location Indicator

Survey Area Information: Bldg #14 Underside FSS

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

	Location	β Scan (cpm)	α Scan (cpm)	β Static (unsn) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
	16	376	12	358	254	10	8	-.57	-8.7
	17	368	8	347	239	6	8	-.57	-30
	18	367	10	338	266	8	8	-.57	39
*	19	1055	23	1037	477	18	7	-.57	4.3
	20	413	13	391	266	11	7	-.57	-13
	21	365	10	328	276	7	8	2.3	39
*	22	800	25	771	367	19	8	-.57	-13
	23	478	11	456	320	6	8	-.57	8.7
	24	409	15	383	284	7	7	-.57	-43
	25	421	15	404	310	12	9	-.57	43
	26	442	8	432	282	5	9	5.18	-8.6
	27	415	14	382	275	11	8	-.57	12.9
	28	382	14	360	309	5	7	-.57	-4.3
	29	443	15	428	336	10	9	-.57	-30
	30	434	11	402	315	9	8	2.3	25.9

Inst #2 * Hot

Results of Surface Scans
Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

Location	Beta Scan gross cpm	Beta Scan net cpm	Instrument #
F1	920	671	1
F2	660	411	1
F3	810	561	1
F4	580	331	1
F5	810	561	1
F6	830	581	1
F7	700	451	1
F8	620	371	1
F9	450	201	1
F10	390	141	1
F11	420	171	1
F12	390	141	1
F13	410	161	1
F14	540	291	1
F15	430	181	1
F16	376	134	2
F17	368	126	2
F18	367	125	2
F19	1055	813	2
F20	413	171	2
F21	365	123	2
F22	800	558	2
F23	478	236	2
F24	409	167	2
F25	421	179	2
F26	442	200	2
F27	415	173	2
F28	382	140	2
F29	443	201	2
F30	434	192	2

All Foundation Material (Footer and Slab) scans performed with either #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Scan MDA Beta - 249 dpm/100cm^2
Scan background Beta - 645 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Scan MDA Beta - 612 dpm/100cm^2
Scan background Beta - 242 cpm
Detector Eff. Beta - .240

Elevated Results of Surface Scans

Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

F1	671
F3	561
F5	561
F6	581
F19	813
F22	558

Direct Measurements (Total Activity)

Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)	Instrument #
F1	818	368	450	144	306	1325	207	253	2649	1
F2	549	383	166	144	22	95	149	253	190	1
F3	766	444	322	144	178	771	183	253	1541	1
F4	524	319	205	144	61	264	159	253	528	1
F5	774	357	417	144	273	1182	201	253	2364	1
F6	807	337	470	144	326	1411	210	253	2823	1
F7	586	372	214	144	70	303	161	253	606	1
F8	600	316	284	144	140	606	176	253	1212	1
F9	439	305	134	144	-10	-43	141	253	-87	1
F10	376	315	61	144	-83	-359	121	253	-719	1
F11	399	338	61	144	-83	-359	121	253	-719	1
F12	379	298	81	144	-63	-273	127	253	-545	1
F13	386	345	41	144	-103	-446	115	253	-892	1
F14	531	315	216	144	72	312	161	253	623	1
F15	409	319	90	144	-54	-234	130	253	-468	1
F16	358	254	104	144	-40	-167	129	244	-333	2
F17	347	239	108	144	-36	-150	130	244	-300	2
F18	338	266	72	144	-72	-300	120	244	-600	2
F19	1037	477	560	144	416	1733	217	244	3467	2
F20	391	266	125	144	-19	-79	134	244	-158	2
F21	328	276	52	144	-92	-383	114	244	-767	2
F22	771	367	404	144	260	1083	191	244	2167	2
F23	456	320	136	144	-8	-33	137	244	-67	2
F24	383	284	99	144	-45	-188	127	244	-375	2
F25	404	310	94	144	-50	-208	126	244	-417	2
F26	432	282	150	144	6	25	140	244	50	2
F27	382	275	107	144	-37	-154	129	244	-308	2
F28	360	309	51	144	-93	-388	114	244	-775	2
F29	428	336	92	144	-52	-217	125	244	-433	2
F30	402	315	87	144	-57	-238	124	244	-475	2

All Foundation Material (Footer and Slab) direct measurements performed with either #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Direct MDA Beta - 244 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .240

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity)

Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

Location	Direct Beta (dpm/100cm^2)	Direct Alpha (dpm/100cm^2)
F1	1325	2649
F3		1541
F5	1182	2364
F6	1411	2823
F8		1212
F19	1733	3467
F22	1083	2167

All concrete with elevated direct measurement readings was identified, marked and segregated from clean concrete. Concrete with elevated readings (above release limits) will be controlled until shipped off-site as radiological waste.

Removable Surface Activity Measurements
Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	82	38.1	134	-0.6	2.5	12.9
F2	-13	17.4	134	-0.6	2.5	12.9
F3	4.3	12.6	134	-0.6	2.5	12.9
F4	17	19.2	134	-0.6	2.5	12.9
F5	-22	21.3	134	-0.6	2.5	12.9
F6	61	33.2	134	-0.6	2.5	12.9
F7	0	9.3	134	-0.6	2.5	12.9
F8	17	19.2	134	-0.6	2.5	12.9
F9	-26	22.8	134	-0.6	2.5	12.9
F10	0	9.3	134	-0.6	2.5	12.9
F11	87	39.2	134	2.3	5.1	12.9
F12	17	19.2	134	2.3	5.1	12.9
F13	8.7	15.2	134	-0.6	2.5	12.9
F14	-22	21.3	134	-0.6	2.5	12.9
F15	-4.3	12.6	134	-0.6	2.5	12.9
F16	-8.7	15.2	134	-0.6	2.5	12.9
F17	-30	24.2	134	-0.6	2.5	12.9
F18	39	27.1	134	-0.6	2.5	12.9
F19	4.3	12.6	134	-0.6	2.5	12.9
F20	-13	17.4	134	-0.6	2.5	12.9
F21	39	27.1	134	2.3	5.1	12.9
F22	-13	17.4	134	-0.6	2.5	12.9
F23	8.7	15.2	134	-0.6	2.5	12.9
F24	-43	28.3	134	-0.6	2.5	12.9
F25	43	28.3	134	-0.6	2.5	12.9
F26	-8.6	15.1	134	5.2	7.6	12.9
F27	12.9	17.3	134	-0.6	2.5	12.9
F28	-4.3	12.6	134	-0.6	2.5	12.9
F29	-30	24.2	134	-0.6	2.5	12.9
F30	25.9	22.7	134	2.3	5.1	12.9

Ludlum 2929 No. 115563 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	72	0.2
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	134	12.9

Elevated Removable Surface Activity Measurements
Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	8	1
F2	7	0
F3	7	0
F4	7	0
F5	8	1
F6	7	0
F7	7	0
F8	7	0
F9	6	-1
F10	7	0
F11	7	0
F12	8	1
F13	7	0
F14	7	0
F15	7	0
F16	8	1
F17	8	1
F18	8	1
F19	7	0
F20	7	0
F21	8	1
F22	8	1
F23	8	1
F24	7	0
F25	9	2
F26	9	2
F27	8	1
F28	7	0
F29	9	2
F30	8	1

Background dose rate: 7-8 uR/hr with Model 19, No. 95453

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

	Beta				Alpha		
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
23	-140	219.1	-61.7	23	-280	438.2	-123.3

$t_{1-\alpha}$ 1.714

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements
Molycorp - Building 14 Survey Unit

Foundation Material (Footer and Slab)

n	$\bar{x}$	s	μ_α
30	0.5	0.7	0.8

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Yes

Appendix B

Building 26 Foundation Data Package

Molycorp Washington, PA

October, 2002

Building 26 Foundation Data Package

This data package contains final status survey information for Building 26, Molycorp, Washington, PA site. The underside of the building's foundation (slab and supporting structural material) was surveyed as an unaffected foundation. The building's footer was not excavated as a part of the slab removal, and is not included in this report. The footer will be removed in the future and surveyed for final status at that time.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 26 foundation provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the foundation (slab portion only) of Building 26 is suitable for unrestricted use and release.

DDO-138 Radiation Protection Survey Report

Site: Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-15-02	1600	Bldg 26 Slab	02-1281

RWP Number: N/A

Purpose of Survey: ☐ RWP ☐ Routine Survey ☒ Unconditional Release ☐ Other

Page 1 of 3

Survey Title: FSS Foundations (underside)

/

1 minute statics taken on concrete.

	BKG	MDA
Inst #1	β- 144	β 253
	α 8	α 92
Inst #2	Bkg.	MDA
	β- 144	β 244
	α- 8	α 81

Model 19 22526 DWC 1-29-03

Bkgd Readings 9-10 μR/Hr.

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12	N	
13		A
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

Legend

00 = mRem/h gamma | 00 C = mRem/h gamma contact | D = Smear Location | ▽ = Air Sample Location | -X-X-X- = Rope, Boundary, or Barrier

00 β = mRem/h beta | 00 βC = mRem/h beta contact | —D— = Large Area Wipe | = Bulk Material Sample

Section 2: Instrument Used

	Instrument Model/SN	Cal Due Date	Probe Model/SN	Cal Due Date	Detector Eff. β-(cpm/dpm) α	MDA β-	MDA α	Other β-	Other α
Inst #1	2350-1 / 126190	1-16-03	43-106 / 133871	12-14-02	.231 / .172	793	115	376	4.4
	2929 / 115563	6-14-03	43-10 / 127216	6-14-03	.231 / .347	134	13	71	.23
Inst #2	2350-1 / 129414	8-2-03	43-106 / 128914	2-2-03	.240 / .195	677	78	296	2.6
		~				~			
			A					A	

Section 3: Review and Approval

Survey Performed By (Sign)	Area Posted and/or Barricaded	Date and Time
Mark Blaunsick / John Huber	☐ Yes ☒ No ☐ Not Required	10-15-02 / 1600
Radiation Safety Officer (Print Name & Sign)		Date and Time
Steve Kowalski / Steve Kowalski		10-16-02 / 1130

Survey # 02-1281

Radiological Survey Results - Survey Location Indicator

Survey Area Information: FSS Foundation's (underside) Bldg. 26

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	431	8	419	357	6	12	-6.6	Ø
2	463	6	430	341	5	12	-6.6	17.3
3	408	9	381	312	8	12	-6.6	-22
4	508	5	482	377	3	13	-6.6	26
5	633	13	603	387	10	13	-6.6	17
6	573	6	551	348	4	14	-6.6	-17
7	596	8	574	363	6	14	-6.6	30
8	604	10	582	359	7	12	2.2	17
9	505	4	482	327	3	13	-6.6	-22
10	628	11	610	387	9	13	-6.6	26
11	563	7	546	358	4	15	-6.6	87
12	571	10	547	373	8	14	-6.6	-39
13	640	8	611	381	5	15	-6.6	Ø
14	566	11	543	337	9	15	-6.6	-56
15	557	9	538	392	6	12	5.1	30

Inst # 1

Survey # 02-1281

Radiological Survey Results - Survey Location Indicator

Survey Area Information: FSS Foundation's (Underside) Bldg. 26

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
16	560	6	539	338	8	13	-6.6	35
17	460	7	438	293	5	15	-6.6	17
18	390	6	369	289	4	15	-6.6	Ø
19	450	11	433	315	8	15	-6.6	43
20	500	12	478	288	10	14	2.2	-26
21	540	11	526	333	11	14	-6.6	35
22	520	19	509	310	17	15	-6.6	4.3
23	390	7	375	331	6	13	-6.6	65
24	440	10	418	314	4	13	-6.6	73
25	400	7	383	305	5	13	2.2	8.6
26	435	16	415	305	12	12	-6.6	26
27	440	24	420	279	20	13	-6.6	21.6
28	485	12	467	304	8	15	-6.6	17.3
29	603	21	554	349	19	15	2.2	-47.6
30	580	31	522	332	26	14	-6.6	38.9

Inst. #2

Results of Surface Scans
Molycorp - Building 26 Survey Unit

Underside of Foundation

Location	Beta Scan gross cpm	Beta Scan net cpm	Instrument Number
F1	431	55	1
F2	463	87	1
F3	408	32	1
F4	508	132	1
F5	633	257	1
F6	573	197	1
F7	596	220	1
F8	604	228	1
F9	505	129	1
F10	628	252	1
F11	563	187	1
F12	571	195	1
F13	640	264	1
F14	566	190	1
F15	557	181	1
F16	560	264	2
F17	460	164	2
F18	390	94	2
F19	450	154	2
F20	500	204	2
F21	540	244	2
F22	520	224	2
F23	390	94	2
F24	440	144	2
F25	400	104	2
F26	435	139	2
F27	440	144	2
F28	485	189	2
F29	603	307	2
F30	580	284	2

All foundation underside scans performed with either: #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Scan MDA Beta - 793 dpm/100cm^2
Scan background Beta - 376 cpm
Detector Eff. Beta - .231

or

2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Scan MDA Beta - 677 dpm/100cm^2
Scan background Beta - 296 cpm
Detector Eff. Beta - .240

Elevated Results of Surface Scans
Molycorp - Building 26 Survey Unit

Underside of Foundation

No elevated scan results were reported.

Direct Measurements (Total Activity)

Molycorp - Building 26 Survey Unit

Underside of Foundation

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)	Instrument Number
F1	419	357	62	144	-82	-355	122	253	-710	1
F2	430	341	89	144	-55	-238	130	253	-476	1
F3	381	312	69	144	-75	-325	124	253	-649	1
F4	482	377	105	144	-39	-169	134	253	-338	1
F5	603	387	216	144	72	312	161	253	623	1
F6	551	348	203	144	59	255	158	253	511	1
F7	574	363	211	144	67	290	160	253	580	1
F8	582	359	223	144	79	342	163	253	684	1
F9	482	327	155	144	11	48	147	253	95	1
F10	610	387	223	144	79	342	163	253	684	1
F11	546	358	188	144	44	190	155	253	381	1
F12	547	373	174	144	30	130	151	253	260	1
F13	611	381	230	144	86	372	164	253	745	1
F14	543	337	206	144	62	268	159	253	537	1
F15	538	392	146	144	2	9	144	253	17	1
F16	539	338	201	144	57	238	152	244	475	2
F17	438	293	145	144	1	4	139	244	8	2
F18	369	289	80	144	-64	-267	122	244	-533	2
F19	433	315	118	144	-26	-108	132	244	-217	2
F20	478	288	190	144	46	192	149	244	383	2
F21	526	333	193	144	49	204	150	244	408	2
F22	509	310	199	144	55	229	151	244	458	2
F23	375	331	44	144	-100	-417	112	244	-833	2
F24	418	314	104	144	-40	-167	129	244	-333	2
F25	383	305	78	144	-66	-275	122	244	-550	2
F26	415	305	110	144	-34	-142	130	244	-283	2
F27	420	279	141	144	-3	-13	138	244	-25	2
F28	467	304	163	144	19	79	143	244	158	2
F29	554	349	205	144	61	254	153	244	508	2
F30	522	332	190	144	46	192	149	244	383	2

All foundation underside direct measurements performed with either: #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Direct MDA Beta - 253 dpm/100cm^2
Direct background Beta - 144 cpm
Detector Eff. Beta - .231

or

2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Direct MDA Beta - 244 dpm/100cm^2
Direct background Beta - 144 cpm
Detector Eff. Beta - .240

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide alpha activity.

Elevated Direct Measurements (Total Activity)

Molycorp - Building 26 Survey Unit

Underside of Foundation

No elevated direct measurements were reported.

Removable Surface Activity Measurements
Molycorp - Building 26 Survey Unit

Underside of Foundation

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	0	9.2	134	-6.6	8.6	13
F2	17.3	19.3	134	-6.6	8.6	13
F3	-22	21.2	134	-6.6	8.6	13
F4	26	22.8	134	-6.6	8.6	13
F5	17	19.2	134	-6.6	8.6	13
F6	-17	19.2	134	-6.6	8.6	13
F7	30	24.2	134	-6.6	8.6	13
F8	17	19.2	134	2.2	4.9	13
F9	-22	21.2	134	-6.6	8.6	13
F10	26	22.8	134	-6.6	8.6	13
F11	87	39.1	134	-6.6	8.6	13
F12	-39	27.1	134	-6.6	8.6	13
F13	0	9.2	134	-6.6	8.6	13
F14	-56	31.9	134	-6.6	8.6	13
F15	30	24.2	134	5.1	7.5	13
F16	35	25.8	134	-6.6	8.6	13
F17	17	19.2	134	-6.6	8.6	13
F18	0	9.2	134	-6.6	8.6	13
F19	43	28.3	134	-6.6	8.6	13
F20	-26	22.8	134	2.2	4.9	13
F21	35	25.8	134	-6.6	8.6	13
F22	4.3	12.5	134	-6.6	8.6	13
F23	65	34.1	134	-6.6	8.6	13
F24	73	36.0	134	-6.6	8.6	13
F25	8.6	15.1	134	2.2	4.9	13
F26	26	22.8	134	-6.6	8.6	13
F27	21.6	21.1	134	-6.6	8.6	13
F28	17.3	19.3	134	-6.6	8.6	13
F29	-47.6	29.6	134	2.2	4.9	13
F30	38.9	27.1	134	-6.6	8.6	13

Smears counted with Ludlum 2929 No. 115563 with 43-10 No. 127216

	Beta	Alpha
Background (cpm)	71	0.23
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	134	13

Elevated Removable Surface Activity Measurements

Molycorp - Building 26 Survey Unit

Underside of Foundation

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 26 Survey Unit

Underside of Foundation

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	12	2
F2	12	2
F3	12	2
F4	13	3
F5	13	3
F6	14	4
F7	14	4
F8	12	2
F9	13	3
F10	13	3
F11	15	5
F12	14	4
F13	15	5
F14	15	5
F15	12	2
F16	13	3
F17	15	5
F18	15	5
F19	15	5
F20	14	4
F21	14	4
F22	15	5
F23	13	3
F24	13	3
F25	13	3
F26	12	2
F27	13	3
F28	15	5
F29	15	5
F30	14	4

Background dose rate: 9-10 uR/hr with Model 19, No. 22526

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 26 Survey Unit

Underside of Foundation

Beta				Alpha			
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	49	239.7	123.5	30	98	479.3	246.9

