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Emissions Inventory Report Summary

*Reporting Requirements for the
New Mexico Administrative Code, Title 20,
Chapter 2, Part 73 (20 NMAC 2.73) for
Calendar Year 1998*

Los Alamos
NATIONAL LABORATORY

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Air Quality Group, ESH-17

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EMISSIONS INVENTORY REPORT SUMMARY

by

Air Quality Group, ESH-17

ABSTRACT

Los Alamos National Laboratory (the Laboratory) is subject to emissions reporting requirements for regulated air contaminants under Title 20 of the New Mexico Administrative Code, Chapter 2, Part 73 (20 NMAC 2.73), Notice of Intent and Emissions Inventory Requirements. The Laboratory has the potential to emit 100 tons per year of suspended particulate matter, nitrogen oxides, carbon monoxide, sulfur oxides, and volatile organic compounds. For 1998, combustion products from the industrial sources contributed the greatest amount of criteria air pollutants from the Laboratory. Research and development activities contributed the greatest amount of volatile organic compounds. Emissions of beryllium and aluminum were reported for activities permitted under 20 NMAC 2.72 Construction Permits.

1.0 INTRODUCTION

Los Alamos National Laboratory (the Laboratory) has reported the regulated air pollutants generated from its operations since the late 1980s when the requirement was first promulgated under Title 20 of the New Mexico Administrative Code, Chapter 2, Part 73 (20 NMAC 2.73), Notice of Intent and Emissions Inventory Requirements. The objective of the reporting requirement is to ensure that regulated air pollutant standards for both the State and Federal Acts are not violated. The air contaminants included in the report are total particulate matter (PM), carbon monoxide (CO), nitrogen oxides (NO_x), sulfur oxides (SO_x), volatile organic compounds (VOCs), beryllium, and aluminum.

2.0 EMISSIONS INVENTORY REPORTING REQUIREMENTS

Annual emissions reporting requirements under 20 NMAC 2.73 apply to any facility that emits, or has the potential to emit, 5 tons per year or more of lead or lead compounds, or 100 tons per year or more of suspended particulate matter in the size range of 10 microns or less (PM₁₀), SO_x, NO_x, CO, or VOCs. Emission units that emit in excess of 1 ton of lead per year or 10 tons per year of the pollutants listed above, as well as emissions from permitted sources, must be included in the report.

3.0 CONTENT OF EMISSIONS INVENTORY REPORT

The information required in the report includes the following:

- the name, address, physical location, owner, and operator of the facility;
- facility contact information;
- signed certification statements by a responsible facility official; and
- specific information for each emission point such as type of control equipment, schedule of operation, annual process or fuel combustion rates, and estimated actual emissions for the previous year.

4.0 REPORTED SOURCES AND METHODS FOR EMISSIONS ESTIMATES

The Laboratory's 1998 Emissions Inventory Report includes estimated actual emissions from industrial type sources such as the steam plants, the large boilers, the asphalt plant, and the water pump. The 1998 Emissions Inventory Report was updated with the following additional sources: paper shredder, rock crusher, and degreaser. In addition, VOC emissions from research and development (R&D) activities and painting operations were assessed and reported as appropriate. The beryllium and aluminum emissions were reported at permitted emission levels for beryllium machining.

4.1 Industrial Sources

Steam plants produce steam for heating and/or electricity when sufficient power from outside sources is not available. The boilers produce steam for process and/or comfort heat. The asphalt plant produces small amounts of asphalt for road repairs in and around the Laboratory. Finally, a natural-gas-fired water pump is used to pump potable water from underground wells.

The reported industrial sources, their locations within the Laboratory, and their unit identifications are as follows:

- Technical Area (TA) 3 steam plant;
- TA-21 steam plant;
- boilers
 - TA-16, plants 5, 6, and 13
 - TA-48-1, BS-6
 - TA-53-365-1, BHW-10
 - TA-53-365-2, BHW-11
 - TA-55-6-3, BHW-1
 - TA-55-6-4, BHW-2;
- asphalt plant; and
- TA-54 water pump.

Two boilers and their corresponding stand-by boilers (TA-55-6-1, TA-55-6-2, TA-16 plant 4-1, and TA-16 plant 4-2) that were reported in 1997 have been removed from the 1998 report. The Btu/hour ratings on these boilers indicate that they are exempt because of their size and therefore do not need to be included in the Emissions Inventory Report.

