October 6, 2000

MEMORANDUM

TO: Doug Howard, Regional Administrator
Twin Falls Regional Office

FROM: Harbi Elshafei, Air Quality Engineer
Process Engineering Group
State Technical Services

THROUGH: Daniel Salgado, Discipline Lead
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State Technical Services

SUBJECT: Technical Analysis for Tier II Operating Permit (#083-00062)
Lamb-Weston, Inc. (Twin Falls)

PURPOSE

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.01.400 *(Rules for the Control of Air Pollution in Idaho)* for issuing Tier II Operating Permits (OP).

FACILITY DESCRIPTION

Lamb-Weston, Inc., located in Twin Falls, Idaho, processes raw potatoes into frozen fried, hashbrown, mashed and special potato products for consumer sales. The facility consists of the following processes:

- Seven (7) product lines, as follows:
  - Line 1, Line 2, Line 2 pre-drying, and Line 4 produce fried potatoes.
  - Hashbrown line produces hashbrown potatoes (this line does not have any emission points).
  - One product line produces mashed potatoes.
  - One product line produces special products.

  The seven lines involve raw potatoes receiving, washing, peeling, trimming, cutting, drying, blanching, grading, shredding, batter applying (as in line 4), frying, freezing, packaging, and palletizing. The drying and frying parts of the lines emit criteria air pollutants in permittable quantities.

- Fuel Combustion Equipment -- boilers (i.e., Boiler #1, Boiler #2, and Boiler #3); natural gas potatoe dryers; emergency diesel generators (i.e., 100 kW and 230 kW); heaters and burners.

- Paved and unpaved roads and material transfer.

A more detailed facility and process description is found in the Tier II Operating Permit application of April 7, 1999 and on the updated Tier II OP applications of April 25, 2000, and May 3, 2000.

PROJECT DESCRIPTION

This project is for the issuance of a Tier II OP for Lamb-Weston, Incorporated (LW), located in Twin Falls, Idaho. The Tier II OP is to limit the Potential to Emit (PTE) of any regulated air pollutant from the entire facility to below a hundred tons per year (100 T/yr), the major source threshold limit.

SUMMARY OF EVENTS

On May 15, 1995, LW at Twin Falls, Idaho submitted a Tier I OP application to the Idaho Department of Environmental Quality (DEQ) for review. The application was prepared by LW's consultant, Lambier Professional Group (LPG), in Portland, Oregon. On July 14, 1995, the application was determined incomplete. On August 14, 1995, LW requested from DEQ a 30-day extension to submit additional information. On September 13, 1995, LW submitted additional information to DEQ. After review, the application was determined administratively complete on November 13, 1995. On December 24, 1998, LW requested in a letter to DEQ to change the OP application from Tier I to Tier II. On April 7, 1999, LW submitted to DEQ a Tier II OP application, which was prepared by LPG. On May 5, 1999, DEQ requested from LW substantiation of a trade secret claim in the facility's Tier II OP application. On May 17, 1999, and April 25, 2000, DEQ received letters from LW withdrawing claims of confidentiality for all materials in the OP application. On June 21, 1999, the Tier II OP application was determined complete. On July 15, 1999, LW requested from DEQ a 30-day extension on processing their Tier II permit to enable the facility to work through details with the U.S. Environmental Protection Agency (EPA) Region 10 on the derating of Boiler #1 located at the facility. On August 13, 1999, DEQ solicited via phone additional information from LW. On December 6 through December 21, 1999, LW source tested for PM and VOC emissions from one of the fryer and dryer stacks at the facility. On October 14, 1999, Boiler #1 was source tested for NO_x and CO emissions from the boiler stack. On January 3, 2000, DEQ received a letter from EPA Region 10 indicating that LW's Boiler #1 was approved for the derating and is no longer subject to the requirements of 40 CFR 60 Subpart Db but is now subject to the New Source Performance Standard (NSPS) requirements of 40 CFR 60 Subpart Dc. On April 25, 2000, and May 3, 2000, DEQ received additional information from LW with a revised emission inventory and the PM-10 and NO_x modeling results from emission units at the facility. On August 2, 2000, DEQ issued a proposed Tier II OP to LW; and a public comment period was held from August 9 through September 8, 2000. On September 8, 2000, comments on the proposed Tier II OP and the technical analysis were submitted to DEQ by LW.

DISCUSSION

1. Process Description

This project is for a Tier II OP for the following existing point and fugitive emission sources:

Point Sources:

1.1 Line 1 Fryer -The Tier II OP application of April 7, 1999, shows that the fryer was constructed or modified in 1988 without applying for a Permit to Construct (PTC) prior to the construction or modification. The construction or modification to Line 1 Fryer occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Line 1 Fryer Specifications

Manufacturer:	Heat and Control
Model:	Custom
Maximum rated capacity:	25.28 (tons of finished potatoes/hr)

Line 1 Fryer Stack Specifications

Height:	49 (ft);
Exit diameter:	2.75 (ft);
Exit temperature:	150 (°F);
Exit gas flow rate:	29,300 actual cubic feet per minute (acfm);

Emissions from the Line 1 Fryer are controlled by a low-efficiency wet scrubber with the following specifications:

Manufacturer:	Gellert Company
Model Number:	Custom
Pressure Drop:	Not available (N/A)
Wet scrubber Flow:	235.2 gallons per min.

1.2 Line 2 Fryer - The Tier II OP application of April 7, 1999 shows that the fryer was constructed or modified in 1970 without applying for a PTC prior to the construction or modification. The construction or modification to Line 2 Fryer occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Line 2 Fryer Specifications

Manufacturer:	Heat and Control
Model:	None
Maximum rated capacity:	23.38 (tons of finished potatoes/hr)

Line 2 Fryer Stack Specifications

Height:	35 (ft);
Exit diameter:	2.00 (ft);
Exit temperature:	110 (°F);
Exit gas flow rate:	25,000 (acfm);

Emissions from the Line 2 Fryer are controlled by a low-efficiency wet scrubber with the following specifications:

Manufacturer:	Gellert Company
Model Number:	Custom
Pressure Drop:	N/A
Wet scrubber Flow:	132 inches of water

1.3 Line 4 Fryer - The Tier II OP application of April 7, 1999 shows that the fryer was constructed or modified in 1989 without applying for a PTC prior to the construction or modification. The construction or modification to Line 4 Fryer occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Line 4 Fryer Specifications

Manufacturer:	Heat and Control
Model:	None
Maximum rated capacity:	32.90 (tons of finished potatoes/hr)

Line 4 Fryer Stack Specifications

Height:	43.3 (ft);
Exit diameter:	3.00 (ft);
Exit temperature:	154 (°F);
Exit gas flow rate:	20,000 (acfm);

Emissions from the Line 4 Fryer are controlled by a low-efficiency wet scrubber with the following specifications:

Manufacturer:	Rey Industries
Model Number:	Custom
Pressure Drop:	N/A
Wet scrubber Flow:	138.6 inches of water

1.4 Special Products Fryer - The Tier II OP application of April 7, 1999 shows that the fryer was constructed or modified in 1977 without applying for a PTC prior to the construction or modification. The construction or modification to Special Products Fryer occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Special Products Fryer Specifications

Manufacturer:	Heat and Control
Model:	None
Maximum rated capacity:	4.64 (tons of finished potatoes/hr)

Special Products Stack Specifications

Height:	41 (ft);
Exit diameter:	4.00 (ft);
Exit temperature:	108 (°F);
Exit gas flow rate:	29,300 (acfm);

Emissions from the Special Products Fryer are controlled by a low-efficiency wet scrubber with the following specifications:

Manufacturer:	Rey Industries
Model Number:	Custom
Pressure Drop:	N/A
Wet scrubber Flow:	246.4 inches of water

1.5 Line 1 Dryer - The Tier II OP application of April 7, 1999 shows that the Dryer was constructed or modified in 1986 without applying for a PTC prior to the construction or modification. The construction or modification to Line 1 Dryer occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Line 1 Dryer Specifications

Manufacturer:	National
Model:	S/N 53353
Maximum rated capacity:	29.45 (tons finished potatoes/hr)
Maximum Rated Capacity:	9.2 (MMBtu/hr)

Line 1 Dryer Stack Specifications (4 stacks)

Height:	48 (ft) ,each;
Exit diameter(s):	2.76 (ft), each;
Exit temperature:	200 (°F);
Exit gas flow rate:	25,000 (acfm), each stack;

1.6 Line 2 Pre-Dryer - The LW submittal of June 3, 1999 shows that the dryer was constructed or modified in July 1988 without applying for a PTC prior to the construction or modification. The construction or modification to Line 2 Pre-Dryer occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Line 2 Pre-Dryer Specifications

Manufacturer:	National
Model:	N/A
Maximum rated capacity:	28.73 (tons finished potatoes/hr)
Maximum Rated Capacity:	2 (MMBtu/hr)

Line 2 Pre-Dryer Stack Specifications (one stack)

Height:	36 (ft);
Exit diameter(s):	2.76 (ft);
Exit temperature:	200 (°F);
Exit gas flow rate:	12,000 (acfm);

1.7 Line 2 Dryer - The Tier II OP application of April 7, 1999 shows that the Dryer was constructed or modified in July 1988 without applying for a PTC prior to the construction or modification. The construction or modification to Line 2 Dryer

occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Line 2 Dryer Specifications

Manufacturer:	National
Model:	N/A
Maximum rated capacity:	28.73 (tons finished potatoes/hr), steam operated

Line 2 Dryer Stack Specifications (6 stacks)

Height:	35 (ft) ,each;
Exit diameter(s):	2.25 (ft), each;
Exit temperature:	200 (°F);
Exit gas flow rate:	10,267 (acfm), each stack;

1.8 Line 4 Dryer - The Tier II OP application of April 7, 1999 shows that the dryer was constructed or modified in 1989 without applying for a PTC prior to the construction or modification. The construction or modification to Line 4 Dryer occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Line 4 Dryer Specifications

Manufacturer:	National
Model:	S/N 56475
Maximum rated capacity:	38.52 (tons finished potatoes/hr)
Maximum Rated Capacity:	13 (MMBtu/hr)

Line 4 Dryer Stack Specifications (5 stacks)

Height:	36 (ft) ,each;
Exit diameter(s):	3.91 (ft) for the 4 west dryer stacks (each) and 3.00 (ft) for the 5th east stack;
Exit temperature:	121 (°F);
Exit gas flow rate:	22,250 (acfm) for the 4 west dryer stacks (each) and 20,000 (acfm) for the 5th east dryer stack;

1.9 Special Products Dryer - The LW submittal of June 3, 1999 shows that the dryer was constructed or modified in June 1976 without applying for a PTC prior to the construction or modification. The construction or modification to Special Products Dryer occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994.

Special Products Dryer Specifications

Manufacturer:	B Eagle
Model:	N/A
Maximum rated capacity:	5.39 (ton finished potatoes/hr)
Maximum Rated Capacity:	2.1 (MM Btu/hr)

Special Products Dryer Stack Specifications (3 stacks)

Height:	31.5 (ft) for the north stack and 32 (ft) for the other 2 stacks;
Exit diameter(s):	3.00 (ft);
Exit temperature:	200 (°F);
Exit gas flow rate:	8,133 (acfm), each stack;

1.10 Boiler #1 -- Gas-fired boiler with a maximum rated capacity of 96.6 MM Btu/hr. The boiler was constructed in 1989 without obtaining a PTC from DEQ. However, on March 6, 1996, LW and DEQ signed the "Voluntary Consent Order" in which LW disclosed to DEQ their failure to obtain a PTC prior to the construction of the boiler and paid a fine of $20,000. The Voluntary Consent Order is in **Appendix B** of this technical memorandum.

On November 20, 1995, EPA Region 10 issued a Compliance Order and Information Request regarding Boiler #1 to Lamb-Weston facility in Twin Falls -- see **Appendix B**.

On January 11, 1999, LW submitted a request to the U.S. EPA Region 10 to derate Boiler #1 from 150 MM Btu/hr to below 100 MM Btu/hr. LW's intention in derating the boiler is to make it operate under less restrictive regulations and be able to remove the Continuous Emissions Monitoring (CEM) system from the boiler. On April 20, 1999, LW submitted additional information to EPA regarding the derating of the boiler. On July 7, 1999, EPA Region 10 informed LW in writing that certain requirements are needed to satisfy the derating of the boiler. On December 27, 1999, DEQ and LW received a letter from EPA Region 10 in which EPA has determined that Boiler #1 is no longer subject to the requirements of 40 CFR 60 Subpart Db. The boiler is now subject to 40 CFR 60 Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units. Please refer to **Appendix B** of this memo, which includes all the correspondence between LW and EPA Region 10 regarding the boiler derating.

Boiler #1 Specifications

Manufacturer:	Combustion Engineering;
Model:	TYPE 26-A-15;
Serial Number:	Contract No. 85672;
Burner:	CoEn (gas firing equipment added to 20D-5117-1); File no. 20D-0772-1; 183,190 SCFH @ 10.8 psig;

Fuel type:	Natural gas;
Maximum Rated Capacity:	96.6 (MMBtu/hr)

Boiler #1 Stack Specifications

Height:	46 (ft);
Exit diameter(s):	6.00 (ft);
Exit temperature:	600 (°F);
Exit gas flow rate:	34,304 (acfm);

1.11 Boiler #2 -- Gas-fired boiler with a maximum rated capacity of 72 MMBtu/hr. The Tier II OP application of April 7, 1999, shows that Boiler #2 was constructed or modified in 1982 without applying for a PTC prior to the construction or modification. The construction or modification to Boiler #2 occured prior to the merger of LW with the Universal Frozen Foods Company. The merger took place on August 1, 1994. The boiler is not subject to NSPS because it was constructed before June 9, 1989.

Boiler #2 Specifications

Manufacturer:	Murray-Trane;
Model:	MCF4-57;
Serial Number:	10846;
Burner:	CoEn 200 Series; File no. 20D-7342; 76,800 SCFH @ 4 psig;
Fuel Type:	Natural gas;
Maximum Rated Capacity:	72 (MMBtu/hr)

Boiler #2 Stack Specifications

Height:	40 (ft);
Exit diameter(s):	4.00 (ft);
Exit temperature:	590 (°F);
Exit gas flow rate:	25,327 (acfm);

1.12 Boiler #3 -- Gas-fired boiler with a maximum rated capacity of 36 MMBtu/hr. The Tier II OP application of April 7, 1999, and the LW submittal of June 3, 1999, show that Boiler #3 was constructed or modified in July 1969.

Boiler #3 Specifications

Manufacturer:	Cleaver-Brooks;
Model:	D-52;
Serial Number:	WL-1360;
Burner:	Springfield; 39,650 SCFH @ 4 psig;
Fuel Type:	Natural gas;
Maximum Rated Capacity:	36 (MMBtu/hr);

Boiler #3 Stack Specifications

Height:	38 (ft);
Exit diameter(s):	3.00 (ft);
Exit temperature:	600 (°F);
Exit gas flow rate:	12,784 (acfm);

Boiler #1 is normally used for base load and Boiler #2 is used for peak load with boiler #3 serving as a standby boiler.

1.13 Emergency Diesel Generators -- There are two emergency generators at the facility. The generators provide emergency power for portions of the plant, should electrical power be lost. The generators are normally run only for testing for approximately 12 hours each per year. The following are the generator and stack specifications:

1.13.1 100 kW Generator - Onan (166 hp; Model:100DGDB). The generator is located in the main building. The generator was constructed in July 1997.

Stack Design specification

Height:	13 ft;
Exit Diameter:	0.25 (ft);
Exit Gas Flow Rate:	800 (acfm);
Exit Temperature:	1060 (°F);

1.13.2 230 kW Generator - Onan, (355 hp; Model:230 Genset). The generator is located in the main building and was constructed in July 1976.

Stack Design Specifications

Height:	7 ft;
Exit Diameter:	0.5 (ft);
Exit Gas Flow Rate:	2370 (acfm);
Exit Temperature:	970 (°F);

Fugitive Sources:

1.14 Heaters and Burners Specifications .

Unit Location	Make/Model	Date Installed	MMBtu/hr
Boiler Room	Gellert	1970	1.50
Line 2 Frozen Grader	Gellert	1970	5.00
Hashbrown Packaging	Gellert	1970	5.00
Hashbrown Processing	Gellert	1970	3.00
Line 1 Packaging	Rapid	1977	6.50
Line1 MCC	Hartzell	1977	1.50
R & D Building	Rapid	1980	0.55

Line I MCC	Hartzel	1989	3.00
Line 4 Blancher	Rey	1989	8.00
Line 4 Dryer	Rey	1989	8.00
Line 4 Packaging	Rey	1989	5.00
Line 4 Palletizing	Hartzel	1989	2.50
Trane Boiler	Rey	1990	4.50
R & D Building	Rey	1991	1.25
Line 1 Fryer	Rey	1992	5.00
Peel Deck	Rey	1997	11.00
Cellar	King	1997	8.80
Line 2 Fryer*	Rey	1999	4.80
Special Products	N/A	1983	9.30
			Total: 94.20

* This unit was exempt from a PTC by DEQ on January 27, 1999.

1.15 Paved and Unpaved roads -- a description of the fugitive road dust emission sources at the facility is in the Tier II OP application (Section E and on page II-D-6-1).

1.16 Material Transfer -- a description of fugitive dust emissions from material transfer at the facility is in the Tier II OP application (SectionD; on pages II-D-5-1 and II-D-5-2).

It should be noted that there is a wastewater anaerobic digester which generates biogas (CH_4, H_2S, CO_2), which is then burned by flares at the facility. The digester is owned by the city of Twin Falls and is operated by a contractor, OMI. The digester treats LW's wastewater and LW claims that emissions from the flares are the responsibility of the city of Twin Falls according to the "Industrial Waste Agreement" between LW and the city of Twin Falls.

2. Area Classification

This facility is located in Twin Falls County. Twin Falls County is located in Air Quality Control Region (AQCR) 63 and Zone 11. The area is classified as attainment or unclassifiable for all federal and state criteria air pollutants (i.e., PM, CO, NO_x, VOC, and SO_2).

3. Facility Classification

Without state or federally enforceable permit conditions, this facility would be considered a major source of NO_x and CO, as defined in IDAPA 58.01.01.008.10. Upon issuance of this permit, the facility is no longer considered major, because the proposed permit limits the facility's potential to emit (PTE) for NO_x and CO to below 100 T/yr, each. This facility is not a designated facility as defined in IDAPA 58.01.01.006.27. The facility's primary SIC code is 2099. The facility AIRS classification is A2.

4. Emission Estimates and Permit Requirements

Emission estimates were provided by LW's consultant, Lambier Professional Group Associates, Inc., and can be seen in the April 7, 1999 Tier II OP application and the revised

permit applications that were submitted to DEQ on April 25, 2000 and May 3, 2000. DEQ also developed a spreadsheet to estimate emissions from the emissions units at the facility for the pollutants PM-10, NO_x, SO_2, CO, and VOC. Emission factors shown in the Tier II OP application were either developed from specific emissions testing performed at this facility from results of similar equipment testing at other LW potato facilities (as shown in LW's Tier II OP application of April 7, 99), or from EPA's AP-42 emission factors (EFs) if testing was not available. All emission estimates and the DEQ's emission spreadsheet and other related calculations are presented as **Appendix A** of this document. Emission calculations submitted within the application were checked for correctness and are also included in **Appendix A.**

4.1 Emissions from Fryers

There are four separate frying processing lines at Lamb-Weston's Twin Falls facility. Emissions from the fryers are mainly particulate matter (PM), particulate matter with an aerodynamic diameter less than or equal to ten microns (PM-10), and volatile organic compounds (VOC). LW conducted source tests to measure PM and VOC emissions from the Line 4 Fryer scrubber stack on December 6 through December 21, 1999. The purpose of the tests was to quantify the PM and VOC emissions from the fryers at the facility under worst-case operating conditions and to develop emission factors (EFs) for PM and VOC that can be used for emission calculations. The Line 4 Fryer was chosen to conduct such tests because it is the largest of the four lines and has the greatest capacity of finished potatoes product. PM-10 and VOC emission rates from Line 1, 2, 4, and the Special Products Fryers are calculated based on the EFs developed from source tests conducted at the Line 4 Fryer. The production rate of finished potatoes product in tons per hour for the Line 4 Fryer was reported during the source tests. For the purpose of developing the EFs, a 25% safety factor (SF) was added to the production rate measured during the source tests. This SF will allow for process variability when running different products. All PM emissions are assumed to be PM-10. Actual (or normal as shown in the spreadsheet in **Appendix A**) annual emissions are calculated based on operation for each fryer of 7,200 hours per year. Maximum annual emissions are calculated based on each fryer operating 8,760 hours per year at maximum production rates.

PM-10 and VOC performance tests will be required in the Tier II OP from the Line 4 Fryer stack on or before December 21, 2004, and at a minimum of once every five years thereafter. Results from the performance tests will be used to establish EFs and to determine compliance with the permitted PM-10 and VOC emission limits from the fryers. When source tests are not performed, the permittee will demonstrate compliance with PM-10 and VOC emission limits through monitoring the daily production rates of finished potato product for each fryer and by using the EFs that are previously developed for PM-10 and VOC source tests to estimate those pollutant emissions for each fryer.

However, it should be noted that there is an AIRS emission factor for the VOC emissions for deep fat frying from cooking vats (SCC 30203601). That EF is 18.5 lbs of VOC/ton processed. If this EF were to be used to calculate the VOC

emissions from the facility's fryers, the VOC emissions from the fryers would be greater than 250 tons per year, the Prevention of Significant Deterioration (PSD) threshold. Also, the VOC emissions would be greater than the major source threshold if the AIRS VOC EF is used to calculate emissions. Therefore, the OP requires including VOC source tests from the fryers to determine compliance with the VOC permitted emission limits.

The permittee is required to prepare an Operation and Maintenance (O&M) manual for each permitted source that has an air pollution control device(s). The manual must contain the operating parameters by which the air pollution control device(s) will be limited for correct operation. These parameters are pressure drop and scrubbing media flowrate, which must be monitored and recorded once daily. The parameters should be supported by manufacturer's documentation, if available.

4.2 Emissions from Dryers

There are four potato dryers at the LW facility. Dryers are used to drive off unwanted moisture from the potatoes prior to entering the fryers. The Line 1 Dryer, Line 2 Pre-Dryer, Line 4 Dryer, and the Special Products Dryer are operated exclusively on natural gas. The Line 2 Dryer is operated on steam. Emissions from the natural gas-fired dryers are mainly PM, PM-10, VOC, carbon monoxide (CO), oxides of nitrogen (NO_x), and trace amounts of sulfur dioxide (SO_2). Emissions from the Line 2 Dryer are PM and PM-10. LW conducted source tests to measure PM and VOC emissions from one of the stacks of the Line 4 Dryer on December 6 through December 21, 1999. The Line 4 Dryer has five drying zones; each zone has its own stack. Zone #5 was chosen because it was most conducive to stack testing in configuration and location. The purpose of the tests was to quantify the PM and VOC emissions from the dryers at the facility under worst-case operating conditions and to develop emission factors (EFs) for PM and VOC that can be used for emission calculations. The Line 4 Dryer was chosen to conduct such tests because it is the largest of the four dryers and has the greatest capacity for drying potatoes. PM-10 and VOC emission rates from Lines 1, 2, 4, and the Special Products Dryers are calculated based on the EFs developed from source tests conducted at the Line 4 Dryer. The results of PM and VOC emission tests of Line 4 Dryer, zone #5 were multiplied by five (5) to account for the emissions from all Line 4 Dryer stacks. The production rate of finished potatoes in tons per hour for the Line 4 Dryer was reported during the source tests. For the purpose of developing the EFs, a 25% SF was added to the production rate measured during the source tests. This SF will allow for process variability when running different products. All PM emissions are assumed to be PM-10. Actual (or normal as shown in the spreadsheet in **Appendix A**) annual emissions are calculated based on operation for each fryer of 7,200 hours per year. Maximum annual emissions are calculated based on each fryer operating 8,760 hours per year at maximum production rates.

The pollutants resulting from natural gas combustion are PM-10, SO_2, CO, NO_x, and VOC. Emission rates of these pollutants from Line 1, 2 (Pre-Dryer), 4, and the Special Products Dryers are calculated based on EFs found in EPA's AP-42, 3/98, Section 1.4, natural gas combustion.

PM-10 performance tests will be required in the Tier II OP from the Line 4 Dryer stack on or before December 21, 2004, and at a minimum of once every five years thereafter. Results from the performance tests will be used to establish EFs and to determine compliance with the permitted PM-10 emission limits from the dryers. When source tests are not performed, the permittee will demonstrate compliance with PM-10 emission limits through monitoring the daily and annual production rates of finished potatoes product for each dryer and by using the EFs that are previously developed for PM-10 source tests to estimate emissions from each of the dryers. Also, the potato dryers will be required to be operated on natural gas exclusively. The SO_2, CO, and VOC emissions from the potato dryers are inherently limited at maximum operation for each dryer. Emissions for each pollutant are well below 100 T/yr when the dryers are operated at maximum capacity. Therefore, these pollutants are not included in the OP -- refer to **Table 1, Appendix A** for the SO_2, CO, and VOC calculated emissions from the dryers .

Table 1 in Appendix A shows that NO_x has a Potential to Emit (PTE) of greater than 100 T/yr, the major source threshold limit from the entire facility. Since NO_x is emitted in the greatest amount from the combustion units at the facility, the NO_x emission limits from the dryers are included in the OP to limit that pollutant PTE from the dryers and from other combustion sources at the facility to below the 100 tons per year threshold of NO_x emissions.

4.3 Emissions from Boilers

The three boilers that exist at the facility are Boiler #1, Boiler #2, and Boiler #3. Specifications for the boilers are in Sections 1.10, 1.11, and 1.12 of this memorandum. All of the boilers are operated exclusively on natural gas. Pollutants emitted from the boilers are mainly PM/PM-10, VOC, CO, SO_2, and NO_x. Emission rates are estimated as follows:

4.3.1 Emissions from Boiler #1:

This boiler was derated from the NSPS 40 CFR 60 Subpart Db to NSPS 40 CFR 60 Subpart Dc by EPA Region 10 on December 27, 1999.

LW conducted source tests to measure NO_x and CO emissions from the boiler stack on October 14, 1999. The purpose of the tests was to quantify the NO_x and CO emissions from the boiler stack and to develop emission factors for NO_x and CO that can be used for emission calculations. NO_x is the pollutant emitted in the greatest amount from the boiler. LW intended to become a synthetic minor facility by limiting the PTE of NO_x emissions to less than 100 tons per year (T/yr) from the entire facility. The NO_x EF that applies to LW's Boiler #1 is 100 lb/MM scf of natural gas burned, as per Table 1.4-1, EPA's AP-42, 3/98. By using EPA's AP-42 EF for NO_x and the boiler maximum capacity (96.6 MM BTU/hr), the NO_x maximum emissions are estimated to be 41.48 T/yr (i.e., 100/83.73 x 34.73 = 41.48). However, the EF for NO_x that was developed from the source test on the boiler stack is estimated at 83.73 lb/MM scf. Based on that EF, the maximum NO_x

emissions from the boiler is estimated to be 34.73 T/yr. The lower NO_x EF for Boiler #1 resulted in reduction of NO_x emissions from the boiler of approximately seven tons per year. Also, the great reduction in NO_x emissions from the boiler was actually due to the derating of the boiler from 40 CFR 60 Subpart Db to 40 CFR 60 Subpart Dc, which resulted in a lower EF for NO_x. The carbon monoxide (CO) EF developed from the source test is estimated to be 33.2 lb/MM scf. Using this EF, the resulting CO emissions from the boiler are estimated to be 13.77 T/yr, compared with 34.84 T/yr when EPA's AP-42 EF was used for the calculations (i.e., 84/33.2 x 13.77 = 34.84). No emission limit is set in the OP for the CO from the boiler.

The PM/PM-10, VOC, and SO_2 emissions from the boiler are estimated by using EFs from Table 1.4-1, AP-42, 3/98. All PM emissions are assumed to be PM-10. Actual annual emissions are calculated based on boiler operation of 7,800 hours per year. Maximum annual emissions are calculated based on operation of 8,760 hours per year and on maximum combustion rated capacity of the boiler. No emission limits are set in the OP for VOC and SO_2 because they are inherently limited at the maximum operation of the boiler. **Table 1, Appendix A** of this memo shows all emission calculations for all pollutants at the facility.

Since NO_x is the pollutant emitted in the greatest amount from the boiler and from the facility in general, a natural gas combustion limit from Boiler #1 is set in the operating permit. Natural gas will be burned exclusively in the boiler.

The permittee will monitor and record the amount of natural gas used for Boiler #1 on a daily basis, as required in 40 CFR 60.48c(g). The permitteee will submit a written notification to EPA Region 10 and to DEQ following procedures listed in 40 CFR 60.48c(a).

When it approved the derating of Boiler #1, EPA requested further requirements from LW in the letter sent to the company on December 27, 1999. LW will continue to monitor and maintain records of the natural gas flow rate on a continuous basis. LW will read and record the natural gas flow rate (ft^3/min) no less frequently than on a continuous basis. LW will report to EPA Region 10 and to Idaho DEQ on a quarterly basis the natural gas-fired heat input of Boiler #1 (MM Btu/hr) for each boiler operating day. All of these requirements are incorporated into the operating permit.

Compliance with the PM-10 emission limits from the boiler will be demonstrated by firing the boiler on natural gas exclusively.

Particulate matter (PM) emission from the boiler will not exceed 0.015 grains per dry standard cubic foot of effluent gas adjusted to three percent (3%) oxygen by volume when natural gas is combusted, as required in IDAPA 58.01.01.675. So long as the boiler is fueled exclusively on natural gas, the likelihood that the grain loading standard will be exceeded is considered

insignificant. Therefore, the only method that will be used to determine compliance with IDAPA 58.01.01.675 is to require that the boiler be fueled only with natural gas.

4.3.2 Emissions from Boiler #2 and Boiler #3:

Emission rates for PM/PM-10, VOC, CO, SO_2, and NO_x are calculated based on EFs found in EPA's AP-42, 3/98, Section 1.4, natural gas combustion. All PM emissions are assumed to be PM-10. Actual annual emissions are calculated based on operation for each boiler of 7,800 hours per year. Maximum annual emissions are calculated based on operations for each source of 8,760 hours and on maximum production rates. Please refer to **Table 1, Appendix A** for the emission calculations from Boilers #2 and #3.

Compliance with the PM-10 and NO_x emission limits from the boilers will be demonstrated by firing the boilers on natural gas exclusively.

Particulate matter (PM) emissions from Boiler #2 and Boiler #3 will not exceed 0.015 grains per dry standard cubic foot of effluent gas for each boiler adjusted to three percent (3%) oxygen by volume when natural gas is combusted, as required in IDAPA 58.01.01.675. So long as the boilers are fueled exclusively on natural gas, the likelihood that the grain loading standard will be exceeded is considered insignificant. Therefore, the only method that will be used to determine compliance with IDAPA 58.01.01.675 is requiring the boilers be fueled only with natural gas.

4.4 <u>Emissions from the Heaters and Burners</u>

There are nineteen (19) heaters and burners at different locations at the facility. The specifications for the heaters and burners and the buildings where the heaters and burners are located are in Section 1.14 of this memorandum. All of the heaters and burners are operated exclusively on natural gas. Pollutants emitted from the heaters and burners are mainly PM/PM-10, VOC, CO, SO_2, and NO_x. Pollutant emissions from these sources are fugitive. Fugitive emission rates are estimated from these sources based on the total natural gas consumption of 94.2 MM Btu/hr and by using EFs from EPA's AP-42, Section 1.4, natural gas combustion. The actual and maximum operation hours for the heaters and burners are 7,200 and 8,760 hours per year, respectively. **Table 1, Appendix A** shows the emission calculations. In this technical analysis, the pollutant of concern from the heaters and burners combustion is NO_x. NO_x emissions from the heaters and burners will be added to the total NO_x emissions from the entire facility to limit its PTE. Total annual NO_x emissions from the heaters and burners are estimated to be 3.75 T/yr. To limit the NO_x emissions from the heaters and burners at its permitted level, natural gas will be burned exclusively in those units.

4.5 Emissions from the Emergency Diesel Generators

There are two Emergency Diesel Generators at the facility. Specifications for the generators are in Section 1.13 of this memorandum. Emissions from the Emergency Diesel Generators are calculated by the permittee and by DEQ. EFs from EPA's AP-42, Section 3.3, Gasoline and Diesel Industrial Engines, 10/96 are used for the calculations. Emission calculations are included in **Table 1, Appendix A** of this memo and in LW's OP application. The pollutants of concern in this technical analysis are PM-10 and NO_x emissions. NO_x emissions are included in the OP to limit the PTE for that pollutant from the generators. Annual NO_x emissions from the generators are limited in the OP at 3.73 T/yr per any consecutive 12-month period. Compliance with this limit can be determined by hours of operation limitations of a maximum of 500 hours per year for each generator. The PM-10 emission limits from the generators are set at 0.87 lbs/hr in the OP. The emission rate limits are based on the hours of operation limitations (8.5 hrs/day) determined through modeling. Please refer to Section 5 of this memo for more information on PM-10 modeling from the generators.

The permittee is required to monitor and record the date and daily and annual hours of any operations for each of the emergency generators.

The operating permit requirements also include a PM grain loading limit (i.e., 0.05 gr/dscf) in accordance with IDAPA 58.01.01.675. The sulfur content in No.2 diesel fuel that is burned in the generators shall be less than five-tenths weight percent (0.5 wt%), as per IDAPA 58.01.01.728.

The facility has two diesel storage tanks with capacities of 90 gallons and 575 gallons. Emissions of VOC from the storage tanks are very small due to the small size of the tanks. These emissions are not included in this OP.

