

### **3.3 Beryllium Activities**

#### **3.3.1 General Description of Source Category**

Several facilities at LANL are subject to the NESHAP for beryllium, regulated under 40 CFR 61 Subpart C and adopted by reference in 20.2.78 NMAC. All applicable requirements are governed by 20.2.78 NMAC, although the required construction or modification permitting for these sources is accomplished under 20.2.72 NMAC.

The Laboratory has received six permits from NMED for the beryllium operations. Permitted activities within TA-3-39 have been moved to TA-3-141; therefore, TA-3-39 is not included in this application. In addition, one permitted beryllium processing operation, TA-3-35, has received a permit, but will not be constructed; therefore, this permit is not active and is not included in this Title V permit application. In addition to the four active permitted sources, LANL also has five registered sources as required under 40 CFR §61.10. One of these registered sources, TA-3-1819, has not performed beryllium operations in the past five years and has lost its registration. In addition, TA-16-207 was erroneously registered. Therefore, three active sources remain registered. These registered sources have no applicable requirements, and are not subject to additional requirements under 20.2.70 NMAC.

Following is a general description of the activities performed within each permitted and registered source.

#### **Permitted Sources**

**TA-3-102, Main Shops Facility.** Activities include machining of small quantities of beryllium parts. Machining equipment includes lathes, a horizontal boring mill, and saws.

**TA-3-141, Beryllium Test Facility.** This source is dedicated to beryllium research and development. Beryllium activities include foundry operations and machining operations such as metallography. Foundry operations include melting scrap

beryllium into ingots in furnaces. LANL machines beryllium parts, assemblies, and formations developed from powders and shaped during consolidation operations. LANL also conducts other beryllium activities such as powder operations and joining and coating operations.

**TA-35-213, Target Fabrication Facility.** Activities include machining of small quantities of classified beryllium parts.

**TA-55-PF4, Plutonium Facility.** Activities include beryllium welding and machining, as well as metallographic specimen preparation, furnace operations, and weld bead dress operations. Non-regulated activities, such as beryllium welding/brazing, compatibility studies, and impact testing, are also conducted in PF4.

### **Registered Sources**

**TA-3-29, Chemistry and Metallurgy Research Facility.** Small metal specimens are exposed to molten plutonium and reaction rates to temperatures approaching the melting point of beryllium are measured. After testing, the metal samples are examined using metallographic procedures, including cutting, polishing, and grinding of the samples. Beryllium metal is also used in direct alloying with other metals such as barium and thorium. During this process, temperatures can range from 400 to 1900°C.

**TA-3-66, Sigma Facility.** Three registered activities are conducted in this facility: beryllium electroplating/chemical milling, polishing of metallographic specimens, and arc melting. The electroplating/milling activity typically involves the removal of the surface from mechanical test specimens using nitric acid. Final polishing of metallographic specimens is performed using a diamond wheel covered with an abrasive cloth treated with ethylene glycol, which prevents beryllium particles from becoming airborne. Arc melting is used to melt small quantities of beryllium (<50 g annually), typically to alloy with other materials; this activity was relocated to TA-3-66 from TA-3-141 in 1996.

**TA-35-87.** Beryllium foil is cut and punched to make filters used during laser experimentation. Small filters are cut or punched out of beryllium foil using standard scissors, metal snips, or punches.

**TA-16-207.** Beryllium is used in this building in two applications: mounting blocks for instrumentation diagnostics and integral parts in special nuclear components. In both applications, only incidental wet sanding is used to prepare the samples. On occasion, a metal shim will be applied to a mounting block using a low power resistance spot welder. The Laboratory reviewed this activity, which was previously registered, and determined that it is not an affected facility under NESHAP Subpart C. Therefore, no additional information will be provided on this source since it was erroneously registered.

**TA-3-1819.** Activities involve alloying small quantities of beryllium (<1 gram) to another metal, typically a rare earth metal, uranium, or titanium. The alloying process is performed in an arc melter. These operations have not occurred in the past five years; therefore, the registration has expired. Since these operations are no longer ongoing, they will not be discussed further.

