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Author(s):	Sturgeon, Richard W.
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1.0 INTRODUCTION

This report provides the results of the *2011 Radioactive Materials Usage Survey for Unmonitored Point Sources*, which was updated by the Environmental Protection (ENV) Division's Environmental Stewardship (ES) at Los Alamos National Laboratory (LANL).[1] ES classifies LANL emission sources into one of four Tiers, based on the potential effective dose equivalent (PEDE) calculated for each point source. Detailed descriptions of these tiers are provided in Section 3. The usage survey is conducted annually; in odd-numbered years the survey addresses all monitored and unmonitored point sources and in even-numbered years it addresses all Tier III and various selected other sources. This graded approach was designed to ensure that the appropriate emphasis is placed on point sources that have higher potential emissions to the environment.

For calendar year (CY) 2011, ES has divided the usage survey into two (2) distinct reports, one covering the monitored point sources (to be completed later this year) and this report covering all unmonitored point sources. This usage survey includes the following release points:

- all unmonitored sources identified in the 2010 usage survey,
- any new release points identified through the new project review (NPR) process, and
- other release points as designated by the Rad-NESHAP Team Leader.

Data for all unmonitored point sources at LANL is stored in the survey files at ES. LANL uses this survey data to help demonstrate compliance with Clean Air Act radioactive air emissions regulations (40 CFR 61, Subpart H).

The remainder of this introduction provides a brief description of the information contained in each section.

[1] Prior to May 2010, ENV-ES was known as ENV-EAQ, the Air Quality Group.

Section 2

Section 2 of this report describes the methods that were employed for gathering usage survey data and for calculating usage, emissions, and dose for these point sources. It also references the appropriate ES procedures for further information.[2]

Section 3

Section 3 describes the *2011 Radioactive Materials Usage Survey for Unmonitored Point Sources* (RMUS) and explains how the survey results are organized. The RMUS Interview Form with the attached RMUS Process Form(s) provides the radioactive materials survey data by technical area (TA) and building number. The survey data for each release point includes information such as: exhaust stack identification number, room number, radioactive material source type (i.e., potential source or future potential source of air emissions), radionuclide, usage (in curies) and usage basis, physical state (gas, liquid, particulate, solid, or custom), release fraction (from Appendix D to 40 CFR 61, Subpart H), and process descriptions. In addition, the interview form also calculates emissions (in curies), lists mrem/Ci factors, calculates PEDEs, and states the location of the critical receptor for that release point. [The critical receptor is the maximum exposed off-site member of the public, specific to each individual facility.] Each of these data fields is described in this section. The Tier classification of release points, which was first introduced with the 1999 usage survey, is also described in detail in this section.

Section 4

Section 4 includes a brief discussion of the dose estimate methodology, and includes a discussion of several release points of particular interest in the CY 2011 usage survey report. It also includes a table of the calculated PEDEs for each release point at its critical receptor.

[2] Following the reorganization of ENV-MAQ into ENV-EAQ and eventually into ENV-ES, procedures are currently identified as "EAQ-xxx and ES-xxx." The transition from ENV-EAQ monikers to ES take place as procedures are updated. For consistency, all referenced procedures in this document are listed as ES-xxx, regardless of their current standing in the transition to the new naming convention.

Section 5

Section 5 describes ES's approach to Quality Assurance (QA) for the usage survey. Satisfactory completion of the survey requires that team members responsible for Rad-NESHAP (National Emissions Standard for Hazardous Air Pollutants) compliance accurately collect and process several types of information, including radioactive materials usage data, process information, and supporting information. They must also perform and document the QA reviews outlined in Section 5.2.6 (Process Verification and Peer Review) of ES-RN, "Quality Assurance Project Plan for the Rad-NESHAP Compliance Project" to verify that all information is complete and correct.

Section 6

Section 6 contains a list of the references cited in the document.

Appendix A is the full text of the *Position Paper on Removing Certain Point Sources from the Usage Survey Report*, ESH-17:00-160, March 2000.

Attachment 1 provides the *2011 Radioactive Material Usage Survey for Unmonitored Point Sources* results.

2.0 METHODOLOGY

The Radioactive Materials Usage Survey for Unmonitored Point Sources (RMUS) is conducted in accordance with applicable ES plans and procedures: ES-RN, *Quality Assurance Project Plan for the Rad-NESHAP Compliance Project*, ES-102, *Radioactive Materials Usage Survey for Point Sources*, ES-126, *Performing a Radioactive Materials Usage Survey Interview,* and ES-137, *Evaluating Potential Emissions and Potential Effective Dose Equivalent from Point Sources.*

For 2011, a baseline was developed by referencing and expanding on the unmonitored sources from the *2009 Radioactive Materials Usage Survey for Point Sources* and *2010 Radioactive Materials Usage Survey for Point Sources.* The 2009 report was a complete review of all unmonitored rad release points (Tier III and Tier IV), while the 2010 report focused primarily on Tier III sources.

A key element to the usage survey is the New Project Review (NPR) process. This is an internal LANL review process, implemented by the LANL requirements document P408, Air Quality Reviews, whereby facility representatives can identify new operations (or modifications to operations) and ensure that appropriate air quality reviews are conducted. Rad-NESHAP personnel review these NPRs for impacts on the survey. We also used interviews with facility representatives, site visits, clean building surveys, and ventilation verification surveys in an effort to identify additional potential release points.

As part of this NPR review process, we identified release points with new and modified operations that yielded a potential increase in radioactive materials usage and subsequently emissions, and verified that these operations were being accounted for on the current usage survey. In addition, we reviewed NPRs issued in 2010 whose status was still pending at the start of 2011. We verified that these operations did not take place in CY'11, or if they did, we verified that we were tracking them appropriately.

A new point source at TA9-34 was identified through Permits and Requirements Identification Process (PRID) #11A-0016-V00 and evaluated for this report. TA9-34 ES-99 is a Tier IV source in 2011.

A new point source at TA50-257 was identified through Permits and Requirements Identification Process (PRID) #10A-0012-V00 and evaluated for this report. TA50-257 ES-99 is a Tier IV source in 2011.

A process at TA15-285 ES-99 was identified through Permits and Requirements Identification Process (PRID) #10A-0010-V00 and investigated for this report. The welding operations were added to the emission estimations in CY'11.

Several other PR-IDs were identified through Permits and Requirements Identification Process (PRID) and evaluated for this report. These PR-IDs either did not occur during CY'11 or were processes already identified through RMUS reporting.

The 2011 unmonitored usage survey includes 11 Tier III sources and 38 Tier IV sources. In addition, 1 Tier III and 1 Tier IV source included in the 2010 usage survey had no active operations in 2011. Three Tier III and 2 Tier IV sources included in the 2009 usage survey also had no active operations in 2011. Table 2-1 lists these facilities.

Table 2-1. Previous Point Sources with No Emissions in 2011

ESID Number	TA and Building	Dose (mrem/yr)	Last Year of Recorded Emissions	Tier
54028101	54-281	4.94E-02	2010	III
500001CT	50-1	2.09E-05	2010	IV
03001600	3-16	1.58E-03	2009	III
41000104	41-1	9.56E-02	2009	III
53001899	53-18	1.64E-03	2009	III
16020599	16-205	8.90E-07	2009	IV
54100999	54-1009	2.45E-05	2009	IV

For the unmonitored Tier III and Tier IV sources, the main objective of the usage survey is to confirm and verify that these release points still have low potential emissions and PEDEs. These stacks have not historically had potential doses > 0.1 mrem/yr, so they

do not require continuous monitoring under EPA regulations (40 CFR 61, Subpart H, 61.93.b.4(i)).

For monitored sources (Tier I and II), the goal of the report is to verify that the appropriate radionuclides are being monitored. As stated earlier, the annual report is being divided into an unmonitored release points report (this report) and a monitored release points report. The report for monitored sources addressing 2011 operations is targeted for completion in September 2012.

The following methodology (described in ES-126) was used to update the usage survey for all release points/facilities:

- Facility managers (FMs) and/or facility points of contact (POCs) listed on the 2009/2010 usage surveys were contacted, and in some cases site visits were scheduled.
- Information from the 2009/2010 surveys were used as baseline information for building a current calendar year update.
- Information on the radioactive materials usage and on the processes performed was obtained for each release point. ES personnel collected usage survey information primarily through interviews with facility POCs. The POCs were instructed to provide only unclassified information regarding radioactive materials at their facilities. If classified processes were involved, POCs were asked to provide an unclassified, conservative (but reasonable) estimate such as a facility, wing, or room limit or a facility Safety Analysis Report (SAR) limit.
- The POCs were reminded that the information provided by the facility is used for regulatory compliance purposes to meet Clean Air Act regulations for radioactive air emissions (40 CFR 61, Subpart H). Also, that the facility information needs to cover both routine operations and any abnormal or accidental releases.
- The information collected during site visits was compiled, verified, and entered into a database by Rad-NESHAP Team members at ES.
- Data QA was conducted in accordance with ES-RN, *Quality Assurance Project Plan for the Rad-NESHAP Compliance Project*.

After we received usage survey information for a given point source/facility, we compiled the data in an MS ACCESS® database. We collected additional information when necessary to refine emissions calculations. This follow-up involved site visits,

meetings, e-mails and phone calls to POCs, radioactive material custodians, etc. For each release point, a graded approach to emissions estimates was performed on the usage survey data to meet requirements described in 40 CFR 61, Subpart H (61.93.b.4(i)).

The methodology used for this graded approach started with emission calculations methods (including the 100°C rule) outlined in Appendix D to 40 CFR 61. When facility representatives provided sufficient detail, we used process information in these engineering calculations to determine potential emissions from point sources.

For point sources with an estimated PEDE of ≥ 0.01 mrem/yr (using Appendix D guidelines) at the critical receptor, we further refined the calculations using less conservative (and more accurate) engineering calculations and EPA-approved methods. In addition, the "Enhanced 100°C Rule" was applied to emissions estimates when appropriate. The rule, as defined in the Federal Facilities Compliance Agreement (FFCA) between DOE and the EPA, states, "A radionuclide material that has a boiling point greater than 2000°C and is heated to within 1000°C of its boiling point or higher, or is intentionally dispersed into the environment, must be considered a gas. If the material is not heated to within 1000°C of its boiling point, the material would be considered a solid or liquid depending on its actual physical state at that temperature" (USDOE & USEPA, 1996).

For facilities that contain radionuclide contamination in hoods and ducts, we used historic monitoring data or duct holdup estimates calculated for previous usage surveys to determine the potential amount of radioactive materials present in the ducts. For those facilities where such data was not available, we estimated contamination levels using available radiological survey data or knowledge of prior radiological operations.

For release points that were monitored up to December 2000, we examined the historic monitoring data (typically 1992 to 1998) as part of the emissions estimation process. For each release point, the most appropriate choice was selected of these following options:

- If existing operations were consistent with operations at the time when the release point was monitored, then the monitoring information was reported as a realistic estimate of CY 2011 emissions.
- If operations ceased before CY 2011, then the historic monitoring data was reported as a conservative estimate of CY 2011 emissions.
- Historic monitoring data might have been reported in conjunction with CY 2011 usage data so that we could conservatively estimate potential emissions resulting from duct-holdup and/or room/area contamination.
- The historic monitoring data review indicated that the data was no longer relevant to current release point operations. The data was not reported as part of the CY 2011 emissions estimate.

After we collected and analyzed the source term and release information, we uploaded the relevant data and process information into the usage survey database.

Using the survey data and RMUS database calculations, ES developed emissions estimates and calculated PEDEs for all point sources in this year's usage survey (described in ES-137).

3.0 RADIOACTIVE MATERIALS USAGE SURVEYS

Fifty six (56) unmonitored release points were assessed for this radioactive materials usage survey. Radioactive materials on the usage surveys are identified as one of two source types: potential emissions source (P), and future potential emissions source (F); although source type F is rarely used (none in 2011). These source types are described in more detail in procedure ES-126.

Procedure ES-126 states, in part, that the definition of a source type P is, "Material that is composed of or contaminated with radioactive material (RAM) and that has the potential to emit all or part of this RAM during normal operations." Source type P's may be tracked individually or grouped for more concise reporting on the usage survey. We use information derived from facility personnel to determine the maximum usage or throughput amount of each radionuclide for the specified calendar year.

Procedure ES-126 also states, in part, that the definition of source type F is, "Material that does not meet the definition of a 'potential emissions source' but that might meet this definition in the future." These are considered sealed/unopened sources if they meet the full definition of a future potential emissions source as defined in ES-126. According to Appendix D of 40 CFR 61, "Radionuclide materials in sealed packages that remain unopened and that have not leaked during the assessment period should not be included in the calculation." This means a sealed source that could potentially have been opened at any time but remained unopened throughout CY 2011. We may report these sources in a single line item, and place more detailed information (if available) in the 2011 usage survey file folder for that facility. It was determined that most source type F line items reported since the 1999 usage survey were actually sealed sources that were not intended to be opened. These types of sources will be included only on a very limited basis in future usage surveys, unless it is determined that a potential for radioactive air emissions may exist in the foreseeable future.

We no longer request information on sealed sources that do not meet the source type F definition. Some examples of this type of sealed source include: calibration sources (including hermetically sealed), disc sources, and radioactive materials in sealed containers that have not been opened and that are intended to remain sealed for the foreseeable future.

We calculated potential effective dose equivalents using mrem/Ci factors established using the CAP88 computer model for each point source. These factors were developed in accordance with ES-501, *Dose Assessment Using CAP-88*, ES-511, *Calculating Mrem Per Ci Factors*, and ES-512, Dose *Factors for Non-CAP88 Radionuclides*. Several facilities, each with more than one unmonitored release point, were dealt with as smaller entities, with each unmonitored ES modeled as an individual point source. Information about the more complex facilities (e.g., TA3-66 and TA48-1) is compiled in the database and is listed in Attachment 1 by TA, building, and room (or ES); whereas, the less complex facilities are listed only by TA and building. Relevant information for each point source is included in the series of Radioactive Material Usage Survey (RMUS) Interview Forms (and supporting process forms) in Attachment 1.

The format of the usage survey interview and process forms includes supporting information (regarding each line item/radionuclide source) and process information. The information for each radionuclide includes process number, source type, usage/throughput activity (i.e., cumulative amounts of radionuclide used in CY 2011), and physical state. We collect process information to use in estimating potential emissions from radionuclide usage activities. We use the usage data together with the process information to calculate potential emissions from a release point.

The basis for the usage data is also documented on the usage survey. The basis field is used to identify the source of information provided by facility representatives (e.g. spreadsheet, database, logbook, user estimate, bounding estimate of user, analytical results, etc.). The importance of this information is described in ES-RN, which states, “Rad-NESHAP Project work will be performed in a manner that ensures appropriate

emphasis on sources that have significant potential or actual emissions to the environment. By implementing a four-tiered graded approach to emissions monitoring and verification activities, this appropriate emphasis will be obtained." The tiers for categorizing monitored and unmonitored release points are described in ES-RN as follows:

Tier I sources	Sources designated Tier I are those sources that have actual emissions that contribute greater than 1 millirem per year to any member of the public (as defined in Subpart H), based on the previous rolling 12-month period. Requirements for Tier I sources include: • Continuous sampling or monitoring of radionuclide emissions is required for all radionuclides contributing 90% or more of the potential off-site dose. • Real-time monitoring with alarm capability for all types of emissions contributing to the "Tier I" status. • Consideration will be given to a special accident monitoring system. • Inspection and maintenance criteria for sample systems: all criteria from Table 5 of the ANSI N13.1-1999 standard, as applicable to the LANL instrumentation and the Tier I category. Applicability is determined from guidance in the ANSI standard. These inspections and maintenance activities are detailed in Appendix E. • An emissions management plan and source-specific procedures will be in place to address elevated emissions from each facility and identify required approvals and notifications prior to operations. • All Tier II requirements also apply to Tier I stacks.

Tier II Sources

Sources designated Tier II are those sources that have the **potential** to contribute greater than 0.1 millirem per year to any member of the public (as defined in Subpart H), based on the most recent Radioactive Materials Usage Survey (RMUS). Requirements for Tier II sources include:

- Continuous sampling or monitoring of radionuclide emissions is required for all radionuclides contributing 90% or more of the potential off-site dose. See Sections 5.3, 5.4, and 5.5.
- Inspection and maintenance criteria for sample systems: all criteria from Table 5 of the ANSI N13.1-1999 standard, as applicable to the LANL instrumentation and the Tier II category. Applicability is determined from guidance in the ANSI standard. These inspections and maintenance activities are detailed in Appendix E.
- Analysis of operations for the RMUS shall meet the record-keeping requirements of Tier IV sources, described below.

Tier III Sources

Sources designated Tier III are those sources that have the potential to contribute between 0.001 and 0.1 millirem per year to any member of the public (as defined in Subpart H), based on the most recent RMUS.

- Potential emissions from Tier III sources will be evaluated annually by analysis of operations, as part of the RMUS.
- For processes and radionuclides which contribute to the Tier III status of the source (over 0.001 millirem per year) or make up over 90% of the potential dose, information used to confirm and verify the level of emissions shall be traceable to a secondary source of documentation (e.g., stack monitoring data, operations logbook, database, etc.). This information will be subject to quality assurance review by a knowledgeable party prior to its use in the RMUS.

Tier IV Sources

Sources designated Tier IV are those sources that have the potential to contribute less than 0.001 millirem per year to any member of the public (as defined in Subpart H), according to the most recent RMUS.

- Potential emissions from Tier IV sources will be evaluated at least every other year by analysis of operations, as part of the RMUS.
- Information used to confirm and verify the level of emissions may be based on user estimates or other estimation methods that DO NOT need to be traceable to a secondary source of documentation. User estimates of radionuclide usage will be conservative upper-bound values

In compliance with this policy, Rad-NESHAP team personnel have collected the appropriate level of documentation based on the tier classifications from the 2009 and 2010 usage surveys (see Table 4.1 for previous tier classifications). The new tier classifications, based on the 2011 usage survey are also listed in Table 4.1.

There were several new fields introduced on the 2001 survey Interview Form, as mentioned previously. Four fields were added to the body of the interview form: Release Fraction, Emissions (Ci), mrem/Ci, and PEDE.

The Release Fraction field documents the assumed fraction of the radionuclide usage amount which is released to the air during processing. The field allows the team member to select a release fraction from a pull down menu with the following options: Gaseous, Particulate, Liquid, Solid, and Custom. The first four fields correspond directly to EPA guidance on estimating potential emissions based on a materials physical state. The purpose of the "Custom" option is to allow the team member to enter a specific release fraction to reflect specific circumstances of an operation. For example, assume that a chemistry technician uses 1 mCi of Cs-137 in an experiment in which they heat the solution to >100° C. After heating, they analyze the solution and determine that they have recovered >99% of the Cs-137, which they document in their logbook. Using a gaseous release fraction of 1.0E+00 for heating a solution to >100° C does not accurately represent the potential for emissions from this operation. The "custom" option allows a NESHAP team member to enter 0.01 as a release fraction to account for recovery of >99% of a solution.

Once a release fraction is selected, the database automatically calculates the estimated emissions by multiplying the usage in curies by the release fraction. Once the Exhaust Stack Identification Number (ES ID#) is chosen from a pull down menu, the mrem/Ci field is populated for each RAM line item. This mrem/Ci field is based on CAP88 dose assessment calculations, run in advance with recent average meteorology input parameters, and actual or conservative stack physical characteristics. Having these CAP88 runs done in advance ("canned") allows for streamlined analyses in the RMUS or

other new project reviews throughout the year. Finally, with the push of a button, the database will calculate a total PEDE value; which is simply the addition of the PEDE (for each RAM) column from the body of the Interview Form.

For some release points with complex operations, operations are tracked not by release point, but by room number. For these release points, including TA-48-1 ES-11 and TA-48-1 ES-15, the Interview Form includes two fields: a "total PEDE (mrem/yr) this interview form", and a "total PEDE (mrem/yr) this exhaust stack". For these special cases, the database will summarize the PEDE information over several Interview Forms to report a total PEDE for an exhaust stack.

4.0 DOSE ESTIMATES

A total of 56 dose assessments were conducted for unmonitored release points. Of the 56 release points, 7 were identified as having no rad emissions associated with them during CY 2011. Four of those were tier III sources and 3 were tier IV sources in the previous year's survey. For the remaining 49 release points, PEDEs were calculated at each facility's critical receptor. The PEDEs are listed in Table 4-1. The calculations were completed using RAM usage and process information provided by facility personnel, and by using calculations in the usage survey database. In addition, 2009 or 2010 tier classifications were reported along with the new 2011 tier classifications (Table 4-1). For 2011, the total PEDE for unmonitored point sources is 1.48E-01 mrem/yr.

In conducting the dose assessment, we may treat facilities with multiple unmonitored release points as single release points. These facilities are typically classified as Tier IV sources and are insignificant contributors to the total dose from unmonitored facilities at LANL. Reporting a single dose from multiple release points at a single facility expedites reporting, record-keeping, QA, etc., for these facilities with insignificant dose contributors. In 2011, the facilities that fall under this category are TA-3-16, TA-3-34, TA-3-1698, TA35-2, TA-43-1, TA-46-31, and TA-48-45.

Three new release points were included in the 2011 usage survey. They were identified through PRIDs routine interviews with facility points of contact.

Table 4-1. PEDE Results for All Release Points on the 2011 Usage Survey

ESID Number	TA and Building	Exhaust Stack (ES)[a]	Dose at Facility Critical Receptor (mrem/yr)	Tier[b]
03001600	03-16	00	0.00E-00	NA (III)
03002913	03-29	13	2.31E-05	IV (IV)
03003299	03-32	99	7.12E-06	IV (IV)
03003400	03-34	00	4.21E-06	IV (IV)
03003501	03-35	01	4.99E-05	IV (IV)
03006601	03-66	01	2.44E-03	III (IV)
03006602	03-66	02	1.45E-03	III (III)
03006603	03-66	03	4.48E-06	IV (IV)
03006604	03-66	04	1.04E-02	III (III)
03006605	03-66	05	2.53E-06	IV (IV)
03006606	03-66	06	6.73E-07	IV (IV)
03006626	03-66	26	7.01E-04	IV (IV)
03006654	03-66	54	2.22E-05	IV (IV)
03006699	03-66	99	6.85E-05	IV (IV)
03010225	03-102	25	1.90E-03	III (III)
03169800	03-1698	00	3.58E-06	IV (IV)
09002103	09-21	03	3.99E-07	IV (IV)
09003499	09-34	99	1.37E-07	IV (NA)
15028599	15-285	99	7.96E-08	IV (IV)
15053401	15-534	01	2.36E-06	IV (IV)
16020299	16-202	99	1.95E-02	III (III)
16020599	16-205	99	0.00E-00	NA (IV)
35000200	35-2	00	4.04E-09	IV (IV)
35021305	35-213	05	6.49E-06	IV (IV)
36000104	36-1	04	1.30E-06	IV (IV)
39006999	39-69	99	1.91E-08	IV (IV)
41000104	41-1	04	0.00E-00	NA (III)
43000100	43-1	00	9.05E-03	III (III)
46002499	46-24	99	2.76E-07	IV (IV)
46003100	46-31	00	2.57E-07	IV (IV)
46004106	46-41	06	8.70E-09	IV (IV)
46015405	46-154	05	2.79E-08	IV (IV)
46015899	46-158	99	4.26E-08	IV (IV)
46020099	46-200	99	6.32E-09	IV (IV)
48000111	48-1	11	5.13E-03	III (III)
48000115	48-1	15	9.71E-04	IV (III)
48000135	48-1	35	3.75E-08	IV (IV)
48000145	48-1	45 (45,46)	8.61E-03	III (IV)
48000166	48-1	66	4.64E-05	IV (IV)
48000167	48-1	67	1.08E-02	III (III)
48000168	48-1	68	1.93E-11	IV (IV)
48004500	48-45	00	6.59E-06	IV (IV)
500001CT	50-1	CT	0.00E-00	NA (IV)
50000299	50-2	99	5.72E-09	IV (IV)
50006901	50-69	01	4.40E-04	IV (IV)
50006902	50-69	02	3.44E-03	III (III)

Table 4-1. PEDE Results for All Release Points on the 2011 Usage Survey (continued)

ESID Number	TA and Building	Exhaust Stack (ES)[a]	Dose at Facility Critical Receptor (mrem/yr)	Tier[b]
50006999	50-69	99	1.50E-04	IV (IV)
50025799	50-257	99	1.91E-05	IV (NA)
53001599	53-15	99	8.46E-06	IV (IV)
53001899	53-18	99	0.00E-00	NA (III)
53098401	53-984	01	7.24E-02	III (III)
53109099	53-1090	99	2.44E-05	IV (IV)
54028101	54-281	01	0.00E-00	NA (III)
54100199	54-1001	99	5.78E-15	IV (IV)
54100999	54-1009	99	0.00E-00	NA (IV)
55000201	55-2	02	4.08E-05	IV (IV)
		Total (mrem/yr):	1.48E-01	

[a]Exhaust Stack: 1) 99 represents an exhaust stack of unknown number (or a ventilation system to which no exhaust stack number has been assigned) and 2) 00 represents a facility with several point sources that were modeled as a single release point.
[b]Tier classification is based on CY2011 PEDEs. Tier classifications in parenthesis ( ) represent the most recent previous usage survey update (either CY2010 or CY2009) classifications.

5.0 Quality Assurance

A thorough degree of quality assurance has been incorporated into the *2011 Radioactive Materials Usage Survey for Unmonitored Point Sources* as described in the ENV-ES-RN (ES-RN). The ES-RN identified the requirements for and the structure of usage survey activities. Data in Section 5.2, Point Source Evaluations, was of particular importance to the survey. Subsection 5.2.6 provides the requirements for process verification and peer review for the usage survey.

Examples of these verification and review activities include (1) the review of additional sources of information to verify that all point sources at LANL have been identified; (2) the verification of information provided by facility representatives by visiting facilities and spot-checking information; and (3) the verification of any data entered into spreadsheets and databases. In addition, a health physicist reviewed the emissions and dose estimates generated from usage survey information. Before submission of this report, all verification and review activities were confirmed to be complete.

Sample calculations of the usage amounts, emissions, off-site dose, and summation of all sources were performed to verify database functionality. Documentation of these verifications exists in the 2011 QA file folder. This verification is in line with requirements in ES-RN.

For Tier III operations, data provided by facilities is subject to additional QA by facility representatives or ES, as appropriate. This requirement is in response to an observation raised in the 2002 independent audit of the Rad-NESHAP compliance program, and the requirement is documented in ES-126.

No significant issues were identified through the 2011 spot checks, ventilation verifications or clean building surveys. As part of the usage survey process, ES personnel continue to identify new or modified processes each year, which had not been identified

through the New Project Review program. Therefore, the interaction between ES personnel and facility points-of-contact continues to be a vital element of a thorough and complete usage survey, and is a valuable tool to supplement the NPR program.

6.0 REFERENCES

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Attachment 1. Radioactive Materials Usage Survey Interview Forms (and Associated Radioactive Materials Usage Survey Process Forms) by TA and Building

The Radioactive Materials Usage Survey Interview Forms/Process Forms are filed in the following order:

Technical Area	Building
3	16
	29
	32
	34
	35
	66
	102
	1698
9	21
	34
15	285
	534
16	202
	205
35	2
	213
36	1
39	69
41	1
43	1
46	24
	31
	41
	154
	158
	200
48	1
	45
50	1
	2
	69
	257
53	15
	18
	984
	1090
54	281
	1001
	1009
55	2

The following legend is provided to aid with interpretation of fields on the Usage Survey Sheets.

Symbol	Definition
ES ID #	Exhaust Stack Identification Number: 1) 99 represents an exhaust stack of unknown number (or a ventilation system to which no exhaust stack number has been assigned) 2) 00 represents a facility with multiple release points modeled as a single release point.
RAM	Radioactive Material
Proc #	Process Number
P	Potential Emissions Source (active point source)
D-38	Depleted Uranium, Material Type-11
U-en	Enriched Uranium, Material Type-34
U-nat	Natural Uranium, Material Type-10
MT-#	Weapons Grade Pu-239 designated as Material Type
MAP	Mixed Activation Products (modeled as Co-60)
MFP	Mixed Fission Products (modeled as Cs-137)
Alpha	RAM modeled as Am-241
Beta	RAM modeled as Sr-90
Beta/Gamma	RAM modeled as Cs-137

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Steve Long

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/09/2012	01/09/2012	2011	UI-FAC	7-2336	smlong@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
03	0016	Shutdown	☐	03001600	LANL Business Center	2009

Total PEDE (mrem/year) this interview form:

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0016 **Room:** Various

Process #: 1

Process performed in room number(s): Various

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Gaseous

Physical state after process: Particulate

Primary Containment: Various

Usage Basis: Historic Monitoring Data

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

TA-3-16 is known as the Ion Beam Facility (IBF). Steve Long was contacted on 1/9/2012. He stated that while some clean up is going on in the facility, there has been no cleaning in the stacks of ducting. However, he also said that the ventilation system was shut down and did not run at all during 2011. Therefore, this facility will no longer be considered a point source of emissions.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Deann Dierks

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/10/2012	01/10/2012	2011	RP-1	5-0864	ddierks@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
03	0029	Active	☐	03002913	County Landfill	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03002913	Duct	1	Pu-239	☑ Ci ☐ g	4.74E-05	6.21E-02	4.74E-05	Particulate	1.00E-03	4.74E-08	2.30E+02	1.09E-05
03002913	Duct	1	Tc-99	☑ Ci ☐ g	5.73E-03	1.70E-02	5.73E-03	Particulate	1.00E-03	5.73E-06	2.13E+00	1.22E-05

Total PEDE (mrem/year) this interview form: 2.31E-05

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0029 **Room:** Duct

Process #: 1

Process performed in room number(s): Duct

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Duct

Usage Basis: Survey Data

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Most of the TA-3-29-1 operations in Wing 1, (U-238 work) ceased in 1992. Tc-99 contamination existed in two labs in this wing. The event that resulted in the contamination occurred about twelve years ago and was the only time Tc-99 was used in Wing 1. The contaminated rooms were shut down around 1991 and the area of contamination was remediated and the contaminated exhaust ventilation ducts were capped off. Some contamination was thought to remain in the ducts. Tc-99 contamination estimations for FE-13 were provided by Bill Wadman.