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements

Molycorp - Building 26 Survey Unit

Underside of Foundation

n	$\bar{x}$	s	μ_α
30	3.6	1.1	4.0

$t_{1-\alpha}$ 1.697

	Guidelines/Conditions Satisfied?
→	Yes

DDO-138 Radiation Protection Survey Report	Site Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-22-02	1700	Bldg 26	02-1317

RWP Number N/A | Purpose of Survey ☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other | Page 1 of 2

Survey Title: FSS Panels / I-Beams (Metal)

1 Minute static's taken on Metal

	BKG	MDA
β⁻	27	116
α	2	54

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13	N	A
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

Model 19 #22526 due 1-29-03

Bkgd Readings 8-10 μr/hr

Legend
00 = mRem/h gamma 00 C = mRem/h gamma contact ⊃ = Smear Location ▽ = Air Sample Location -X-X-X- = Rope Boundary or Barrier
00 β = mRem/h beta 00 βC = mRem/h beta contact —⊃— = Large Area Wipe = Bulk Material Sample

Section 2. Instrument Used

Instrument Model/SN		Cal Due Date	Probe Model/SN		Cal Due Date	Detector Eff β (cpm/dpm)	α	MDA β⁻	α	Other BKG β⁻	α
2350-1	126190	1-16-03	43-106	133871	12-14-02	.231	.172	824	85	406	2.4
2929	115563	6-14-03	43-10	127216	6-14-03	.231	.347	136	13.5	73	.25
N/A											

Section 3: Review and Approval

Survey Performed By (Sign) Mark Blonciak / John Huber [signatures]

Area Posted and/or Barricaded ☐ Yes ☒ No ☐ Not Required

Date and Time 10-22-02 / 1700

Radiation Safety Officer (Print Name & Sign) Steve Kowalski / Steve Kowalski [signature]

Date and Time 10-22-02 / 1715

Radiological Survey Results - Survey Location Indicator Survey # 02-1317

Survey Area Information: FSS Panels / I Beams from Bldg # 26

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	524	17	491	436	14	8	-.7	4.3
2	361	3	344	313	2	8	-.7	22
3	395	9	362	315	7	8	-.7	-4.3
4	377	4	364	336	2	8	-.7	-22
5	335	7	290	265	5	8	2.2	-13
6	366	5	352	295	3	10	-.7	13
7	461	9	436	317	6	10	2.2	27
8	517	11	488	383	8	10	-.7	35
9	448	4	420	356	3	10	-.7	-22
10	503	9	489	388	6	10	-.7	65
11	448	3	411	390	2	11	-.7	8.7
12	447	7	412	387	5	11	-.7	-13
13	378	8	362	312	6	11	2.2	0
14	394	5	359	308	4	11	-.7	27
15	362	4	337	323	3	11	-.7	-17

Results of Surface Scans

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

Location	Beta Scan gross cpm	Beta Scan net cpm
F1	524	118
F2	361	-45
F3	395	-11
F4	377	-29
F5	335	-71
F6	366	-40
F7	461	55
F8	517	111
F9	448	42
F10	503	97
F11	448	42
F12	447	41
F13	378	-28
F14	394	-12
F15	362	-44

All foundation underside metal component scans performed with Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Scan MDA Beta - 824 dpm/100cm^2
Scan background Beta - 406 cpm
Detector Eff. Beta - .231

Elevated Results of Surface Scans

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

No elevated scan results were reported.

Direct Measurements (Total Activity)

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)
F1	491	436	55	27	28	121	77	116	242
F2	344	313	31	27	4	17	65	116	35
F3	362	315	47	27	20	87	73	116	173
F4	364	336	28	27	1	4	63	116	9
F5	290	265	25	27	-2	-9	61	116	-17
F6	352	295	57	27	30	130	78	116	260
F7	436	317	119	27	92	398	103	116	797
F8	488	383	105	27	78	338	97	116	675
F9	420	356	64	27	37	160	81	116	320
F10	489	388	101	27	74	320	96	116	641
F11	411	390	21	27	-6	-26	59	116	-52
F12	412	387	25	27	-2	-9	61	116	-17
F13	362	312	50	27	23	100	74	116	199
F14	359	308	51	27	24	104	75	116	208
F15	337	323	14	27	-13	-56	54	116	-113

All foundation underside metal component direct measurements performed with Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Direct MDA Beta - 116 dpm/100cm^2
Direct background Beta - 27 cpm
Detector Eff. Beta - .231

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide alpha activity.

Elevated Direct Measurements (Total Activity)

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

No elevated direct measurements were reported.

Removable Surface Activity Measurements

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	4.3	12.6	136	-0.7	2.8	13.5
F2	22	21.3	136	-0.7	2.8	13.5
F3	-4.3	12.6	136	-0.7	2.8	13.5
F4	-22	21.3	136	-0.7	2.8	13.5
F5	-13	17.4	136	2.2	4.9	13.5
F6	13	17.4	136	-0.7	2.8	13.5
F7	27	23.2	136	2.2	4.9	13.5
F8	35	25.9	136	-0.7	2.8	13.5
F9	-22	21.3	136	-0.7	2.8	13.5
F10	65	34.2	136	-0.7	2.8	13.5
F11	8.7	15.2	136	-0.7	2.8	13.5
F12	-13	17.4	136	-0.7	2.8	13.5
F13	0	9.4	136	2.2	4.9	13.5
F14	27	23.2	136	-0.7	2.8	13.5
F15	-17	19.2	136	-0.7	2.8	13.5

Smears counted with Ludlum 2929 No. 115563 with 43-10 No. 127216

	Beta	Alpha
Background (cpm)	73	0.25
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	136	13.5

Elevated Removable Surface Activity Measurements

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	8	-1
F2	8	-1
F3	8	-1
F4	8	-1
F5	8	-1
F6	10	1
F7	10	1
F8	10	1
F9	10	1
F10	10	1
F11	11	2
F12	11	2
F13	11	2
F14	11	2
F15	11	2

Background dose rate: 8-10 uR/hr with Model 19, No. 22526

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

Beta				Alpha			
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
15	112	140.6	175.6	15	224	281.3	351.3

$t_{1-\alpha}$ 1.753

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements

Molycorp - Building 26 Survey Unit

Underside of Foundation, Metal Structure

n	$\bar{x}$	s	μ_α
15	0.7	1.3	1.3

$t_{1-\alpha}$ 1.753

Guidelines/Conditions Satisfied?

Yes

Appendix C

Building 28 Foundation Data Package

Molycorp Washington, PA

October, 2002

Building 28 Foundation Data Package

This data package contains final status survey information for Building 28, Molycorp, Washington, PA site. The underside of the building's foundation/slab was surveyed as an affected foundation. The building's footer was not excavated as a part of the slab removal, and is not included in this report. The footer will be removed in the future and surveyed for final status at that time.

Several sections of concrete were identified with elevated levels of activity and were segregated from the clean concrete. Clean concrete, surveyed and found to be below release limits, remains on the footprint of the building and awaits verification surveys. Concrete with elevated readings was segregated and will be treated and processed as rad waste.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 28 foundation provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the foundation (slab portion only) of Building 28 is suitable for unrestricted use and release.

	DDO-138 Radiation Protection Survey Report	Site Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-3-02	1630	Bldg-28	02-1209

RWP Number	Purpose of Survey	Page
N/A	☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other	1 of 3

Survey Title: FSS underside Bldg 28

* All areas marked To be sent To R.M.A For RAD WASTE. shipment

1 Minute STATIC'S TAKEN ON Concrete

		BKG	MDA
INST #1	B⁻	144	253
	α	8	92

		BKG	MDA
INST #2	B⁻	144	244
	α	8	81

Model #9 95453 Due 12-12-02

Bkgd Readings 8 HR/hr → 10 HR/hr

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

N/A

Legend

00 = mRem/h gamma | 00 C = mRem/h gamma contact | D = Smear Location | ▽ = Air Sample Location | -X-X-X- = Rope, Boundary or Barrier

00 β = mRem/h beta | 00 βC = mRem/h beta contact | —D— = Large Area Wipe | = Bulk Material Sample

Section 2: Instrument Used

	Instrument Model/SN		Cal Due Date	Probe Model/SN		Cal Due Date	Detector Eff B⁻ (cpm/dpm)	Detector Eff α	MDA B⁻	MDA α	Other B⁻ BKG	Other α
INST #1	2350-1	126190	1-16-03	43-106	133871	12-14-02	.231	.172	830	110	412	4
INST #2	2350-1	129414	8-2-03	43-106	128914	2-2-03	.240	.195	768	95	381	2.4
	2929	115563	6-14-03	43-10	127216	6-14-03	.231	.347	134	11.9	71	.12

Section 3: Review and Approval

Survey Performed By (Sign)	Area Posted and/or Barricaded	Date and Time
Mark Blaucak	☐ Yes ☒ No ☐ Not Required	10-3-02 / 1630

Radiation Safety Officer (Print Name & Sign)	Date and Time
Steve Kowalski / Steve Kowalski	

Survey # 02-1209

Radiological Survey Results - Survey Location Indicator

Survey Area Information: Bldg # 28 FSS

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsn) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	660	9	620	381	6	13	2.5	35
2	490	6	476	355	8	13	-.34	-22
3	680	8	649	416	7	13	-.34	4.3
4	680	12	626	530	11	12	-.34	56
5	700	14	602	455	22	10	-.34	52
* 6	820	16	744	470	14	12	-.34	17
7	860	9	785	528	8	10	2.5	8.6
8	850	5	791	639	5	8	-.34	-8.6
9	640	10	624	442	4	10	2.5	4.3
10	710	8	686	469	9	10	-.34	35
11	740	6	710	499	7	8	-.34	4.3
12	690	9	674	448	5	10	2.5	-52
13	740	6	701	489	4	9	-.34	13
14	680	12	654	419	10	10	-.34	-17
15	650	7	635	461	8	10	2.5	-43

INST. #1

Survey # 02-1209

Radiological Survey Results - Survey Location Indicator

Survey Area Information: Bldg. 28 FSS (underside)

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
16	632	11	605	359	9	11	-.34	13
17	673	8	651	375	5	12	-.34	17
18	780	10	768	435	6	11	-.34	-8.7
19	796	12	784	609	6	10	2.5	-48
20	1120	21	1091	365	17	11	-.34	-35
21	796	10	768	329	7	11	-.34	-27
22	797	19	769	499	15	10	-.34	-30
23	410	8	397	300	7	10	-.34	4.3
24	567	17	535	310	8	10	5.4	-17
25	448	9	410	308	5	12	-.34	17
26	520	11	495	383	7	11	-.34	-8.7
27	471	5	422	317	3	11	-.34	-26
28	675	18	643	365	14	12	-.34	22
29	683	16	647	319	8	13	-.34	-17
30	638	21	610	320	15	13	5.4	35
31	630	13	597	390	8	14	-.34	34.6
32	525	17	493	350	9	12	-.34	-77.9
33	606	15	578	384	7	13	-.34	-8.6
34	573	10	558	388	7	15	-.34	4.3
35	451	13	426	338	9	12	-.34	34.6
36	533	19	501	327	15	13	2.5	60.6
37	617	20	598	490	17	16	-.34	12.9
38	530	18	505	378	14	15	-.34	30.3
39	999	19	700	577	15	17	-.34	17.3

Inst # 2

Results of Surface Scans
Molycorp - Building 28 Survey Unit

Underside of Foundation

Location	Beta Scan gross cpm	Beta Scan net cpm	Instrument Number
F1	660	248	1
F2	490	78	1
F3	680	268	1
F4	680	268	1
F5	700	288	1
F6	820	408	1
F7	860	448	1
F8	850	438	1
F9	640	228	1
F10	710	298	1
F11	740	328	1
F12	690	278	1
F13	740	328	1
F14	680	268	1
F15	650	238	1
F16	632	251	2
F17	673	292	2
F18	780	399	2
F19	796	415	2
F20	1120	739	2
F21	796	415	2
F22	797	416	2
F23	410	29	2
F24	567	186	2
F25	448	67	2
F26	520	139	2
F27	471	90	2
F28	675	294	2
F29	683	302	2
F30	638	257	2
F31	630	249	2
F32	525	144	2
F33	606	225	2
F34	573	192	2
F35	451	70	2
F36	533	152	2
F37	617	236	2
F38	530	149	2
F39	739	358	2

All foundation underside scans performed with either: #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Scan MDA Beta - 830 dpm/100cm^2
Scan background Beta - 412 cpm
Detector Eff. Beta - .231

or

2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Scan MDA Beta - 768 dpm/100cm^2
Scan background Beta - 381 cpm
Detector Eff. Beta - .240

Elevated Results of Surface Scans

Molycorp - Building 28 Survey Unit

Underside of Foundation

No elevated scan results were reported.

Direct Measurements (Total Activity)

Molycorp - Building 28 Survey Unit

Underside of Foundation

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)	Instrument Number
F1	620	381	239	144	95	411	166	253	823	1
F2	476	355	121	144	-23	-100	138	253	-199	1
F3	649	416	233	144	89	385	165	253	771	1
F4	626	530	96	144	-48	-208	131	253	-416	1
F5	602	455	147	144	3	13	145	253	26	1
F6	744	470	274	144	130	563	173	253	1126	1
F7	785	528	257	144	113	489	170	253	978	1
F8	791	639	152	144	8	35	146	253	69	1
F9	624	442	182	144	38	165	153	253	329	1
F10	686	469	217	144	73	316	161	253	632	1
F11	710	499	211	144	67	290	160	253	580	1
F12	674	448	226	144	82	355	163	253	710	1
F13	701	489	212	144	68	294	160	253	589	1
F14	654	419	235	144	91	394	165	253	788	1
F15	635	461	174	144	30	130	151	253	260	1
F16	605	359	246	144	102	425	161	244	850	2
F17	651	375	276	144	132	550	167	244	1100	2
F18	768	435	333	144	189	788	178	244	1575	2
F19	784	609	175	144	31	129	146	244	258	2
F20	1091	365	726	144	582	2425	241	244	4850	2
F21	768	329	439	144	295	1229	197	244	2458	2
F22	769	499	270	144	126	525	166	244	1050	2
F23	397	300	97	144	-47	-196	127	244	-392	2
F24	535	310	225	144	81	338	157	244	675	2
F25	410	308	102	144	-42	-175	128	244	-350	2
F26	495	383	112	144	-32	-133	131	244	-267	2
F27	422	317	105	144	-39	-163	129	244	-325	2
F28	643	365	278	144	134	558	168	244	1117	2
F29	647	319	328	144	184	767	177	244	1533	2
F30	610	320	290	144	146	608	170	244	1217	2

F31	597	390	207	144	63	263	153	244	525	2
F32	493	350	143	144	-1	-4	138	244	-8	2
F33	578	384	194	144	50	208	150	244	417	2
F34	558	388	170	144	26	108	145	244	217	2
F35	426	338	88	144	-56	-233	124	244	-467	2
F36	501	327	174	144	30	125	146	244	250	2
F37	598	490	108	144	-36	-150	130	244	-300	2
F38	505	378	127	144	-17	-71	134	244	-142	2
F39	700	577	123	144	-21	-88	133	244	-175	2

All foundation underside direct measurements performed with either: #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Direct MDA Beta - 253 dpm/100cm^2
Direct background Beta - 144 cpm
Detector Eff. Beta - .231

or

2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Direct MDA Beta - 244 dpm/100cm^2
Direct background Beta - 144 cpm
Detector Eff. Beta - .240

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity) and Averaging Results

Molycorp - Building 28 Survey Unit

Underside of Foundation

Location	Direct Beta (dpm/100cm^2)	Direct Alpha (dpm/100cm^2)
F6		1126
F17		1100
F18		1575
F20	2425	4850
F21	1229	2458
F22		1050
F28		1117
F29		1533
F30		1217

All concrete with elevated direct measurement readings was identified, marked and segregated from clean concrete. Concrete with elevated readings (above release limits) will be controlled until shipped off-site as radiological waste.

Removable Surface Activity Measurements

Molycorp - Building 28 Survey Unit

Underside of Foundation

Location (see map)	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA	Instrument Used
F1	35	25.8	134	35	19.7	12	1
F2	-22	21.2	134	-22	15.6	12	1
F3	4.3	12.5	134	4.3	6.9	12	1
F4	56	31.9	134	56	24.9	12	1
F5	52	30.8	134	52	24.0	12	1
F6	17	19.2	134	17	13.7	12	1
F7	8.6	15.1	134	8.6	9.8	12	1
F8	-8.6	15.1	134	-8.6	9.8	12	1
F9	4.3	12.5	134	4.3	6.9	12	1
F10	35	25.8	134	35	19.7	12	1
F11	4.3	12.5	134	4.3	6.9	12	1
F12	-52	30.8	134	-52	24.0	12	1
F13	13	17.4	134	13	12.0	12	1
F14	-17	19.2	134	-17	13.7	12	1
F15	-43	28.3	134	-43	21.8	12	1
F16	13	17.4	134	13	12.0	12	1
F17	17	19.2	134	17	13.7	12	1
F18	-8.7	15.2	134	-8.7	9.8	12	1
F19	-48	29.7	134	-48	23.1	12	1
F20	-35	25.8	134	-35	19.7	12	1
F21	-27	23.1	134	-27	17.3	12	1
F22	-30	24.2	134	-30	18.2	12	1
F23	4.3	12.5	134	4.3	6.9	12	1
F24	-17	19.2	134	-17	13.7	12	1
F25	17	19.2	134	17	13.7	12	1
F26	-8.7	15.2	134	-8.7	9.8	12	1
F27	-26	22.8	134	-26	17.0	12	1
F28	22	21.2	134	22	15.6	12	1
F29	-17	19.2	134	-17	13.7	12	1
F30	35	25.8	134	35	19.7	12	1
F31	35	25.8	134	35	19.7	12	1

F32	-78	37.2	134	-78	29.4	12	1
F33	-8.6	15.1	134	-8.6	9.8	12	1
F34	4.3	12.5	134	4.3	6.9	12	1
F35	35	25.8	134	35	19.7	12	1
F36	61	33.2	134	61	26.0	12	1
F37	13	17.4	134	13	12.0	12	1
F38	30	24.2	134	30	18.2	12	1
F39	17	19.2	134	17	13.7	12	1

Smears counted with Ludlum 2929 No. 115563 with 43-10 No. 127216

	Beta	Alpha
Background (cpm)	71	0.12
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	134	12.0

Elevated Removable Surface Activity Measurements

Molycorp - Building 28 Survey Unit

Underside of Foundation

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 28 Survey Unit

Underside of Foundation

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	13	4
F2	13	4
F3	13	4
F4	12	3
F5	10	1
F6	12	3
F7	10	1
F8	8	-1
F9	10	1
F10	10	1
F11	8	-1
F12	10	1
F13	9	0
F14	10	1
F15	10	1
F16	11	2
F17	12	3
F18	11	2
F19	10	1
F20	11	2
F21	11	2
F22	10	1
F23	10	1
F24	10	1
F25	12	3
F26	11	2
F27	11	2
F28	12	3
F29	13	4
F30	13	4
F31	14	5
F32	12	3
F33	13	4
F34	15	6
F35	12	3
F36	13	4
F37	16	7
F38	15	6
F39	17	8

Background dose rate: 8-10 uR/hr with Model 19, No. 22526

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 28 Survey Unit

Underside of Foundation

Beta				Alpha			
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	112	226.4	181.9	30	224	452.7	363.8

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements

Molycorp - Building 28 Survey Unit

Underside of Foundation

n	$\bar{x}$	s	μ_α
39	3.4	2.0	3.9

$t_{1-\alpha}$ 1.686

Guidelines/Conditions Satisfied?
Yes

Appendix D

Building 38 Foundation Data Package

Molycorp Washington, PA

October, 2002

Building 38 Foundation Data Package

This data package contains final status survey information for Building 38, Molycorp, Washington, PA site. The underside of the building's foundation/slab was surveyed as an affected foundation. The building's footer was not excavated as a part of the slab removal, and is not included in this report.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 38 foundation provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the foundation (slab portion only) of Building 38 is suitable for unrestricted use and release.