Emissions from the Laboratory's industrial sources were calculated by using fuel use, operating records, and the appropriate emission factors. These sources are operated primarily on natural gas. No diesel fuel was used to power industrial sources in 1998.

Various methods and resources were used to determine individual source emissions: The NO_x emissions from the TA-3 steam plant were calculated with an emission factor obtained from a stack test. The NO_x and CO emission factors were provided by the manufacturer of the TA-16 boilers. Emissions from the asphalt plant were based on the amount of asphalt produced in 1998. The PM emissions from the asphalt plant were calculated with an emission factor obtained from a stack test. Emission factors for NO_x, CO, and VOC emissions from the water pump were obtained from the pump engine manufacturer. Emissions from fuel combustion equipment were based on the actual or estimated fuel consumption. All other industrial source emissions were estimated according to U.S. Environmental Protection Agency (EPA) guidance documents such as the Compilation of Air Pollutant Emission Factors (AP-42).

4.2 Paper Shredder

The paper shredder at TA-52-11 has been in operation since 1991. It replaced a shredder that did not meet Department of Energy (DOE) orders for shredding classified documents.

The original shredding equipment was installed in the mid-1960s. Referred to as a hammermill, it required power from a co-located large diesel engine. Installation dates and the manufacturer's equipment specifications for the original equipment are no longer on file.

Shredding operations are a source of PM emissions. However, the shredder at TA-52-11 does not meet the definition of a new or modified source, under 20 NMAC 2.72 Construction Permits, since it replaced another shredder and did not result in an increase in air emissions. It is estimated that the PM emissions decreased when the hammermill was replaced by the shredder because of the shredder's smaller capacity and its electrical power source. Therefore, the shredder did not require a construction permit upon installation.

In addition, the original shredder at TA-52-11 was grandfathered under New Mexico's Air Quality Control Regulations (AQCR) 702 Permits because it was in operation prior to August 31, 1972. AQCR 702 superseded 20 NMAC 2.72.

The Laboratory will update the Clean Air Act Title V Operating Permit application, which was submitted in 1995 to comply with 20 NMAC 2.70, to include the paper shredder and its potential emissions. The potential emissions (based on 5 boxes per hour, 8760 operating hours per year, and 1% uncontrolled release factor) are estimated to be 13 tons of PM per year. Estimates of actual emissions are based on an averaged monthly shredding rate and engineering calculations for controlled emissions. The PM emissions are controlled with a cyclone and a baghouse.

4.3 Rock Crusher

In May 1998, the Laboratory submitted an exemption notification for an impact rock crusher to crush potentially radioactively contaminated concrete and rock removed from buildings as part of the Laboratory's Decontamination and Decommissioning (D&D) efforts. The crusher was operated for approximately 20 days, before the New Mexico Environment Department (NMED) informed the Laboratory that a construction permit was required. The Laboratory submitted a 20 NMAC 2.72 construction permit application in late 1998 and subsequently received a construction permit to operate this equipment. The rock crusher is pictured in Figure 1.



Figure 1. Rock crusher.

The portable crusher will be moved to D&D sites within the Laboratory boundaries. Currently located at TA-21, this 150-ton/hour crusher is equipped with a water spray system for emissions control of PM during loading, conveying, and crushing. The crusher is also equipped with a 200-horsepower diesel-fired engine. Air emissions from the rock crusher include PM from the crushing activities and combustion products from the diesel-fired engine. Emission estimates are based on the actual hours of operation and emission factors from AP-42.

4.4 Degreaser

A halogenated-solvent cleaning machine was installed at TA-55 Building PF-4 in September 1998. This degreaser was reported to NMED's Air Quality Bureau as required under the National Emission Standards for Hazardous Air Pollutants, 40 CFR 63 Subpart T, Halogenated Solvent Cleaning. The solvent used is trichloroethylene (CAS No. 79-01-6) and is a VOC. Measured losses for the period during which the degreaser was operational (September–December 1998) were reported for the VOC emissions.

4.5 Research and Development Activities

The majority of the Laboratory's work is devoted to R&D activities, which vary in size, in the types of chemicals used, and in operating parameters. Furthermore, R&D activities occur at virtually all TAs within the Laboratory.