ENV-ES was contacted by Steve Costigan (HSR-1 Team Leader at CMR) in 1999 because they were planning to cleanup removable Tc-99 contamination in two rooms in Wing 1. The two rooms have been closed off and designated a controlled area. Rad survey data from the rooms was provided to ESH-17 (now ENV-ES).

The provided information was used to estimate a potential particulate release of Tc-99 and Pu-239 (based on beta/gamma and alpha smear results) during clean up operations. It was conservatively assumed that the rooms were contaminated at the maximum smear result from a survey conducted on 1/29/99 (see 1998 file folder for original smear data). It was also assumed that beta/gamma contamination was from Tc-99 and alpha contamination was from Pu-239 (based on information provided by Steve Costigan). Based on the conservative calculations, the potential emissions were estimated using 1.0E-3, the Appendix D reduction factor for particulates.

In CY'03, Steve Costigan and Dwain Keith stated that the clean-up operation was complete. There is no known radioactive material in the rooms, but they still have residual contamination in room ventilation downstream of the rooms. The contaminated ventilation ducts are exhausted by the general fan exhaust for Wing 1 (ES-13). Therefore, this source will remain on the '09 usage survey in order to conservatively estimate potential emissions from duct contamination.

For CY'11, Deann Dierks stated that no radiological work was performed in Wing 1 during 2011.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Darrin Byler

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/02/2012	02/02/2012	2011	MST-8	7-5152	dbyler@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
03	0032	Active	☐	03003299	County Landfill	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03003299	102E/F	1	D-38	☐ Ci ☑ g	7.67E+02	4.38E-07	3.36E-04	Particulate	1.00E-03	3.36E-07	2.12E+01	7.12E-06

Total PEDE (mrem/year) this interview form: 7.12E-06

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0032 **Room:** 102E

Process #: 1

Process performed in room number(s): 102E, 102F

Heating? No Heating

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: None

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

This project involves the fabrication and characterization of depleted uranium (D-38) fuel pellets. D-38 mononitride is synthesized, blended within a metal matrix and pressed and sintered into pellets. Characterization of the individual components and finished pellets is done using microscopy, ion scattering, thermal analysis, and mechanical testing techniques. Darrin Byler stated that less than 767 grams of D-38 was processes in CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Michael Hundley

Interview Date: 01/24/2012 **Callback Date:** 01/24/2012 **Survey Year:** 2011 **Operating Group:** MPA-CMMS **Phone #:** 7-4129 **E-Mail:** hundley@lanl.gov

TA: 03 **Building:** 0034 **Facility Status:** Active **Monitored?** ☐ **ES ID #:** 03003400 **Facility Critical Receptor:** County Landfill **mrem/Ci Factors Developed:** 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03003400	108	1	D-38	☑ Ci ☐ g	1.75E-05	4.38E-07	1.75E-05	Liquid	1.00E-03	1.75E-08	1.96E+01	3.43E-07
03003400	108	1	Th-232	☑ Ci ☐ g	1.09E-06	1.10E-07	1.09E-06	Liquid	1.00E-03	1.09E-09	1.53E+02	1.66E-07
03003400	112	2	D-38	☑ Ci ☐ g	7.88E-05	4.38E-07	7.88E-05	Liquid	1.00E-03	7.88E-08	1.96E+01	1.55E-06
03003400	126	2	D-38	☑ Ci ☐ g	8.41E-07	4.38E-07	8.41E-07	Liquid	1.00E-03	8.41E-10	1.96E+01	1.65E-08
03003400	126	2	Th-232	☑ Ci ☐ g	4.14E-09	1.10E-07	4.14E-09	Liquid	1.00E-03	4.14E-12	1.53E+02	6.31E-10
03003400	122	3	D-38	☑ Ci ☐ g	7.88E-05	4.38E-07	7.88E-05	Particulate	1.00E-03	7.88E-08	1.96E+01	1.55E-06
03003400	122	3	D-38	☑ Ci ☐ g	1.75E-05	4.38E-07	1.75E-05	Particulate	1.00E-03	1.75E-08	1.96E+01	3.43E-07
03003400	122	3	Th-232	☑ Ci ☐ g	1.09E-06	1.10E-07	1.09E-06	Particulate	1.00E-03	1.09E-09	1.53E+02	1.66E-07
03003400	104	4	Cs-137	☑ Ci ☐ g	3.19E-06	8.68E+01	3.19E-06	Particulate	1.00E-03	3.19E-09	1.58E+01	5.03E-08
03003400	129	4	H-3	☑ Ci ☐ g	2.00E-09	9.68E+03	2.00E-09	Gaseous	1.00E+00	2.00E-09	1.67E-03	3.34E-12
03003400	B1	4	Cs-137	☑ Ci ☐ g	2.30E-07	8.68E+01	2.30E-07	Particulate	1.00E-03	2.30E-10	1.58E+01	3.63E-09
03003400	B1	4	H-3	☑ Ci ☐ g	1.54E-05	9.68E+03	1.54E-05	Gaseous	1.00E+00	1.54E-05	1.67E-03	2.57E-08
03003400	B10	4	Cs-137	☑ Ci ☐ g	5.84E-08	8.68E+01	5.84E-08	Particulate	1.00E-03	5.84E-11	1.58E+01	9.21E-10
03003400	B10	4	H-3	☑ Ci ☐ g	9.92E-07	9.68E+03	9.92E-07	Gaseous	1.00E+00	9.92E-07	1.67E-03	1.66E-09

Total PEDE (mrem/year) this interview form: 4.21E-06

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0034 **Room:** 108

Process #: 1

Process performed in room number(s): 108

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Liquid

Physical state after process: Solid

Primary Containment: Tube

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to an email from Michael Hundley dated 1/24/12 (see file folder), this process did not change in CY'11 and CY'09 information should be used for emission estimations.

The operations involve etching the D-38 with nitric acid to remove surface oxides. They place the metal and/or other metal alloys in a quartz tube, seal it, heat it to 1000 deg C, and cool the tube. The enhanced rule (see Federal Facility Compliance Agreement) applies to these operations, and will be used (liquid reduction factor) to calculate D-38 and natural thorium (assumed to be Th-232) emissions from operations in Room 108. They maintain notebooks to track usage (secondary documentation).

40 g x 4.38E-7 Ci/g = 1.75E-05 Ci D-38 usage.
10 g x 1.09E-07 Ci/g = 1.09E-06 Ci Th-232 usage.

Rooms 103, 104, 107, 116, 122, 123, and 128 are where the crystals are studied in non-destructive operations. According to ENV-EAQ-RN, Quality Assurance Project Plan for the Rad-NESHAP Compliance Project (Section 5.2 Point Source Evaluations), radioactive materials that are used in non-destructive processes and are not readily dispersible, are not considered point sources of potential air emissions.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0034 **Room:** 112

Process #: 2

Process performed in room number(s): 112, 126

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Liquid

Physical state after process: Solid

Primary Containment: Vac. Chamber

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to an email from Michael Hundley dated 1/24/12 (see file folder), this process did not change in CY'11 and CY'09 information should be used for emission estimations.

In Room 112 (Eric Bauer) and Room 126 (Jason Lashley) arc-melting operations with D-38 and Th-232 (natural thorium) take place. The operation is similar to what is done in Room 108, except the arc-melting is conducted in a vacuum chamber. The metals are placed in the chamber with other metals, they are rapidly heated and cooled, and the resulting compound is studied in non-destructive operations in several other rooms in this facility. The enhanced rule (see the Federal Facility Compliance Agreement) also applies to these operations and a liquid reduction factor will be used to calculate potential emissions from this operation.

Room 112
180 g D-38 x 4.38E-07 Ci/g = 7.88E-05 Ci D-38 usage

Room 126
1.92 g D-38 x 4.38E-07 Ci/g = 8.41E-07 Ci D-38 usage
0.038 g Th-232 x 1.09E-07 Ci/g = 4.14E-09 Ci Th-232 usage

The compounds are used in non-destructive measurements in Rooms 103, 104, 107, 116, 122, 123, and 128. According to ENV-EAQ-RN, Quality Assurance Project Plan for the Rad-NESHAP Compliance Project (Section 5.2 Point Source Evaluations), radioactive materials that are used in non-destructive processes and are not readily dispersible, are not considered point sources of potential air emissions.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0034 **Room:** 122

Process #: 3

Process performed in room number(s): 122

Heating? <100 deg C

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: Vac. Chamber

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to an email from Michael Hundley dated 1/24/12 (see file folder), this process did not change in CY'11 and CY'09 information should be used for emission estimations.

Eric Bauer has an operation in Room 122. The electro-refiner system takes samples that were grown in Rooms 108 and 112 and improves their quality via an electro-refinement process. The material is heated close to the melting temperature in the refining process however it is far from the boiling temperature for these materials.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0034 **Room:** B10

Process #: 4

Process performed in room number(s): 104, 129, B1, B10

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: None

Usage Basis: Smear Data

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Several rooms in this building were characterized in 1996, and the results indicated potential contamination (see CY'96 Inventory file folder for more details). As a result of that survey, and information provided by facility personnel, several rooms (and/or their associated hoods and ductwork) are tracked on the usage survey for having potential contamination. There has not been any additional characterization work done at this facility (since 1996), so this line item will remain on the CY'11 usage survey.

Room 104 (currently non-destructive operations) was contaminated several years ago from a broken vial of samarium. The room was decontaminated during CY'96. Room dimensions from the CY'96 inventory were used to estimate potential alpha and beta/gamma contamination of this room. The alpha results were all NDA, and the average from 4 positive beta/gamma smears was used to estimate potential emissions.

According to the 1996 inventory for Room 129, there was potential H-3 contamination in the hood in this room from many years ago. The contamination estimate will also remain on the CY'11 Usage Survey.

Rooms B1 and B10 were characterized in CY'96. There was potential tritium contamination in the ductwork from Room B1 that was identified during characterization efforts. It was assumed that both rooms were uniformly contaminated at the average H-3 and average beta/gamma smear result. All the alpha smears were "no detectable activity" (NDA). A particulate reduction factor was applied to the beta/gamma estimate but not to the H-3 estimate for potential emissions.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Rob Aikin

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/13/2012	04/13/2012	2011	MST-6	7-3782	raikin@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
03	0035	Active	☐	03003501	County Landfill	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03003501	None	1	MT-34	☐ Ci ☑ g	1.50E+02	1.61E-05	2.41E-03	Particulate	1.00E-03	2.41E-06	2.06E+01	4.99E-05

Total PEDE (mrem/year) this interview form: 4.99E-05

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0035 **Room:** None

Process #: 1

Process performed in room number(s): None

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Filter

Usage Basis: MASS Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

There were no rad operations that created emissions performed in this building.

According to the MASS database (secondary documentation is the database maintained at TA3-66), there are approximately 147 g of enriched uranium (modeled as MT-34 and rounded up to 150 g for usage survey) holdup in the HEPA filter of this exhaust system. A particulate reduction factor was applied to the usage estimate in order to calculate potential emissions.

ENV-ES stack monitoring system was turned off in February 2000. The PEDE calculated for the CY'11 usage survey is a factor of 10 higher than the effective dose equivalent (EDE) calculated from the CY'99 monitoring data. Therefore, stack monitoring data will not be used to quantify duct holdup because the data in MASS provides a conservative, documented estimate.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Rob Aikin

Interview Date: 01/20/2012 **Callback Date:** 04/21/2012 **Survey Year:** 2011 **Operating Group:** MST-6 **Phone #:** 7-3782 **E-Mail:** raikin@lanl.gov

TA: 03 **Building:** 0066 **Facility Status:** Active **Monitored?** ☐ **ES ID #:** 03006601 **Facility Critical Receptor:** County Landfill **mrem/Ci Factors Developed:** 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006601	B100	1	MT-33	☑ Ci ☐ g	4.77E-11	7.89E-06	4.77E-11	Custom	1.00E+00	4.77E-11	1.65E+01	7.89E-10
03006601	B3	2	MT-11	☐ Ci ☑ g	8.36E+03	4.37E-07	3.65E-03	Particulate	1.00E-03	3.65E-06	1.45E+01	5.29E-05
03006601	B3	2	MT-33	☐ Ci ☑ g	2.12E+03	7.89E-06	1.67E-02	Particulate	1.00E-03	1.67E-05	1.65E+01	2.77E-04
03006601	Duct	3	MT-11	☑ Ci ☐ g	1.96E-06	4.37E-07	1.96E-06	Custom	1.00E+00	1.96E-06	1.45E+01	2.84E-05
03006601	B100	4	MT-11	☐ Ci ☑ g	9.50E+04	4.37E-07	4.15E-02	Solid	1.00E-06	4.15E-08	1.45E+01	6.01E-07
03006601	B101	5	MT-11	☐ Ci ☑ g	1.12E+05	4.37E-07	4.91E-02	Custom	4.26E-04	2.09E-05	1.45E+01	3.03E-04
03006601	B101	5	MT-33	☐ Ci ☑ g	3.18E+04	7.89E-06	2.51E-01	Custom	4.26E-04	1.07E-04	1.65E+01	1.77E-03
03006601	G5	6	D-38	☐ Ci ☑ g	2.45E+00	4.38E-07	1.07E-06	Custom	2.38E-02	2.55E-08	1.52E+01	3.87E-07
03006601	G105	7	D-38	☐ Ci ☑ g	1.40E+01	4.38E-07	6.13E-06	Particulate	1.00E-03	6.13E-09	1.52E+01	9.30E-08
03006601	G105	8	D-38	☐ Ci ☑ g	1.40E+01	4.38E-07	6.13E-06	Custom	1.00E-01	6.13E-07	1.52E+01	9.30E-06
03006601	G105	9	D-38	☐ Ci ☑ g	4.10E+01	4.38E-07	1.80E-05	Particulate	1.00E-03	1.80E-08	1.52E+01	2.72E-07
03006601	G105	10	D-38	☐ Ci ☑ g	1.40E+01	4.38E-07	6.13E-06	Particulate	1.00E-03	6.13E-09	1.52E+01	9.30E-08

Total PEDE (mrem/year) this interview form: 2.44E-03

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** B100

Process #: 1

Process performed in room number(s): B100, B101

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Custom

Physical state after process: Solid

Primary Containment: Furnaces

Usage Basis: Log Sheets

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Rob Aikin was our point of contact for CY'11.

The main operation exhausted to ES-01 is the foundry in the B-area. The B-area includes: B100 and B101 (FE-8), B101 (FE-13), B107 (FE-8, FE-25, and FE-26&27), and B3 (FE-8). ES-01 also exhausts FE-7 which is the fan exhausting G105. Rooms B100 and B101 are where the furnaces are located (Process #1). According to Rob, approximately 1,077 kg of charge weight material (approximately 12% of which was MT-33) was the total throughput in furnaces C, E & K for CY'11. The maximum temperature reached in any of the furnaces is 1520 degrees C. Engineering calculations were used to estimate potential emissions from these furnace operations. Supplemental source information is located in the file folder.

Secondary documentation for this operation is in log sheets that are maintained at TA3-66, B100 (see file folder for consolidated info provided by Rob). The information provided in this report was collected from casting logs of individual castings.

The usage estimate is actually the estimated maximum emissions based on engineering calculations which are based on the number of batches run per furnace in CY'11 and the volume of each furnace (see file folder for spreadsheet). Therefore, a physical state of "custom" and a reduction factor of 1.00E+00 were reported for Process #1.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** B3

Process #: 2

Process performed in room number(s): B3

Heating? No Heating

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: None

Usage Basis: Log Sheets

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Rob Aikin was our point of contact for CY'11.

There is a breaking press and a hack saw in Room B3 that are ventilated by a flex-hosed exhaust trunk. The breaking press and/or hack saw may be used to cut/saw larger pieces of MT-11 and MT-33 into smaller pieces to be used in the foundry. Since 836 kg MT-11 and 212 kg of MT-33 was used in the foundry in CY'11 (see file folder for email from Rob), these values were used to estimate potential emissions from the breaking press and hack saw. It was assumed that 1% of the throughput was available for emissions, and the particulate reduction factor (1.00E-03) was applied to that amount. This is a very conservative estimate of potential particulate emissions from that machinery as very little particulate is generated during operations, and not all of the inventory actually goes through these machines. Secondary documentation for this operation is in log sheets that are maintained at TA3-66, B100 (see file folder for consolidated info provided by Rob). Rob also stated that the information provided in this report was collected from casting logs of individual castings.

MT-11 = 8.36 kg = 8,360 g usage.
MT-33 = 2.12 kg = 2,120 g usage.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** Ducts

Process #: 3

Process performed in room number(s): Ducts

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Custom

Physical state after process: Particulate

Primary Containment: Ducts

Usage Basis: Historic Monitoring Data

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Fan Exhaust (FE)-8 is an historically monitored release point. Historic monitoring data (1992-1995) was used to estimate emissions from potential duct holdup in FE-8. This fan exhaust has no filtration so no back-calculation to estimate usage was required. In order to estimate emissions from this particulate emission source, a physical state of "custom" and a reduction factor of 1.00E+00 was entered on the interview form. Secondary documentation is in the annual Radionuclide Air Emissions Reports produced by ENV-ES's predecessor organizations (see file folder for copies of summary emissions data for 1992-1994 from the Federal Facilities Compliance Agreement and emissions data for 1995 from the 1995 Annual Report).

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** B100

Process #: 4

Process performed in room number(s): B100

Heating? No Heating

Physical state before process: Solid

Physical state during process: Solid

Physical state after process: Solid

Primary Containment: Drums

Usage Basis: MASS Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Rob Aikin was our point of contact for CY'11. Turnings were generated in room B100. The total amount was 95 kg (95,000 g). This operation was exhausted by FE-8 (ES-1).

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** B101

Process #: 5

Process performed in room number(s): B101

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Custom

Physical state after process: Solid

Primary Containment: Furnaces

Usage Basis: Log Sheets

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Rob Aikin, an appreciable amount of MT-11 and MT-33 material was melted in a Button Melter. It is a small furnace that uses an electric arc to melt metal in a water-cooled copper hearth. It is done under a vacuum without gas flowing (similar to the VAR furnace which was not used in CY'11).

During the melting they are alloying uranium and other materials. They assume that all of the lost mass is MT-11 and MT-33 (worst case). The loss is 0.0426% or 4.26E-04 which will be used for the custom reduction factor. This release fraction was measured at the facility in 2004, and remains applicable today.

In CY'11, 8 of the 20 button sets were plates with Unalloyed LEU or LEU-10%Mo which is modeled as MT-33. There was a total amount of 31.78 kg of MT-33.

The remaining 12 button sets of U-10%Mo and U-7%Nb were modeled as MT-11 (depleted uranium). There was a total amount of 112.41 kg of MT-11

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** G5

Process #: 6

Process performed in room number(s): G5

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Custom

Physical state after process: Solid

Primary Containment: Equipment

Usage Basis: Log Books

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Jason Cooley provided descriptions and usage/estimated loss information. He maintains log books of before melting and after melting weights. He used that data to provide the information below.

There are 3 instruments used to melt D-38, U-enriched (modeled as MT-34) and Th-232. Only the Arc melter was in operation in 2011 and no Th-232 was melted.

The arc melter is exhausted to ES-01. D-38 is heated to approximately 2500 deg C. According to Jason, they heated 2.4504 g D-38 with a measured loss of 0.0582 g.

Measured losses of 0.0582 g
0.0582 g / 2.4504 g x 100 = 2.38% estimated emissions (custom release fraction of 2.38E-02)

No U-enriched was used in CY'11.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** G105

Process #: 7

Process performed in room number(s): G105

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Ziplock Bag

Usage Basis: Log Book

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Dennis Guidry provided the material amount information for CY'11.

D-38 was used but natural uranium and enriched uranium were not used in this process in calendar year (CY) 2011. The samples are turnings, solids, and powders. They are cleaned with soapy water or dilute nitric acid in the controlled hood in G105. This process is to prepare the samples prior to placement in furnaces (Process #9). This is being treated as a potential point source of emissions, because samples are placed in nitric acid. It is conservatively assumed that particulate emissions could potentially be generated from this operation. Dennis provided data from log books which are the secondary documentation for this operation (see email in file folder for CY'11 usage data). There were approximately 14 g D-38 processed in this operation during CY'11. A particulate reduction factor was applied to this data in order to conservatively estimate potential air emissions.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** G105

Process #: 8

Process performed in room number(s): G105

Heating? >100 deg C

Physical state before process: Particulate

Physical state during process: Custom

Physical state after process: Particulate

Primary Containment: Furnaces

Usage Basis: Log Book

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Dennis Guidry provided the material amount information for CY'11.

This process includes that part of the operation where the samples are heated in furnaces to 2300-2500 degrees C. These furnaces include a carbon analyzer, an oxygen/nitrogen analyzer, and a hydrogen analyzer. All three analyzers consist of furnaces that heat the sample very quickly to ~2300-2500 degrees C. Pneumatic gas is vented to the in-house ventilation system and should not contain any contaminants from the actual analysis. The carbon analyzer furnace gas is ventilated through a HEPA-filtered vacuum system and back into the room. The furnace gas (exhaust) for the oxygen/nitrogen and hydrogen analyzers are connected to a hood drop located along the north wall of G105. Even though the carbon analyzer is exhausted back into the room, it is conservatively being included as a potential emissions source because there is a hood in this room.

The samples are combusted during this process, and radioactive ash that is left after the heating operation is disposed of in the foundry waste stream. At ES's request, MST-6 personnel conducted recovery experiments during the spring of CY'99 (results in the 1998 Usage Survey file in folder for this release point). They determined that a minimum of 90% of the total radioactive materials combusted in the furnaces was recovered during these operations. Therefore, it is assumed that 10% of the total radioactive materials throughput was potentially exhausted as gaseous emissions for the CY'11 usage survey estimate. Dennis provided data from log books which are the secondary documentation for this operation (see email in file folder for CY'11 usage data). For CY'11, approximately 14 g of D-38 was the total D-38 throughput for all three furnaces combined. A physical state of "custom" and a reduction factor of 1.0E-01 (10%) were assigned to this particulate/gaseous emissions source in order to more realistically represent the potential emissions from this operation.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** G105

Process #: 9

Process performed in room number(s): G105

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: None

Usage Basis: Log Book

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Dennis Guidry stated in an email dated 1/20/12 (see file folder) that used approximately 41 g of D-38 for surface area analyses in CY'11 (see email in file folder).

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** G105

Process #: 10

Process performed in room number(s): G105

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Vial

Usage Basis: Log Book

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Dennis Guidry stated in an email dated 1/20/12 (see file folder) that used approximately 14 g of D-38 for particle size analyses in CY'11 (see email in file folder).

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Rob Aikin

Interview Date: 04/11/2012

Callback Date: 04/21/2012

Survey Year: 2011

Operating Group: MST-6

Phone #: 7-3782

E-Mail: raikin@lanl.gov

TA: 03

Building: 0066

Facility Status: Active

Monitored? ☐

ES ID #: 03006602

Facility Critical Receptor: County Landfill

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006602	B100	1	MT-11	☐ Ci ☑ g	3.42E+04	4.37E-07	1.49E-02	Particulate	1.00E-03	1.49E-05	1.40E+01	2.09E-04
03006602	B100	1	MT-33	☐ Ci ☑ g	9.80E+03	7.89E-06	7.73E-02	Particulate	1.00E-03	7.73E-05	1.60E+01	1.23E-03
03006602	B100	2	Co-60	☑ Ci ☐ g	5.44E-05	1.13E+03	5.44E-05	Particulate	1.00E-03	5.44E-08	1.75E+00	9.52E-08
03006602	B100	2	Cs-137	☑ Ci ☐ g	9.92E-06	8.68E+01	9.92E-06	Particulate	1.00E-03	9.92E-09	1.07E+01	1.06E-07
03006602	B100	2	MT-11	☑ Ci ☐ g	8.42E-04	4.37E-07	8.42E-04	Particulate	1.00E-03	8.42E-07	1.40E+01	1.18E-05
03006602	B100	2	Nb-94	☑ Ci ☐ g	4.54E-07	1.90E-01	4.54E-07	Particulate	1.00E-03	4.54E-10	4.35E-01	1.97E-10
03006602	B100	2	Sr-90	☑ Ci ☐ g	9.92E-06	1.38E+02	9.92E-06	Particulate	1.00E-03	9.92E-09	1.05E+01	1.04E-07
03006602	B100	2	Th-232	☑ Ci ☐ g	2.63E-06	1.10E-07	2.63E-06	Particulate	1.00E-03	2.63E-09	1.02E+02	2.68E-07

Total PEDE (mrem/year) this interview form: 1.45E-03

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** B100

Process #: 1

Process performed in room number(s): B100, B101

Heating? No Heating

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: None

Usage Basis: Log Sheets

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

After completing foundry operations, the mold and cast from the foundry is then taken to a breakout area in Room B100 that is exhausted by FE-13, and the mold is placed under water and the cast is broken away from the mold. Any material remaining in the mold at this point is known as skull. According to Robert Aikin, there was a total of 34.2 kg of MT-11 and 9.8 kg of MT-33 of skull generated from CY'11 foundry operations (see memo in file folder). Secondary documentation for this operation is log sheets that are maintained at TA3-66, B100. The information provided in this report was collected from casting logs of individual castings.

The part is brushed under water, packaged and shipped out. The mold is either disposed of (non-rad waste) or it is cleaned with steel wool and reused. The cleaning is to remove graphite and coating materials that are deposited during foundry operations. There is very little MT-11 or MT-33 in this cleaning process. The crucibles are taken from the furnace area to B107 for cleaning; they are not cleaned in the breakout area so there is very little potential for particulate emissions.

There is also a vacuum system in B100 that is used for cleaning crucibles as well. It is located in the second breakout area on the mezzanine and is also exhausted through FE-13 (ES-02). The system is designed so that the skull sucked up in the hose passes through a cyclone separator, a bagout chamber, a filter, a fan, and then back into the FE-13 ventilation system. This system is used to clean crucibles from E and F furnaces and C and K furnaces (after these crucibles go through the oven in B107).

Both of these operations involve the same potential throughput of MT-11 and MT-33. Therefore, one emissions estimate will be calculated for each since the total throughput can only be potentially emitted as particulate 1 time (either from the breakout area on the first floor or the breakout area vacuum on the second floor). Therefore, a particulate reduction factor will be applied to the actual skull value provided in order to estimate potential air emissions.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** B100

Process #: 2

Process performed in room number(s): B100

Heating? No Heating

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: Drums

Usage Basis: Waste Profile Forms

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

There is a small compactor located in B100. The compactor began operating during CY'97. It is used to compress mostl depleted uranium (MT-11) contaminated waste into 55-gallon drums. The waste consists of materials such as boots, cardboard, packing, and used machinery seals. According to Darryl Garcia, Waste Management Coordinator for TA3-66, 13 drums with an average activity of 6.48E-05 Ci of MT-11 were compacted during CY'11. Ten of those drums also had an average of 5.44E-06 Ci of Co-60 and 8 drums had an average of 1.24E-06 Ci or Cs-137. Eight drums had an average of 1.24E-06 Sr-90, 1 drum had 4.54E-07 Ci of Nb-94 and 1 had 2.63E-06 Ci of Th-232. The Nb-94 is an activation product that is normally seen along with Co-60 and the Sr-90 is a low beta emitter that is calculated from Cs-137. Secondary documentation is in the waste profile forms maintained at TA3-66 by the Waste Management Coordinator.

6.48E-05 Ci/drum x 13 drums = 8.42E-04 Ci MT-11
5.44E-06 Ci/drum x 10 drums = 5.44E-05 Ci Co-60
1.24E-06 Ci/drum x 8 drums = 9.92E-06 Ci Cs-137
1.24E-06 Ci/drum x 8 drums = 9.92E-06 Ci Sr-90
4.54E-07 Ci of Nb-94
2.63E-06 Ci of Th-232

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Mark Paffett

Interview Date: 01/10/2012

Callback Date: 01/11/2012

Survey Year: 2011

Operating Group: MST-6

Phone #: 5-2395

E-Mail: mtp@lanl.gov

TA: 03

Building: 0066

Facility Status: Active

Monitored? ☐

ES ID #: 03006603

Facility Critical Receptor: County Landfill

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006603	D106	1	D-38	☐ Ci ☑ g	2.00E+02	4.38E-07	8.76E-05	Liquid	1.00E-03	8.76E-08	1.46E+01	1.28E-06
03006603	D103	2	D-38	☐ Ci ☑ g	5.00E+02	4.38E-07	2.19E-04	Particulate	1.00E-03	2.19E-07	1.46E+01	3.20E-06

Total PEDE (mrem/year) this interview form: 4.48E-06

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** D106

Process #: 1

Process performed in room number(s): D106

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Mark Paffett in an email dated 1/10/12 (see file folder) they used approximately 200 grams of UF6 (depleted uranium) in compatibility experiments in Room D106. The process flow diagram for these operations shows the material is either recovered, trapped on NaF beds or converted into a residual solid UO2F2 deposit.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** D103

Process #: 2

Process performed in room number(s): D103

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Vials

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Mark Paffett in an email dated 1/11/12 (see file folder) they process approximately 500 grams of uranium oxide and hydrides in a glovebox to be shipped as solids to TA39.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Duncan Hammon

Interview Date: 01/25/2012

Callback Date: 04/19/2012

Survey Year: 2011

Operating Group: MST-6

Phone #: 7-4386

E-Mail: hammon@lanl.gov

TA: 03

Building: 0066

Facility Status: Active

Monitored? ☐

ES ID #: 03006604

Facility Critical Receptor: County Landfill

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006604	R100	1	MT-11	☐ Ci ☑ g	2.70E+04	4.37E-07	1.18E-02	Particulate	1.00E-03	1.18E-05	1.40E+01	1.65E-04
03006604	R100	2	LEU-10Mo	☐ Ci ☑ g	3.20E+04	1.53E-05	4.90E-01	Particulate	1.00E-03	4.90E-04	1.61E+01	7.89E-03
03006604	R100	2	MT-11	☐ Ci ☑ g	3.81E+05	4.37E-07	1.66E-01	Particulate	1.00E-03	1.66E-04	1.40E+01	2.32E-03
03006604	R108	3	MT-11	☐ Ci ☑ g	4.00E+04	4.37E-07	1.75E-02	Solid	1.00E-06	1.75E-08	1.40E+01	2.44E-07
03006604	R108	3	MT-11	☐ Ci ☑ g	3.50E+02	4.37E-07	1.53E-04	Liquid	1.00E-03	1.53E-07	1.40E+01	2.13E-06

Total PEDE (mrem/year) this interview form: 1.04E-02

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** R100

Process #: 1

Process performed in room number(s): R100

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: Mill

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Duncan Hammon sent updated information for CY'11 via email (see file folder). TA3-66 is the Uranium Foundry, and FE-1 exhausts the R-area of that facility.