DOO-138 Radiation Protection Survey Report

Site: Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-22-02	1300	Bldg 38	02-1316

RWP Number: N/A

Purpose of Survey: ☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other

Page 1 of 3

Survey Title: FSS SLAB (underside)

1 MINUTE STATIC'S TAKEN on CONCRET

	BKG	MDA
β	144	253
α	8	92

Model #19 95453 Due 12-12-02

Bkgd Readings: 7-8 µR/hr

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1–26	N/A	N/A

Legend

00 = mRem/h gamma; 00 C = mRem/h gamma contact; [symbol] = Smear Location; [symbol] = Air Sample Location; -X-X-X- = Rope Boundary or Barrier

00 β = mRem/h beta; 00 βC = mRem/h beta contact; [symbol] = Large Area Wipe; [symbol] = Bulk Material Sample

Section 2: Instrument Used

Instrument Model/SN	Cal Due Date	Probe Model/SN	Cal Due Date	Detector Eff β cpm/dpm	Detector Eff α cpm/dpm	MDA β	MDA α	Other BKG β	Other BKG α
2350-1/126190	1-16-03	43-106/133871	12-14-02	.231	.172	804 (corrected to 732)	137 (corrected to 125)	320	5.2
2929/115563	6-14-03	43-10/127216	6-14-03	.231	.347	136	13.5	73	.25
N/A									

Section 3: Review and Approval

Survey Performed By (Sign): [signature] / [signature]

Area Posted and/or Barricaded: ☐ Yes ☐ No ☒ Not Required

Date and Time: 10-22-02 / 1300

Radiation Safety Officer (Print Name / Sign): Steve Kowalski / [signature]

Date and Time: 10-22-02

Radiological Survey Results - Survey Location Indicator

Survey Area Information: FSS SLAB (underside) Survey # 02-1316

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	380	7	355	330	6	8	-.7	22
2	440	11	412	301	3	8	-.7	-52
3	460	5	425	327	4	8	-.7	-39
4	420	9	408	341	7	8	-.7	22
5	400	11	386	265	10	8	-.7	4.3
6	410	12	390	314	10	9	-.7	-17
7	420	7	407	328	4	9	-.7	13
8	420	8	394	314	6	9	-.7	-39
9	440	14	424	316	9	8	-.7	-8.7
10	420	8	394	298	3	9	-.7	13
11	430	7	416	331	4	9	-.7	-4.3
12	410	6	392	275	2	9	-.7	69
13	460	13	436	363	10	8	-.7	-13
14	450	9	427	351	8	8	-.7	56
15	460	5	420	338	3	9	-.7	-26
16	410	6	390	305	4	9	-.7	39
17	430	4	412	321	2	9	-.7	-17
18	450	7	421	351	5	9	2.2	-13
19	530	9	514	310	7	9	-.7	-8.7
20	460	4	441	358	2	8	-.7	4.3
21	430	5	415	344	3	8	-.7	-22
22	460	3	438	335	2	9	-.7	35
23	520	7	500	346	6	8	2.2	26
24	460	4	449	336	1	8	2.2	17
25	450	6	445	343	3	9	-.7	13
26	510	7	496	364	2	9	2.2	-8.7
27	410	8	393	345	5	9	-.7	-43

Radiological Survey Results - Survey Location Indicator

Survey Area Information: FSS SLAB (underside) survey # 02-1316

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
28	400	8	385	329	2	9	-.7	17
29	420	13	405	339	8	9	-.7	-26
30	470	7	457	340	3	9	2.2	-22

Results of Surface Scans

Molycorp - Building 38 Survey Unit

Underside of Foundation

Location	Beta Scan gross cpm	Beta Scan net cpm
F1	380	60
F2	440	120
F3	460	140
F4	420	100
F5	400	80
F6	410	90
F7	420	100
F8	420	100
F9	440	120
F10	420	100
F11	430	110
F12	410	90
F13	460	140
F14	450	130
F15	460	140
F16	410	90
F17	430	110
F18	450	130
F19	530	210
F20	460	140
F21	430	110
F22	460	140
F23	520	200
F24	460	140
F25	450	130
F26	510	190
F27	410	90
F28	400	80
F29	420	100
F30	470	150

All foundation underside scans performed with Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Scan MDA Beta - 732 dpm/100cm^2
Scan background Beta - 320 cpm
Detector Eff. Beta - .231

Elevated Results of Surface Scans

Molycorp - Building 38 Survey Unit

Underside of Foundation

No elevated scan results were reported

Direct Measurements (Total Activity)

Molycorp - Building 38 Survey Unit

Underside of Foundation

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)
F1	355	330	25	144	-119	-515	110	253	-1030
F2	412	301	111	144	-33	-143	135	253	-286
F3	425	327	98	144	-46	-199	132	253	-398
F4	408	341	67	144	-77	-333	123	253	-667
F5	386	265	121	144	-23	-100	138	253	-199
F6	390	314	76	144	-68	-294	126	253	-589
F7	407	328	79	144	-65	-281	127	253	-563
F8	394	314	80	144	-64	-277	127	253	-554
F9	424	316	108	144	-36	-156	135	253	-312
F10	394	298	96	144	-48	-208	131	253	-416
F11	416	331	85	144	-59	-255	128	253	-511
F12	392	275	117	144	-27	-117	137	253	-234
F13	436	363	73	144	-71	-307	125	253	-615
F14	427	351	76	144	-68	-294	126	253	-589
F15	420	338	82	144	-62	-268	128	253	-537
F16	390	305	85	144	-59	-255	128	253	-511
F17	412	321	91	144	-53	-229	130	253	-459
F18	421	351	70	144	-74	-320	124	253	-641
F19	514	310	204	144	60	260	158	253	519
F20	441	358	83	144	-61	-264	128	253	-528
F21	415	344	71	144	-73	-316	124	253	-632
F22	438	335	103	144	-41	-177	133	253	-355
F23	500	346	154	144	10	43	146	253	87
F24	449	336	113	144	-31	-134	136	253	-268
F25	445	343	102	144	-42	-182	133	253	-364
F26	496	364	132	144	-12	-52	141	253	-104
F27	393	345	48	144	-96	-416	118	253	-831
F28	385	329	56	144	-88	-381	120	253	-762
F29	405	339	66	144	-78	-338	123	253	-675
F30	457	340	117	144	-27	-117	137	253	-234

All foundation underside direct measurements performed with Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity) and Averaging Results

Molycorp - Building 38 Survey Unit (Unaffected Area)

No elevated direct measurements were reported.

Removable Surface Activity Measurements

Molycorp - Building 38 Survey Unit

Underside of Foundation

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	22	21.3	147	-0.7	2.8	11.5
F2	-52	30.9	147	-0.7	2.8	11.5
F3	-39	27.1	147	-0.7	2.8	11.5
F4	22	21.3	147	-0.7	2.8	11.5
F5	4.3	12.6	147	-0.7	2.8	11.5
F6	-17	19.2	147	-0.7	2.8	11.5
F7	13	17.4	147	-0.7	2.8	11.5
F8	-39	27.1	147	-0.7	2.8	11.5
F9	-8.7	15.2	147	-0.7	2.8	11.5
F10	13	17.4	147	-0.7	2.8	11.5
F11	-4.3	12.6	147	-0.7	2.8	11.5
F12	69	35.1	147	-0.7	2.8	11.5
F13	-13	17.4	147	-0.7	2.8	11.5
F14	56	31.9	147	-0.7	2.8	11.5
F15	-26	22.8	147	-0.7	2.8	11.5
F16	39	27.1	147	-0.7	2.8	11.5
F17	-17	19.2	147	-0.7	2.8	11.5
F18	-13	17.4	147	2.2	4.9	11.5
F19	-8.7	15.2	147	-0.7	2.8	11.5
F20	4.3	12.6	147	-0.7	2.8	11.5
F21	-22	21.3	147	-0.7	2.8	11.5
F22	35	25.9	147	-0.7	2.8	11.5
F23	26	22.8	147	2.2	4.9	11.5
F24	17	19.2	147	2.2	4.9	11.5
F25	13	17.4	147	-0.7	2.8	11.5
F26	-8.7	15.2	147	2.2	4.9	11.5
F27	-4.3	12.6	147	-0.7	2.8	11.5
F28	17	19.2	147	-0.7	2.8	11.5
F29	-26	22.8	147	-0.7	2.8	11.5
F30	-22	21.3	147	2.2	4.9	11.5

Ludlum 2929 No. 115566 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	73	0.18
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	147	11.5

Elevated Removable Surface Activity Measurements
Molycorp - Building 38 Survey Unit

Underside of Foundation

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 38 Survey Unit

Underside of Foundation

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	8	1
F2	8	1
F3	8	1
F4	8	1
F5	8	1
F6	9	2
F7	9	2
F8	9	2
F9	8	1
F10	9	2
F11	9	2
F12	9	2
F13	8	1
F14	8	1
F15	9	2
F16	9	2
F17	9	2
F18	9	2
F19	9	2
F20	8	1
F21	8	1
F22	9	2
F23	8	1
F24	8	1
F25	9	2
F26	9	2
F27	9	2
F28	9	2
F29	9	2
F30	9	2

Background dose rate: 7-8 uR/hr with Model 19, No. 95453

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 38 Survey Unit

Underside of Foundation

	Beta				Alpha		
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	-221	145.6	-175.8	30	-442	291.2	-351.6

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements
Molycorp - Building 38 Survey Unit

Underside of Foundation

n	$\bar{x}$	s	μ_α
30	1.6	0.5	1.8

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?
Yes

Appendix E

Building 39 Foundation Data Package

Molycorp Washington, PA

October, 2002

Building 39 Foundation Data Package

This data package contains final status survey information for Building 39, Molycorp, Washington, PA site. The underside of the building's foundation/slab was surveyed as an affected foundation. The building's footer was not excavated as a part of the slab removal, and is not included in this report.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 39 foundation provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the foundation (slab portion only) of Building 39 is suitable for unrestricted use and release.

RPP-OP-019

DDO-138 Radiation Protection Survey Report

Site Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-24-02	1600	Bldg 39	02-1355

RWP Number: N/A

Purpose of Survey: ☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other

Page 1 of 3

Survey Title: FSS SLAB (underside)

1 Minute STATIC'S TAKEN on Concrete

	BKG	MDA
B⁻	144	253
α	8	92

Model 19 #95453 Due 12-12-02

Bkgd Readings 9 μR/hr

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16	N/A	
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

Legend

00 = mRem/h gamma; 00 C = mRem/h gamma contact; ◯ = Smear Location; ▽ = Air Sample Location; -X-X-X- = Rope Boundary or Barrier

00 β = mRem/h beta; 00 βC = mRem/h beta contact; —◯— = Large Area Wipe; ☐ = Bulk Material Sample

Section 2: Instrument Used

Instrument Model/SN		Cal Due Date	Probe Model/SN		Cal Due Date	Detector Eff β (cpm/dpm)	MDA β	MDA α	Other BKG β⁻	Other BKG α
2350-1	126190	1-16-03	43-106	133871	12-14-02	.231	.172 607	60	220	1.2
2929	115563	6-14-03	43-10	127216	6-14-03	.231	.347 132	12.7	69	.18

Section 3: Review and Approval

Survey Performed By (Sign): Mark Blasnick

Area Posted and/or Barricaded: ☐ Yes ☒ No ☐ Not Required

Date and Time: 10-24-02 / 1600

Radiation Safety Officer (Print Name & Sign): Steve Kowalski / Steve Kowalski

Date and Time: 10-27-02 / 0800

Radiological Survey Results - Survey Location Indicator

Survey # 02-1355

Survey Area Information: FSS SLAB (underside)

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	420	7	397	351	6	10	-.5	78
2	530	5	515	413	3	12	2.4	22
3	400	8	391	342	4	11	2.4	30
4	520	9	501	364	4	14	-.5	8.7
5	450	10	435	330	5	13	-.5	26
6	440	7	424	345	9	13	-.5	-13
7	460	12	438	390	7	12	-.5	52
8	430	14	411	335	11	11	-.5	13
9	410	13	405	303	8	11	-.5	30
10	420	4	396	323	2	11	-.5	8.7
11	440	9	418	292	7	13	2.4	4.3
12	430	6	415	319	3	10	-.5	-8.7
13	420	5	402	316	2	10	-.5	0
14	440	8	421	330	4	11	-.5	30
15	470	11	446	354	6	13	-.5	17
16	430	7	413	348	3	12	-.5	-4.3
17	520	5	498	378	2	14	2.4	-8.7
18	440	9	420	331	5	10	-.5	22
19	430	5	418	376	4	11	-.5	-13
20	480	4	458	349	3	12	-.5	86.5
21	460	6	442	341	2	10	-.5	-8.7
22	430	4	417	330	2	12	-.5	17
23	410	3	394	308	1	11	-.5	0
24	400	5	384	354	4	12	-.5	22
25	420	7	412	320	6	12	-.5	-4.3
26	410	11	394	343	8	11	2.4	-13
27	450	6	432	325	5	14	2.4	26

Radiological Survey Results - Survey Location Indicator

Survey Area Information: FSS SLAB (underside)

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm^2) α	Smears (dpm/100 cm^2) β
28	460	13	438	335	8	13	-.5	-13
29	480	7	449	342	4	12	-.5	4.3
30	460	6	419	359	5	14	-.5	17

Results of Surface Scans
Molycorp - Building 39 Survey Unit

Underside of Foundation

Location	Beta Scan gross cpm	Beta Scan net cpm
F1	420	200
F2	530	310
F3	400	180
F4	520	300
F5	450	230
F6	440	220
F7	460	240
F8	430	210
F9	410	190
F10	420	200
F11	440	220
F12	430	210
F13	420	200
F14	440	220
F15	470	250
F16	430	210
F17	520	300
F18	440	220
F19	430	210
F20	480	260
F21	460	240
F22	430	210
F23	410	190
F24	400	180
F25	420	200
F26	410	190
F27	450	230
F28	460	240
F29	480	260
F30	460	240

All foundation underside scans performed with Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Scan MDA Beta - 607 dpm/100cm^2
Scan background Beta - 220 cpm
Detector Eff. Beta - .231

Elevated Results of Surface Scans
Molycorp - Building 39 Survey Unit

Underside of Foundation

No elevated scan results were reported

Direct Measurements (Total Activity)

Molycorp - Building 39 Survey Unit

Underside of Foundation

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)
F1	397	351	46	144	-98	-424	117	253	-848
F2	515	413	102	144	-42	-182	133	253	-364
F3	391	342	49	144	-95	-411	118	253	-823
F4	501	364	137	144	-7	-30	142	253	-61
F5	435	330	105	144	-39	-169	134	253	-338
F6	424	345	79	144	-65	-281	127	253	-563
F7	438	390	48	144	-96	-416	118	253	-831
F8	411	335	76	144	-68	-294	126	253	-589
F9	405	303	102	144	-42	-182	133	253	-364
F10	396	323	73	144	-71	-307	125	253	-615
F11	418	292	126	144	-18	-78	139	253	-156
F12	415	319	96	144	-48	-208	131	253	-416
F13	402	316	86	144	-58	-251	129	253	-502
F14	421	330	91	144	-53	-229	130	253	-459
F15	446	354	92	144	-52	-225	130	253	-450
F16	413	348	65	144	-79	-342	123	253	-684
F17	498	378	120	144	-24	-104	138	253	-208
F18	420	331	89	144	-55	-238	130	253	-476
F19	418	376	42	144	-102	-442	116	253	-883
F20	458	349	109	144	-35	-152	135	253	-303
F21	442	341	101	144	-43	-186	133	253	-372
F22	417	330	87	144	-57	-247	129	253	-494
F23	399	308	91	144	-53	-229	130	253	-459
F24	384	354	30	144	-114	-494	112	253	-987
F25	412	320	92	144	-52	-225	130	253	-450
F26	394	343	51	144	-93	-403	118	253	-805
F27	432	325	107	144	-37	-160	134	253	-320
F28	438	335	103	144	-41	-177	133	253	-355
F29	449	342	107	144	-37	-160	134	253	-320
F30	419	359	60	144	-84	-364	121	253	-727

All foundation underside direct measurements performed with Ludlum
Model 2350-1 No. 126190 with 43-106 No. 133871

Monitor Info:
Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity) and Averaging Results
Molycorp - Building 39 Survey Unit (Unaffected Area)

No elevated direct measurements were reported.