### 3.3.2 Operating Schedule

Each source has a different operating schedule, based on the needs of the particular activities conducted within the source. These operating schedules are summarized in the following table.

**Table 3.3-1. Operating Schedule for Beryllium Activities**

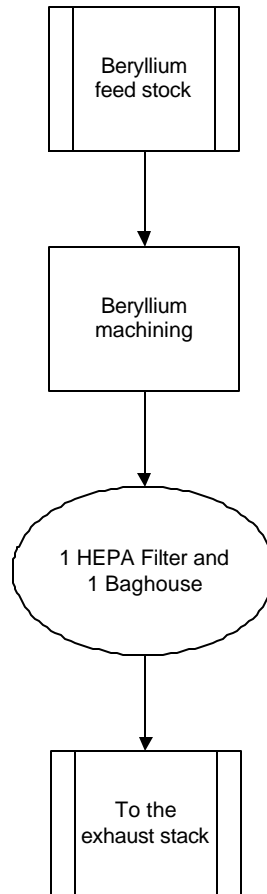
Source	Operating Schedule
TA-3-102	The source has a maximum operating schedule of 12 hr/day, 5 day/wk, 4 wk/mo, and 12 mo/yr. The source has a normal operating schedule of performing operations only intermittently.
TA-3-141	The source is permitted to operate 24 hr/day, 7 day/wk and 52 wk/yr for a total of 8760 hr/yr.
TA-35-213	The source has a maximum operating schedule of 8 hr/day, 5 day/wk, 4 wk/mo, and 12 mo/yr. The source has a normal operating schedule of 4 hr/day, 3 day/wk, 4 wk/mo, and 12 mo/yr.

Source	Operating Schedule
TA-55-PF4	The source is permitted to operate 24 hr/day, 7 day/wk and 52 wk/yr for a total of 8760 hr/yr.
TA-3-29	Operating schedules vary among these registered sources. These sources are not subject to any permit requirements, and so may operate up to 8760 hr/yr. Historically, they have operated much less during the year.
TA-3-66	
TA-35-87	