According to Duncan, there are two operations that take place in R100. The first involves a rolling mill. The depleted uranium (D-38) is heated to less than 1000 degrees C, and run through a rolling mill to press it into sheets. Duncan provided a table that was compiled from a database he maintains in order to track his D-38 throughput. There were 27 kg throughput of D-38 in this operation for CY'11.

The second operation in R100 involves D-38 and LEU-10Mo in several steps. A plate or sheet of the material is sheared to a size they need. The plate is sent to a machine shop (not part of FE-1) where additional forming is done. Back in R100, the plate is put on a press with a dye ring, it is heated to >400 degrees C but <1000 degrees C, and it is punched through the press. The formed piece is cleaned with a degreaser and then sent to P100 for a thorough cleaning with an ultrasonic cleaner. Again in R100, the piece is annealed in a furnace at >100 degrees C but <1000 degrees C. The data Duncan provided indicated that there were 381 kg throughput of D-38 and 32 kg throughput of LEU-10Mo in this operation for CY'11.

Duncan has categorized his operations according to temperature for purposes of estimating potential rad air emissions. The categories are H (Process #1) and L (Process #2). Process #1 (27 kg D-38) contains operations which process D-38 at high temperatures (>400 degrees C and <1000 degrees C) with the D-38 exposed to air. These operations; which include forging, rolling, and forming of uranium alloys, generate a relatively large amount of particulate (<0.1%).

Process #2 (381 kg D-38 and 32 kg of LEU-Mo10) contains operations that process D-38 at lower temperatures to protect the uranium from direct exposure to air. These operations; which include vacuum heat treatment, rolling out of salt or oil, and forming at temperatures <350 degrees C, generate little loose particulate (<<0.1%).

In order to estimate potential air emissions from both processes, a particulate reduction factor was applied to each throughput value. This is a very conservative estimate because a subject matter expert stated that very little of the particulate was exhausted to the ambient air. In addition, for Process #2, Duncan estimated that much less than 0.1% of the total throughput was generated as particulate, which indicates that the particulate reduction factor yields an overestimate of potential rad air emissions.

K-104 (in the K-area) was historically ventilated through FE-1, but there is no evidence of that exhaust system in the area now. There may have been tensile strength testing (with D-38) in this room, however, there is no ventilation from this room. There is ductwork visible below the high ceiling, but it does not ventilate any operations in this room. There may still be storage of <1 kg D-38 in K104.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** R100

Process #: 2

Process performed in room number(s): R100

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: None

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Duncan Hammon sent updated information for CY'11 via email (see file folder). TA3-66 is the Uranium Foundry, and FE-1 exhausts the R-area of that facility.

According to Duncan, there are two operations that take place in R100. The first involves a rolling mill. The depleted uranium (D-38) is heated to less than 1000 degrees C, and run through a rolling mill to press it into sheets. Duncan provided a table that was compiled from a database he maintains in order to track his D-38 throughput. There were 27 kg throughput of D-38 in this operation for CY'11.

The second operation in R100 involves D-38 and LEU-10Mo in several steps. A plate or sheet of the material is sheared to a size they need. The plate is sent to a machine shop (not part of FE-1) where additional forming is done. Back in R100, the plate is put on a press with a dye ring, it is heated to >400 degrees C but <1000 degrees C, and it is punched through the press. The formed piece is cleaned with a degreaser and then sent to P100 for a thorough cleaning with an ultrasonic cleaner. Again in R100, the piece is annealed in a furnace at >100 degrees C but <1000 degrees C. The data Duncan provided indicated that there were 381 kg throughput of D-38 and 32 kg throughput of LEU-10Mo in this operation for CY'11.

Duncan has categorized his operations according to temperature for purposes of estimating potential rad air emissions. The categories are H (Process #1) and L (Process #2). Process #1 (27 kg D-38) contains operations which process D-38 at high temperatures (>400 degrees C and <1000 degrees C) with the D-38 exposed to air. These operations; which include forging, rolling, and forming of uranium alloys, generate a relatively large amount of particulate (<0.1%).

Process #2 (381 kg D-38 and 32 kg of LEU-Mo10) contains operations that process D-38 at lower temperatures to protect the uranium from direct exposure to air. These operations; which include vacuum heat treatment, rolling out of salt or oil, and forming at temperatures <350 degrees C, generate little loose particulate (<<0.1%).

In order to estimate potential air emissions from both processes, a particulate reduction factor was applied to each throughput value. This is a very conservative estimate because a subject matter expert stated that very little of the particulate was exhausted to the ambient air. In addition, for Process #2, Duncan estimated that much less than 0.1% of the total throughput was generated as particulate, which indicates that the particulate reduction factor yields an overestimate of potential rad air emissions.

K-104 (in the K-area) was historically ventilated through FE-1, but there is no evidence of that exhaust system in the area now. There may have been tensile strength testing (with D-38) in this room, however, there is no ventilation from this room. There is ductwork visible below the high ceiling, but it does not ventilate any operations in this room. There may still be storage of <1 kg D-38 in K104.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** R108

Process #: 3

Process performed in room number(s): R108

Heating? No Heating

Physical state before process: Solid

Physical state during process: Liquid

Physical state after process: Solid

Primary Containment: None

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

R108 houses the EB welding operation. According to Tom Lienert, they performed the same type welding operations in 2011 as in 2005. From 2006 to 2010, Paul Burgardt had reported that they simply handled sold depleted uranium but had not performed welding operations on it.

They processed approximately 40 kg g of solid D-38 (MT-11) material in 2011. Only a tiny fraction of that material is molten during the welding process. Approximately 350 g of D-38 was melted and held in the molten state (for approximately 2 seconds) during the welds. The interior of the machine has been swiped by an RCT and the contamination levels were generally very low to BDL (Below Detectable Levels). Because the temperature during the weld never reaches 2000 deg C, the physical state of this operation will be considered a liquid (FFCA enhanced rule).

350 g = MT-11 Liquid
40,000 g = MT-11 Solid

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Mark Paffett

Interview Date: 01/10/2012

Callback Date: 01/11/2012

Survey Year: 2011

Operating Group: MST-6

Phone #: 5-2395

E-Mail: mtp@lanl.gov

TA: 03

Building: 0066

Facility Status: Active

Monitored? ☐

ES ID #: 03006605

Facility Critical Receptor: County Landfill

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006605	P-Area	1	D-38	☐ Ci ☑ g	2.00E+05	4.38E-07	8.76E-02	Solid	1.00E-06	8.76E-08	1.44E+01	1.26E-06
03006605	P-Area	1	D-38	☐ Ci ☑ g	2.00E+05	4.38E-07	8.76E-02	Custom	1.00E-06	8.76E-08	1.44E+01	1.26E-06

Total PEDE (mrem/year) this interview form: 2.53E-06

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** P-Area

Process #: 1

Process performed in room number(s): P-Area

Heating? No Heating

Physical state before process: Solid

Physical state during process: Custom

Physical state after process: Solid

Primary Containment: Bath

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Mark Paffett stated in an email dated 1/11/2012 (see file folder) that there were no changes in the processes in the P Area. The amount used in CY'11 was conservatively estimated at 200 kg.

This area contains large baths containing aqueous degreasers, soapy water, clean water, acid baths, electroplating baths, etc. The area is ventilated by FE-2, -3, and 4. Two fans must be running continuously when personnel are working in the area.

The oxide removal operations (using nitric acid baths) involve removing D-38 oxide from the surface of parts and may be considered a destructive operation. The primary effort in the P-area is cleaning D-38 parts, but some parts were placed in the nitric or etching baths as well. In addition, some parts are actually placed in the cleaning and/or etching baths two times in order to assure that they are clean. For potential emissions purposes, Mark stated that the process did not change in CY'11. For potential emissions purposes, the D-38 usage was 200 kg. Approximately 0.1% of the total throughput for oxide removal operations (and not the total throughput for cleaning and oxide removal operations) was potentially removed as D-38 oxide. The D-38 oxide primarily settles out in the sludge baths.

Therefore, a physical state of "custom" was selected on the Interview Form to estimate potential emissions from this particulate source. The reduction factor of 1.0E-6 was selected because the particulate reduction factor (1.0E-3) multiplied by the amount of oxide potentially removed during cleaning operations (0.1% or 0.001) = 1.0E-6. In addition, historic monitoring data has indicated that the D-38 removed during these operations settles in the baths and is not an air emissions concern.

Also, a solid reduction factor was used in a second line item to account for the portion of material not dissolved in the acid bath.

In addition, Robert Hanrahan (MST-6 facility representative studying uranium oxide and uranium dioxide in D106) provided supporting information regarding uranium oxide and its properties (see CY'01 file folder). He stated that for solid D-38, it would take more than 10 years for enough uranium oxide (> 1 micron thickness) to form on a surface for there to be potential for generation of particulate. At TA3-66, parts are formed in the B, C and R-areas as well as off-site and sent to the P-area for cleaning within a reasonably short time frame (< 1 year). Robert also stated that for the P-area operations, the D-38 oxide on parts are dissolved in the nitric acid baths and there is very little chance for airborne emissions.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Jason Cooley

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/13/2012	04/13/2012	2011	MST-6	5-6879	cooley@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
03	0066	Active	☐	03006606	County Landfill	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006606	S103	1	D-38	☐ Ci ☑ g	9.10E+01	4.38E-07	3.99E-05	Particulate	1.00E-03	3.99E-08	1.62E+01	6.48E-07
03006606	S103	1	Th-232	☐ Ci ☑ g	1.80E+00	1.10E-07	1.98E-07	Particulate	1.00E-03	1.98E-10	1.26E+02	2.50E-08

Total PEDE (mrem/year) this interview form: 6.73E-07

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** S103

Process #: 1

Process performed in room number(s): S103

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Glove Box

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Jason Cooley provided information for this part of the Uranium and Uranium Hydride Powder Handling operations at TA3-66.

According to Jason, approximately 91 g D-38 (MT-11) uranium hydride powder and 1,800 mg (1.8 g) of natural thorium (Th-232) was handled in a glove box during calendar year CY'11. This operation is simply the transfer of the powder from one container to another inside a glovebox. The purpose of this operation is storage, transfer, and protection (the powder is pyrophoric) of the powder.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Rob Aikin

Interview Date: 04/11/2012

Callback Date: 04/21/2012

Survey Year: 2011

Operating Group: MST-6

Phone #: 7-3782

E-Mail: raikin@lanl.gov

TA: 03

Building: 0066

Facility Status: Active

Monitored? ☐

ES ID #: 03006626

Facility Critical Receptor: County Landfill

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006626	B107	1	MT-11	☐ Ci ☑ g	1.39E+04	4.37E-07	6.09E-03	Particulate	1.00E-03	6.09E-06	1.80E+01	1.10E-04
03006626	B107	1	MT-33	☐ Ci ☑ g	3.62E+03	7.89E-06	2.86E-02	Particulate	1.00E-03	2.86E-05	2.07E+01	5.91E-04

Total PEDE (mrem/year) this interview form: 7.01E-04

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** B107

Process #: 1

Process performed in room number(s): B107

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: None

Usage Basis: Log Sheets

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Rob Aikin provided information for this room in the foundry area (B-area). FE-26&27 exhausts the hood in Room B107 where crucibles from the furnace are cleaned.

Once the crucible is heated in Rooms B100 and/or B101, it is taken to a hood in Room B107 that is ventilated by FE-26&27 (Process #1) where the inside of the crucible is cleaned. An emissions estimate similar to that from the breakout area (ES-02) was reported. According to Rob, there was a total of 3.62 kg of MT-33 and 13.94 kg of MT-11 skull generated from CY'11 foundry operations (see memo in file folder). This is a measured value and the secondary documentation of this is the records maintained at TA3-66, B100. The amounts are assumed to be particulate for emissions estimating, and a particulate reduction factor was applied to that in order to conservatively estimate potential emissions from this release point. Most of the skull in the crucibles is uranium oxide. This is a very conservative emissions estimate because the same amounts were in the crucible in the first floor breakout area prior to being cleaned in the hood in B107.

Process #2 from the CY'10 report did not take place in CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Erik Luther

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/11/2012	1/11/2012	2011	MST-6	6-0174	eluther@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
03	0066	Active	☐	03006654	County Landfill	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006654	K105A	1	D-38	☐ Ci ☑ g	2.50E+03	4.38E-07	1.10E-03	Particulate	1.00E-03	1.10E-06	1.65E+01	1.81E-05
03006654	K105A	1	Th-232	☐ Ci ☑ g	3.00E+02	1.10E-07	3.30E-05	Particulate	1.00E-03	3.30E-08	1.25E+02	4.13E-06

Total PEDE (mrem/year) this interview form: 2.22E-05

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** K105A

Process #: 1

Process performed in room number(s): K105A

Heating? >100 deg C

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Vessel

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Erik Luther and Chris Ching-Fong provided information on this process (see file folder for note on meeting).

They processed 2,500 grams of dUO2 and 300 grams of Th-232 in K105A in 2011. All of the material was blended with ZrC, carbon and a liquid binder and extruded into a tube shape. The mixing was all performed in a hood. Handling the powders creates little dust. Once mixed, the material is wet and creates no dust. Most of the material was heat treated to 850C. Inert gas was slowly flowed over the material. The gas passed through a cold trap, through a vacuum pump, a dust filter and then into the exhaust system. The solid material was then put into a graphite die, put into a furnace in K105B and heated up to roughly 2100C under vacuum. Any gas that may have come off the exterior of the graphite die passed through a vacuum pump, and then into the exhaust system. All solid depleted uranium material in K105B was fully contained by the graphite die and there should not have been any release to the exhaust system.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: James Foley

Interview Date: 01/20/2012 **Callback Date:** 01/20/2012 **Survey Year:** 2011 **Operating Group:** MST-6 **Phone #:** 5-2856 **E-Mail:** foley@lanl.gov

TA: 03 **Building:** 0066 **Facility Status:** Active **Monitored?** ☐ **ES ID #:** 03006699 **Facility Critical Receptor:** County Landfill **mrem/Ci Factors Developed:** 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03006699	H107	1	D-38	☐ Ci ☑ g	2.40E+03	4.38E-07	1.05E-03	Particulate	1.00E-03	1.05E-06	1.63E+01	1.71E-05
03006699	H107	1	LEU-10Mo	☐ Ci ☑ g	5.00E+00	1.53E-05	7.65E-05	Particulate	1.00E-03	7.65E-08	1.80E+01	1.38E-06
03006699	H107	1	MT-34	☐ Ci ☑ g	5.00E+00	1.61E-05	8.05E-05	Particulate	1.00E-03	8.05E-08	1.80E+01	1.45E-06
03006699	H107	1	Th-232	☐ Ci ☑ g	2.30E+02	1.10E-07	2.53E-05	Particulate	1.00E-03	2.53E-08	1.14E+02	2.89E-06
03006699	H106	2	D-38	☐ Ci ☑ g	2.40E+03	4.38E-07	1.05E-03	Particulate	1.00E-03	1.05E-06	1.63E+01	1.71E-05
03006699	H106	2	LEU-10Mo	☐ Ci ☑ g	5.00E+00	1.53E-05	7.65E-05	Particulate	1.00E-03	7.65E-08	1.80E+01	1.38E-06
03006699	H106	2	MT-34	☐ Ci ☑ g	5.00E+00	1.61E-05	8.05E-05	Particulate	1.00E-03	8.05E-08	1.80E+01	1.45E-06
03006699	H106	2	Th-232	☐ Ci ☑ g	2.30E+02	1.10E-07	2.53E-05	Particulate	1.00E-03	2.53E-08	1.14E+02	2.89E-06
03006699	H105B	3	D-38	☐ Ci ☑ g	2.40E+03	4.38E-07	1.05E-03	Liquid	1.00E-03	1.05E-06	1.63E+01	1.71E-05
03006699	H105B	3	LEU-10Mo	☐ Ci ☑ g	5.00E+00	1.53E-05	7.65E-05	Liquid	1.00E-03	7.65E-08	1.80E+01	1.38E-06
03006699	H105B	3	MT-34	☐ Ci ☑ g	5.00E+00	1.61E-05	8.05E-05	Liquid	1.00E-03	8.05E-08	1.80E+01	1.45E-06
03006699	H105B	3	Th-232	☐ Ci ☑ g	2.30E+02	1.10E-07	2.53E-05	Liquid	1.00E-03	2.53E-08	1.14E+02	2.89E-06

Total PEDE (mrem/year) this interview form: 6.85E-05

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** H107

Process #: 1

Process performed in room number(s): H107

Heating? No Heating

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: Fume Hood

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Metallurgical analyses on samples from the foundry (B-Area) are performed in the H-Area. According to Jim Foley, 240 D-38 samples were processed in CY'11. They use a database of sample log-in data to compile the usage information. The D-38 samples averaged 10 g each with the range being a few grams to 20 g. They also processed 1 sample of HEU (MT-34), 1 sample of LEU (LEU-10mo) and 23 samples of Th-232. In H-107, the samples are wet cut with a diamond saw (bench top operation) so they estimate there are no emissions from this operation (Process #1). ENV-ES conservatively assumed there were particulate emissions from this operation. The cut D-38 is mounted in epoxy resin in a cup. In order to expose the face of the D-38 it is ground and polished (also wet operation so they assume no emissions). Mounting, grinding, and polishing are done in a fume hood. Particulate emissions are estimated from this operation as well.

The sample is then transferred to Room H106 and into another glovebox for polishing of the exposed face (Process #2). Particulate emissions are also estimated from this step in the process. The sample is moved to Room H105B where the exposed face of the sample is etched with acids (Process #3). The amount of material lost due to etching is caught in solution. It is estimated that approximately tens of atomic layers are removed in solution and the solution is disposed of as rad waste through the rad liquid disposal line. Potential liquid emissions are estimated from this part of the operation.

Photomicrographs of the sample are taken in H102 and H108. This is a non-destructive operation. Therefore, no emissions will be reported for CY '11.

D-38 = 240 samples x 10 g each = 2,400 g
Th-232 = 23 samples x 10 g each = 230 g

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** H106

Process #: 2

Process performed in room number(s): H106

Heating? No Heating

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: Glove Box

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Metallurgical analyses on samples from the foundry (B-Area) are performed in the H-Area. According to Jim Foley, 240 D-38 samples were processed in CY'11. They use a database of sample log-in data to compile the usage information. The D-38 samples averaged 10 g each with the range being a few grams to 20 g. They also processed 1 sample of HEU (MT-34), 1 sample of LEU (LEU-10mo) and 23 samples of Th-232. In H-107, the samples are wet cut with a diamond saw (bench top operation) so they estimate there are no emissions from this operation (Process #1). ENV-ES conservatively assumed there were particulate emissions from this operation. The cut D-38 is mounted in epoxy resin in a cup. In order to expose the face of the D-38 it is ground and polished (also wet operation so they assume no emissions). Mounting, grinding, and polishing are done in a fume hood. Particulate emissions are estimated from this operation as well.

The sample is then transferred to Room H106 and into another glovebox for polishing of the exposed face (Process #2). Particulate emissions are also estimated from this step in the process. The sample is moved to Room H105B where the exposed face of the sample is etched with acids (Process #3). The amount of material lost due to etching is caught in solution. It is estimated that approximately tens of atomic layers are removed in solution and the solution is disposed of as rad waste through the rad liquid disposal line. Potential liquid emissions are estimated from this part of the operation.

Photomicrographs of the sample are taken in H102 and H108. This is a non-destructive operation. Therefore, no emissions will be reported for CY '11.

D-38 = 240 samples x 10 g each = 2,400 g
Th-232 = 23 samples x 10 g each = 230 g

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0066 **Room:** H105B

Process #: 3

Process performed in room number(s): H105B

Heating? No Heating

Physical state before process: Solid

Physical state during process: Liquid

Physical state after process: Solid

Primary Containment: Equipment

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Technicians

Process Description:

Metallurgical analyses on samples from the foundry (B-Area) are performed in the H-Area. According to Jim Foley, 240 D-38 samples were processed in CY'11. They use a database of sample log-in data to compile the usage information. The D-38 samples averaged 10 g each with the range being a few grams to 20 g. They also processed 1 sample of HEU (MT-34), 1 sample of LEU (LEU-10mo) and 23 samples of Th-232. In H-107, the samples are wet cut with a diamond saw (bench top operation) so they estimate there are no emissions from this operation (Process #1). ENV-ES conservatively assumed there were particulate emissions from this operation. The cut D-38 is mounted in epoxy resin in a cup. In order to expose the face of the D-38 it is ground and polished (also wet operation so they assume no emissions). Mounting, grinding, and polishing are done in a fume hood. Particulate emissions are estimated from this operation as well.

The sample is then transferred to Room H106 and into another glovebox for polishing of the exposed face (Process #2). Particulate emissions are also estimated from this step in the process. The sample is moved to Room H105B where the exposed face of the sample is etched with acids (Process #3). The amount of material lost due to etching is caught in solution. It is estimated that approximately tens of atomic layers are removed in solution and the solution is disposed of as rad waste through the rad liquid disposal line. Potential liquid emissions are estimated from this part of the operation.

Photomicrographs of the sample are taken in H102 and H108. This is a non-destructive operation. Therefore, no emissions will be reported for CY '11.

D-38 = 240 samples x 10 g each = 2,400 g
Th-232 = 23 samples x 10 g each = 230 g

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	David Bullock

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/09/2012	04/09/2012	2011	RP-1	6-2189	dbullock@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
03	0102	Active	☐	03010225	LANL Business Center	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03010225	110	1	Th-230	☑ Ci ☐ g	2.00E-05	2.06E-02	2.00E-05	Custom	1.00E+00	2.00E-05	5.52E+01	1.10E-03
03010225	110	1	U-234	☑ Ci ☐ g	1.00E-05	6.22E-03	1.00E-05	Custom	1.00E+00	1.00E-05	1.38E+01	1.38E-04
03010225	110	1	U-238	☑ Ci ☐ g	5.80E-05	3.36E-07	5.80E-05	Custom	1.00E+00	5.80E-05	1.14E+01	6.61E-04

Total PEDE (mrem/year) this interview form: 1.90E-03

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 0102 **Room:** 110

Process #: 1

Process performed in room number(s): 110

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Custom

Physical state after process: Particulate

Primary Containment: Duct

Usage Basis: 1996 LANL Air Emissions Report

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

David Bullock provided the 2011 information for this exhaust system.

According to David, there were no activities associated with Room 110 or this exhaust system during 2011.

The only source of radionuclide air emissions in CY'11 was from duct holdup.

This release point was monitored through June 1996, and that monitoring data will be reported on the CY'11 Usage Survey as a conservative estimate of the potential air emissions due to duct holdup in this ventilation system. (It is unknown what level of machining operations took place in CY'96 so this will not be corrected for in the monitoring data.) The stack was HEPA-filtered so a correction factor was applied to the monitored emissions (multiply reported emissions by 2000) to estimate potential "usage" without pollution controls (per 40CFR61, Subpart H). In order to estimate emissions from this particulate emission source, a physical state of "custom" and a reduction factor of 1.0E+00 was entered on the interview form. No reduction factor was applied to this data because it is actual monitoring data.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Carl Cady

Interview Date: 01/23/2012 **Callback Date:** 04/13/2012 **Survey Year:** 2011 **Operating Group:** MST-8 **Phone #:** 7-6369 **E-Mail:** cady@lanl.gov

TA: 03 **Building:** 1698 **Facility Status:** Active **Monitored?** ☐ **ES ID #:** 03169800 **Facility Critical Receptor:** County Landfill **mrem/Ci Factors Developed:** 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
03169800	B102	1	D-38	☐ Ci ☑ g	4.10E+02	4.38E-07	1.80E-04	Particulate	1.00E-03	1.80E-07	1.72E+01	3.09E-06
03169800	B134	2	D-38	☐ Ci ☑ g	6.00E+01	4.38E-07	2.63E-05	Particulate	1.00E-03	2.63E-08	1.72E+01	4.53E-07
03169800	B114	3	D-38	☐ Ci ☑ g	4.00E+02	4.38E-07	1.75E-04	Solid	1.00E-06	1.75E-10	1.72E+01	3.02E-09
03169800	B114	4	D-38	☐ Ci ☑ g	4.00E+00	4.38E-07	1.75E-06	Liquid	1.00E-03	1.75E-09	1.72E+01	3.02E-08

Total PEDE (mrem/year) this interview form: 3.58E-06

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 1698 **Room:** B102

Process #: 1

Process performed in room number(s): B102

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: Equipment

Usage Basis: Log Books

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Carl Cady, the compression testing used 95 g and Tension testing used 315 g for a total of 410 grams of depleted uranium in CY'11. Carl maintains a log book to track each lot of material that they use in testing.

There is low strain rate compression testing and tension testing done in this room. The room is ventilated through the building's HEPA-filtered ventilation system. There is no single exhaust point associated with these machines. Carl stated that none of the compression testing leads to failure, but they do deform the physical shape. In addition, the tension tests may fracture. The maximum temperature during the operation is 600 degrees C. The estimated throughput for this room is 410 g D-38. Because he did not differentiate between compression testing and tension testing in his estimate, ES will assume that all 410 g was potentially tested to fracture.

This Process was #2 in CY'09.

Process #1 from the CY'09 report were not performed in CY'09 according to Carl Cady.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 1698 **Room:** B134

Process #: 2

Process performed in room number(s): B134

Heating? <100 deg C

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: None

Usage Basis: Log Book

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Carl Cady stated that a Taylor Anvil tester was used in Room B134 during CY'11. Carl maintains a log book to track each lot of material that they use in testing.

A slug of D-38 (or a D-38 alloy) is accelerated down a gun path and impacts on a steel target. Samples can fracture but the aim of the test is to keep the samples intact. However, in order to account for the fracturing of any of the samples, a particulate reduction factor was conservatively applied to the usage number to estimate emissions. This operation is done at ambient temperatures. Carl stated that approximately 60 g (see email in file folder) were processed in the Taylor Anvil during CY'11.

This Process was #3 in CY'09.

The Tensile Hopkins Bar was not used in this room during CY'11 according to Carl.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 1698 **Room:** B114

Process #: 3

Process performed in room number(s): B114

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Solid

Physical state after process: Solid

Primary Containment: Vac. Chamber

Usage Basis: Log Books

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Jason Cooley provided the information for this processes.

The purpose of the operation is to determine what is the influence of impurities in the kinetics of D-38 (MT-11). The solid D-38 is heated to approximately 925 degrees C and then cooled. They do not actively store these materials in B114 (sample storage is at TA3-66). Batches of samples are "held" until analysis is complete, and then they are returned to their owner.

This is a non-destructive operation, but they have seen a little contamination on the vacuum coils. Therefore, the enhanced 100 degrees C rule and the solid reduction factor were applied to the emissions estimate. The system is a totally enclosed vacuum chamber exhausted through lab exhaust.

400 g D-38 (MT-11)

When heating is performed, the samples are sealed in glass containers.

Radionuclide Materials Usage Survey Process Form

TA: 03 **Building:** 1698 **Room:** B114

Process #: 4

Process performed in room number(s): B114

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Liquid

Physical state after process: Solid

Primary Containment: None

Usage Basis: Log Books

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Jason Cooley reported that spot welding operations occurred on a small amount of D-38 in this room.

They processed approximately 40 g of solid D-38 material during this process in CY'11. Only a tiny fraction of that material is molten during the welding process. A total of 10 samples were spot welded and conservatively, it is assumed that 10% of the sample (0.4 g) is melted during the spot weld.

10 samples x 0.4 g/sample = 4 g Liquid
10 samples x 4 g/sample = 40 g Solid

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Jacqueline Veauthier

Interview Date: 01/24/2012

Callback Date: 02/29/2012

Survey Year: 2011

Operating Group: C-IIAC

Phone #: 5-8001

E-Mail: veauthier@lanl.gov

TA: 09

Building: 0021

Facility Status: Active

Monitored? ☐

ES ID #: 09002103

Facility Critical Receptor: LANL Business Center

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
09002103	119	1	H-3	☑ Ci ☐ g	4.60E-06	9.68E+03	4.60E-06	Gaseous	1.00E+00	4.60E-06	1.60E-04	7.36E-10
09002103	119	1	H-3	☑ Ci ☐ g	3.35E-05	9.68E+03	3.35E-05	Gaseous	1.00E+00	3.35E-05	1.60E-04	5.36E-09
09002103	120	1	H-3	☑ Ci ☐ g	4.60E-06	9.68E+03	4.60E-06	Gaseous	1.00E+00	4.60E-06	1.60E-04	7.36E-10
09002103	140	2	D-38	☐ Ci ☑ g	2.00E+02	4.38E-07	8.76E-05	Liquid	1.00E-03	8.76E-08	1.60E+00	1.40E-07
09002103	119	3	D-38	☐ Ci ☑ g	1.80E-01	4.38E-07	7.88E-08	Gaseous	1.00E+00	7.88E-08	1.60E+00	1.26E-07
09002103	119	3	D-38	☐ Ci ☑ g	1.80E-01	4.38E-07	7.88E-08	Gaseous	1.00E+00	7.88E-08	1.60E+00	1.26E-07

Total PEDE (mrem/year) this interview form: 3.99E-07

Radionuclide Materials Usage Survey Process Form

TA: 09 **Building:** 0021 **Room:** 119

Process #: 1

Process performed in room number(s): 119, 120

Heating? No Heating

Physical state before process: Gaseous

Physical state during process: Gaseous

Physical state after process: Gaseous

Primary Containment: Duct

Usage Basis: '96 inventory

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

The H-3 is all legacy contamination from 20-25 years ago. Curie amounts for Rooms 119 and 120 were derived from smear samples taken in the building in 1996. No recent smear data is available. In addition, there is potential duct contamination from ductwork out of Room 119. The estimate remains on the usage survey because the fan from the Room 119 ventilation system is still operating.

Radionuclide Materials Usage Survey Process Form

TA: 09 **Building:** 0021 **Room:** 140

Process #: 2

Process performed in room number(s): 140

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Lloyd Davis stated that he performs seperation experiments on depleted uranium. This work is performed in a hood in Room 140. There is no heating involved with this process.