Removable Surface Activity Measurements
Molycorp - Building 39 Survey Unit

Underside of Foundation

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	78	37.1	132	-0.5	2.4	12.7
F2	22	21.2	132	2.4	5.2	12.7
F3	30	24.1	132	2.4	5.2	12.7
F4	8.7	15.1	132	-0.5	2.4	12.7
F5	26	22.7	132	-0.5	2.4	12.7
F6	-13	17.3	132	-0.5	2.4	12.7
F7	52	30.8	132	-0.5	2.4	12.7
F8	13	17.3	132	-0.5	2.4	12.7
F9	30	24.1	132	-0.5	2.4	12.7
F10	8.7	15.1	132	-0.5	2.4	12.7
F11	4.3	12.4	132	2.4	5.2	12.7
F12	-8.7	15.1	132	-0.5	2.4	12.7
F13	0	9.1	132	-0.5	2.4	12.7
F14	30	24.1	132	-0.5	2.4	12.7
F15	17	19.1	132	-0.5	2.4	12.7
F16	-4.3	12.4	132	-0.5	2.4	12.7
F17	-8.7	15.1	132	2.4	5.2	12.7
F18	22	21.2	132	-0.5	2.4	12.7
F19	-13	17.3	132	-0.5	2.4	12.7
F20	86.5	39.0	132	-0.5	2.4	12.7
F21	-8.7	15.1	132	-0.5	2.4	12.7
F22	17	19.1	132	-0.5	2.4	12.7
F23	0	9.1	132	2.4	5.2	12.7
F24	22	21.2	132	2.4	5.2	12.7
F25	-4.3	12.4	132	-0.5	2.4	12.7
F26	-13	17.3	132	-0.5	2.4	12.7
F27	26	22.7	132	-0.5	2.4	12.7
F28	-13	17.3	132	-0.5	2.4	12.7
F29	4.3	12.4	132	-0.5	2.4	12.7
F30	17	19.1	132	-0.5	2.4	12.7

Ludlum 2929 No. 115563 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	69	0.18
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	132	12.7

Elevated Removable Surface Activity Measurements

Molycorp - Building 39 Survey Unit

Underside of Foundation

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 39 Survey Unit

Underside of Foundation

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	10	1
F2	12	3
F3	11	2
F4	14	5
F5	13	4
F6	13	4
F7	12	3
F8	11	2
F9	11	2
F10	11	2
F11	13	4
F12	10	1
F13	10	1
F14	11	2
F15	13	4
F16	12	3
F17	14	5
F18	10	1
F19	11	2
F20	12	3
F21	10	1
F22	12	3
F23	11	2
F24	12	3
F25	12	3
F26	11	2
F27	14	5
F28	13	4
F29	12	3
F30	14	5

Background dose rate: 9 uR/hr with Model 19, No. 95453

Summary of Building Surface Direct Reading (Total Activity) Results
Molycorp - Building 39 Survey Unit

Underside of Foundation

	Beta				Alpha		
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	-254	115.2	-218.0	30	-507	230.3	-436.0

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements
Molycorp - Building 39 Survey Unit

Underside of Foundation

n	$\bar{x}$	s	μ_α
30	2.8	1.3	3.2

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Yes

Appendix F

Building 21-22 Footer Data Package

Molycorp Washington, PA

October, 2002

Building 21-22 Footers Data Package

This data package contains final status survey information for Building 21-22, Molycorp, Washington, PA site. The building's combined footers were surveyed in accordance with the Concrete Sampling and Management Plan.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 21-22 combined footers provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the footers of Building 21-22 are suitable for unrestricted use and release.

DOO-138 Radiation Protection Survey Report

Site: Molycorp Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-21-02	1700	Bldg #22/21	02-1292

RWP Number	Purpose of Survey	Page
NA	☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other	1 of 3

Survey Title: FSS Foundations (Footers)

1 Minute STATIC's TAKEN on Concrete

		BKG	MDA
Inst #1	β⁻	144	253
	α	8	92
Inst #2	β⁻	144	244
	α	8	81

Model 19 #22526 Due 1-29-03

Bkg Readings: 10 μR/hr

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1–26	N/A	N/A

Legend

00 = mRem/h gamma; 00 C = mRem/h gamma contact; ◯ = Smear Location; ▽ = Air Sample Location; -X-X-X- = Rope Boundary or Barrier

00 β = mRem/h beta; 00 βC = mRem/h beta contact; –◯– = Large Area Wipe; = Bulk Material Sample

Section 2 Instrument Used

Instrument Model/SN		Cal Due Date	Probe Model/SN		Cal Due Date	Detector Eff β (cpm/dpm)	α	MDA β⁻	α	Other BKG β⁻	α
2350-1	126190	1-16-03	43-106	133871	12-14-02	.231	.172	892	132	476	5.8
2350-1	129414	8-2-03	43-106	128914	2-2-03	.240	.195	808	115	422	5.6
2929	115563	6-14-03	43-10	127216	6-14-03	.231	.347	139	12.3	77	.15

Section 3 Review and Approval

Survey Performed By (Sign): Mark Blancuoll / John Fuller

Area Posted and/or Barricaded: ☒ Yes ☐ No ☐ Not Required

Date and Time: 10-21-02 / 1700

Radiation Safety Officer (Print Name & Sign): Steve Kowalski / Steve Kowalski

Date and Time: 10-22-02 / 1710

Radiological Survey Results - Survey Location Indicator

Survey # 02-129

Survey Area Information: FSS Foundations

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	680	15	639	408	11	10	-.43	-13
2	660	13	646	399	10	10	-.43	-48
3	660	9	624	384	8	12	-.43	-30
4	680	9	646	437	7	12	-.43	-69
5	640	12	630	394	13	15	-.43	4.3
6	780	8	726	473	6	15	-.43	0
7	680	5	644	414	4	16	-.43	-39
8	610	7	598	377	9	14	2.4	0
9	710	6	720	478	7	14	-.43	-52
10	660	10	642	456	8	14	-.43	-22
11	620	11	589	346	14	14	-.43	-43
12	560	10	535	355	15	14	-.43	-22
13	630	10	611	391	11	15	-.43	17
14	480	12	468	378	9	15	-.43	-13
15	500	8	497	382	5	14	-.43	-39
16	460	7	448	353	4	14	-.43	8.7
17	580	14	549	351	16	14	-.43	-22
18	560	6	533	354	7	15	-.43	13
19	460	9	443	345	9	15	2.4	-8.7
20	480	8	469	349	5	14	2.4	0

INST #1

Radiological Survey Results - Survey Location Indicator Survey # 02-1293

Survey Area Information: FSS Foundations

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
21	370	8	335	301	6	14	2.4	-30
22	455	7	429	324	6	14	-.43	-48
23	515	9	481	304	5	15	-.43	-8.7
24	401	4	316	312	4	14	-.43	13
25	577	5	538	348	3	14	-.43	17
26	610	7	570	360	5	16	-.43	-35
27	483	11	459	360	8	15	-.43	22
28	523	10	504	445	7	15	-.43	26
29	448	11	415	331	8	15	2.4	69
30	502	8	476	432	6	14	2.4	-22

INST #2

Results of Surface Scans

Molycorp - Building 21-22 Survey Unit

Footer Material

Location	Beta Scan gross cpm	Beta Scan net cpm	Instrument #
F1	680	204	1
F2	660	184	1
F3	660	184	1
F4	680	204	1
F5	640	164	1
F6	780	304	1
F7	680	204	1
F8	610	134	1
F9	710	234	1
F10	660	184	1
F11	620	144	1
F12	560	84	1
F13	630	154	1
F14	480	4	1
F15	500	24	1
F16	460	-16	1
F17	580	104	1
F18	560	84	1
F19	460	-16	1
F20	480	4	1
F21	370	-52	2
F22	455	33	2
F23	515	93	2
F24	401	-21	2
F25	577	155	2
F26	610	188	2
F27	483	61	2
F28	523	101	2
F29	448	26	2
F30	502	80	2

All footer material scans performed with either #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Scan MDA Beta - 892dpm/100cm^2
Scan background Beta - 476 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Scan MDA Beta - 808 dpm/100cm^2
Scan background Beta - 422 cpm
Detector Eff. Beta - .240

Elevated Results of Surface Scans

Molycorp - Building 21-22 Survey Unit

Footer Material

No elevated scan results were reported

Direct Measurements (Total Activity)

Molycorp - Building 21-22 Survey Unit

Footer Material

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)	Instrument #
F1	639	408	231	144	87	377	164	253	753	1
F2	646	399	247	144	103	446	168	253	892	1
F3	624	384	240	144	96	416	166	253	831	1
F4	646	437	209	144	65	281	159	253	563	1
F5	620	394	226	144	82	355	163	253	710	1
F6	726	473	253	144	109	472	169	253	944	1
F7	644	414	230	144	86	372	164	253	745	1
F8	598	377	221	144	77	333	162	253	667	1
F9	720	478	242	144	98	424	167	253	848	1
F10	642	456	186	144	42	182	154	253	364	1
F11	589	346	243	144	99	429	167	253	857	1
F12	535	355	180	144	36	156	153	253	312	1
F13	611	391	220	144	76	329	162	253	658	1
F14	468	378	90	144	-54	-234	130	253	-468	1
F15	497	382	115	144	-29	-126	137	253	-251	1
F16	448	353	95	144	-49	-212	131	253	-424	1
F17	549	351	198	144	54	234	157	253	468	1
F18	533	354	179	144	35	152	152	253	303	1
F19	443	345	98	144	-46	-199	132	253	-398	1
F20	469	349	120	144	-24	-104	138	253	-208	1
F21	335	301	34	144	-110	-458	109	244	-917	2
F22	429	324	105	144	-39	-163	129	244	-325	2
F23	481	309	172	144	28	117	145	244	233	2
F24	316	312	4	144	-140	-583	99	244	-1167	2
F25	538	348	190	144	46	192	149	244	383	2
F26	570	360	210	144	66	275	154	244	550	2
F27	459	360	99	144	-45	-188	127	244	-375	2
F28	504	445	59	144	-85	-354	116	244	-708	2
F29	415	331	84	144	-60	-250	123	244	-500	2
F30	476	432	44	144	-100	-417	112	244	-833	2

All footer material direct measurements performed with either: #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Direct MDA Beta - 244 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .240

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity)
Molycorp - Building 21-22 Survey Unit

Footer Material

No elevated direct measurements were reported

Removable Surface Activity Measurements

Molycorp - Building 21-22 Survey Unit

Footer Material

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	-13	17.6	139	-0.4	2.2	12.3
F2	-48	29.8	139	-0.4	2.2	12.3
F3	-30	24.3	139	-0.4	2.2	12.3
F4	-69	35.2	139	-0.4	2.2	12.3
F5	4.3	12.8	139	-0.4	2.2	12.3
F6	0	9.6	139	-0.4	2.2	12.3
F7	-39	27.2	139	-0.4	2.2	12.3
F8	0	9.6	139	2.4	5.2	12.3
F9	-52	30.9	139	-0 4	2.2	12.3
F10	-22	21.4	139	-0.4	2.2	12.3
F11	-43	28.4	139	-0.4	2.2	12.3
F12	-22	21.4	139	-0.4	2.2	12.3
F13	17	19.4	139	-0.4	2.2	12.3
F14	-13	17.6	139	-0.4	2.2	12.3
F15	-39	27.2	139	-0.4	2.2	12.3
F16	8.7	15.4	139	-0.4	2.2	12.3
F17	-22	21.4	139	-0.4	2.2	12.3
F18	13	17.6	139	-0.4	2.2	12.3
F19	-8.7	15.4	139	2.4	5.2	12.3
F20	0	9.6	139	2.4	5.2	12.3
F21	-30	24.3	139	2.4	5.2	12.3
F22	-48	29.8	139	-0.4	2.2	12.3
F23	-8.7	15.4	139	-0.4	2.2	12.3
F24	13	17.6	139	-0.4	2.2	12.3
F25	17	19.4	139	-0.4	2.2	12.3
F26	-35	26.0	139	-0.4	2.2	12.3
F27	22	21.4	139	-0.4	2.2	12.3
F28	26	22.9	139	-0.4	2.2	12.3
F29	69	35.2	139	2.4	5.2	12.3
F30	-22	21.4	139	2.4	5.2	12.3

Ludlum 2929 No. 115563 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	77	0.15
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	139	12.3

Elevated Removable Surface Activity Measurements
Molycorp - Building 21-22 Survey Unit

Footer Material

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements
Molycorp - Building 21-22 Survey Unit

Footer Material

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	10	0
F2	10	0
F3	12	2
F4	12	2
F5	15	5
F6	15	5
F7	16	6
F8	14	4
F9	14	4
F10	14	4
F11	14	4
F12	14	4
F13	15	5
F14	15	5
F15	14	4
F16	14	4
F17	14	4
F18	15	5
F19	15	5
F20	14	4
F21	14	4
F22	14	4
F23	15	5
F24	14	4
F25	14	4
F26	15	5
F27	15	5
F28	15	5
F29	15	5
F30	14	4

Background dose rate: 10 uR/hr with Model 19, No. 22526

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 21-22 Survey Unit

Footer Material

Beta				Alpha			
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	75	315.9	173.0	30	150	631.8	346.0

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements

Molycorp - Building 21-22 Survey Unit

Footer Material

n	$\bar{x}$	s	μ_α
30	4.0	1.4	4.5

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?
Yes

Appendix G

Building 23 Footer Data Package

Molycorp Washington, PA

October, 2002

Building 23 Footers Data Package

This data package contains final status survey information for Building 23, Molycorp, Washington, PA site. The building's footers were surveyed in accordance with the Concrete Sampling and Management Plan.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 23 footers provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the footers of Building 23 are suitable for unrestricted use and release.

DOO-133 Radiation Protection Survey Report

Site: Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-23-02	1700	Bldg 23	02-1354

RWP Number	Purpose of Survey	Page
N/A	☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other	1 of 3

Survey Title: F55 Foundations (Footer)

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

1 Minute Statics
Taken on Concrete

	BKG	MDA
β⁻	144	253
α	8	92

Model 19 # 95453 Due 12-12-02

Bkgd Readings 9 mR/hr

Legend

00 = mRem/h gamma | 00 C = mRem/h gamma contact | □ = Smear Location | — = Air Sample Location | -X-X-X- = Rope Boundary or Barrier

00 β = mRem/h beta | 00 βC = mRem/h beta contact | -□- = Large Area Wipe | = Bulk Material Sample

Section 2 Instrument Used

Instrument Model/SN	Cal Due Date	Probe Model/SN	Cal Due Date	Detector Eff β dpm/cpm	Eff α	MDA β⁻	MDA α	Other BKG	Other α
2350-1	126190 1-16-03	43-106	133871 12-14-02	.231	.172	727	73.7	316	1.8
2929	115563 6-14-03	43-10	127216 6-14-03	.231	.347	134	13	72	.18

Section 3 Review and Approval

Survey Performed By (Sign): Mark Blauvelt

Area Posted and/or Barricaded: ☐ Yes ☒ No ☐ Not Required

Date and Time: 10-23-02 / 1400

Radiation Safety Officer (Print Name & Sign): Steve Kowalski / Steve Kowalski

Date and Time: 10-24-02 / 1430

Radiological Survey Results - Survey Location Indicator Survey # 02-1354

Survey Area Information: FSS Foundations

	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA
Instrument Data								

	Print Name	Signature	Date
Performed By:			

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsn) (cpm)	β Static (sn) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	610	6	579	341	5	11	-.5	-8.7
2	560	4	520	345	2	10	2.4	-17
3	480	9	457	299	3	10	-.5	-22
4	520	6	509	347	5	10	-.5	-8.7
5	480	10	457	313	13	11	-.5	35
6	460	9	449	276	11	10	2.4	0
7	420	11	401	285	9	9	-.5	8.7
8	460	8	447	315	4	9	2.4	-13
9	690	7	674	454	6	9	2.4	-22
10	610	11	589	382	12	9	-.5	-4.3
11	580	10	553	379	11	9	5.2	-8.7
12	690	6	666	416	8	8	-.5	4.3
13	530	5	519	403	2	9	2.4	0
14	620	9	606	368	7	10	-.5	8.7
15	570	8	546	371	6	9	2.4	4.3
16	420	5	385	341	4	9	-.5	13
17	530	6	518	327	5	11	2.4	-8.7
18	740	8	721	475	6	12	2.4	-4.3
19	520	11	511	314	9	12	-.5	13
20	510	7	502	298	4	11	-.5	4.3
21	500	6	483	324	5	10	-.5	8.7
22	490	5	470	325	2	10	-.5	-22
23	590	9	579	341	7	11	-.5	-43
24	660	11	638	402	10	12	2.4	0
25	880	9	868	635	4	12	2.4	-8.7
26	560	5	546	341	2	10	-.5	-48
27	550	6	533	346	3	10	-.5	-8.7

Radiological Survey Results - Survey Location Indicator Survey #02-1354

Survey Area Information: FSS FOUNDATIONS

	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	Scan MDA	Scan MDA	Static MDA	Static MDA
Instrument Data								

	Print Name	Signature	Date
Performed By			

Location	Scan (cpm)	Scan (cpm)	Static (unsn) (cpm)	Static (sn) cpm	Static cpm	ER (rem/hr)	Smears dpm/100 cm²	
							2	3
28	440	6	426	305	2	10	2.4	-39
29	430	9	416	295	5	9	-.5	17
30	480	7	461	321	4	10	2.4	8.7

3 3

Results of Surface Scans
Molycorp - Building 23 Survey Unit

Footer Material

Location	Beta Scan gross cpm	Beta Scan net cpm
F1	610	294
F2	560	244
F3	480	164
F4	520	204
F5	480	164
F6	460	144
F7	420	104
F8	460	144
F9	690	374
F10	610	294
F11	580	264
F12	690	374
F13	530	214
F14	620	304
F15	570	254
F16	420	104
F17	530	214
F18	740	424
F19	520	204
F20	510	194
F21	500	184
F22	490	174
F23	590	274
F24	660	344
F25	880	564
F26	560	244
F27	550	234
F28	440	124
F29	430	114
F30	480	164

All footer scans performed with Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Scan MDA Beta - 727 dpm/100cm^2
Scan background Beta - 316 cpm
Detector Eff. Beta - .231

Elevated Results of Surface Scans

Molycorp - Building 23 Survey Unit

Footer Material

No elevated scan results were reported.