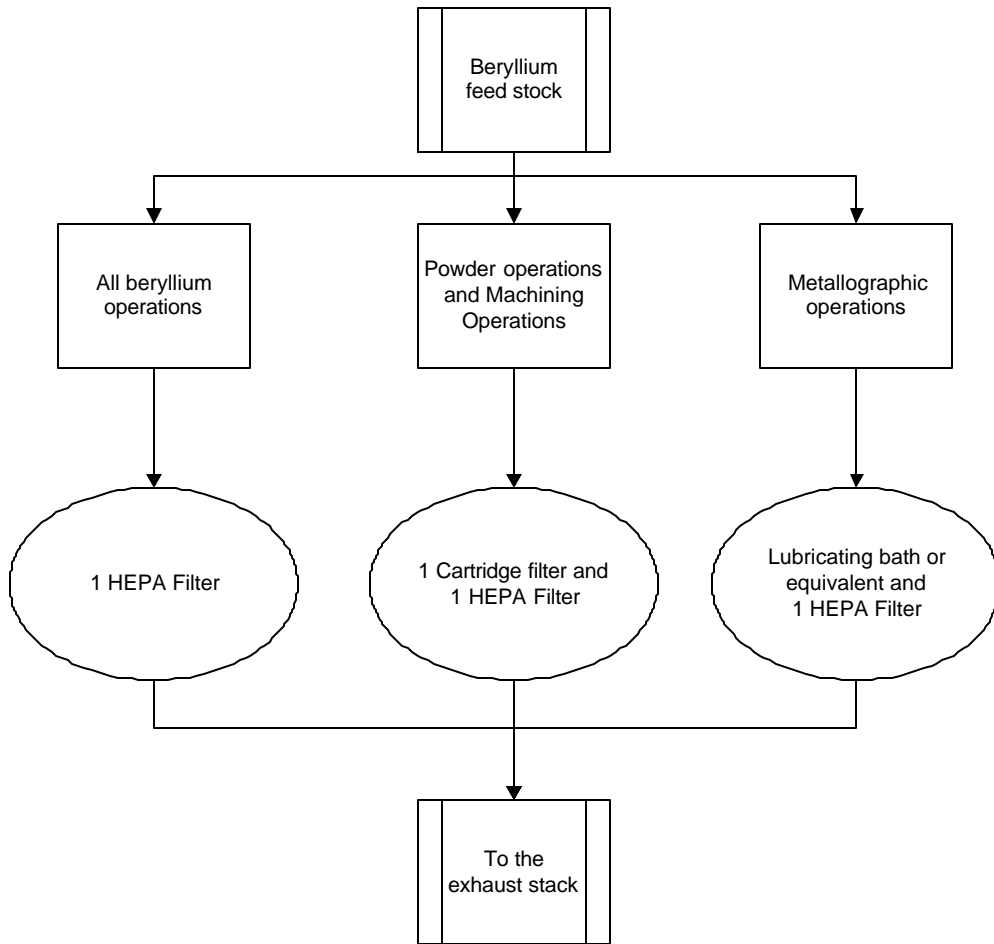
### 3.3.3 Process Flow Diagram

Process flow diagrams for each of the permitted sources are provided. These diagrams emphasize the pollution control equipment in place for each source.

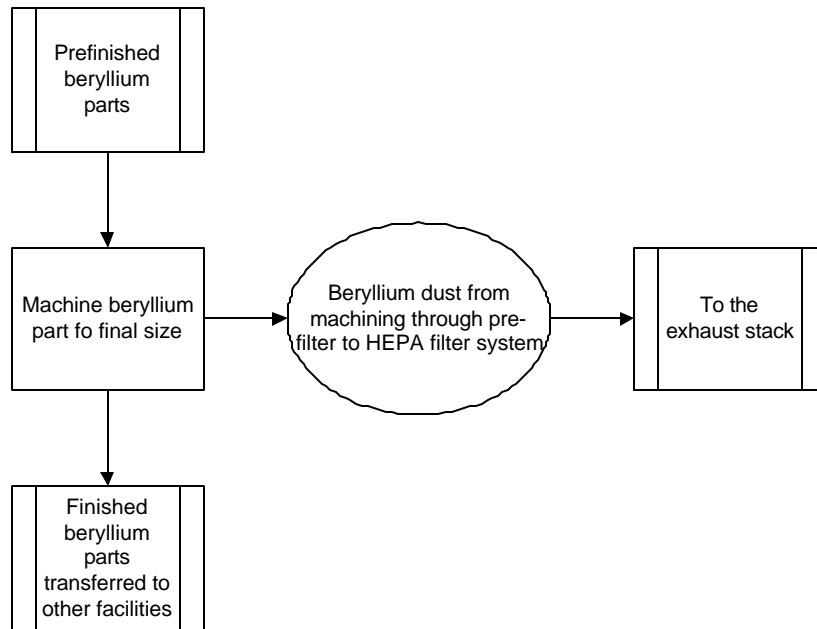
**Figure 3.3-1. Process Flow Diagrams for Beryllium Activities (TA-3-102)**



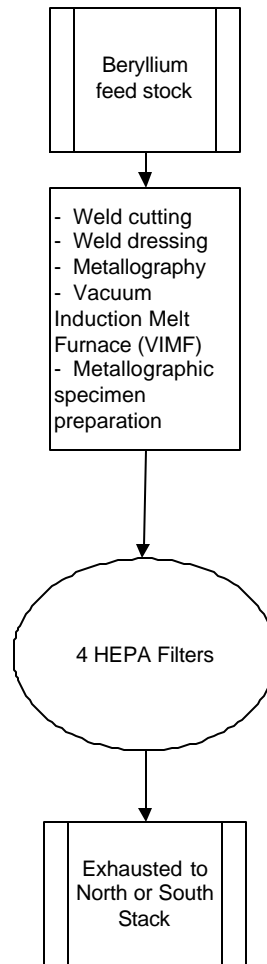
**Figure 3.3-2. Process Flow Diagram for Beryllium Activities (TA-3-141)**



