

### **3.13 Steam Plant at Technical Area 21 (TA-21-357)**

#### **3.13.1 General Description of Source Category**

The TA-21-357 steam plant consists of three boilers installed in 1983 and manufactured by the Industrial Boiler Company. The boilers are designed to burn either natural gas or No. 2 fuel oil. Natural gas is the primary fuel. Fuel oil is available for use in emergencies, such as an interruption in gas supply. Steam produced in the TA-21-357 steam plant is used to provide space heating for the buildings in TA-21.

Each of the three steam plant boilers has a nameplate maximum heat input capacity of 12 MMBtu/hr. Because LANL is located at a high elevation, the boilers do not operate at nameplate capacity. The maximum heat input, derated for altitude, is calculated to be 10.2 MMBtu/hr. This reflects a 15% decrease in input rating consistent with the LANL Facility Engineering Manual (Chapter 6, Section 204) specification for forced draft boilers at this altitude.

LANL wishes to establish federally-enforceable permitted fuel limits for the TA-21 steam plant in order to limit criteria pollutant and HAP emissions. The proposed natural gas limit is 60 million cubic feet per year (MMscf/yr) and the proposed fuel oil limit is 10,000 gallons per year (gal/yr). The fuel limits are based on fuel consumption data from previous years and projected steam demand.

#### **3.13.2 Operating Schedule**

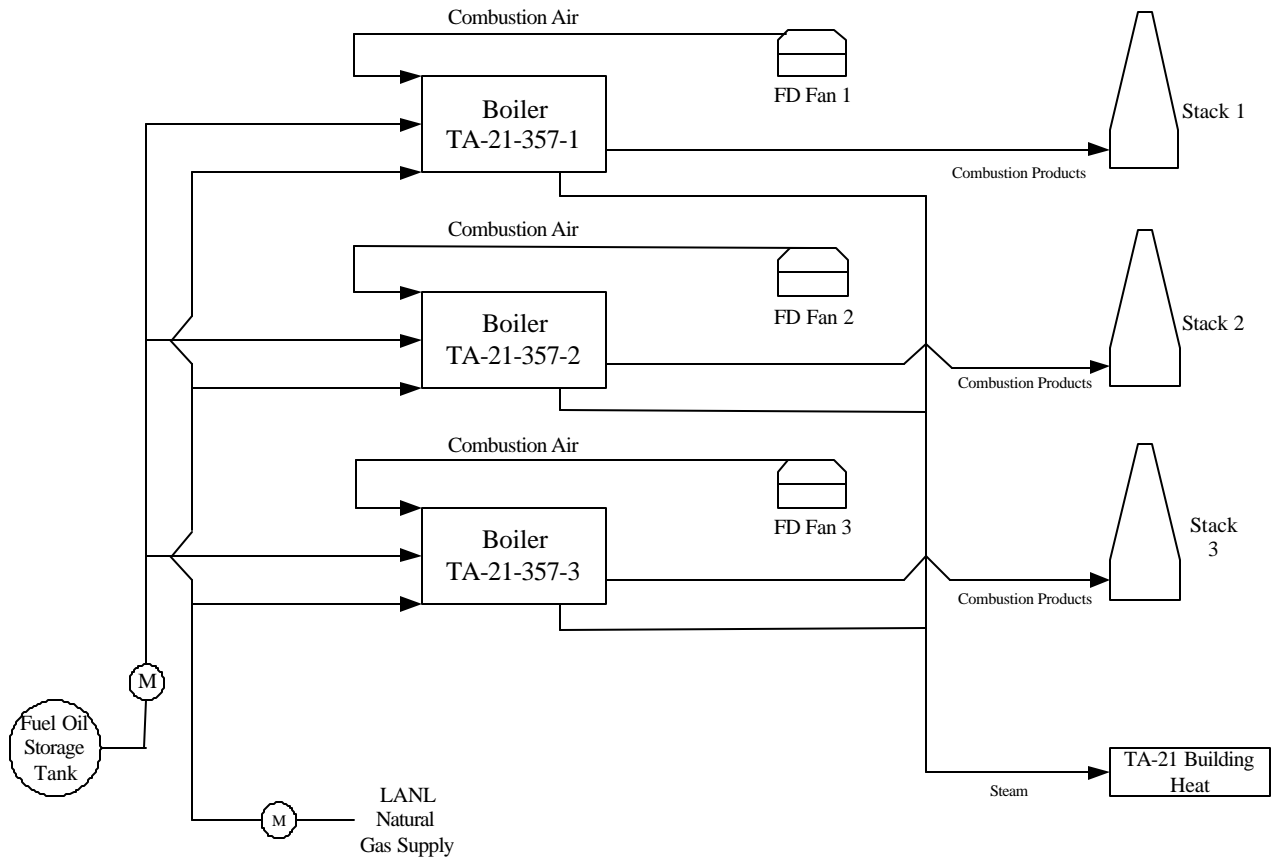
The normal operating schedule for this plant is 24 hours per day, 7 days per week. Normally, only one boiler is operated at a time, with one boiler on hot standby. Under maximum operating conditions, the third boiler can be brought online.

#### **3.13.3 Process Flow Diagram**

A general process flow diagram for the TA-21-357 steam plant is provided in Figure 3.13-1.