Direct Measurements (Total Activity)

Molycorp - Building 23 Survey Unit

Footer Material

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta ($dpm/100cm^2$)	Uncertainty 95% CL	MDA ($dpm/100cm^2$)	Direct Alpha [1] ($dpm/100cm^2$)
F1	579	341	238	144	94	407	166	253	814
F2	520	345	175	144	31	134	152	253	268
F3	457	299	158	144	14	61	147	253	121
F4	509	347	162	144	18	78	148	253	156
F5	457	313	144	144	0	0	144	253	0
F6	449	276	173	144	29	126	151	253	251
F7	401	285	116	144	-28	-121	137	253	-242
F8	447	315	132	144	-12	-52	141	253	-104
F9	674	454	220	144	76	329	162	253	658
F10	589	382	207	144	63	273	159	253	545
F11	553	379	174	144	30	130	151	253	260
F12	666	416	250	144	106	459	168	253	918
F13	519	403	116	144	-28	-121	137	253	-242
F14	606	368	238	144	94	407	166	253	814
F15	546	371	175	144	31	134	152	253	268
F16	385	341	44	144	-100	-433	116	253	-866
F17	518	327	191	144	47	203	155	253	407
F18	721	475	246	144	102	442	168	253	883
F19	511	314	197	144	53	229	157	253	459
F20	502	298	204	144	60	260	158	253	519
F21	483	324	159	144	15	65	148	253	130
F22	470	325	145	144	1	4	144	253	9
F23	579	341	238	144	94	407	166	253	814
F24	638	402	236	144	92	398	165	253	797
F25	868	635	233	144	89	385	165	253	771
F26	546	341	205	144	61	264	159	253	528
F27	533	346	187	144	43	186	154	253	372
F28	426	305	121	144	-23	-100	138	253	-199
F29	416	295	121	144	-23	-100	138	253	-199
F30	461	321	140	144	-4	-17	143	253	-35

All footer direct measurements performed with Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity)

Molycorp - Building 23 Survey Unit

Footer Material

No elevated direct measurements were reported

Removable Surface Activity Measurements
Molycorp - Building 23 Survey Unit

Footer Material

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	-0.5	9.7	134	-8.7	9.8	13
F2	2.4	11.2	134	-17	13.7	13
F3	-0.5	9.7	134	-22	15.6	13
F4	-0.5	9.7	134	-8.7	9.8	13
F5	-0.5	9.7	134	35	19.7	13
F6	2.4	11.2	134	0	0.3	13
F7	-0.5	9.7	134	8.7	9.8	13
F8	2.4	11.2	134	-13	12.0	13
F9	2.4	11.2	134	-22	15.6	13
F10	-0.5	9.7	134	-4.3	6.9	13
F11	5.2	13.1	134	-8.7	9.8	13
F12	-0.5	9.7	134	4.3	6.9	13
F13	2.4	11.2	134	0	0.3	13
F14	-0.5	9.7	134	8.7	9.8	13
F15	2.4	11.2	134	4.3	6.9	13
F16	-0.5	9.7	134	13	12.0	13
F17	2.4	11.2	134	-8.7	9.8	13
F18	2.4	11.2	134	-4.3	6.9	13
F19	-0.5	9.7	134	13	12.0	13
F20	-0.5	9.7	134	4.3	6.9	13
F21	-0.5	9.7	134	8.7	9.8	13
F22	-0.5	9.7	134	-22	15.6	13
F23	-0.5	9.7	134	-43	21.8	13
F24	2.4	11.2	134	0	0.3	13
F25	2.4	11.2	134	-8.7	9.8	13
F26	-0.5	9.7	134	-48	23.1	13
F27	-0.5	9.7	134	-8.7	9.8	13
F28	2.4	11.2	134	-39	20.8	13
F29	-0.5	9.7	134	17	13.7	13
F30	2.4	11.2	134	8.7	9.8	13

Ludlum 2929 No. 115563 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	72	0.18
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	134	13.0

Elevated Removable Surface Activity Measurements
Molycorp - Building 23 Survey Unit

Footer Material

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 23 Survey Unit

Footer Material

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	11	2
F2	10	1
F3	10	1
F4	10	1
F5	11	2
F6	10	1
F7	9	0
F8	9	0
F9	9	0
F10	9	0
F11	9	0
F12	8	-1
F13	9	0
F14	10	1
F15	9	0
F16	9	0
F17	11	2
F18	12	3
F19	12	3
F20	11	2
F21	10	1
F22	10	1
F23	11	2
F24	12	3
F25	12	3
F26	10	1
F27	10	1
F28	10	1
F29	9	0
F30	10	1

Background dose rate: 9 uR/hr with Model 19, No. 22526

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 23 Survey Unit

Footer Material

Beta				Alpha			
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	148	213.7	214.1	30	296	427.3	428.2

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements

Molycorp - Building 23 Survey Unit

Footer Material

n	$\bar{x}$	s	μ_α
30	1.1	1.1	1.4

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?
Yes

Appendix H

Building 25 Footer Data Package

Molycorp Washington, PA

October, 2002

Building 25 Footers Data Package

This data package contains final status survey information for Building 25, Molycorp, Washington, PA site. The building's footers were surveyed in accordance with the Concrete Sampling and Management Plan.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 25 footers provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the footers of Building 25 are suitable for unrestricted use and release.

	DDO-138 Radiation Protection Survey Report	Site Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-17-02	1400	Bldg 25	02-1287

RWP Number	Purpose of Survey	Page
N/A	☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other	1 of 3

Survey Title: FSS FOUNDATIONS (footers)

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18	N	A
19		
20		
21		
22		
23		
24		
25		
26		

1 MINUTE STATIC'S TAKEN ON CONCRETE

INST #1

	BKG	MDA
β⁻	144	253
α	8	92

INST #2

	BKG	MDA
β⁻	144	244
α	8	81

Model 19 # 22526 Due 1-29-03

Bkgd Readings

Legend

00 = mRem/h gamma | 00 C = mRem/h gamma contact | ⊃ = Smear Location | ▽ = Air Sample Location | -X-X-X- = Rope, Boundary, or Barrier

00 β = mRem/h beta | 00 βC = mRem/h beta contact | –⊃– = Large Area Wipe | = Bulk Material Sample

Section 2: Instrument Used

Instrument Model/SN	Cal Due Date	Probe Model/SN	Cal Due Date	Detector Eff β⁻ cpm/dpm	Detector Eff α	MDA β⁻	MDA α	Other BKG β⁻	Other BKG α
Inst #1 2350-1 / 126190	1-16-03	43-106 / 133871	12-14-02	.231	.172	820	83	402	2.3
Inst #2 2350-1 / 129414	8-2-03	43-106 / 128914	2-2-03	.240	.195	659	43	280	.8
2929 / 115563	6-14-03	43-10 / 127216	6-14-03	.231	.347	138	13.9	76	.3

Section 3: Review and Approval

Survey Performed By (Sign)	Area Posted and/or Barricaded	Date and Time
Mark Blomquist / Joe Haber	☐ Yes ☒ No ☐ Not Required	10-17-02 / 1400

Radiation Safety Officer (Print Name & Sign)	Date and Time
Mike McDonald	10-22-02 1000

Radiological Survey Results - Survey Location Indicator Survey # 02-1287

Survey Area Information: FSS Foundations

	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA
Instrument Data								

	Print Name	Signature	Date
Performed By:			

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsn) (cpm)	β Static (sn) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	430	10	418	307	4	14	-.87	-22
2	420	4	400	279	3	14	2	-43
3	450	9	437	344	7	13	-.87	-13
4	450	8	433	306	6	15	-.87	-8.7
5	440	9	424	327	9	13	-.87	43
6	400	3	373	295	4	14	-.87	-13
7	510	5	472	303	2	14	-.87	-35
8	490	7	464	347	8	14	-.87	26
9	430	12	399	300	11	13	2	13
10	470	9	458	330	7	14	2	4.3
11	610	7	573	337	5	15	-.87	17
12	420	5	398	322	6	13	-.87	-8.7
13	410	6	383	290	7	14	-.87	0
14	430	6	400	337	4	14	-.87	13
15	520	10	489	332	9	14	2	8.7

Inst # 1

Radiological Survey Results - Survey Location Indicator

Survey #02-1287

Survey Area Information: FSS Foundations

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
16	424	8	398	293	6	13	-.87	-22
17	384	3	342	245	2	13	2	26
18	393	11	363	254	9	13	-.87	-43
19	386	9	365	275	6	13	-.87	43
20	450	7	423	261	5	14	-.87	-13
21	461	6	432	304	4	14	-.87	-35
22	468	8	434	286	6	14	-.87	13
23	471	8	420	279	5	13	2	61
24	513	4	475	291	3	13	-.87	8.7
25	431	6	408	263	4	14	-.81	-13
26	421	5	394	290	3	14	2	-22
27	443	7	424	299	5	14	-.87	-17
28	568	12	535	278	9	13	-.87	8.7
29	573-	11	559	313	7	14	2	-4.3
30	410	9	385	318	6	14	2	13

Unit #2

Results of Surface Scans
Molycorp - Building 25 Survey Unit

Footer Material

Location	Beta Scan gross cpm	Beta Scan net cpm	Instrument #
F1	430	28	1
F2	420	18	1
F3	450	48	1
F4	450	48	1
F5	440	38	1
F6	400	-2	1
F7	510	108	1
F8	490	88	1
F9	430	28	1
F10	470	68	1
F11	610	208	1
F12	420	18	1
F13	410	8	1
F14	430	28	1
F15	520	118	1
F16	424	144	2
F17	384	104	2
F18	393	113	2
F19	386	106	2
F20	450	170	2
F21	461	181	2
F22	468	188	2
F23	471	191	2
F24	513	233	2
F25	431	151	2
F26	421	141	2
F27	443	163	2
F28	568	288	2
F29	573	293	2
F30	410	130	2

All footer material scans performed with either #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Scan MDA Beta - 820 dpm/100cm^2
Scan background Beta - 402 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Scan MDA Beta - 659 dpm/100cm^2
Scan background Beta - 280 cpm
Detector Eff. Beta - .240

Elevated Results of Surface Scans

Molycorp - Building 25 Survey Unit

Footer Material

No elevated scan results were reported

Direct Measurements (Total Activity)

Molycorp - Building 25 Survey Unit

Footer Material

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)	Instrument #
F1	418	307	111	144	-33	-143	135	253	-286	1
F2	400	279	121	144	-23	-100	138	253	-199	1
F3	437	344	93	144	-51	-221	131	253	-442	1
F4	433	306	127	144	-17	-74	140	253	-147	1
F5	424	327	97	144	-47	-203	132	253	-407	1
F6	373	295	78	144	-66	-286	126	253	-571	1
F7	472	303	169	144	25	108	150	253	216	1
F8	464	347	117	144	-27	-117	137	253	-234	1
F9	399	300	99	144	-45	-195	132	253	-390	1
F10	458	330	128	144	-16	-69	140	253	-139	1
F11	573	337	236	144	92	398	165	253	797	1
F12	398	322	76	144	-68	-294	126	253	-589	1
F13	383	290	93	144	-51	-221	131	253	-442	1
F14	400	337	63	144	-81	-351	122	253	-701	1
F15	489	332	157	144	13	56	147	253	113	1
F16	398	293	105	144	-39	-163	129	244	-325	2
F17	342	245	97	144	-47	-196	127	244	-392	2
F18	363	254	109	144	-35	-146	130	244	-292	2
F19	365	275	90	144	-54	-225	125	244	-450	2
F20	423	261	162	144	18	75	143	244	150	2
F21	432	304	128	144	-16	-67	135	244	-133	2
F22	434	286	148	144	4	17	140	244	33	2
F23	420	279	141	144	-3	-13	138	244	-25	2
F24	475	291	184	144	40	167	148	244	333	2
F25	408	263	145	144	1	4	139	244	8	2
F26	394	290	104	144	-40	-167	129	244	-333	2
F27	424	299	125	144	-19	-79	134	244	-158	2
F28	535	278	257	144	113	471	164	244	942	2
F29	559	313	246	144	102	425	161	244	850	2
F30	385	318	67	144	-77	-321	119	244	-642	2

All footer material direct measurements performed with either: #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Direct MDA Beta - 244 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .240

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity)

Molycorp - Building 25 Survey Unit

Footer Material

No elevated direct measurements were reported

Removable Surface Activity Measurements
Molycorp - Building 25 Survey Unit

Footer Material

Location	Removable Beta ($dpm/100cm^2$)	Uncertainty 95% CL	MDA	Removable Alpha ($dpm/100cm^2$)	Uncertainty 95% CL	MDA
F1	-22	21.4	138	-0.9	3.1	13.9
F2	-43	28.4	138	2.0	4.7	13.9
F3	-13	17.5	138	-0.9	3.1	13.9
F4	-8.7	15.4	138	-0.9	3.1	13.9
F5	43	28.4	138	-0.9	3.1	13.9
F6	-13	17.5	138	-0.9	3.1	13.9
F7	-35	25.9	138	-0.9	3.1	13.9
F8	26	22.9	138	-0.9	3.1	13.9
F9	13	17.5	138	2.0	4.7	13.9
F10	4.3	12.8	138	2.0	4.7	13.9
F11	17	19.3	138	-0.9	3.1	13.9
F12	-8.7	15.4	138	-0.9	3.1	13.9
F13	0	9.5	138	-0.9	3.1	13.9
F14	13	17.5	138	-0.9	3.1	13.9
F15	8.7	15.4	138	2 0	4.7	13.9
F16	-22	21.4	138	-0.9	3.1	13.9
F17	26	22.9	138	2.0	4.7	13.9
F18	-43	28.4	138	-0.9	3.1	13.9
F19	43	28.4	138	-0.9	3.1	13.9
F20	-13	17.5	138	-0.9	3.1	13.9
F21	-35	25.9	138	-0.9	3.1	13.9
F22	13	17.5	138	-0.9	3.1	13.9
F23	61	33.3	138	2.0	4.7	13.9
F24	8.7	15.4	138	-0.9	3.1	13.9
F25	-13	17.5	138	-0 9	3.1	13.9
F26	-22	21.4	138	2.0	4.7	13.9
F27	-17	19.3	138	-0.9	3.1	13.9
F28	8.7	15.4	138	-0.9	3.1	13.9
F29	-4.3	12.8	138	2.0	4.7	13.9
F30	13	17.5	138	2.0	4.7	13.9

Ludlum 2929 No. 115563 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	76	0.3
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	138	13.9

Elevated Removable Surface Activity Measurements
Molycorp - Building 25 Survey Unit

Footer Material

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 25 Survey Unit

Footer Material

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	14	1
F2	14	1
F3	13	0
F4	15	2
F5	13	0
F6	14	1
F7	14	1
F8	14	1
F9	13	0
F10	14	1
F11	15	2
F12	13	0
F13	14	1
F14	14	1
F15	14	1
F16	13	0
F17	13	0
F18	13	0
F19	13	0
F20	14	1
F21	14	1
F22	14	1
F23	13	0
F24	13	0
F25	14	1
F26	14	1
F27	14	1
F28	13	0
F29	14	1
F30	14	1

Background dose rate: 13 uR/hr with Model 19, No. 22526

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 25 Survey Unit

Footer Material

Beta				Alpha			
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	-64	210.6	1.0	30	-128	421.2	2.1

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements
Molycorp - Building 25 Survey Unit

Footer Material

n	$\bar{x}$	s	μ_α
30	0.7	0.6	0.9

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Yes

Appendix I

Building 33 Footer Data Package

Molycorp Washington, PA

October, 2002

Building 33 Footers Data Package

This data package contains final status survey information for Building 33, Molycorp, Washington, PA site. The building's footers were surveyed in accordance with the Concrete Sampling and Management Plan.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 33 footers provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the footers of Building 33 are suitable for unrestricted use and release.