**Figure 3.3-3. Process Flow Diagram for Beryllium Activities (TA-35-213)**



**Figure 3.3-4. Process Flow Diagram for Beryllium Activities (TA-55-PF4)**



### **3.3.4 Emissions**

For permitted sources, actual and allowable emissions limits, shown in Table 3.3-2, were assumed to be the permit limits under 20.2.72 NMAC. Registered sources have no emissions limits, and therefore are not presented here. Further, because of the relative small quantities of beryllium emissions, they have a negligible contribution toward facility HAP emissions (see Chapter 2).



**Table 3.3-2. Emissions Estimates for Beryllium Activities**

Source	Allowable Beryllium Emissions Limits	
TA-3-102	1.8E-04 gm/hr	0.064 gm/yr
TA-3-141	0.35 gm/24hr	3.5 gm/yr
TA-35-213	1.8E-04 gm/hr	0.36 gm/yr
TA-55-PF4	0.12 gm/24hr	2.99 gm/yr
TA-3-29		Negligible <sup>(a)</sup>
TA-3-66		Negligible <sup>(a)</sup>
TA-35-87		Negligible <sup>(a)</sup>

(a) Annual throughputs for these combined operations are less than 1 lb and emissions are significantly less.

### 3.3.5 Emissions Control Equipment

Emissions from all permitted and registered sources are mitigated through the use of one or more pollution control devices as shown in Table 3.3-3. Emissions control equipment identified for permitted sources are taken from the respective construction permits. Emissions control equipment for registered sources is provided for information purposes only. These registered sources have no applicable requirements, and are not subject to additional requirements under 20.2.70 NMAC.

**Table 3.3-3. Emissions Control Equipment**

Source	Emissions Control Equipment
TA-3-102	<ul style="list-style-type: none"> <li>Operations are exhausted through one HEPA filter and one baghouse.</li> </ul>
TA-3-141	<ul style="list-style-type: none"> <li>All processes are exhausted through a HEPA filtration system prior to entering the atmosphere.</li> <li>Powder operations, other than closed glovebox operations, and machining operations, other than the processes used in metallographic preparation are exhausted through a cartridge filtration system then through the HEPA filtration system.</li> <li>Metallographic preparation activities are conducted in lubricating baths or equivalent.</li> </ul>
TA-35-213	<ul style="list-style-type: none"> <li>All processes are exhausted through one pre-filter and one HEPA filter.</li> </ul>
TA-55-PF4	<ul style="list-style-type: none"> <li>Weld cutting, weld dressing, metallography, and vacuum induction melt furnace are exhausted through four HEPA filters in series, each with 99.95% control efficiency.</li> </ul>
TA-3-29	<ul style="list-style-type: none"> <li>Operations performed in wing 2 are exhausted through two stage HEPA filtration.</li> </ul>
TA-3-66	<ul style="list-style-type: none"> <li>No emissions control equipment is required; however, most operations are vented through at least one stage of HEPA filtration.</li> </ul>

Source	Emissions Control Equipment
	<ul style="list-style-type: none"> <li>Grinding and cutting operations are performed wet.</li> </ul>
TA-35-87	<ul style="list-style-type: none"> <li>Activities performed within an enclosed cabinet.</li> </ul>

### 3.3.6 Applicable Requirements

Several facilities at LANL are subject to the NESHAP for beryllium, regulated under 40 CFR 61 Subpart C and adopted by reference in 20.2.78 NMAC. All applicable requirements are governed by 20.2.78 NMAC, although the required construction or modification permitting for these sources is accomplished under 20.2.72 NMAC. Therefore, the federally enforceable requirements are summarized in this section.

Applicable requirements for the four beryllium permits are described in Table 3.3-4. Some of the earlier beryllium permits have very few conditions or recordkeeping and reporting requirements. Requirements became more detailed for recent permits.