VOCs are any compound of carbon, with the exception of specific chemicals, that participates in atmospheric photochemical reactions. VOCs include commonly used chemicals such as ethanol, methanol, and isopropanol. As a conservative estimate, VOCs identified in the Laboratory's procurement records were assumed to be 100% emitted to the air. The Laboratory's VOCs were identified from chemical procurement records obtained by separation of

- inorganic chemicals;
- solid materials;

- organics with a vapor pressure <10 mmHg (specified in NMED's "List of Insignificant Activities," dated September 29, 1995);
- non-VOC materials by definition (40 CFR 51.100);
- fuels used for combustion purposes; and
- maintenance chemical and oils.

For 1998, the estimate of 12-1/2 tons of VOC emissions was based on chemical procurement records.

4.6 Additional Permitted Sources

The Laboratory operates under five 20 NMAC 2.72 Construction Permits for beryllium machining operations subject to 40 CFR 61, Subpart C, National Emission Standards for Beryllium. Emissions from these sources were reported at permitted emission levels. Actual emissions monitored during initial compliance stack tests were below these levels.

5.0 REPORTING EXEMPTIONS

As part of the evaluation of VOC emissions from the Laboratory, painting activities were considered. Paint information for 1998 was gathered from the Work Order Control (WOC) database maintained by Johnson Controls of Northern New Mexico (JCNNM) and the Laboratory's procurement and inventory systems. The procurement records were evaluated for applicability of exemptions for trivial and insignificant activities. The records for paint containers less than one pound were determined to reflect a trivial activity and thus were not evaluated for VOCs. Analysis of the remaining records showed that nearly all of the painting activities performed at the Laboratory during 1998 were maintenance-related activities and were exempt from further VOC analysis.

For those painting activities that were not maintenance related, the corresponding amounts of paint were totaled. For 1998, this total was 1,120 lb, which qualified as an insignificant activity because actual emissions were less than two tons per year.

The following exemptions from NMED Air Pollution Control Bureau's Operating Permit Program "List of Trivial Activities," dated January 10, 1996, were used in the VOC paint analysis:

- activities that occur strictly for maintenance of grounds or buildings, including: lawn care, pest control, grinding, cutting, welding, **painting**, woodworking, sweeping, general repairs, janitorial activities, plumbing, re-tarring roofs, installing insulation, steam cleaning and water washing activities, and paving of roads, parking lots and other areas;
- activities for maintenance and repair of equipment, pollution control equipment, or motor vehicles either inside or outside of a building; and
- paint or non-paint materials dispensed from prepackaged aerosol cans of 16 ounces or less capacity.

The following exemption from the NMED Air Pollution Control Bureau's Operating Permit Program "List of Insignificant Activities," dated September 29, 1995, was used in the VOC paint analysis:

- surface coating of equipment, including spray painting and roll coating, for sources with facility-wide total cleanup solvent and coating actual emissions of **less than two (2) tons per year**.

6.0 EMISSIONS SUMMARY

The Laboratory's reported emissions for 1998 are summarized in Table 1. The largest sources of criteria pollutants emitted at the Laboratory were combustion products from industrial sources. Four sources are listed with zero emissions: three that are listed in the Aerometric Information Retrieval System (AIRS) but have never been built or operated (Stack Nos. 005, 009, and 012) and one that is no longer in use (Stack No. 003). Emissions of beryllium and aluminum are reported for those sources that have emission limits required by 20 NMAC 2.72 Construction Permits. The beryllium and aluminum emissions are also reported under the PM emissions.

Figure 2 provides a comparison among 1995, 1997, and 1998 emissions reported to NMED. The emissions decreased over the four-year period. However, SO_x emissions and VOC R&D emissions reporting began in 1997 and therefore no values for 1995 are available for comparison. A recent increase in VOC emissions is due to two additional emission units (degreaser and rock crusher) generating VOC emissions and an increase in VOC emissions from R&D by 25% since 1997.

Figure 3 shows the air pollutant emissions by source. The TA-3 steam plant contributes the greatest amount of NO_x, SO_x, PM, and CO emissions. R&D activities contribute the most VOC emissions.