**Figure 3.13-1. Process Flow Diagram for Technical Area 21 (TA-21-357) Steam Plant**



### 3.13.4 Emissions

Emission factors used to estimate air emissions for the TA-21-357 steam plant are shown in Table 3.13-1. Natural gas emission factors are from AP-42, 7/98, Section 1.4, Natural Gas Combustion, Tables 1.4-1 and 1.4-2. Fuel oil emission factors are from AP-42, 9/98, Section 1.3, Fuel Oil Combustion, Tables 1.3-1, 1.3-2 and 1.3-3. The SO<sub>2</sub> emission factor for fuel oil is the sum of the AP-42 SO<sub>2</sub> and SO<sub>3</sub> emission factors using a sulfur content of 0.34%. The PM emission factor for fuel oil is the sum of the factors for filterable and condensable PM.

**Table 3.13-1. Emission Factors for the TA-21-357 Steam Plant**

<b>Criteria Pollutant</b>	<b>Emission Factor<sup>(a)</sup> Natural Gas (lb/10<sup>6</sup> ft<sup>3</sup>)</b>	<b>Emission Factor<sup>(b)</sup> Distillate Fuel (lb/10<sup>3</sup> gal)</b>
NO <sub>x</sub>	100	20
CO	84	5
SO <sub>x</sub>	0.6	49
PM	7.6	3.3
VOC	5.5	0.2
HAP <sup>(c)</sup>	1.89	6.11E-02

(a) AP-42, 7/98, Section 1.4, Natural Gas Combustion, Tables 1.4-1, 1.4-2, and 1.4-3.

(b) AP-42, 9/98, Section 1.3, Fuel Oil Combustion, Tables 1.3-1, 1.3-2, 1.3-3, 1.3-8, and 1.3-10.

(c) Heating value of 137,000 Btu/gal used in emission factor conversions.

HAP emission estimates were calculated using emission factors also shown in Table 3.13-1. Natural gas emission factors were taken from AP-42, 7/98, Section 1.4, Natural Gas Combustion, Table 1.4-3. Fuel oil emission factors for formaldehyde and polycyclic organic matter (POM) are from AP-42, 9/98, Section 1.3, Fuel Oil Combustion, Table 1.3-8 and from Table 1.3-10 for trace metals. AP-42 does not contain additional organic HAP emission factors for distillate fuel oil combustion. The remaining HAP emission factors for distillate fuel oil use are from the external combustion boiler section of EPA's Factor Information Retrieval (FIRE) emission factor database (10/2000 version).

Maximum annual criteria and HAP pollutant emission rates were calculated using the following general formulas:

For natural gas:

$$EmissionRate\left(\frac{lb}{yr}\right) = [EmissionFactor\left(\frac{lb}{MMCF\ gas}\right)] [GasInputRate\left(\frac{MMCF\ gas}{yr}\right)]$$

For fuel oil:

$$Emission\ Rate\left(\frac{lb}{yr}\right) = [Emission\ Factor\left(\frac{lb}{10^3\ gal\ oil}\right)] [Oil\ Input\ Rate\left(\frac{10^3\ gal\ oil}{yr}\right)]$$



Emissions were calculated for this source using LANL's proposed limit on natural gas of 60 MMscf per year and on fuel oil of 10,000 gallons per year. Emissions estimates are shown in Table 3.13-2.

**Table 3.13-2. Criteria Pollutant and HAP Emissions Estimates for the TA-21-357 Steam Plant**

Criteria Pollutant	Emissions Natural Gas (ton/year)	Emissions Distillate Fuel (ton/year)	Total Emissions (ton/year)
NO <sub>x</sub>	3.0	0.1	3.1
CO	2.5	0.03	2.5
SO <sub>x</sub>	0.02	0.2	0.3
PM	0.2	0.02	0.2
VOC	0.2	0.001	0.2
HAP	0.06	0.0003	0.06

### 3.13.5 Emissions Control Equipment

The steam plant does not have emissions control equipment.

### 3.13.6 Applicable Requirements

Unit-specific applicable requirements that apply to the TA-21 steam plant are listed below in Table 3.13-3 followed by a citation of the basis for the requirement.

**Table 3.13-3. Applicable Requirements for the TA-21-357 Steam Plant**

Source Category	Applicable Requirements
TA-21-357 Steam Plant	<ul style="list-style-type: none"> <li>Limit natural gas to 60 MMscf/yr and fuel oil to 10,000 gal/yr, 12-month rolling average. (LANL proposed condition)</li> <li>Visible emissions shall not equal or exceed an opacity of 20%. (20.2.61 NMAC)</li> </ul>

### 3.13.7 Proposed Monitoring, Recordkeeping, and Reporting

Proposed monitoring, recordkeeping and reporting requirements for this source are shown in Table 3.13-4.

**Table 3.13-4. Proposed Monitoring, Recordkeeping, and Reporting for the TA-21-357 Steam Plant**

Source Category	Monitoring, Recordkeeping, and Reporting
TA-21-357 Steam Plant	<p><b>Monitoring:</b></p> <ul style="list-style-type: none"> <li>• A volumetric flow meter shall be utilized to measure the total amount of natural gas being used on a semiannual basis. (LANL proposed condition)</li> <li>• Total fuel oil consumption shall be monitored on a semiannual basis. (LANL proposed condition)</li> </ul> <p><b>Recordkeeping:</b></p> <ul style="list-style-type: none"> <li>• Records of total natural gas and fuel oil usage shall be kept on a semiannual basis. (LANL proposed condition)</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>