Radionuclide Materials Usage Survey Process Form

TA: 09 **Building:** 0021 **Room:** 119

Process #: 3

Process performed in room number(s): 119

Heating? >100 deg C

Physical state before process: Particulate

Physical state during process: Gaseous

Physical state after process: Particulate

Primary Containment: Vessel

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Jackie Veauthier stated that on 9/14/11, they prepared 180 mg of depleted uranium in a hood in this facility. The sample was placed in a sealed vessel and then transferred to TA9-34. There, they performed a combustion experiment and afterwards transferred the vessel back to TA9-21. The vessel was then reopened in the hood and the packaged for transfer. Because the material was opened at 2 separate times in the hood, ENV-ES will count the 180 mg of depleted uranium twice and assign a gaseous physical state to the material.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Jackie Veauthier

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/29/2012	03/08/2012	2011	C-IIAC	5-8001	veauthier@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
09	0034	Active	☐	09003499	LANL Business Center	2011

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
09003499	Various	1	D-38	☐ Ci ☑ g	1.80E-01	4.38E-07	7.88E-08	Gaseous	1.00E+00	7.88E-08	1.74E+00	1.37E-07

Total PEDE (mrem/year) this interview form: 1.37E-07

Radionuclide Materials Usage Survey Process Form

TA: 09 **Building:** 0034 **Room:** Various

Process #: 1

Process performed in room number(s): 119, 120

Heating? >100 deg C

Physical state before process: Particulate

Physical state during process: Gaseous

Physical state after process: Particulate

Primary Containment: Vessel

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Jackie Veauthier stated that on 9/14/11, they transferred a vessel containing 180 mg of depleted uranium to this facility for a combusion experiment. They performed a combustion experiment which involves gas released through HEPA filters on the vessel through a snorkel. After the expeirment, the material was transferred to TA9-21.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Brandy Duran

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/23/2012	01/25/2012	2011	C-IIAC	5-3759	bduran@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
15	0285	Active	☐	15028599	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
15028599	UNK	1	D-38	☐ Ci ☑ g	1.80E-01	4.38E-07	7.88E-08	Gaseous	1.00E+00	7.88E-08	1.01E+00	7.96E-08

Total PEDE (mrem/year) this interview form: 7.96E-08

Radionuclide Materials Usage Survey Process Form

TA: 15 **Building:** 0285 **Room:** UNK

Process #: 1

Process performed in room number(s): UNK

Heating? >100 deg C

Physical state before process: Particulate

Physical state during process: Gaseous

Physical state after process: Particulate

Primary Containment: Vessel

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

This is the Vessel Repair Facility. After shots take place in vessels at DARHT, they are taken to TA15-534. At that facility, they are deconned of all surface removable contamination. The vessels are then taken to the Vessel Repair Facility and prepared for another detonation. Some welding is performed on these vessels which can possibly contain fixed contamination. Because the contamination is on the interior surface of the vessel where the welding occurs, ENV-ES will conservatively designate the physical state to be gaseous.

Brandy Duran stated that 0.1% of the throughput of depleted uranium deconned at TA15-534 would be a conservative estimate of the amount that remains on these vessels when they arrive at TA15-285. However, ENV-ES will use an even more conservative estimate of 1% of the VPF throughput (50 kg x 1% = 500 g) for usage estimation purposes.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Brandy Duran

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/23/2012	01/25/2012	2011	C-IIAC	5-3759	bduran@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
15	0534	Active	☐	15053401	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
15053401	105	1	D-38	☐ Ci ☑ g	2.01E+02	4.38E-07	8.79E-05	Liquid	1.00E-03	8.79E-08	1.03E+00	9.03E-08
15053401	110	1	D-38	☐ Ci ☑ g	5.00E+03	4.38E-07	2.19E-03	Particulate	1.00E-03	2.19E-06	1.03E+00	2.25E-06
15053401	110	1	D-38	☐ Ci ☑ g	4.50E+04	4.38E-07	1.97E-02	Solid	1.00E-06	1.97E-08	1.03E+00	2.03E-08

Total PEDE (mrem/year) this interview form: 2.36E-06

Radionuclide Materials Usage Survey Process Form

TA: 15 **Building:** 0534 **Room:** 105

Process #: 1

Process performed in room number(s): 105, 110

Heating? <100 deg C

Physical state before process: Particulate

Physical state during process: Liquid

Physical state after process: Particulate

Primary Containment: Vials

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Brandy Duran reported that analytical laboratory work using depleted uranium took place in the Vessel Prep Facility in 2011.

In the chem lab, Room 105, they processed approximately 650 mg of depleted uranium in soils and 200 g of depleted uranium in waste samples. The materials underwent physical separations being put into a solution, heating operations, chemical operations, and analysis. The heating was performed in a closed system.

650 mg = 0.65 g
0.65 g + 200 g = 200.65 g of D-38 total in Room 105

They perform clean-out operations of the DARHT firing vessels in Room 110. They processed approximately 50 kg of depleted uranium in 2011. Approximately 10% is particulate (5 kg) and the rest is solid (45 kg). This material is handled but not disturbed and there was no heating.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Drew Geller

Interview Date: 03/28/2012

Callback Date: 03/28/2012

Survey Year: 2011

Operating Group: W-7

Phone #: 7-1052

E-Mail: dgeller@lanl.gov

TA: 16

Building: 0202

Facility Status: Active

Monitored? ☐

ES ID #: 16020299

Facility Critical Receptor: Ponderosa Campground

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
16020299	107	1	H-3	☑ Ci ☐ g	2.40E+01	9.68E+03	2.40E+01	Gaseous	1.00E+00	2.40E+01	5.00E-04	1.20E-02
16020299	108	2	D-38	☐ Ci ☑ g	3.87E+03	4.38E-07	1.70E-03	Solid	1.00E-06	1.70E-09	5.37E+00	9.10E-09
16020299	108	3	H-3	☑ Ci ☐ g	1.50E+01	9.68E+03	1.50E+01	Gaseous	1.00E+00	1.50E+01	5.00E-04	7.50E-03

Total PEDE (mrem/year) this interview form: 1.95E-02

Radionuclide Materials Usage Survey Process Form

TA: 16 **Building:** 0202 **Room:** 109

Process #: 1

Process performed in room number(s): 107, 109

Heating? No Heating

Physical state before process: Gaseous

Physical state during process: Gaseous

Physical state after process: Gaseous

Primary Containment: Hood

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Drew Geller was our contact for this facility for CY'11. Drew stated that they did not perform any tritium operations in his fume hood (Room 107) during CY'11. However they did do a test of a bubbler with trace amounts of gas in another fume hood. Drew suggested we once again use the conservative amount of 24 Ci for this facility.

Radionuclide Materials Usage Survey Process Form

TA: 16 **Building:** 0202 **Room:** 108

Process #: 2

Process performed in room number(s): 108

Heating? No Heating

Physical state before process: Solid

Physical state during process: Solid

Physical state after process: Solid

Primary Containment: Hood

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

There was 3.87 Kg of depleted uranium in inventory in this facility as reported by Scott Schilling. This material will be reported as a solid as it is not disturbed.

Radionuclide Materials Usage Survey Process Form

TA: 16 **Building:** 0202 **Room:** 109

Process #: 3

Process performed in room number(s): 109

Heating? No Heating

Physical state before process: Gaseous

Physical state during process: Gaseous

Physical state after process: Gaseous

Primary Containment: Hood

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Joe Sanchez said in a phone interview that there is off-gassing operations happening in a hood in this room. He stated that in CY'11 there was 15 Ci of H-3 off-gassed from contaminated parts in a drum.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Betsy Hillmer

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
05/01/2012	05/02/2012	2011	RP-1	5-1302	emeek@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
16	0205	Active	☐	16020599	Ponderosa Campground	2009

Total PEDE (mrem/year) this interview form:

Radionuclide Materials Usage Survey Process Form

TA: 16 **Building:** 0205 **Room:** 110

Process #: 0

Process performed in room number(s): 110

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis:

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Betsy Hillmer took over reporting responsibilities from Terry Vergamini for CY'11.

In an email dated 5/2/12 (see file folder), facility personnel stated that no mass spec maintenance activities occurred in Room 110 during CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Mark Martinez

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/10/2012	01/10/2012	2011	RP-1	5-4677	marklm@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
35	0002	Active	☐	35000200	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
35000200	C157	1	Am-241	☑ Ci ☐ g	9.64E-08	3.43E+00	9.64E-08	Particulate	1.00E-03	9.64E-11	4.07E+01	3.92E-09
35000200	C157	1	Sr-90	☑ Ci ☐ g	4.41E-08	1.38E+02	4.41E-08	Particulate	1.00E-03	4.41E-11	2.71E+00	1.20E-10

Total PEDE (mrem/year) this interview form: 4.04E-09

Radionuclide Materials Usage Survey Process Form

TA: 35 **Building:** 0002 **Room:** C157

Process #: 1

Process performed in room number(s): C157

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Hood

Usage Basis: Smear Data

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Spoke to Mark Martinez of RP-1 and Dave Miko of N-1 on 1/10/12. Both stated in phone interviews that no open rad operations took place in this building during CY'11. Sealed sources are brought into the facility but none were opened and there were no accidental releases.

However, a previously decontaminated hood in Room C157 was found to contain removable contamination.

The hottest smear data found was 443 dpm/100cm2 alpha and 203 dpm/100cm2 beta in a small area of the hood. Alpha contamination is modeled as Am-241 and beta as Sr-90. Conservatively, the entire surface area was considered to be contaminated (see CY'05 folder for calculations).

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	John Dunwoody

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/29/2012	02/29/2012	2011	MST-7	7-8469	dunwoody@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
35	0213	Active	☐	35021305	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
35021305	F-11	1	H-3	☑ Ci ☐ g	1.00E-02	9.68E+03	1.00E-02	Gaseous	1.00E+00	1.00E-02	6.46E-04	6.46E-06
35021305	Various	2	D-38	☐ Ci ☑ g	1.04E+01	4.38E-07	4.57E-06	Particulate	1.00E-03	4.57E-09	6.79E+00	3.10E-08

Total PEDE (mrem/year) this interview form: 6.49E-06

Radionuclide Materials Usage Survey Process Form

TA: 35 **Building:** 0213 **Room:** F-11

Process #: 1

Process performed in room number(s): Ducts, F-11

Heating? No Heating

Physical state before process: Gaseous

Physical state during process: Gaseous

Physical state after process: Gaseous

Primary Containment: Hood

Usage Basis: '96 inventory

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Two hoods in room F-11 are potentially contaminated with H-3 from historic operations. An estimate was provided during the '96 Inventory (see '96 file folder) and that estimate is reported again for CY '11 emissions. In addition, ductwork in the facility is also potentially contaminated with H-3.

Radionuclide Materials Usage Survey Process Form

TA: 35 **Building:** 0213 **Room:** Various

Process #: 2

Process performed in room number(s): Various

Heating? No Heating

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: Various

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

John Dunwoody provided the information for the depleted uranium (D-38) processing performed in this facility during CY'11. The D-38 is in both solid and particulate form. ENV will conservatively assign the 10.44 g a particulate physical state. Some material is solid and some is particulate. He stated that this processing will be performed in Bldg 455 in CY'12.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Alan Justus

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/30/2012	01/30/2012	2011	RP-2	5-9715	ajustus@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
36	0001	Active	☐	36000104	Residence at Pajarito Acres	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
36000104	104	1	H-3	☑ Ci ☐ g	2.50E-02	9.68E+03	2.50E-02	Gaseous	1.00E+00	2.50E-02	5.20E-05	1.30E-06

Total PEDE (mrem/year) this interview form: 1.30E-06

Radionuclide Materials Usage Survey Process Form

TA: 36 **Building:** 0001 **Room:** 104

Process #: 1

Process performed in room number(s):

Heating? No Heating

Physical state before process: Gaseous

Physical state during process: Gaseous

Physical state after process: Gaseous

Primary Containment: Cylinder

Usage Basis: Log Books

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Alan Justus provided H-3 release data for CY'11. The email indicates that .025 Ci were released in CY'11.

RP-2 has H-3 in Room 104 which is stored in a pressurized lecture bottle. The bottle is effectively a sealed source until it is used for instrument calibration or for H-3 bubbler calibration at other LANL locations. It is stored inside a hood that is exhausted by ES-04 (FE-6).

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Paulo Rigg

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/30/2012	02/02/2012	2011	WX-9	5-5934	prigg@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
39	0069	Active	☐	39006999	Acoma Lane	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
39006999	NA	1	D-38	☐ Ci ☑ g	1.60E+01	4.38E-07	7.01E-06	Particulate	1.00E-03	7.01E-09	1.94E+00	1.36E-08
39006999	NA	1	MT-10	☐ Ci ☑ g	4.00E+00	7.04E-07	2.82E-06	Particulate	1.00E-03	2.82E-09	1.95E+00	5.50E-09

Total PEDE (mrem/year) this interview form: 1.91E-08

Radionuclide Materials Usage Survey Process Form

TA: 39 **Building:** 0069 **Room:** NA

Process #: 1

Process performed in room number(s): UNK

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Vessel

Usage Basis: Process Knowledge

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Shock and Detonation Physics (WX-9) personnel conducted plate impact experiments on uranium powders and alloys using the power driven launchers (gas guns). According to Paulo, they performed 10 experiments using a total of 16 grams of depleted uranium and 4 grams of natural uranium (MT-10) in CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Mark Martinez

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
05/01/2012	05/01/2012	2011	RP-1	5-4677	marklm@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
41	0001	Inactive	☐	41000104	Storage Garage	2009

Total PEDE (mrem/year) this interview form:

Radionuclide Materials Usage Survey Process Form

TA: 41 **Building:** 0001 **Room:** All

Process #: 0

Process performed in room number(s): All

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis:

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Spoke to Bobby Romero (Operations Manager STO-DO) on 5/1/12. Bobby stated that the ventilation system was capped off and has not been in operation since 2010.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Mark Martinez

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/30/2012	01/30/2012	2011	RP-1	5-4677	marklm@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
43	0001	Active	☐	43000100	Business on Trinity Drive	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
43000134	Duct	1	Am-241	☑ Ci ☐ g	2.69E-07	3.43E+00	2.69E-07	Custom	1.00E+00	2.69E-07	7.89E+03	2.12E-03
43000110	Duct	1	Pu-239	☑ Ci ☐ g	2.28E-08	6.21E-02	2.28E-08	Custom	1.00E+00	2.28E-08	9.48E+03	2.16E-04
43000134	Duct	1	Pu-239	☑ Ci ☐ g	5.49E-07	6.21E-02	5.49E-07	Custom	1.00E+00	5.49E-07	9.48E+03	5.20E-03
43000112	Duct	1	Sr-90	☑ Ci ☐ g	2.27E-07	1.38E+02	2.27E-07	Custom	1.00E+00	2.27E-07	4.66E+02	1.06E-04
43000134	Duct	1	Sr-90	☑ Ci ☐ g	1.29E-06	1.38E+02	1.29E-06	Custom	1.00E+00	1.29E-06	4.66E+02	6.01E-04
43000109	Duct	1	Sr-90	☑ Ci ☐ g	7.74E-08	1.38E+02	7.74E-08	Custom	1.00E+00	7.74E-08	4.66E+02	3.61E-05
43000110	Duct	1	Sr-90	☑ Ci ☐ g	1.19E-07	1.38E+02	1.19E-07	Custom	1.00E+00	1.19E-07	4.66E+02	5.55E-05
43000110	Duct	1	U-234	☑ Ci ☐ g	5.53E-07	6.22E-03	5.53E-07	Custom	1.00E+00	5.53E-07	6.85E+02	3.79E-04
43000110	Duct	1	U-235	☑ Ci ☐ g	7.02E-09	2.16E-06	7.02E-09	Custom	1.00E+00	7.02E-09	6.11E+02	4.29E-06
43000110	Duct	1	U-238	☑ Ci ☐ g	1.43E-08	3.36E-07	1.43E-08	Custom	1.00E+00	1.43E-08	5.66E+02	8.09E-06
43000109	Duct	1	U-238	☑ Ci ☐ g	8.65E-08	3.36E-07	8.65E-08	Custom	1.00E+00	8.65E-08	5.66E+02	4.90E-05
43000134	Duct	1	U-238	☑ Ci ☐ g	1.70E-07	3.36E-07	1.70E-07	Custom	1.00E+00	1.70E-07	5.66E+02	9.62E-05
43000112	Duct	1	U-238	☑ Ci ☐ g	2.92E-07	3.36E-07	2.92E-07	Custom	1.00E+00	2.92E-07	5.66E+02	1.65E-04
43000109	Duct	1	Y-90	☑ Ci ☐ g	7.74E-08	5.43E+05	7.74E-08	Custom	1.00E+00	7.74E-08	1.32E+00	1.02E-07
43000112	Duct	1	Y-90	☑ Ci ☐ g	2.27E-07	5.43E+05	2.27E-07	Custom	1.00E+00	2.27E-07	1.32E+00	3.00E-07
43000110	Duct	1	Y-90	☑ Ci ☐ g	1.19E-07	5.43E+05	1.19E-07	Custom	1.00E+00	1.19E-07	1.32E+00	1.57E-07
43000134	Duct	1	Y-90	☑ Ci ☐ g	1.29E-06	5.43E+05	1.29E-06	Custom	1.00E+00	1.29E-06	1.32E+00	1.70E-06

Total PEDE (mrem/year) this interview form: 9.05E-03

Radionuclide Materials Usage Survey Process Form

TA: 43 **Building:** 0001 **Room:** Duct

Process #: 1

Process performed in room number(s): Duct

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Custom

Physical state after process: Particulate

Primary Containment: Duct

Usage Basis: 1995 LANL Air Emissions Report

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Mark Martinez stated in an email (see file folder) that there were no rad operations performed in this facility in CY'11.

The emissions accounted for in this building is duct hold up as reported in the "1995 LANL Radionuclide Air Emissions" report (see file folder for a copy of the data from the report). These were all monitored stacks until November of 1995. No active rad operations took place in CY'04 in these stacks, so the data is reported now as potential duct contamination because the fans are still running. In addition, the ducts are posted for suspect internal contamination.

Usage data for these historically monitored emissions are equal to the actual monitoring data for CY'95 because there is no HEPA filtration on these release points.

In order to estimate emissions from this particulate source, a physical state of "custom" and a reduction factor of 1.00E+00 was selected on the interview form. No reduction factor was applied to this actual monitoring data.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Clarence Boyer

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/31/2012	01/31/2012	2011	QPA-SCL	5-6772	bjc@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
46	0024	Active	☐	46002499	Business on DP Road	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
46002499	B30	1	MT-34	☑ Ci ☐ g	1.89E-04	1.61E-05	1.89E-04	Particulate	1.00E-03	1.89E-07	1.46E+00	2.76E-07

Total PEDE (mrem/year) this interview form: 2.76E-07

Radionuclide Materials Usage Survey Process Form

TA: 46 **Building:** 0024 **Room:** B30

Process #: 1

Process performed in room number(s): B30

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Duct

Usage Basis: '96 inventory

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Bryan Carlson stated in an email dated 1/31/2012 (see file folder) that there were no tritium operations performed in this building in CY'11.

TA46-24 is a laboratory and office building. Legacy U-en contamination exists in the duct leading from B-30. Contamination in the ductwork was estimated using historical survey data and estimated duct dimensions (see file folder for a copy of calculations). A particulate reduction factor (1.00E-03) was applied to the estimated contamination to estimate potential emissions.

ENV-ES models U-enriched as MT-34.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Clarence Boyer

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/31/2012	01/31/2012	2011	STO-DO	7-6302	cboyer@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
46	0031	Active	☐	46003100	Business on DP Road	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
46003100	Ducts	1	MT-34	☑ Ci ☐ g	1.67E-04	1.61E-05	1.67E-04	Particulate	1.00E-03	1.67E-07	1.54E+00	2.57E-07

Total PEDE (mrem/year) this interview form: 2.57E-07

Radionuclide Materials Usage Survey Process Form

TA: 46 **Building:** 0031 **Room:** Ducts

Process #: 1

Process performed in room number(s): Ducts

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Ducts

Usage Basis: '96 inventory

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Two stacks (FE-25 and FE-41) are known to have previously exhausted a number of systems and have in the past released U-235. Although no surveys have been performed, contamination in these stacks may be transferable (swipes above 1000 dpm/100 cm2). For emissions purposes, it is assumed that 100 ft of 1 foot by 1 foot ductwork feeding the stacks have U-235 contamination of 50,000 dpm/100 cm2. Estimated amount of contamination was calculated using maximum contamination survey results provided by Terry Vergamini, and surface data provided by Jerilyn Mosso. This information was provided during the '94 and '96 Inventories. U-235 is conservatively assumed to be enriched uranium (U-en) for emissions and modeling purposes.

Enriched uranium has been designated Material Type 34 (MT-34). ENV-ES will track mixtures of uranium and plutonium according to their designated material type.

Alpha contamination is present in Rooms 151B, 168, 170, 172, and hallways. Contamination is fixed under paint. Therefore, no air emissions are estimated from this contamination.

(50,000 dpm / 100 cm2) x 400 ft2 x (929 cm2 / ft2) x (4.505E-13 Ci/dpm) = 8.37E-05 Ci
8.37E-05 Ci x 2 stacks = 1.67E-04 Ci

Clarence Boyer stated that no rad work was performed in this facility in CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Clarence Boyer

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/31/2012	01/31/2012	2011	STO-DO	7-6302	cboyer@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
46	0041	Active	☐	46004106	Business on DP Road	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
46004106	Duct	1	U-238	☑ Ci ☐ g	7.19E-06	3.36E-07	7.19E-06	Particulate	1.00E-03	7.19E-09	1.21E+00	8.70E-09

Total PEDE (mrem/year) this interview form: 8.70E-09

Radionuclide Materials Usage Survey Process Form

TA: 46 **Building:** 0041 **Room:** Duct

Process #: 1

Process performed in room number(s): Duct

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Duct

Usage Basis: '96 inventory

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

David Cremers

Process Description:

Clarence Boyer stated in an email dated 1/31/12 (see file folder) that there were no changes in CY'11 from CY'09.

Legacy contamination (U-238) remains in the ductwork. According to the '94 Inventory, the contamination levels are below 1000 dpm/100 cm2 and is located the hoods and ductwork in Rooms 106 and 110. Contamination levels in the exhaust ducting were estimated from historical survey data (see file for a copy of the calculations from the '94 and '96 Inventories).

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Clarence Boyer

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
05/01/2012	05/01/2012	2011	STO-DO	7-6302	cboyer@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
46	0154	Active	☐	46015405	Business on DP Road	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
46015405	All	1	MT-34	☑ Ci ☐ g	9.72E-06	1.61E-05	9.72E-06	Particulate	1.00E-03	9.72E-09	1.57E+00	1.52E-08
46015405	All	1	U-238	☑ Ci ☐ g	9.72E-06	3.36E-07	9.72E-06	Particulate	1.00E-03	9.72E-09	1.30E+00	1.26E-08

Total PEDE (mrem/year) this interview form: 2.79E-08

Radionuclide Materials Usage Survey Process Form

TA: 46 **Building:** 0154 **Room:** ALL

Process #: 1

Process performed in room number(s): ALL

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Vents

Usage Basis: '96 inventory

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Clarence Boyer confirmed that there was no change in the duct contamination and no surveys have been conducted during CY'11. Clarence also stated that no active rad ops occurred in this facility in CY'11.

The only point source in this building is legacy contamination (U-en) in the "drop down" vents and the stack. This contamination is from a experiment conducted approximately 5 years ago. The contamination level was estimated for the 1994 and 1996 Inventories by assuming drop down vents and ductwork were uniformly contaminated at 1000 dpm/100 cm2 of U-en and U-238 (see the file for calculations). U-en is being tracked by it's official LANL designation, Material Type 34 (MT-34).

There is a cabinet in Room 110A that contains internally contaminated equipment. The openings on the equipment are capped, and the equipment remains undisturbed.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Kirk Rector

Interview Date: 05/01/2012

Callback Date: 05/02/2012

Survey Year: 2011

Operating Group: C-PCS

Phone #: 7-9457

E-Mail: kdr@lanl.gov

TA: 46

Building: 0158

Facility Status: Active

Monitored? ☐

ES ID #: 46015899

Facility Critical Receptor: Business on DP Road

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
46015899	107	1	D-38	☑ Ci ☐ g	1.25E-05	4.38E-07	1.25E-05	Liquid	1.00E-03	1.25E-08	1.21E+00	1.51E-08
46015899	107	1	MT-10	☑ Ci ☐ g	2.60E-06	7.04E-07	2.60E-06	Liquid	1.00E-03	2.60E-09	1.22E+00	3.17E-09
46015899	107	1	Th-232	☑ Ci ☐ g	2.60E-06	1.10E-07	2.60E-06	Liquid	1.00E-03	2.60E-09	9.36E+00	2.43E-08

Total PEDE (mrem/year) this interview form: 4.26E-08

Radionuclide Materials Usage Survey Process Form

TA: 46 **Building:** 0158 **Room:** 107

Process #: 1

Process performed in room number(s): 107

Heating? <100 deg C

Physical state before process: Solid

Physical state during process: Liquid

Physical state after process: Solid

Primary Containment: Bottle

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Kirk Rector stated that during CY'11, there were no rad operations in the hood of this facility.

The hood is used to store these samples which could be ventilated through ES-99.

The process had involved bench top wet chemistry operations. They worked mostly with uranyl nitrate hexahydrate with no fuming acids ever involved, and no heating >100 deg C. Quantities of the materials stored are low, with individual samples <5 nCi/g.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Dan Kelly

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/31/2012	01/31/2012	2011	C-CDE	5-7388	dnkelly@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
46	0200	Active	☐	46020099	Business on DP Road	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
46020099	110	1	D-38	☐ Ci ☑ g	1.00E+01	4.38E-07	4.38E-06	Liquid	1.00E-03	4.38E-09	1.44E+00	6.32E-09

Total PEDE (mrem/year) this interview form: 6.32E-09

Radionuclide Materials Usage Survey Process Form

TA: 46 **Building:** 200 **Room:** 110

Process #: 1

Process performed in room number(s): 110

Heating? No Heating

Physical state before process: Solid

Physical state during process: Liquid

Physical state after process: Solid

Primary Containment: None

Usage Basis: Process Knowledge

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Dan Kelly stated that the scope of the operations did not change from CY'09 to CY'11.

A hood inside this room is used to wash (acid solution) some of the metal samples. Approximately 20 samples are washed each year.

Process #1 from the CY'09 Usage Survey did not occur in CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Hakim Boukhalfa

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/19/2012	04/19/2012	2011	EES-14	7-7219	hakim@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	6	1	D-38	☑ Ci ☐ g	5.00E-06	4.38E-07	5.00E-06	Liquid	1.00E-03	5.00E-09	1.52E+01	7.60E-08
48000115	6	1	H-3	☑ Ci ☐ g	5.00E-06	9.68E+03	5.00E-06	Gaseous	1.00E+00	5.00E-06	1.30E-03	6.50E-09
48000115	6	1	Np-237	☑ Ci ☐ g	5.00E-06	7.05E-04	5.00E-06	Liquid	1.00E-03	5.00E-09	9.54E+01	4.77E-07
48000115	6	1	Pu-239	☑ Ci ☐ g	5.00E-06	6.21E-02	5.00E-06	Liquid	1.00E-03	5.00E-09	2.33E+02	1.17E-06
48000115	6	1	U-233	☑ Ci ☐ g	5.00E-06	9.65E-03	5.00E-06	Liquid	1.00E-03	5.00E-09	1.72E+01	8.60E-08

Total PEDE (mrem/year) this interview form:	1.81E-06
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 6

Process #: 1

Process performed in room number(s): 6

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Hakim Boukhalfa, these isotopes were used as tracers added to groundwater and then injected into geologic columns to assess migration in the environment. The residue from the columns are collected and counted.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	David L. Finnegan

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/04/2012	01/04/2012	2011	C-NR	5-2178	dlf@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	19A	1	H-3	☑ Ci ☐ g	3.00E-07	9.68E+03	3.00E-07	Gaseous	1.00E+00	3.00E-07	1.30E-03	3.90E-10

Total PEDE (mrem/year) this interview form:	3.90E-10
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 19A

Process #: 1

Process performed in room number(s): 19A

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Glass Flask

Usage Basis: Process Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Spoke to Dave Finnegan via phone interview on 01/04/2012. Dave stated that the operations in this room did not change and that he used the same amount of H-3 in CY'11 as he used in CY'10.

The H-3 is used as a counting standard for the liquid scintillation counter. It is only opened periodically to remove aliquots in order to prepare standards. There is no heating of the H-3. The H-3 vial is opened in a hood.

Various residents bring samples into Room 19A to be counted. These samples are brought into the room, counted, then taken away by the resident, no samples are stored in Room 19A. Emissions from these samples are accounted for in the various rooms in TA48-1.

There are a couple of sealed sources also present in the room. These sources remained intact during 2011.