	DDO-138 Radiation Protection Survey Report	Site, Molycorp / Washington, PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-16-02	1000	Bldg 33 (Footers)	02-1282

RWP Number	Purpose of Survey	Page
N/A	☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other	1 of 3

Survey Title: FSS RAMP / FOUNDATIONS

Front Half of Footers South side

1 MINUTE STATIC'S TAKEN ON CONCRETE

		BKG	MDA
INST #1	β⁻	144	253
	α	8	92
INST #2	β⁻	144	244
	α	8	81

Model #19-22526 Due 1-29-03

Bkgd Readings: 8-10 HR/hr

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14	N	A
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

Legend

00 = mRem/h gamma | 00 C = mRem/h gamma contact | ⊙ = Smear Location | ▽ = Air Sample Location | -X-X-X- = Rope, Boundary, or Barrier

00 β = mRem/h beta | 00 βC = mRem/h beta contact | —⊙— = Large Area Wipe | = Bulk Material Sample

Section 2: Instrument Used

	Instrument Model/SN	Cal Due Date:	Probe Model/SN	Cal Due Date.	Detector Eff β⁻ (cpm/dpm)	Detector Eff α	MDA β⁻	MDA α	Other BKG β⁻	Other BKG α
INST # 1	2350-1 / 126190	1-16-03	43-106 / 133871	12-14-02	.231	.172	776	104	360	3.6
INST # 2	2350-1 / 129414	8-2-03	43-106 / 128914	2-2-03	.240	.195	726	82	340	2.8
	2929 / 115563	6-14-03	43-10 / 127216	6-14-03	.231	.347	138	12.5	76	.17

Section 3: Review and Approval

Survey Performed By (Sign)		Area Posted and/or Barricaded	Date and Time	
Mark Blaurock	Joel Kuhn	☐ Yes ☒ No ☐ Not Required	10-16-02	1000

Radiation Safety Officer (Print Name & Sign)	Date and Time
Steve Kowalski / Steve Kowalski	10-16-02 / 1400

Radiological Survey Results - Survey Location Indicator

Survey # 02-1282

Survey Area Information: FSS RAMP / FOUNDATIONS

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	580	16	563	401	20	12	-.5	-4.3
2	540	22	512	334	22	11	-.5	-39
3	520	21	499	373	24	11	-.5	-22
4	490	17	477	355	22	10	2.4	4.3
5	580	8	552	376	10	10	-.5	13
6	480	11	453	362	13	11	2.4	8.7
7	490	12	465	379	9	10	-.5	-30
8	720	9	688	452	7	11	5.3	56
9	500	8	483	293	6	10	-.5	-8.7
10	490	11	476	347	9	12	-.5	48
11	580	13	567	358	8	10	2.5	22
12	530	12	517	403	11	10	-.5	56
13	610	14	581	369	12	12	-.5	35
14	420	5	391	345	8	11	2.5	-22
15	440	6	426	340	7	10	-.5	-17
16	420	12	405	347	9	10	-.5	13
17	500	9	472	349	6	10	-.5	30
18	440	5	428	371	4	10	-.5	-13
19	460	7	448	360	8	11	2.5	-39
20	520	9	497	367	10	12	-.5	-8.7
21	470	14	444	328	12	12	2.5	17
22	420	16	404	360	10	12	-.5	22
23	580	10	553	374	8	11	2.5	4.3
24	620	11	593	351	7	10	-.5	-8.7

INST #1

Radiological Survey Results - Survey Location Indicator

Survey # 02-1282

Survey Area Information: FSS RAMP/FOUNDATIONS

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsn) (cpm)	β Static (sn) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
25	590	11	561	342	9	10	-.5	-22
26	520	12	486	362	14	11	-.5	8.7
27	450	10	422	333	11	11	-.5	-4.3
28	500	7	462	334	4	12	2.4	-30
29	590	11	577	369	9	11	-.5	13
30	440	10	429	301	8	11	2.4	0

INST # 2

Results of Surface Scans
Molycorp - Building 33 Survey Unit

Footer Material

Location	Beta Scan gross cpm	Beta Scan net cpm	Instrument #
F1	580	220	1
F2	540	180	1
F3	520	160	1
F4	490	130	1
F5	580	220	1
F6	480	120	1
F7	490	130	1
F8	720	360	1
F9	500	140	1
F10	490	130	1
F11	580	220	1
F12	530	170	1
F13	610	250	1
F14	420	60	1
F15	440	80	1
F16	420	60	1
F17	500	140	1
F18	440	80	1
F19	460	100	1
F20	520	160	1
F21	470	110	1
F22	420	60	1
F23	580	220	1
F24	620	260	1
F25	590	250	2
F26	520	180	2
F27	450	110	2
F28	500	160	2
F29	590	250	2
F30	440	100	2

All footer material scans performed with either #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Scan MDA Beta - 776 dpm/100cm^2
Scan background Beta - 360 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Scan MDA Beta - 726 dpm/100cm^2
Scan background Beta - 340 cpm
Detector Eff. Beta - .240

Elevated Results of Surface Scans

Molycorp - Building 33 Survey Unit

Footer Material

No elevated scan results were reported

Direct Measurements (Total Activity)

Molycorp - Building 33 Survey Unit

Footer Material

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [(1)] (dpm/100cm^2)	Instrument #
F1	563	401	162	144	18	78	148	253	156	1
F2	512	334	178	144	34	147	152	253	294	1
F3	499	373	126	144	-18	-78	139	253	-156	1
F4	477	355	122	144	-22	-95	138	253	-190	1
F5	552	376	176	144	32	139	152	253	277	1
F6	453	362	91	144	-53	-229	130	253	-459	1
F7	465	379	86	144	-58	-251	129	253	-502	1
F8	688	452	236	144	92	398	165	253	797	1
F9	483	293	190	144	46	199	155	253	398	1
F10	476	347	129	144	-15	-65	140	253	-130	1
F11	567	358	209	144	65	281	159	253	563	1
F12	517	403	114	144	-30	-130	136	253	-260	1
F13	581	369	212	144	68	294	160	253	589	1
F14	391	345	46	144	-98	-424	117	253	-848	1
F15	426	340	86	144	-58	-251	129	253	-502	1
F16	405	347	58	144	-86	-372	121	244	-745	1
F17	472	349	123	144	-21	-91	139	244	-182	1
F18	428	371	57	144	-87	-377	120	244	-753	1
F19	448	360	88	144	-56	-242	129	244	-485	1
F20	497	367	130	144	-14	-61	140	244	-121	1
F21	444	328	116	144	-28	-121	137	244	-242	1
F22	404	360	44	144	-100	-433	116	244	-866	1
F23	553	374	179	144	35	152	152	244	303	1
F24	593	351	242	144	98	424	167	244	848	1
F25	561	342	219	144	75	313	156	244	625	2
F26	486	362	124	144	-20	-83	134	244	-167	2
F27	422	333	89	144	-55	-229	125	244	-458	2
F28	462	334	128	144	-16	-67	135	244	-133	2
F29	577	369	208	144	64	267	153	244	533	2
F30	429	301	128	144	-16	-67	135	244	-133	2

All footer material direct measurements performed with either #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Direct MDA Beta - 244 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .240

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity)

Molycorp - Building 33 Survey Unit

Footer Material

No elevated direct measurements were reported.

Removable Surface Activity Measurements
Molycorp - Building 33 Survey Unit

Footer Material

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	-4.3	12.8	138	-0.5	2.4	12.5
F2	-39	27.2	138	-0.5	2.4	12.5
F3	-22	21.4	138	-0.5	2.4	12.5
F4	4.3	12.8	138	2.4	5.2	12.5
F5	13	17.5	138	-0.5	2.4	12.5
F6	8.7	15.4	138	2.4	5.2	12.5
F7	-30	24.3	138	-0.5	2.4	12.5
F8	56	32.0	138	5.3	7.7	12.5
F9	-8.7	15.4	138	-0.5	2.4	12.5
F10	48	29.8	138	-0.5	2.4	12.5
F11	22	21.4	138	2.5	5.3	12.5
F12	56	32.0	138	-0.5	2.4	12.5
F13	35	25.9	138	-0.5	2.4	12.5
F14	-22	21.4	138	2.5	5.3	12.5
F15	-17	19.3	138	-0.5	2.4	12.5
F16	13	17.5	138	-0.5	2.4	12.5
F17	30	24.3	138	-0.5	2.4	12.5
F18	-13	17.5	138	-0.5	2.4	12.5
F19	-39	27.2	138	2.5	5.3	12.5
F20	-8.7	15.4	138	-0.5	2.4	12.5
F21	17	19.3	138	2.5	5.3	12.5
F22	22	21.4	138	-0.5	2.4	12.5
F23	4.3	12.8	138	2.5	5.3	12.5
F24	-8.7	15.4	138	-0.5	2.4	12.5
F25	-22	21.4	138	-0.5	2.4	12.5
F26	8.7	15.4	138	-0.5	2.4	12.5
F27	-4.3	12.8	138	-0.5	2.4	12.5
F28	-30	24.3	138	2.4	5.2	12.5
F29	13	17.5	138	-0.5	2.4	12.5
F30	0	9.5	138	2.4	5.2	12.5

Ludlum 2929 No. 115563 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	76	0.17
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	138	12.5

Elevated Removable Surface Activity Measurements
Molycorp - Building 33 Survey Unit

Footer Material

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 33 Survey Unit

Footer Material

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	12	1
F2	11	0
F3	11	0
F4	10	-1
F5	10	-1
F6	11	0
F7	10	-1
F8	11	0
F9	10	-1
F10	12	1
F11	10	-1
F12	10	-1
F13	12	1
F14	11	0
F15	10	-1
F16	10	-1
F17	10	-1
F18	10	-1
F19	11	0
F20	12	1
F21	12	0
F22	12	0
F23	11	0
F24	10	-1
F25	10	-1
F26	11	0
F27	11	0
F28	12	1
F29	11	0
F30	11	0

Background dose rate: 8-10 uR/hr with Model 19, No. 22526

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 33 Survey Unit

Footer Material

Beta				Alpha			
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	-32	246.9	44.0	30	-65	493.8	88.0

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements

Molycorp - Building 33 Survey Unit

Footer Material

n	$\bar{x}$	s	μ_α
30	-0.2	0.7	0.0

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Yes

Appendix J

Building 35 Footer Data Package

Molycorp Washington, PA

October, 2002

Building 35 Footers Data Package

This data package contains final status survey information for Building 35, Molycorp, Washington, PA site. The building's footers were surveyed in accordance with the Concrete Sampling and Management Plan.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 35 footers provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the footers of Building 35 are suitable for unrestricted use and release.

DDO-138 Radiation Protection Survey Report

Site Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-14-02	1300	BLDG-35	02-1273

RWP Number: N/A

Purpose of Survey: ☐ RWP ☐ Routine Survey ☒ Unconditional Release ☐ Other

Survey Title: FSS Foundations (footers)

Data Point #4, will be removed to R.M.A for rad waste

1 Minute STATICS TAKEN ON Concrete

		BKG	MDA
Inst #1	β⁻	144	253
	α	8	92
Inst #2	β⁻	144	244
	α	8	81

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12	N	A
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

Model 19 # 22526 Due 1-29-03

Bkgd Readings BKG - 10-12 μR/h

Legend

00 = mRem/h gamma | 00 C = mRem/h gamma contact | ▷ = Smear Location | ▽ = Air Sample Location | -X-X-X- = Rope, Boundary or Barrier

00 β = mRem/h beta | 00 βC = mRem/h beta contact | –▷– = Large Area Wipe | = Bulk Material Sample

Section 2: Instrument Used

	Instrument Model/SN		Cal Due Date	Probe Model/SN		Cal Due Date	Detector Eff β (cpm/dpm)		MDA β⁻	MDA α	Other β⁻ BKG	Other α
Inst #1	2350-1	126190	1-16-03	43-106	133871	12-14-02	.231	.172	1157	165	800	9
Inst #2	2350-1	129414	8-2-03	43-106	128914	2-2-03	.240	.195	736	145	350	9
	2929	115563	6-14-03	43-10	127216	6-14-03	.231	.347	134	13	71	.23

Section 3: Review and Approval

Survey Performed By (Sign): Joe Huber

Area Posted and/or Barricaded: ☒ Yes ☐ No ☐ Not Required

Date and Time: 10-14-02 / 1300

Radiation Safety Officer (Print Name & Sign): Steve Kowalski / Steve Kowalski

Date and Time: 10-14-02 / 1400

Radiological Survey Results - Survey Location Indicator Survey # 02-1273

Survey Area Information: FSS Foundations Bldg 35

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsn) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	860	14	836	586	10	12	-.66	0
2	790	12	770	540	8	12	-.66	13
3	590	8	575	479	7	13	-.66	-13
4 *	1040	9	932	540	7	12	-.66	0
5	490	16	476	447	12	13	-.66	-26
6	520	12	494	408	16	14	-.66	13
7	440	13	426	412	10	14	-.66	43
8	410	7	375	297	4	12	-.66	39
9	440	6	425	335	7	15	5.1	8.7
10	580	14	556	405	9	15	-.66	-4.3
11	620	11	586	354	8	16	-.66	-8.7
12	430	10	401	333	7	15	-.66	-22
13	440	9	407	317	6	12	2.2	-35
14	440	8	416	336	5	13	-.66	17
15	450	12	402	345	11	14	-.66	-13

* Hot Removed from area

Inst. # 1

Radiological Survey Results - Survey Location Indicator Survey # 02 - 1273

Survey Area Information: FSS - Foundations Bldg 35

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
16	571	24	566	331	21	13	2.2	8.7
17	451	27	430	362	23	13	-.66	4.3
18	659	21	638	439	18	15	2.2	13
19	593	45	571	345	42	15	-.66	0
20	372	6	347	204	3	16	-.66	13
21	314	6	290	261	3	17	-.66	74
22	446	16	423	284	12	17	-.66	48
23	382	8	358	289	6	16	-.66	-8.7
24	325	10	314	280	8	16	-.66	13
25	426	13	392	274	10	15	-.66	56
26	436	23	413	280	20	15	-.66	4.3
27	381	9	364	287	7	14	-.66	22
28	410	8	382	271	7	14	2.2	17
29	639	14	625	405	12	15	-.66	-8.7
30	535	7	484	356	3	15	-.66	0

Inst. # 2

Results of Surface Scans
Molycorp - Building 35 Survey Unit

Footer Material

Location	Beta Scan gross cpm	Beta Scan net cpm	Instrument #
F1	860	60	1
F2	790	-10	1
F3	590	-210	1
F4	1040	240	1
F5	490	-310	1
F6	520	-280	1
F7	440	-360	1
F8	410	-390	1
F9	440	-360	1
F10	580	-220	1
F11	620	-180	1
F12	430	-370	1
F13	440	-360	1
F14	440	-360	1
F15	450	-350	1
F16	571	221	2
F17	451	101	2
F18	659	309	2
F19	593	243	2
F20	372	22	2
F21	314	-36	2
F22	446	96	2
F23	382	32	2
F24	325	-25	2
F25	426	76	2
F26	436	86	2
F27	381	31	2
F28	410	60	2
F29	639	289	2
F30	535	185	2

All footer material scans performed with either #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Scan MDA Beta - 1157 dpm/100cm^2
Scan background Beta - 800 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Scan MDA Beta - 736 dpm/100cm^2
Scan background Beta - 350 cpm
Detector Eff. Beta - .240

Elevated Results of Surface Scans

Molycorp - Building 35 Survey Unit

Footer Material

No elevated scan results were reported

Direct Measurements (Total Activity)

Molycorp - Building 35 Survey Unit

Footer Material

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)	Instrument #
F1	836	586	250	144	106	459	168	253	918	1
F2	770	540	230	144	86	372	164	253	745	1
F3	575	479	96	144	-48	-208	131	253	-416	1
F4	932	540	392	144	248	1074	196	253	2147	1
F5	476	447	29	144	-115	-498	112	253	-996	1
F6	494	408	86	144	-58	-251	129	253	-502	1
F7	426	412	14	144	-130	-563	107	253	-1126	1
F8	375	297	78	144	-66	-286	126	253	-571	1
F9	425	335	90	144	-54	-234	130	253	-468	1
F10	556	405	151	144	7	30	146	253	61	1
F11	586	354	232	144	88	381	165	253	762	1
F12	401	333	68	144	-76	-329	124	253	-658	1
F13	407	317	90	144	-54	-234	130	253	-468	1
F14	416	336	80	144	-64	-277	127	253	-554	1
F15	402	345	57	144	-87	-377	120	253	-753	1
F16	566	331	235	144	91	379	159	244	758	2
F17	430	362	68	144	-76	-317	119	244	-633	2
F18	638	439	199	144	55	229	151	244	458	2
F19	571	345	226	144	82	342	157	244	683	2
F20	347	204	143	144	-1	-4	138	244	-8	2
F21	290	261	29	144	-115	-479	107	244	-958	2
F22	423	284	139	144	-5	-21	137	244	-42	2
F23	358	289	69	144	-75	-313	119	244	-625	2
F24	314	280	34	144	-110	-458	109	244	-917	2
F25	392	274	118	144	-26	-108	132	244	-217	2
F26	413	280	133	144	-11	-46	136	244	-92	2
F27	364	287	77	144	-67	-279	121	244	-558	2
F28	382	271	111	144	-33	-138	130	244	-275	2
F29	625	405	220	144	76	317	156	244	633	2
F30	484	356	128	144	-16	-67	135	244	-133	2

All footer material direct measurements performed with either #1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

or

#2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Direct MDA Beta - 244 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .240

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity)

Molycorp - Building 35 Survey Unit

Footer Material

Location	Direct Beta (dpm/100cm^2)	Direct Alpha (dpm/100cm^2)
F4	1074	2147

All concrete with elevated direct measurement readings was identified, marked and segregated from clean concrete. Concrete with elevated readings (above release limits) will be controlled until shipped off-site as radiological waste.

Removable Surface Activity Measurements

Molycorp - Building 35 Survey Unit

Footer Material

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	0	9.2	134	-0.7	2.7	13
F2	13	17.4	134	-0.7	2.7	13
F3	-13	17.4	134	-0.7	2.7	13
F4	0	9.2	134	-0.7	2.7	13
F5	-26	22.8	134	-0.7	2.7	13
F6	13	17.4	134	-0.7	2.7	13
F7	43	28.3	134	-0.7	2.7	13
F8	39	27.1	134	-0.7	2.7	13
F9	8.7	15.2	134	5.1	7.5	13
F10	-4.3	12.5	134	-0.7	2.7	13
F11	-8.7	15.2	134	-0.7	2.7	13
F12	-22	21.2	134	-0.7	2.7	13
F13	-35	25.8	134	2.2	4.9	13
F14	17	19.2	134	-0.7	2.7	13
F15	-13	17.4	134	-0.7	2.7	13
F16	8.7	15.2	134	2.2	4.9	13
F17	4.3	12.5	134	-0.7	2.7	13
F18	13	17.4	134	2.2	4.9	13
F19	0	9.2	134	-0.7	2.7	13
F20	13	17.4	134	-0.7	2.7	13
F21	74	36.3	134	-0.7	2.7	13
F22	48	29.7	134	-0.7	2.7	13
F23	-8.7	15.2	134	-0.7	2.7	13
F24	13	17.4	134	-0.7	2.7	13
F25	56	31.9	134	-0.7	2.7	13
F26	4.3	12.5	134	-0.7	2.7	13
F27	22	21.2	134	-0.7	2.7	13
F28	17	19.2	134	2.2	4.9	13
F29	-8.7	15.2	134	-0.7	2.7	13
F30	0	9.2	134	-0.7	2.7	13

Ludlum 2929 No. 115563 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	71	0.23
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	134	13.0

Elevated Removable Surface Activity Measurements
Molycorp - Building 35 Survey Unit

Footer Material

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements
Molycorp - Building 35 Survey Unit

Footer Material

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	12	1
F2	12	1
F3	13	2
F4	12	1
F5	13	2
F6	14	3
F7	14	3
F8	12	1
F9	15	4
F10	15	4
F11	16	5
F12	15	4
F13	12	1
F14	13	2
F15	14	3
F16	13	2
F17	13	2
F18	15	4
F19	15	4
F20	16	5
F21	17	5
F22	17	5
F23	16	5
F24	16	5
F25	15	4
F26	15	4
F27	14	3
F28	14	3
F29	15	4
F30	15	4

Background dose rate: 10-12 uR/hr with Model 19, No. 22526

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 35 Survey Unit

Footer Material

Beta				Alpha			
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
29	-103	301.5	-7.5	29	-205	603.0	-15.0

$t_{1-\alpha}$ 1.699

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements
Molycorp - Building 35 Survey Unit

Footer Material

n	$\bar{x}$	s	μ_α
30	3.2	1.4	3.6

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Yes

Appendix K

Building 42 Footer Data Package

Molycorp Washington, PA

October, 2002

Building 42 Footers Data Package

This data package contains final status survey information for Building 42, Molycorp, Washington, PA site. The building's footers were surveyed in accordance with the Concrete Sampling and Management Plan.