**Table 3.3-4. Applicable Requirements for Beryllium Activities**

Source Category	Applicable Requirement
TA-3-102	<p><b><i>Operating Requirements:</i></b></p> <ul style="list-style-type: none"> <li>Beryllium operations will consist of only beryllium machining and associated cleanup activities. (Permit 636)</li> </ul> <p><b><i>Processing Limit(s):</i></b></p> <ul style="list-style-type: none"> <li>Not applicable.</li> </ul> <p><b><i>Emission Limit(s):</i></b></p> <ul style="list-style-type: none"> <li><math>4.0 \times 10^{-07}</math> pounds of beryllium per hour and <math>7.0 \times 10^{-08}</math> tons of beryllium per year. (Permit 636)</li> </ul>

Source Category	Applicable Requirement
TA-3-141	<p><b><i>Operating Requirements:</i></b></p> <ul style="list-style-type: none"> <li>• The continuous emission monitor will be maintained in accordance with the Laboratory's quality program. (Condition 3 of Permit 634-M2)</li> </ul> <p><b><i>Processing Limit(s):</i></b></p> <ul style="list-style-type: none"> <li>• Beryllium processed by the facility will not exceed 10,000 pounds per calendar year and/or 1000 pounds per day. (Condition 3 of Permit 634-M2)</li> </ul> <p><b><i>Control Equipment and Control Efficiencies:</i></b></p> <ul style="list-style-type: none"> <li>• All processes are exhausted through a HEPA filtration system prior to entering the atmosphere. (Condition 1.b of Permit 634-M2)</li> <li>• Powder operations, other than closed glovebox operations, and machining operations, other than the processes used in metallographic preparation are exhausted through a cartridge filtration system then through the HEPA filtration system. (Condition 1.b of Permit 634-M2)</li> <li>• Metallographic preparation activities are conducted in lubricating baths or equivalent. (Condition 1.b of Permit 634-M2)</li> </ul> <p><b><i>Emission Limit(s):</i></b></p> <ul style="list-style-type: none"> <li>• Beryllium stack emissions from the facility will not exceed 0.35 grams in a 24 hour time period and will not exceed 3.5 grams per year. (Condition 2 of Permit 634-M2)</li> </ul>
TA-35-213	<p><b><i>Operating Requirements:</i></b></p> <ul style="list-style-type: none"> <li>• Beryllium operations will consist of only beryllium machining and associated cleanup activities. (Permit 632)</li> </ul> <p><b><i>Processing Limit(s):</i></b></p> <ul style="list-style-type: none"> <li>• Not applicable.</li> </ul> <p><b><i>Emission Limit(s):</i></b></p> <ul style="list-style-type: none"> <li>• <math>4.0 \times 10^{-7}</math> pounds of beryllium per hour and <math>4.0 \times 10^{-7}</math> tons of beryllium per year. (Permit 632)</li> </ul>

Source Category	Applicable Requirement				
TA-55-PF4	<p><b>Operating Requirements:</b></p> <ul style="list-style-type: none"> <li>Regulated beryllium activities will be ducted through the pollution control equipment and out the north or south stack of PF-4. (Condition 1.b of Permit 1081-M1-R3)</li> </ul> <p><b>Processing Limit(s):</b></p> <ul style="list-style-type: none"> <li>44 pounds of beryllium per hour (20 kg/hour) in any 24 hour period; 1100 pounds/year (500 kg/year) using a rolling average. (Condition 1.c of Permit 1081-M1-R3)</li> </ul> <p><b>Control Equipment and Control Efficiencies:</b></p> <ul style="list-style-type: none"> <li>The following control measures are also included: (Condition 3 of Permit 1081-M1-R1 and 1081-M1-R3)</li> </ul>				
	<b>Operation</b>	<b>Filter type and quantity</b>		<b>Control efficiency</b>	
	Weld cutting	4 HEPA Filters		99.95% each	
	Weld dressing	4 HEPA Filters		99.95% each	
	Metallography	4 HEPA Filters		99.95% each	
	Vacuum Furnace	4 HEPA Filters		99.95% each	
	<ul style="list-style-type: none"> <li>The non-accessible filters will be replaced when the pressure drop across the filter falls to levels indicating filter breakthrough or increase to levels indicative of excessive loading. (Condition 3 of Permit 1081-M1-R1)</li> </ul> <p><b>Emission Limit(s):</b></p> <ul style="list-style-type: none"> <li>Stack emissions limits from the facility include (Condition 2 of Permit 1081-M1-R3):</li> </ul>				
	<b>Operation</b>	<b>Beryllium limit</b>		<b>Aluminum limit</b>	
		<b>gm/24 hr</b>	<b>gm/year</b>	<b>gm/24 hr</b>	<b>gm/year</b>
	Machining	0.12	2.99	0.12	2.99
Foundry	$3.49 \times 10^{-5}$	$8.73 \times 10^{-4}$	$3.49 \times 10^{-5}$	$8.73 \times 10^{-4}$	
<b>Total</b>	<b>0.12</b>	<b>2.99</b>	<b>0.12</b>	<b>2.99</b>	