Dave stated that he was the only person doing open rad work in this room during 2011.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Amr Abdel-Fattah

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/25/2012	04/25/2012	2011	EES-14	5-2339	amr2450@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	304	1	Pu-239	☑ Ci ☐ g	2.00E-06	6.21E-02	2.00E-06	Liquid	1.00E-03	2.00E-09	2.33E+02	4.66E-07

Total PEDE (mrem/year) this interview form:	4.66E-07
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 304

Process #: 1

Process performed in room number(s): 304

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Amr Abdel-Fattah stated in a phone interview that only about 2 uCi of Pu-239 were used in this process during CY'11. No heating was involved.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Hakim Boukhalfa

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/19/2012	04/19/2012	2011	EES-14	7-7219	hakim@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Total PEDE (mrem/year) this interview form:	
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 305

Process #: 0

Process performed in room number(s): 305

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis:

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Hakim Boukhalfa stated that this room was not used for rad operations during CY'11. Any future operations will be conducted by Bon Cella.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Ann Schake

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/03/2012	02/03/2012	2011	C-NR	7-0988	schake@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	307	1	Cs-137	☑ Ci ☐ g	6.26E-08	8.68E+01	6.26E-08	Gaseous	1.00E+00	6.26E-08	1.23E+01	7.72E-07
48000115	307	1	MT-52	☑ Ci ☐ g	1.36E-06	2.79E-01	1.36E-06	Gaseous	1.00E+00	1.36E-06	6.91E+01	9.39E-05
48000115	307	2	Cs-137	☑ Ci ☐ g	5.00E-09	8.68E+01	5.00E-09	Gaseous	1.00E+00	5.00E-09	1.23E+01	6.17E-08

Total PEDE (mrem/year) this interview form:	9.48E-05
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 307

Process #: 1

Process performed in room number(s): 307

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Thermal calibration procedures were performed in this room during CY'11. The procedures are outlined in the Technical Operation Procedure located in the CY'97, Room 307 file folder. The liquid is heated to >100 deg C during operations. Any mixed fission products (MFP) will be modeled as Cs-137 (most conservative MFP from a dose standpoint). The Pu-239 is modeled as MT-52.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 307

Process #: 2

Process performed in room number(s): 307

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Ann stated they performed radiochemistry on environmental samples (Diss ID 4103) in this room during 2011. The liquid is heated to >100 deg C during operations.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	David L. Finnegan

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
01/04/2012	04/19/2012	2011	C-NR	5-2178	dlf@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	308	1	H-3	☑ Ci ☐ g	2.00E-09	9.68E+03	2.00E-09	Gaseous	1.00E+00	2.00E-09	1.30E-03	2.60E-12
48000115	308	2	H-3	☑ Ci ☐ g	1.76E-06	9.68E+03	1.76E-06	Gaseous	1.00E+00	1.76E-06	1.30E-03	2.29E-09
48000115	308	2	Pu-239	☑ Ci ☐ g	2.75E-06	6.21E-02	2.75E-06	Liquid	1.00E-03	2.75E-09	2.33E+02	6.41E-07
48000115	308	3	Pu-239	☑ Ci ☐ g	5.00E-06	6.21E-02	5.00E-06	Liquid	1.00E-03	5.00E-09	2.33E+02	1.17E-06

Total PEDE (mrem/year) this interview form:	1.81E-06
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 308

Process #: 1

Process performed in room number(s): 308

Heating? >100 deg C

Physical state before process: Solid

Physical state during process: Gaseous

Physical state after process: Solid

Primary Containment: Bottle

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Spoke to Dave Finnegan on 2/8/11. He stated that Process #1 and the amount of H-3 used did not change in CY'10 from CY'09. The operation takes place in a closed system.

The process involves environmental samples that may contain fission products at different activity levels. Only the H-3, which is evaporated when the sample is heated (>100 deg C) is a source of emissions.

H-3 = 2.00E-09 Ci

Cs-137, Co-60, Eu-152, Eu-154, and Eu-155 are the other isotopes that are contained in the environmental samples. However, no emissions are reported from these radionuclides because they are heated in a closed system.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 308

Process #: 2

Process performed in room number(s): 308

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Hakim Boukhalfa, these isotopes were used as tracers added to groundwater and then injected into geologic columns to assess migration in the environment. The residue from the columns were collected and counted.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 308

Process #: 3

Process performed in room number(s): 308

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Hakim Boukhalfa, radiochemistry extraction experiments using approximately 5 uCi of Pu-239 were performed in this room during CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Hakim Boukhalfa

Interview Date: 04/19/2012

Callback Date: 04/19/2012

Survey Year: 2011

Operating Group: EES-14

Phone #: 7-7219

E-Mail: hakim@lanl.gov

TA: 48

Building: 0001

Facility Status: Active

Monitored? ☐

ES ID #: 48000115

Facility Critical Receptor: Residence at Royal Crest

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	309	1	H-3	☑ Ci ☐ g	1.76E-06	9.68E+03	1.76E-06	Gaseous	1.00E+00	1.76E-06	1.30E-03	2.29E-09
48000115	309	1	Pu-239	☑ Ci ☐ g	2.75E-06	6.21E-02	2.75E-06	Liquid	1.00E-03	2.75E-09	2.33E+02	6.41E-07
48000115	309	2	Pu-239	☑ Ci ☐ g	5.00E-06	6.21E-02	5.00E-06	Liquid	1.00E-03	5.00E-09	2.33E+02	1.17E-06

Total PEDE (mrem/year) this interview form: 1.81E-06

Total PEDE (mrem/year) this exhaust stack: 9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 309

Process #: 1

Process performed in room number(s): 309

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Hakim Boukhalfa, these isotopes were used as tracers added to groundwater and then injected into geologic columns to assess migration in the environment. The residue from the columns were collected and counted.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 309

Process #: 2

Process performed in room number(s): 309

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to Hakim Boukhalfa, radiochemistry extraction experiments using approximately 5 uCi of Pu-239 were performed in this room during CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Hakim Boukhalfa

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/19/2012	04/30/2012	2011	EES-14	7-7219	hakim@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	310	1	Am-241	☑ Ci ☐ g	7.21E-05	3.43E+00	7.21E-05	Particulate	1.00E-03	7.21E-08	1.94E+02	1.40E-05

Total PEDE (mrem/year) this interview form:	1.40E-05
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 310

Process #: 1

Process performed in room number(s): 310

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Glove Box

Usage Basis: Survey Data

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Hakim Boukhalfa stated in a phone interview that no active open rad work was performed in this room during CY'11, however a small amount of contamination was found inside a box located in the glovebox in this lab. He suggested ENV-ES contact Frank Williams (RP-1). Frank stated that approximately 80,000 dpm/100cm2 was the amount of contamination found in the box. The size of the box was estimated at 2,000 cm2.

Alpha (Am-241) = 2,000 cm2 x 80,000 dpm/100 cm2 = 1.60E+08 dpm
1.60E+08 dpm x 4.505E-13 Ci/dpm = 7.21E-05 Ci

Hakim stated that this room will be used as a "clean lab" in the future.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Don Dry

Interview Date: 02/01/2012

Callback Date: 02/01/2012

Survey Year: 2011

Operating Group: C-NR

Phone #: 7-4200

E-Mail: dry@lanl.gov

TA: 48

Building: 0001

Facility Status: Active

Monitored? ☐

ES ID #: 48000115

Facility Critical Receptor: Residence at Royal Crest

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	311	1	Am-241	☑ Ci ☐ g	4.60E-07	3.43E+00	4.60E-07	Liquid	1.00E-03	4.60E-10	1.94E+02	8.91E-08
48000115	311	1	Cd-109	☑ Ci ☐ g	2.11E-06	2.60E+03	2.11E-06	Liquid	1.00E-03	2.11E-09	5.47E-01	1.15E-09
48000115	311	1	Ce-139	☑ Ci ☐ g	1.08E-07	6.83E+03	1.08E-07	Liquid	1.00E-03	1.08E-10	2.91E-02	3.15E-12
48000115	311	1	Co-57	☑ Ci ☐ g	8.11E-08	8.43E+03	8.11E-08	Liquid	1.00E-03	8.11E-11	6.74E-02	5.46E-12
48000115	311	1	Co-60	☑ Ci ☐ g	4.05E-07	1.13E+03	4.05E-07	Liquid	1.00E-03	4.05E-10	1.65E+00	6.69E-10
48000115	311	1	Cs-137	☑ Ci ☐ g	3.51E-07	8.68E+01	3.51E-07	Liquid	1.00E-03	3.51E-10	1.23E+01	4.33E-09
48000115	311	1	Hg-203	☑ Ci ☐ g	2.97E-07	1.38E+04	2.97E-07	Liquid	1.00E-03	2.97E-10	3.18E-02	9.45E-12
48000115	311	1	Sn-113	☑ Ci ☐ g	3.78E-07	1.00E+04	3.78E-07	Liquid	1.00E-03	3.78E-10	1.87E-01	7.08E-11
48000115	311	1	Sr-85	☑ Ci ☐ g	4.87E-07	2.37E+04	4.87E-07	Liquid	1.00E-03	4.87E-10	1.17E-01	5.69E-11
48000115	311	1	Y-88	☑ Ci ☐ g	7.84E-07	1.39E+04	7.84E-07	Liquid	1.00E-03	7.84E-10	3.27E-01	2.56E-10

Total PEDE (mrem/year) this interview form: 9.57E-08

Total PEDE (mrem/year) this exhaust stack: 9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 311

Process #: 1

Process performed in room number(s): 311

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Particulate

Primary Containment: Vials

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Don Dry provided the information for this room in an email dated 2/1/12 (see file folder).

Don performed radiochemisty operations in this room during CY'11 involving multiple isotopes. Some were poured directly into vials while a few were allowed to evaporate to dryness. No heating was involved.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Ann Schake

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/03/2012	02/03/2012	2011	C-NR	7-0988	schake@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	312	1	Cs-137	☑ Ci ☐ g	2.23E-08	8.68E+01	2.23E-08	Gaseous	1.00E+00	2.23E-08	1.23E+01	2.75E-07
48000115	312	1	MT-52	☑ Ci ☐ g	9.49E-06	2.79E-01	9.49E-06	Gaseous	1.00E+00	9.49E-06	6.91E+01	6.55E-04
48000115	312	2	MT-52	☑ Ci ☐ g	2.00E-10	2.79E-01	2.00E-10	Gaseous	1.00E+00	2.00E-10	6.91E+01	1.38E-08

Total PEDE (mrem/year) this interview form:	6.56E-04
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 312

Process #: 1

Process performed in room number(s): 312

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Thermal calibration procedures were performed in this room during CY'11. The procedures are outlined in the Technical Operation Procedure located in the CY'97, Room 307 file folder. The liquid is heated to >100 deg C during operations. Any mixed fission products (MFP) will be modeled as Cs-137 (most conservative MFP from a dose standpoint). The Pu-239 is modeled as MT-52.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 312

Process #: 2

Process performed in room number(s): 312

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Ann stated they performed radiochemistry on low-level and archived samples in this room during 2011. The liquid is heated to >100 deg C during operations. The Pu-239 is modeled as MT-52.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Eva Birnbaum

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/06/2012	02/06/2012	2011	C-IIAC	5-7167	eva@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000115	Residence at Royal Crest	2009

Total PEDE (mrem/year) this interview form:	
Total PEDE (mrem/year) this exhaust stack:	9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 314

Process #: 0

Process performed in room number(s): 314

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis:

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Eva Birnbaum stated in an email dated 02/06/2012 (see file folder) that no rad work was performed in this room during CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Eva Birnbaum

Interview Date: 02/06/2012 **Callback Date:** 02/06/2012 **Survey Year:** 2011 **Operating Group:** C-IIAC **Phone #:** 5-7167 **E-Mail:** eva@lanl.gov

TA: 48 **Building:** 0001 **Facility Status:** Active **Monitored?** ☐ **ES ID #:** 48000115 **Facility Critical Receptor:** Residence at Royal Crest **mrem/Ci Factors Developed:** 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000115	315	1	Ac-225	☑ Ci ☐ g	5.00E-05	5.80E+04	5.00E-05	Liquid	1.00E-03	5.00E-08	3.01E+01	1.51E-06
48000115	315	1	As-72	☑ Ci ☐ g	1.00E-03	1.67E+06	1.00E-03	Liquid	1.00E-03	1.00E-06	7.62E-03	7.62E-09
48000115	315	1	As-73	☑ Ci ☐ g	1.00E-03	2.23E+04	1.00E-03	Liquid	1.00E-03	1.00E-06	1.33E-02	1.33E-08
48000115	315	1	As-74	☑ Ci ☐ g	1.00E-03	9.93E+04	1.00E-03	Liquid	1.00E-03	1.00E-06	3.94E-02	3.94E-08
48000115	315	1	Ge-68	☑ Ci ☐ g	1.00E-03	7.09E+03	1.00E-03	Liquid	1.00E-03	1.00E-06	1.29E+01	1.29E-05
48000115	315	1	Se-72	☑ Ci ☐ g	2.00E-03	2.13E+05	2.00E-03	Liquid	1.00E-03	2.00E-06	4.10E-02	8.20E-08
48000115	315	1	Se-75	☑ Ci ☐ g	2.00E-03	1.45E+04	2.00E-03	Liquid	1.00E-03	2.00E-06	4.76E-01	9.52E-07
48000115	315	1	Sr-82	☑ Ci ☐ g	1.00E-02	6.28E+04	1.00E-02	Liquid	1.00E-03	1.00E-05	3.08E-01	3.08E-06
48000115	315	1	Sr-85	☑ Ci ☐ g	8.00E-03	2.37E+04	8.00E-03	Liquid	1.00E-03	8.00E-06	1.17E-01	9.36E-07
48000115	315	2	As-72	☑ Ci ☐ g	1.00E-05	1.67E+06	1.00E-05	Gaseous	1.00E+00	1.00E-05	7.62E-03	7.62E-08
48000115	315	2	As-73	☑ Ci ☐ g	1.00E-05	2.23E+04	1.00E-05	Gaseous	1.00E+00	1.00E-05	1.33E-02	1.33E-07
48000115	315	2	As-74	☑ Ci ☐ g	1.00E-05	9.93E+04	1.00E-05	Gaseous	1.00E+00	1.00E-05	3.94E-02	3.94E-07
48000115	315	2	Ge-68	☑ Ci ☐ g	1.00E-05	7.09E+03	1.00E-05	Gaseous	1.00E+00	1.00E-05	1.29E+01	1.29E-04
48000115	315	2	Se-72	☑ Ci ☐ g	2.00E-05	2.13E+05	2.00E-05	Gaseous	1.00E+00	2.00E-05	4.10E-02	8.20E-07
48000115	315	2	Se-75	☑ Ci ☐ g	2.00E-05	1.45E+04	2.00E-05	Gaseous	1.00E+00	2.00E-05	4.76E-01	9.52E-06
48000115	315	2	Sr-82	☑ Ci ☐ g	1.00E-04	6.28E+04	1.00E-04	Gaseous	1.00E+00	1.00E-04	3.08E-01	3.08E-05
48000115	315	2	Sr-85	☑ Ci ☐ g	8.00E-05	2.37E+04	8.00E-05	Gaseous	1.00E+00	8.00E-05	1.17E-01	9.36E-06

Total PEDE (mrem/year) this interview form: 2.00E-04

Total PEDE (mrem/year) this exhaust stack: 9.71E-04

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 315

Process #: 1

Process performed in room number(s): 315

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Batch Files

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Eva Birnbaum provided data information on this room in an email dated 02/06/2012 (see file folder). The process description did not change.

The waste exhaust for the ICP-AES, which is used for assaying radioactive solutions (Process #1), is spliced into ES-15. Approximately 1% of some liquid samples handled in Process #1 are vaporized (Process #2). The solutions are vaporized via the plasma torch in the DCP, and they are exhausted through a HEPA filter and subsequently into ES-15. The vaporized amount is considered a gas for emissions estimates.

ICP-AES = Inductively Coupled Plasma - Atomic Emissions Spectrometer
DCP = Direct Current Plasma

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 315

Process #: 2

Process performed in room number(s): 315

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Batch Files

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Eva Birnbaum provided data information on this room in an email dated 02/06/2012 (see file folder). The process description did not change.

The waste exhaust for the ICP-AES, which is used for assaying radioactive solutions (Process #1), is spliced into ES-15. Approximately 1% of some liquid samples handled in Process #1 are vaporized (Process #2). The solutions are vaporized via the plasma torch in the DCP, and they are exhausted through a HEPA filter and subsequently into ES-15. The vaporized amount is considered a gas for emissions estimates.

ICP-AES = Inductively Coupled Plasma - Atomic Emissions Spectrometer
DCP = Direct Current Plasma

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Jaqueline Kiplinger

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/01/2012	02/01/2012	2011	MPA-MC	5-9553	kiplinger@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000111	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	402	1	D-38	☑ Ci ☐ g	1.53E-05	4.38E-07	1.53E-05	Liquid	1.00E-03	1.53E-08	1.18E+01	1.81E-07
48000111	402	1	Th-232	☑ Ci ☐ g	5.45E-07	1.10E-07	5.45E-07	Liquid	1.00E-03	5.45E-10	9.17E+01	5.00E-08
48000111	402	2	D-38	☑ Ci ☐ g	6.57E-05	4.38E-07	6.57E-05	Liquid	1.00E-03	6.57E-08	1.18E+01	7.75E-07
48000111	402	2	Th-232	☑ Ci ☐ g	6.54E-07	1.10E-07	6.54E-07	Liquid	1.00E-03	6.54E-10	9.17E+01	6.00E-08

Total PEDE (mrem/year) this interview form:	1.07E-06
Total PEDE (mrem/year) this exhaust stack:	5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 402

Process #: 1

Process performed in room number(s): 402

Heating? <100 deg C

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Bottle

Usage Basis: Bounding Estimate of User

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Jackie Kiplinger stated in an email dated 2/1/2012 (see file folder) that nothing changed from CY'10 to CY'11.

Postdocs work primarily with depleted uranium and non-aqueous solvents. All work is done in a hood and glovebox in an inert atmosphere. The compounds/chemicals are extremely air sensitive so contact with the air is kept to a minimum. Samples are sealed before characterization takes place. The glovebox is ventilated to a hood. Glassware is also bagged and washed inside a hood or glovebox due to air sensitivity.

According to Jackie, these are larger scale starting material preparations (Process #1). They process depleted uranium to form chemical compounds.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 402

Process #: 2

Process performed in room number(s): 402

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: Bounding Estimate of User

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Jackie Kiplinger stated in an email dated 2/1/2012 (see file folder) that nothing changed from CY'10 to CY'11.

They use the reagent solutions or redissolved materials from Process #1 to do synthetic procedures with the D-38, and Th-232 mostly at room temperature (Process #2). They work in an inert atmosphere dry box, and the helium atmosphere is flushed to the exhaust system for the 400 wing. Samples for characterization are stored between salt plates or in tin vials that are contained in secondary vials.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Ann Schake

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/03/2012	02/03/2012	2011	C-NR	7-0988	schake@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000111	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	407	1	Cs-137	☑ Ci ☐ g	4.45E-08	8.68E+01	4.45E-08	Gaseous	1.00E+00	4.45E-08	9.63E+00	4.28E-07
48000111	407	2	Cs-137	☑ Ci ☐ g	7.23E-07	8.68E+01	7.23E-07	Gaseous	1.00E+00	7.23E-07	9.63E+00	6.96E-06

Total PEDE (mrem/year) this interview form:	7.39E-06
Total PEDE (mrem/year) this exhaust stack:	5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 407

Process #: 1

Process performed in room number(s): 407

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various Technicians

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Thermal calibration procedures were performed in this room during CY'11. The procedures are outlined in the Technical Operation Procedure located in the CY'97, Room 307 file folder. The liquid is heated to >100 deg C during operations. Any mixed fission products (MFP) will be modeled as Cs-137 (most conservative MFP from a dose standpoint).

ID# 4106 + ID# 4112 = Process #1 total
4.45E-08 Ci + 3.15E-12 Ci = 4.45E-08 Ci total

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 407

Process #: 2

Process performed in room number(s): 407

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Michael Cisneros

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Ann stated they performed radiochemistry on environmental samples (Diss ID 4103) in this room during 2011. The liquid is heated to >100 deg C during operations.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Robert Steiner

Interview Date: 02/03/2012 **Callback Date:** 02/03/2012 **Survey Year:** 2011 **Operating Group:** C-NR **Phone #:** 7-0979 **E-Mail:** steiner@lanl.gov

TA: 48 **Building:** 0001 **Facility Status:** Active **Monitored?** ☐ **ES ID #:** 48000111 **Facility Critical Receptor:** Residence at Royal Crest **mrem/Ci Factors Developed:** 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	408	1	Am-241	☑ Ci ☐ g	2.00E-09	3.43E+00	2.00E-09	Liquid	1.00E-03	2.00E-12	1.50E+02	3.00E-10
48000111	408	1	Am-243	☑ Ci ☐ g	2.00E-09	2.00E-01	2.00E-09	Liquid	1.00E-03	2.00E-12	1.48E+02	2.96E-10
48000111	408	1	H-3	☑ Ci ☐ g	5.00E-09	9.68E+03	5.00E-09	Gaseous	1.00E+00	5.00E-09	1.01E-03	5.05E-12
48000111	408	1	Np-237	☑ Ci ☐ g	1.00E-09	7.05E-04	1.00E-09	Liquid	1.00E-03	1.00E-12	8.29E+01	8.29E-11
48000111	408	1	Po-209	☑ Ci ☐ g	2.00E-08	1.68E+01	2.00E-08	Liquid	1.00E-03	2.00E-11	2.84E+01	5.68E-10
48000111	408	1	Po-210	☑ Ci ☐ g	2.00E-08	4.49E+03	2.00E-08	Liquid	1.00E-03	2.00E-11	1.42E+01	2.84E-10
48000111	408	1	Pu-238	☑ Ci ☐ g	4.00E-09	1.71E+01	4.00E-09	Liquid	1.00E-03	4.00E-12	1.66E+02	6.64E-10
48000111	408	1	Pu-239	☑ Ci ☐ g	4.00E-09	6.21E-02	4.00E-09	Liquid	1.00E-03	4.00E-12	1.81E+02	7.24E-10
48000111	408	1	Pu-240	☑ Ci ☐ g	4.00E-09	2.27E-01	4.00E-09	Liquid	1.00E-03	4.00E-12	1.81E+02	7.24E-10
48000111	408	1	Pu-241	☑ Ci ☐ g	4.00E-08	1.03E+02	4.00E-08	Liquid	1.00E-03	4.00E-11	7.77E+00	3.11E-10
48000111	408	1	Pu-242	☑ Ci ☐ g	4.00E-10	3.94E-03	4.00E-10	Liquid	1.00E-03	4.00E-13	1.71E+02	6.84E-11
48000111	408	1	Th-228	☑ Ci ☐ g	4.00E-10	8.21E+02	4.00E-10	Liquid	1.00E-03	4.00E-13	1.41E+02	5.64E-11
48000111	408	1	Th-229	☑ Ci ☐ g	4.00E-10	2.14E-01	4.00E-10	Liquid	1.00E-03	4.00E-13	2.59E+02	1.04E-10
48000111	408	1	Th-230	☑ Ci ☐ g	4.00E-10	2.06E-02	4.00E-10	Liquid	1.00E-03	4.00E-13	5.24E+01	2.10E-11
48000111	408	1	Th-232	☑ Ci ☐ g	4.00E-10	1.10E-07	4.00E-10	Liquid	1.00E-03	4.00E-13	9.17E+01	3.67E-11
48000111	408	1	U-232	☑ Ci ☐ g	1.00E-10	2.21E+01	1.00E-10	Liquid	1.00E-03	1.00E-13	4.19E+01	4.19E-12
48000111	408	1	U-233	☑ Ci ☐ g	1.00E-10	9.65E-03	1.00E-10	Liquid	1.00E-03	1.00E-13	1.34E+01	1.34E-12
48000111	408	1	U-234	☑ Ci ☐ g	5.00E-10	6.22E-03	5.00E-10	Liquid	1.00E-03	5.00E-13	1.31E+01	6.55E-12
48000111	408	1	U-235	☑ Ci ☐ g	1.00E-10	2.16E-06	1.00E-10	Liquid	1.00E-03	1.00E-13	1.17E+01	1.17E-12

Radioactive Materials Usage Survey Interview Form

48000111	408	1	U-236	☑ Ci ☐ g	5.00E-11	6.47E-05	5.00E-11	Liquid	1.00E-03	5.00E-14	1.21E+01	6.05E-13
48000111	408	1	U-238	☑ Ci ☐ g	5.00E-10	3.36E-07	5.00E-10	Liquid	1.00E-03	5.00E-13	1.08E+01	5.40E-12

Total PEDE (mrem/year) this interview form: 4.26E-09

Total PEDE (mrem/year) this exhaust stack: 5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 408

Process #: 1

Process performed in room number(s): 408

Heating? <100 deg C

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

ENV-ES personnel received an email from Robert Steiner on 02/03/2012 (see file folder) stating that the information for this room was reviewed and he stated that there were no changes in CY'11 from CY'10.

The conservative estimates that he provided were based on a maximum activity that they might encounter in a sample. Most samples are much lower in activity.

The process includes radiochemical separations and electrodes positions. None of the steps in this process volatilize any of the radionuclides.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Mark McCleskey

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/18/2012	04/18/2012	2011	C-DO	7-5636	tmark@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000111	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	409	1	Th-232	☐ Ci ☑ g	1.00E+00	1.10E-07	1.10E-07	Gaseous	1.00E+00	1.10E-07	9.17E+01	1.01E-05
48000111	409	1	U-238	☐ Ci ☑ g	1.00E+00	3.36E-07	3.36E-07	Gaseous	1.00E+00	3.36E-07	1.08E+01	3.63E-06

Total PEDE (mrem/year) this interview form:	1.37E-05
Total PEDE (mrem/year) this exhaust stack:	5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 409

Process #: 1

Process performed in room number(s): 409

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Mark McCleskey stated in an email (see file folder) that there were no changes from CY'10 to CY'11. They performed experiments using U-238 and Th-232 in solution. As part of the process, the material was placed in a furnace and heated above 100 deg. C. They use 1 g each of U-238 and Th-232.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Ann Schake

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/03/2012	02/08/2012	2011	C-NR	7-0988	schake@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000111	Residence at Royal Crest	2009

Total PEDE (mrem/year) this interview form:	
Total PEDE (mrem/year) this exhaust stack:	5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 Building: 0001 Room: 410

Process #: 1

Process performed in room number(s): 410

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis:

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

Ann Schake, Hugh Selby and Eva Birnbaum confirmed in emails (see file folder) that no rad work was performed in Room 410 curing CY'11.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Ann Schake

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/03/2012	02/03/2012	2011	C-NR	7-0988	schake@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000111	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	411	1	Cs-137	☑ Ci ☐ g	8.40E-10	8.68E+01	8.40E-10	Gaseous	1.00E+00	8.40E-10	9.63E+00	8.09E-09

Total PEDE (mrem/year) this interview form:	8.09E-09
Total PEDE (mrem/year) this exhaust stack:	5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 411

Process #: 1

Process performed in room number(s): 411

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Scott Bowen, Warren Oldham

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Thermal calibration procedures were performed in this room during CY'11. The procedures are outlined in the Technical Operation Procedure located in the CY'97, Room 307 file folder. The liquid is heated to >100 deg C during operations. Any mixed fission products (MFP) will be modeled as Cs-137 (most conservative MFP from a dose standpoint).

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Iain May

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/18/2012	04/18/2012	2011	C-IIAC	7-8643	iainmay@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000111	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	412	1	D-38	☐ Ci ☑ g	5.00E+00	4.38E-07	2.19E-06	Liquid	1.00E-03	2.19E-09	1.18E+01	2.58E-08
48000111	412	1	Th-232	☐ Ci ☑ g	5.00E+00	1.10E-07	5.50E-07	Liquid	1.00E-03	5.50E-10	9.17E+01	5.04E-08

Total PEDE (mrem/year) this interview form:	7.63E-08
Total PEDE (mrem/year) this exhaust stack:	5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 412

Process #: 1

Process performed in room number(s): 412

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

According to Iain May in an email dated 4/18/2012 (see file folder), they did not perform any radiochemistry experiments in CY'11. However, the fume hood contained a few grams of Th-232 and depleted uranium in vials. Iain stated to be conservative, we should report 5 g each of the materials. The vials may have been opened in the hood, but not used.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Allen Moody

Interview Date: 02/03/2012

Callback Date: 04/25/2012

Survey Year: 2011

Operating Group: C-NR

Phone #: 5-1671

E-Mail: wamoody@lanl.gov

TA: 48

Building: 0001

Facility Status: Active

Monitored? ☐

ES ID #: 48000111

Facility Critical Receptor: Residence at Royal Crest

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	414	1	Cs-137	☑ Ci ☐ g	6.91E-08	8.68E+01	6.91E-08	Gaseous	1.00E+00	6.91E-08	9.63E+00	6.65E-07
48000111	414	2	Po-209	☑ Ci ☐ g	7.50E-09	1.68E+01	7.50E-09	Gaseous	1.00E+00	7.50E-09	2.84E+01	2.13E-07
48000111	414	2	Po-210	☑ Ci ☐ g	1.40E-08	4.49E+03	1.40E-08	Gaseous	1.00E+00	1.40E-08	1.42E+01	1.99E-07
48000111	414	2	Pu-239	☑ Ci ☐ g	4.91E-06	6.21E-02	4.91E-06	Gaseous	1.00E+00	4.91E-06	1.81E+02	8.89E-04
48000111	414	2	Pu-240	☑ Ci ☐ g	1.90E-09	2.27E-01	1.90E-09	Gaseous	1.00E+00	1.90E-09	1.81E+02	3.44E-07
48000111	414	2	Pu-242	☑ Ci ☐ g	1.90E-09	3.94E-03	1.90E-09	Gaseous	1.00E+00	1.90E-09	1.71E+02	3.25E-07
48000111	414	2	U-232	☑ Ci ☐ g	4.68E-06	2.21E+01	4.68E-06	Gaseous	1.00E+00	4.68E-06	4.19E+01	1.96E-04
48000111	414	2	U-233	☑ Ci ☐ g	1.69E-05	9.65E-03	1.69E-05	Gaseous	1.00E+00	1.69E-05	1.34E+01	2.26E-04
48000111	414	2	U-235	☑ Ci ☐ g	5.60E-09	2.16E-06	5.60E-09	Gaseous	1.00E+00	5.60E-09	1.17E+01	6.55E-08
48000111	414	3	LEU-10Mo	☑ Ci ☐ g	3.60E-09	1.53E-05	3.60E-09	Liquid	1.00E-03	3.60E-12	1.30E+01	4.69E-11
48000111	414	3	MT-10	☑ Ci ☐ g	3.80E-10	7.04E-07	3.80E-10	Liquid	1.00E-03	3.80E-13	1.19E+01	4.52E-12

Total PEDE (mrem/year) this interview form: 1.31E-03

Total PEDE (mrem/year) this exhaust stack: 5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 414

Process #: 1

Process performed in room number(s): 414

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Thermal calibration procedures were performed in this room during CY'11. The procedures are outlined in the Technical Operation Procedure located in the CY'97, Room 307 file folder. The liquid is heated to >100 deg C during operations. Any mixed fission products (MFP) will be modeled as Cs-137 (most conservative MFP from a dose standpoint).

Processes conducted in CY'10: #1 from Evelyn Bond and #3 and #4 from Ann did not occur during CY'11.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 414

Process #: 2

Process performed in room number(s): 414

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: Notebook

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Walter Moody provided the information for this process for CY'11.

