

3.1 Air Curtain Destructors

3.1.1 General Description of Source Category

LANL operates three air curtain destructors to burn wood and wood slash harvested from operating areas to support fire mitigation efforts. LANL is also authorized by NMED to burn yard waste in the destructors. A portion of the wood is mulched, offered to local residents for firewood, and sold to lumber mills. The remaining material is burned in the destructors. The combustion is initiated by the use of a fire starter, then the air curtain destructors introduce high velocity air into a combustion environment. As the air continuously rotates in and over the environment, a "curtain" is created over the fire trapping smoke and particulate matter. Constant airflow into and over the combustion environment allows temperatures to remain high, resulting in more complete combustion of all emission products.

There are two types of destructors at LANL. The T-Series trench burners, powered by 125 hp diesel engines, utilize a mobile trailer-mounted burner that is used in combination with an earthen pit, or trench made to function as the firebox. The S-Series model, powered by a 76 hp diesel engine, is a portable system utilizing a refractory walled enclosure and is completely self-contained and minimizes any set-up or tear-down. There are two T-Series systems and one S-Series system currently in use.

LANL operates all three units under an open burning permit. The permit is effective from June 20, 2001 through December 31, 2002. LANL will not be operating these destructors long term and will transfer ownership of the equipment offsite prior to October 1, 2003. As a result, LANL is requesting, prior to permit expiration, an extension of the current open burning permit to operate until ownership is transferred.

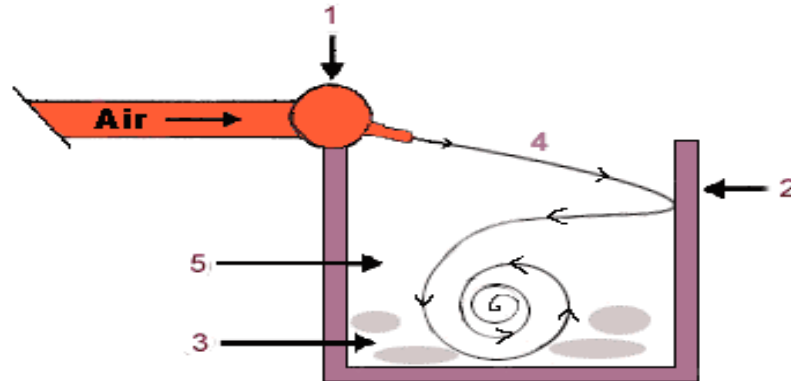
3.1.2 Operating Schedule

LANL has obtained approval to operate the units on a 24-hour basis. Each unit is capable of burning approximately 10 tons of wood per hour. Fuel loading rates for all three units cumulatively will not exceed 32,000 tons of wood per year, which will require the operation of the engines for approximately 3,200 hours per year. The destructors do not operate on a continuous basis because of adverse weather and wind conditions. In addition, time is required for relocation, setup and tear down, and maintenance. The destructors will complete on-site requirements to burn wood resulting from thinning activities by the fire risk mitigation program by October 1, 2003, at which time they will cease to operate on LANL property.

3.1.3 Process Flow Diagram

A process flow diagram for the air curtain destructors is provided in Figure 3.1-1.

Figure 3.1-1. Process Flow Diagram for Air Curtain Destructor



- (1) Air curtain machine manifold and nozzles directing high velocity air flow into refractory lined box or earthen trench.
- (2) Refractory lined wall as on the S-Series machines, or earthen wall as used with the T-Series machines.
- (3) Material to be burned.
- (4) Initial airflow forms a high velocity "curtain" over fire.
- (5) Continued air flow over-oxygenates fire keeping temperatures high. Higher temperatures provide a cleaner and more complete burn.

3.1.4 Emissions

There are two sources of emissions associated with the air curtain destructors, the diesel engines supplying the air curtain, and the combustion products of the firebox. Sample calculations are shown below and the emission factors used to determine emissions are provided in Table 3.1-1.

$$\text{Emissions Rate (Engine)} \left(\frac{\text{ton}}{\text{year}} \right) = \text{Emission Factor} \left(\frac{\text{lb}}{\text{hp-hr}} \right) * 125 \text{ hp} * \left(\frac{\text{hr}}{10 \text{ tons}} \right) * \left(\frac{\text{ton}}{2000 \text{ lb}} \right) * \left(\frac{32,000 \text{ tons}}{\text{year}} \right)$$

$$\text{Emissions Rate (Burn)} \left(\frac{\text{ton}}{\text{year}} \right) = \text{Emission Factor} \left(\frac{\text{lb}}{\text{ton}} \right) * \left(\frac{32,000 \text{ ton}}{\text{year}} \right) * \left(\frac{\text{ton}}{2000 \text{ lb}} \right)$$

Table 3.1-1. Emission Factors for Air Curtain Destructors

Emission Source	NO _x	CO	SO _x	TSP	PM ₁₀	VOC	HAPs
Engine Operation ^(a) (lb/hp-hr)	0.031	0.0067	0.0021	0.0022	0.0022	0.0025	4.6E-05
Wood Combustion (lb/ton)	2.0 ^(b)	1.4 ^(c)	0.1 ^(d)	2.0 ^(e)	1.5 ^(f)	3.8 ^(g)	0.35 ^(b)

(a) AP-42, 10/96, Section 3.3, Gasoline and Diesel Industrial Engines, Tables 3.3-1 and 3.3-2.