4.6 Emissions of NO_x and CO from the Natural Gas Combustion Units at the Facility and other Facility-Wide Requirements

In the Facility-Wide Conditions of this Tier II OP, a limit on natural gas combustion from the entire facility was set at 1,844 MM cubic feet (cf) per any consecutive 12-month period. As stated before in this technical memo, NO_x is the pollutant emitted in the greatest amount from the natural gas combustion units at the facility. If one takes the worst case assumption that NO_x EF is 100 lbs/10^6 cf for each emission unit that combusts natural gas at the facility (note: NO_x EF for Boiler #1 is actually less than 100 lbs/10^6 cf), the facility's NO_x emission limits are estimated to be 92.20 T/yr (i.e., 1,844 x 10^6 cf/yr x 100 lbs /10^6 cf x 1 ton / 2000 lbs = 92.2 T/yr). To limit the facility to this amount of NO_x emissions, the total maximum natural gas consumption for the entire facility must be limited to less than or equal to 1,844 million cubic feet per year (1,844 MM cf/yr). Thus, based upon the emission inventory information provided by LW, the facility would be below the 100 tons per year threshold of NO_x emissions.

The maximum CO emissions from the entire facility as shown in **Table 1, Appendix A** are greater than 100 T/yr. By limiting the natural gas consumptions of 1844 MM cf/yr, the CO emissions will be below the 100 T/yr, the major source threshold for that pollutant.

Compliance determination for natural gas consumption can be verified by monitoring and recording the date and amount of natural gas burned in cubic feet (cf) per month and the cf per any consecutive 12-month period. These requirements are incorporated into the operating permit.

All stacks, vents, and other openings at the facility must comply with the opacity rules as specified in IDAPA 58.01.01.625. In addition to the opacity requirements, any fugitive emissions generated from facility operations must not be seen crossing the facility boundary.

The permittee is required to reasonably control fugitive emissions per IDAPA 58.01.01.651.

The permittee is required to comply with the provisions of IDAPA 58.01.01.600-616 for open burning.

The permittee is required to comply with the excess emissions requirements as set in IDAPA 58.01.01.130-136.

4.7 Fugitive Emissions from Paved/Unpaved Roads and from Transfer Operations at the Facility

Fugitive particulate emissions from paved and unpaved roads and from transfer operations were calculated by the permittee by using EFs from EPA's AP-42, Sections 13.2.1 and 13.2.2. Fugitive emissions calculations can be seen in the application materials. All fugitive emissions from the facility shall be controlled in accordance with IDAPA 58.01.01.650 of the Rules -- see the Facility-Wide Conditions in the operating permit

5. Modeling

LPG conducted ISCST3 modeling for the PM-10 and NO_x emissions from the LW facility in Twin Falls, Idaho. The predicted PM-10 and NO_x impacts were determined to be below the National Ambient Air Quality Standards (NAAQS).

The PTE calculations were used for modeling of 24-hr and annual PM-10 and NO_x emission rates from the natural gas combustion units (i.e., dryers and boilers) at the facility. The modeling results showed that PM-10 and NO_x NAAQS were not exceeded at these emission rates.

Mary Walsh, State Technical Services Meteorologist at IDEQ, reviewed LPG's modeling results. The following is a summary of Ms. Walsh's review:

As part of the Tier II Operating Permit process, Lamb-Weston, located in Twin Falls, carried out a modeling analysis to show compliance with the National Ambient Air Quality Standards (NAAQS) for PM_{10} and NO_x. Using the EPA-approved ISCST3 model with regulatory default options, rural dispersion, and five years' worth of meteorological data from the National Weather Service (NWS), the facility evaluated the ambient impacts of 28 sources of PM_{10} and 18 sources of NO_x. Due to a lack of model-ready meteorological data from the Twin Falls area, it was recommended that the facility look into using data from the NWS sites here in Idaho. Carrying out a comparative analysis of historical data for Twin Falls, Pocatello and Boise, the facility showed the surface data in Pocatello to be more closely representative of conditions within the Twin Falls area.

Following further guidance from IDEQ, an extensive receptor grid, with elevation data obtained from the USGS Digital Elevation Model (DEM), was placed in those areas constituting ambient air (i.e. those to which the public has access). Upon determining the area of maximum impact, additional receptors were added to ensure that the maximum ambient concentration had, in fact, been resolved. Discrete receptors were also located at all points within 4 km of the plant identified as having an increased sensitivity to changes in ambient pollutant concentrations. Known as sensitive receptors, these points included schools, hospitals and day care and retirement centers. An evaluation of the predicted impacts at these sites showed concentrations well below those of the applicable standards. The effects of building downwash, which can lead to high impacts near a source due to the distortion of flow around buildings, was also included in the analysis. All buildings located within the facility boundary, along with those owned by Henningsen Cold Storage, Longview Fibre, and the Farm House Collection were evaluated for their potential wake affects.

Due to its proximity to ambient air, it was found that the 230 kW generator contributed the most to the maximum modeled PM_{10} impact. This impact was found to occur along Minidoka Avenue (which is located between the main plant and the dry storage area). In order to show compliance with the NAAQS, federally enforceable limitations were proposed for the facility's generators to help reduce daily and annual PM_{10} impacts from these sources. As such, the facility has agreed to limit the operation of their generators to 500 hours per year and 8.5 hours per day. These limitations were factored into the PM_{10} emission rates modeled for these sources.

Using a conservative PM_{10} background value of 94 $\mu g/m^3$, obtained from IDEQ and based upon the maximum concentrations measured at the Twin Falls site over the last three years, the facility's ambient PM_{10} impacts were found to meet all applicable requirements. In lieu of actual monitoring data in the Twin Falls area for NO_x, a conservative statewide background concentration of 40 $\mu g/m^3$ was applied in the analysis. This value was based upon historical data obtained from IDEQ's ambient monitoring network and discussions with EPA and other state environmental agencies in the Pacific Northwest. A review of the submitted materials by staff from IDEQ Technical Services showed the analysis to meet IDEQ requirements as long as the hour-of-operation limitations imposed upon the generators are followed.

The ISCST3 modeling input and results are shown in **Appendix D** of this memo.

6. Regulatory Review

This Tier II OP is subject to the following permitting regulations:

IDAPA 58.01.01.006	Definitions;
IDAPA 58.01.01.401	Tier II Operating Permit;
IDAPA 58.01.01.402	Application Procedures;
IDAPA 58.01.01.403	Permit Requirements for Tier II Sources;
IDAPA 58.01.01.404	Procedures for Issuing Permits;
IDAPA 58.01.01.405	Conditions for Tier II Operating Permits;
IDAPA 58.01.01.406	Obligation to Comply;
IDAPA 58.01.01.470	Permit application Fees for Tier II Permits;
IDAPA 58.01.01.625	Visible Emissions;
IDAPA 58.01.01.650	General Rules for Control of Fugitive Dust;
IDAPA 58.01.01.675	Fuel Burning Equipment -- Particulate Matter;
IDAPA 58.01.01.728	Distillate Fuel Oil, and
40 CFR 60 Subpart Dc	Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.

7. AIRS Information

Information necessary to the AIRS database is included as **Appendix C** of this technical memorandum.

8. Fees

Upon issuance of a Tier II OP, this facility will no longer be considered a major facility as defined in IDAPA 58.01.01.008.14. Therefore, registration and registration fees, in accordance with IDAPA 58.01.01.526 are not applicable upon issuance of this permit. Permit application fees of five hundred dollars ($500.00), in accordance with IDAPA 58.01.01.470, are applicable.

RECOMMENDATION

Based on the review of the Operating Permit application and on applicable state federal regulations concerning the permitting of air pollution sources and public comments received, DEQ staff recommends that Lamb-Weston, Inc. in Twin Falls be issued a Tier II Operating Permit No.083-00062 for the sources existing at the facility. A public comment period was held from August 9, to September 8, 2000 in accordance with IDAPA 58.01.01.404.02.b. Staff also recommends that the facility be notified of the Tier II permit fee requirement in writing. This fee will be applicable upon issuance of this permit.

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cc: Twin Falls Regional Office
DEQ State Offices

Appendix A

Table 1

Calculated by: Harbi A. Elshafei, DEQ's Air Quality Engineer
Date: 05/10/00

Lamb-Weston, Twin Falls
Tier II OP Emission Point Calculations
Filename: LWTPT2R2.WK1

Emission Unit / Fuel Combustion	Combustion Capcity Normal mmcf/hr	Combustion Capcity Maximum	Normal mmBtu/hr	Maximum	Fuel Usage Normal mmcf/y	Fuel Usage Maximum	Operating Hour Normal Hours	Operating Hour Maximum	Combustion Rate Normal mmcf/hr Fuel use	Combustion Rate Maximum	Emission Factor PM/PM-10 lb/mmcf	NOx lb/mmcf	SO2 lb/mmcf	CO lb/mmcf	VOC lb/mmcf	Uncontrol Emission PM/PM-10 (lb/hr) Normal	Maximum	PM/PM-10 (Normal
Boiler No. 1 (a)	0.0947	0.0947	96.6	96.6	738.71	829.62	7800	8760	0.0947	0.0947	7.6	83.73	0.6	33.2	5.5	0.72	0.72	2.81
Boiler No. 2	0.0706	0.0706	72	72	550.59	618.35	7800	8760	0.0706	0.0706	7.6	100	0.6	84	5.5	0.54	0.54	2.09
Boiler No. 3	0.0353	0.0353	36	36	275.29	309.18	7800	8760	0.0353	0.0353	7.6	100	0.6	84	5.5	0.27	0.27	1.05
Line 1 Dryer	0.0090	0.0353	9.2	36	64.94	309.18	7200	8760	0.0090	0.0353	7.6	100	0.6	84	5.5	0.07	0.27	0.25
Line 2 Pre Dryer	0.0020	0.0039	2	4	14.12	34.35	7200	8760	0.0020	0.0039	7.6	100	0.6	84	5.5	0.01	0.03	0.05
Line 4 Dryer	0.0127	0.0270	13	27.5	91.76	236.18	7200	8760	0.0127	0.0270	7.6	100	0.6	84	5.5	0.10	0.20	0.35
Special Products Dryer	0.0021	0.0049	2.1	5	14.82	42.94	7200	8760	0.0021	0.0049	7.6	100	0.6	84	5.5	0.02	0.04	0.06
Heater, Burner, and Air Handing Unit (b)	0.0924	0.0924	94.2	94.2	75.00	809	812	8760	0.0924	0.0924	7.6	100	0.6	84	5.5	0.70	0.70	0.29
Emergency Diesel Generators (c)																0.87	0.87	0.22
										Total:						3.29	3.64	7.16

	Uncontrol Emission NOx (lb/hr) Maximum	Normal	NOx (T/y) Maximum	Normal	Uncontrol Emission SO2 (lb/hr) Maximum	Normal	SO2 (T/y) Maximum	Normal	Uncontrol Emission CO (lb/hr) Maximum	Normal	CO (T/y) Maximum	Normal	Uncontrol Emission VOC (lb/hr) Maximum	Normal	VOC (T/y) Maximum	Normal
Boiler No. 1 (a)	3.15	7.93	7.93	30.93	34.73	0.06	0.06	0.22	0.25	3.14	3.14	12.26	13.77	0.52	0.52	2.03
Boiler No. 2	2.35	7.06	7.06	27.53	30.92	0.04	0.04	0.17	0.19	5.93	5.93	23.12	25.97	0.39	0.39	1.51
Boiler No. 3	1.17	3.53	3.53	13.76	15.46	0.02	0.02	0.08	0.09	2.96	2.96	11.56	12.99	0.19	0.19	0.76
Line 1 Dryer	1.17	0.90	3.53	3.26	15.46	0.01	0.02	0.02	0.09	0.76	2.96	2.73	12.99	0.05	0.19	0.18
Line 2 Pre Dryer	0.13	0.20	0.39	0.71	1.72	0.001	0.002	0.004	0.010	0.16	0.33	0.59	1.44	0.01	0.02	0.04
Line 4 Dryer	0.90	1.27	2.70	4.59	11.81	0.01	0.02	0.03	0.07	1.07	2.26	3.85	9.92	0.07	0.16	0.25
Special Products Dryer	0.16	0.21	0.49	0.74	2.15	0.001	0.003	0.004	0.01	0.17	0.41	0.62	1.80	0.01	0.03	0.04
Heater, Burner, and Air Handing Unit (b)	3.07	9.24	9.24	3.75	40.45	0.06	0.06	0.02	0.24	7.76	7.76	3.15	33.98	0.51	0.51	0.21
Emergency Diesel Generators (c)	3.85	14.90	14.90	3.73	65.35	0.94	0.94	0.24	4.20	3.58	3.58	0.89	15.59	1.00	1.00	0.25
	15.97	**46.23**	**49.76**	**98.98**	**218.04**	**1.13**	**1.16**	**0.79**	**5.16**	**25.54**	**29.35**	**58.79**	**128.45**	**2.75**	**3.00**	**5.27**

Product Drying (d)	Capacity Normal ton/hr	Maximum ton/hr	Operating Hours Normal hours	Maximum hours	Emission Factor PM/PM-10 lb/ton	VOC lb/ton	Ctrl Eff (e)	Control Emission PM/PM-10 (lb/hr) Normal	Maximum	PM/PM-10 (T/y) Normal	Maximum	Uncontrol Emission VOC (lb/hr) Normal	Maximum	VOC (T/y) Normal	Maximum
Line 1 Dryer	16.94	24.56	7200	8760	0.0562	0.0372		0.95	1.38	3.43	6.05	0.63	0.91	2.27	4.00
Line 2 Dryer	15.63	22.66	7200	8760	0.0562	0.0372		0.88	1.27	3.16	5.58	0.58	0.84	2.09	3.69
Line 4 Dryer	22.13	32.08	7200	8760	0.0562	0.0372		1.24	1.80	4.48	7.90	0.82	1.19	2.96	5.23
Special Products Dryer	3.13	4.53	7200	8760	0.0562	0.0372		0.18	0.26	0.63	1.12	0.12	0.17	0.42	0.74
							Total (for the Product Drying):			11.70	20.64			7.74	13.66
Product Frying (f)															
Line 1 Fryer	16.94	24.56	7200	8760	0.192	0.031	0.50	1.63	2.36	5.85	10.33	0.52	0.75	1.87	3.31
Line 2 Fryer	15.63	22.66	7200	8760	0.192	0.031	0.50	1.50	2.18	5.40	9.53	0.48	0.70	1.73	3.05
Line 4 Fryer	22.13	32.08	7200	8760	0.192	0.031	0.50	2.12	3.08	7.65	13.49	0.68	0.99	2.45	4.32
Special Products Fryer	3.13	4.53	7200	8760	0.192	0.031	0.50	0.30	0.43	1.08	1.90	0.10	0.14	0.35	0.61
							Total (for the Product Frying):			19.99	35.25			6.40	11.28
							Total (PM-10 from the entire facility) (g):			38.84	71.86				

Note:

Natural Gas Heating Value = 1020 mmBtu/mmscf

(a) NOx & CO emissions are estimated using EFs developed from source tests conducted on January 12, 1999, as per June 3, 1999, LW's submittal to DEQ.
(b) Emissions are for all the heaters, burners, and Air Handling Unit at the facility. Air Handling Unit is exempt from the PTC, as per DEQ's letter to LW on January 27, 1998.
(c) There are two emergency generators at the facility with capacities of 230 kW & 100 kW. Emission Rates are taken from Tier II OP application, which uses EF's from EPA's AP-42 and the Manufacturer.
(d) PM and VOCs emissions from the dryers are estimated using emission factors developed from source tests conducted at the Plant in December, 1999.
(e) Cntl Eff = Control efficiency. The scrubber is estimated to have a removal efficiency of 50% for PM and PM-10, as per LW's Tier II OP application of April 7, 1999.
(f) PM and VOCs emissions from the fryers are estimated using emission factors developed from source tests conducted at the Plant in December, 1999.
(g) This total includes all PM-10 emissions from point sources at the facility (i.e., combustion units, fryers).

Lamb-Weston, Twin Falls
Tier II Permit Application
Emission Calculations

Emission Summary

FUEL BURNING

Emission Unit	Emission Point	PM		PM10		SO2		CO		NOx		VOC		Lead	
		lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr
Boiler No. 1	Boiler No. 1	17.27	2.81	17.27	2.81	1.36	0.22	75.46	12.26	190.31	30.93	12.50	2.03	1.1E-03	1.8E-04
Boiler No. 2	Boiler No. 2	12.88	2.09	12.88	2.09	1.02	0.17	142.31	23.12	169.41	27.53	9.32	1.51	8.5E-04	1.4E-04
Boiler No. 3	Boiler No. 3	6.44	1.05	6.44	1.05	0.51	0.08	71.15	11.56	84.71	13.76	4.66	0.76	4.2E-04	6.9E-05
Heaters & Burners	Fugitive	16.85	0.29	16.85	0.29	1.33	0.02	186.18	3.15	221.65	3.75	12.19	0.21	1.1E-03	1.9E-05
Line 1 Dryer	Line 1 Dryer	6.44	0.25	6.44	0.25	0.51	0.02	71.15	2.73	84.71	3.25	4.66	0.18	4.2E-04	1.6E-05
Line 2 Pre Dryer	Line 2 Pre Dryer	0.72	0.05	0.72	0.05	0.06	0.004	7.91	0.59	9.41	0.71	0.52	0.04	4.7E-05	3.5E-06
Line 4 Dryer	Line 4 Dryer	4.92	0.35	4.92	0.35	0.39	0.03	54.35	3.85	64.71	4.59	3.56	0.25	3.2E-04	2.3E-05
Special Products Dryer	Special Products Dryer	0.89	0.06	0.89	0.06	0.07	0.004	9.88	0.62	11.78	0.74	0.65	0.04	5.9E-05	3.7E-06
Emergency Diesel Generators	230KW & 100KW Generators	7.42	0.22	7.42	0.22	8.02	0.24	30.39	0.89	126.67	3.73	8.52	0.25	N/A	N/A
	Total	73.81	7.15	73.81	7.15	13.26	0.78	648.79	58.79	963.34	88.98	56.57	5.27	4.4E-03	4.6E-04

PRODUCT DRYING

Emission Unit	Emission Point	PM		PM10		VOC	
		lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr
Line 1 Dryer	Line 1 Dryer	33.14	3.43	33.14	3.43	21.94	2.27
Line 2 Dryer	Line 2 Dryer	30.57	3.16	30.57	3.16	20.24	2.09
Line 4 Dryer	Line 4 Dryer	43.29	4.48	43.29	4.48	28.66	2.96
Special Products Dryer	Special Products Dryer	6.11	0.63	6.11	0.63	4.05	0.42
	Total	113.11	11.70	113.11	11.70	74.88	7.75

PRODUCT FRYING

Emission Unit	Emission Point	PM		PM10		VOC	
		lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr
Line 1 Scrubber	Line 1 Stack Wash	56.60	5.86	56.60	5.86	18.11	1.87
Line 2 Scrubber	Line 2 Stack Wash	52.22	5.40	52.22	5.40	16.71	1.73
Line 4 Scrubber	Line 4 Stack Wash	73.94	7.65	73.94	7.65	23.66	2.45
Special Products Scrubber	Special Products Stack Wash	10.44	1.08	10.44	1.08	3.34	0.35
	Total	193.20	19.99	193.20	19.99	61.82	6.40

FUGITIVE DUST

Emission Unit	Emission Point	PM		PM10	
		lb/day	ton/yr	lb/day	ton/yr
Roads	Fugitive	263.06	18.93	81.00	5.44
Material Transfer	Fugitive	0.76	0.12	0.36	0.05
	Total	263.85	19.04	81.36	5.50

PLANT TOTAL

	PM		PM10		SO2		CO		NOx		VOC		Lead	
	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr	lb/day	ton/yr
Plant Total	643.98	57.88	461.49	44.34	13.26	0.78	648.79	58.79	963.34	88.98	193.27	19.41	4.4E-03	4.6E-04

Lamb-Weston, Twin Falls
Emission Calculations

Emission Summary by Emission Unit

Emission Unit	PM			PM10			SO2			CO			NOx			VOC			Lead		
	lb/hr	lb/day	ton/yr	lb/hr	lb/day	ton/yr	lb/hr	lb/day	ton/yr	lb/hr	lb/day	ton/yr	lb/hr	lb/day	ton/yr	lb/hr	lb/day	ton/yr	lb/hr	lb/day	ton/yr
Boiler No. 1	0.72	17.27	2.81	0.72	17.27	2.81	0.06	1.38	0.22	3.14	75.46	12.26	7.93	190.31	30.93	0.52	12.50	2.03	4.7E-05	1.1E-03	1.8E-04
Boiler No. 2	0.54	12.88	2.09	0.54	12.88	2.09	0.04	1.02	0.17	5.93	142.31	23.12	7.06	169.41	27.53	0.39	9.32	1.51	3.5E-05	8.5E-04	1.4E-04
Boiler No. 3	0.27	6.44	1.05	0.27	6.44	1.05	0.02	0.51	0.08	2.96	71.15	11.56	3.53	84.71	13.76	0.19	4.66	0.76	1.8E-05	4.2E-04	6.9E-05
Heaters & Burners	0.70	16.85	0.29	0.70	16.85	0.29	0.06	1.33	0.02	7.76	186.18	3.15	9.24	221.65	3.75	0.51	12.19	0.21	4.6E-05	1.1E-03	1.9E-05
Line 1 Dryer																					
(Fuel Burning)	0.27	6.44	0.25	0.27	6.44	0.25	0.02	0.51	0.02	2.96	71.15	2.73	3.53	84.71	3.25	0.19	4.66	0.18	1.8E-05	4.2E-04	1.6E-05
(Drying)	1.38	33.14	3.43	1.38	33.14	3.43										0.91	21.94	2.27			
Total	1.65	39.58	3.67	1.65	39.58	3.67	0.02	0.51	0.02	2.96	71.15	2.73	3.53	84.71	3.25	1.11	26.60	2.45	1.8E-05	4.2E-04	1.6E-05
Line 2 Dryer (Pre-heater)																					
(Fuel Burning)	0.03	0.72	0.05	0.03	0.72	0.05	0.00	0.06	0.004	0.33	7.91	0.59	0.39	9.41	0.71	0.02	0.52	0.04	2.0E-06	4.7E-05	3.5E-06
(Drying)	1.27	30.57	3.16	1.27	30.57	3.16										0.84	20.24	2.09			
Total	1.30	31.29	3.22	1.30	31.29	3.22	0.00	0.06	0.00	0.33	7.91	0.59	0.39	9.41	0.71	0.86	20.76	2.13	2.0E-06	4.7E-05	3.5E-06
Line 4 Dryer																					
(Fuel Burning)	0.20	4.92	0.35	0.20	4.92	0.35	0.02	0.39	0.03	2.26	54.35	3.85	2.70	64.71	4.59	0.15	3.56	0.25	1.3E-05	3.2E-04	2.3E-05
(Drying)	1.80	43.29	4.48	1.80	43.29	4.48										1.19	28.66	2.96			
Total	2.01	48.21	4.83	2.01	48.21	4.83	0.02	0.39	0.03	2.26	54.35	3.85	2.70	64.71	4.59	1.34	32.21	3.22	1.3E-05	3.2E-04	2.3E-05
Special Products Dryer																					
(Fuel Burning)	0.04	0.89	0.06	0.04	0.89	0.06	0.00	0.07	0.004	0.41	9.88	0.62	0.49	11.76	0.74	0.03	0.65	0.04	2.5E-06	5.9E-05	3.7E-06
(Drying)	0.25	6.11	0.63	0.25	6.11	0.63										0.17	4.05	0.42			
Total	0.29	7.01	0.69	0.29	7.01	0.69	0.00	0.07	0.00	0.41	9.88	0.62	0.49	11.76	0.74	0.20	4.69	0.46	2.5E-06	5.9E-05	3.7E-06
Emergency Diesel Generators	0.87	7.42	0.22	0.87	7.42	0.22	0.94	8.02	0.24	3.58	30.39	0.89	14.90	126.67	3.73	1.00	8.52	0.25	N/A	N/A	N/A
Line 1 Scrubber	2.36	56.60	5.86	2.36	56.60	5.86										0.75	18.11	1.87			
Line 2 Scrubber	2.18	52.22	5.40	2.18	52.22	5.40										0.70	16.71	1.73			
Line 4 Scrubber	3.08	73.94	7.65	3.08	73.94	7.65										0.99	23.66	2.45			
Special Products Scrubber	0.44	10.44	1.08	0.44	10.44	1.08										0.14	3.34	0.35			
Roads	10.96	263.08	18.93	3.38	81.00	5.44															
Material Transfer	0.05	0.76	0.12	0.02	0.36	0.05															
Plant Total	27.41	643.98	57.88	19.80	461.49	44.34	1.16	13.26	0.78	29.34	648.79	58.79	49.76	963.34	88.98	8.70	193.27	19.41	1.8E-04	4.4E-03	4.6E-04

Appendix B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

DEC 2 7 1999

Reply To
Attn Of: OAQ-107

Mr. Dave Kubosumi
Engineering Manager
Lamb Weston, Inc.
856 Russet Street
Twin Falls, Idaho 83303-0128

Re: NSPS Subpart Db Applicability

Dear Mr. Kubosumi:

This letter responds to your November 8, 1999, request to the United States Environmental Protection Agency, Region 10 (Region 10), for an applicability determination for Boiler No. 1. The boiler commenced construction after June 19, 1984, and its heat input capacity is greater than 100 MMBtu/hr. Thus, the requirements of 40 C.F.R. Part 60, Subpart Db - Standards of Performance for Industrial - Commercial - Institutional Steam Generating Units applied. Subsequent to a recent permanent physical change to the boiler, its heat input capacity decreased such that it is now less than 100 MMBtu/hr. For the reasons discussed below, Region 10 has determined that the boiler is no longer subject to the requirements of 40 C.F.R. Part 60, Subpart Db.

Lamb Weston has successfully demonstrated that the boiler's heat input capacity is less than 100 MMBtu/hr. On November 3, 1999, the boiler was operated at full load during four 15-minute periods. The draft fan motor was operating at full speed and air inlet dampers were fully open. Maximum natural gas flow rates were maintained so as to optimize combustion efficiency. The highest 15-minute heat input value recorded by the facility was 96.6 MMBtu/hr.

Lamb Weston has also successfully documented that the boiler's heat input capacity has been reduced by replacing a 200 horsepower (hp) draft fan motor with a 75 hp motor, effectively reducing fan speed from 1725 revolutions per minute (rpm) to 840 rpm. As prescribed in our June 30, 1999, letter to Lamb-Weston, a boiler derate must be accomplished in accordance with the following criteria:

1. Be accomplished through a permanent physical change which will preclude it from operating at a capacity greater than the derated value.
2. Be a change that cannot be easily undone
3. Require a system shutdown to make the change or to reverse it
4. Reduce the capacity, not the feed rate, of the boiler.

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January 11, 1999

LambWeston

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JAN 13 1999

DIV. OF ENVIRONMENTAL QUALITY
AIR & HAZARDOUS WASTE

John Keenan
USEPA, Region 10
1200 6th Ave. OAQ – 107
Seattle, WA 98101-9797

Dear John:

We are in the planning stages of de-rating our 150,000 lb/hr. below the 100 MM Btu firing rate in order to avoid being affected by 40 CFR 60 Subpart Db. We have been in contact with IDEQ on this matter and I believe Sue Richards, or someone from her staff has spoken to you on this matter. I believe that IDEQ supports this move, as per their letter dated January 6th, 1999, as long as Lamb Weston can meet EPA's criteria. The following plan addresses this criteria, as we understand it. IDEQ was very helpful in the research and supplied us with documents from the EPA web site that supported the de-rating of boilers.

Our plan is to de-rate our boiler to a maximum firing rate of 98.5 MM Btu's. This plan will be accomplished as follows:

- The 200-hp fan motor will be changed to a 75-hp.
- The speed of the fan will be reduced from 1800 rpm to 840 rpm.
- The wind box damper will be adjusted to the proper airflow when the burner is re-tuned to a maximum firing rate of 98.5 MM Btu's and welded in place.
- Coen (burner manufacturer) or a representative of Coen will submit all calculations to support the new firing rate.
- The gas valve and forced draft damper will be re-adjusted to accommodate the reduced airflow and to produce proper combustion at the new maximum firing rate.

Please let me know if this plan is acceptable or what else we may need to do before we schedule the boiler down for these modifications. What else do we need to submit after we have an acceptable plan and we have completed the modification before we can discontinue the operation of the CEM system?

Thank you,

Bill Pack

Enclosure
Cc: Ed White, Lamb-Weston, Inc.
Sue Richards, IDEQ
Yihong Chen, IDEQ

Word/Bill/Boilde-r

Lamb-Weston, Inc., P.O. Box 128, 856 Russet St., Twin Falls, ID 83303-0128
Telephone 208-733-5664 • FAX 208-736-5661

Dave Harbi

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

JUN 30 1999

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JUL 07 1999
DIV. OF ENVIRONMENTAL QUALITY
AIR & HAZARDOUS WASTE

Reply To
Attn Of: OAQ-107

Mr. Bill Pack
Lamb-Weston, Inc.
P.O. Box 128
Twin Falls, Idaho 83303-0128

Re: Guidance for NSPS Subpart Db Boiler Derate

Dear Mr. Pack:

This letter is in response to your January 11, 1999, request to EPA Region 10 to review your plan to derate the 150,000 lb/hr Combustion Engineering natural gas fired boiler located in Twin Falls, Idaho. The boiler is subject to 40 C.F.R. 60, Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units. We have reviewed your plan along with the additional information you submitted on April 20, 1999. We are providing you guidance as detailed below.

According to your plan, the derate will be accomplished through the following physical change to the boiler:

- The 200 horsepower (hp) combustion air fan motor will be replaced with a 75 hp fan motor.
- The maximum speed of the fan will be reduced from 1725 revolutions per minute (rpm) to 840 rpm.
- The wind box damper will be welded in place after being adjusted to tune the burner to a maximum firing rate of 98.5 MMBtu..
- After the wind box damper has been welded in place, the natural gas valve and forced draft damper will be readjusted to accommodate the reduced air flow and to ensure proper combustion at the new maximum firing rate.

EPA policy specifies that an approved boiler derate must satisfy all of the following conditions:

- The derate is accomplished through a permanent physical change to the affected facility which will preclude it from operating at a capacity greater than the derated value.
- The derate is a change that cannot be easily undone.
- The derate requires a system shutdown to make the change or to reverse it.
- The derate reduces the capacity, not the feed rate, of the boiler.

Information you have submitted to EPA Region 10 indicates that your proposal to replace the combustion fan motor and weld the wind box damper in place represents a physical change that

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cannot be easily undone. The physical change limits the maximum flow of air available for combustion and, thus, limits the firing capacity of the boiler. The physical change will require a system shutdown, and undoing the physical change will also require a system shutdown.

We suggest you satisfy each of the following requirements if you intend to further pursue a boiler derate:

1. Implement proposed physical change to the boiler as specified in your January 11 and April 20, 1999, submittals.
2. Verify the maximum heat input capacity of the boiler through a demonstration using the techniques for heat input measurement described in Section 4.1 of the ASME Power Test Code. Conduct the demonstration over a 24 hour period. During the demonstration, the firing rate motor potentiometer must be set to its maximum (i.e. full-scale) position in order to achieve the highest possible natural gas flow rate. In addition, the forced draft damper must be set so as to achieve the highest possible combustion air flow rate.
3. Monitor and keep records of the natural gas flow rate on a continuous basis. Read and record natural gas flow rate (ft^3/min), no less frequently than on a daily basis.
4. Report to EPA Region 10 on a quarterly basis the natural gas fired heat input capacity of the boiler (MMBtu/hr) for each boiler operating day.

Approval or disapproval of the proposed boiler derate will be determined by EPA Region 10 only after you comply with the aforementioned conditions and submit your demonstration results to us for review. In the event you cannot conduct your demonstration under the prescribed conditions, please provide an explanation.

In the event you ever intend to undo the aforementioned physical change such that the boiler's capacity increases above 100 MMBtu/hr, then any potential derate approval becomes invalid.

This response has been coordinated with EPA's Office of Enforcement and Compliance Assurance. If you have any questions regarding any aspect of this response, please contact either Dan Meyer or John Keenan of this office at (206) 553-4150 and (206) 553-1817, respectively.

Sincerely,

Raymond Nye

Douglas E. Hardesty, Manager
Federal and Delegated Air Programs

cc: Ms. Yihong Chen, IDEQ
Mr. James Greaves, USEPA Region 10 - Idaho Operations Office
Ms. Sue Richards, IDEQ
Mr. Ed White, Lamb-Weston

HC/NC/JF ✓
TWIN FALLS

LambWeston

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DEC 01 1998
DIV. OF ENVIRONMENTAL QUALITY
AIR & HAZARDOUS WASTE

November 30, 1998

Daniel Salgado
Air quality Permits Manager
1410 N. Hilton
Boise, ID 83706

Dear Dan,

The attached documents give a brief explanation on the plants plan to de-rate the 150,000-lb/hr boiler to less than 100,000 MMbtu's. I have also summarized this plan below. Would you please review this plan and respond to me if it is acceptable from a regulator's point of view. We are also interested to know if IDEQ will support these modifications when we present them to EPA in order to limit our compliance under NSPS.

Lamb Weston plans to remove the 200 hp, 1200-rpm forced draft fan motor and replace it with a 75 hp, 900-rpm motor. The plant will have Coen (burner manufacturer) tune the air dampers on the wind box and then permanently secure them. These dampers will be tuned when the boiler is running at a firing rate equal to 99.5 MMbtu's. The main gas line orifice will also be changed to give a full-scale reading of 100,000 cfm and the boiler controller will be reset for this value.