Operations include running solutions through columns, electroplating, dissolving and crystallization. The isotopes used in this process were heated to above 100 deg C and were given a "gaseous" physical state during the process.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 414

Process #: 3

Process performed in room number(s): 414

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: Notebook

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Walter Moody provided the information for this process for CY'11.

Operations include running solutions through columns, electroplating, dissolving and crystallization. The isotopes and amounts used in this process were not heated.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Marianne Wilkerson

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/21/2012	02/21/2012	2011	C-NR	7-5922	mpw@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000111	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	415	1	MT-10	☐ Ci ☑ g	3.00E+02	7.04E-07	2.11E-04	Liquid	1.00E-03	2.11E-07	1.19E+01	2.51E-06
48000111	415	1	MT-35	☐ Ci ☑ g	4.00E+00	2.45E-05	9.80E-05	Liquid	1.00E-03	9.80E-08	1.30E+01	1.28E-06
48000111	415	2	MT-10	☐ Ci ☑ g	5.00E+00	7.04E-07	3.52E-06	Gaseous	1.00E+00	3.52E-06	1.19E+01	4.18E-05

Total PEDE (mrem/year) this interview form:	4.56E-05
Total PEDE (mrem/year) this exhaust stack:	5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 415

Process #: 1

Process performed in room number(s): 415

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Marianne Wilkerson provided the information for Room 415 for CY'11. They synthesize uranium oxide materials using enriched uranium (which will be modeled as MT-35) and natural uranium (MT-10). Solutions containing uranium were maintained at room temperature (these materials were not heated during the reaction process).

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 415

Process #: 2

Process performed in room number(s): 415

Heating? >100 deg C

Physical state before process: Particulate

Physical state during process: Gaseous

Physical state after process: Particulate

Primary Containment: Fume Hood

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Marianne Wilkerson provided the information for Room 415 for CY'11. Approximately 5 grams of uranium oxides containing uranium of natural isotopic composition were prepared in a furnace tube reaction within a certified chemical fume hood to temperatures exceeding 100 deg C.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Marianne Wilkerson

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/21/2012	02/21/2012	2011	C-NR	7-5922	mpw@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000166	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000166	415	1	MT-10	☐ Ci ☑ g	3.00E+02	7.04E-07	2.11E-04	Liquid	1.00E-03	2.11E-07	1.21E+01	2.55E-06
48000166	415	1	MT-35	☐ Ci ☑ g	4.00E+00	2.45E-05	9.80E-05	Liquid	1.00E-03	9.80E-08	1.32E+01	1.30E-06
48000166	415	2	MT-10	☐ Ci ☑ g	5.00E+00	7.04E-07	3.52E-06	Gaseous	1.00E+00	3.52E-06	1.21E+01	4.25E-05

Total PEDE (mrem/year) this interview form:	4.64E-05
Total PEDE (mrem/year) this exhaust stack:	4.64E-05

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 415

Process #: 1

Process performed in room number(s): 415

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Marianne Wilkerson provided the information for Room 415 for CY'11. They synthesize uranium oxide materials using enriched uranium (which will be modeled as MT-35) and natural uranium (MT-10). Solutions containing uranium were maintained at room temperature (these materials were not heated during the reaction process).

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 415

Process #: 2

Process performed in room number(s): 415

Heating? >100 deg C

Physical state before process: Particulate

Physical state during process: Gaseous

Physical state after process: Particulate

Primary Containment: Fume Hood

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Marianne Wilkerson provided the information for Room 415 for CY'11. Approximately 5 grams of uranium oxides containing uranium of natural isotopic composition were prepared in a furnace tube reaction within a certified chemical fume hood to temperatures exceeding 100 deg C.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Laura Wolfsberg

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/03/2012	02/03/2012	2011	C-IIAC	5-9795	lwolf@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000111	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000111	416	1	D-38	☐ Ci ☑ g	1.60E+01	4.38E-07	7.01E-06	Liquid	1.00E-03	7.01E-09	1.18E+01	8.27E-08
48000111	416	2	Ra-228	☐ Ci ☑ g	3.00E-02	2.72E+02	8.16E+00	Solid	1.00E-06	8.16E-06	3.43E+01	2.80E-04
48000111	416	2	Th-228	☐ Ci ☑ g	3.00E-02	8.21E+02	2.46E+01	Solid	1.00E-06	2.46E-05	1.41E+02	3.47E-03
48000111	416	2	Th-232	☐ Ci ☑ g	5.94E+00	1.10E-07	6.53E-07	Solid	1.00E-06	6.53E-13	9.17E+01	5.99E-11
48000111	416	3	Be-7	☐ Ci ☑ g	7.50E-08	3.50E+05	2.62E-02	Liquid	1.00E-03	2.63E-05	3.30E-03	8.66E-08

Total PEDE (mrem/year) this interview form:	3.75E-03
Total PEDE (mrem/year) this exhaust stack:	5.13E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 416

Process #: 1

Process performed in room number(s): 416

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vessel

Usage Basis: Process Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Laura stated that the process did not change in CY'11 from CY'10.

They dissolved about 12 g of UO2O2, 2 g of U3O8 and 2 g of U-238 metal (all depleted uranium) in 14.5M of nitric acid and then load it onto an ion exchange column. The impurities are flushed out of the column and the clean D-38 is eluted. They recycle it and use it from year to year.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 416

Process #: 2

Process performed in room number(s): 416

Heating? No Heating

Physical state before process: Solid

Physical state during process: Solid

Physical state after process: Solid

Primary Containment: Foil

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

According to an email from Laura Wolfsberg (see file folder), she measured approximately 6 g on 2 foils with a caliper. They were then encapsulated in Kapton. They were solid natural Th foils. Approximately 99% was Th-232 and the rest (0.5% each) was Th-228 and Ra-228.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 416

Process #: 3

Process performed in room number(s): 416

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Foil

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Dallas Reilly

Process Description:

Laura Wolfsberg state that they plated Be-7 onto Mg foil by placing freshly etched Mg foil into a diluted Be-7/Be-9 solution.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Ann Schake

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/03/2012	02/03/2012	2011	C-NR	7-0988	schake@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000168	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000168	421	1	MT-52	☑ Ci ☐ g	3.59E-13	2.79E-01	3.59E-13	Gaseous	1.00E+00	3.59E-13	5.36E+01	1.93E-11

Total PEDE (mrem/year) this interview form:	1.93E-11
Total PEDE (mrem/year) this exhaust stack:	1.93E-11

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 421

Process #: 1

Process performed in room number(s): 421

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Thermal calibration procedures were performed in this room during CY'11. The procedures are outlined in the Technical Operation Procedure located in the CY'97, Room 307 file folder. The liquid is heated to >100 deg C during operations. The Pu-239 will be modeled as MT-52.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: George Goff

Interview Date: 02/28/2012 **Callback Date:** 03/14/2012 **Survey Year:** 2011 **Operating Group:** C-IIAC **Phone #:** 4-0337 **E-Mail:** georgeg@lanl.gov

TA: 48 **Building:** 0001 **Facility Status:** Active **Monitored?** ☐ **ES ID #:** 48000145 **Facility Critical Receptor:** Residence at Royal Crest **mrem/Ci Factors Developed:** 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000145	423	1	D-38	☑ Ci ☐ g	2.50E-04	4.38E-07	2.50E-04	Liquid	1.00E-03	2.50E-07	9.48E+00	2.37E-06
48000145	423	2	I-131	☑ Ci ☐ g	6.84E-05	1.24E+05	6.84E-05	Liquid	1.00E-03	6.84E-08	6.11E-02	4.18E-09
48000145	423	2	I-133	☑ Ci ☐ g	2.07E-04	1.13E+06	2.07E-04	Liquid	1.00E-03	2.07E-07	1.14E-02	2.36E-09
48000145	423	2	Xe-133	☑ Ci ☐ g	1.06E-04	1.87E+05	1.06E-04	Liquid	1.00E-03	1.06E-07	1.48E-05	1.57E-12
48000145	423	2	Xe-133m	☑ Ci ☐ g	8.60E-06	4.48E+05	8.60E-06	Liquid	1.00E-03	8.60E-09	1.42E-05	1.22E-13
48000145	423	3	I-131	☑ Ci ☐ g	3.00E-07	1.24E+05	3.00E-07	Gaseous	1.00E+00	3.00E-07	6.11E-02	1.83E-08
48000145	423	3	I-133	☑ Ci ☐ g	4.00E-06	1.13E+06	4.00E-06	Gaseous	1.00E+00	4.00E-06	1.14E-02	4.56E-08
48000145	423	3	Xe-133	☑ Ci ☐ g	3.00E-07	1.87E+05	3.00E-07	Gaseous	1.00E+00	3.00E-07	1.48E-05	4.44E-12
48000145	423	3	Xe-133m	☑ Ci ☐ g	2.00E-07	4.48E+05	2.00E-07	Gaseous	1.00E+00	2.00E-07	1.42E-05	2.84E-12
48000145	423	4	Am-241	☑ Ci ☐ g	7.21E-06	3.43E+00	7.21E-06	Gaseous	1.00E+00	7.21E-06	1.18E+02	8.51E-04
48000145	423	4	U-232	☑ Ci ☐ g	6.00E-06	2.21E+01	6.00E-06	Gaseous	1.00E+00	6.00E-06	3.31E+01	1.99E-04
48000145	423	4	U-234	☑ Ci ☐ g	5.78E-09	6.22E-03	5.78E-09	Gaseous	1.00E+00	5.78E-09	1.05E+01	6.07E-08
48000145	423	4	U-235	☑ Ci ☐ g	1.87E-10	2.16E-06	1.87E-10	Gaseous	1.00E+00	1.87E-10	9.39E+00	1.76E-09
48000145	423	4	U-236	☑ Ci ☐ g	2.68E-11	6.47E-05	2.68E-11	Gaseous	1.00E+00	2.68E-11	9.71E+00	2.60E-10
48000145	423	4	U-238	☑ Ci ☐ g	1.69E-12	3.36E-07	1.69E-12	Gaseous	1.00E+00	1.69E-12	8.69E+00	1.47E-11

Total PEDE (mrem/year) this interview form: 1.05E-03

Total PEDE (mrem/year) this exhaust stack: 8.61E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 423

Process #: 1

Process performed in room number(s): 423

Heating? <100 deg C

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Bottle

Usage Basis: User Estimate

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

George Goff provided information for this room in an email dated 03/14/2012 (see file folder).

George stated that they used approximately 25% of the D-38 inventory (1.0E-3 Ci). Thus, 2.50E-04 Ci was used in this room during CY'11. They study solubility, solution complexation, sorption and leaching from solid materials and toxicity. No heating above 100 deg C was involved in these processes.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 423

Process #: 2

Process performed in room number(s): 423

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Iani May provided the informaion for this process in CY'11. They performed radiochemistry type operations on irradiated targets in this room during CY'11.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 423

Process #: 3

Process performed in room number(s): 423

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Iani May provided the informaion for this process in CY'11. They performed radiochemistry type operations on irradiated targets in this room during CY'11. Iain stated in the email that the work performed in Dec Linatron 300N sample was heated above 100 deg and will thus be considered a gas.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 423

Process #: 4

Process performed in room number(s): 423

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: Notebook

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Operations include running solutions through columns, electroplating, dissolving and crystallization. The isotopes used in this process were heated to above 100 deg C and were given a "gaseous" physical state during the process.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: George Goff

Interview Date: 02/03/2012

Callback Date: 03/14/2012

Survey Year: 2011

Operating Group: C-IIAC

Phone #: 4-0337

E-Mail: georgeg@lanl.gov

TA: 48

Building: 0001

Facility Status: Active

Monitored? ☐

ES ID #: 48000145

Facility Critical Receptor: Residence at Royal Crest

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000145	430	1	D-38	☑ Ci ☐ g	2.00E-04	4.38E-07	2.00E-04	Liquid	1.00E-03	2.00E-07	9.48E+00	1.90E-06
48000145	430	1	MT-52	☑ Ci ☐ g	6.60E-03	2.79E-01	6.60E-03	Liquid	1.00E-03	6.60E-06	4.30E+01	2.84E-04
48000145	430	1	Tc-99	☑ Ci ☐ g	2.70E-02	1.70E-02	2.70E-02	Liquid	1.00E-03	2.70E-05	1.36E+00	3.67E-05
48000145	430	2	Cs-137	☑ Ci ☐ g	1.82E-09	8.68E+01	1.82E-09	Gaseous	1.00E+00	1.82E-09	7.70E+00	1.40E-08
48000145	430	3	Cs-137	☑ Ci ☐ g	1.45E-06	8.68E+01	1.45E-06	Gaseous	1.00E+00	1.45E-06	7.70E+00	1.12E-05
48000145	430	4	Cs-137	☑ Ci ☐ g	8.17E-08	8.68E+01	8.17E-08	Gaseous	1.00E+00	8.17E-08	7.70E+00	6.29E-07
48000145	430	4	MT-52	☑ Ci ☐ g	1.68E-04	2.79E-01	1.68E-04	Gaseous	1.00E+00	1.68E-04	4.30E+01	7.22E-03

Total PEDE (mrem/year) this interview form: 7.56E-03

Total PEDE (mrem/year) this exhaust stack: 8.61E-03

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 430

Process #: 1

Process performed in room number(s): 430

Heating? <100 deg C

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

George Goff reported that they performed experiments using D-38, Pu-239 (modeled as MT-52) and Tc-99 in this hood and used various percentages of the inventory.

They study solubility, solution complexation, sorption and leaching from solid materials. No heating above 100 deg C was involved in these processes.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 430

Process #: 2

Process performed in room number(s): 430

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

In CY'11, Ann Schake performed radiochemistry on low-level and archived samples in this room. Perchlorate acid fuming, dilutions and aliquot preparation was performed on these samples.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 430

Process #: 3

Process performed in room number(s): 430

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Ann stated they performed radiochemistry on environmental samples (Diss ID 4103) in this room during 2011. The liquid is heated to >100 deg C during operations.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 430

Process #: 4

Process performed in room number(s): 430

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Ann Schake provided the 2011 spreadsheet via email (see file folder).

Thermal calibration procedures were performed in this room during CY'11. The procedures are outlined in the Technical Operation Procedure located in the CY'97, Room 307 file folder. The liquid is heated to >100 deg C during operations. Any mixed fission products (MFP) will be modeled as Cs-137 (most conservative MFP from a dose standpoint). The Pu-239 is modeled as MT-52.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: George Goff

Interview Date: 02/10/2012

Callback Date: 03/26/2012

Survey Year: 2011

Operating Group: C-IIAC

Phone #: 4-0337

E-Mail: georgeg@lanl.gov

TA: 48

Building: 0001

Facility Status: Active

Monitored? ☐

ES ID #: 48000167

Facility Critical Receptor: Residence at Royal Crest

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000167	430	1	Am-243	☑ Ci ☐ g	1.59E-02	2.00E-01	1.59E-02	Liquid	1.00E-03	1.59E-05	1.41E+02	2.24E-03
48000167	430	1	D-38	☑ Ci ☐ g	3.00E-08	4.38E-07	3.00E-08	Liquid	1.00E-03	3.00E-11	1.13E+01	3.38E-10
48000167	430	1	MT-52	☑ Ci ☐ g	6.60E-02	2.79E-01	6.60E-02	Liquid	1.00E-03	6.60E-05	5.10E+01	3.36E-03
48000167	430	1	Np-237	☑ Ci ☐ g	2.00E-04	7.05E-04	2.00E-04	Liquid	1.00E-03	2.00E-07	7.89E+01	1.58E-05
48000167	430	2	MT-52	☐ Ci ☑ g	3.00E-01	2.79E-01	8.37E-02	Custom	1.00E-03	8.37E-05	5.10E+01	4.27E-03
48000167	430	2	Np-237	☐ Ci ☑ g	1.20E-01	7.05E-04	8.46E-05	Custom	1.00E-03	8.46E-08	7.89E+01	6.67E-06
48000167	430	3	I-131	☑ Ci ☐ g	6.60E-04	1.24E+05	6.60E-04	Gaseous	1.00E+00	6.60E-04	6.67E-02	4.40E-05
48000167	430	3	I-133	☑ Ci ☐ g	1.80E-03	1.13E+06	1.80E-03	Gaseous	1.00E+00	1.80E-03	1.37E-02	2.47E-05
48000167	430	3	Kr-85	☑ Ci ☐ g	6.00E-08	3.91E+02	6.00E-08	Gaseous	1.00E+00	6.00E-08	3.16E-06	1.90E-13
48000167	430	3	MT-38	☐ Ci ☑ g	3.00E-01	6.69E-05	2.01E-05	Particulate	1.00E-03	2.01E-08	1.25E+01	2.51E-07
48000167	430	3	MT-52	☐ Ci ☑ g	6.00E-02	2.79E-01	1.67E-02	Particulate	1.00E-03	1.67E-05	5.10E+01	8.53E-04
48000167	430	3	Ru-103	☑ Ci ☐ g	2.54E-04	3.23E+04	2.54E-04	Gaseous	1.00E+00	2.54E-04	3.28E-02	8.33E-06
48000167	430	3	Ru-106	☑ Ci ☐ g	1.83E-05	3.31E+03	1.83E-05	Gaseous	1.00E+00	1.83E-05	3.23E-01	5.91E-06
48000167	430	3	Xe-133	☑ Ci ☐ g	1.68E-03	1.87E+05	1.68E-03	Gaseous	1.00E+00	1.68E-03	1.76E-05	2.96E-08
48000167	430	3	Xe-133m	☑ Ci ☐ g	8.60E-05	4.48E+05	8.60E-05	Gaseous	1.00E+00	8.60E-05	1.69E-05	1.45E-09

Total PEDE (mrem/year) this interview form: 1.08E-02

Total PEDE (mrem/year) this exhaust stack: 1.08E-02

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 430

Process #: 1

Process performed in room number(s): 430

Heating? <100 deg C

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Bottle

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

George Goff provided information for this room in an email dated 3/14/2012 (see file folder). The Pu-239 mixture is MT-52.

Experiments were performed using Np-237, D-38, Pu-239 (MT-52), and Am-243. They study solubility, solution complexation, interaction with microbes, sorption and leaching from solid materials and toxicity. No heating above 100 deg C was involved in these processes.

Processes are performed in HEPA-filtered hoods on the southwest side of the room (ES-67).

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 430

Process #: 2

Process performed in room number(s): 430

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Custom

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Sean Reilly was our point of contact for this process in CY'11. Information was gathered through email and a phone interview.

They performed actinide research and development as well as synthetic chemistry in Room 430 using the hoods exhausted by ES-67. The Weapons Grade Pu-239 that they used will be modeled as MT-52 (94% Pu-239 & 6% Pu-240). Sean stated that during CY'11, approximately 300 mg of Pu-239 and 120 mg of Np237 was used in this process. He estimated that approximately 75% of the material was heated above 100 deg C to drive off the water but that 100% of the rad materials are recovered. ENV-ES will use a custom release fraction of 1.00E-03 for this process.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** 430

Process #: 3

Process performed in room number(s): 430

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Flask

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Iain May provided the information for this process in CY'11. They performed radiochemistry type operations on irradiated targets in this room during CY'11.

Irradiation can result in gaseous nuclides (fission gases). These are assigned a physical state of "gaseous" and a release fraction of 100%. Other nuclides in the samples (MT-52 and HEU) are considered particulates with a release fraction of 1.00E-03.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Eva Birnbaum

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/06/2012	02/06/2012	2011	C-IIAC	5-7167	eva@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
48	0001	Active	☐	48000135	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48000135	Hotcell	1	Ge-68	☑ Ci ☐ g	3.00E-06	7.09E+03	3.00E-06	Particulate	1.00E-03	3.00E-09	1.20E+01	3.59E-08
48000135	Hotcell	1	Sr-82	☑ Ci ☐ g	5.00E-06	6.28E+04	5.00E-06	Particulate	1.00E-03	5.00E-09	2.84E-01	1.42E-09
48000135	Hotcell	1	Sr-85	☑ Ci ☐ g	1.40E-06	2.37E+04	1.40E-06	Particulate	1.00E-03	1.40E-09	1.08E-01	1.51E-10

Total PEDE (mrem/year) this interview form:	3.75E-08
Total PEDE (mrem/year) this exhaust stack:	3.75E-08

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0001 **Room:** Hot Cell

Process #: 1

Process performed in room number(s): Hot Cell

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Hood

Usage Basis: Bounding Estimate of User

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Eva Birnbaum stated in an email dated 2/6/12 (see file folder) that there was no change in operation involving this exhaust system and no occurrences took place in CY'11.

The facility bases the "bounding user estimate" on known radionuclide contamination of mechanical equipment inside the hood.

FE-35 is an unmonitored release point at the back of the hot cell area (which is monitored). It exhausts a hood that is used to store contaminated manipulator arms and other mechanical equipment that has been used in the hot cells.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Robert Steiner

Interview Date: 02/10/2012

Callback Date: 04/18/2012

Survey Year: 2011

Operating Group: C-NR

Phone #: 7-0979

E-Mail: steiner@lanl.gov

TA: 48

Building: 0045

Facility Status: Active

Monitored? ☐

ES ID #: 48004500

Facility Critical Receptor: Residence at Royal Crest

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
48004500	W106	1	Pu-238	☑ Ci ☐ g	4.51E-12	1.71E+01	4.51E-12	Gaseous	1.00E+00	4.51E-12	1.89E+02	8.52E-10
48004500	W106	1	Pu-239	☑ Ci ☐ g	4.51E-12	6.21E-02	4.51E-12	Gaseous	1.00E+00	4.51E-12	2.05E+02	9.25E-10
48004500	W106	1	Pu-240	☑ Ci ☐ g	4.51E-12	2.27E-01	4.51E-12	Gaseous	1.00E+00	4.51E-12	2.05E+02	9.25E-10
48004500	W106	1	Pu-242	☑ Ci ☐ g	2.82E-09	3.94E-03	2.82E-09	Gaseous	1.00E+00	2.82E-09	1.95E+02	5.50E-07
48004500	W110	1	Pu-238	☑ Ci ☐ g	4.51E-12	1.71E+01	4.51E-12	Gaseous	1.00E+00	4.51E-12	1.89E+02	8.52E-10
48004500	W110	1	Pu-239	☑ Ci ☐ g	4.51E-12	6.21E-02	4.51E-12	Gaseous	1.00E+00	4.51E-12	2.05E+02	9.25E-10
48004500	W110	1	Pu-240	☑ Ci ☐ g	4.51E-12	2.27E-01	4.51E-12	Gaseous	1.00E+00	4.51E-12	2.05E+02	9.25E-10
48004500	W110	1	Pu-242	☑ Ci ☐ g	2.82E-09	3.94E-03	2.82E-09	Gaseous	1.00E+00	2.82E-09	1.95E+02	5.50E-07
48004500	E107	2	Pu-239	☑ Ci ☐ g	3.10E-11	6.21E-02	3.10E-11	Gaseous	1.00E+00	3.10E-11	2.05E+02	6.36E-09
48004500	E106A	3	Np-236a	☑ Ci ☐ g	5.85E-13	5.90E+05	5.85E-13	Gaseous	1.00E+00	5.85E-13	1.32E+01	7.72E-12
48004500	E106A	3	Np-237	☑ Ci ☐ g	2.88E-14	7.05E-04	2.88E-14	Gaseous	1.00E+00	2.88E-14	9.42E+01	2.71E-12
48004500	E106A	3	Pu-242	☑ Ci ☐ g	1.13E-10	3.94E-03	1.13E-10	Gaseous	1.00E+00	1.13E-10	1.95E+02	2.20E-08
48004500	E106A	3	Pu-244	☑ Ci ☐ g	7.35E-16	1.83E-05	7.35E-16	Gaseous	1.00E+00	7.35E-16	2.05E+02	1.51E-13
48004500	E106A	3	Th-229	☑ Ci ☐ g	4.47E-09	2.14E-01	4.47E-09	Gaseous	1.00E+00	4.47E-09	2.94E+02	1.31E-06
48004500	E106A	3	U-233	☑ Ci ☐ g	2.24E-09	9.65E-03	2.24E-09	Gaseous	1.00E+00	2.24E-09	1.52E+01	3.40E-08
48004500	E109	3	Np-236a	☑ Ci ☐ g	5.85E-13	5.90E+05	5.85E-13	Gaseous	1.00E+00	5.85E-13	1.32E+01	7.72E-12
48004500	E109	3	Np-237	☑ Ci ☐ g	2.88E-14	7.05E-04	2.88E-14	Gaseous	1.00E+00	2.88E-14	9.42E+01	2.71E-12
48004500	E109	3	Pu-242	☑ Ci ☐ g	1.13E-10	3.94E-03	1.13E-10	Gaseous	1.00E+00	1.13E-10	1.95E+02	2.20E-08
48004500	E109	3	Pu-244	☑ Ci ☐ g	7.35E-16	1.83E-05	7.35E-16	Gaseous	1.00E+00	7.35E-16	2.05E+02	1.51E-13

Radioactive Materials Usage Survey Interview Form

48004500	E109	3	Th-229	☑ Ci ☐ g	4.47E-09	2.14E-01	4.47E-09	Gaseous	1.00E+00	4.47E-09	2.94E+02	1.31E-06
48004500	E109	3	U-233	☑ Ci ☐ g	2.24E-09	9.65E-03	2.24E-09	Gaseous	1.00E+00	2.24E-09	1.52E+01	3.40E-08
48004500	E111	3	Np-237	☑ Ci ☐ g	2.88E-14	7.05E-04	2.88E-14	Gaseous	1.00E+00	2.88E-14	9.42E+01	2.71E-12
48004500	E111	3	Pu-244	☑ Ci ☐ g	7.35E-16	1.83E-05	7.35E-16	Gaseous	1.00E+00	7.35E-16	2.05E+02	1.51E-13
48004500	N107	3	Th-229	☑ Ci ☐ g	4.47E-09	2.14E-01	4.47E-09	Gaseous	1.00E+00	4.47E-09	2.94E+02	1.31E-06
48004500	N107	3	U-233	☑ Ci ☐ g	2.24E-09	9.65E-03	2.24E-09	Gaseous	1.00E+00	2.24E-09	1.52E+01	3.40E-08
48004500	W108	4	Np-236a	☑ Ci ☐ g	1.17E-12	5.90E+05	1.17E-12	Gaseous	1.00E+00	1.17E-12	1.32E+01	1.54E-11
48004500	W108	4	Np-237	☑ Ci ☐ g	5.75E-14	7.05E-04	5.75E-14	Gaseous	1.00E+00	5.75E-14	9.42E+01	5.42E-12
48004500	W108	4	Pu-242	☑ Ci ☐ g	2.25E-10	3.94E-03	2.25E-10	Gaseous	1.00E+00	2.25E-10	1.95E+02	4.39E-08
48004500	W108	4	Pu-244	☑ Ci ☐ g	1.47E-15	1.83E-05	1.47E-15	Gaseous	1.00E+00	1.47E-15	2.05E+02	3.01E-13
48004500	W108	4	Th-229	☑ Ci ☐ g	4.47E-09	2.14E-01	4.47E-09	Gaseous	1.00E+00	4.47E-09	2.94E+02	1.31E-06
48004500	W108	4	U-233	☑ Ci ☐ g	2.24E-09	9.65E-03	2.24E-09	Gaseous	1.00E+00	2.24E-09	1.52E+01	3.40E-08

Total PEDE (mrem/year) this interview form: 6.59E-06

Total PEDE (mrem/year) this building: 6.59E-06

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0045 **Room:** W106

Process #: 1

Process performed in room number(s): E104A, E104B, E106B, W106, W110

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Robert Steiner was our point of contact for this process in CY'11. Spoke to Rob via telephone on 4/18/12. He stated that there were no changes in the radiochemistry processes or the amounts of material used from previous years.

Radiochemistry processes are performed on approximately 2,500 bioassay samples in Rooms W106 and W110. These samples are taken into rooms E104A, E104B and E106B (Clean Rooms) for alpha spectroscopy. Because the samples are heated to >100 deg C, and considered a gas (100% emitted), in Rooms W106 and W110 prior to being used in the Clean Rooms, it would be double-counting to estimate any emissions from the Clean Rooms.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0045 **Room:** E107

Process #: 2

Process performed in room number(s): E107

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Beaker

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Robert Steiner was our point of contact for this process in CY'11. Spoke to Rob via telephone on 4/18/12. He stated that there were no changes in the radiochemistry processes or the amounts of material used from previous years.

Ultra trace analysis is performed using radiochemistry in Room E107. The samples are heated to >100 deg C and are considered a gas (100% emitted). The trace material was Pu-239.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0045 **Room:** E106A

Process #: 3

Process performed in room number(s): E106A, E109, E111, E113, N107, N113

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Bottle

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Mike Murrell stated in an email dated 02/10/2012 (see file folder) that there were no changes in the radiochemistry processes or the amounts of material used from previous years.

Process #3 begins in Room E113. Rm. E113 houses a cabinet full of various rad and nonrad isotopic standards. When any of these standards are used they are taken out of the cabinet and aliquoted on a mass balance. They are not used in this room for any chemical operations, thus no emissions will be allocated to this room. Various isotopes are used for chemical operations in multiple rooms in this facility.

The process includes dissolving rocks and adding a known isotope to an acid solution. There is heating above 100 deg C during this process. These solutions are then taken to Room N113 to a vacuum chamber where they are heated to >1200 deg C, and are then analyzed for the isotopes. Several isotopes are also taken to E111 and ashed. Because all of the isotopes from E106A, E109, and N107 are emitted as 100% gaseous emissions from those rooms, and in order to avoid double counting emissions, the usage survey for Mike Murrell will not include air emissions from N113.

NCRP 123 identifies Np-236a and Np-236b in the screening factors tables. ES modeled both and Np-236a had the higher dose factor. Therefore, ES will assume that all Np-236 is Np-236a.

Radionuclide Materials Usage Survey Process Form

TA: 48 **Building:** 0045 **Room:** W108

Process #: 4

Process performed in room number(s): W108

Heating? >100 deg C

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Bottle

Usage Basis: User Knowledge

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

Mike Murrell updated the information for this room in an email dated 02/10/2012 (see file folder). They perform radiochemistry processes in Room W108.

The Np-236, Np-237, Pu-242, Pu-244, Th-229 and U-233 are used as tracers for chemistry and are heated to greater than 100 deg C.