(b) AP-42, 03/02, Section 1.6, Wood Residue Combustion in Boilers, Tables 1.6-2, 1.6-3, and 1.6-4, based on a heating value of 4500 Btu/lb.

(c) Fountainhead Engineering Limited, Final Report Describing Particulate and Carbon Monoxide Emissions from the Whitton S-127 Air Curtain Destructor, December 26, 2000.

(d) EIIP Volume II, Chapter 14, 07/01, Appendix A, "Other Incineration – 4953", Trench Burner: Wood.

(e) Florida Department of Environmental Regulation Memo June 5, 1986.

(f) PM₁₀ Emissions are estimated to be approximately 75% of Total TSP emissions based on AP-42, 10/96, Section 13.1, Wildfires and Prescribed Burning, Table 13.1-3, values for short and long needle conifers.

(g) AP-42, Section 13.1, Wildfires and Prescribed Burning, Table 13.1-3 Flaming Phase for Short/Long Conifer averaged.

Cumulative potential emission rates are provided based on a combined annual fuel-loading rate of 32,000 tons per year of wood with the engines in operation for approximately 3,200 hours for the year. Since the T-series burners are the higher emitters of the two types, due to the higher horsepower rating of the engine, the total emissions from the 32,000 tons annual fuel loading is calculated solely from these burners to be conservative. Table 3.1-2 provides the emissions estimates for the air curtain destructors. After October 1, 2003, there will be no air emissions associated with these destructors, as they will not operate on LANL property.

Table 3.1-2. Emissions Estimates for Air Curtain Destructors

	NO _x	CO	SO _x	TSP	PM ₁₀	VOC	HAPs
	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr	ton/yr
Engine Total	6.2	1.34	0.42	0.44	0.44	0.5	9.2E-03
Burn Total	32	22.4	1.6	32	24	60.8	5.6
Total	38.2	23.7	2.0	32.4	24.4	61.3	5.6

3.1.5 Emissions Control Equipment

There are no control devices associated with the air curtain destructors. However, the very nature of the design of the destructors reduces emissions associated with the burning of this type of material due to the presence of the air curtain, which promotes more complete combustion.

3.1.6 Applicable Requirements

The air curtain destructors are affected facilities under 40 CFR §60.2000 to 2265 (NSPS Subpart CCCC) *Standards of Performance for Commercial and Industrial Solid Waste Incineration Units for Which Construction is Commenced After November 30, 1999 or for Which Modification or Reconstruction is Commenced On or After June 1, 2001*. The opacity limit of 20% as specified in 20.2.61.108 NMAC, Smoke and Visible Emissions, is superseded by the more stringent requirement of 10% from Subpart CCCC, 40 CFR §60.2250, during normal operations. NSPS Subpart CCCC excepts periods of startup and malfunction. Opacity during startup is limited to 35% for the first 30 minutes of operation, 40 CFR §60.2250(a)(2). Applicable requirements can be found in the following table. These requirements will remain effective until October 1, 2003, when ownership of the destructors is transferred.

Table 3.1-3. Applicable Requirements for Air Curtain Destructors

Source Category	Applicable Requirement
Air Curtain Destructors (3)	<p>Operating Requirements:</p> <ul style="list-style-type: none"> • Opacity limit is 10% during normal operation. (§60.2250(a)(1)) • Opacity limit is 35% during startup and within the first 30 minutes of operation. (§60.2250(a)(2)) • Opacity limit is 20%. (20.2.61.108 NMAC) • The fuel loading rates for each unit shall not exceed 200 tons wood/day, or 30,000 tons wood/year, 12-month rolling average. (LANL proposed condition) • The fuel loading rates for all three units combined shall not exceed 32,000 tons wood/year, 12-month rolling average. (LANL proposed condition) • Burn only wood waste and yard waste. (§60.2245(b))

3.1.7 Proposed Monitoring, Recordkeeping, and Reporting

Recordkeeping and reporting requirements are presented in the following table. Required recordkeeping and reporting are followed with a citation for the basis of the requirement. These requirements will remain effective until October 1, 2003, when ownership of the destructors is transferred.

Table 3.1-4. Proposed Monitoring, Recordkeeping, and Reporting for Air Curtain Destructors

Source Category	Monitoring, Recordkeeping, and Reporting
Air Curtain Destructors (3)	<p>Monitoring:</p> <ul style="list-style-type: none"> • Conduct an annual opacity test at least every 12 months. (§60.2255(c)) <p>Recordkeeping:</p> <ul style="list-style-type: none"> • Records for opacity tests and reports must be kept for at least 5 years. (§60.2260(b)) • Records of the occurrence and duration of any startup, shutdown or malfunction in the operation of the unit. (§60.7(b)) • The following will be logged daily when in operation: location, ID#, type and quantity of fire starter, date and times of burn, description and quantity of fuel, diesel fuel consumed, and stability class. (LANL proposed condition) <p>Reporting:</p> <ul style="list-style-type: none"> • Submit opacity test results every 12 months. (§60.2260(d)) • 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) • 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)