If you have any questions about this matter please do not hesitate to call, my direct line is (208) 736 5640.

Sincerely,

Bill Pack

Cc: Ed White

Lamb-Weston, Inc., P.O. Box 128, 856 Russet St., Twin Falls, ID 83303-0128
Telephone 208-733-5664 • FAX 208-736-5661

Coen Company, Inc.
1510 Tanforan Avenue
Woodland, California 95776
Telephone: (530) 668-2100
Facsimile: (530) 668-2171

Name: Don Kaes
Fax Number: 208-736-5661
From: Brett Barnes (email: bbarnes@coen.com)
Number of pages including this one: 1

Company: Lamb Weston
Phone Number: 208-736-5642
Date: November 23, 1998
Proposal: 98-20-0800

Subject: Coen Files: 20D-05117 & 20D-10772

Per my conversation with Allan Woodbury, if fan RPM is reduced to about 840 or so, combustion air to burner will be limited such that the burner will only be able to fire 99.5 mmbtu/hr. The actual air flow can be further limited in the field by a Coen Field Service Representative by adjusting the windbox air control damper. Also, the inlet vane damper can be fixed in place so that air flow from remote fan cannot be increased or adjusted.

If you have any questions on this or need anything else, please call me at (530) 668 - 2103.

Sincerely Yours,
COEN COMPANY, INC.

Brett

Brett Barnes
Application Engineer
Steam Generation Systems

cc: Allan Woodbury

North Associates Inc.

2091 E. Murray-Holladay Rd. Suite 11
Salt Lake City UT 84117 USA

Phone 801-274-3333
Fax 801-274-9999
Email north.assoc@juno.com

QUOTATION

DATE: 11/24/98

FAX Page 1 of 1

TO: Don Kaes
Lamb-Weston/Twin Falls

SUBJ: Motor for FD Fan
Boiler De-Rate

We are pleased to offer the following for your consideration & evaluation:

ITM	QTY	DESCRIPTION	UNIT PRICE
a	1	75 hp TEFC 900 rpm 460 Volt 60 Hz 3 ph Motor (885 rpm actual)	$ 4,709.00
b	1	30 hp TEFC 900 rpm 460 Volt 60 Hz 3 ph Motor (880 rpm actual)	$ 2,067.00
c	1	30 hp Nema 12 Soft Start	$ 1,875.00

PMT TERMS: Net 30 days. 1.5% interest charge added monthly to unpaid accounts.
SHIPMENT: 2-6 weeks after release.
FOB: origin.
FIELD LABOR/SUPERVISION: not included.
FREIGHT/TAXES: not included.
PRICING VALID: for 30 days.

By: H. Allan Woodbury

awQ

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OCT - 4 1999

DIV. OF ENVIRONMENTAL QUALITY
TECHNICAL SERVICES OFFICE

LambWeston

(AIR # 083-00062)

Lamb Weston, Inc.
P.O. Box 128
Twin Falls, Idaho 83303-0128
30-Sep-99

RE: NSPS Subpart Db Boiler Derate

Douglas E. Hardesty, Manager Federal and Delegated Air Programs
United States Environmental Protection Agency Region 10
1200 Sixth Avenue
Seattle, WA 98101

Dear Douglas E. Hardesty, Manager Federal and Delegated Air Programs,

I have attached the test plan and protocol that the Lamb-Weston, Twin Falls plant will follow to complete the final phase of the boiler #1 de-rating. The plan outlines the "heat input verification test" that will be conducted on November 3, 1999.

We have selected the test procedure in accordance with my discussions with you. We have chosen to do the 15 minute intervals because of the noise concern. The plant is located in the town of Twin Falls and a 100% full-run steam test is very loud and we want to minimize the noise, while still performing acceptable test replications.

I have verified all of the test procedures with the manufacturer and the calibration equipment is being certified by the manufacturer. The test will be conducted by technicians, properly trained in this testing procedure.

Please call me at (208) 733-5664 to discuss the test plan or any questions you may have.

Brian Stoddard
Engineering Technician
Enclosure (1)
cc: Ms. Yihong Chen, IDEQ
Ms. Sue Richards, IDEQ
Central File

non-confidential

HEAT INPUT CAPACITY VERIFICATION CONDUCTED ON THE BOILER # 1
LAMB WESTON, TWIN FALLS, IDAHO

Background:

The Lamb-Weston Twin Falls, Idaho plant is in the final phases of converting the boiler # 1 to a lower heat input capacity and to de-rate the boiler below the 100 MMBtu threshold as defined in New Source Performance Standards. The boiler heat input will be reduced to 98.5 MMBtu and the following is the heat input capacity test outline and procedures.

Test Proposal:

The heat input capacity test will verify the maximum heat input of Boiler # 1. Test parameters will follow:

1. Section 4.1 of the ASME Power Test Code (PTC)—Section 4 INPUT MEASUREMENT—Gaseous Fuel—Quantity Measurement...Paragraph 4.09. Which states:

   > "Measurement of the relatively large volume of gaseous fuel normally encountered in testing steam generators requires the use of the orifice, flow nozzle or venturi. The measuring device shall be calibrated prior to and after the test. For probable measurement errors see Par. 3.03.4..."

2. Test Results will be calculated in MMBtu/hr.

3. The test replications (or runs) will be conducted in four (4) fifteen (15) minute test periods with the Boiler operating at 100% firing rate.

4. Sample time for all test runs will be 15 minutes.

5. The test is scheduled for November 3,1999 from 0800 to 1700. It is planned to complete all testing the same day.

6. The written report will follow within 30 days following the completion of the tests conducted on November 3, 1999.

Project Organization and Responsibilities

The following Lamb-Weston personnel will conduct and participate in the test.

Project Lead	Brian Stoddard	(208) 733-5664
Support Personnel	Don Kaes	
	Tom Alexander	
	Paul Will	

Test Procedures

The gas flow monitoring equipment (pressure, differential, and temperature transmitters, see Figure 1) will be calibrated before and after the test with certified test equipment, this equipment is listed in the following section--Operational Data and Instrumentation. The monitoring equipment calibration will follow manufactures' specification (see Appendix A). Data recording will begin 5 minutes after the boiler gas valve has reached full open and continue for a 15 minute period in 1 minute intervals.

Operational Data and Instrumentation

All Transmitter outputs go to the Modicon PLC (see Figure 1).
The scfh (standard cubic feet per hour) value is displayed on the boiler control panel. The gas flow calculation inputs and the calculation results are recorded in the Process Control System via 'i Fix Dynamics'. These values are exported to an Excell spread sheet. At the spreadsheet a conversion is preformed to report the natural gas flow rate from scfh to MMBtu/hr.

The actual heat value in MMBtu/scfh will be obtained from the IGI Resources Inc. bill as the billing factor. The billing factor will be averaged (this value will vary, because of the region that the gas comes from) for the prior month and this portion of the bill will be included in the report.

The gas line pressure is monitored by a Foxboro-Model 841 GM-AI1, the differential pressure is monitored by a Rosemount-Model 1151 DP, the gas line temperature is monitored by a Foxboro RTD with stainless steel well Model BO184RA, and the boiler room temperature is monitored by a home made thermal-couple.

The gas flow monitoring will be calibrated by the following equipment: DRUCK Model DPI600/TR Pressure indicator/calibrator, TRANSMATION Model 1040 Digital calibrator/indicator. This equipment's certificates will be included in the report.

LambWeston

HEAT INPUT CAPACITY VERICATION REPORT

LAMB WESTON, INC.
Twin Falls, Idaho

HEAT INPUT CAPACITY VERIFICATION ON BOILER # 1

November 3, 1999

Prepared by

Brian Stoddard

Lamb Weston, Inc., P.O. Box 128, 856 Russet St., Twin Falls, ID 83303-0128
Telephone 208-733-5664 • FAX 208-736-5696

Table 1 Continued
Heat Input Capacity Test Results
Boiler #1 Gas Input

Deviation of Actual Readings

Gas Line Temperature Transmitter

Unit: FOXBORO, PR-3U Platinum Resistance Temperature Detector, Range -320 to +1200 F
S/N: PR-14UBS-003

Before Test, 0920 hrs.					After Test, 1213 hrs.				
Input Element	Output (omhs)	Graph* see App. A	Deviation	Reference Value* (F)	Input Element	Output (omhs)	Graph* see App. A	Deviation	Reference Value* (F)
Ambient air	107.50	108.22	-0.72	70	Ambient air	111.40	110.60	0.81	81
Ice water bath	100.30	100.43	-0.13	34	Ice water bath	100.30	100.43	-0.13	34
Hot water bath	132.40	132.38	0.02	183	Hot water bath	129.50	129.41	0.09	169

Graph* value obtain from manufacturer's specifications (see Appendix A)
Reference Value* is from a FLUKE 77 Seires II Multimeter S/N 64920461with 80TK Thermocouple module S/N 6564053

Deviation of Actual Readings

Boiler Room Transmitter

Unit: Lamb-Weston thermocouple
S/N: none

Before Test, 0940 hrs.			
Input Element	Output* (F)	Reference Value* (F)	Deviation
Ambient air	70.00	70.40	-0.40
Ice water bath	34.00	34.50	-0.50
Hot water bath	167.00	167.00	0.00

After Test, 1205 hrs.			
Input Element	Output* (F)	Reference Value* (F)	Deviation
Ambient air	78.00	76.50	1.50
Ice water bath	36.00	35.00	1.00
Hot water bath	183.00	183.00	0.00

Output* is a direct reading taken from the PLC
Reference Value* is from a FLUKE 77 Seires II Multimeter S/N 64920461with 80TK Thermocouple module S/N 6564053

Test Procedures

The gas flow monitoring equipment (pressure, differential pressure, and temperature transmitters) was calibrated before and after the testing with certified equipment. The monitoring equipment calibration was calibrated following the manufactures' specification (see Appendix A). The calibration data was hand recorded (see Appendix E) during calibration and put into Table 1.

Calibration The calibration results are in Table 1. The before test calibrations began at 0844 ended at 0951 hours. The after test calibration began at 1206 and ended at 1243 hours. Calibration equipment certification sheets are in Appendix D.

Data Appendix B shows the 1-minute values before, during, and after the test. The gray section in Appendix B displays data during the before and after calibration. For the gas line temperature it was necessary to take the RTD off line during calibration to read the output in ohms. This explains the 32,767 values recorded.
The blue section displays data for test #1. The cyan section displays data for test #2. The yellow section displays data for test #3. The red section displays data for test #4.
The scfh averaging data begins at 0955 and ended at 1015 hours for test number 1, 1025 to 1045 hours for test number 2, 1055 to 1115 hours for test number 3, 1125 to 1145 hours for test number 4.
Fortunately, plant production used all the steam generated and boiler # 1 ran at 100% of the new rated value for the duration of the calibrations and the 4 test runs.

Calculations The Standard Cubic Feet per Hour (scfh) is calculated in the Modicon Program using the monitoring equipment's outputs and a standard flow calculation for an orifice with temperature compensation.
The conversion from scfh to MMBtu/h is achieved by applying the gas factor from Intermountain Gas Company.

The MMBtu's are calculated using the following equation:

$$MMBtu = scfh \times GasFactor$$

Discussion

As noted, the results of the tests show that the gas flow is operating within the allowable specification. All instrument calibrations and all testing parameters were within specifications. Measured gas flow for the four tests averaged 96,050,515 MMBtu/hr. The limit for the source is 100 MMBtu's, specified by Subpart Db. The Boiler #1 maintained 100% firing rate before and after the tests were conducted, therefore the results are valid in all respects.

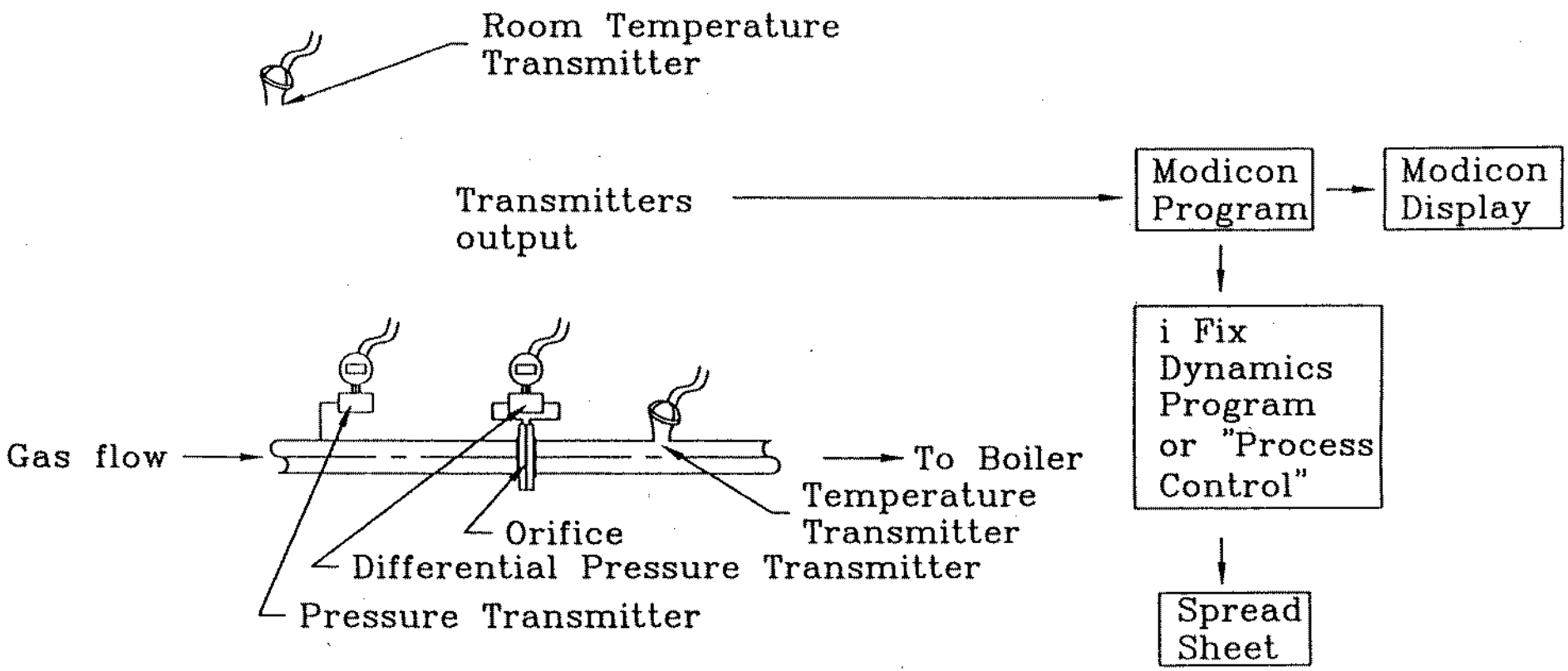
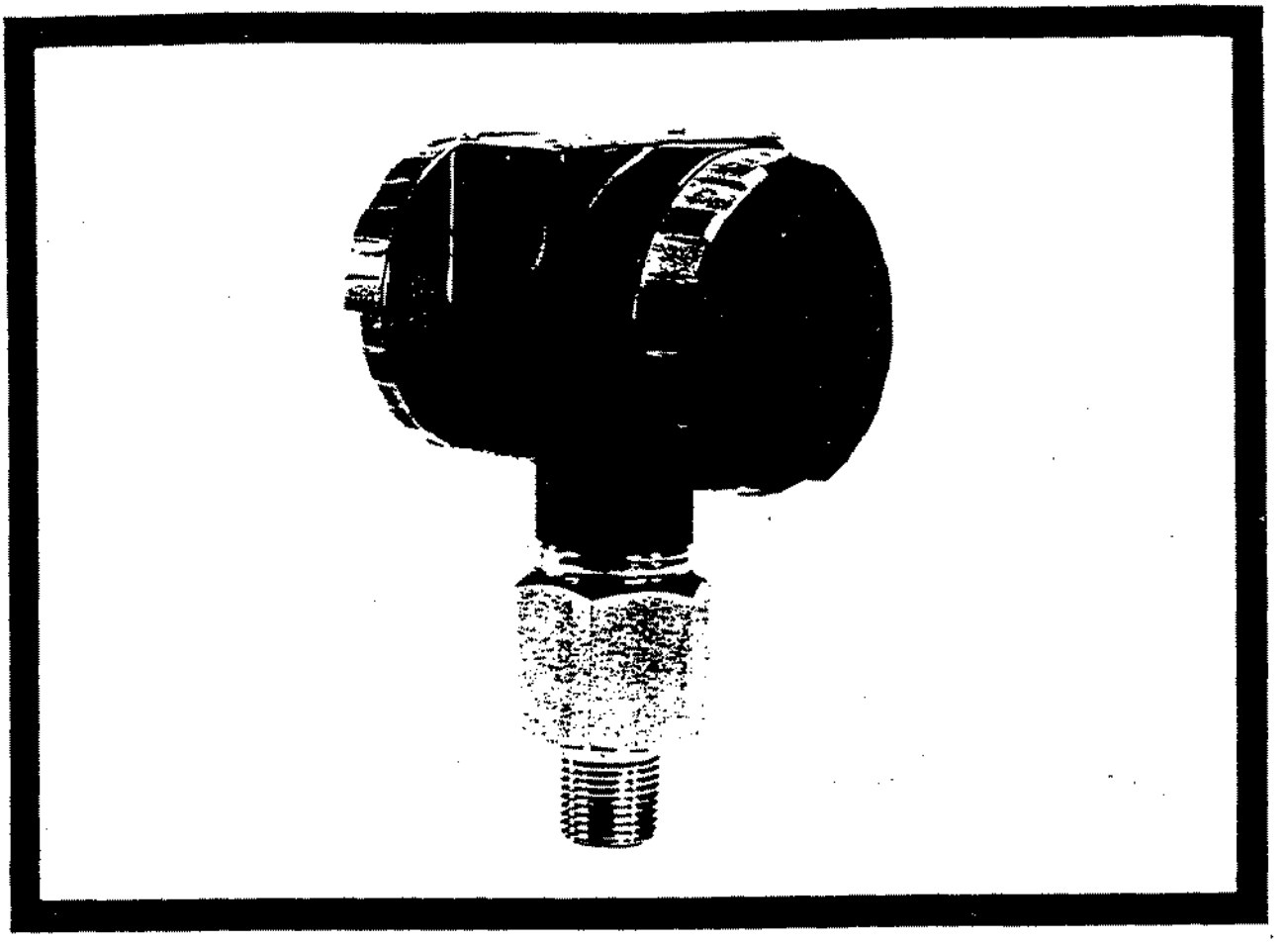


Figure 1

Boiler #1
Gas Line



841 ELECTRONIC GAUGE PRESSURE TRANSMITTERS

These compact, cost-saving transmitters precisely measure gauge pressure and transmit a proportional 4 to 20 mA dc signal. They are available with standard or explosionproof housings.

DIRECT PROCESS MOUNTING

With its small size, light weight, and 1/2 NPT (or R 1/2) external process connection, the 841 Transmitter is installed on, and supported by, the process piping. This greatly reduces the cost of installation and maintenance, as compared to other transmitters that require a pipe stand and mounting bracket.

COMPACT SIZE AND LIGHTWEIGHT

These transmitters utilize integrated circuit sensor technology to deliver accurate and dependable pressure measurements. They are compact in size and weigh only 1.1 kg (2.3 lb) with the standard housing.

LOW COST OF OWNERSHIP

Not only is the initial cost of this transmitter attractive, but cost considerations must also include the savings realized as a result of the unit's total replacement concept. The lightweight, compact, and direct process-mounted design promotes ease of initial installation or rapid replacement of the transmitter. In addition, spare-parts inventory and maintenance training is totally eliminated. Combine these features with the corrosion, overrange, and radio-frequency interference (RFI) protection, and the result is a transmitter with the lowest cost of ownership in the market today.

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Section 2 Transmitter Functions

OVERVIEW

This section contains information on commissioning and operating Model 1151 Smart Pressure Transmitters. Instructions for setting transmitter switches (prior to installation) and explanations of software functions are provided in this section.

For your convenience, fast key sequences are listed for each software function. If you are unfamiliar with the communicator or how to follow fast key sequences, please refer to Appendices A and B for communicator operations.

Commissioning the Transmitter on the Bench

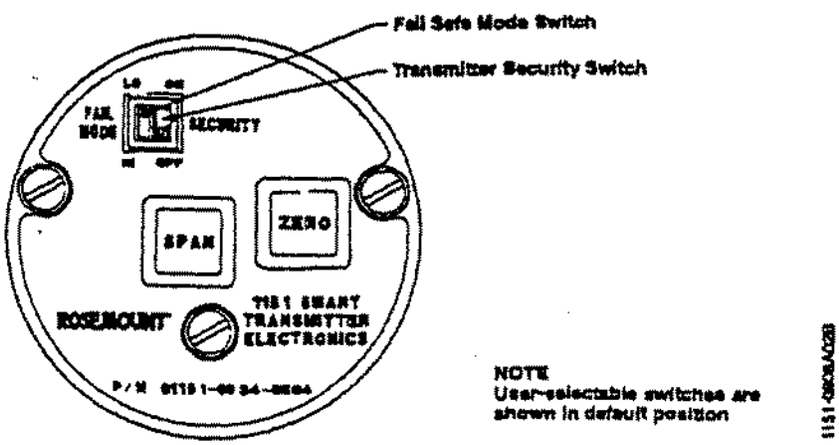
Commissioning consists of testing the transmitter, testing the loop, and verifying transmitter configuration data. Model 1151 Smart transmitters may be commissioned either before or after installation. We recommend commissioning the transmitter on the bench before installation. This ensures that all transmitter components are in good working order and acquaints you with the operation of the device.

To avoid exposing the transmitter electronics to the plant environment after installation, set the failure mode and transmitter security switches during the commissioning stage on the bench.

Setting Hardware Switches

The Model 1151 Smart Pressure Transmitter contains hardware switches that provide user-selectable operation of the failure mode and transmitter security. The switches are located on the electronics assembly just inside the electronics housing cover, as shown in Figure 2-1.

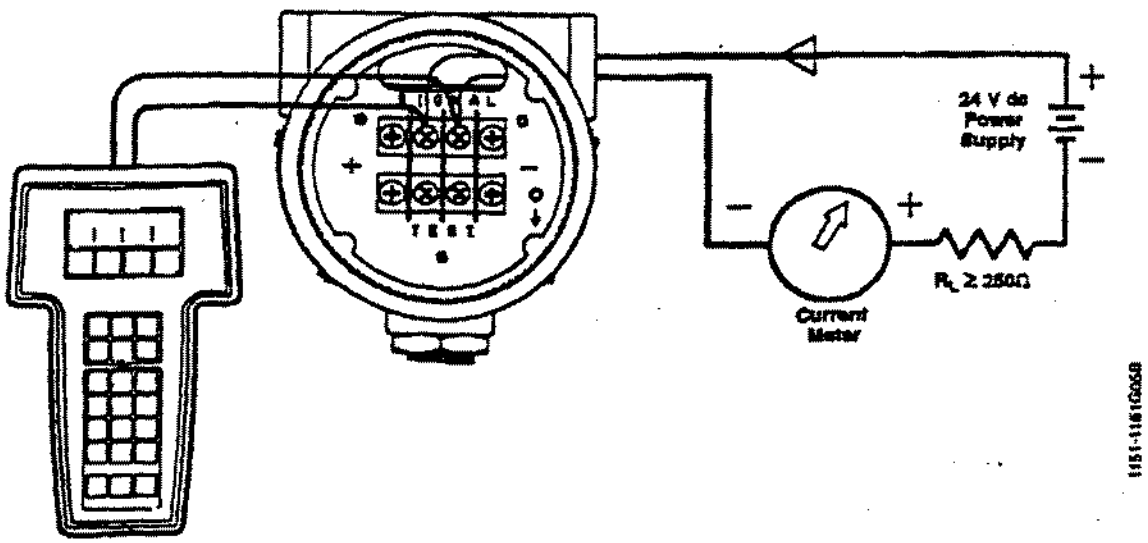
FIGURE 2-1.
Transmitter Switch Locations.



Wiring Diagrams (Bench Hook-up)

After the bench equipment is connected as shown in Figure 2-2, turn on the HART-based communicator by pressing the ON/OFF key. The communicator will search for a HART-compatible device and will indicate when the connection is made. If the connection is not made, the communicator will indicate that no device was found. If this occurs, refer to Section 4--Troubleshooting.

FIGURE 2-2. Bench Hook-up.



NOTE
An alternate location to connect an ammeter is on the set of terminals labelled "TEST." Connect the positive lead of the ammeter to the positive test terminal, and the negative lead of the ammeter to the negative test terminal.

Calibration Overview

Complete calibration of the Model 1151 Smart Pressure Transmitter involves the following tasks:

Configure the Analog Output Parameters

- Setting Process Variable Units (page 2-7)
- Rerranging (page 2-7)
- Setting Output Type (page 2-11)
- Setting Damping (page 2-12)

Calibrate the Sensor

- Full Trim (page 2-12)
- Zero Trim (page 2-13)

Calibrate the 4–20 mA Output

- 4–20 mA Output Trim (page 2-16) or
- 4–20 mA Output Trim Using Other Scale (page 2-16)

FIGURE 2-3. Model 1151 Transmitter Data Flow with Calibration Options.

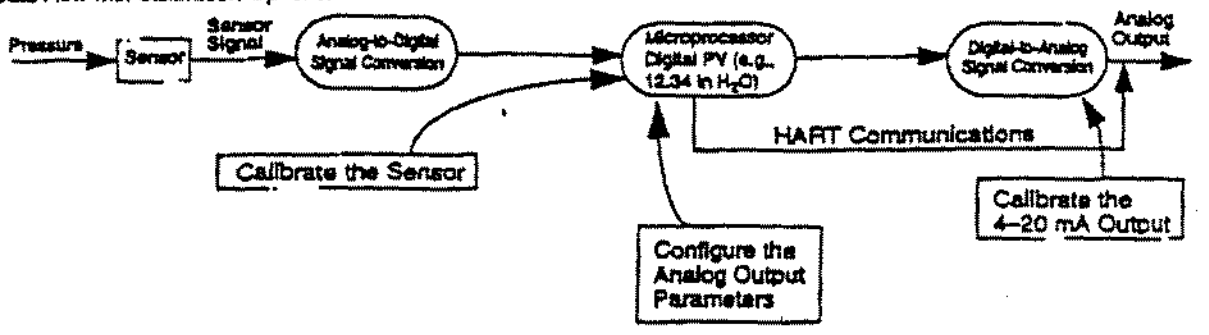


Figure 2-3 illustrates the Model 1151 transmitter data flow. This data flow can be summarized in four major steps:

1. A change in pressure is measured by a change in the sensor output (Sensor Signal).
2. The sensor signal is converted to a digital format that can be understood by the microprocessor (Analog-to-Digital Signal Conversion).
3. Corrections are performed in the microprocessor to obtain a digital representation of the process input (Digital PV).
4. The Digital PV is converted to an analog value (Digital-to-Analog Signal Conversion).

Figure 2-3 also identifies the approximate transmitter location for each calibration task. Note that the data flows from left to right, and a parameter change affects all values to the right of the changed parameter.

Not all calibration procedures should be performed for each Model 1151 transmitter. In addition, some procedures are appropriate for bench calibration, but should not be performed during field calibration. Table 2-1 identifies the recommended calibration procedures for each type of Model 1151 transmitter for both bench and field calibration.

Common Functions

The following tasks are a common part of a transmitter commissioning.

Setting the Loop to Manual

Whenever you are preparing to send or request data that would disrupt the loop or change the output of the transmitter, you will have to set the loop to manual. Both the HART Communicator Model 275 and the Rosemount Model 268 will prompt you to set the loop to manual when necessary. Keep in mind that acknowledging this prompter does not set the loop to manual. It's only a reminder; you have to set the loop to manual yourself, as a separate operation.

Change Non-output Related Information

HART Comm.	1, 3, 4
Model 268	F3, F3,

The Model 1151 Smart contains several configuration parameters that do not directly affect the transmitter output. These parameters include:

Date, Descriptor, Message, and Meter type.

Sending Data to the Transmitter

HART Comm.	Note
Model 268	F3, F4,

Whenever you update transmitter configuration data with a HART-based communicator, the data you enter must be sent to the transmitter memory.

NOTE
Depending on the task, an option to enter the data (or send changes and enter the data) will appear at the end of the configuration function. Follow the on-screen prompts to complete the send data function.

Review the transmitter memory to ensure that configuration changes have been entered.

Configure the Analog Output Parameters

Setting Process Variable Units

HART Comm.	1, 3
Model 268	F3, F2

By setting the output units you can monitor the process in the measures you specify. This is important if your plant uses different units than those preset by Rosemount Inc. You can select output units from among 14 output options. The Model 1151 Smart allows any of the following output units: inH_2O, inHg, ftH_2O, mmH_2O, mmHg, psi, bar, mbar, g/cm^2, kg/cm^2, Pa, kPa, torr, and atm.

Reranging

One of the most common configuration tasks involves reranging the transmitter 4 and 20 mA points.

Reranging matches the transmitter range points with the applied process pressures. It can be performed three ways: using the communicator only, using the communicator and a reference pressure, or by using the integral zero and span buttons and a reference pressure.

To decide which method is appropriate, consider the following:

- Reranging with only the communicator changes the analog 4 and 20 mA points independently without a pressure input.

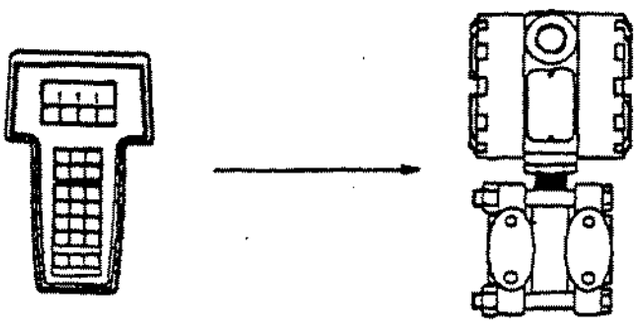
This means that when you change either the 4 or 20 mA setting, you also change the span. For instance:

NOTE
Do not rerange the transmitter such that the 4 and 20 mA range points (upper range value–URV and lower range value–LRV) are outside the high and low digital sensor trim values. To optimize performance, the digital trim span should be equal to or slightly greater than the 4–20 mA span.

Reranging with a Communicator Only

[illegible]	1, 2, 3, 1, 1
[illegible]	F3, F2, F1, F3, F1

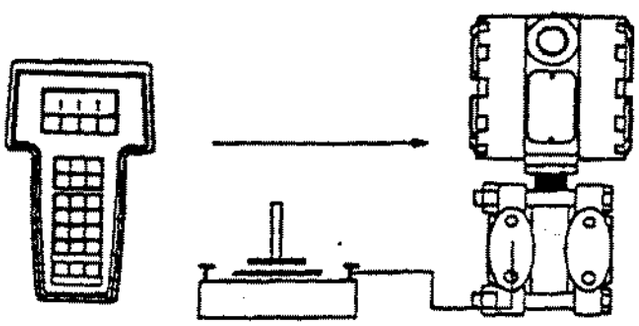
Reranging with the keypad and no pressure input changes the 4 and 20 mA points independently.



Reranging with a Pressure Input Source and a Communicator

[illegible]	1, 2, 3, 1, 2
[illegible]	F3, F2, F1, F3, F2

Reranging with a pressure input source and the communicator or the zero and span buttons allows you to maintain the same analog span.



To rerange with a reference pressure, you must apply the pressure input you want to represent the 4 or 20 mA point. Allow the variable reading to stabilize for approximately ten seconds. Press either the 4 mA or 20 mA to make this pressure value either point.

Setting the Output Type

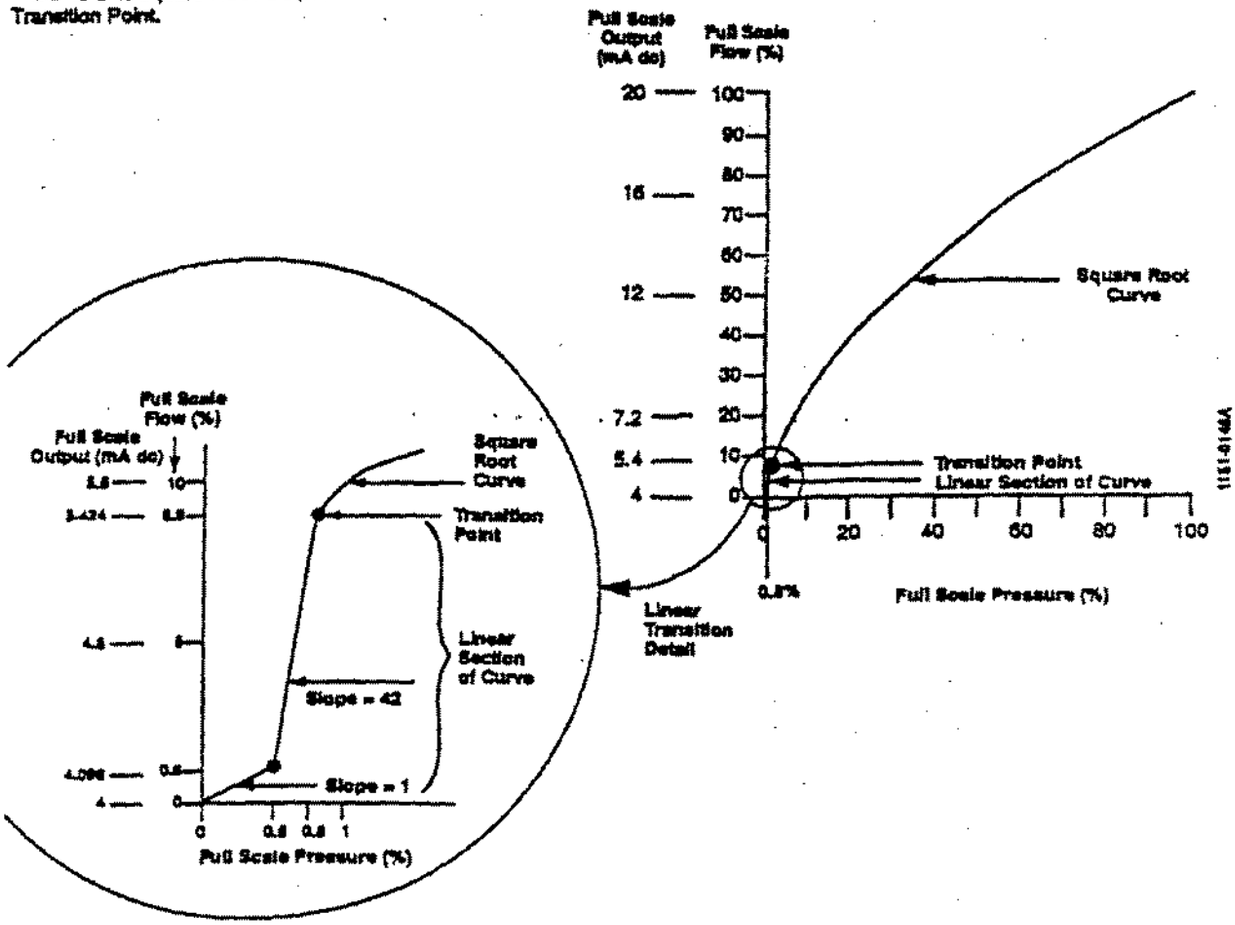
HART Comm.	1, 3, 5
Model 268	F3, F2, F1, P1

When the square root output option is active the Model 1151 analog output is proportional to flow. To avoid the extremely high gain that results as the input approaches zero, the Model 1151 automatically switches to a linear output in order to ensure a more stable output near zero. Figure 2-6 illustrates this transition point.