Field data collection forms, survey report forms, statistical test results, and comparisons to release limits are provided.

Summary

Results from the final status survey of Building 42 footers provides evidence that all release criteria have been met, demonstrates that residual radioactivity is below the unrestricted use criteria, and confirms that the footers of Building 42 are suitable for unrestricted use and release.

	DDO-138 Radiation Protection Survey Report	Site Molycorp / Washington PA

Section 1: Survey Information

Date	Time	Location	Survey Issue Log Number
10-9-02	1630	Bldg 42	MB ~~02-1267~~ 02-1276

RWP Number	Purpose of Survey	Page
N A	☐ RWP ☐ Routine Survey ☐ Unconditional Release ☐ Other	1 of 3

Survey Title. FSS Foundations

1 Minute statics taken on Concrete

		BKG	MDA
Inst #1	B⁻	144	253
	α	8	92
Inst #2	B⁻	144	244
	α	8	81

Model 19 # 95453 12-12-02

Bkgd Readings 78

Smear Number	Beta dpm/100cm²	Alpha dpm/100cm²
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16	N	A
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		

Legend

00 = mRem/h gamma | 00 C = mRem/h gamma contact | ⊃ = Smear Location | ▽ = Air Sample Location | -X-X-X- = Rope, Boundary or Barrier

00 β = mRem/h beta | 00 βC = mRem/h beta contact | —①— = Large Area Wipe | = Bulk Material Sample

Section 2: Instrument Used

	Instrument Model/SN		Cal Due Date	Probe Model/SN		Cal Due Date	Detector Eff B(cpm/dpm)	Eff α	MDA B⁻	MDA α	Other B⁻	Other BKG	Other α
Inst #1	2350-1	126190	1-16-03	43-106	133871	12-14-02	.231	.172	872	104	455		3.6
Inst #2	2350-1	129414	8-2-03	43-106	128914	2-2-03	.240	.195	765	68.5	378		2
	2929	115563	6-14-03	43-10	127216	6-14-03	.231	.347	133.9	12.4	71		.17

Section 3: Review and Approval

Survey Performed By (Sign)	Area Posted and/or Barricaded	Date and Time
Mark Blanner / John Auler	☐ Yes ☐ No ☒ Not Required	10-9-02 / 1630
Radiation Safety Officer (Print Name & Sign)		**Date and Time**
Steve Kowalski / Steve Kowalski		10-10-02 / 1010

Survey #

02-1267

Radiological Survey Results - Survey Location Indicator

Survey Area Information. FSS Foundations Bldg # 42

	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA
Instrument Data								

	Print Name	Signature	Date
Performed By:			

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
1	580	8	541	349	6	9	5.3	22
2	480	7	454	393	5	9	-.49	6.5
3	540	3	500	334	4	10	2.4	-26
4	530	6	510	333	7	11	-.49	8.7
5	500	9	470	356	11	10	-.49	17
6	520	3	499	439	2	9	-.49	8.7
7	540	4	504	328	3	10	2.4	-48
8	690	8	660	460	7	9	-.49	13
9	460	11	423	347	9	9	-.49	22
10	500	7	486	348	8	11	-.49	-52
11	490	5	476	347	4	10	2.4	56
12	480	6	463	378	2	10	-.49	48
13	540	11	539	340	10	10	-.49	8.7
14	460	10	446	379	8	9	-.49	ø
15	480	6	444	335	7	11	2.4	-35

Inst # 1

Survey # 02-1267

Radiological Survey Results - Survey Location Indicator

Survey Area Information: FSS Foundations Bldg #42

Instrument Data	Instrument Model/SN	Cal Due	Probe Model/SN	Cal Due	α Scan MDA	β Scan MDA	α Static MDA	β Static MDA

Performed By:	Print Name	Signature	Date

Location	β Scan (cpm)	α Scan (cpm)	β Static (unsh) (cpm)	β Static (sh) (cpm)	α Static (cpm)	ER (μrem/hr)	Smears (dpm/100 cm²) α	Smears (dpm/100 cm²) β
16	541	11	524	327	9	10	-.49	26
17	431	11	412	344	7	10	-.49	-22
18	463	15	435	307	13	11	-.49	4.3
19	477	12	459	336	9	9	-.49	8.7
20	427	10	392	297	9	11	-.49	-13
21	430	6	401	322	3	9	2.4	-17
22	456	7	439	299	6	9	5.3	43
23	410	19	396	330	16	10	-.49	-8.7
24	453	13	436	328	11	10	-.49	4.3
25	479	21	457	357	18	11	2.4	-17
26	465	11	442	311	9	11	2.4	-39
27	420	11	402	322	10	12	2.4	4.3
28	361	10	334	268	7	11	-.49	30
29	438	5	411	304	3	11	2.4	69
30	473	19	455	333	17	10	8.2	43

Inst # 2

Results of Surface Scans
Molycorp - Building 42 Survey Unit

Footer Material

Location	Beta Scan gross cpm	Beta Scan net cpm	Instrument #
F1	580	125	1
F2	480	25	1
F3	540	85	1
F4	530	75	1
F5	500	45	1
F6	520	65	1
F7	540	85	1
F8	690	235	1
F9	460	5	1
F10	500	45	1
F11	490	35	1
F12	480	25	1
F13	560	105	1
F14	460	5	1
F15	480	25	1
F16	541	163	2
F17	431	53	2
F18	463	85	2
F19	477	99	2
F20	427	49	2
F21	430	52	2
F22	456	78	2
F23	410	32	2
F24	453	75	2
F25	479	101	2
F26	465	87	2
F27	420	42	2
F28	361	-17	2
F29	438	60	2
F30	473	95	2

All footer scans performed with either: # 1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Scan MDA Beta - 872 dpm/100cm^2
Scan background Beta - 455 cpm
Detector Eff. Beta - .231

or

2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Scan MDA Beta - 765 dpm/100cm^2
Scan background Beta - 378 cpm
Detector Eff. Beta - .240

Elevated Results of Surface Scans

Molycorp - Building 42 Survey Unit

Footer Material

No elevated scan results were reported.

Direct Measurements (Total Activity)

Molycorp - Building 42 Survey Unit

Footer Material

Location	Unshield Beta cpm	Shield Beta cpm	Gross Beta cpm	Bkgd cpm	Net cpm	Direct Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA (dpm/100cm^2)	Direct Alpha [1] (dpm/100cm^2)	Instrument #
F1	541	349	192	144	48	208	156	253	416	1
F2	454	393	61	144	-83	-359	121	253	-719	1
F3	500	334	166	144	22	95	149	253	190	1
F4	510	333	177	144	33	143	152	253	286	1
F5	470	356	114	144	-30	-130	136	253	-260	1
F6	499	439	60	144	-84	-364	121	253	-727	1
F7	504	328	176	144	32	139	152	253	277	1
F8	660	460	200	144	56	242	157	253	485	1
F9	423	347	76	144	-68	-294	126	253	-589	1
F10	486	348	138	144	-6	-26	142	253	-52	1
F11	476	347	129	144	-15	-65	140	253	-130	1
F12	463	378	85	144	-59	-255	128	253	-511	1
F13	539	340	199	144	55	238	157	253	476	1
F14	446	379	67	144	-77	-333	123	253	-667	1
F15	444	335	109	144	-35	-152	135	253	-303	1
F16	524	327	197	144	53	221	151	244	442	2
F17	412	344	68	144	-76	-317	119	244	-633	2
F18	435	307	128	144	-16	-67	135	244	-133	2
F19	459	336	123	144	-21	-88	133	244	-175	2
F20	392	297	95	144	-49	-204	126	244	-408	2
F21	401	322	79	144	-65	-271	122	244	-542	2
F22	439	299	140	144	-4	-17	138	244	-33	2
F23	396	330	66	144	-78	-325	118	244	-650	2
F24	436	328	108	144	-36	-150	130	244	-300	2
F25	457	357	100	144	-44	-183	128	244	-367	2
F26	442	311	131	144	-13	-54	135	244	-108	2
F27	402	322	80	144	-64	-267	122	244	-533	2
F28	334	268	66	144	-78	-325	118	244	-650	2
F29	411	304	107	144	-37	-154	129	244	-308	2
F30	455	333	122	144	-22	-92	133	244	-183	2

All footer direct measurements performed with either: # 1 - Ludlum Model 2350-1 No. 126190 with 43-106 No. 133871

Direct MDA Beta - 253 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .231

or

2 - Ludlum Model 2350-1 No. 129414 with 43-106 No. 128914

Direct MDA Beta - 244 dpm/100cm^2
Concrete background Beta - 144 cpm
Detector Eff. Beta - .240

(1) - A beta to alpha ratio factoring (1:2, beta to alpha) was used to provide a more accurate alpha activity determination.

Elevated Direct Measurements (Total Activity)

Molycorp - Building 42 Survey Unit

Footer Material

No elevated direct measurements were reported.

Removable Surface Activity Measurements
Molycorp - Building 42 Survey Unit

Footer Material

Location	Removable Beta (dpm/100cm^2)	Uncertainty 95% CL	MDA	Removable Alpha (dpm/100cm^2)	Uncertainty 95% CL	MDA
F1	22	21.2	134	5.3	7.7	13
F2	65	34.1	134	-0.5	2.3	13
F3	-26	22.8	134	2.4	5.2	13
F4	8.7	15.2	134	-0.5	2.3	13
F5	17	19.2	134	-0.5	2.3	13
F6	8.7	15.2	134	-0.5	2.3	13
F7	-48	29.7	134	2.4	5.2	13
F8	13	17.4	134	-0.5	2.3	13
F9	22	21.2	134	-0.5	2.3	13
F10	-52	30.8	134	-0.5	2.3	13
F11	56	31.9	134	2.4	5.2	13
F12	48	29.7	134	-0.5	2.3	13
F13	8.7	15.2	134	-0.5	2.3	13
F14	0	9.2	134	-0.5	2.3	13
F15	-35	25.8	134	2.4	5.2	13
F16	26	22.8	134	-0.5	2.3	13
F17	-22	21.2	134	-0.5	2.3	13
F18	4.3	12.5	134	-0.5	2.3	13
F19	8.7	15.2	134	-0.5	2.3	13
F20	-13	17.4	134	-0.5	2.3	13
F21	-17	19.2	134	2.4	5.2	13
F22	43	28.3	134	5.3	7.7	13
F23	-8.7	15.2	134	-0.5	2.3	13
F24	4.3	12.5	134	-0.5	2.3	13
F25	-17	19.2	134	2.4	5.2	13
F26	-39	27.1	134	2.4	5.2	13
F27	4.3	12.5	134	2.4	5.2	13
F28	30	24.2	134	-0.5	2.3	13
F29	69	35.1	134	2.4	5.2	13
F30	43	28.3	134	8.2	9.5	13

Ludlum 2929 No. 115563 with 43-10 No. 127216 Info:

	Beta	Alpha
Background (cpm)	71	0.17
Bkgd ct. time	60	60
Sample ct. time	1	1
Efficiency	0.231	0.347
MDA	134	12.4

Elevated Removable Surface Activity Measurements
Molycorp - Building 42 Survey Unit

Footer Material

No elevated removable surface activity was reported above limits.

Exposure Rate Measurements

Molycorp - Building 42 Survey Unit

Footer Material

Location	Exposure Rate (uR/hr)	Net Exp Rate (uR/hr)
F1	9	1
F2	9	1
F3	10	2
F4	11	3
F5	10	2
F6	9	1
F7	10	2
F8	9	1
F9	9	1
F10	11	3
F11	10	2
F12	10	2
F13	10	2
F14	9	1
F15	11	3
F16	10	2
F17	10	2
F18	11	3
F19	9	1
F20	11	3
F21	9	1
F22	9	1
F23	10	2
F24	10	2
F25	11	3
F26	11	3
F27	12	4
F28	11	3
F29	11	3
F30	10	2

Background dose rate: 7-8 uR/hr with Model 19, No. 95453

Summary of Building Surface Direct Reading (Total Activity) Results

Molycorp - Building 42 Survey Unit

Footer Material

	Beta				Alpha		
n	$\bar{x}$	s	μ_α	n	$\bar{x}$	s	μ_α
30	-107	193.3	-46.9	30	-214	386.7	-93.9

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Beta	Alpha
Yes	Yes

Summary of Exposure Rate Measurements
Molycorp - Building 42 Survey Unit

Footer Material

n	$\bar{x}$	s	μ_α
30	2.1	0.9	2.3

$t_{1-\alpha}$ 1.697

Guidelines/Conditions Satisfied?

Yes

Appendix L

Instrumentation Data

Molycorp Washington, PA

Instrumentation Data

This data package contains instrumentation information (background, QC, and source response data forms) for the instruments used during the final status survey of building foundations.

Ludlum Model 19 Micro-Rem

Routine Performance and Background Data Form

Instrument ID #: 95453	Cal. Due: 12-12-02	Source ID #: Cs-137 #1610
Mean Source Value: 150	Mean plus + 20% Value: 180	Mean plus - 20% Value: 120

Date	Time	Meter Scale				Background Reading	Sat/Unsat
		25 µrem (sat/unsat)	50 µrem (sat/unsat)	250 µrem +/-20% value	500 µrem +/-20% value		
9-18-02	0640			150		15	Sat
9-19-02	0615			160		10	Sat
9-23-02	0635			150		8	Sat
9-24-02	0635			150		8	Sat
9-25-02	0650			150		9	Sat
9-26-02	0650			150		10	Sat
9-30-02	0640			150		9	Sat
10-1-02	0640			140		9	Sat
10-2-02	0630			150		8	Sat
10-3-02	0640			150		8	Sat
10-7-02	0645			150		10	Sat
10-8-02	0625	N/A	N/A	175	N/A	8	Sat
10-9-02	0630			170		11	Sat
10-10-02	0645			160		10	Sat
10-14-02	0715			150		10	Sat
~~10-15-02~~ 10-14-02	0640			160		10	Sat
10-16-02	0650			150		10	Sat
10-17-02	0655			160		10	Sat
10-21-02	0655			160		10	Sat

Ludlum Model 19 Micro-Rem

Routine Performance and Background Data Form

Instrument ID #: 95453	Cal. Due: 12-12-02	Source ID #: Cs-137 #1610
Mean Source Value: 150	Mean plus + 20% Value: 180	Mean plus - 20% Value: 120

Date	Time	Meter Scale				Background Reading	Sat/Unsat
		25 µrem (sat/unsat)	50 µrem (sat/unsat)	250 µrem +/-20% value	500 µrem +/-20% value		
10-22-02	0640			130		12	Sat
10-23-02	0645			140		10	Sat
10-24-02	0640			150		9	Sat
10-28-02	0640			150		11	Sat
		N			N		
			A				
					A		

Ludlum Model 19 Micro-Rem

Routine Performance and Background Data Form

Instrument ID #: 22526	Cal. Due: 1-29-03	Source ID #: Cs-137 A6143
Mean Source Value: 160	Mean plus + 20% Value: 192	Mean plus - 20% Value: 128

Date	Time	Meter Scale				Background Reading	Sat/Unsat
		25 µrem (sat/unsat)	50 µrem (sat/unsat)	250 µrem +/-20% value	500 µrem +/-20% value		
10-2-02	0630			150		8	Sat
10-3-02	0630			150		8	Sat
10-4-02	0650			150		9	Sat
10-7-02	0650			150		11	Sat
10-8-02	0620			170		9	Sat
10-9-02	0630			155		13	Sat
10-10-02	0650			150		10	Sat
10-11-02	0650			150		14	Sat
10-14-02	0715			150		12	Sat
10-15-02	0640			175		13	Sat
10-16-02	0645			150		9	Sat
10-17-02	0655			150		9	Sat
10-21-02	0640			150		9	Sat
10-22-02	0640			150		13	Sat
10-23-02	0645			160		10	Sat
10-24-02	0640			160		9	Sat
10-28-02	0640			160		10	Sat

EFF = .240

Daily Instrumentation Operational Check Sheet

Instrument: 2350-1 # 129414 Probe: 43-106 # 128914

Cal Due: 8-2-03 Cal Due: 2-2-03

Source ID:	Tc 99 # 3935	Mean Source Count Rate:	4643	Mean +2 σ Value:	4791	Mean -2 σ Value:	4495
Radiation Type:	B⁻	Sigma Value:	74	Mean +3 σ Value:	4864	Mean -3 σ Value:	4421

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-3-02	0650	5	1538	308	1	4502	—	—	66	Sat
10-3-02	1630	—	—	—	1	4611	✓	✓	—	Sat
10-7-02	0700	5	1280	256	1	4506	—	—	61	Sat

EFF = .195.