Table 1. 1998 Summary of Emissions (Pounds/Year = PY; Tons/Year [shaded] = TY)

Sources		1998 Estimated Actual Emissions (PY)						
		Al	Be	NOx	SOx	PM	CO	VOC
Stack Number								
001	BE Shop, TA-3, Bldg 39, Room 16*	0.00	0.008	0.00	0.00	0.008	0.00	0.00
002	Edgemoor BLRS 3EA TA-3-22	0.00	0.00	107760	397	3306	26444	926
003	Steam Plant TA-16-Bldg 540	0.00	0.00	0.00	0.00	0.00	0.00	0.00
004	Industrial BLRS 3 TA-21-357	0.00	0.00	6647	28	650	1662	133
005	TD Site Not Operating Stack	0.00	0.00	0.00	0.00	0.00	0.00	0.00
006	BE Machining TA-35, Bldg 213*	0.00	0.0008	0.00	0.00	0.0008	0.00	0.00
007	BE Machining TA-3, Bldg 141*	0.00	0.0004	0.00	0.00	0.0004	0.00	0.00
008	BE Machining TA-3, Bldg 102*	0.00	0.00014	0.00	0.00	0.00014	0.00	0.00
009	BE Shop, TA-3-35 Not Built Stack	0.00	0.00	0.00	0.00	0.00	0.00	0.00
010	BE Cutting and Bead Dressing*	0.0041	0.0041	0.00	0.00	0.0082	0.00	0.00
011	Metallography*	0.00	0.0030	0.00	0.00	0.0030	0.00	0.00
012	Solid Waste Fired Boiler	0.00	0.00	0.00	0.00	0.00	0.00	0.00
013	Asphalt Rotary Dryer TA-3-73	0.00	0.00	44	9	123	599	30
014	Pump Engine	0.00	0.00	8034	3	5	2571	161
Subtotal AIRS (PY):		0.004	0.016	122485	437	4084	31275	1249
Subtotal AIRS (TY):		0.000	0.000	61.242	0.219	2.042	15.638	0.625
Non-Exempt Boilers (PY):		N/A	N/A	13143	100	1993	4374	877
Non-Exempt Boilers (TY):		N/A	N/A	6.571	0.050	0.997	2.187	0.438
Paper Shredder (PY):		N/A	N/A	N/A	N/A	0.544	N/A	N/A
Paper Shredder (TY):		N/A	N/A	N/A	N/A	0.000	N/A	N/A
Rock Crusher and Diesel Engine (PY):		N/A	N/A	496	33	58	107	40
Rock Crusher and Diesel Engine (TY):		N/A	N/A	0.248	0.016	0.029	0.053	0.020
Degreaser VOC (PY):		N/A	N/A	N/A	N/A	N/A	N/A	47.480
Degreaser VOC (TY):		N/A	N/A	N/A	N/A	N/A	N/A	0.024
R&D VOC (PY):		N/A	N/A	N/A	N/A	N/A	N/A	25000
R&D VOC (TY):		N/A	N/A	N/A	N/A	N/A	N/A	12.500
Total Emissions in PY:		0.004	0.016	136123	570	6136	35756	27166
Total Emissions in TY:		0.000	0.000	68.062	0.285	3.068	17.878	13.583