The transition from linear to square root is not adjustable. It occurs at 0.8% of ranged pressure input or 9.0% of full-scale flow output in transmitters with Revision 5.2. software. In earlier software, the transition point occurred at 4.0% of ranged pressure input, or 20% of full scale flow output.

The transition from linear to square root output is smooth, with no step change or discontinuity in output.

FIGURE 2-6. Square Root Output Transition Point.



From 0.0 percent to 0.6 percent of the ranged pressure input, the slope of the curve is unity (y = x). This allows accurate calibration near zero. Greater slopes would cause large changes in output for small changes at input. From 0.6 percent to 0.8 percent, the slope of the curve equals 42 (y = 42x) to achieve continuous transition from linear to square root at the transition point.

NOTE
A full trim requires a pressure source at least three times more accurate than the transmitter. For best accuracy, make sure the applied pressure is equal to or slightly less than the desired 4 mA setpoint, or equal to or slightly greater than the 20 mA setpoint.

The last trim/input values used will be displayed briefly. The engineering units shown match those selected under configuration or in transmitter characterization.

In selecting the pressure input values, the low and high values should be equal to or outside the 4 and 20 mA points. Do not attempt to obtain reverse output by reversing the high and low points.

The low trim value should be trimmed first. This provides a stable reference for additional sensor trim adjustment. Adjustment of the low trim value provides an offset correction to the factory-established characterization curve. Adjustment of the high trim value provides a slope or gain correction to the characterization curve based on the low trim value. In neither case is the factory-established characterization curve changed by this procedure. The trim values allow you to optimize performance over your specified measuring range at the calibration temperature.

Zero Trim

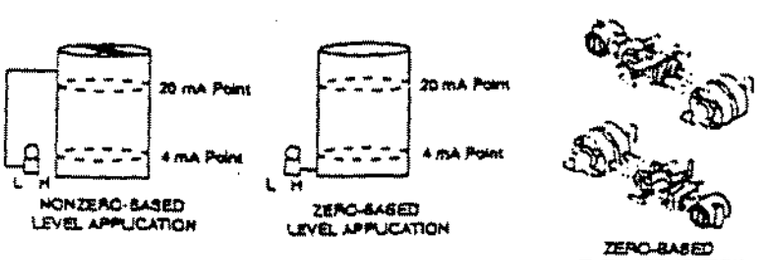
[illegible]	1, 2, 3, 3, 1
[illegible]	F3, F2, F1, F3, F2

A zero trim is a simpler, one-point adjustment. It must be zero-based (in other words, within 3.0% of true zero) and it may be performed when an exact pressure source is not available for the second pressure needed in a full trim.

It is useful for compensating for mounting position effects or for zero shifts due to static pressure in differential pressure applications. However, since this correction maintains the slope of the characterization curve, it should not be used in place of a full trim over the full sensor range.

Zero trim is best performed with the transmitter installed in its final mounting position with static pressure applied (or no pressure for a gage transmitter).

NOTE
Because a zero trim must be zero-based, it generally should not be used with Model 1151 Absolute Pressure Transmitters. Absolute pressure transmitters reference absolute zero. To correct mounting position effects on a Model 1151 Absolute Pressure Transmitter, perform a low trim within the full sensor trim function. The low trim function provides a "zero" correction similar to the zero trim function but it does not require the input to be zero based.



The following example illustrates the correction procedure:

A Model 1151DP 4 (Range 4) with 316L SST isolating diaphragms is to be used in an application where the static line pressure is 1,200 psi. The transmitter is reranged (as stated in Reranging with a Pressure Input Source and a Communicator on page 2-9) so that the transmitter output is 4 mA at 50 inH_2O and 20 mA at 150 inH_2O.

To correct for systematic error due to static line pressure, use the following formulas to determine a corrected value for Low Trim and High Trim.

Low Trim (LT) = LRV + S (LRV) P

Where LT = Corrected Low Trim Value at Atmosphere
LRV = Lower Range Value at Pressure P = 50 inH_2O
S = –(Span Shift from Table 2-2) = –0.0087/1000 psi
P = Static Line Pressure = 1200 psi

High Trim (HT) = URV + S (URV) P

Where HT = Corrected High Trim Value at Atmosphere
URV = Upper Range Value at Pressure P = 150 inH_2O
S = –(Span shift from Table 2-2) = –0.0087/1000 psi
P = Static Line Pressure = 1200 psi

In this example:

URV = 150 inH_2O

LRV = 50 inH_2O

S = +0.0087/1000 psi

P = 1200

LT = 50 + (0.0087/1000)(50)(1200)

LT = 50.53 inH_2O

HT = 150 + (0.0087/1000)(150)(1200)

HT = 151.56 inH_2O

Entering Corrected Values

To input the corrected values for the Low Trim and High Trim, perform a full trim as explained on page page 2-12. When applying the low and high pressure values, edit the pressure reading and enter your corrected Low and High Trim values.

Instruction

MI
016-131
June 1986

PLATINUM RESISTANCE TEMPERATURE DETECTORS

PR Series, Style C

INTRODUCTION

Description

Foxboro Platinum Resistance Temperature Detectors (RTD's) utilize the change in electrical resistance of a platinum wire due to a temperature change as the sensitive portion of the sensor element assembly (see Figure 1). Sensors may be single or dual element and are available in either bare sheath or well-type assemblies.

The PR-□□B is designed for bare sheath mounting and requires a bushing for direct mounting to the process vessel. Models PR-□□N and PR-□□U are designed for mounting in a well. A spring-loading device keeps the element tip pressed against the bottom of the well for metal-to-metal contact. This improves thermal response time and minimizes the effects of shock and vibration.

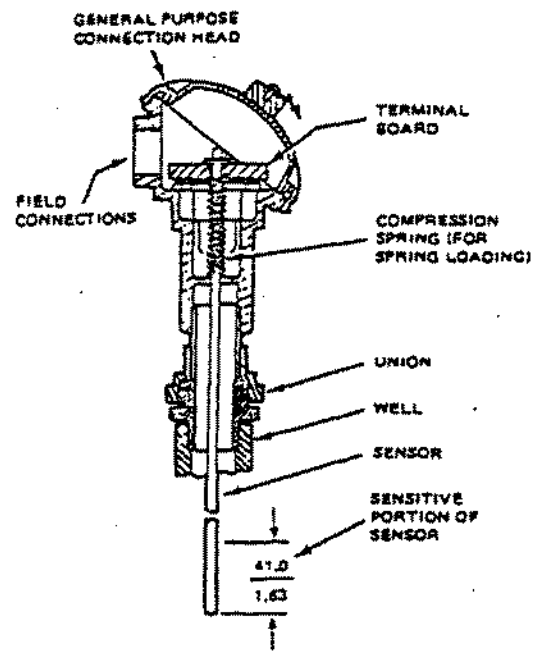


Figure 1. Platinum RTD

Standard Specifications

Calibration:
- IEC-B: International Standard IEC 751-1983. Resistance of 100.000 ±0.12 Ω at 0°C (32°F). Alpha is 0.00385 Ω/Ω/°C. Reference. Technical Information TI 005-028.
- SAMA: SAMA Standard RC21-4. Curves PR 279 (°C) and PR 278 (°F). Resistance of 98.129 ±0.1 Ω at 0°C (32°F). Alpha is 0.003923 Ω/Ω/°C. Reference TI 5-27a.

Temperature Limits: The maximum temperature limit is determined by the lowest upper range limit of the sheath, sensor, or assembly.
- Connection Head: 105°C (220°F)
- AISI Type 316 Stainless Steel (316 ss)Sheath Sensor: -200 and +480°C (-320 and +900°F)
- Inconel Sheath Sensor: -40 and +650°C (-40 and +1200°F)

Accuracy:
- IEC-B Calibration Sensor: ±0.3 + 0.005 (T)°C
- SAMA Calibration Sensor: ±0.26 K (±0.5°F) or ±0.25% of temperature reading, whichever is larger, for 480°C (900°F) and below; ±0.5% of reading between 480 and 650°C (900 and 1200°F).

Minimum Immersion: To minimize thermal conduction errors, an immersion length of at least 90 mm (3.5 in) is required.

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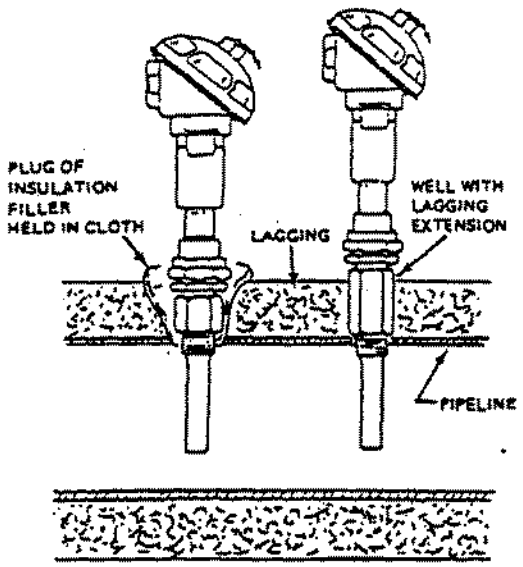

Figure 4. Lagging Well/Insulated Pipeline

Sensor Assembly With Bare Sheath (PR-038)

Three types of couplings are available for connecting a bare sheath assembly to the process.

Packing-Gland Coupling

The packing-gland coupling allows for adjustments of depth. It can be used in wells, kettles, vessels, pipelines, tanks, etc.

When installing packing gland in wells, etc., tighten bushing first (see Figure 5). Then moderately tighten jam nut.

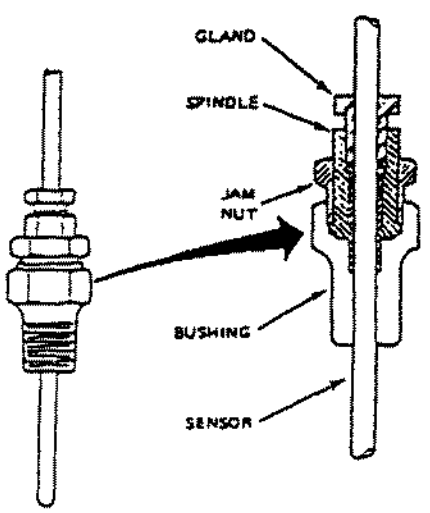

Figure 5. Packing-Gland Coupling

To make further depth adjustments, loosen the gland nut and slide sensor to desired position. Tighten gland nut to secure sensor sheath. See "Wiring" section for electrical connections.

Compression Coupling

```
*************
*  CAUTION  *
*************
```

The compression coupler has a ferrule mounted internally (see Figure 6). Once the compression coupler has been tightened onto the bare sensor it cannot be relocated.

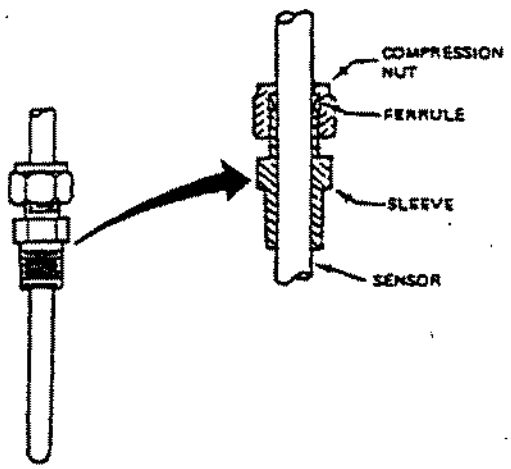

Figure 6. Compression Coupling

1. When installing, make sure the compression coupling is in the desired position before tightening.
2. See "Wiring" section for electrical connections.

Spring-Loaded Coupling

Bare sheath RTD's can be furnished with a spring-loading device. A split nut clamps to the sensor sheath at the correct location so that turning the jam nut compresses the spring and forces the tip of the RTD against the bottom of the well.

MAINTENANCE

Field Test

To determine functional operation of sensor, Technical Information TI 005-028 (IEC Calibration) or TI 5-27a (SAMA Calibration) is required for correct Resistance/Temperature relationship.

1. Insert sensitive portion of sensor [89 mm (3.5 in) minimum] into a known temperature, such as an ice bath or room temperature (see Figure 9).

2. Refer to proper TI (TI 5-27a or TI 005-028) for correct resistance.

3. Connect ohmmeter to terminals indicated in Table 2. Result is shown in last column.

Table 2.

FROM TERMINAL	TO TERMINAL	RESULT
SINGLE ELEMENT		
D	E	Value from TI
D	F	Value from TI
D	To Sheath	Open Circuit Indicated
DUAL ELEMENT		
A	B	Value from TI
A	C	Value from TI
A	To Sheath	Open Circuit Indicated
D	E	Value from TI
D	F	Value from TI
D	To Sheath	Open Circuit Indicated

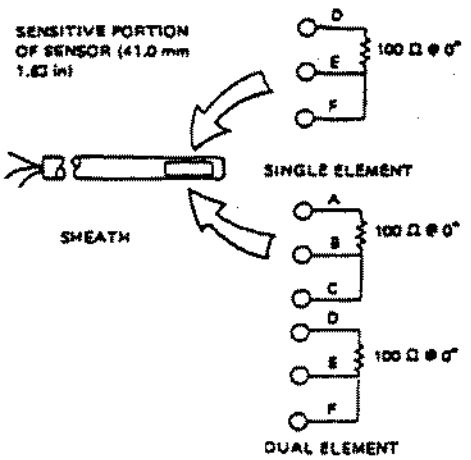

Figure 9. Single/Dual Element Wiring

Disassembly

Spring-Loaded RTD

NOTE
If it becomes necessary to replace a spring-loaded RTD, the following procedure must be followed.

1. Remove connection head cover. Disconnect field and sensor wiring. Note sensor wiring.

2. Remove terminal board screws (see Figure 10) and withdraw terminal board and sensor.

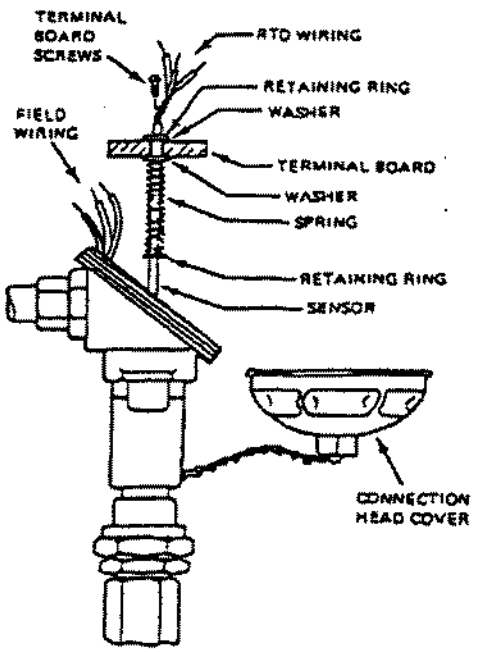

Figure 10. Spring-Loaded RTD

3. Using retaining ring pliers, pull off retaining rings. Slide terminal board, spring, and washers off sensor.

Technical Information

TI 005-028

ASTM* AND IEC PLATINUM RTD TEMPERATURE—RESISTANCE TABLES
°C vs Absolute Ω and °F vs Absolute Ω

The values listed in these tables represent the International Platinum RTD Calibration Standards, and were generated using the equations found in Foxboro drawing 10104MU, "Temperature Calibraton Sources".

°C vs Absolute Ω

°C	0	1	2	3	4	5	6	7	8	9
	RESISTANCE IN ABSOLUTE OHMS									
-200	18.493									
-190	22.803	22.374	21.944	21.514	21.083	20.653	20.221	19.790	19.358	18.926
-180	27.078	26.652	26.226	25.799	25.372	24.945	24.517	24.089	23.661	23.232
-170	31.320	30.897	30.474	30.051	29.627	29.203	28.779	28.354	27.929	27.504
-160	35.531	35.111	34.691	34.271	33.850	33.429	33.008	32.587	32.165	31.742
-150	39.714	39.297	38.879	38.462	38.044	37.626	37.208	36.789	36.370	35.951
-140	43.869	43.455	43.040	42.625	42.210	41.795	41.379	40.963	40.547	40.130
-130	47.999	47.587	47.175	46.763	46.350	45.937	45.524	45.111	44.697	44.283
-120	52.104	51.696	51.286	50.876	50.466	50.055	49.645	49.234	48.822	48.411
-110	56.190	55.785	55.379	54.967	54.559	54.151	53.742	53.333	52.924	52.515
-100	60.254	59.849	59.443	59.037	58.631	58.225	57.818	57.412	57.005	56.598
-90	64.299	63.895	63.491	63.087	62.682	62.279	61.874	61.469	61.065	60.659
-80	68.325	67.923	67.521	67.119	66.717	66.314	65.911	65.508	65.105	64.702
-70	72.335	71.934	71.534	71.133	70.733	70.332	69.931	69.530	69.128	68.727
-60	76.328	75.930	75.531	75.132	74.733	74.333	73.934	73.534	73.135	72.735
-50	80.307	79.910	79.512	79.115	78.717	78.319	77.921	77.523	77.125	76.727
-40	84.271	83.875	83.479	83.083	82.687	82.291	81.894	81.498	81.101	80.704
-30	88.222	87.828	87.433	87.038	86.643	86.248	85.853	85.458	85.062	84.667
-20	92.160	91.767	91.374	90.980	90.587	90.193	89.799	89.405	89.011	88.617
-10	96.086	95.694	95.302	94.910	94.517	94.125	93.732	93.339	92.946	92.553
0	100.000	99.609	99.218	98.827	98.436	98.045	97.653	97.262	96.870	96.478
0	100.000	100.391	100.781	101.172	101.562	101.953	102.343	102.733	103.123	103.513
10	103.902	104.292	104.681	105.071	105.460	105.849	106.238	106.627	107.016	107.404
20	107.793	108.181	108.570	108.958	109.346	109.734	110.122	110.509	110.897	111.284
30	111.672	112.059	112.446	112.833	113.220	113.607	113.994	114.380	114.767	115.153
40	115.539	115.925	116.311	116.697	117.083	117.469	117.854	118.240	118.625	119.010
50	119.395	119.780	120.165	120.550	120.934	121.319	121.703	122.087	122.471	122.855
60	123.239	123.623	124.007	124.390	124.774	125.157	125.540	125.923	126.306	126.689
70	127.072	127.454	127.837	128.219	128.602	128.984	129.366	129.748	130.130	130.511
80	130.893	131.274	131.656	132.037	132.418	132.799	133.180	133.561	133.941	134.322
90	134.702	135.082	135.463	135.843	136.223	136.603	136.982	137.362	137.741	138.121
100	138.500	138.879	139.258	139.637	140.016	140.395	140.773	141.152	141.530	141.908
110	142.286	142.664	143.042	143.420	143.797	144.175	144.552	144.930	145.307	145.684
120	146.061	146.438	146.814	147.191	147.567	147.944	148.320	148.696	149.072	149.448
130	149.824	150.199	150.575	150.950	151.326	151.701	152.076	152.451	152.826	153.200
140	153.575	153.950	154.324	154.698	155.072	155.446	155.820	156.194	156.568	156.941
150	157.315	157.688	158.061	158.434	158.807	159.180	159.553	159.926	160.298	160.671
160	161.043	161.415	161.787	162.159	162.531	162.903	163.274	163.646	164.017	164.388
170	164.760	165.131	165.501	165.872	166.243	166.613	166.984	167.354	167.724	168.095
180	168.464	168.834	169.204	169.574	169.943	170.313	170.682	171.051	171.420	171.789
190	172.158	172.527	172.895	173.264	173.632	174.000	174.368	174.736	175.104	175.472
200	175.840	176.207	176.575	176.942	177.309	177.676	178.043	178.410	178.777	179.143
210	179.510	179.876	180.242	180.608	180.975	181.340	181.706	182.072	182.437	182.803
220	183.168	183.533	183.899	184.264	184.628	184.993	185.358	185.722	186.087	186.451
230	186.815	187.179	187.543	187.907	188.271	188.634	188.998	189.361	189.724	190.087
240	190.451	190.813	191.176	191.539	191.901	192.264	192.626	192.988	193.350	193.712
°C	0	1	2	3	4	5	6	7	8	9

*ASTM limits the maximum temperature to 650°C (1202°F)

ASTM = American Society for Testing and Materials
IEC = International Electrotechnical Commission

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*F vs Absolute Ω

*F	0	1	2	3	4	5	6	7	8	9
	RESISTANCE IN ABSOLUTE OHMS									
-330	18.012									
-320	20.413	20.174	19.934	19.694	19.454	19.214	18.974	18.734	18.493	18.253
-310	22.803	22.565	22.326	22.087	21.848	21.609	21.370	21.131	20.892	20.652
-300	25.182	24.945	24.707	24.470	24.232	23.994	23.756	23.518	23.280	23.041
-290	27.551	27.314	27.078	26.841	26.605	26.368	26.131	25.894	25.657	25.420
-280	29.910	29.674	29.439	29.203	28.967	28.731	28.496	28.260	28.023	27.787
-270	32.258	32.024	31.789	31.558	31.320	31.085	30.850	30.615	30.380	30.145
-260	34.598	34.364	34.131	33.897	33.663	33.429	33.195	32.961	32.727	32.493
-250	36.929	36.696	36.463	36.230	35.997	35.764	35.531	35.298	35.065	34.831
-240	39.259	39.019	38.787	38.555	38.323	38.090	37.858	37.626	37.394	37.161
-230	41.564	41.333	41.102	40.871	40.639	40.408	40.177	39.945	39.714	39.482
-220	43.869	43.639	43.409	43.178	42.948	42.717	42.487	42.256	42.025	41.795
-210	46.167	45.937	45.708	45.478	45.249	45.019	44.789	44.559	44.329	44.099
-200	48.457	48.228	47.999	47.770	47.542	47.313	47.084	46.854	46.625	46.396
-190	50.739	50.512	50.283	50.055	49.827	49.599	49.371	49.142	48.914	48.685
-180	53.015	52.788	52.561	52.333	52.106	51.878	51.651	51.423	51.195	50.967
-170	55.284	55.058	54.831	54.604	54.378	54.151	53.924	53.697	53.470	53.243
-160	57.547	57.321	57.095	56.869	56.643	56.417	56.190	55.964	55.737	55.511
-150	59.804	59.578	59.353	59.127	58.902	58.676	58.450	58.225	57.999	57.773
-140	62.054	61.829	61.604	61.379	61.155	60.930	60.704	60.479	60.254	60.029
-130	64.299	64.074	63.850	63.626	63.401	63.177	62.953	62.728	62.503	62.279
-120	66.538	66.314	66.090	65.867	65.643	65.419	65.195	64.971	64.747	64.523
-110	68.771	68.548	68.325	68.102	67.879	67.655	67.432	67.208	66.985	66.761
-100	71.000	70.777	70.555	70.332	70.109	69.886	69.663	69.441	69.218	68.995
-90	73.223	73.001	72.779	72.557	72.335	72.112	71.890	71.668	71.445	71.223
-80	75.442	75.220	74.999	74.777	74.555	74.333	74.111	73.888	73.668	73.446
-70	77.656	77.435	77.214	76.992	76.771	76.550	76.328	76.107	75.885	75.664
-60	79.865	79.645	79.424	79.203	78.982	78.761	78.540	78.319	78.098	77.877
-50	82.070	81.850	81.630	81.409	81.189	80.969	80.748	80.527	80.307	80.086
-40	84.271	84.051	83.831	83.611	83.391	83.171	82.951	82.731	82.511	82.291
-30	86.468	86.248	86.029	85.809	85.589	85.370	85.150	84.931	84.711	84.491
-20	88.660	88.441	88.222	88.003	87.784	87.565	87.345	87.126	86.907	86.687
-10	90.849	90.630	90.412	90.193	89.974	89.755	89.536	89.317	89.098	88.879
0	93.034	92.815	92.597	92.379	92.160	91.942	91.723	91.505	91.286	91.068
0	93.834	93.252	93.470	93.688	93.907	94.125	94.343	94.561	94.779	94.997
10	95.215	95.433	95.651	95.868	96.086	96.304	96.522	96.739	96.957	97.174
20	97.392	97.610	97.827	98.045	98.262	98.479	98.697	98.914	99.131	99.348
30	99.566	99.783	100.000	100.217	100.434	100.651	100.868	101.085	101.302	101.519
40	101.736	101.953	102.169	102.386	102.603	102.819	103.036	103.253	103.469	103.686
50	103.902	104.119	104.335	104.551	104.768	104.984	105.200	105.417	105.633	105.849
60	106.065	106.281	106.497	106.713	106.929	107.145	107.361	107.577	107.793	108.009
70	108.224	108.440	108.656	108.871	109.087	109.303	109.518	109.734	109.949	110.165
80	110.380	110.595	110.811	111.026	111.241	111.457	111.672	111.887	112.102	112.317
90	112.532	112.747	112.962	113.177	113.392	113.607	113.822	114.037	114.251	114.466
100	114.681	114.895	115.110	115.325	115.539	115.754	115.968	116.183	116.397	116.611
110	116.826	117.040	117.254	117.469	117.683	117.897	118.111	118.325	118.539	118.753
120	118.967	119.181	119.395	119.609	119.823	120.037	120.250	120.464	120.678	120.891
130	121.105	121.319	121.532	121.746	121.959	122.173	122.386	122.599	122.813	123.026
140	123.239	123.452	123.666	123.879	124.092	124.305	124.518	124.731	124.944	125.157
150	125.370	125.583	125.796	126.008	126.221	126.434	126.647	126.859	127.072	127.284
160	127.497	127.709	127.922	128.134	128.347	128.559	128.771	128.984	129.196	129.408
170	129.620	129.833	130.045	130.257	130.469	130.681	130.893	131.105	131.317	131.529
180	131.740	131.952	132.164	132.376	132.587	132.799	133.011	133.222	133.434	133.645
190	133.857	134.068	134.280	134.491	134.702	134.913	135.125	135.336	135.547	135.758
200	135.969	136.180	136.392	136.603	136.814	137.024	137.235	137.446	137.657	137.868
210	138.079	138.289	138.500	138.711	138.921	139.132	139.342	139.553	139.763	139.974
220	140.184	140.395	140.605	140.815	141.025	141.236	141.446	141.656	141.866	142.076
230	142.286	142.496	142.706	142.916	143.126	143.336	143.546	143.755	143.965	144.175
240	144.385	144.594	144.804	145.013	145.223	145.432	145.642	145.851	146.061	146.270
250	146.479	146.689	146.898	147.107	147.316	147.525	147.735	147.944	148.153	148.362
260	148.571	148.780	148.988	149.197	149.406	149.615	149.824	150.032	150.241	150.450
270	150.658	150.867	151.075	151.284	151.492	151.701	151.909	152.118	152.326	152.534
280	152.742	152.951	153.159	153.367	153.575	153.783	153.991	154.199	154.407	154.615
290	154.823	155.031	155.239	155.446	155.654	155.862	156.070	156.277	156.485	156.692
*F	0	1	2	3	4	5	6	7	8	9

°F vs Absolute Ω (Cont.)