Daily Instrumentation Operational Check Sheet

Instrument: 2350-1 # 129414 Probe: 43-106 # 128914

Cal Due: 8-2-03 Cal Due: 2-2-03

Source ID:	Th 230 # 3937	Mean Source Count Rate:	739	Mean +2 σ Value:	799	Mean -2 σ Value:	679
Radiation Type:	α	Sigma Value:	30	Mean +3 σ Value:	829	Mean -3 σ Value:	649

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-3-02	0650	5	13	2.6	1	726	—	—	8.8	Sat
10-7-02	1630	—	—	—	1	745	—	—	—	Sat
10-7-02	0705	5	8	1.6	1	741	—	—	7.6	Sat

Daily Instrumentation Operational Check Sheet

EFF = .240

Voltage ~~∠1450~~ 3K

B - 1800

Instrument: 2350-1 #129414

Probe: 43-106 #128914

Cal Due: 8-2-03

Cal Due: 2-2-03

Source ID:	Te 99 # 3935	Mean Source Count Rate:	4422	Mean +2 σ Value:	4556	Mean -2 σ Value:	4288
Radiation Type:	B⁻	Sigma Value:	67	Mean +3 σ Value:	4623	Mean -3 σ Value:	4221

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-9-02	1000	5	1643	329	1	4469	✓	✓	68.3	Sat
10-9-02	1700	—	—	—	1	4491	—	—	—	Sat
10-10-02	0655	5	1648	330	1	4418	—	—	68.5	Sat
10-10-02	1630	—	—	—	1	4616	✓	✓	—	Sat
10-14-02	0740	5	1398	279.6	1	4410	✓	✓	63	Sat
10-14-02	1700	N/A	—	—	1	4534	—	—	—	Sat
10-15-02	0640	5	1267	253.4	1	4438	✓	✓	60.3	Sat
10-15-02	1650	—	—	—	1	4601	—	—	—	Sat
10-16-02	0710	5	1421	284	1	4541	—	—	63.7	Sat
10-16-02	1610	—	—	—	1	4591	—	—	—	Sat
10-17-02	0710	5	1391	278	1	4412	—	—	63	Sat
10-17-02	1400	—	—	—	1	4576	✓	—	—	Sat
10-21-02	0645	5	1318	264	1	4501	—	—	61.5	Sat
10-21-02	1645	—	—	—	1	4530	—	—	—	Sat

Daily Instrumentation Operational Check Sheet

EFF = .195

Voltage 2 = 1450

Instrument: 2350-1 # 129414 Probe: 43-106 # 128914

Cal Due: 8-2-03 Cal Due: 2-2-03

Source ID:	Th230 # 3937	Mean Source Count Rate:	720	Mean +2 σ Value:	776	Mean -2 σ Value:	664
Radiation Type:	α	Sigma Value:	28	Mean +3 σ Value:	804	Mean -3 σ Value:	636

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10.9.02	1005	5	59	11.8	1	734	—	—	7.8	Sat
10-9-02	1700	—	—	—	1	767	—	—	—	Sat
10-10-02	0650	5	7	1.4	1	689	—	—	7.3	Sat
10.10.02	1630	—	—	—	1	718	—	—	—	Sat
10.14.02	0750	5	13	2.6	1	722	—	—	8.8	Sat
10-14-02	1650	—	—	—	1	760	—	—	—	Sat
10.15.02	0640	5	14	2.8	1	737	—	—	9.0	Sat
10.15.02	1650	—	—	—	1	747	—	—	—	Sat
10-16-02	0715	5	13	2.6	1	718	—	—	8.8	Sat.
10-16-02	1615	—	—	—	1	745	—	—	—	Sat
10-17-02	0715	5	14	2.8	1	655	—	—	9.0	Sat
10-17.02	1405	—	—	—	1	754	—	—	—	Sat
10-21-02	0645	5	6	1.2	1	737	—	—	7.7	Sat
10.21.02	1645	—	—	—	1	705	—	—	—	Sat

EFF. 231

Daily Instrumentation Operational Check Sheet

Instrument: 2350-1 # 126190 Probe: 43-106 # 133871

Cal Due: 1-16-03 Cal Due: 12-14-02

Source ID:	Mean Source Count Rate:	Mean +2 σ Value:	Mean -2 σ Value:
Tc99 # 3935	4638	4780	4496

Radiation Type:	Sigma Value:	Mean +3 σ Value:	Mean -3 σ Value:
B-	71	4851	4425

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-15-02	1645	—	—	—	1	4710	—	—	—	Sat
10-16-02	0700	5	1477	295	1	4529	—	—	64.9	Sat
10-16-02	1600	—	—	—	1	4506	—	—	—	Sat
10-17-02	0640	5	1366	273	1	4523	—	—	62.5	Sat
10-17-02	1400	—	—	—	1	4603	—	—	—	Sat
10-21-02	0650	5	1344	268.8	1	4506	—	—	62	Sat
10-21-02	1700	—	—	—	1	4533	—	—	—	Sat
10-22-02	0615	5	1640	328	1	4544	—	—	68.2	Sat
10-22-02	1700	—	—	—	1	4516	—	—	—	Sat
10-23-02	0625	5	1438	288	1	4536	—	—	64.1	Sat
10-23-02	1700	—	—	—	1	4521	—	—	—	Sat
10-24-02	0645	5	1451	290	1	4723	—	—	64.4	Sat
10-24-02	1600	—	—	—	1	4561	—	—	—	Sat
10-28-02	0650	5	1450	290	1	4629	—	—	64.4	Sat

EFF = .172

Daily Instrumentation Operational Check Sheet

Instrument: 2350-1 # 126190 Probe: 43-106 # 133871

Cal Due: 1-16-03 Cal Due: 12-14-02

Source ID:	Th230 # 3937	Mean Source Count Rate:	660	Mean +2 σ Value:	718	Mean -2 σ Value:	602
Radiation Type:	α	Sigma Value:	29	Mean +3 σ Value:	747	Mean -3 σ Value:	573

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-15-02	1645	–	–	–	1	675	–	–	–	Sat
10-16-02	0630	5	16	3.2	1	648	–	–	9.4	Sat
10-16-02	1650	–	–	–	1	687	–	–	–	Sat
10-17-02	0640	5	18	3.6	1	672	–	–	9.8	Sat
10-17-02	1700	–	–	–	1	696	–	–	–	Sat
10-21-02	0655	.5	3	.6	1	685	–	–	5.8	Sat
10-21-02	1405	–	–	–	1	671	–	–	–	Sat
10-22-02	0610	5	20	4	1	695	–	–	10.2	Sat
10-22-02	1655	–	–	–	1	662	–	–	–	Sat
10-23-02	0620	5	7	1.7	1	613	–	–	7.6	Sat
10-23-02	1700	–	–	–	1	621	–	–	–	Sat
10-24-02	0650	5	8	1.6	1	650	–	–	7.6	Sat
10-24-02	1600	–	–	–	1	631	–	–	–	Sat
10-28-02	0650	5	6	1.2	1	651	–	–	6.9	Sat

Daily Instrumentation Operational Check Sheet

EFF = .231

Instrument: 2350-1 # 126190 Probe: 43-10 # 133871

Cal Due: 1-16 03 Cal Due: 12-14-02

Source ID: Tc 99 # 3935 Mean Source Count Rate: 4638 Mean +2 σ Value: 4780 Mean -2 σ Value: 4496

Radiation Type: B Sigma Value: 71 Mean +3 σ Value: 4851 Mean -3 σ Value: 4425

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-1-02	1600	-	—	—	1	4698	—	—	—	Sat
10-2-02	0625	5	1537	307	1	4579	—	—	66.2	Sat
10-2-02	1640	—	—	—	1	4756	—	—	—	Sat
10-3-02	0650	5	1611	322	1	4522	—	—	67.6	Sat
10-3-02	1640	—	—	—	1	4634	✓	✓	—	Sat
10-7-02	0655	5	1635	327	1	4608	—	-	68.2	Sat
10 7-02	1705	—	—	—	1	4623	~	✓	—	Sat
10-8-02	0645	5	1590	318	1	4511	✓	✓	67.3	Sat
10-8-02	1700	—	—	—	1	4565	✓	✓	—	Sat
10-9-02	0635	5	1799	360	1	4518	✓	✓	71.3	Sat
10-9-02	1650	—	—	—	1	4569	—	—	—	Sat
10-10-02	0700	5	1735	347	1	4505	—	—	70.1	Sat
10-10-02	1635	—	—	—	1	4731	✓	✓	—	—
10-14-02	0740	5	1544	309	1	4610	✓	✓	66.3	Sat
10-14-02	1705	—	—	—	1	4507	—	—	—	Sat
10-15-02	0645	5	1719	344	1	4450	✓	✓	69.8	Sat

Daily Instrumentation Operational Check Sheet

EFF: .172

Instrument: 3350-1 #106190 Probe: 43 106 #133871

Cal Due: 1-16-03 Cal Due: 12-14-02

Source ID: Th 230 #3937 Mean Source Count Rate: 660 Mean +2 σ Value: 718 Mean -2 σ Value: 602

Radiation Type: α Sigma Value: 29 Mean +3 σ Value: 747 Mean -3 σ Value: 573

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-1-02	1600	—	—	—	1	667	—	—	—	Sat
10-2-02	0640	5	15	3	1	710	—	—	9.2	Sat
10-2-02	1640	—	—	—	1	606	—	—	—	Sat
10-3-02	0655	5	13	2.6	1	656	—	—	8.8	Sat
10-3-02	1640	—	—	—	1	648	✓	✓	—	Sat
10-7-02	0700	5	10	2	1	660	—	—	8.1	Sat
10-7-02	1705	—	—	—	1	646	✓	✓	—	Sat
10-8-02	0645	5	17	3.4	1	690	✓	✓	9.6	Sat
10-8-02	1705	—	—	—	1	679	✓	✓	—	Sat
10-9-02	0635	5	24	4.8	1	684	✓	✓	10.8	Sat
10-9-02	1655	—	✓	—	1	695	✓	✓	—	Sat
10-10-02	0645	5	13	2.6	1	633	—	—	8.8	Sat
10-10-02	1635	—	—	—	1	686	✓	✓	—	Sat
10-14-02	0750	5	21	4.2	1	645	✓	✓	10.3	Sat
10-14-02	1705	—	—	—	1	635	✓	✓	—	Sat
10-15-02	0645	5	38	7.6	1	643	✓	✓	12.9	Sat

EFF. 231

Daily Instrumentation Operational Check Sheet

Instrument: 2929 - 115563 Probe: 43-10 # 127216

Cal Due: 6-14-03 Cal Due: 6-14-03

Source ID: Tc99 #3935 Mean Source Count Rate: 3722 Mean +2 σ Value: 3824 Mean -2 σ Value: 3620

Radiation Type: B⁻ Sigma Value: 51 Mean +3 σ Value: 3875 Mean -3 σ Value: 3569

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-3-02	0625	60	4283	71	1	3737	—	—	30.9	Sat
10-4-02	0640	60	4385	73	1	3625	—	—	31.3	Sat
10-7-02	0630	60	4303	72	1	3759	—	—	31	Sat
10-8-02	0630	60	4227	70	1	3774	✓	✓	30.8	Sat
10-9-02	0600	60	4270	71	1	3736	✓	—	30.9	Sat
10-10-02	0630	60	4250	71	1	3708	✓	—	30.9	Sat
10-11-02	0630	60	4484	75	1	3731	✓	—	31.7	Sat
10-14-02	0650	60	4238	71	1	3759	✓	✓	30.9	Sat
10-15-02	0615	60	4273	71	1	3777	—	✓	30.9	Sat
10-16-02	0630	60	4543	76	1	3741	—	—	31.9	Sat
10-17-02	0645	60	4554	76	1	3756	—	—	31.9	Sat
10-21-02	0630	60	4616	77	1	3625	—		32.1	Sat
10-22-02	0640	60	4365	73	1	3755	✓	✓	31.3	Sat
10-23-02	0615	60	4342	72	1	3814	✓	✓	31	Sat
10-24-02	0625	60	4156	69	1	3666	—	—	30.5	Sat
10-28-02	0625	60	4257	71	1	3815	—	—	31	Sat

EFF = .347

Daily Instrumentation Operational Check Sheet

Instrument: 2929 # 115563 Probe: 43-10 # 127216

Cal Due: 6-14-03 Cal Due: 6-14-03

Source ID: Th230 # 3937 Mean Source Count Rate: 1376 Mean +2 σ Value: 1448 Mean -2 σ Value: 1304

Radiation Type: ∝ Sigma Value: 36 Mean +3 σ Value: 1484 Mean -3 σ Value: 1268

Background					Source Check				Results	
Date	Time	Count Time (min)	Gross Counts	BKGD CPM	Count Time (min)	Gross Counts	W/I 2 σ Value	W/I 3 σ Value	LLD	SAT/ UNSAT
10-3-02	0625	60	7	.12	1	1316	—	—	4.1	—
10-4-02	0640	60	10	.17	1	1406	—	—	4.3	Sat
10-7-02	0640	60	12	.2	1	1376	—	—	4.5	Sat
10-8-02	0630	60	11	.18	1	1388	✓	✓	4.4	SAT
10-9-02	0604	60	10	.17	1	1389	✓	✓	4.3	Sat
10-10-02	0630	60	13	.21	1	1368	✓	✓	4.5	Sat
10-11-02	0635	60	13	.21	1	1380	✓	✓	4.5	Sat
10-14-02	0650	60	14	.23	1	1373	✓	✓	4.5	Sat
10-15-02	0615	60	8	.13	1	1322	✓	✓	4.2	Sat
10-16-02	0640	60	10	.17	1	1407	—	—	4.3	Sat
10-17-02	0640	60	18	.3	1	1375	—	—	4.8	Sat
10-21-02	0640	60	9	.15	1	1368	—	—	4.3	Sat
10-22-02	0620	60	15	.25	1	1410	✓	✓	4.6 ~~5.1~~	~~Sat~~
10-23-02	0615	60	11	.18	1	1390	✓	✓	4.4	Sat
10-24-02	0625	60	11	.18	1	1331	—	—	4.4	Sat
10-28-02	0625	60	9	.15	—	1413	—	—	4.3	Sat

Appendix M

Background Assessment Data

Molycorp Washington, PA

Background Assessment

MACTEC, Inc. performed material-specific backgrounds with it's large-area gas-flow instruments (used for final status surveys) on surfaces of similar construction as the buildings at the site having no possibility of being impacted by site operations. Measurements were collected from multiple locations to provide an estimate of the variability or uncertainty.

An average background value was determined for each material surveyed (poured concrete, cinderblock, and a class of material designated a generic material).

The number of background measurements obtained per material type:

- Concrete - minimum of 20 measurements
- Cinderblock - minimum of 20 measurements
- Generic Material - minimum of 10 measurements for each type of material surveyed (i.e., wood, insulation, corrugated steel, etc.)

Background measurements were calculated from surveys obtained at the Canton Volunteer Fire Department Station 52-1, Canton Township, PA. A mean value for each instrument was calculated. The most conservative background values were selected and used for all background subtracts for direct (static) type surveys performed.

Included in this appendix are the results of MACTEC's background assessment data.

Concrete Background Assessment
Molycorp Washington, PA

Poured Concrete Surfaces

Ludlum Model 2350-1 (126190) with 43-106 (133871)

	Beta - Direct Measurements (cpm)			Alpha - Direct Measurements (cpm)
	Unshield	Shield	Net	Net
	500	350	150	9
	418	314	104	6
	447	326	121	8
	494	312	182	5
	483	351	132	3
	466	306	160	6
	478	347	131	9
	469	327	142	8
	426	353	73	12
	429	343	86	7
	499	349	150	10
	462	330	132	9
	496	372	124	8
	491	336	155	9
	458	295	163	12
	527	337	190	11
	464	327	137	13
	521	302	219	12
	492	323	169	4
	484	319	165	8
Mean (cpm)	144			8
Stand Deviation	34.4			2.8
n_b	4			8

Readings taken at the Canton Volunteer Fire Department Station 52-1, Canton Township, PA on their poured concrete surfaces.

Concrete Background Assessment
Molycorp Washington, PA

Poured Concrete Surfaces

Ludlum Model 2350-1 (95356) with 43-68 (91046)

	Beta - Direct Measurements (cpm)			Alpha - Direct Measurements (cpm)
	Unshield	Shield	Net	Net
	460	330	130	10
	482	397	85	14
	592	381	211	15
	589	381	208	12
	561	348	213	23
	555	408	147	11
	491	388	103	13
	511	392	119	6
	1014	409	605	18
	606	375	231	17
	523	429	94	12
	590	386	204	14
	703	407	296	17
	662	389	273	13
	551	408	143	10
	518	346	172	7
	478	349	129	12
	465	345	120	5
	520	403	117	14
	522	407	115	13
Mean (cpm)	186			13
Stand Deviation	115.5			4.2
n_b	29			8

Readings taken at the Canton Volunteer Fire Department Station 52-1, Canton Township, PA on their poured concrete surfaces.

Concrete Background Assessment
Molycorp Washington, PA

Poured Concrete Surfaces

Ludlum Model 2350-1 (95359) with 43-106 (133866)

Beta - Direct Measurements (cpm)

Unshield	Shield	Net
460	330	130
482	397	85
592	381	211
589	381	208
561	344	217
555	408	147
491	388	103
511	392	119
643	409	234
606	375	231
563	429	134
590	386	204
703	407	296
682	389	293
551	370	181
518	332	186
601	411	190
599	365	234
520	403	117
522	407	115

Mean (cpm)	182
Stand Deviation	61.1
n_b	8

Readings taken at the Canton Volunteer Fire Department Station 52-1, Canton Township, PA on their poured concrete surfaces.

Concrete Background Assessment
Molycorp Washington, PA

Poured Concrete Surfaces

Ludlum Model 2350-1 (129414) with 43-106 (128914)

Beta - Direct Measurements (cpm)

Unshield	Shield	Net
492	301	191
479	348	131
496	306	190
537	340	197
610	316	294
465	302	163
547	331	216
509	335	174
510	355	155
541	346	195
563	320	243
517	341	176
505	375	130
530	352	178
520	370	150
518	332	186
519	411	108
506	365	141
570	360	210
534	343	191

Mean (cpm)	181
Stand Deviation	42.0
n_b	4

Readings taken at the Canton Volunteer Fire Department Station 52-1, Canton Township, PA on their poured concrete surfaces.

Metal/Drywall Background Assessment
Molycorp Washington, PA

Metal/Drywall Surfaces

Ludlum Model 2350-1 (117563) with 43-106 (128912)

	Beta - Direct Measurements (cpm)			Alpha - Direct Measurements (cpm)
	Unshield	Shield	Net	Net
	288	266	22	3
	305	224	81	4
	277	252	25	5
	331	291	40	2
	294	290	4	3
	312	301	11	1
	311	302	9	1
	315	300	15	1
	320	285	35	3
	313	286	27	1
Mean (cpm)	27			2
Stand Deviation	22.2			1.4
n_b	56			26

Readings taken at the Canton Volunteer Fire Department Station 52-1, Canton Township, PA on their metal/drywall surfaces.

Metal/Drywall Background Assessment
Molycorp Washington, PA

Metal/Drywall Surfaces

Ludlum Model 2350-1 (117566) with 43-68 (19046)

	Beta - Direct Measurements (cpm)			Alpha - Direct Measurements (cpm)
	Unshield	Shield	Net	Net
	268	246	22	3
	268	238	30	2
	291	275	16	1
	286	245	41	2
	290	274	16	1
	312	283	29	3
	333	312	21	2
	325	275	50	1
	274	251	23	1
	266	237	29	4
Mean (cpm)	28			2
Stand Deviation	10.8			1.1
n_b	11			21

Readings taken at the Canton Volunteer Fire Department Station 52-1, Canton Township, PA on their metal/drywall surfaces.