NCRP 123 identifies Np-236a and Np-236b in the screening factors tables. ES modeled both and Np-236a had the higher dose factor. Therefore, ES will assume that all Np-236 is Np-236a.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Randy Johnson

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/04/2012	04/04/2012	2011	ENV-ES	7-0509	randyj@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
50	0001	Active	☐	500001CT	Residence at Royal Crest	2009

Total PEDE (mrem/year) this interview form:

Radionuclide Materials Usage Survey Process Form

TA: 50 Building: 0001 Room: NA

Process #: 0

Process performed in room number(s): NA

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis: RLWTF Discharge Report

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

Two small cooling towers exist at the RLWTF; they are located adjacent to the driveway on the east side of the building. In 2010, treated waters were fed to the TA50 cooling towers for a short period of time. This operation did not occur in CY'11 and it is not anticipated that this operation will happen again.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Harold Martinez Jr.

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
03/13/2012	03/13/2012	2011	RP-1	7-6917	hdmartinez@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
50	0002	Active	☐	50000299	Residence at Royal Crest	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
50000299	NA	1	Am-241	☑ Ci ☐ g	7.66E-08	3.43E+00	7.66E-08	Particulate	1.00E-03	7.66E-11	7.00E+01	5.36E-09
50000299	NA	1	Sr-90	☑ Ci ☐ g	7.84E-08	1.38E+02	7.84E-08	Particulate	1.00E-03	7.84E-11	4.54E+00	3.56E-10

Total PEDE (mrem/year) this interview form: 5.72E-09

Radionuclide Materials Usage Survey Process Form

TA: 50 **Building:** 0002 **Room:** NA

Process #: 1

Process performed in room number(s): NA

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: None

Usage Basis: Smear Data

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

TA50-2 is the Radioactive Liquid Waste Treatment Facility's pump house that is used to move the waste water through the various processes. This room is ventilated with a fan to satisfy confined space issues and has fixed and removable contamination in the room.

Harold Martinez Jr provided smear data for the CY'11 survey. No work was performed other than general maintenance and no spills occurred in CY'11.

The pump house was added to the calendar year (CY) '96 inventory based on the phone conversations with Dave Moss and smear data he provided. Harold Martinez Jr. provided smear data for the CY'11 usage survey update. There were results for smears from several locations in the pump house. The total surface area of the room was calculated to be 2.53E+06 cm2 was assumed to be uniformly contaminated at the single highest smear result for alpha and beta contamination: 6.7246 dpm/100 cm2 alpha and 6.8845 dpm/100 cm2 beta. Alpha-emitting radioactive material is modeled as Am-241 and beta-emitting radioactive material is modeled s Sr-90.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: John Guy

Interview Date: 04/04/2012 **Callback Date:** 04/04/2012 **Survey Year:** 2011 **Operating Group:** RP-1 **Phone #:** 6-1555 **E-Mail:** jguy@lanl.gov

TA: 50 **Building:** 0069 **Facility Status:** Active **Monitored?** ☐ **ES ID #:** 50006901 **Facility Critical Receptor:** Residence at Royal Crest **mrem/Ci Factors Developed:** 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
50006901	Duct	1	U-234	☑ Ci ☐ g	4.40E-05	6.22E-03	4.40E-05	Custom	1.00E+00	4.40E-05	6.24E+00	2.75E-04
50006901	Duct	1	U-238	☑ Ci ☐ g	3.20E-05	3.36E-07	3.20E-05	Custom	1.00E+00	3.20E-05	5.16E+00	1.65E-04

Total PEDE (mrem/year) this interview form: 4.40E-04

Radionuclide Materials Usage Survey Process Form

TA: 50 **Building:** 0069 **Room:** Duct

Process #: 1

Process performed in room number(s): Duct

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Custom

Physical state after process: Particulate

Primary Containment: Duct

Usage Basis: 1996 LANL Air Emissions Report

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

According to a phone interview with John Guy on 4/4/12, the snorkel that exhausted to ES-1 is still tagged out of service and not being used.

Although no operations took place using this exhaust system in CY'11, historically, the snorkel system (ES-1) was used to exhaust the immediate area when they were performing head space hydrogen gas sampling operations. They also used the snorkel when changing out the bung filter. No rad had ever been detected during those operations. They also used the snorkel to exhaust the immediate area when they were performing visual inspections of drums. During that process, they would take the lid off the drum, and visually inspect the material inside. The material was wrapped in plastic and not opened during these operations. No rad was detected during those procedures.

According to the '94 Inventory, "if any contamination exists in the ES-1 exhaust system, it is below transferable levels". This exhaust services a welding hood that was once used to weld and cut on contaminated materials. For CY'11, it is assumed that air emissions are due to potential duct hold-up. Welding operations have not occurred in many years. No duct hold-up studies have been done because historic operations don't support the need for it.

This was a monitored release point, and the last sample was collected at the end of May 1996. The analytical data for that year are reported in the '11 Usage Survey to conservatively represent air emissions due to potential duct holdup. The stack, ES-1, was HEPA-filtered so a correction factor was applied to the monitored emissions (multiply reported emissions by 2000) to estimate potential emissions without pollution controls (per 40 CFR 61, Subpart H).

In order to estimate emissions from this particulate source, a physical state of "custom" and a reduction factor of 1.00E+00 was selected on the interview form. No reduction factor was applied to this actual monitoring data.

According to John, Kurt Hillmer will be our future contact for this exhaust system.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: John Guy

Interview Date: 04/04/2012

Callback Date: 04/04/2012

Survey Year: 2011

Operating Group: RP-1

Phone #: 6-1555

E-Mail: jguy@lanl.gov

TA: 50

Building: 0069

Facility Status: Active

Monitored? ☐

ES ID #: 50006902

Facility Critical Receptor: Residence at Royal Crest

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
50006902	Duct	1	Pu-239	☑ Ci ☐ g	4.00E-05	6.21E-02	4.00E-05	Custom	1.00E+00	4.00E-05	8.59E+01	3.44E-03

Total PEDE (mrem/year) this interview form: 3.44E-03

Radionuclide Materials Usage Survey Process Form

TA: 50 Building: 0069 Room: Duct

Process #: 1

Process performed in room number(s): Duct

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Custom

Physical state after process: Particulate

Primary Containment: Duct

Usage Basis: 1996 LANL Air Emissions Report

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

This exhaust services the general building area and a hood. The hood had been tagged out of service during CY'11. According to John Guy, a couple of small spills occurred in the general room area, however no elevated amounts of rad was detected.

For CY'11, it is assumed that air emissions are due to potential duct hold-up. No duct hold-up studies have been done because historic operations don't support the need for it.

This was a monitored release point, and the last sample was collected at the end of May 1996. The analytical data for that year are reported in the '11 Usage Survey to conservatively represent air emissions due to potential duct holdup. The stack, ES-02, was HEPA-filtered so a correction factor was applied to the monitored emissions (multiply reported emissions by 2000) to estimate potential emissions without pollution controls (per 40 CFR 61, Subpart H).

In order to estimate emissions from this particulate source, a physical state of "custom" and a reduction factor of 1.00E+00 was selected on the interview form. No reduction factor was applied to this actual monitoring data.

According to John, Kurt Hillmer will be our future contact for this exhaust system.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon

Facility Point of Contact: Christine Bullock

Interview Date: 04/26/2012

Callback Date: 04/26/2012

Survey Year: 2011

Operating Group: RP-1

Phone #: 5-8133

E-Mail: cbullock@lanl.gov

TA: 50

Building: 0069

Facility Status: Active

Monitored? ☐

ES ID #: 50006999

Facility Critical Receptor: Residence at Royal Crest

mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
50006999	ALL	1	Pu-239	☑ Ci ☐ g	1.69E-06	6.21E-02	1.69E-06	Gaseous	1.00E+00	1.69E-06	8.56E+01	1.45E-04
50006999	ALL	1	Sr-90	☑ Ci ☐ g	1.06E-06	1.38E+02	1.06E-06	Gaseous	1.00E+00	1.06E-06	4.62E+00	4.90E-06

Total PEDE (mrem/year) this interview form: 1.50E-04

Radionuclide Materials Usage Survey Process Form

TA: 50 Building: 0069 Room: ALL

Process #: 1

Process performed in room number(s): ALL

Heating? No Heating

Physical state before process: Gaseous

Physical state during process: Gaseous

Physical state after process: Gaseous

Primary Containment: Duct

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No If yes, list names below:

Various

Process Description:

The facility vacuum pump system is designated TA50-69 ES-99. It supplies suction for Fixed Air Samplers (FAS), continuous air monitors (CAM), and the stack sampler, and discharges pump exhaust air out the east wall of TA50-69.

RP-1 provided FAS data for 2011. The vacuum pump source term was developed by identifying the highest alpha and beta readings on any of the 21 FAS systems each week, and assuming that those concentrations apply to the entire flow volume for that week. Alpha was modeled as Pu-239 and beta as Sr-90 (more conservative than Pu-241). The stack sample flow measured concentrations were then added to this source term. ENV-ES is treating this as "gaseous" because it represents airborne rad; no credit is taken for the sample filters in the FAS systems. 100% release.

The FAS's and CAM measure same air volume: air concentration in the main building. The stack sampler measures glovebox discharge. The CAM systems are not as sensitive to low levels of rad as the FAS system; therefore we are only using FAS for this calculation. Adding in FAS data plus stack data will capture the entire spectrum of potential releases from the vacuum systems.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon
Facility Point of Contact: Chris Del Signore

Interview Date: 04/04/2012
Callback Date: 04/04/2012
Survey Year: 2011
Operating Group: TA-55-RLW
Phone #: 5-5956
E-Mail: jcds@lanl.gov

TA: 50
Building: 0257
Facility Status: Active
Monitored? ☐
ES ID #: 50025799
Facility Critical Receptor: Residence at Royal Crest
mrem/Ci Factors Developed: 2011

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
50025799	NA	1	Am-241	☑ Ci ☐ g	1.50E-05	3.43E+00	1.50E-05	Liquid	1.00E-03	1.50E-08	6.43E+01	9.65E-07
50025799	NA	1	As-74	☑ Ci ☐ g	3.10E-05	9.93E+04	3.10E-05	Liquid	1.00E-03	3.10E-08	1.51E-02	4.68E-10
50025799	NA	1	Co-58	☑ Ci ☐ g	1.20E-06	3.18E+04	1.20E-06	Liquid	1.00E-03	1.20E-09	6.02E-02	7.22E-11
50025799	NA	1	Co-60	☑ Ci ☐ g	1.10E-06	1.13E+03	1.10E-06	Liquid	1.00E-03	1.10E-09	6.37E-01	7.01E-10
50025799	NA	1	Cs-137	☑ Ci ☐ g	2.10E-05	8.68E+01	2.10E-05	Liquid	1.00E-03	2.10E-08	4.26E+00	8.95E-08
50025799	NA	1	Eu-152	☑ Ci ☐ g	5.30E-05	1.74E+02	5.30E-05	Liquid	1.00E-03	5.30E-08	1.64E-01	8.69E-09
50025799	NA	1	H-3	☑ Ci ☐ g	3.70E-02	9.68E+03	3.70E-02	Gaseous	1.00E+00	3.70E-02	4.33E-04	1.60E-05
50025799	NA	1	I-133	☑ Ci ☐ g	1.00E-05	1.13E+06	1.00E-05	Liquid	1.00E-03	1.00E-08	6.84E-03	6.84E-11
50025799	NA	1	Pu-238	☑ Ci ☐ g	1.40E-05	1.71E+01	1.40E-05	Liquid	1.00E-03	1.40E-08	7.12E+01	9.97E-07
50025799	NA	1	Pu-239	☑ Ci ☐ g	9.40E-06	6.21E-02	9.40E-06	Liquid	1.00E-03	9.40E-09	7.73E+01	7.27E-07
50025799	NA	1	Rb-83	☑ Ci ☐ g	8.30E-06	1.83E+04	8.30E-06	Liquid	1.00E-03	8.30E-09	1.33E-01	1.10E-09
50025799	NA	1	Rb-84	☑ Ci ☐ g	9.80E-06	4.73E+04	9.80E-06	Liquid	1.00E-03	9.80E-09	6.94E-02	6.80E-10
50025799	NA	1	Sr-85	☑ Ci ☐ g	9.20E-06	2.37E+04	9.20E-06	Liquid	1.00E-03	9.20E-09	4.03E-02	3.71E-10
50025799	NA	1	Th-232	☑ Ci ☐ g	5.10E-09	1.10E-07	5.10E-09	Liquid	1.00E-03	5.10E-12	3.93E+01	2.00E-10
50025799	NA	1	U-234	☑ Ci ☐ g	5.80E-05	6.22E-03	5.80E-05	Liquid	1.00E-03	5.80E-08	5.61E+00	3.25E-07
50025799	NA	1	U-235	☑ Ci ☐ g	1.20E-07	2.16E-06	1.20E-07	Liquid	1.00E-03	1.20E-10	5.01E+00	6.01E-10
50025799	NA	1	U-238	☑ Ci ☐ g	2.00E-06	3.36E-07	2.00E-06	Liquid	1.00E-03	2.00E-09	4.64E+00	9.28E-09
50025799	NA	1	V-48	☑ Ci ☐ g	1.30E-06	1.70E+05	1.30E-06	Liquid	1.00E-03	1.30E-09	3.58E-02	4.65E-11
50025799	NA	1	Y-88	☑ Ci ☐ g	1.40E-05	1.39E+04	1.40E-05	Liquid	1.00E-03	1.40E-08	1.27E-01	1.78E-09

Radioactive Materials Usage Survey Interview Form

Total PEDE (mrem/year) this interview form: 1.91E-05

Radionuclide Materials Usage Survey Process Form

TA: 50 Building: 0257 Room: NA

Process #: 1

Process performed in room number(s): NA

Heating? <100 deg C

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Tanks

Usage Basis: Plant Data

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

Information was provided in the "Radioactive Liquid Waste Treatment Facility Discharges in 2011" report by Chris Del Signor.

A thermal evaporator was used for evaporation of the treated wastewater. The unit can treat up to 400 gallons of water per hour. Water droplets in the exhaust are collected and controlled by stainless steel mesh filters.

(PRID 10A-0012-V00)

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon
Facility Point of Contact: Dave Fuehne

Interview Date: 05/14/2012
Callback Date: 05/14/2012
Survey Year: 2011
Operating Group: ENV-ES
Phone #: 5-3850
E-Mail: davef@lanl.gov

TA: 53
Building: 0015
Facility Status: Active
Monitored? ☐
ES ID #: 53001599
Facility Critical Receptor: Business at East Gate
mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
53001599	NA	1	Ag-110m	☑ Ci ☐ g	8.15E-09	4.75E+03	8.15E-09	Liquid	1.00E-03	8.15E-12	3.76E-01	3.06E-12
53001599	NA	1	Ar-41	☑ Ci ☐ g	5.10E-09	4.18E+07	5.10E-09	Liquid	1.00E-03	5.10E-12	7.20E-04	3.67E-15
53001599	NA	1	Be-7	☑ Ci ☐ g	4.88E-07	3.50E+05	4.88E-07	Liquid	1.00E-03	4.88E-10	3.00E-03	1.46E-12
53001599	NA	1	Co-56	☑ Ci ☐ g	1.48E-08	3.02E+04	1.48E-08	Liquid	1.00E-03	1.48E-11	4.12E-01	6.10E-12
53001599	NA	1	Co-58	☑ Ci ☐ g	1.72E-06	3.18E+04	1.72E-06	Liquid	1.00E-03	1.72E-09	1.10E-01	1.89E-10
53001599	NA	1	Co-60	☑ Ci ☐ g	7.96E-09	1.13E+03	7.96E-09	Liquid	1.00E-03	7.96E-12	1.17E+00	9.31E-12
53001599	NA	1	Cr-51	☑ Ci ☐ g	1.36E-07	9.24E+04	1.36E-07	Liquid	1.00E-03	1.36E-10	1.23E-03	1.67E-13
53001599	NA	1	Cs-139	☑ Ci ☐ g	1.01E-06	1.45E+08	1.01E-06	Liquid	1.00E-03	1.01E-09	4.27E+00	4.31E-09
53001599	NA	1	Eu-146	☑ Ci ☐ g	3.74E-07	1.96E+05	3.74E-07	Liquid	1.00E-03	3.74E-10	1.42E-01	5.31E-11
53001599	NA	1	Eu-148	☑ Ci ☐ g	1.45E-07	1.62E+04	1.45E-07	Liquid	1.00E-03	1.45E-10	1.33E-01	1.93E-11
53001599	NA	1	Eu-156	☑ Ci ☐ g	1.02E-06	5.51E+04	1.02E-06	Liquid	1.00E-03	1.02E-09	3.57E-02	3.64E-11
53001599	NA	1	Fe-59	☑ Ci ☐ g	2.06E-07	4.97E+04	2.06E-07	Liquid	1.00E-03	2.06E-10	7.61E-02	1.57E-11
53001599	NA	1	Gd-146	☑ Ci ☐ g	9.32E-07	1.85E+04	9.32E-07	Liquid	1.00E-03	9.32E-10	1.62E-01	1.51E-10
53001599	NA	1	Gd-149	☑ Ci ☐ g	4.85E-07	9.44E+04	4.85E-07	Liquid	1.00E-03	4.85E-10	7.77E-03	3.77E-12
53001599	NA	1	Hf-175	☑ Ci ☐ g	2.80E-05	1.07E+04	2.80E-05	Liquid	1.00E-03	2.80E-08	2.91E-02	8.15E-10
53001599	NA	1	Hf-181	☑ Ci ☐ g	1.07E-07	1.70E+04	1.07E-07	Liquid	1.00E-03	1.07E-10	4.27E-02	4.57E-12
53001599	NA	1	K-40	☑ Ci ☐ g	3.24E-08	7.04E-06	3.24E-08	Liquid	1.00E-03	3.24E-11	2.48E+00	8.04E-11
53001599	NA	1	Lu-171	☑ Ci ☐ g	3.20E-07	9.27E+04	3.20E-07	Liquid	1.00E-03	3.20E-10	9.55E-03	3.06E-12
53001599	NA	1	Lu-172	☑ Ci ☐ g	9.49E-06	1.13E+05	9.49E-06	Liquid	1.00E-03	9.49E-09	1.99E-02	1.89E-10

Radioactive Materials Usage Survey Interview Form

53001599	NA	1	Lu-173	☑ Ci ☐ g	9.08E-06	1.51E+03	9.08E-06	Liquid	1.00E-03	9.08E-09	2.49E-02	2.26E-10
53001599	NA	1	Lu-177	☑ Ci ☐ g	6.83E-07	1.11E+05	6.83E-07	Liquid	1.00E-03	6.83E-10	3.36E-03	2.29E-12
53001599	NA	1	Mn-52	☑ Ci ☐ g	3.86E-09	4.49E+05	3.86E-09	Liquid	1.00E-03	3.86E-12	3.01E-02	1.16E-13
53001599	NA	1	Na-22	☑ Ci ☐ g	1.64E-08	6.25E+03	1.64E-08	Liquid	1.00E-03	1.64E-11	9.51E-01	1.56E-11
53001599	NA	1	Na-24	☑ Ci ☐ g	2.11E-09	8.73E+06	2.11E-09	Liquid	1.00E-03	2.11E-12	5.30E-03	1.12E-14
53001599	NA	1	Pb-214	☑ Ci ☐ g	2.08E-07	3.25E+07	2.08E-07	Liquid	1.00E-03	2.08E-10	3.12E-02	6.49E-12
53001599	NA	1	Pu-239	☑ Ci ☐ g	5.83E-05	6.21E-02	5.83E-05	Liquid	1.00E-03	5.83E-08	1.45E+02	8.45E-06
53001599	NA	1	Rb-83	☑ Ci ☐ g	2.28E-08	1.83E+04	2.28E-08	Liquid	1.00E-03	2.28E-11	2.43E-01	5.54E-12
53001599	NA	1	Sb-124	☑ Ci ☐ g	1.68E-08	1.75E+04	1.68E-08	Liquid	1.00E-03	1.68E-11	1.38E-01	2.32E-12
53001599	NA	1	Sc-46	☑ Ci ☐ g	6.36E-08	3.39E+04	6.36E-08	Liquid	1.00E-03	6.36E-11	1.70E-01	1.08E-11
53001599	NA	1	Se-75	☑ Ci ☐ g	3.41E-07	1.45E+04	3.41E-07	Liquid	1.00E-03	3.41E-10	3.38E-01	1.15E-10
53001599	NA	1	Sn-113	☑ Ci ☐ g	4.79E-08	1.00E+04	4.79E-08	Liquid	1.00E-03	4.79E-11	1.33E-01	6.35E-12
53001599	NA	1	Tl-208	☑ Ci ☐ g	8.69E-09	2.96E+08	8.69E-09	Liquid	1.00E-03	8.69E-12	2.87E-04	2.49E-15
53001599	NA	1	W-178	☑ Ci ☐ g	3.17E-05	3.40E+04	3.17E-05	Liquid	1.00E-03	3.17E-08	1.16E-02	3.68E-10
53001599	NA	1	W-187	☑ Ci ☐ g	7.84E-08	7.01E+05	7.84E-08	Liquid	1.00E-03	7.84E-11	1.78E-03	1.40E-13
53001599	NA	1	Xe-122	☑ Ci ☐ g	1.06E-06	1.28E+06	1.06E-06	Liquid	1.00E-03	1.06E-09	2.70E-05	2.86E-14
53001599	NA	1	Xe-125	☑ Ci ☐ g	1.72E-07	1.47E+06	1.72E-07	Liquid	1.00E-03	1.72E-10	1.33E-04	2.29E-14
53001599	NA	1	Y-91m	☑ Ci ☐ g	6.31E-06	4.16E+07	6.31E-06	Liquid	1.00E-03	6.31E-09	2.61E-04	1.65E-12
53001599	NA	1	Yb-169	☑ Ci ☐ g	1.59E-06	2.41E+04	1.59E-06	Liquid	1.00E-03	1.59E-09	1.93E-02	3.07E-11
53001599	NA	1	Zn-65	☑ Ci ☐ g	1.06E-07	8.24E+03	1.06E-07	Liquid	1.00E-03	1.06E-10	1.48E+00	1.57E-10

Total PEDE (mrem/year) this interview form: 8.46E-06

Radionuclide Materials Usage Survey Process Form

TA: 53 **Building:** 0015 **Room:** NA

Process #: 0

Process performed in room number(s): NA

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vial

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Per a conversation with Dave Fuehne on 5/14/12, the operations at TA53-15 did not change from previous years and the amounts of rad materials should remain the same.

The water samples came from the 1L Target cooling water. Eron Kerstiens of AOT-OPS provided water sample data which represents the worst-case sample from recent years. Each month, a 125-mL sample is pulled; there are 8 samples pulled each year (8 months of operations per year). The worst-case sample concentrations were multiplied by 8 to determine annual throughput values at this source. The spreadsheet and explanatory email are in the file folder.

Cs-139 was modeled as Cs-137 in CAP-88.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Fredrik Tovesson

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/30/2012	04/30/2012	2011	LANSCE-NS	5-9652	tovesson@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
53	0018	Active	☐	53001899	Business at East Gate	2009

Total PEDE (mrem/year) this interview form:

Radionuclide Materials Usage Survey Process Form

TA: 53 Building: 0018 Room: NA

Process #: 0

Process performed in room number(s): NA

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis:

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

Fredrik Tovesson stated that no activity took place in the hood in this facility in CY'11. All fission foils were either stored in their current target assemblies (and not handled/used) or in the safe.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon
Facility Point of Contact: Dave Fuehne

Interview Date: 03/26/2012
Callback Date: 04/22/2012
Survey Year: 2011
Operating Group: ENV-ES
Phone #: 5-3850
E-Mail: davef@lanl.gov

TA: 53
Building: 0984
Facility Status: Active
Monitored? ☐
ES ID #: 53098401
Facility Critical Receptor: Business at East Gate
mrem/Ci Factors Developed: 2011

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
53098401	NA	1	Cu-62	☑ Ci ☐ g	1.81E-02	3.11E+08	1.81E-02	Liquid	1.00E-03	1.81E-05	3.18E-04	5.76E-09
53098401	NA	1	Cu-64	☑ Ci ☐ g	2.77E-01	3.86E+06	2.77E-01	Liquid	1.00E-03	2.77E-04	5.25E-04	1.45E-07
53098401	NA	1	Cu-66	☑ Ci ☐ g	1.34E-01	5.59E+08	1.34E-01	Liquid	1.00E-03	1.34E-04	1.97E-05	2.64E-09
53098401	NA	1	Cu-67	☑ Ci ☐ g	5.64E-02	7.55E+05	5.64E-02	Liquid	1.00E-03	5.64E-05	2.16E-03	1.22E-07
53098401	NA	1	Cu-68	☑ Ci ☐ g	1.89E-02	5.34E+09	1.89E-02	Liquid	1.00E-03	1.89E-05	9.03E-09	1.71E-13
53098401	NA	1	Cu-68m	☑ Ci ☐ g	8.17E-03	7.37E+08	8.17E-03	Liquid	1.00E-03	8.17E-06	1.33E-04	1.08E-09
53098401	NA	1	Cu-69	☑ Ci ☐ g	6.06E-05	9.56E+08	6.06E-05	Liquid	1.00E-03	6.06E-08	4.42E-05	2.68E-12
53098401	NA	1	Ga-65	☑ Ci ☐ g	8.96E-03	1.90E+08	8.96E-03	Liquid	1.00E-03	8.96E-06	8.80E-04	7.89E-09
53098401	NA	1	Ga-66	☑ Ci ☐ g	2.87E-01	5.00E+06	2.87E-01	Liquid	1.00E-03	2.87E-04	3.58E-03	1.03E-06
53098401	NA	1	Ga-67	☑ Ci ☐ g	2.96E+01	5.98E+05	2.96E+01	Liquid	1.00E-03	2.96E-02	1.46E-03	4.32E-05
53098401	NA	1	Ga-68	☑ Ci ☐ g	7.92E+01	4.08E+07	7.92E+01	Liquid	1.00E-03	7.92E-02	1.38E-01	1.09E-02
53098401	NA	1	Ga-70	☑ Ci ☐ g	2.83E+01	1.27E+08	2.83E+01	Liquid	1.00E-03	2.83E-02	4.63E-05	1.31E-06
53098401	NA	1	Ga-72	☑ Ci ☐ g	8.57E+00	3.09E+06	8.57E+00	Liquid	1.00E-03	8.57E-03	4.45E-03	3.81E-05
53098401	NA	1	Ge-66	☑ Ci ☐ g	3.50E-11	2.10E+07	3.50E-11	Liquid	1.00E-03	3.50E-14	1.97E-03	6.91E-17
53098401	NA	1	Ge-67	☑ Ci ☐ g	3.38E-01	1.48E+08	3.38E-01	Liquid	1.00E-03	3.38E-04	6.52E-04	2.20E-07
53098401	NA	1	Ge-68	☑ Ci ☐ g	2.05E+00	7.09E+03	2.05E+00	Liquid	1.00E-03	2.05E-03	9.16E+00	1.88E-02
53098401	NA	1	Ge-69	☑ Ci ☐ g	5.42E+01	1.16E+06	5.42E+01	Liquid	1.00E-03	5.42E-02	3.09E-03	1.67E-04
53098401	NA	1	Ge-71	☑ Ci ☐ g	8.05E+00	1.61E+05	8.05E+00	Liquid	1.00E-03	8.05E-03	3.10E-04	2.50E-06
53098401	NA	1	H-3	☑ Ci ☐ g	1.62E-04	9.68E+03	1.62E-04	Gaseous	1.00E+00	1.62E-04	9.12E-04	1.48E-07

Radioactive Materials Usage Survey Interview Form

53098401	NA	1	Ni-65	☑ Ci ☐ g	9.75E-03	1.92E+07	9.75E-03	Liquid	1.00E-03	9.75E-06	5.83E-04	5.68E-09
53098401	NA	1	Ni-67	☑ Ci ☐ g	2.84E-13	8.02E+09	2.84E-13	Liquid	1.00E-03	2.84E-16	2.03E-07	5.78E-23
53098401	NA	1	Zn-65	☑ Ci ☐ g	1.93E-01	8.24E+03	1.93E-01	Liquid	1.00E-03	1.93E-04	1.65E+00	3.18E-04
53098401	NA	1	Zn-69	☑ Ci ☐ g	9.45E-01	4.87E+07	9.45E-01	Liquid	1.00E-03	9.45E-04	9.63E-05	9.10E-08
53098401	NA	1	Zn-69m	☑ Ci ☐ g	2.51E-01	3.30E+06	2.51E-01	Liquid	1.00E-03	2.51E-04	1.17E-03	2.94E-07
53098401	NA	1	Zn-71	☑ Ci ☐ g	1.58E-02	1.08E+09	1.58E-02	Liquid	1.00E-03	1.58E-05	1.62E-05	2.56E-10
53098401	NA	1	Zn-71m	☑ Ci ☐ g	5.70E-02	1.11E+07	5.70E-02	Liquid	1.00E-03	5.70E-05	1.35E-03	7.70E-08
53098401	NA	2	Ar-41	☑ Ci ☐ g	3.40E+00	4.18E+07	3.40E+00	Gaseous	1.00E+00	3.40E+00	8.09E-04	2.75E-03
53098401	NA	2	C-11	☑ Ci ☐ g	8.16E+01	8.40E+08	8.16E+01	Gaseous	1.00E+00	8.16E+01	4.82E-04	3.93E-02

Total PEDE (mrem/year) this interview form: 7.24E-02

Radionuclide Materials Usage Survey Process Form

TA: 53 **Building:** 0984 **Room:** NA

Process #: 1

Process performed in room number(s): NA

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Particulate

Physical state after process: Particulate

Primary Containment: Glove Box

Usage Basis: Database

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

The Isotope Production Facility (IPF) began operations at its current location in 2004.

ES-1 is the main stack from this facility, and this stack is always running. ES-1 continuously ventilates the Isotope Production Facility hot cell and buffer room areas, and provides a pressure relief vent path for the radioactive liquid waste system at IPF. A second stack, ES-2, ventilates the beam tunnel between the main LANSCE beam line and the IPF area. ES-2 operates only when personnel access to the below-ground beam tunnel is needed. ES-2 had zero emissions in CY'11.

Emissions from ES-1 were evaluated in 3 pathways in 2011.