°F	0	1	2	3	4	5	6	7	8	9
	RESISTANCE IN ABSOLUTE OHMS									
950	284.218	284.402	284.586	284.770	284.955	285.139	285.323	285.507	285.691	285.875
960	286.058	286.242	286.426	286.610	286.794	286.977	287.161	287.345	287.528	287.712
970	287.895	288.079	288.262	288.446	288.629	288.813	289.996	289.179	289.362	289.546
980	289.729	289.912	290.095	290.278	290.461	290.644	290.827	291.010	291.193	291.376
990	291.559	291.741	291.924	292.137	292.290	292.472	292.655	292.837	293.020	293.202
1000	293.385	293.567	293.750	293.932	294.114	294.297	294.479	294.661	294.843	295.025
1010	295.207	295.390	295.572	295.754	295.936	296.117	296.299	296.481	296.663	296.845
1020	297.027	297.208	297.390	297.572	297.753	297.935	298.116	298.298	298.479	298.661
1030	298.842	299.023	299.205	299.386	299.567	299.748	299.930	300.111	300.292	300.473
1040	300.654	300.835	301.016	301.197	301.378	301.559	301.739	301.920	302.101	302.282
1050	302.462	302.643	302.823	303.004	303.185	303.365	303.546	303.726	303.906	304.087
1060	304.267	304.447	304.627	304.808	304.988	305.168	305.348	305.528	305.708	305.888
1070	306.068	306.248	306.428	306.608	306.788	306.967	307.147	307.327	307.506	307.686
1080	307.866	308.045	308.225	308.404	308.584	308.763	308.943	309.122	309.301	309.480
1090	309.660	309.839	310.018	310.197	310.376	310.555	310.734	310.913	311.092	311.271
1100	311.450	311.629	311.808	311.987	312.165	312.344	312.523	312.701	312.880	313.058
1110	313.237	313.415	313.594	313.772	313.951	314.129	314.307	314.486	314.664	314.842
1120	315.020	315.198	315.376	315.554	315.732	315.910	316.088	316.266	316.444	316.622
1130	316.800	316.978	317.155	317.333	317.511	317.688	317.866	318.043	318.221	318.398
1140	318.576	318.753	318.931	319.108	319.285	319.463	319.640	319.817	319.994	320.171
1150	320.348	320.525	320.702	320.879	321.056	321.233	321.410	321.587	321.764	321.941
1160	322.117	322.294	322.471	322.647	322.824	323.000	323.177	323.353	323.530	323.706
1170	323.883	324.059	324.235	324.412	324.588	324.764	324.940	325.116	325.292	325.468
1180	325.644	325.820	325.996	326.172	326.348	326.524	326.700	326.876	327.051	327.227
1190	327.403	327.578	327.754	327.929	328.105	328.280	328.456	328.631	328.807	328.982
1200	329.157	329.332	329.508	329.683	329.858	330.033	330.208	330.383	330.558	330.733
1210	330.908	331.083	331.258	331.433	331.608	331.782	331.957	332.132	332.306	332.481
1220	332.656	332.830	333.005	333.179	333.354	333.528	333.702	333.877	334.051	334.225
1230	334.400	334.574	334.748	334.922	335.096	335.270	335.444	335.618	335.792	335.966
1240	336.140	336.314	336.487	336.661	336.835	337.009	337.182	337.356	337.529	337.703
1250	337.876	338.050	338.223	338.397	338.570	338.743	338.917	339.090	339.263	339.436
1260	339.610	339.783	339.956	340.129	340.302	340.475	340.648	340.821	340.993	341.166
1270	341.339	341.512	341.685	341.857	342.030	342.203	342.375	342.548	342.720	342.893
1280	343.065	343.237	343.410	343.582	343.754	343.927	344.099	344.271	344.443	344.615
1290	344.787	344.959	345.131	345.303	345.475	345.647	345.819	345.991	346.163	346.334
1300	346.506	346.678	346.849	347.021	347.193	347.364	347.536	347.707	347.879	348.050
1310	348.221	348.393	348.564	348.735	348.906	349.078	349.249	349.420	349.591	349.762
1320	349.933	350.104	350.275	350.446	350.617	350.787	350.958	351.129	351.300	351.470
1330	351.641	351.812	351.982	352.153	352.323	352.494	352.664	352.835	353.005	353.175
1340	353.345	353.516	353.686	353.856	354.026	354.196	354.366	354.536	354.706	354.876
1350	355.046	355.216	355.386	355.556	355.726	355.895	356.065	356.235	356.404	356.574
1360	356.744	356.913	357.083	357.252	357.422	357.591	357.760	357.930	358.099	358.268
1370	358.437	358.607	358.776	358.945	359.114	359.283	359.452	359.621	359.790	359.959
1380	360.127	360.296	360.465	360.634	360.803	360.971	361.140	361.308	361.477	361.646
1390	361.814	361.982	362.151	362.319	362.488	362.656	362.824	362.992	363.161	363.329
1400	363.497	363.665	363.833	364.001	364.169	364.337	364.505	364.673	364.841	365.009
1410	365.176	365.344	365.512	365.680	365.847	366.015	366.182	366.350	366.517	366.685
1420	366.852	367.020	367.187	367.354	367.521	367.689	367.856	368.023	368.190	368.357
1430	368.524	368.691	368.858	369.025	369.192	369.359	369.526	369.693	369.860	370.026
1440	370.193	370.360	370.526	370.693	370.859	371.026	371.193	371.359	371.525	371.692
1450	371.858	372.024	372.191	372.357	372.523	372.689	372.855	373.021	373.188	373.354
1460	373.520	373.685	373.851	374.017	374.183	374.349	374.515	374.680	374.846	375.012
1470	375.177	375.343	375.509	375.674	375.840	376.005	376.170	376.336	376.501	376.667
1480	376.832	376.997	377.162	377.327	377.492	377.658	377.823	377.988	378.153	378.318
1490	378.482	378.647	378.812	378.977	379.142	379.307	379.471	379.636	379.800	379.965
1500	380.130	380.294	380.459	380.623	380.788	380.952	381.116	381.281	381.445	381.609
1510	381.773	381.937	382.102	382.266	382.430	382.594	382.758	382.922	383.086	383.249
1520	383.413	383.577	383.741	383.904	384.068	384.232	384.395	384.559	384.723	384.886
1530	385.050	385.213	385.376	385.540	385.703	385.866	386.030	386.193	386.356	386.519
1540	386.682	386.846	387.009	387.172	387.335	387.477	387.660	387.823	387.986	388.149
1550	388.312	388.474	388.637	388.800	388.962	389.125	389.288	389.450	389.612	389.775
1560	389.937									
°F	0	1	2	3	4	5	6	7	8	9

*ASTM maximum temperature limit is 1202°F

APPENDIX B

Test Data

3/99	10:36:00	92175.51	42.47	10.53	44	99.96	71
3/99	10:36:00	92159.17	42.47	10.53	44	99.96	71
3/99	10:37:00	92248.3	42.47	10.53	44	99.96	71
3/99	10:38:00	92432.94	42.47	10.53	44	99.96	71
3/99	10:38:00	92429.19	42.47	10.53	44	99.96	71
3/99	10:40:00	92278.88	42.47	10.53	44	99.96	71
3/99	10:41:00	92030.57	42.47	10.53	44	99.96	71
3/99	10:42:00	91698.77	42.47	10.53	44	99.96	71
3/99	10:43:00	92314.02	42.47	10.53	44	99.96	71
3/99	10:44:00	91737.45	41.89	10.53	44	99.96	71
3/99	10:45:00	92008.85	41.89	10.53	44	99.96	71
3/99	10:46:00	92049.91	41.89	10.53	44	99.96	71
3/99	10:47:00	92057.92	41.89	10.53	44	99.96	71
3/99	10:48:00	92439.95	42.59	10.53	44	99.96	71
3/99	10:49:00	92334.79	42.59	10.53	44	99.96	71
3/99	10:50:00	91957	41.89	10.53	44	99.96	72
3/99	10:51:00	92046.12	41.89	10.53	44	99.96	72
3/99	10:52:00	92262	41.89	10.53	44	99.96	72
3/99	10:53:00	92478.17	42.72	10.53	44	99.96	72
3/99	10:54:00	92616.72	42.72	10.53	44	99.96	72
3/99	10:55:00	92292.56	42.21	10.53	44	99.96	72
3/99	10:56:00	92336.37	42.21	10.53	44	99.96	73
3/99	10:57:00	92150.92	42.21	10.53	44	99.96	73
3/99	10:58:00	92239.8	42.21	10.53	44	99.96	73
3/99	10:59:00	92110.48	42.21	10.53	44	99.96	73
3/99	11:00:00	91994.11	42.21	10.53	44	99.96	73
3/99	11:01:00	91930.36	42.21	10.53	45	99.96	73
3/99	11:02:00	92120.16	42.21	10.53	44	99.96	73
3/99	11:03:00	92295.39	42.21	10.53	45	99.96	73
3/99	11:04:00	92786.26	42.21	10.53	45	99.96	73
3/99	11:05:00	92442.36	42.21	10.53	45	99.96	73
3/99	11:06:00	92918.48	42.21	10.53	45	99.96	73
3/99	11:07:00	92288.32	42.21	10.53	44	99.96	73
3/99	11:08:00	92329.8	42.21	10.53	44	99.96	74
3/99	11:09:00	93053.84	42.21	10.53	44	99.96	74
3/99	11:10:00	92715.69	42.21	10.53	44	99.96	74
3/99	11:11:00	93112.3	42.21	10.53	44	99.96	74
3/99	11:12:00	93092.81	42.72	10.53	44	99.96	74
3/99	11:13:00	93013.59	42.72	10.53	44	99.96	74
3/99	11:14:00	92650.99	42.72	10.53	44	99.96	74
3/99	11:15:00	92669.58	42.72	10.53	44	99.96	74
3/99	11:16:00	92951.93	42.15	10.53	45	99.96	74
3/99	11:17:00	92921.44	42.15	10.53	45	99.96	74
3/99	11:18:00	92794.93	42.15	10.53	45	99.96	74
3/99	11:19:00	92950.92	42.15	10.53	45	99.96	74
3/99	11:20:00	93291.94	42.78	10.53	44	99.96	74
3/99	11:21:00	92646.41	42.15	10.53	45	99.96	74
3/99	11:22:00	92596.36	42.15	10.53	45	99.96	74
3/99	11:23:00	92640.7	42.15	10.53	45	99.96	75
3/99	11:24:00	92690.37	42.66	10.53	45	99.96	75
3/99	11:25:00	92186.75	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:26:00	92607.86	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:27:00	92727.49	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:28:00	92860.46	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:29:00	92307.8	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:30:00	92780.88	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:31:00	92977.18	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:32:00	92792.85	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:33:00	92296.47	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:34:00	92963.5	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:35:00	92640.7	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:36:00	92988.7	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:37:00	92612.83	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:38:00	92047.46	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:39:00	92767.80	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:40:00	92901.8	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:41:00	93021.14	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:42:00	93042.86	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:43:00	93266.76	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:44:00	93210.86	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:45:00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	75
3/99	11:46:00	93218.24	42.4	10.51	45	99.96	76
3/99	11:47:00	93259.71	42.4	10.51	45	99.96	76
3/99	11:48:00	93632	42.4	10.51	45	99.96	77
3/99	11:49:00	93721.34	42.4	10.51	45	99.96	77
3/99	11:50:00	93056.38	42.4	10.51	45	99.96	77
3/99	11:51:00	92918.09	42.4	10.51	45	99.96	77
3/99	11:52:00	92638.51	42.4	10.51	45	99.96	77
3/99	11:53:00	93612.42	42.4	10.51	45	99.96	77
3/99	11:54:00	93302.01	42.4	10.51	45	99.96	77
3/99	11:55:00	93534.06	42.4	10.51	45	99.96	77
3/99	11:56:00	93949.84	42.91	10.51	45	99.96	77

APPENDIX D

Equipment Certificates

TRANSCAT

CERTIFICATE OF CALIBRATION

Customer: LAMB WESTON
2975 S. LAMB WESTON ROAD
AMERICAN FALLS, ID 83211

Cert/RA Nbr:	19-MD923-1-1	Date Received:	10/05/99
ID Nbr:	N/A	Date Calibrated:	10/21/99
Manufacturer:	TRANSMATION	Next Calibration	10/21/00
Description:	CALIBRATOR	Calibration Proc:	MP I-ED09
Model Nbr:	1040	Data Sheet Nbr:	99-COFC-0
Serial Nbr:	A65087SP	Item Received:	In Tolerance
PO Nbr:	300-1939	Item Returned:	In Tolerance

Temperature: 75°F **Relative Humidity: 24%**

TRANSCAT will maintain and document the traceability of all its standards to the National Institute of Standards and Technology, NIST(formerly NBS), or the National Research Council, NRC, of Canada, or to other recognized national or international standard bodies, or to measurable conditions created in our laboratory, or accepted fundamental and/or natural physical constants, ratio type of calibration, or by comparison to consensus standards. The TRANSCAT calibration system, when applicable, conforms to the requirements of MIL-STD-45662A, ANSI/NCSL Z540-1-1994, ISO10012-1-1992, and ISO/IEC Guide 25. 10CFR21 and/or IEEE-A98-1985 applies if specified contractually.

Complete records of work performed are maintained by TRANSCAT and are available for inspection. Laboratory assets used in the performance of this calibration are shown below.

The results in this report relate only to the item calibrated or tested.

All calibrations have been performed using the standards having a test accuracy ratio of four or more times greater than the unit calibrated, unless otherwise noted. Uncertainties have been estimated at a 95 percent confidence level(k=2). Limitations on the uses of this instrument are detailed in the manufacturer's operating instructions.

Customer Notes:

Asset	Manufacturer	Model Nbr	Description	Date Cal'd	Date Due	Traceability Numbers
19-008	WAVETEK	1281	MULTIMETER	10/11/99	10/11/00	53018-1160
19-009	JOHN FLUKE MFG. CO.	5700A	METER CALIBRATOR	10/6/99	10/6/00	674082-4660012

10/28/99

Lee Alexander
Lab Manager

Date

Calibrated at:
7000 E. Slauson Ave
Santa Fe Springs, CA 90670

By Frank Blevins

Reprinted on 10/28/99

This certificate may not be reproduced except in full, without the written approval of Transcat.
Additional information, if applicable may be included on serparate page(s).

CALIBRATION DATA

DATE 3NOV 99 0945 MANUFACTURE FOXBORO

RANGE

INPUT 0 OUTPUT 20psi MODEL 841 ELECTRIC [illegible] PRESSURE TRANSMITTER

SERIAL # B0184RA

DRUCK AIR psi BEFORE INPUT	TIME 0845 TRANSCAT mA OUTPUT	3006 SCALE 0-4095 PLC	DRUCK AIR Psi AFTER INPUT	TIME 1245 TRANSCAT mA OUTPUT	PLC
0 0.00	4.02	13	0 0.00	4.00	10
5.00	8.00	1035	5.00	8.03	1039
10.00	12.02	2060	10.00	12.03	2065
15.00	16.01	3088	15.00	16.02	3089
MAX 20.03	20.03	4095	MAX 20.00	20.02	4095

COMMENTS:

CALIBRATION DATA

DATE 3NOV 95 0920 MANUFACTURE FOXBORO RTD

RANGE

INPUT -320 °F OUTPUT +1200 °F MODEL PR-34 PLATINUM RESISTANCE TEMPERTURE DETECTOR

SERIAL # PR-14UBS-003

3000E2 READINGS PLC	BEFORE TIME 0920 PLC NO Ω		FLUKE THERMO COUPLE	AFTER TIME 1213 PLC OHMS		FLUKE
	INPUT	OUTPUT		INPUT	OUTPUT	
	0 BOILER ROOM TEMP	107.50	70°F	0 ROOM TEMP	82/111.4	81
35	ICE WATER BATH	100.30	34°F	ICE WATER BATH	33/100.30	34
182	HOT WATER BATH	132.40	183°F	HOT WATER BATH	171/129.5	174/169
					TIME LAPSE ACCURACE IN OF THE HOT WATER BATH	THEREFORE TEMP
	MAX			MAX		

COMMENTS:

NOTE: FLUKE 77 SERIES II MULTIMETER
SERIAL# 64920461

TOTE THERMOCOUPLE MODEL
SERIAL # 6[illegible]

TEST
#1 955 - 1015
#2 1025 - 1045
#3 1055 - 1115
#4 1125 - 1145

APPENDIX C

Intermountain Gas Company, Btu factor

EXECUTIVE OFFICES

INTERMOUNTAIN GAS COMPANY

555 SOUTH COLE ROAD • P.O. BOX 7608 • BOISE, IDAHO 83707 • (208) 377-6000 • FAX: 377-6097

November 3, 1999

Brian Stoddard
Lamb-Weston
P. O. Box 128
Twin Falls, ID 83303-0128

Sent Via Facsimile (208) 736-5696

Dear Mr Stoddard:

The average BTU factor, as billed by Intermountain Gas Company for Lamb-Weston for the past year has been in the range of 1.035 to 1.040 BTU's per 1,000 Cubic Feet of natural gas for the Twin Falls, ID area.

If you have any further questions, please do not hesitate to contact me at (208) 377-6053.

Sincerely,

Dan McAlister
Industrial Services Manager

DAM/slk

IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

1410 North Hilton, Boise, ID 83706-1255, (208) 334-0502

Philip E. Batt, Governor

March 8, 1996

CERTIFIED MAIL # 875 712 992
RETURN RECEIPT REQUESTED

Andrew S. Brassington, Corporate Counsel
Lamb-Weston, Incorporated
Administrative Office
8701 West Gage Blvd., P.O. Box 1900
Tri-Cities, Washington 99352-1900

RE: Voluntary Consent Order

Dear Mr. Brassington,

Enclosed is a signed original Consent Order regarding recent violations of state air quality rules which occurred at Lamb-Weston, Incorporated's facilities located in Twin Falls and American Falls, Idaho.

If you have any questions, please contact Tim Trumbull of my staff at (208) 334-5898.

Sincerely,

David J. Pisarski, Chief
Enforcement Bureau
Idaho Division of Environmental Quality

TTT/TWK/sd c:\...\Lambwest\signedco.ltr

Enclosure

cc: L. Kronberg, Deputy Attorney General
M. Henderson, Lamb-Weston
J. Fuentes
T. Trumbull
T. Krinke
S. Tarowsky
G. Spinner, SEIRO
B. Lupton, SCIRO
AFS/Source File
COF

IDAHO DEPARTMENT OF HEALTH AND WELFARE

IN THE MATTER OF	)	
Lamb-Weston, Inc. 2005 Saint Street Richland, Washington 99352	)	CONSENT ORDER Idaho Code § 39-108

1. Pursuant to the Idaho Environmental Protection and Health Act (EPHA), Idaho Code §§ 39-101 through 39-130, the Idaho Department of Health and Welfare (Department) enters into this Consent Order with Lamb-Weston, Inc. (Lamb-Weston).

2. Lamb-Weston, a Delaware Corporation registered to do business in Idaho and in good standing, owns and operates potato processing plants in American Falls and Twin Falls, Idaho.

3. Pursuant to an internal review of the air permit status at its Idaho facilities in preparation for applying for certain required operating permits, Lamb-Weston discovered certain permit deficiencies. Lamb-Weston voluntarily met with the Department on June 6, 1995, to disclose the alleged unintentional failure to obtain a Permit to Construct for natural gas boiler #1 at the American Falls facility, as required by the Rules for the Control of Air Pollution in Idaho (Rules), found at IDAPA 16.01.01.000 et seq. On June 26, 1995, Lamb-Weston voluntarily met again with the Department to disclose the failure to obtain a Permit To Construct for natural gas boiler #1 at the Twin Falls facility, as required by the Rules. On both of these dates, Lamb-Weston met with the Department to discuss how Lamb-Weston shall resolve the alleged unintentional violations and achieve compliance with the Rules.

4. To achieve compliance with the Rules, Lamb-Weston has submitted and obtained a Tier II Operating Permit for the American Falls facility, and submitted a timely and complete Tier I application for the Twin Falls facility.

5. In order to resolve the alleged unintentional violations cited in paragraph 3 of this Consent Order, the Department and Lamb-Weston agree that within fifteen (15) days of Lamb-Weston's receipt of a fully executed copy of this Consent Order, Lamb-Weston shall pay to the Department a civil penalty of Twenty Thousand Dollars ($20,000).

6. If any event occurs that causes, or may cause, delay in the achievement of any requirement of this Consent Order, Lamb-Weston shall notify the Department in writing within ten (10)

9. This Consent Order shall remain in full force and effect until terminated in writing by the Department.

10. Lamb-Weston is solely responsible for the adequacy of all measures undertaken pursuant to this Consent Order.

11. This Consent Order shall not release Lamb-Weston from its continued obligation to fully comply with all provisions of the Rules, the EPHA, or other applicable local, state, or federal laws.

12. This Consent Order shall bind Lamb-Weston, its successors, and assigns, until terminated in writing by the Department.

13. The effective date of this Consent Order shall be the date of signature by the Administrator of the Idaho Division of Environmental Quality.

DATED THIS 6TH day of March, 1996

By: Wallace M. Cory
Wallace M. Cory, Administrator, P.E.
Idaho Division of Environmental Quality

DATED THIS 28 day of FEB, 1996

By: Andrew S Bunsington, CORPORATE COUNSEL
Authorized Representative of Lamb-Weston, Inc.

1:\DI\Lambweson.CDS (jmm)
February 28, 1996

RM/JKC/JRF

TM 12-7-95

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

NOV 2 1 1995

RECEIVED
NOV 22 1995
DIV. OF ENVIRONMENTAL QUALITY
PERMITS & ENFORCEMENT

Reply to
Attn of: AT-082

Mr. Orville Green
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, ID 83706

RE: Compliance Order and Information Request
Lamb-Weston, Inc.
Twin Falls and American Falls, Idaho
EPA Docket No. 10-95-0140-CAA

Dear Mr. Green:

Enclosed is a copy of a Compliance Order and Information Request issued pursuant to the Clean Air Act to Lamb-Weston, Incorporated (LWI), which operates frozen food processing plants in Twin Falls and American Falls, Idaho. This action is designed to ensure that LWI will operate these facilities in compliance with the New Source Performance Standards outlined in 40 CFR Part 60, Subpart Db.

Our objectives in issuing this Notice of Violation are to satisfy our legal requirements and to help assure that LWI achieves compliance as expeditiously as possible. I understand that this matter has been coordinated with Ron Hill of your office. We will continue to make every effort to coordinate our activities with State authorities to avoid needless duplication of effort.

Should you or your staff have any questions about this matter, please contact Angela McFadden for technical assistance at (206) 553-6908, or Ted Yackulic for legal assistance at (206) 553-1218.

Sincerely,

for Anita J. Frankel, Director
Office of Air Program

Enclosures

cc: Doug Cole, IOO
Tim Trumbull, IDEQ
Ron Hill, IDEQ

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

IN THE MATTER OF: Lamb-Weston, Incorporated Twin Falls, Idaho American Falls, Idaho Respondent.	)	Docket No. 10-95-0140-CAA COMPLIANCE ORDER and INFORMATION REQUEST

BACKGROUND

1. This Compliance Order and Information Request applies to gas-fired boiler #1 at the frozen food processing plant in Twin Falls, Idaho (Twin Falls Boiler) and gas-fired boiler #1 at the frozen food processing plant in American Falls, Idaho (American Falls Boiler), both operated by Lamb-Weston, Incorporated (LWI).

2. Section 111 of the CAA, 42 U.S.C. § 7411, authorizes the U.S. Environmental Protection Agency (EPA) to promulgate Standards of Performance for New Stationary Sources.

3. New Source Performance Standards (NSPS), Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units, appear in 40 C.F.R. Part 60, Subpart Db, §§60.40b-60.49b. These standards were promulgated September 12, 1990 (55 Fed. Reg. 37683). These standards apply to any steam generating unit for which construction, modification, or reconstruction commenced after June 19, 1984, and that has a heat

input capacity from the fuels combusted in the steam generating unit of greater than 100 million Btu (mmBtu)/hr.

4. Section 60.44b(a) provides that nitrogen oxide emissions from gas-fired power boilers must not be greater than 0.10 lb/mmBtu for boilers that combust natural gas having a low heat release rate, and must not be greater than 0.20 lb/mmBtu for boilers that combust natural gas having a high heat release rate.

5. Section 60.46b prescribes the performance test protocols for measuring emissions of oxides of nitrogen and demonstrating compliance with the nitrogen oxides standard.

6. Section 60.48b prescribes the requirements for continuous monitoring of oxides of nitrogen emissions and opacity. Section 60.48b(g)(2) provides that, in lieu of installing, calibrating, maintaining and operating a continuous emission monitoring system (CEMS), the owner or operator of an affected facility shall monitor steam generating unit operating conditions and predict nitrogen oxides emission rates as specified in a plan submitted pursuant to § 60.49b(c).

opacity?

In lieu of CEMS

7. Section 60.49b prescribes specific recordkeeping and reporting requirements. Section 60.49b(c) provides ~~than~~ that an owner or operator who seeks to demonstrate compliance through the monitoring of steam generating unit operating conditions under the provisions of § 60.48b(g)(2) shall submit a monitoring plan to the Administrator for approval within 360 days of initial startup of the affected facility.

8. Sections 60.7, 60.8, 60.11, and 60.13 contain provisions which generally apply to all facilities subject to NSPS; among other things, these provisions specify the timeframe

for when performance tests must be conducted, and require the source to notify EPA when such tests will be conducted.

9. The specifications and test procedures for nitrogen oxides continuous emissions monitoring systems are provided in 40 C.F.R. Part 60, Appendix B, Performance Specification 2.

FINDINGS

10. The Twin~~s~~ Falls Boiler was constructed after September 19, 1984. The American Falls Boiler was constructed after September 19, 1984.

11. The Twin~~s~~ Falls Boiler has a rated heat input capacity of 150 mmBtu/hr. The American Falls Boiler has a rated heat input capacity of 116 mmBtu/hr.

12. LWI did not notify EPA of construction, anticipated startup, or startup of either the Twin Falls Boiler or the American Falls Boiler, in violation of §§ 60.7(a) and 60.49b(a).

13. LWI did not conduct a 30-day performance test on either the Twin Falls Boiler or the American Falls Boiler for oxides of nitrogen within 60 days after achieving the maximum production rate at which each affected facility was operated, but not later than 180 days after initial startup of each facility, in violation of §§ 60.8(a) and 60.46b.

14. LWI did not install, calibrate, maintain, and operate CEMS for measuring nitrogen oxides concentrations at the outlet of either the Twin Falls Boiler or the American Falls Boiler, in violation of § 60.48b(g)(1).

15. LWI did not submit plans for monitoring steam generating unit operating conditions to predict nitrogen oxides emission rates for either the Twin Falls Boiler or the American Falls Boiler within 360 days after initial startup of these facilities. Having failed to do so, LWI is precluded from monitoring steam generating unit operating conditions and predicting nitrogen oxides emission rates to demonstrate future compliance with § 60.48b(g)(2).

16. LWI did not submit excess emission monitoring reports to EPA for either the Twin Falls Boiler or the American Falls Boiler, in violation of § 60.7(c).

COMPLIANCE ORDER

17. Under the authority of Section 113 of the CAA, 42 U.S.C. § 7413, EPA may, on the basis of any information available to EPA, issue an order to any person found to be in violation of New Source Performance Standards which requires such person to comply with such standards. Pursuant to Section 113(a)(3) of the CAA, 42 U.S.C. §7413(a)(3), EPA, through the Region 10 Director of the Office of Air, and upon the basis of available information, hereby issues this Compliance Order.

18. LWI shall demonstrate compliance with the nitrogen oxides emission standard of § 60.44b for the Twin Falls Boiler and the American Falls Boiler within 90 days of receipt of this order, using the results of applicable 30-day performance tests conducted in accordance with the conditions specified in § 60.46b.

19. LWI shall monitor nitrogen oxides emissions from the Twin Falls Boiler and the American Falls Boiler as required by § 60.48b(g)(1) by maintaining and operating the CEMS used to conduct the performance test in paragraph 18 until such time as these CEMS are replaced.

20. LWI shall comply with the recordkeeping and reporting requirements prescribed in 40 C.F.R. §§ 60.7 and 60.49b for the Twin Falls Boiler and the American Falls Boiler. Reports shall be submitted to:

Angela McFadden
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue (AT-082)
Seattle, WA 98101

INFORMATION REQUEST

21. Section 114 of the CAA, 42 U.S.C. § 7414, authorizes the Administrator of the United States Environmental Protection Agency (EPA) to require any person who owns or operates an emissions source to provide records, reports, sampling of emissions, or other information for the purpose of determining whether any violations of the Act have occurred.

22. Respondent must provide a complete written response to this Information Request, with any appropriate attachments, within the time periods set forth below. The written response to this Information Request shall be submitted to:

Angela McFadden
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue (AT-082)
Seattle, WA 98101

23. Within 15 days of replacement and/or removal of any part of the Twin Falls Boiler's CEMS or the American Falls Boiler's CEMS, LWI shall notify EPA of the date and location of such replacement and/or removal.

24. Within 30 days of replacement of any part of the Twin Falls Boiler's CEMS or the American Falls Boiler's CEMS, LWI shall conduct a performance evaluation of the modified CEMS using the procedures in 40 CFR 60 Appendix B, Performance Specification 2.

25. Within 60 days of replacement of any part of the Twin Falls Boiler's CEMS or the American Falls Boiler's CEMS, LWI shall use the modified CEMS to conduct a performance test of the affected boiler as described in § 40.46b(g)(1).

26. Pursuant to 40 C.F.R. §§ 2.201-2.311 (1991), Respondent may assert a business confidentiality claim covering any portion of the submitted information which is entitled to confidential treatment and which is not emission data or necessary to determine emission data. Special rules governing certain information obtained under the Act appear in 40 C.F.R. § 2.301. Failure to assert a claim in the manner described in 40 C.F.R. § 2.203(b) allows the submitted information to be released to the public without further notice. Information subject to a business confidentiality claim may be disclosed by EPA only to the extent set forth in the above-cited regulations.

27. This Information Request is not subject to the Paperwork Reduction Act.

Enforcement

28. Issuance of this Order and Information Request does not preclude any other action by EPA to redress past or future violations of the CAA, including any of the following:

a. An administrative penalty order pursuant to Section 113(d) of the CAA, 42 U.S.C. § 7413(d), for civil penalties of up to $25,000 per day for each violation during the period the facility is not in compliance; or

b. A civil action pursuant to Section 113(b) of the CAA, 42 U.S.C. § 7413(b), for injunctive relief or civil penalties of up to $25,000 per day for each violation during the period the facility is not in compliance, or both;

29. Pursuant to Section 120 of the CAA, 42 U.S.C. § 7420, EPA is also authorized to assess noncompliance penalties aimed at recovering the economic benefit which any person receives by operating its facility out of compliance.

30. In addition, under Section 306 of the CAA, 42 U.S.C. § 6706; the regulations promulgated thereunder, 40 C.F.R. Part 15 (1990); and Executive Order 11738, facilities to be utilized in federal contracts, grants, or loans must be in full compliance with the Act and all regulations promulgated thereunder. Violation of the CAA may result in the subject facility being declared ineligible for participation in any federal contract, grant, or loan.

31. Pursuant to Section 113(a) of the CAA, 42 U.S.C. § 7413(a)(3), failure to comply with this Compliance Order or provide the required information may lead to a civil action to obtain compliance or an action for civil or criminal penalties.

Opportunity for Conference

32. Pursuant to Section 113(a)(4), this Compliance Order does not take effect until the person to whom it is issued has had an opportunity to confer with EPA concerning the alleged violations. Respondent may, upon request, confer with EPA about this Compliance Order. Such a conference will enable Respondent to present information bearing on the finding of violation and any efforts Respondent has taken or proposes to take to comply with the NSPS. Respondent has the right to be represented by counsel at any such conference. A request for a conference should be made in writing within 10 days of the date of this Order to:

Angela McFadden
U.S. Environmental Protection Agency
1200 Sixth Avenue (AT-082)
Seattle, WA 98101
(206) 553-6908

Failure to request a conference in writing within this 10-day period will constitute a waiver of Respondent's opportunity for such a conference. By offering the opportunity for a conference or participating in one, EPA does not waive or limit its right to any remedy available under the Act.

33. If you have any questions regarding technical matters related to this Compliance Order or Information Request, you should contact Angela McFadden, Idaho-Oregon Air Unit, at (206) 553-6908. If your questions are of a legal nature, you should contact Ted Yackulic, Office of Regional Counsel, at (206) 553-1218.

Effective Date

34. This Compliance Order and Information Request will take effect immediately after any conference held pursuant to paragraph 32 above or, if no conference is requested in accordance with paragraph 32 above, 10 days after the date of this Order.

Dated this 20th day of November, 1995.

for Anita J. Frankel, Director
Office of Air Program

DP/JF/TK/Dan P./MB/AFS/SF

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

APR 03 1996

RECEIVED
APR 09 1996
DIV. OF ENVIRONMENTAL QUALITY
PERMITS & ENFORCEMENT

Reply To
Attn Of: OAQ-107

Orville Green, Assistant Administrator
Permits & Enforcement
Idaho Division of Environmental Quality (IDEQ)
1410 N. Hilton
Boise, Idaho 83706

Dear Mr. Green:

This letter is in response to a request from Lisa Kronberg of IDEQ for EPA's comments on the consent order between Lamb-Weston, Incorporated, and IDEQ to resolve Lamb-Weston's failure to obtain permits to construct boilers at its facilities in American Falls and Twin Falls, Idaho.

Based on its review of the consent order resolving the violation of failure to obtain a permit as required by IDAPA 16.01.01012, part of the Idaho State Implementation Plan, and in exercise of its non-reviewable prosecutorial discretion, EPA does not presently intend to take enforcement action regarding the violations of IDAPA 16.01.01012 for boiler #1 at Lamb-Weston's American Falls facility or boiler #1 at the Twin Falls facility.

The consent order does not address potential violations of Idaho's New Source Review (NSR) regulations. Because the boiler located at the Twin Falls facility may emit more than 250 tons per year of a criteria pollutant, IDEQ should investigate this issue, determine whether NSR applies to this source, and, if NSR violations are found, pursue appropriate enforcement action to resolve them.

The consent order states that Lamb-Weston voluntarily met with IDEQ to disclose its failure to obtain permits to construct. It is our understanding, however, that these violations were discovered through the process of obtaining a Title V permit (a regulatory requirement); thus, EPA would not consider this to be a voluntary disclosure under its self-audit policy.

In addition, EPA intends to continue to investigate, and follow up with appropriate enforcement action, any violations of the federal New Source Performance Standards (NSPS) found or previously identified at the Lamb-Weston facilities. Because

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authority to enforce the NSPS is not delegated to the State of Idaho. EPA has primary enforcement responsibility for these requirements.

If you or your staff have any questions about these comments, please call Angela McFadden at (206) 553-6908, or me at (206) 553-2963.

Sincerely,

for Anita J. Frankel, Director
Office of Air Quality

cc: Don Dossett
Lisa Kronberg, IDEQ
Tim Trumbull, IDEQ

Appendix C

ABBREVIATED AIRS DATA ENTRY SHEET

Name of Facility: Lamb-Weston, Inc.

AIRS/Permit #: Tier II OP # 083-00062

Permit Issue Date:

*Source/Emissions Unit Name (25 spcs) (Please use name as indicated in permit)	SCC # (8 digit #)	Air Program (SIP/NESHAP/NSPS/PSD)
*(1) Line 1 Fryer	30203601	NA SIP
(2) Line 2 Fryer	30203601	NA
(3) Line 4 Fryer	30203601	NA
(4) Special Products Fryer	30203601	NA
(5) Line 1 Dryer	10200602	NA
(6) Line 2 Dryer (steam dryer)	39999999	NA
(7) Line 2 Pre-Dryer	10300603	NA
(8) Line 4 Dryer	10200602	NA
(9) Special Products Dryer	10300603	NA
(10) Boiler #1 (Combustion Engineering)	10200602	~~NA~~ NSPS
(11) Boiler #2 (Murray-Trane)	10200602	NA SIP
(12) Boiler #3 (Cleaver-Brooks)	10200602	NA
(13) Heaters and Burners (18 units)	10300603	NA
(14) Heater (Rey, 11 MM Btu/hr) (fugitives)	10200602	NA
(15) Emergency Diesel Generator (100 kW)	20200102	NA
(16) Emergency Diesel Generator (230 kW)	20200102	NA
(17) Fugitive Emissions -- Paved/unpaved roads and material transfers	39999999	NA

RETURN TO PAT RAYNE
AIRS-PT.LST (9/95)

Appendix D

MODELING REPORT FOR

LAMB-WESTON, TWIN FALLS

TIER II APPLICATION

Prepared by:
LPG Associates, Inc.
537 SE Ash, Suite 12
Portland, Oregon 97214
(503) 230-1240

MODELING REPORT FOR
LAMB-WESTON, TWIN FALLS TIER II APPLICATION

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DISCUSSION OF SOURCE EMISSION INVENTORY	1
DESCRIPTION OF THE SOURCE'S ENVIRONMENT	1
MODELING METHODOLOGY	2
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ATTACHMENT A – MODELING PARAMETERS
ATTACHMENT B – ANNUAL PM10 RESULTS MAPS
ATTACHMENT C – 24 HOUR PM10 SECOND HIGH RESULTS MAPS
ATTACHMENT D – ANNUAL NOx RESULTS MAPS
ATTACHMENT E – SENSITIVE RECEPTORS
ATTACHMENT F – INPUT-OUTPUT FILES

MODELING REPORT FOR
LAMB-WESTON, TWIN FALLS TIER II APPLICATION

BACKGROUND

The modeling was carried out to demonstrate that the Lamb-Weston, Twin Falls Plant does not cause a violation of a National Ambient Air Quality Standard at the emissions rates proposed for the Tier II Permit. This demonstration is required by Idaho Administrative Code IDAPA 16.01.01.403.02, Permit Requirements for Tier II Sources, NAAQS. Modeling was performed for the criteria pollutants of PM10 and NOx.

DISCUSSION OF SOURCE EMISSION INVENTORY

The Twin Falls Lamb-Weston Plant processes potatoes. There are seven product lines producing four different products. Four of the product lines (Lines 1, 2, 4, and special products) produce fried products, two product lines (hashbrown and Line 3) produce hashbrown potatoes, and one product line produces mash potatoes.

There are 28 point sources listed in the Tier II application which emit PM10 and 18 which emit NOx. The sources modeled are listed in the Modeled Source Parameters Table in Attachment A. The fugitive PM10 sources of the space heaters, material handling and road emissions were not modeled.