*Reported emissions based on allowable emissions in permits

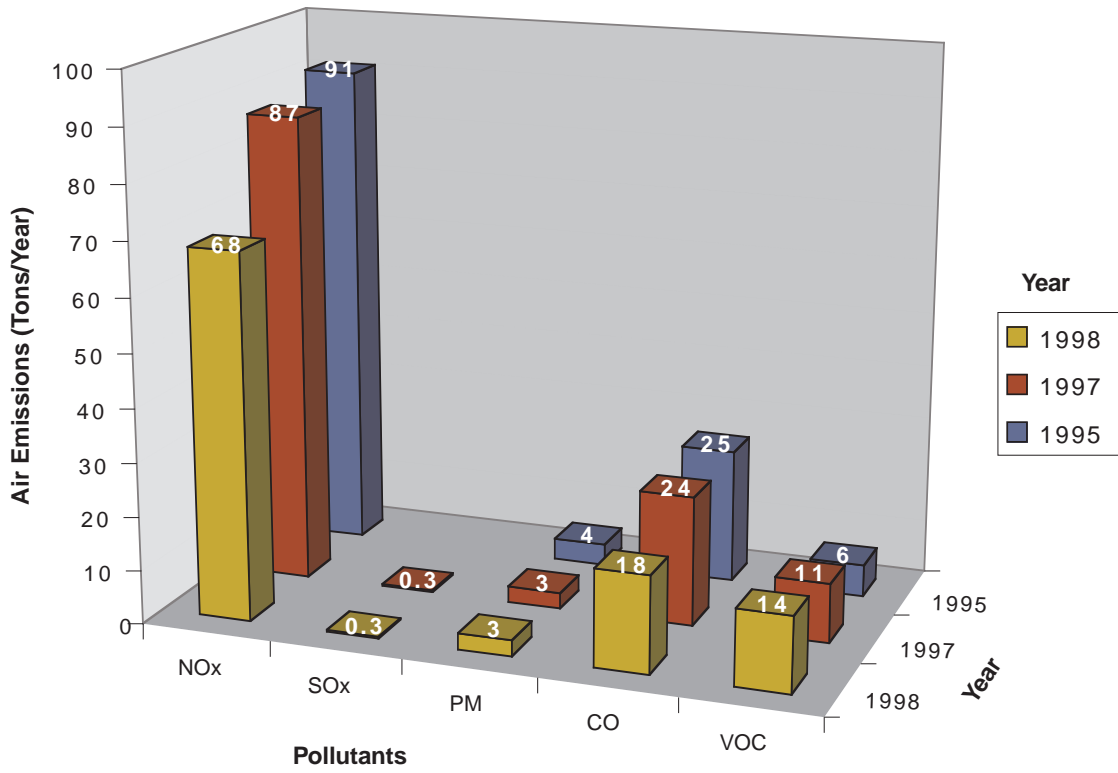


Figure 2. Emissions generated in 1995, 1997, and 1998.

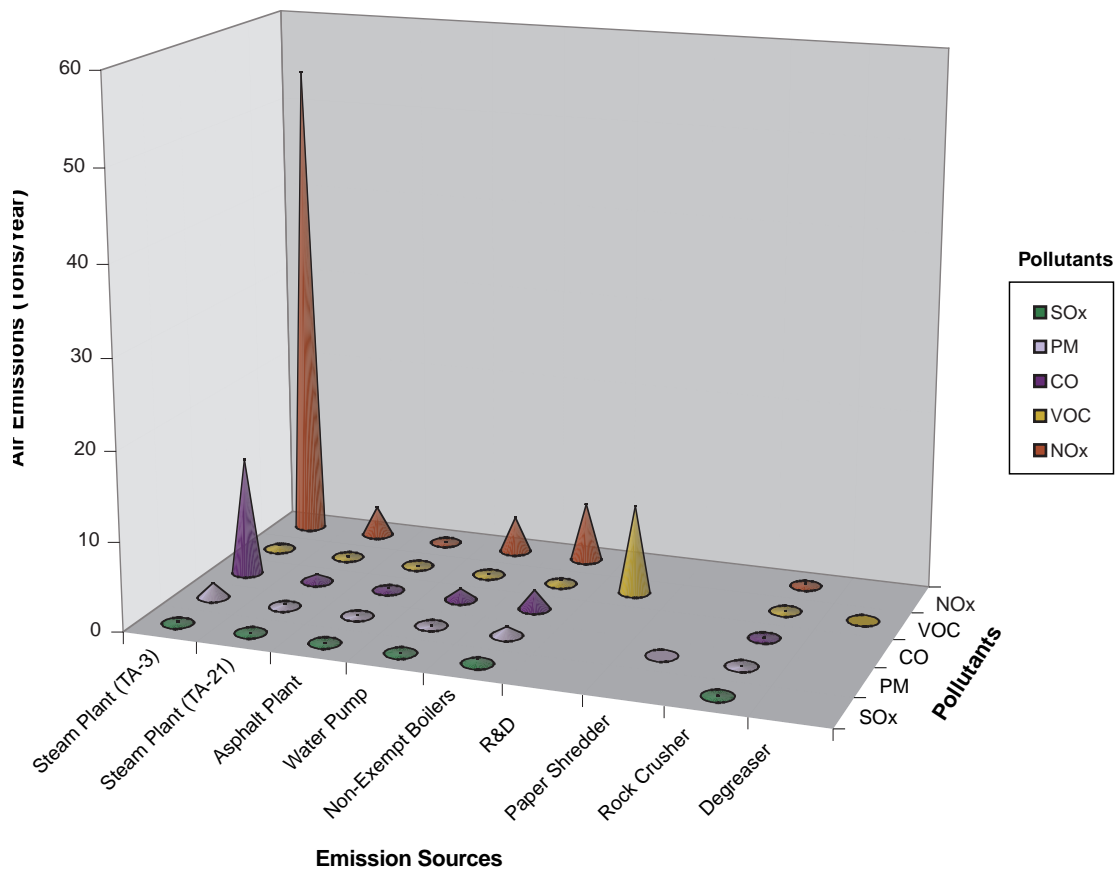


Figure 3. Emissions by source in 1998.

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