The first pathway of emissions from ES-1 involves target rupture events. When initially evaluated in the late 1990's, a rupture of the IPF irradiation targets was considered an "accident" or "abnormal condition" and not evaluated as part of the routine emissions suite, per Rad-NESHAP regulatory guidance of assuming "emissions are normal." However, there were multiple rupture events from 2005 through 2011. Because of this fact, the rupture of a target should no longer be considered "accidental" or "abnormal" and such an event should be evaluated as part of the routine anticipated emissions from a source. To account for these events, the 5 target rupture events in 2009 are included in this evaluation as potential emissions. For this analysis, facility representatives supplied calculations of what the target source term would be at the time of rupture.

These calculations were done using computer codes such as MCNPx and CINDER, which is their DOE-approved way to track target rad inventory. At the time of rupture, it is assumed that the entire inventory is released into the cooling water surrounding each target. There are then three options for estimating release:

1) gas-phase, insoluble nuclides such as noble gases krypton and argon; these are assumed to have a 100% release fraction. Tritium (H-3) is included here as well to match other LANL sites.
2) soluble vapor-phase nuclides which are assumed to be dissolved in the cooling water - this includes, bromine, and phosphorous nuclides, for example. These are assumed to have a release fraction of 1E-3, appropriate for liquids.
3) particles suspended in the cooling water - all other nuclides, such as zinc, copper, rubidium, etc. These are assumed to have a release fraction of 1E-3, appropriate for particulates and liquids.

The inventory was provided by the facility, and the nuclides sorted by activity, until all nuclides contributing 0.1% or more of the total target activity were included. Then the release fractions above were applied to evaluate the potential release from this rupture event. The rupture events were then totaled and included as a single "process" on this report.

The target rupture events are described in the file folder for this source, and electronically on the group computer file server ("Projects" drive) for Rad-NESHAP. These emissions represent the potential emissions of rad material, not actual, via this pathway. Some double counting is anticipated; releases of krypton gas, for example, would be "assigned" to C-11 and Ar-41 as part of the stack gas monitoring pathway, and again tracked in this target rupture pathway.

Radionuclide Materials Usage Survey Process Form

TA: 53 Building: 0984 Room: NA

Process #: 2

Process performed in room number(s): NA

Heating? No Heating

Physical state before process: Gaseous

Physical state during process: Gaseous

Physical state after process: Gaseous

Primary Containment: Glove Box

Usage Basis: Database

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

The Isotope Production Facility (IPF) began operations at its current location in 2004.

ES-1 is the main stack from this facility, and this stack is always running. ES-1 continuously ventilates the Isotope Production Facility hot cell and buffer room areas, and provides a pressure relief vent path for the radioactive liquid waste system at IPF. A second stack, ES-2, ventilates the beam tunnel between the main LANSCE beam line and the IPF area. ES-2 operates only when personnel access to the below-ground beam tunnel is needed. ES-2 had zero emissions in CY'11.

Emissions from ES-1 are evaluated in 3 pathways in 2011.

The second pathway is the ES-1 stack gas monitoring system. The stack is monitored for radioactive gases using a Flow-through Kanne ionization chamber. The ion chamber's integrated current is converted to curies, reflecting radioactive gas emissions for 2011. A standard composition of 96% C-11 and 4% Ar-41 is applied, representing "historical" diffuse emissions. A measurement to verify this composition assumption was made in 2011, showing only positron emitting radionuclides (511 keV) and Ar-41 (1296 keV). Assuming all positron-emitting nuclides are C-11 results in a conservative estimate of off-site dose, as C-11 has the highest mrem/Ci factor of all the typical positron-emitting rad gases. For 2011, this emissions pathway resulted in 81.59 Ci of C-11 and 3.40 Ci of Ar-41 being emitted.

More complete details of emissions measurements for the ES-1 RLW vent line, the "abnormal" plume detected on NEWNET, and the ES-2 beam tunnel emissions are described in the 2007 Diffuse Emissions reports for LANSCE. While these three analyses are from point sources, the methods used are similar to the other diffuse emissions operations at LANSCE and are calculated as part of that program.

The third pathway, via an "unknown plume", did not occur in 2011 per Mike McNaughton and the NEWNET program.

The improved gas monitoring system was installed in 2007 to better measure actual emissions from ES-1. This replaced the RLW vent line monitor's relatively crude methodology with a flow-through ionization chamber better equipped to quantify emissions. The location of this new monitor is farther downstream, eliminating the possibility of a repeat of the "unknown plume" situation experiment in 2006.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon
Facility Point of Contact: Dave Fuehne

Interview Date: 04/30/2012
Callback Date: 04/30/2012
Survey Year: 2011
Operating Group: ENV-ES
Phone #: 5-3850
E-Mail: davef@lanl.gov

TA: 53
Building: 1090
Facility Status: Active
Monitored? ☐
ES ID #: 53109099
Facility Critical Receptor: Business at East Gate
mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
53109099	NA	1	Al-28	☑ Ci ☐ g	6.90E-06	2.98E+09	6.90E-06	Gaseous	1.00E+00	6.90E-06	2.56E-03	1.77E-08
53109099	NA	1	Al-29	☑ Ci ☐ g	2.12E-06	9.98E+08	2.12E-06	Gaseous	1.00E+00	2.12E-06	3.39E-04	7.19E-10
53109099	NA	1	Ar-41	☑ Ci ☐ g	7.92E-03	4.18E+07	7.92E-03	Gaseous	1.00E+00	7.92E-03	8.02E-04	6.35E-06
53109099	NA	1	Be-7	☑ Ci ☐ g	8.58E-04	3.50E+05	8.58E-04	Gaseous	1.00E+00	8.58E-04	3.34E-03	2.87E-06
53109099	NA	1	C-11	☑ Ci ☐ g	1.02E-03	8.40E+08	1.02E-03	Gaseous	1.00E+00	1.02E-03	4.78E-04	4.88E-07
53109099	NA	1	C-14	☑ Ci ☐ g	1.55E-04	4.47E+00	1.55E-04	Gaseous	1.00E+00	1.55E-04	2.82E-02	4.37E-06
53109099	NA	1	Cl-34m	☑ Ci ☐ g	3.19E-07	1.72E+08	3.19E-07	Gaseous	1.00E+00	3.19E-07	1.34E-03	4.27E-10
53109099	NA	1	Cl-38	☑ Ci ☐ g	5.01E-05	1.33E+08	5.01E-05	Gaseous	1.00E+00	5.01E-05	9.31E-04	4.66E-08
53109099	NA	1	Cl-39	☑ Ci ☐ g	8.77E-05	8.67E+07	8.77E-05	Gaseous	1.00E+00	8.77E-05	9.08E-04	7.96E-08
53109099	NA	1	F-18	☑ Ci ☐ g	3.19E-06	9.52E+07	3.19E-06	Gaseous	1.00E+00	3.19E-06	7.08E-04	2.26E-09
53109099	NA	1	H-3	☑ Ci ☐ g	7.34E-05	9.68E+03	7.34E-05	Gaseous	1.00E+00	7.34E-05	9.04E-04	6.64E-08
53109099	NA	1	Mg-27	☑ Ci ☐ g	1.33E-06	7.37E+08	1.33E-06	Gaseous	1.00E+00	1.33E-06	2.98E-04	3.96E-10
53109099	NA	1	Mg-28	☑ Ci ☐ g	2.12E-07	5.33E+06	2.12E-07	Gaseous	1.00E+00	2.12E-07	7.82E-03	1.66E-09
53109099	NA	1	N-13	☑ Ci ☐ g	2.24E-02	1.45E+09	2.24E-02	Gaseous	1.00E+00	2.24E-02	3.52E-04	7.88E-06
53109099	NA	1	Na-22	☑ Ci ☐ g	5.15E-07	6.25E+03	5.15E-07	Gaseous	1.00E+00	5.15E-07	1.06E+00	5.46E-07
53109099	NA	1	Na-24	☑ Ci ☐ g	3.72E-06	8.73E+06	3.72E-06	Gaseous	1.00E+00	3.72E-06	5.91E-03	2.20E-08
53109099	NA	1	Ne-24	☑ Ci ☐ g	6.37E-08	2.32E+09	6.37E-08	Gaseous	1.00E+00	6.37E-08	8.29E-05	5.28E-12
53109099	NA	1	O-14	☑ Ci ☐ g	2.48E-05	1.14E+10	2.48E-05	Gaseous	1.00E+00	2.48E-05	1.52E-05	3.77E-10
53109099	NA	1	O-15	☑ Ci ☐ g	6.75E-03	6.15E+09	6.75E-03	Gaseous	1.00E+00	6.75E-03	3.71E-05	2.50E-07

Radioactive Materials Usage Survey Interview Form

53109099	NA	1	P-30	☑ Ci ☐ g	2.34E-06	2.51E+09	2.34E-06	Gaseous	1.00E+00	2.34E-06	5.79E-05	1.35E-10
53109099	NA	1	P-32	☑ Ci ☐ g	1.33E-05	2.86E+05	1.33E-05	Gaseous	1.00E+00	1.33E-05	9.69E-02	1.29E-06
53109099	NA	1	P-33	☑ Ci ☐ g	4.67E-06	1.56E+05	4.67E-06	Gaseous	1.00E+00	4.67E-06	2.62E-02	1.22E-07
53109099	NA	1	S-35	☑ Ci ☐ g	8.18E-06	4.28E+04	8.18E-06	Gaseous	1.00E+00	8.18E-06	3.81E-04	3.12E-09
53109099	NA	1	Si-31	☑ Ci ☐ g	3.19E-06	3.86E+07	3.19E-06	Gaseous	1.00E+00	3.19E-06	2.32E-04	7.40E-10

Total PEDE (mrem/year) this interview form: 2.44E-05

Radionuclide Materials Usage Survey Process Form

TA: 53 **Building:** 1090 **Room:** NA

Process #: 1

Process performed in room number(s): NA

Heating? No Heating

Physical state before process: Gaseous

Physical state during process: Gaseous

Physical state after process: Gaseous

Primary Containment: None

Usage Basis: Spreadsheet

Are other personnel performing RAD operations in room? ☐ Yes ☑ No **If yes, list names below:**

Process Description:

TA-53, Building 1090 is the detector station located 60 m downstream from Flight Path 5. Flight path 5 is one of the many experiment lines coming off the 1 L target of the Manual Lujan Neutron Scattering Center.

Flight path 5 is a neutron experiment line, used for transmission spectroscopy (examining the energy range & flux of neutrons that pass through materials). The Lujan Center's description of FP5 is: A general purpose flight path used to study the Doppler broadening of low-energy neutron resonance because of environmental changes (i.e. temperature and pressure).

Between the experiment station and the detector station located in building 1090, the flight path beam line is kept under vacuum. Therefore, the only potential for emissions from Building 1090 is neutron activation of the air in the detector station at beam level.

Other information, including analysis methodology, is located on the ENV-ES Projects Drive. Dave Fuehne reviewed the maximum emissions levels for 2011.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon
Facility Point of Contact: Bob Lechel

Interview Date: 05/11/2012
Callback Date: 05/11/2012
Survey Year: 2011
Operating Group: ENV-ES
Phone #: 5-6912
E-Mail: lechel@lanl.gov

TA: 54
Building: 0231
Facility Status: Active
Monitored? ☐
ES ID #: 54023101
Facility Critical Receptor: Church on State Rd. 4
mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
54023101	NA	1	Am-241	☑ Ci ☐ g	1.74E+00	3.43E+00	1.74E+00	Custom	2.10E-05	3.64E-05	9.83E+01	3.58E-03
54023101	NA	1	Am-241	☑ Ci ☐ g	1.85E+01	3.43E+00	1.85E+01	Custom	2.10E-05	3.88E-04	9.83E+01	3.81E-02
54023101	NA	1	Am-243	☑ Ci ☐ g	4.77E-04	2.00E-01	4.77E-04	Custom	2.10E-05	1.00E-08	1.02E+02	1.02E-06
54023101	NA	1	Ba-133	☑ Ci ☐ g	3.54E-06	2.55E+02	3.54E-06	Custom	2.10E-05	7.44E-11	7.59E-02	5.65E-12
54023101	NA	1	Cm-243	☑ Ci ☐ g	1.43E-05	5.06E+01	1.43E-05	Custom	2.10E-05	3.01E-10	7.82E+01	2.35E-08
54023101	NA	1	Co-60	☑ Ci ☐ g	1.27E-03	1.13E+03	1.27E-03	Custom	2.10E-05	2.67E-08	9.88E-01	2.64E-08
54023101	NA	1	Cs-137	☑ Ci ☐ g	1.59E-03	8.68E+01	1.59E-03	Custom	2.10E-05	3.35E-08	6.28E+00	2.10E-07
54023101	NA	1	Eu-152	☑ Ci ☐ g	9.74E-04	1.74E+02	9.74E-04	Custom	2.10E-05	2.05E-08	2.58E-01	5.28E-09
54023101	NA	1	Eu-154	☑ Ci ☐ g	5.27E-04	2.70E+02	5.27E-04	Custom	2.10E-05	1.11E-08	3.05E-01	3.37E-09
54023101	NA	1	Na-22	☑ Ci ☐ g	9.11E-08	6.25E+03	9.11E-08	Custom	2.10E-05	1.91E-12		0.00E+00
54023101	NA	1	Np-237	☑ Ci ☐ g	1.75E-04	7.05E-04	1.75E-04	Custom	2.10E-05	3.68E-09	5.42E+01	1.99E-07
54023101	NA	1	Pb-212	☑ Ci ☐ g	2.73E-05	1.39E+06	2.73E-05	Custom	2.10E-05	5.73E-10	4.15E-01	2.38E-10
54023101	NA	1	Pu-238	☑ Ci ☐ g	1.33E+00	1.71E+01	1.33E+00	Custom	2.10E-05	2.79E-05	1.09E+02	3.04E-03
54023101	NA	1	Pu-239	☑ Ci ☐ g	5.93E+00	6.21E-02	5.93E+00	Custom	2.10E-05	1.24E-04	1.18E+02	1.47E-02
54023101	NA	1	Pu-240	☑ Ci ☐ g	7.17E-01	2.27E-01	7.17E-01	Custom	2.10E-05	1.51E-05	1.18E+02	1.78E-03
54023101	NA	1	Pu-241	☑ Ci ☐ g	7.61E+00	1.03E+02	7.61E+00	Custom	2.10E-05	1.60E-04	5.07E+00	8.10E-04
54023101	NA	1	Pu-242	☑ Ci ☐ g	2.16E-04	3.94E-03	2.16E-04	Custom	2.10E-05	4.53E-09	1.12E+02	5.08E-07
54023101	NA	1	Sr-90	☑ Ci ☐ g	1.59E-03	1.38E+02	1.59E-03	Custom	2.10E-05	3.35E-08	6.14E+00	2.05E-07
54023101	NA	1	Tl-208	☑ Ci ☐ g	7.84E-06	2.96E+08	7.84E-06	Custom	2.10E-05	1.65E-10	5.23E-04	8.61E-14

Radioactive Materials Usage Survey Interview Form

54023101	NA	1	U-234	☑ Ci ☐ g	4.30E-03	6.22E-03	4.30E-03	Custom	2.10E-05	9.04E-08	8.56E+00	7.74E-07
54023101	NA	1	U-235	☑ Ci ☐ g	9.94E-05	2.16E-06	9.94E-05	Custom	2.10E-05	2.09E-09	8.06E+00	1.68E-08
54023101	NA	1	U-238	☑ Ci ☐ g	7.11E-05	3.36E-07	7.11E-05	Custom	2.10E-05	1.49E-09	7.46E+00	1.11E-08

Total PEDE (mrem/year) this interview form: 6.20E-02

Radionuclide Materials Usage Survey Process Form

TA: 54 **Building:** 0231 **Room:** N/A

Process #: 1

Process performed in room number(s): N/A

Heating? No Heating

Physical state before process: Particulate

Physical state during process: Custom

Physical state after process: Particulate

Primary Containment: Drums

Usage Basis: Database

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

New operations began in 2011 to perform sorting, segregation and repackaging activities of debris waste in order to meet the disposal requirements for the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC).

All data came from a database generated by "WasteHelp". The "Uncertainty" curie amount column was added to the "Curie" amount in order to be conservative.

This facility was reviewed through the PRID (#08P-0101-V00) over the past several years.

NOTE: A custom physical state and reduction factor of 2.10E-05 (2% particulate and 98% solid).

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Robert Lechel

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
02/19/2019	04/19/2012	2011	ENV-ES	5-6912	lechel@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
54	0281	D & D'ed	☐	54028101	Church on State Rd. 4	2009

Total PEDE (mrem/year) this interview form:

Radionuclide Materials Usage Survey Process Form

TA: 54 Building: 0281 Room: N/A

Process #: 0

Process performed in room number(s): N/A

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis:

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

Robert Lechel reported in an email dated 02/16/2012 (see file folder) that the process ended in CY'10 and the facility was completely torn down and removed from the site.

TA54-281 was the Low Level Waste Compactor (LLWC) at Area G of TA54. This facility had been operational since 1997. The outer building structure contained a permacon structure inside which contained the LLWC. Flexible hose linked the LLWC to a HEPA-filtered ventilation system and included a small stack.

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Joan Lujan

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/19/2012	04/19/2012	2011	ENV-ES	7-7383	jjlujan@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
54	1001	Active	☐	54100199	Church on State Rd. 4	2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
54100199	NA	1	H-3	☑ Ci ☐ g	6.44E-08	9.68E+03	6.44E-08	Liquid	1.00E-03	6.44E-11	8.97E-05	5.78E-15

Total PEDE (mrem/year) this interview form: 5.78E-15

Radionuclide Materials Usage Survey Process Form

TA: 54 Building: 1001 Room: NA

Process #: 1

Process performed in room number(s): N/A

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: Log Books

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

Joan Lujan stated in a phone interview conducted on 04/19/2012 that there were only minor changes in the tritium processes or the amounts of material used from previous years.

H-3 operation are performed in a hood. The procedure includes the transfer of quality control (QC) samples from one vial to another. One (1) spike (sample) is shipped biweekly. The samples are prepared at another facility or at Grand Junction, then brought to this building and sent off with the silica gel distillate samples as a QC. Because the entire procedure is the simple transfer of H-3 from one vial to another, the tritium will be considered a liquid. The most conservative concentration (53.7 pCi/mL) was used in the calculation:

1 spikes (50 g each) shipped biweekly = 6 spikes shipped monthly = 24 spikes shipped/yr

53.7 pCi/mL x 50 mL x 24 spikes = 6.44E+04 pCi = 6.44E-08 Ci/yr

Radioactive Materials Usage Survey Interview Form

EAQ Representative:	Facility Point of Contact:
Richard Sturgeon	Myrna Romero

Interview Date:	Callback Date:	Survey Year:	Operating Group:	Phone #:	E-Mail:
04/30/2012	04/30/2012	2011	NPI-3	7-7800	mjr@lanl.gov

TA:	Building:	Facility Status:	Monitored?	ES ID #:	Facility Critical Receptor:	mrem/Ci Factors Developed:
54	1009	Inactive	☐	54100999	Church on State Rd. 4	2009

Total PEDE (mrem/year) this interview form:

Radionuclide Materials Usage Survey Process Form

TA: 54 Building: 1009 Room: N/A

Process #: 0

Process performed in room number(s): N/A

Heating?

Physical state before process:

Physical state during process:

Physical state after process:

Primary Containment:

Usage Basis:

Are other personnel performing RAD operations in room? ☐ Yes ☑ No If yes, list names below:

Process Description:

According to Myrna Romero in an email dated 04/30/12 (see file folder), this facility has been declared as surplus (no longer needed) it has been shut down and is to be prepared for D&D. No decontamination operations occurred in CY'11 at TA54-1009.

Radioactive Materials Usage Survey Interview Form

EAQ Representative: Richard Sturgeon
Facility Point of Contact: Milan Gadd

Interview Date: 04/26/2012
Callback Date: 04/26/2012
Survey Year: 2011
Operating Group: RP-2
Phone #: 7-2713
E-Mail: milang@lanl.gov

TA: 55
Building: 0002
Facility Status: Active
Monitored? ☐
ES ID #: 55000201
Facility Critical Receptor: Residence at Royal Crest
mrem/Ci Factors Developed: 2009

Stack ID	Room	Proc #	RAM	Amount Basis	Amount	Specific Activity (Ci/g)	Usage (Ci)	Physical state	Release Fraction	Emission (Ci)	mrem/Ci	PEDE
55000201	124B	1	Pu-238	☑ Ci ☐ g	1.31E-08	1.71E+01	1.31E-08	Solid	1.00E-06	1.31E-14	9.63E+01	1.26E-12
55000201	124B	1	Pu-239	☑ Ci ☐ g	1.19E-07	6.21E-02	1.19E-07	Solid	1.00E-06	1.19E-13	1.05E+02	1.25E-11
55000201	124B	2	Am-241	☑ Ci ☐ g	4.23E-09	3.43E+00	4.23E-09	Solid	1.00E-06	4.23E-15	9.58E+01	4.05E-13
55000201	124B	2	Sr-90	☑ Ci ☐ g	5.59E-08	1.38E+02	5.59E-08	Solid	1.00E-06	5.59E-14	6.10E+00	3.41E-13
55000201	124B	3	H-3	☑ Ci ☐ g	3.00E-05	9.68E+03	3.00E-05	Gaseous	1.00E+00	3.00E-05	6.52E-04	1.96E-08
55000201	124B	4	Am-241	☑ Ci ☐ g	2.00E-08	3.43E+00	2.00E-08	Liquid	1.00E-03	2.00E-11	9.58E+01	1.92E-09
55000201	124B	4	H-3	☑ Ci ☐ g	4.41E-06	9.68E+03	4.41E-06	Gaseous	1.00E+00	4.41E-06	6.52E-04	2.88E-09
55000201	124B	4	Tc-99	☑ Ci ☐ g	4.10E-02	1.70E-02	4.10E-02	Liquid	1.00E-03	4.10E-05	9.95E-01	4.08E-05
55000201	124B	5	Am-241	☑ Ci ☐ g	8.56E-10	3.43E+00	8.56E-10	Liquid	1.00E-03	8.56E-13	9.58E+01	8.20E-11
55000201	124B	6	Am-241	☑ Ci ☐ g	9.91E-10	3.43E+00	9.91E-10	Liquid	1.00E-03	9.91E-13	9.58E+01	9.49E-11
55000201	124B	6	Sr-90	☑ Ci ☐ g	1.40E-06	1.38E+02	1.40E-06	Liquid	1.00E-03	1.40E-09	6.10E+00	8.54E-09
55000201	124B	7	Am-241	☑ Ci ☐ g	5.41E-12	3.43E+00	5.41E-12	Liquid	1.00E-03	5.41E-15	9.58E+01	5.18E-13
55000201	124B	7	Sr-90	☑ Ci ☐ g	1.85E-11	1.38E+02	1.85E-11	Liquid	1.00E-03	1.85E-14	6.10E+00	1.13E-13
55000201	123	8	Am-241	☑ Ci ☐ g	2.77E-08	3.43E+00	2.77E-08	Particulate	1.00E-03	2.77E-11	9.58E+01	2.65E-09
55000201	123	8	Am-241	☑ Ci ☐ g	5.59E-09	3.43E+00	5.59E-09	Particulate	1.00E-03	5.59E-12	9.58E+01	5.36E-10
55000201	123	8	Sr-90	☑ Ci ☐ g	9.01E-10	1.38E+02	9.01E-10	Particulate	1.00E-03	9.01E-13	6.10E+00	5.50E-12
55000201	123	8	Sr-90	☑ Ci ☐ g	3.08E-08	1.38E+02	3.08E-08	Particulate	1.00E-03	3.08E-11	6.10E+00	1.88E-10

Total PEDE (mrem/year) this interview form: 4.08E-05

Printed on 6/13/2012

Radionuclide Materials Usage Survey Process Form

TA: 55 **Building:** 0002 **Room:** 124B

Process #: 1

Process performed in room number(s): 123, 124A, 124B

Heating? No Heating

Physical state before process: Solid

Physical state during process: Solid

Physical state after process: Solid

Primary Containment: Detector Drawer

Usage Basis: Memo Documentation

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Milan Gadd provided the information for the RP-2 Health Physics Analysis Laboratory (HPAL) which operates a low level counting laboratory in PF-2 in Rooms 123, 124A and 124B. The hood used by RP-2 is exhausted to FE-1 and is located in Room 124B.

Air Filters by IMPULSE: Most of the air filters analyzed at TA-55 are counted on the IMPULSE counting system. This system consists of 128 zinc-sulfide (ZnS) alpha detectors which can be used singly or as a group. No preparation is required.

Radionuclide Materials Usage Survey Process Form

TA: 55 **Building:** 0002 **Room:** 124B

Process #: 2

Process performed in room number(s): 123, 124A, 124B

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: Memo Documentation

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Milan Gadd provided the information for the RP-2 Health Physics Analysis Laboratory (HPAL) which operates a low level counting laboratory in PF-2 in Rooms 123, 124A and 124B. The hood used by RP-2 is exhausted to FE-1 and is located in Room 124B.

Tritium Oil Samples: Oil samples are typically submitted in 20 mL vials containing 15-20 mL of oil. An aliquot of the sample is extracted and added to 10 mL of liquid scintillation cocktail. All samples were prepared in the hood in Room 124B.

Radionuclide Materials Usage Survey Process Form

TA: 55 **Building:** 0002 **Room:** 124B

Process #: 3

Process performed in room number(s): 123, 124A, 124B

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Gaseous

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: Memo Documentation

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Milan Gadd provided the information for the RP-2 Health Physics Analysis Laboratory (HPAL) which operates a low level counting laboratory in PF-2 in Rooms 123, 124A and 124B. The hood used by RP-2 is exhausted to FE-1 and is located in Room 124B.

Tritium Stack Monitors: Approximately 770 tritium stack monitor samples processed in 2011. Each sample set consists of six vials containing 30 mL of ethylene glycol. Typically one set of stack monitor vials is collected on a weekly basis. Samples were prepared in the Room 124B hood.

Radionuclide Materials Usage Survey Process Form

TA: 55 **Building:** 0002 **Room:** 124B

Process #: 4

Process performed in room number(s): 123, 124A, 124B

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: Memo Documentation

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Milan Gadd provided the information for the RP-2 Health Physics Analysis Laboratory (HPAL) which operates a low level counting laboratory in PF-2 in Rooms 123, 124A and 124B. The hood used by RP-2 is exhausted to FE-1 and is located in Room 124B.

Tritium Liquids (non-oils): Tritium water samples are prepared for analysis at the location where they are received. Liquid samples are typically submitted in 20 mL vials however the volume of the sample is highly variable ranging from 2 mL to 20 mL. Preparation consists of the extraction of an aliquot (0.5 mL) into each of two a liquid scintillation counting vials and the addition of 10 mL liquid scintillation counting cocktail (flour). The physical state of tritium is considered gaseous.

Radionuclide Materials Usage Survey Process Form

TA: 55 **Building:** 0002 **Room:** 124B

Process #: 5

Process performed in room number(s): 123, 124A, 124B

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: Memo Documentation

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Milan Gadd provided the information for the RP-2 Health Physics Analysis Laboratory (HPAL) which operates a low level counting laboratory in PF-2 in Rooms 123, 124A and 124B. The hood used by RP-2 is exhausted to FE-1 and is located in Room 124B.

Nasal Smears: Nasal smear samples are submitted as two cotton swabs in a paper (manila) envelope. The swabs are removed from the envelope and placed in a liquid scintillation vial. The excess "stick" portion of the swab is removed and liquid scintillation cocktail added. The vial is then capped and counted.

Radionuclide Materials Usage Survey Process Form

TA: 55 **Building:** 0002 **Room:** 124B

Process #: 6

Process performed in room number(s): 123, 124A, 124B

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: Memo Documentation

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Milan Gadd provided the information for the RP-2 Health Physics Analysis Laboratory (HPAL) which operates a low level counting laboratory in PF-2 in Rooms 123, 124A and 124B. The hood used by RP-2 is exhausted to FE-1 and is located in Room 124B.

Tritium Smears: Tritium smear samples consist of a 2.5 cm diameter filter paper placed in a 20 mL liquid scintillation vial and 10 mL of liquid scintillation cocktail added to the vial.

Radionuclide Materials Usage Survey Process Form

TA: 55 **Building:** 0002 **Room:** 124B

Process #: 7

Process performed in room number(s): 123, 124A, 124B

Heating? No Heating

Physical state before process: Liquid

Physical state during process: Liquid

Physical state after process: Liquid

Primary Containment: Vials

Usage Basis: Memo Documentation

Are other personnel performing RAD operations in room? ☑ Yes ☐ No **If yes, list names below:**

Various

Process Description:

Milan Gadd provided the information for the RP-2 Health Physics Analysis Laboratory (HPAL) which operates a low level counting laboratory in PF-2 in Rooms 123, 124A and 124B. The hood used by RP-2 is exhausted to FE-1 and is located in Room 124B.

Tritium Air Samples: Tritium air samples are similar to tritium smears consisting of 2.5 cm diameter filters placed in 20 mL liquid scintillation vials with 10 mL of liquid scintillation cocktail.

Radionuclide Materials Usage Survey Process Form

TA: 55 Building: 0002 Room: 123

Process #: 8

Process performed in room number(s): 123, 124A, 124B

Heating? No Heating

Physical state before process: Solid

Physical state during process: Particulate

Physical state after process: Solid

Primary Containment: Vials

Usage Basis: Measurement Data

Are other personnel performing RAD operations in room? ☑ Yes ☐ No If yes, list names below:

Various

Process Description:

Milan Gadd provided the information for the RP-2 Health Physics Analysis Laboratory (HPAL) which operates a low level counting laboratory in PF-2 in Rooms 123, 124A and 124B. The hood used by RP-2 is exhausted to FE-1 and is located in Room 124B. Processes performed in 124A and 123 are included in these emissions estimates based on the processes having the possibility of being moved to 124B.

Gas Flow Proportional Counters (GFPC): Samples submitted for gross alpha or gross alpha/beta analysis which are not counted using the IMPULSE system are analyzed using Berthold LB-770 gas-flow proportional counters. These counters consist of an array of 10 proportional detectors with a diameter of 5.7 cm. Samples counted using the LB-770s do not require any preparation other than ensuring the sample diameter is less than 5.7 cm which may involve cutting the sample itself or cutting or removing it from the backing (such as NuCon smears). Because of the possibility of cutting the samples, a physical state of "particulate" will be used in order to be conservative.