The Modeled Source Parameters Table shows the modeled emissions for the 230 kW and 100 kW Generators. Since the generators are only operated for testing and during power outage emergencies, the modeling was performed based on 500 hours per year of operation for each generator for calculating annual emissions and 8 ½ hours per day for calculating 24 hour emissions. Eight and a half hours per day operation was used to avoid exceeding the 24 hour PM10 NAAQS in the area between the main plant building and the dry storage building. The average annual emission rate for each generator was estimated by ratioing the maximum hourly output by 500/8760 to correct for the generators being operated for only 500 hours per year. Similarly the average 24 hour emissions rate was estimated by ratioing the maximum hourly output by 8.5/24.

DESCRIPTION OF THE SOURCE'S ENVIRONMENT

The plant emission points are shown on the Air Emission Points Drawing in Attachment A. The buildings and roof heights used in the modeling are shown on the Modeled Buildings and Roof Heights Drawing in Attachment A. Property boundaries are shown on the Property Boundary Drawing in Attachment A.

The terrain surrounding the plant is shown on the Sensitive Receptor Location Map in Attachment A.

MODELING METHODOLOGY

The EPA ISCST3, Version 99155, model was used. The model was run using the regulatory default options.

Surface meteorological data for Pocatello with mixing height data for Boise from the EPA SCRAM Website was used for the modeling. Twin Falls is located halfway between Pocatello and Boise. A comparison of historic wind data from the Climatological Handbook, Columbia Basin States was made for Twin Falls, Boise and Pocatello. The Pocatello historic data fit the Twin Falls data for monthly wind direction and magnitude much better than the Boise data. The comparison is shown in the Comparison of Twin Falls, Pocatello and Boise Long Term Wind Data in Attachment A. Boise mixing height data was used since mixing height data is not available with the Pocatello surface data. Pocatello surface data and Boise mixing height data for the years 1987-1991 was used because those are the latest years available.

The plant is in a rural area based on the Twin Falls and Filer USGS maps showing less than 50% of the area within 3 kilometers surrounding the plant as being industrial, commercial or compact residential.

The initial modeling was performed using a 90 meter grid spacing centered on the main plant building. The initial grid array was 2000 meters by 2000 meters. An approximately 30 meter grid spacing was used along the site property lines. Additional points were located at schools, kindergartens, day cares, nursing homes and hospitals within 2.5 miles (4 km) of the plant. The locations of the Sensitive Receptors are shown on the Sensitive Receptor Location Map in Attachment A. After the initial modeling, a grid spacing of 30 meters was used to locate the maximum impacts. The grids exclude points within the plant property lines and points which fall within the boundaries of the modeled buildings. All grid points except for the fenceline points correspond to USGS Digital Elevation Model (DEM) data points.

Buildings modeled included the main plant building, plant office building, dry storage building and three large adjacent buildings owned by Henningsen Cold Storage, Longview Fibre and The Farm House Collection.

MODELING RESULTS

Input, Output and Meteorological files for the modeling runs are included in the attached diskettes. Three runs were made for each of the five years modeled. They were:

1. Annual PM10 (named anpm);
2. Annual NOx (named anno); and,
3. 24 Hour PM10 (named 24pmal)

Maps showing the results of the modeling runs are included in the attachments. Input files, output files and the meteorological files are on diskette at the end of the report.

The modeling results were added to the background concentrations for Twin Falls which were provided by IDEQ to determine if the National Ambient Air Quality Standards (NAAQS) are exceeded. For PM10 24 hour average, the second high for each year was used for comparison with the NAAQS. The following tables show the results of the modeling for each year and compare the results with the NAAQS:

PM10 Modeling Results

	Annual			24 Hour			
					Model 2nd High		
Year	Model µg/m³	Background (24.1 µg/m³) plus Model Results µg/m³	NAAQS µg/m³	Model 1st High µg/m³	µg/m³	Background (94 µg/m³) plus Model Results µg/m³	NAAQS µg/m³
1987	11.8	35.9	50	66.2	50.2	144.2	150
1988	**14.2**	**38.3**	**50**	68.5	51.4	145.4	150
1989	11.0	35.1	50	73.3	46.3	140.3	150
1990	12.2	36.3	50	60.4	49.7	143.7	150
1991	12.3	36.4	50	55.0	**54.6**	**148.6**	**150**

NOx Modeling Results

	Annual		
Year	Model µg/m³	Background (40 µg/m³) plus Model µg/m³	NAAQS µg/m³
1987	24.0	64.0	100
1988	23.7	63.7	100
1989	21.3	61.3	100
1990	21.0	61.0	100
1991	**24.1**	**64.1**	**100**

The highest annual average PM10 result from the modeling was 14.2 µg/m³ for 1988. The location is shown on Page 5 of Attachment B. Adding the maximum annual background PM10 of 24.1 µg/m³ results in an estimated maximum annual impact of 38.8 µg/m³ which is less than the NAAQS limit of 50 µg/m³.

The highest 2nd high 24 hour average PM10 result was 54.6 µg/m³ in 1991. The location is shown on page 15 of Attachment C. Adding the maximum 24 hour background PM10 of 94 µg/m³ results in an estimated highest 2nd high 24 hour PM10 impact of 148.6 µg/m³ which is less than the NAAQS limit of 150 µg/m³.

The highest annual average NOx result from the modeling was 24.1 µg/m³ for 1991. The location is shown on Page 14 of Attachment D. Adding the maximum annual background NOx

of 40 $\mu g/m^3$ results in an estimated maximum annual impact of 64.1 $\mu g/m^3$ which is less than the NAAQS limit of 100 $\mu g/m^3$.

For the Sensitive Receptors, the highest 24 hour PM10 concentrations for the 5 year period modeled and the highest annual NOx concentrations are shown on the Sensitive Receptors Within 2.5 Miles Table and on the Sensitive Receptor Map in Attachment E. The highest PM10 24 Hour concentration was 12.68 $\mu g/m^3$ at the Magic Valley Alternative School. The highest annual NOx concentration was 3.38 $\mu g/m^3$ also at the Magic Valley Alternative School.

CONCLUSION

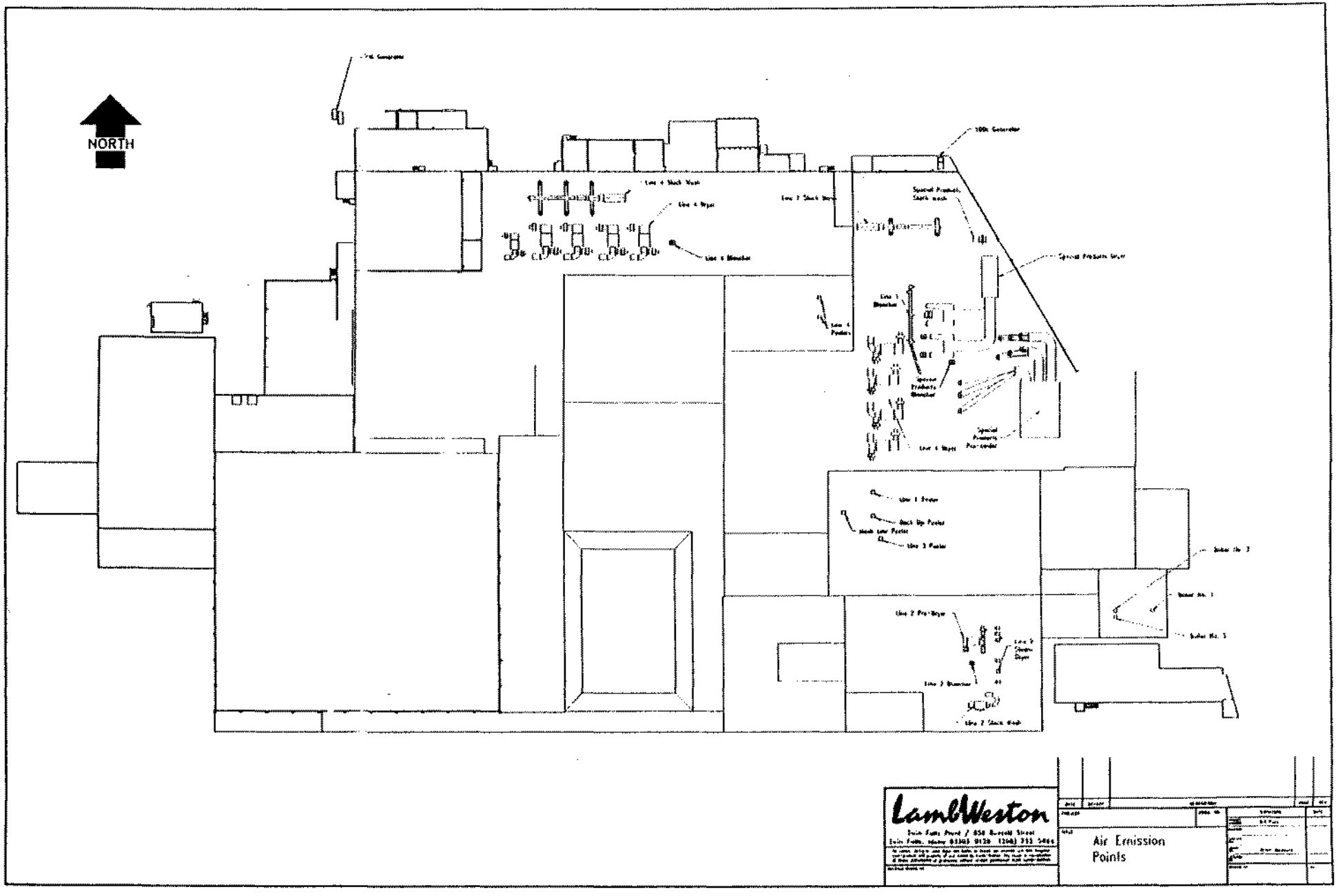
The modeling was carried out to demonstrate that the Lamb-Weston, Twin Falls Plant does not cause a violation of a National Ambient Air Quality Standard at the emissions rates proposed for the Tier II Permit. This demonstration is required by Idaho Administrative Code IDAPA 16.01.01.403.02, Permit Requirements for Tier II Sources, NAAQS. The modeling results show that a National Ambient Air Quality Standard will not be exceeded when the plant is operated with the emissions estimated in the Tier II application. The 24 hour PM10 standard of 150 $\mu g/m^3$ is the closest limit approached with a maximum estimated 2nd high concentration of 148.6 $\mu g/m^3$ when a background 24 hour concentration of 94 $\mu g/m^3$ is added to the modeling results of 54.6 $\mu g/m^3$.

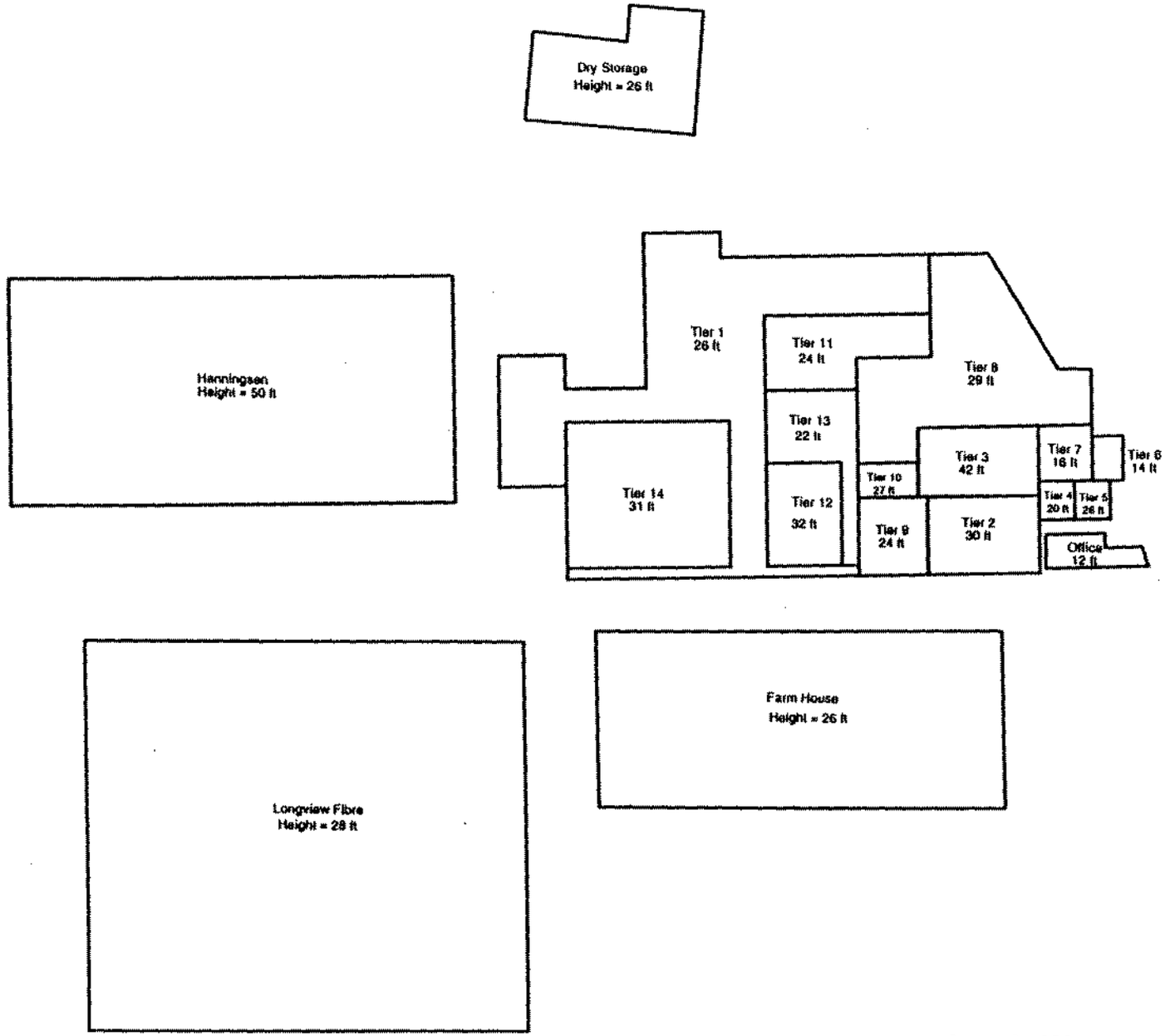
ATTACHMENT A

MODELING PARAMETERS

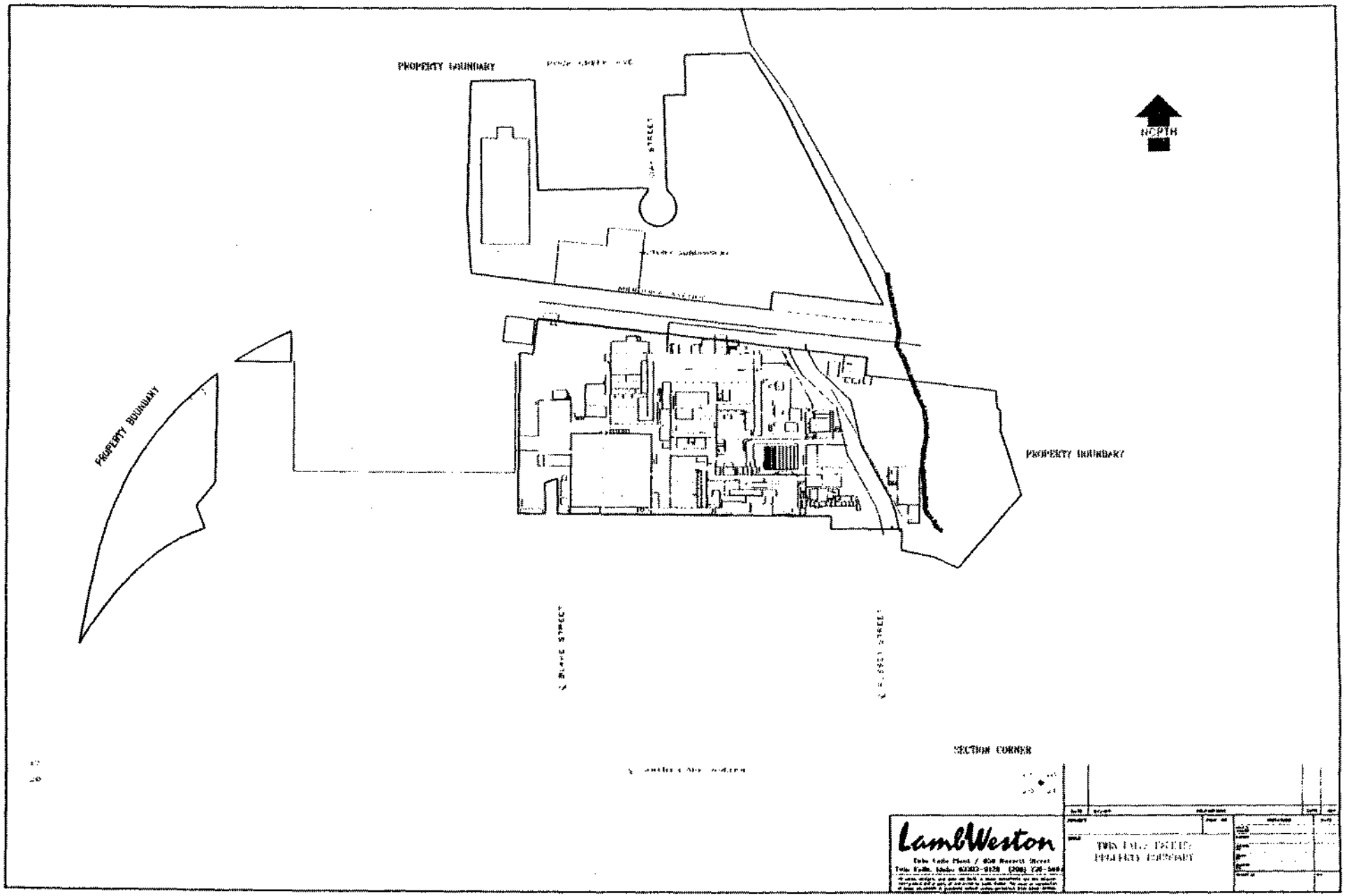
Lamb-Weston, Twin Falls
Modeled Source Parameters

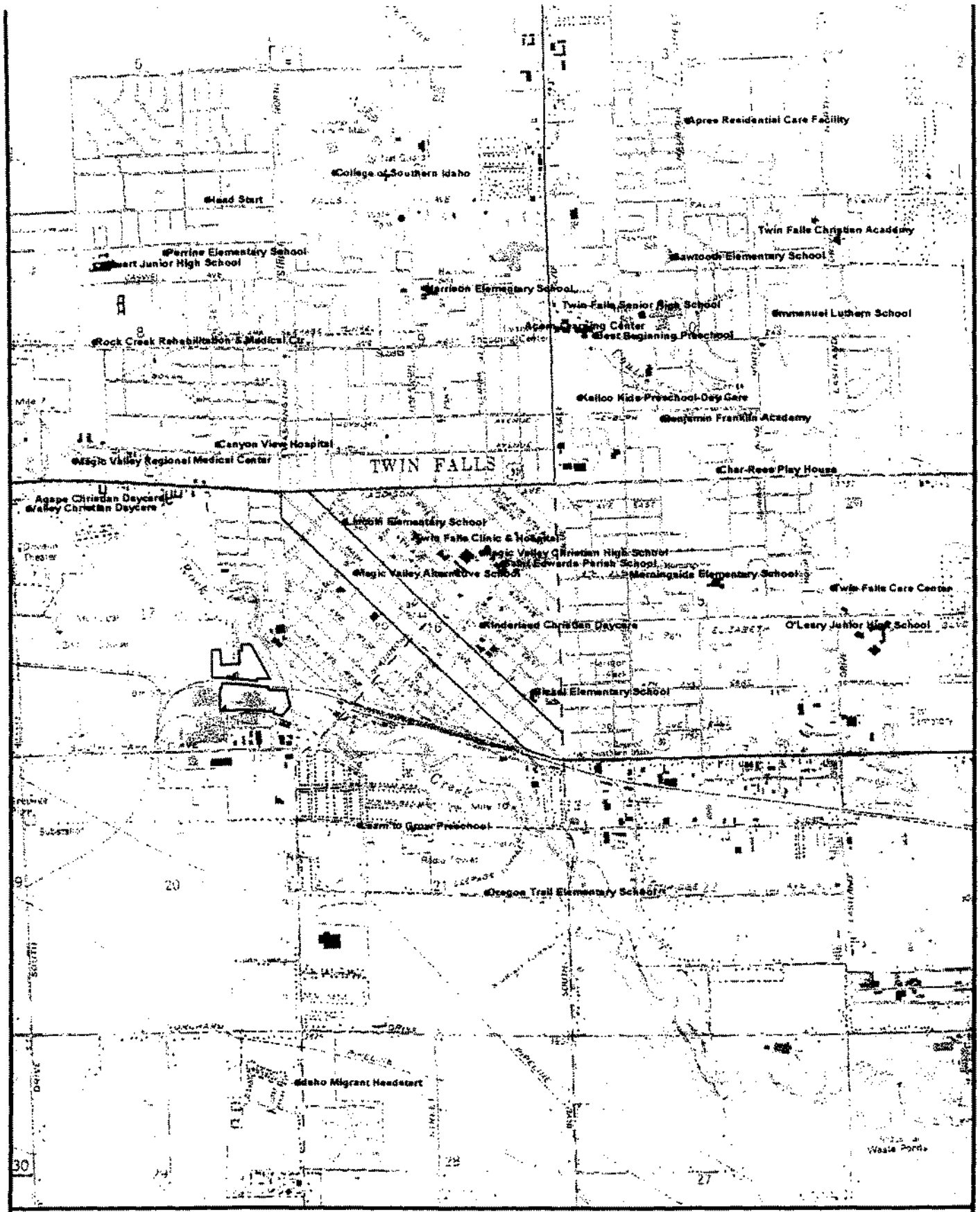
Source Name	UTM Coordinates NAD 83		Roof Elevation	Source Elevation (above ground)		Source Exit Diameter		Exit Velocity		Exit Temp.		PM Emissions		NOx Emissions	
	X (km)	Y (km)	(ft)	(ft)	(m)	(ft)	(m)	acfm	m/s	°F	°K	lb/hr	g/s	lb/hr	g/s
Boiler 1	706.840	4713.935	26	46	14.02	5.00	1.52	79,900	20.67	600	588.7	0.734	0.0925	8.086	1.0188
Boiler 2	706.833	4713.936	20	40	12.19	4.00	1.22	31,658	12.80	590	583.2	0.536	0.0676	7.059	0.8894
Boiler 3	706.833	4713.934	20	38	11.58	3.00	0.91	15,980	11.48	600	588.7	0.268	0.0338	3.529	0.4447
Line 1 Dryer 1 North	706.777	4713.994	29	48	14.63	2.76	0.84	25,000	21.23	200	366.5	0.412	0.0519	0.882	0.1112
Line 1 Dryer 2	706.777	4713.986	29	48	14.63	2.76	0.84	25,000	21.23	200	366.5	0.412	0.0519	0.882	0.1112
Line 1 Dryer 3	706.778	4713.978	29	48	14.63	2.76	0.84	25,000	21.23	200	366.5	0.412	0.0519	0.882	0.1112
Line 1 Dryer 4 South	706.777	4713.970	29	48	14.63	2.76	0.84	25,000	21.23	200	366.5	0.412	0.0519	0.882	0.1112
Line 1 Fryer	706.769	4714.023	29	49	14.94	2.75	0.84	29,300	25.06	150	338.7	2.358	0.2972		
Line 2 Pre Dryer	706.799	4713.925	30	36	10.97	2.76	0.84	12,000	10.19	200	366.5	0.212	0.0267	0.392	0.0494
Line 2 Dryer 1 North	706.805	4713.928	30	35	10.67	2.25	0.69	10,267	13.12	200	366.5	0.182	0.0229		
Line 2 Dryer 2	706.805	4713.927	30	35	10.67	2.25	0.69	10,267	13.12	200	366.5	0.182	0.0229		
Line 2 Dryer 3	706.805	4713.926	30	35	10.67	2.25	0.69	10,267	13.12	200	366.5	0.182	0.0229		
Line 2 Dryer 4	706.805	4713.921	30	35	10.67	2.25	0.69	10,267	13.12	200	366.5	0.182	0.0229		
Line 2 Dryer 5	706.805	4713.918	30	35	10.67	2.25	0.69	10,267	13.12	200	366.5	0.182	0.0229		
Line 2 Dryer 6 South	706.805	4713.915	30	35	10.67	2.25	0.69	10,267	13.12	200	366.5	0.182	0.0229		
Line 2 Fryer	706.798	4713.910	30	35	10.67	2.00	0.61	25,000	40.43	110	316.5	2.176	0.2741		
Line 4 Dryer 1 West	706.688	4714.016	26	36	10.97	3.91	1.19	22,250	9.41	121	322.5	0.402	0.0506	0.539	0.0679
Line 4 Dryer 2	706.695	4714.017	26	36	10.97	3.91	1.19	22,250	9.41	121	322.5	0.402	0.0506	0.539	0.0679
Line 4 Dryer 3	706.703	4714.017	26	36	10.97	3.91	1.19	22,250	9.41	121	322.5	0.402	0.0506	0.539	0.0679
Line 4 Dryer 4	706.711	4714.018	26	36	10.97	3.91	1.19	22,250	9.41	121	322.5	0.402	0.0506	0.539	0.0679
Line 4 Dryer 5 East	706.719	4714.018	26	36	10.97	3.00	0.91	20,000	14.37	121	322.5	0.402	0.0506	0.539	0.0679
Line 4 Fryer	706.714	4714.028	26	43.3	13.21	3.00	0.91	20,000	14.37	154	341.1	3.081	0.3882		
Special Products 1 North	706.786	4714.002	29	31.5	9.60	3.00	0.91	8,133	5.84	200	366.5	0.097	0.0123	0.163	0.0206
Special Products 2	706.782	4713.997	29	32	9.75	3.00	0.91	8,133	5.84	200	366.5	0.097	0.0123	0.163	0.0206
Special Products 3 South	706.786	4713.993	29	32	9.75	3.00	0.91	8,133	5.84	200	366.5	0.097	0.0123	0.163	0.0206
Special Products Fryer	706.799	4714.020	29	41	12.50	4.00	1.22	29,300	11.84	108	315.4	0.435	0.0548		
230K Generator (Annual)	706.645	4714.045	N/A	7	2.13	0.50	0.15	2,370	61.32	970	794.3	0.0446	0.00562	0.628	0.0791
100K Generator (Annual)	706.788	4714.039	29	13	3.96	0.25	0.08	800	82.79	1060	844.3	0.0052	0.00066	0.222	0.0280
230K Generator (24 Hour)												0.2766	0.0349		
100K Generator (24 Hour)												0.0324	0.0041		


NORTH
LambWeston
Air Emission
Points



Lamb-Weston, Twin Falls
Modeled Buildings and Roof Heights


PROPERTY BOUNDARY
PROPERTY BOUNDARY
PROPERTY BOUNDARY
NORTH
SECTION CORNER
LambWeston

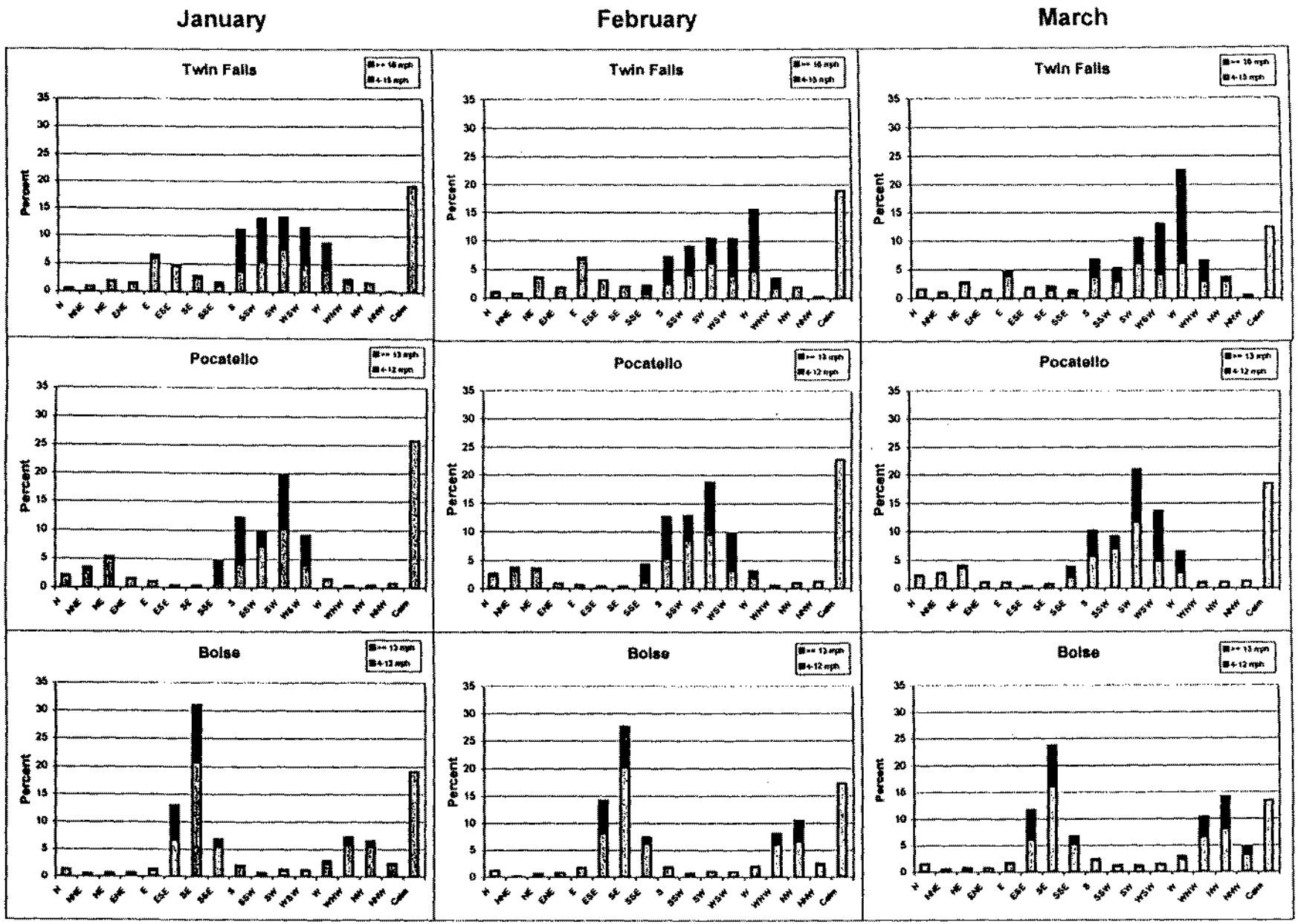


FROM
USGS 7.5 MINUTE
TWIN FALLS
QUADRANGLE

— Site Boundary
● Sensitive Receptor

LAMB-WESTON
TWIN FALLS, IDAHO
SENSITIVE RECEPTOR
LOCATIONS

Comparison of Twin Falls, Pocatello and Boise Long Term Wind Data

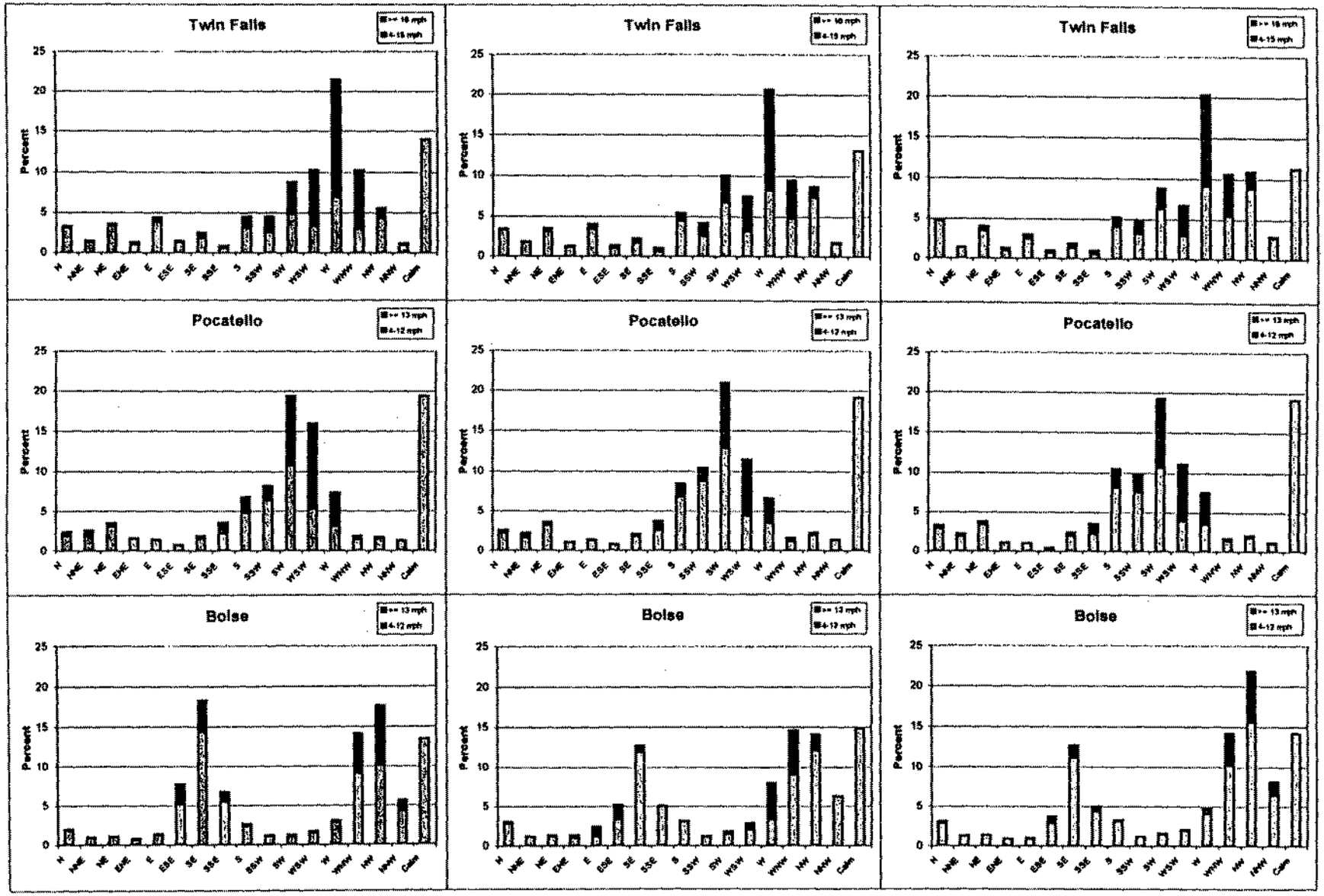


Data Source: Climatological Handbook, Columbia Basin States, Volume 3, Part A, June 1968