### 3.3.7 Proposed Monitoring, Recordkeeping, and Reporting

A combination of monitoring, recordkeeping, and reporting is proposed for the permitted beryllium sources at LANL. A description of each proposed requirement is provided in the following table for each source.

**Table 3.3-5. Proposed Monitoring, Recordkeeping, and Reporting for Beryllium Activities**

Source Category	Monitoring, Recordkeeping, and Reporting
TA-3-102	<p><b>Monitoring/Recordkeeping:</b></p> <ul style="list-style-type: none"> <li>• Records of the emission test results and other data needed to determine total emissions shall be retained at the source and made available, for inspection by the Department, for a minimum of two years. (Permit 636)</li> </ul> <p><b>Reporting:</b></p> <ul style="list-style-type: none"> <li>• Report criteria pollutant and HAP emissions on a semiannual basis. (20.2.73.300 NMAC for criteria pollutants and LANL proposed condition for HAPs and semiannual basis)</li> <li>• Submit semiannual report of any required monitoring within 45 days from the end of each reporting period. The reporting periods are January to June and July to December. (20.2.70.302(E)(1) NMAC)</li> </ul>
TA-3-141	<p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>• Facility exhaust stack will be equipped with a continuous emission monitor used to measure beryllium emissions. (Conditions 1.f and 3 of Permit 634-M2)</li> <li>• Cartridge and HEPA filters will be equipped with differential pressure gauges that measure the differential pressure across the cartridge and HEPA filters while the exhaust fans are in operation. (Condition 3 of Permit 634-M2)</li> </ul> <p><b>Recordkeeping:</b></p> <ul style="list-style-type: none"> <li>• Generate and maintain beryllium inventory records to demonstrate compliance with the 10,000 pounds of beryllium per calendar year and/or the 1000 pounds of beryllium per day processing limit. (Condition 4 of Permit 634-M2)</li> <li>• Record pressure drop across the cartridge and HEPA filters once per day that the exhaust fans are in operation and the facility is occupied. (Condition 4 of Permit 634-M2)</li> <li>• Record control equipment maintenance and repair activities. (Condition 4 of Permit 634-M2)</li> </ul> <p><b>Reporting:</b></p> <ul style="list-style-type: none"> <li>• Anticipated date of initial startup of each new or modified source not less than thirty (30) days prior to the date. (Condition 5.a of Permit 634-M2)</li> <li>• Actual date of initial startup of each new or modified source within fifteen (15) days after the startup date. (Condition 5.b of Permit 634-M2)</li> <li>• Provide the date when each new or modified emission source reaches the maximum production rate at which it will operate within fifteen (15) days after that date. (Condition 5.c of Permit 634-M2)</li> </ul>