Boise and Pocatello data from 1949-1958, Twin Falls data from 1948-1957

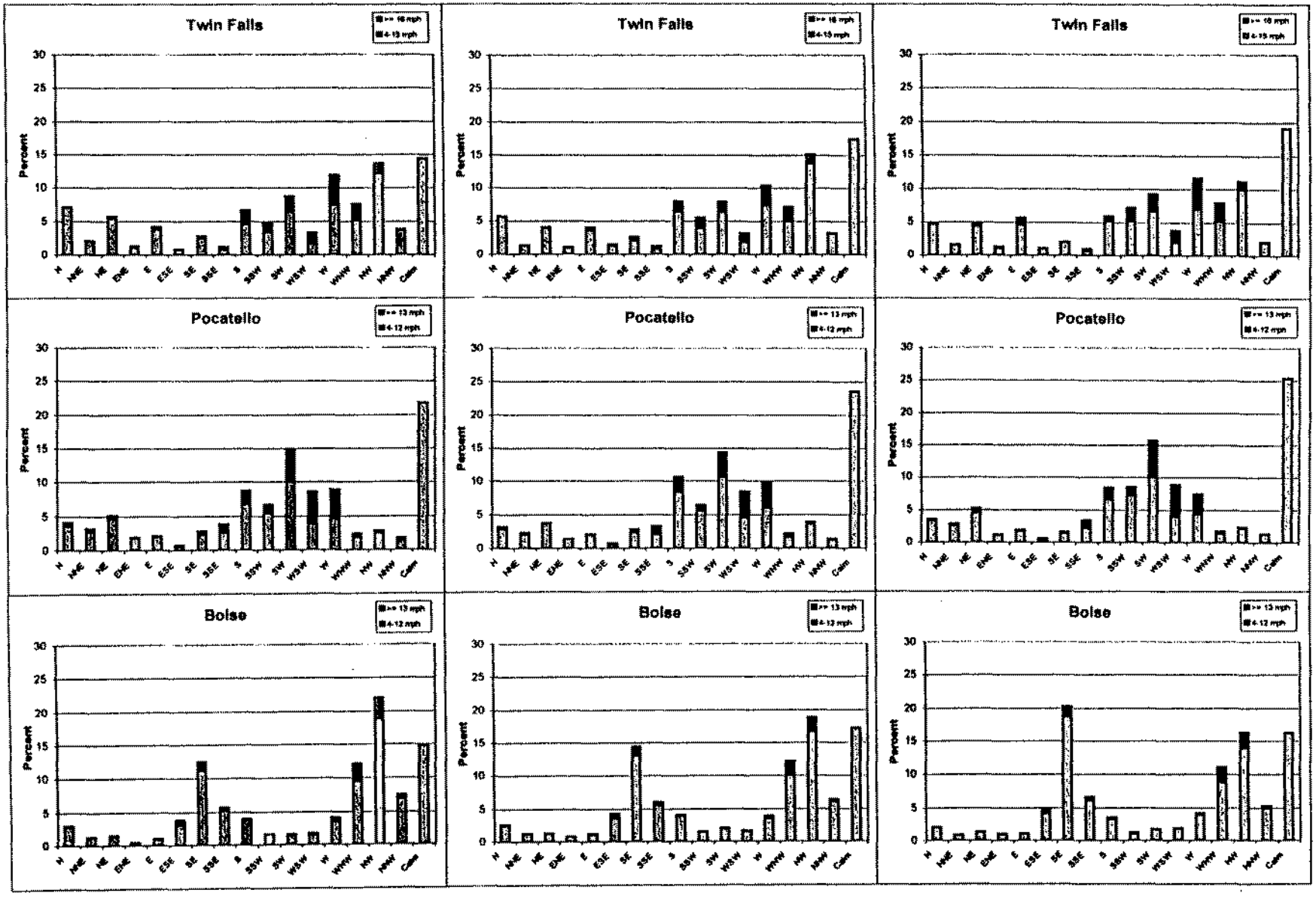
Comparison of Twin Falls, Pocatello and Boise Long Term Wind Data

April | May | June

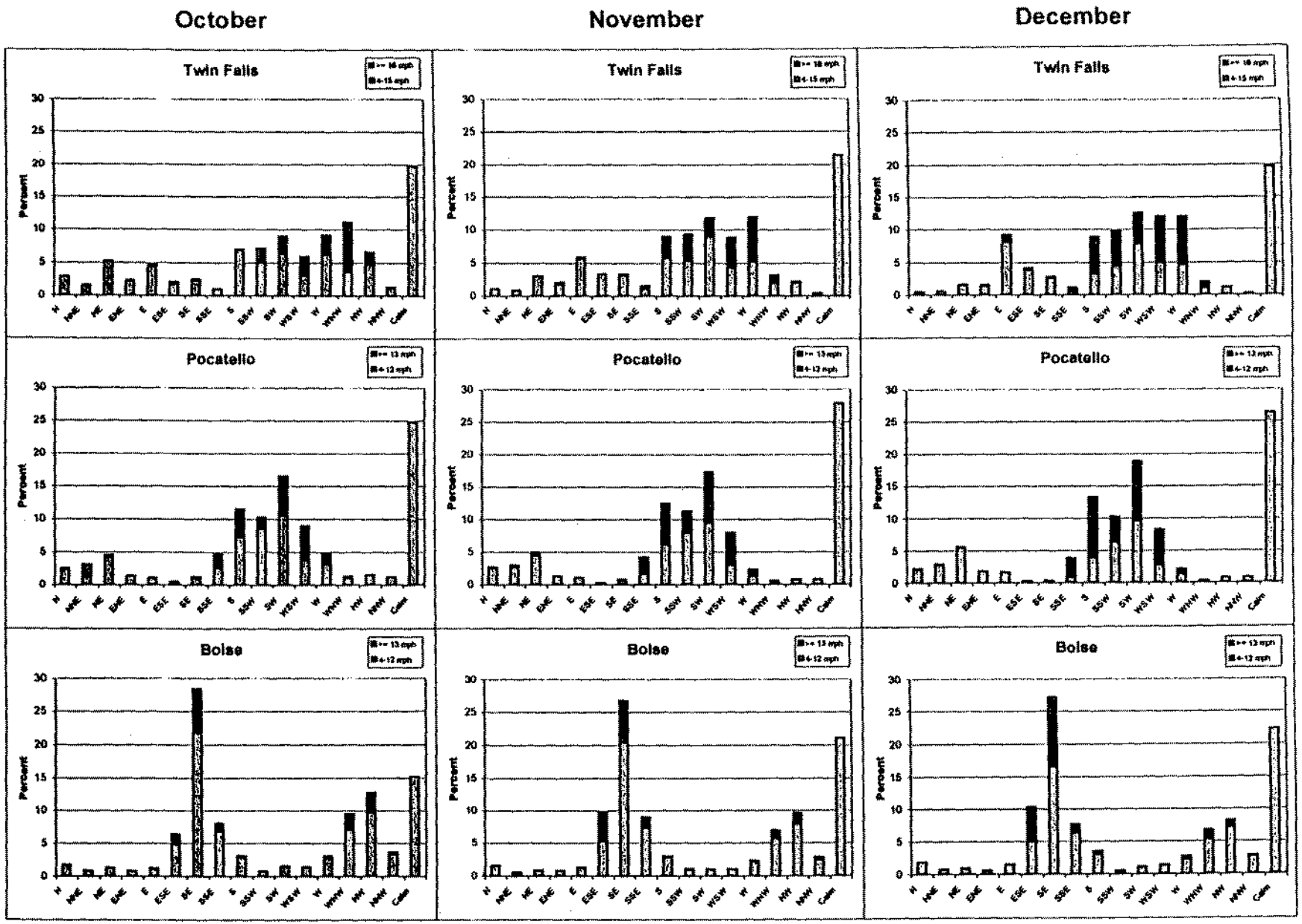


Comparison of Twin Falls, Pocatello and Boise Long Term Wind Data

July | August | September

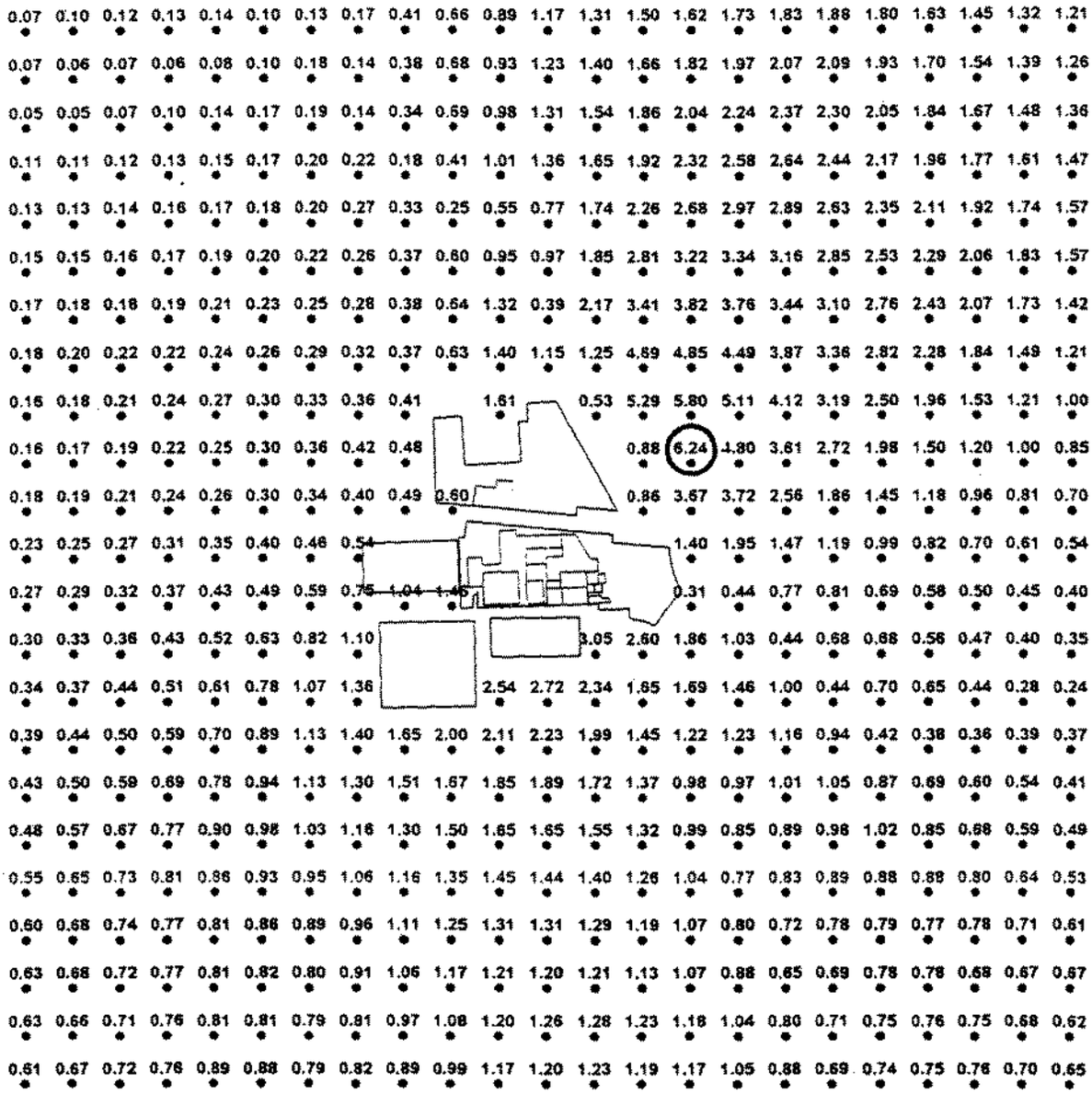


Comparison of Twin Falls, Pocatello and Boise Long Term Wind Data



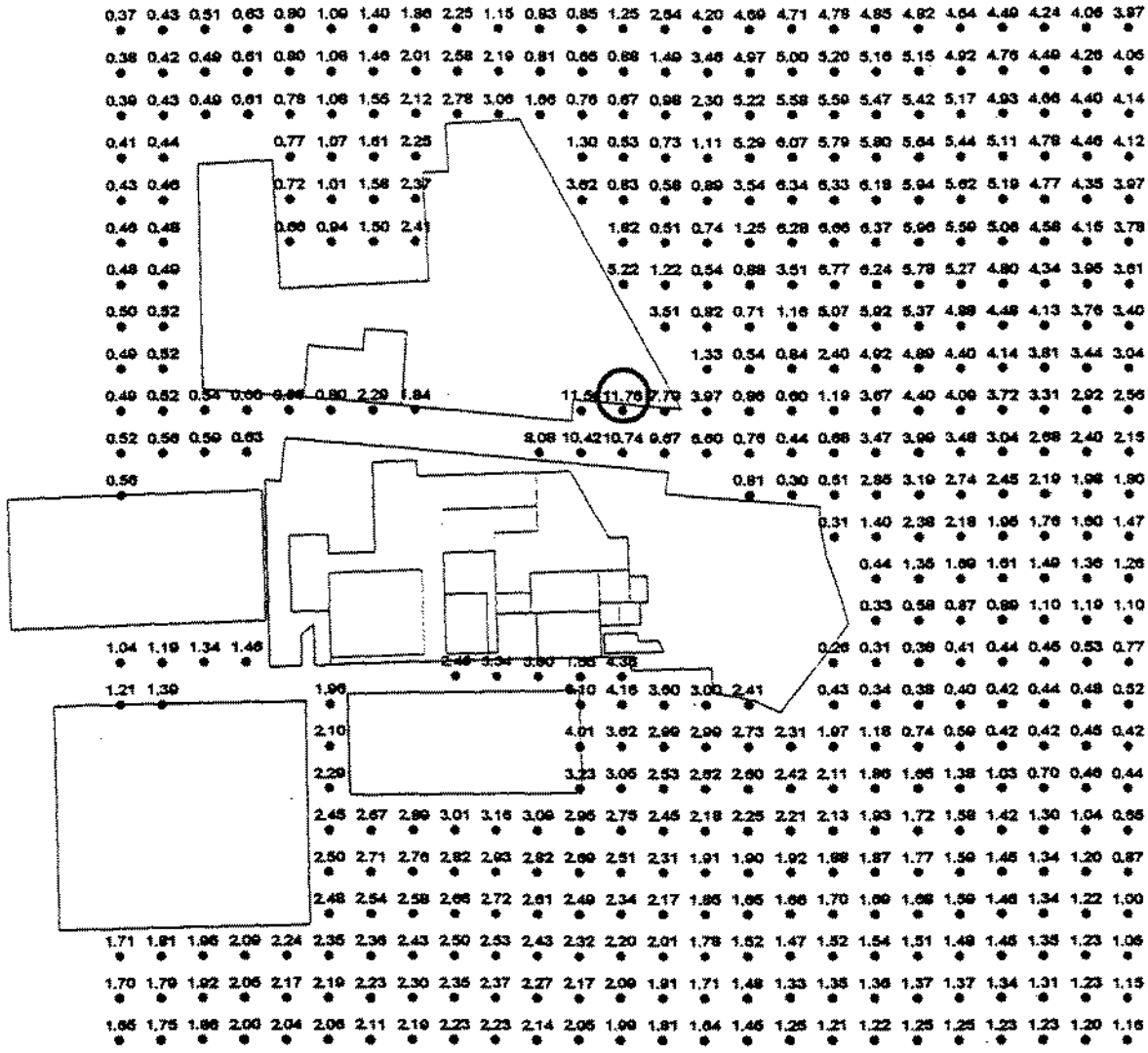
ATTACHMENT B

ANNUAL PM10 RESULTS MAPS



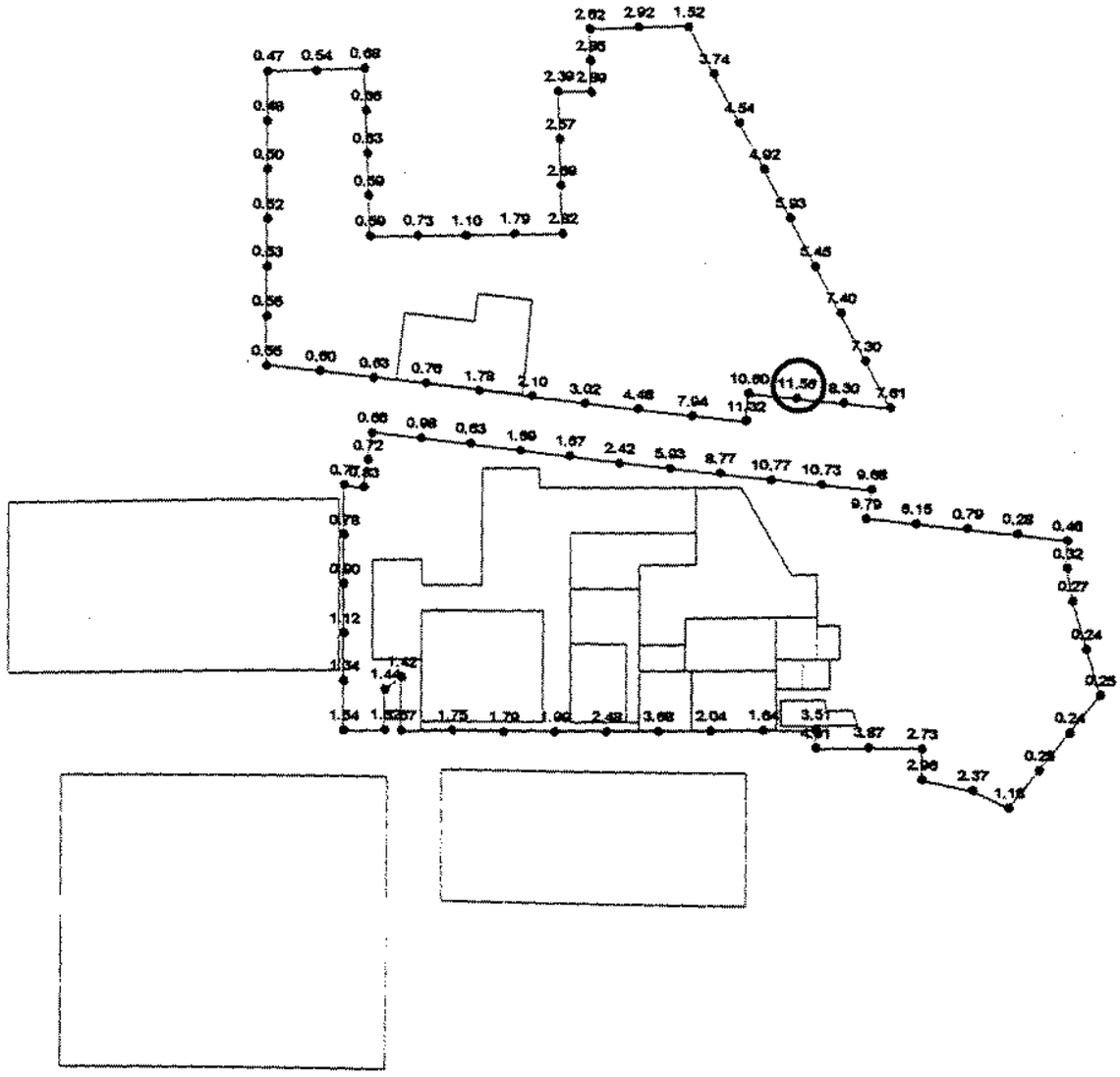
Highest Concentration

Lamb-Weston, Twin Falls
1987 PM10 Initial Grid Annual Concentrations



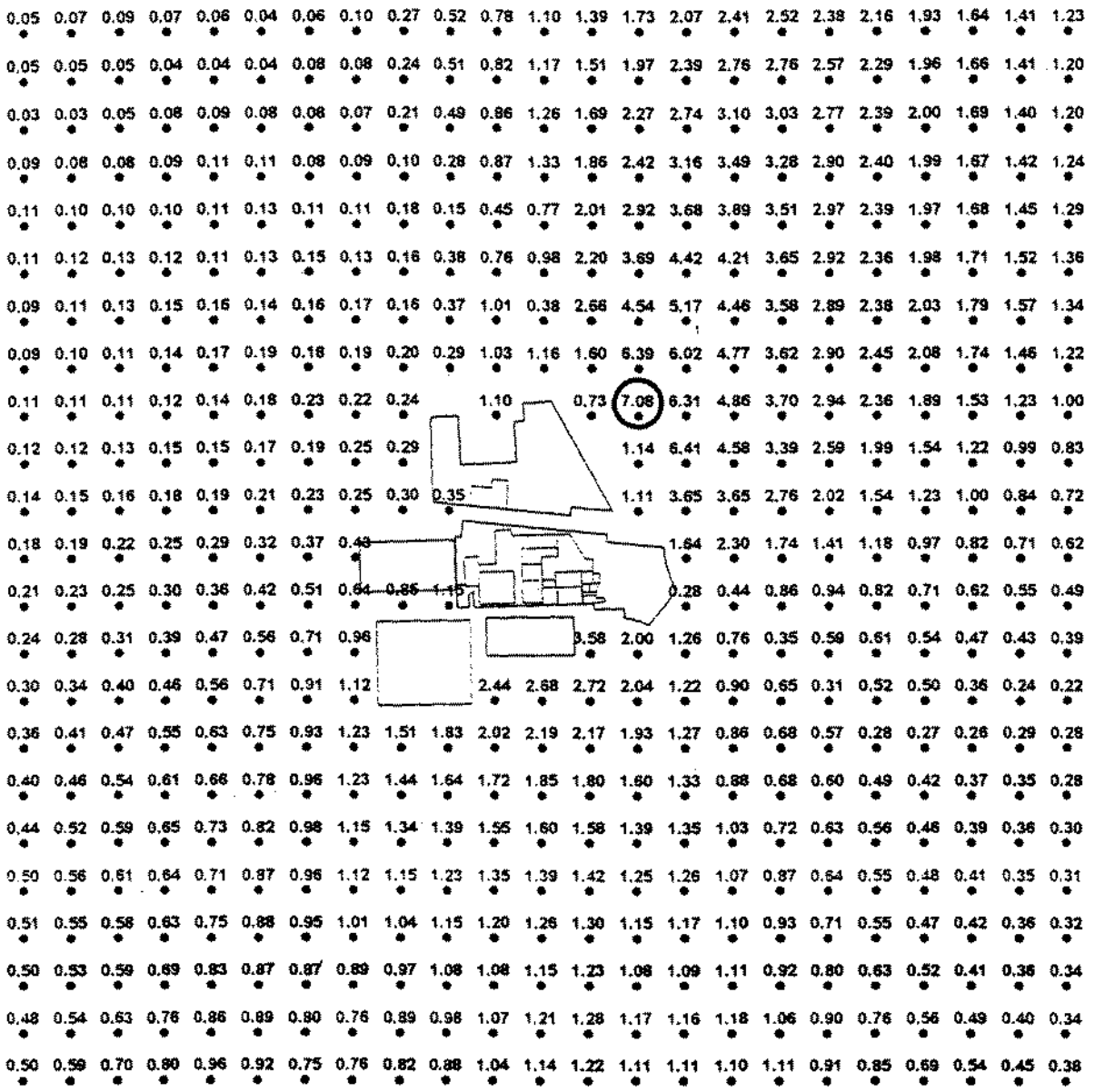
Highest Concentration for 1987

Lamb-Weston, Twin Falls
1987 PM10 Fine Grid Annual Concentrations



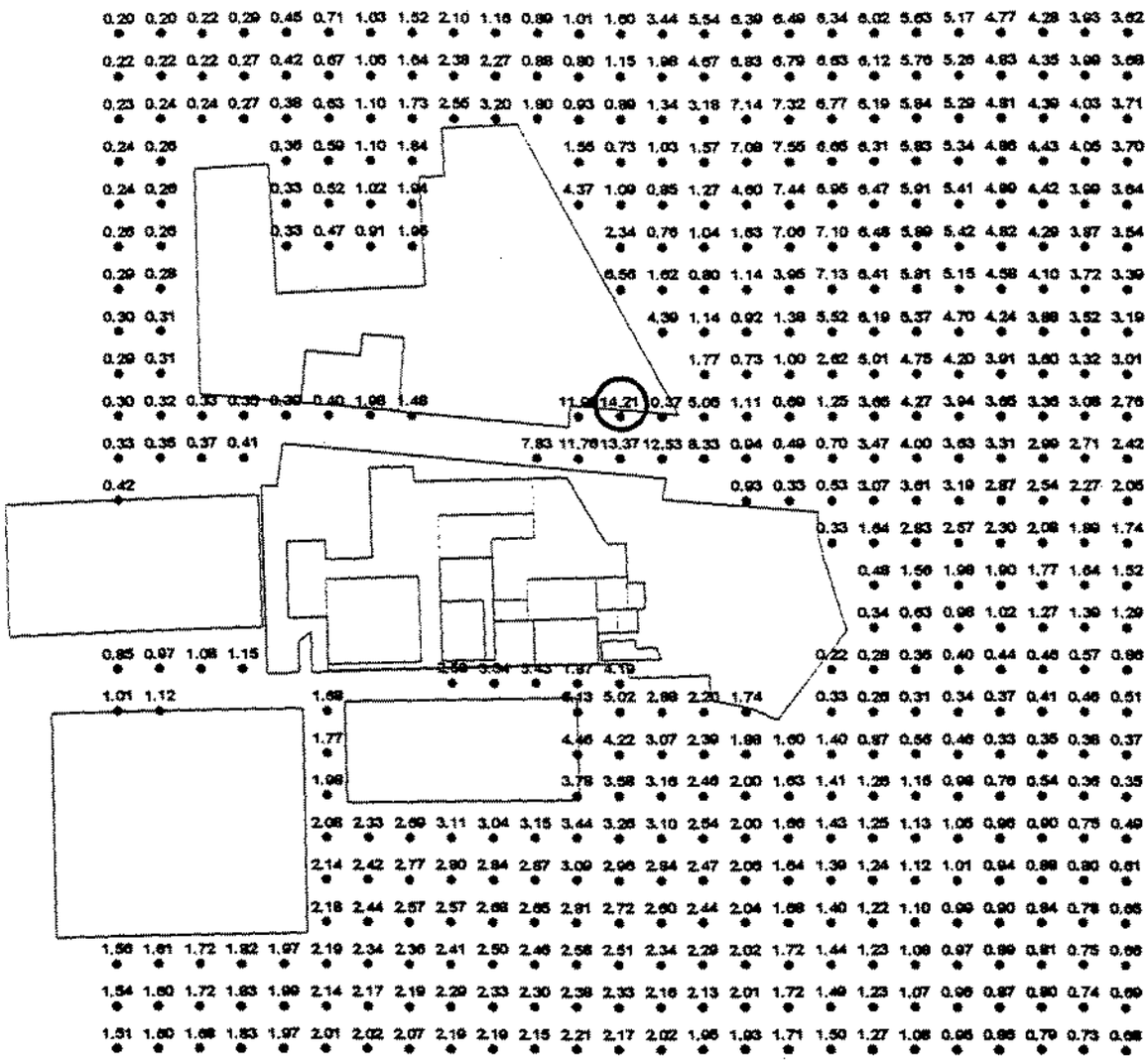
Highest Concentration

Lamb-Weston, Twin Falls
1987 PM10 Fenceline Annual Concentrations



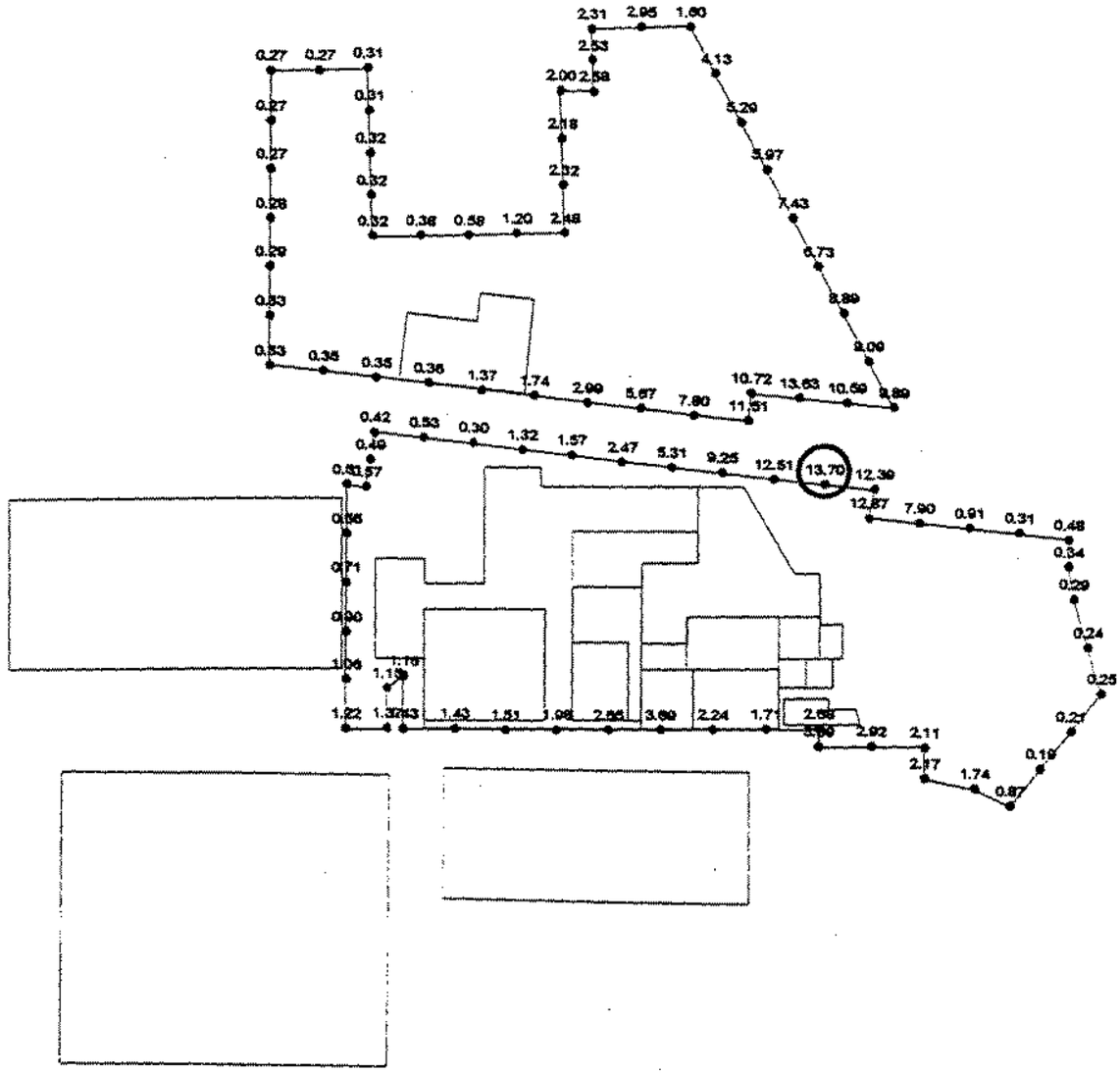
Highest Concentration

Lamb-Weston, Twin Falls
1988 PM10 Initial Grid Annual Concentrations



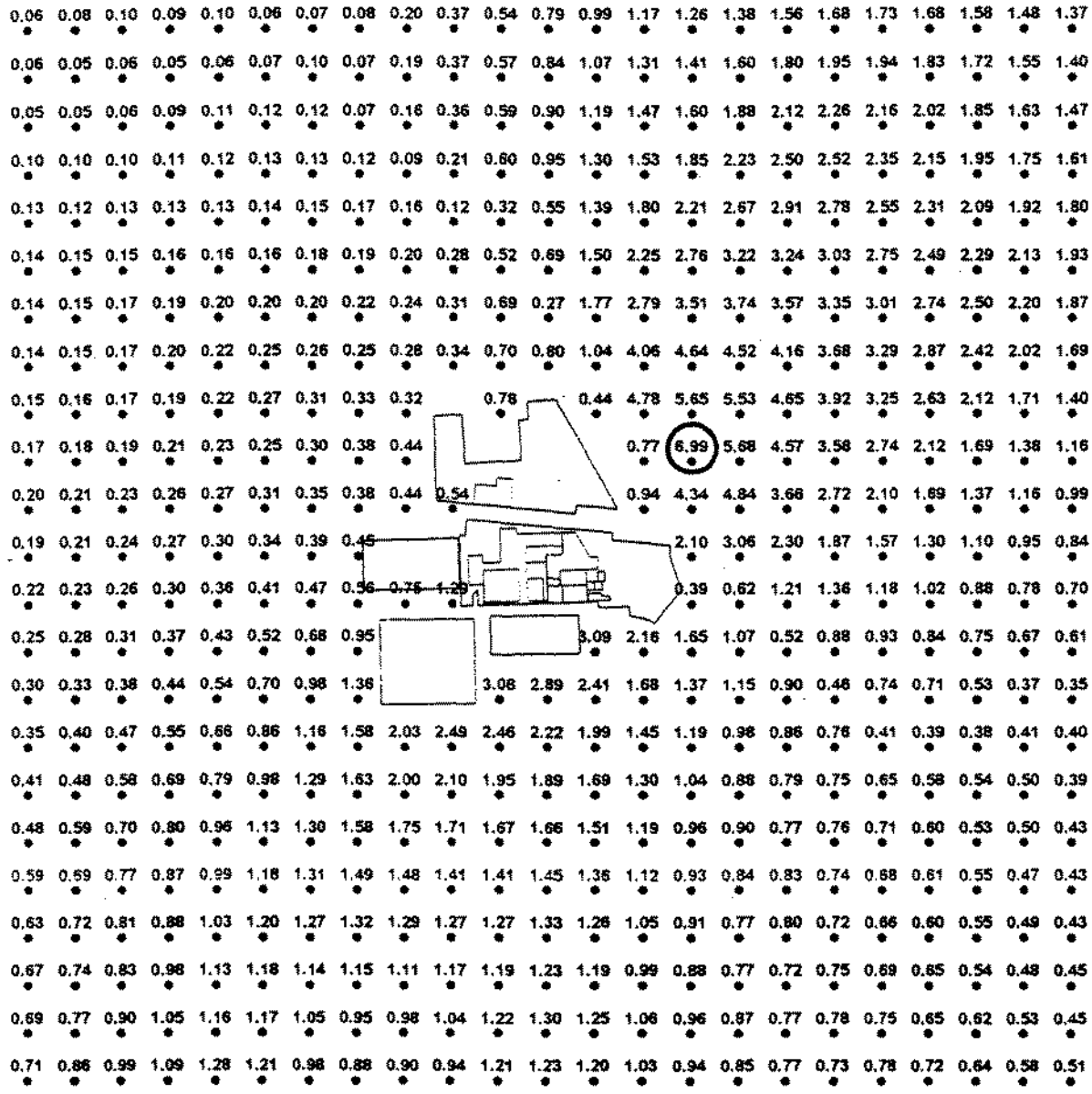
Highest Concentration
for 5 Years Modeled