Source Category	Monitoring, Recordkeeping, and Reporting
	<ul style="list-style-type: none"> <li>• Notify the Air Quality Bureau within 60 days after each calendar quarter of the facility's compliance status with the permitted emission rate from the continuous monitoring system. (Condition 5.f of Permit 634-M2)</li> <li>• Provide any data generated by activities described in the Quality Assurance Plan (QAP) that will assist the AQB's Enforcement Section in determining the reliability of the methodology used for demonstrating compliance with the permitted emission rate within 45 days of such a request. (Condition 5.g of Permit 634-M2)</li> <li>• Report criteria pollutant and HAP emissions on a semiannual basis. (20.2.73.300 NMAC for criteria pollutants and LANL proposed condition for HAPs and semiannual basis)</li> <li>• Submit semiannual report of any required monitoring within 45 days from the end of each reporting period. The reporting periods are January to June and July to December. (20.2.70.302(E)(1) NMAC)</li> </ul>
TA-35-213	<p><b>Monitoring/Recordkeeping:</b></p> <ul style="list-style-type: none"> <li>• Records of emissions test results and other data needed to determine total emissions shall be retained at the source and made available for inspection by NMED for a minimum of two years. (Permit 632)</li> </ul> <p><b>Reporting:</b></p> <ul style="list-style-type: none"> <li>• Report criteria pollutant and HAP emissions on a semiannual basis. (20.2.73.300 NMAC for criteria pollutants and LANL proposed condition for HAPs and semiannual basis)</li> <li>• Submit semiannual report of any required monitoring within 45 days from the end of each reporting period. The reporting periods are January to June and July to December. (20.2.70.302(E)(1) NMAC)</li> </ul>
TA-55-PF4	<p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>• The HEPA filtration systems will be equipped with a differential pressure gauge that measures the differential pressure (inches of water) across the HEPA filters while the exhaust fans are in operation. (Condition 11 of Permit 1081-M1-R3)</li> <li>• Control efficiency will be verified by daily HEPA filter pressure drop tests and annual HEPA filter challenge tests of accessible filters. (Condition 3 of Permit 1081-M1-R1 and 1081-M1-R3)</li> </ul> <p><b>Recordkeeping:</b></p> <ul style="list-style-type: none"> <li>• Emission test results and facility operating parameters including a daily record of the pressure drop measured across each appropriate HEPA plenum filtration stage, when the exhaust fans are operating, will be retained at the source for a minimum of two (2) years. (Condition 9 of Permit 1081-M1-R3)</li> <li>• A copy of the annual HEPA test, a log of the daily pressure drop readings and a control equipment maintenance log shall be kept for a minimum of</li> </ul>

Source Category	Monitoring, Recordkeeping, and Reporting
	<p>two years. This documentation shall be provided upon request. (Condition 3 of Permit 1081-M1-R1 and Condition 9 of Permit 1081-M1-R3)</p> <ul style="list-style-type: none"> <li>• A log of the filter replacement shall be kept which shall be made available to the Department personnel upon request. (Condition 3 of Permit 1081-M1-R1)</li> <li>• The permittee shall keep records of the number and weight of classified parts processed during a 24 hour period and year using a rolling average. Records shall be retained for 2 years and shall be made available to properly cleared Department personnel upon request. (Condition 9 of Permit 1081-M1-R3)</li> </ul> <p><b>Reporting:</b></p> <ul style="list-style-type: none"> <li>• HEPA filtration system malfunctions will be reported as soon as possible, but no later than twenty-four (24) hours after the start of the next regular business day and will also be reported in accordance with the requirements contained in 20.2.7 NMAC. (Condition 10.f of Permit 1081-M1-R3)</li> <li>• Emission test results and facility operating parameters will be made available to Department personnel upon request. (Condition 9 of Permit 1081-M1-R3)</li> <li>• Reports may be required to be submitted to the Department if inspections of the source indicate noncompliance with this permit or as a means of determining compliance. (Condition 9 of Permit 1081-M1)</li> <li>• Report criteria pollutant and HAP emissions on a semiannual basis. (20.2.73.300 NMAC for criteria pollutants and LANL proposed condition for HAPs and semiannual basis)</li> <li>• Submit semiannual report of any required monitoring within 45 days from the end of each reporting period. The reporting periods are January to June and July to December. (20.2.70.302(E)(1) NMAC)</li> </ul>