Lamb-Weston, Twin Falls
1988 PM10 Fine Grid Annual Concentrations



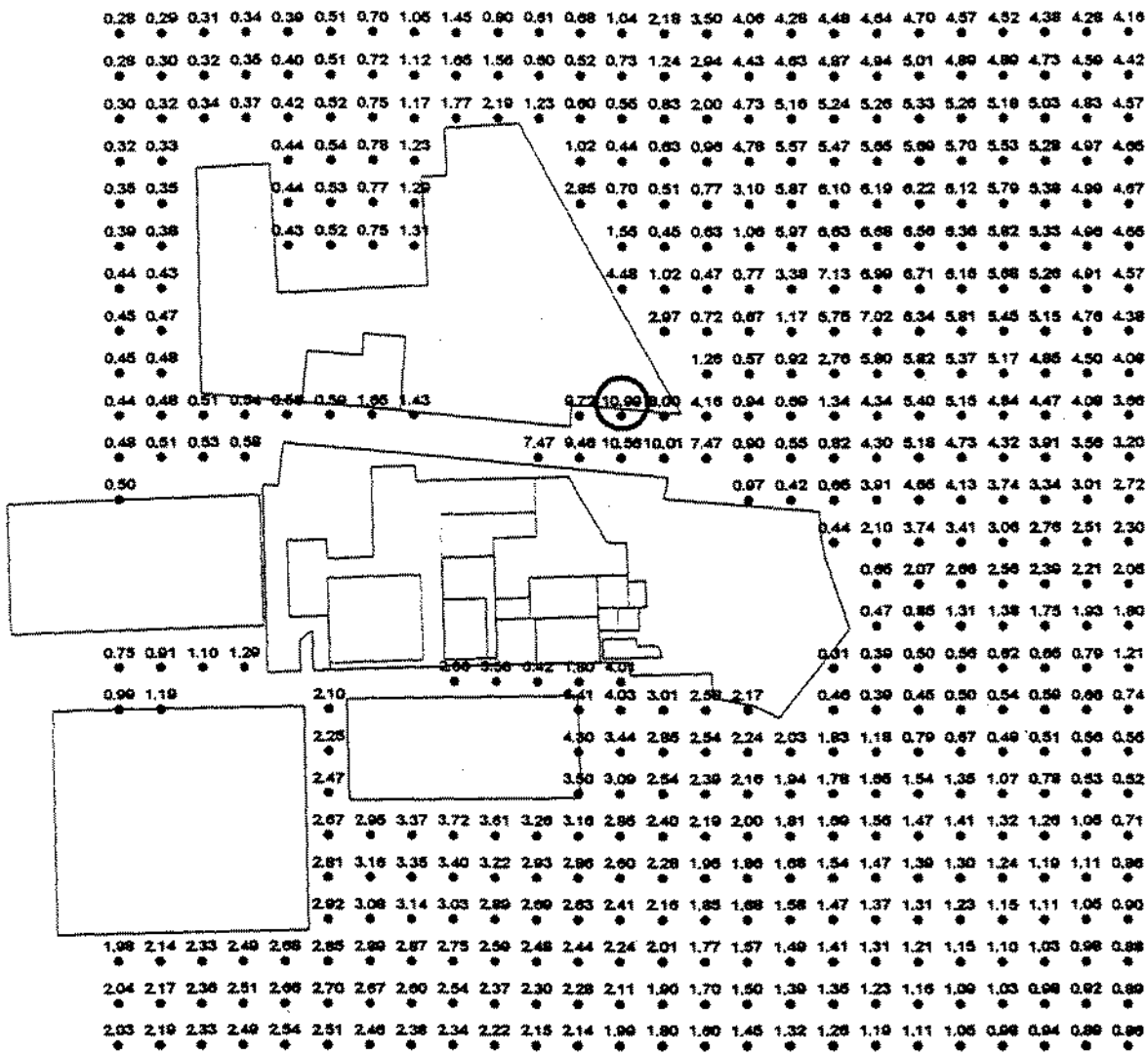
Highest Concentration

Lamb-Weston, Twin Falls
1988 PM10 Fenceline Annual Concentrations



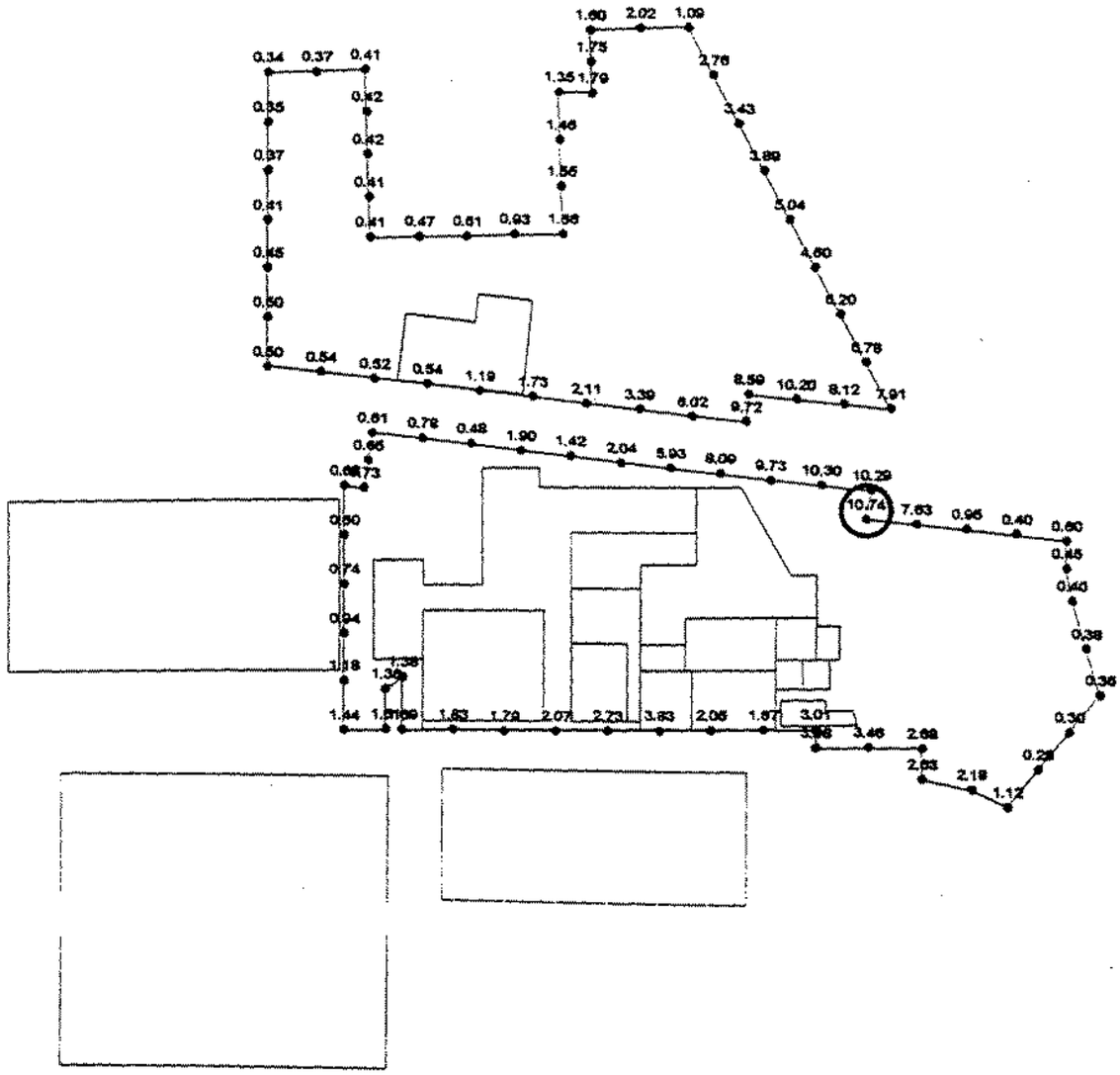
Highest Concentration

Lamb-Weston, Twin Falls
1989 PM10 Initial Grid Annual Concentrations



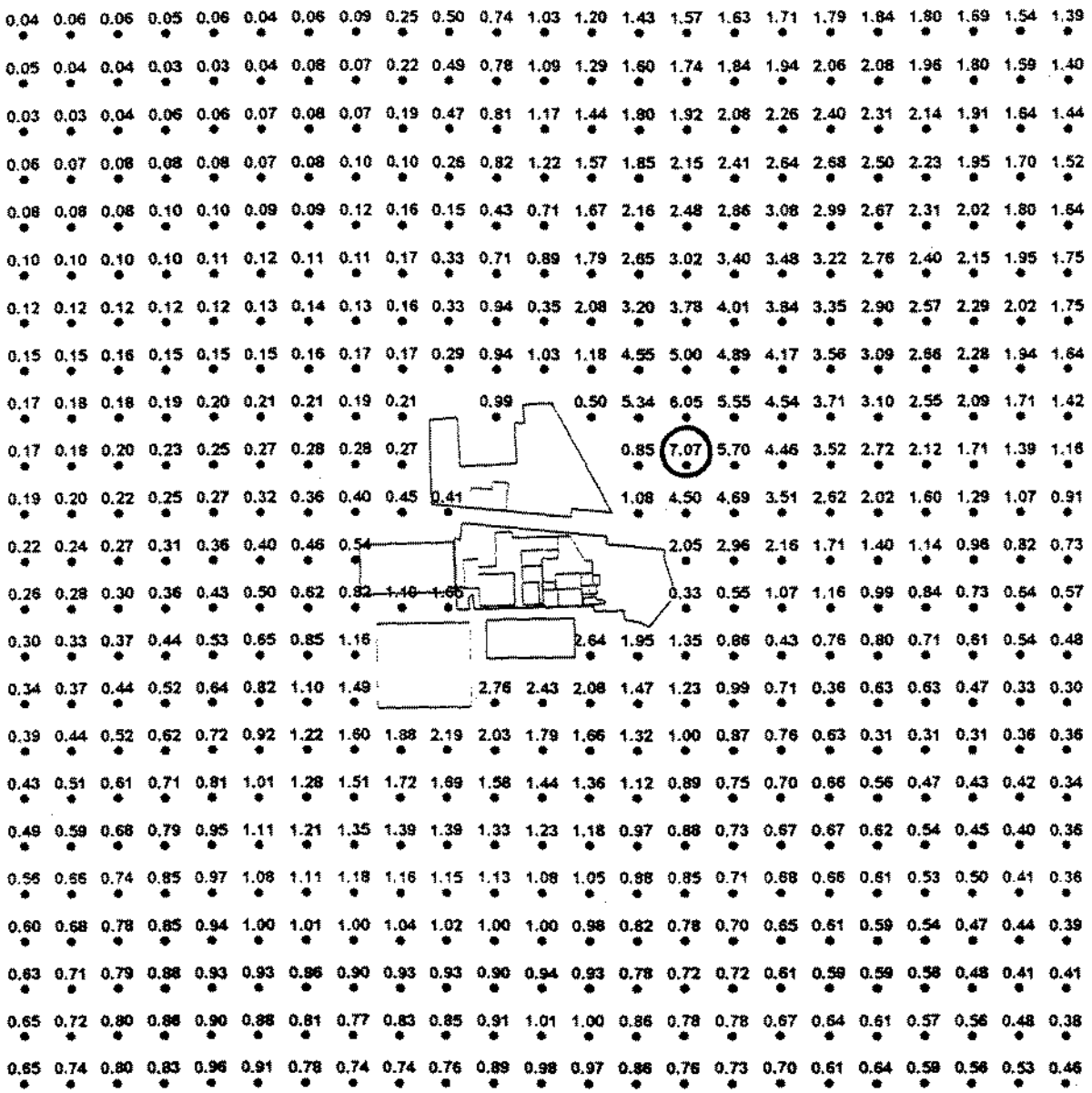
Highest Concentration for 1989

Lamb-Weston, Twin Falls
1989 PM10 Fine Grid Annual Concentrations



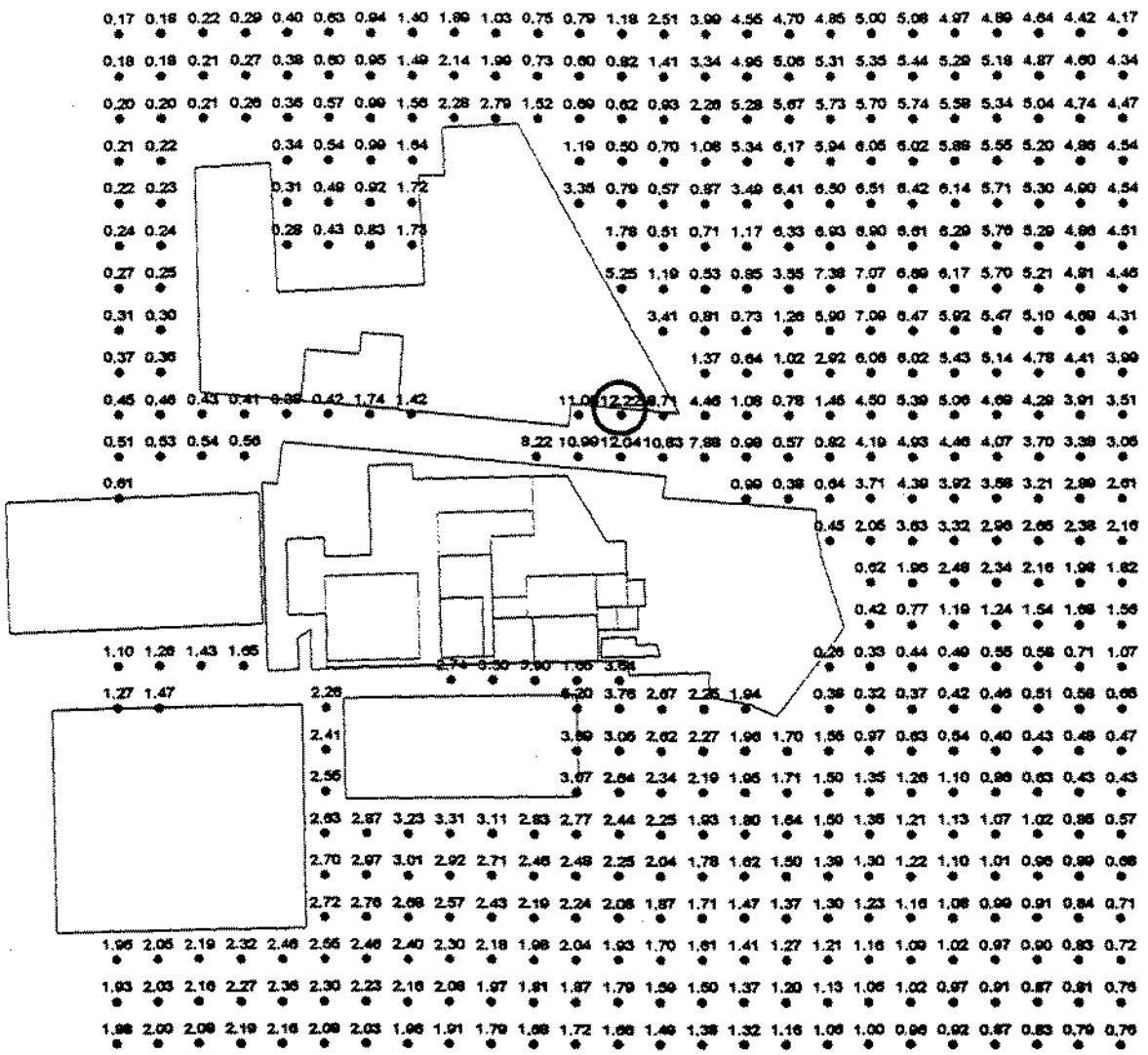
Highest Concentration

Lamb-Weston, Twin Falls
1989 PM10 Fenceline Annual Concentrations



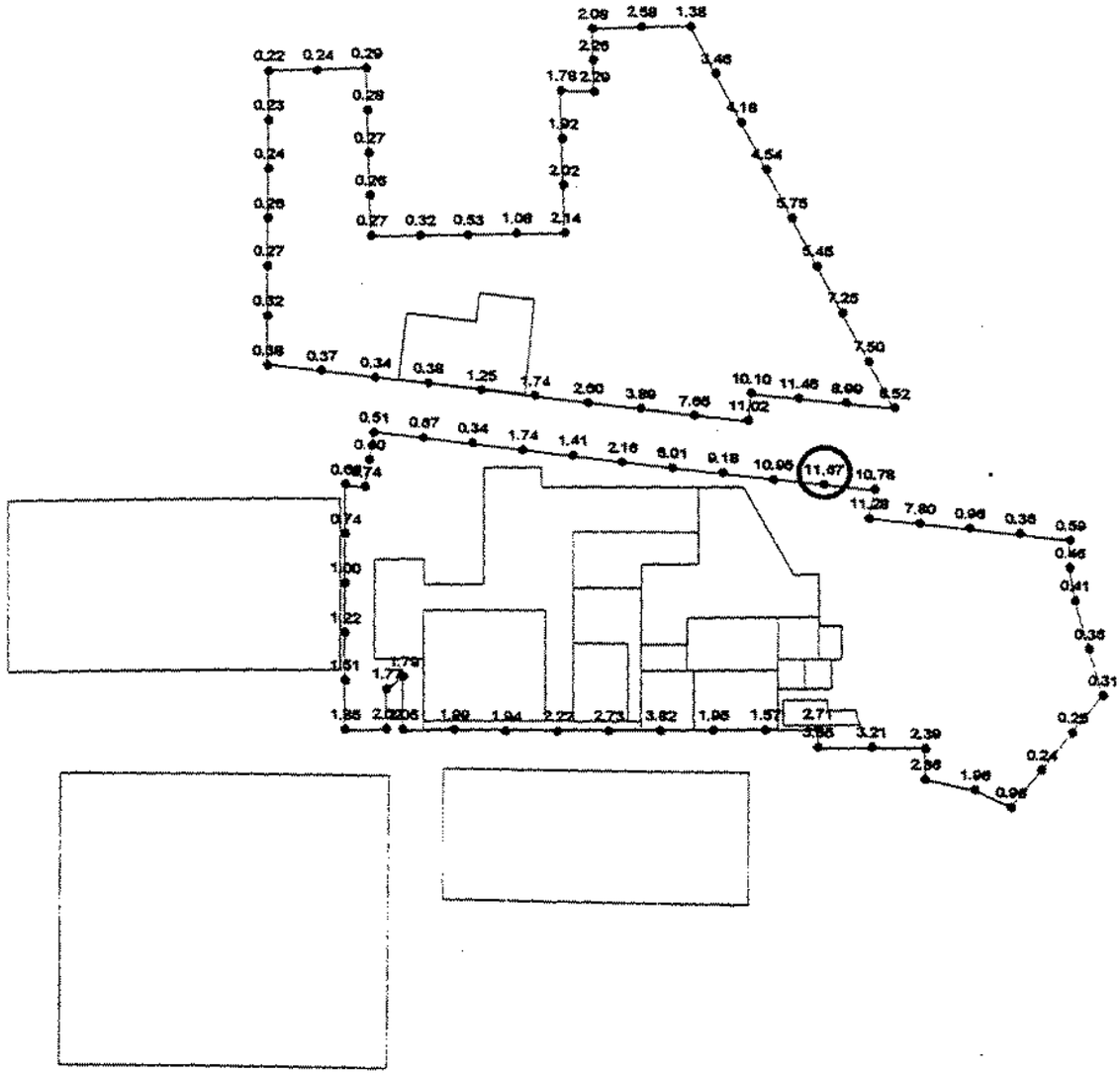
Highest Concentration

Lamb-Weston, Twin Falls
1990 PM10 Initial Grid Annual Concentrations



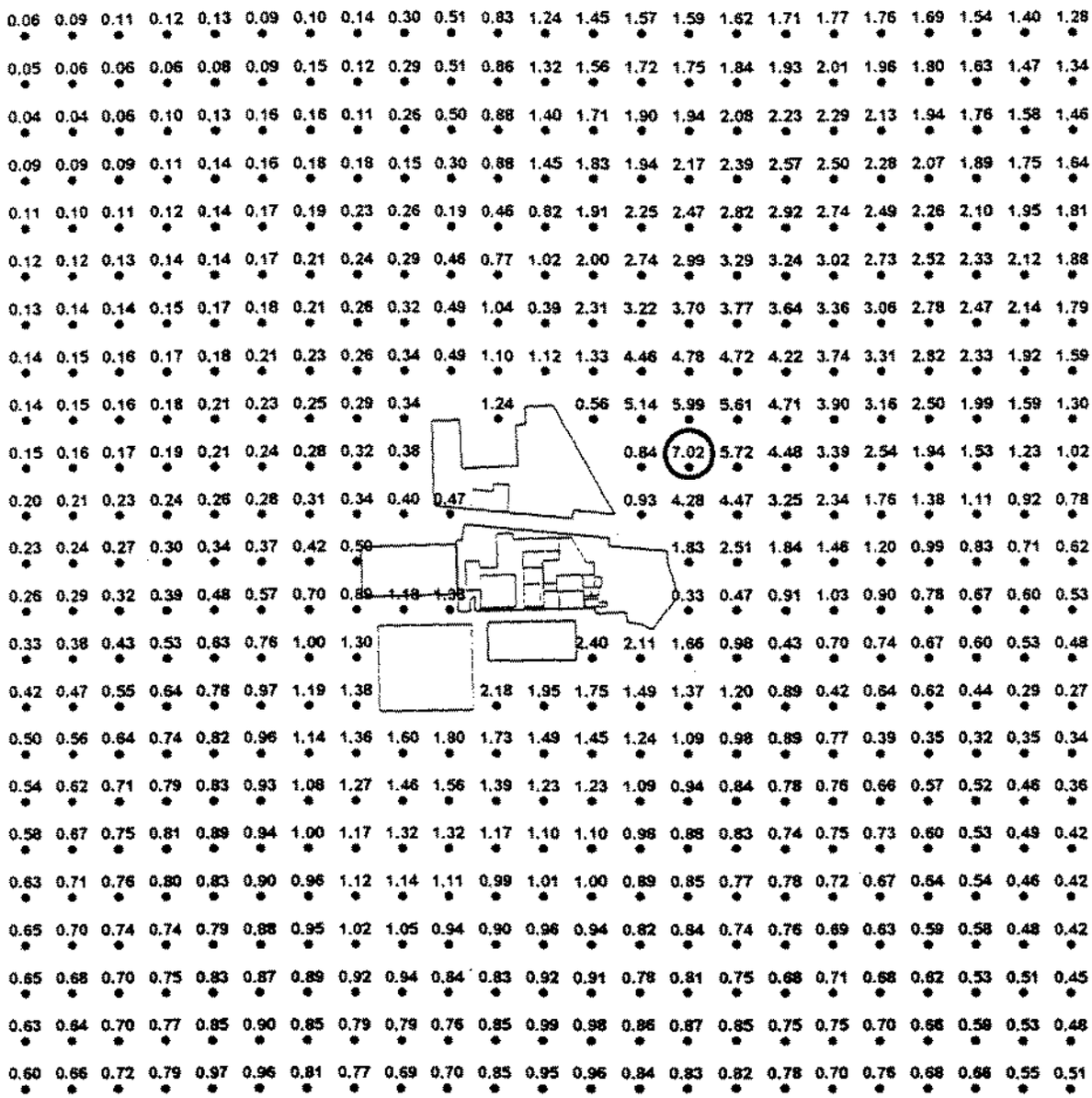
Highest Concentration for 1990

Lamb-Weston, Twin Falls
1990 PM10 Fine Grid Annual Concentrations



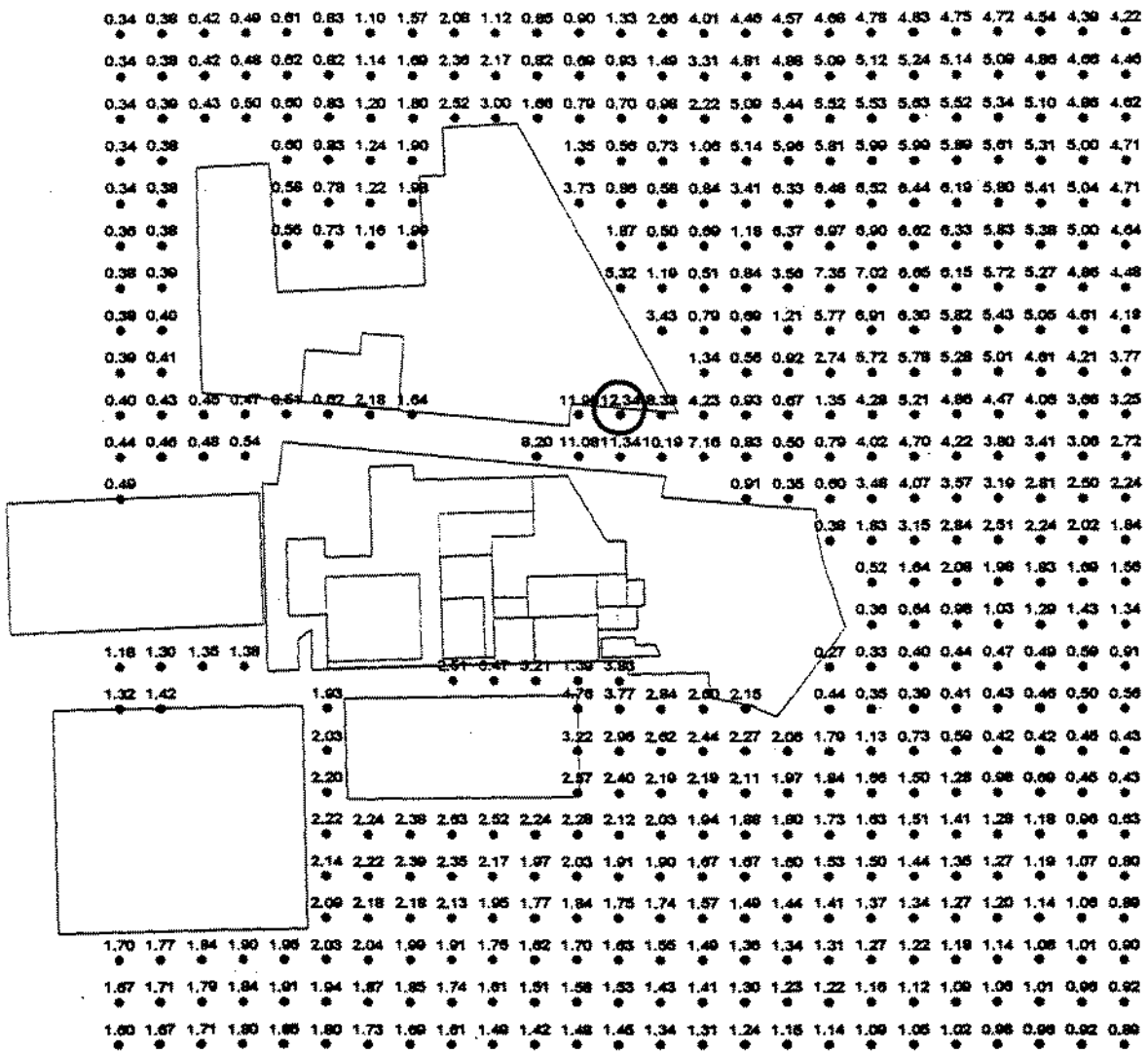
Highest Concentration

Lamb-Weston, Twin Falls
1990 PM10 Fenceline Annual Concentrations



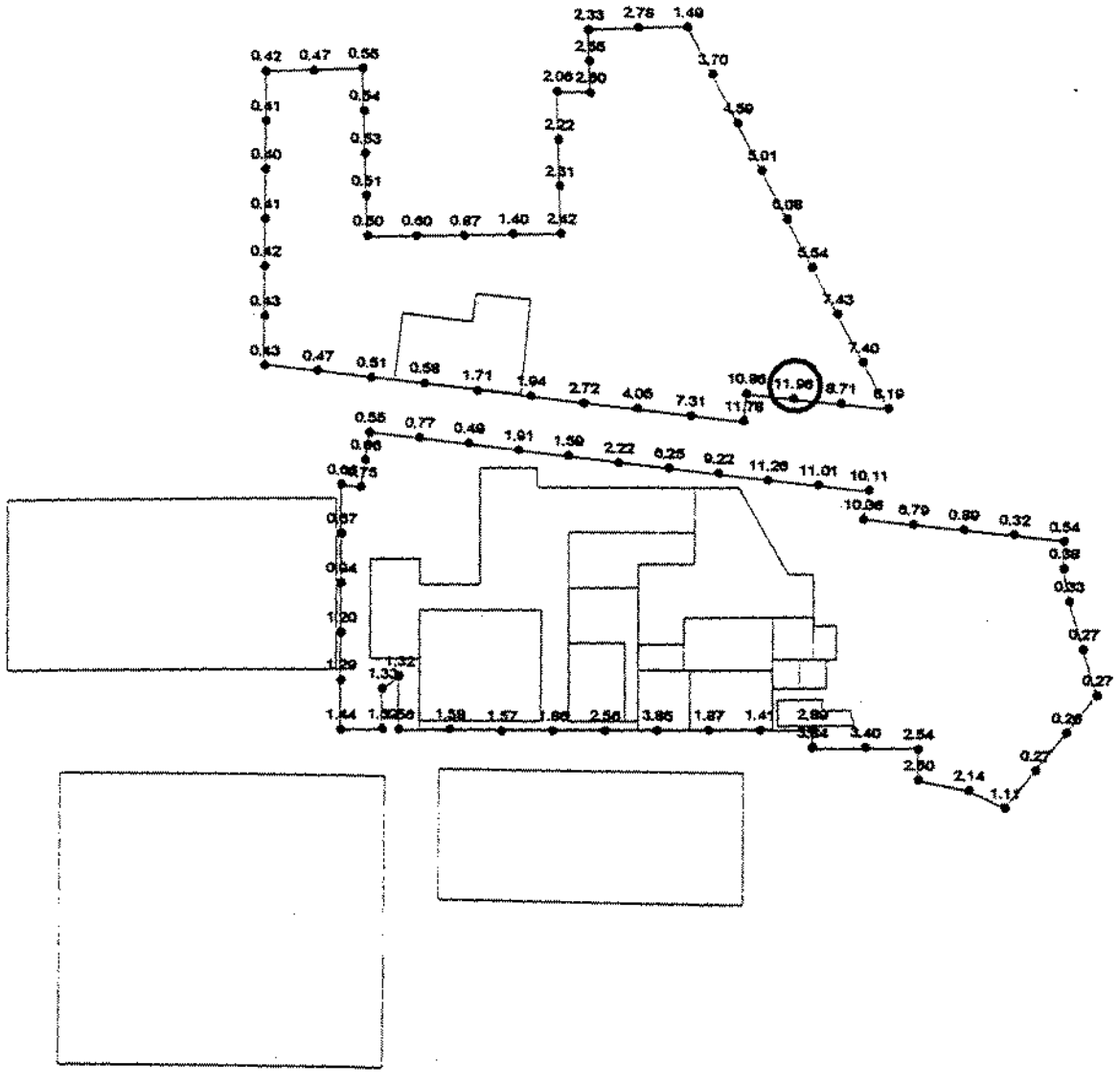
Highest Concentration

Lamb-Weston, Twin Falls
1991 PM10 Initial Grid Annual Concentrations



Highest Concentration for 1991

Lamb-Weston, Twin Falls
1991 PM10 Fine Grid Annual Concentrations

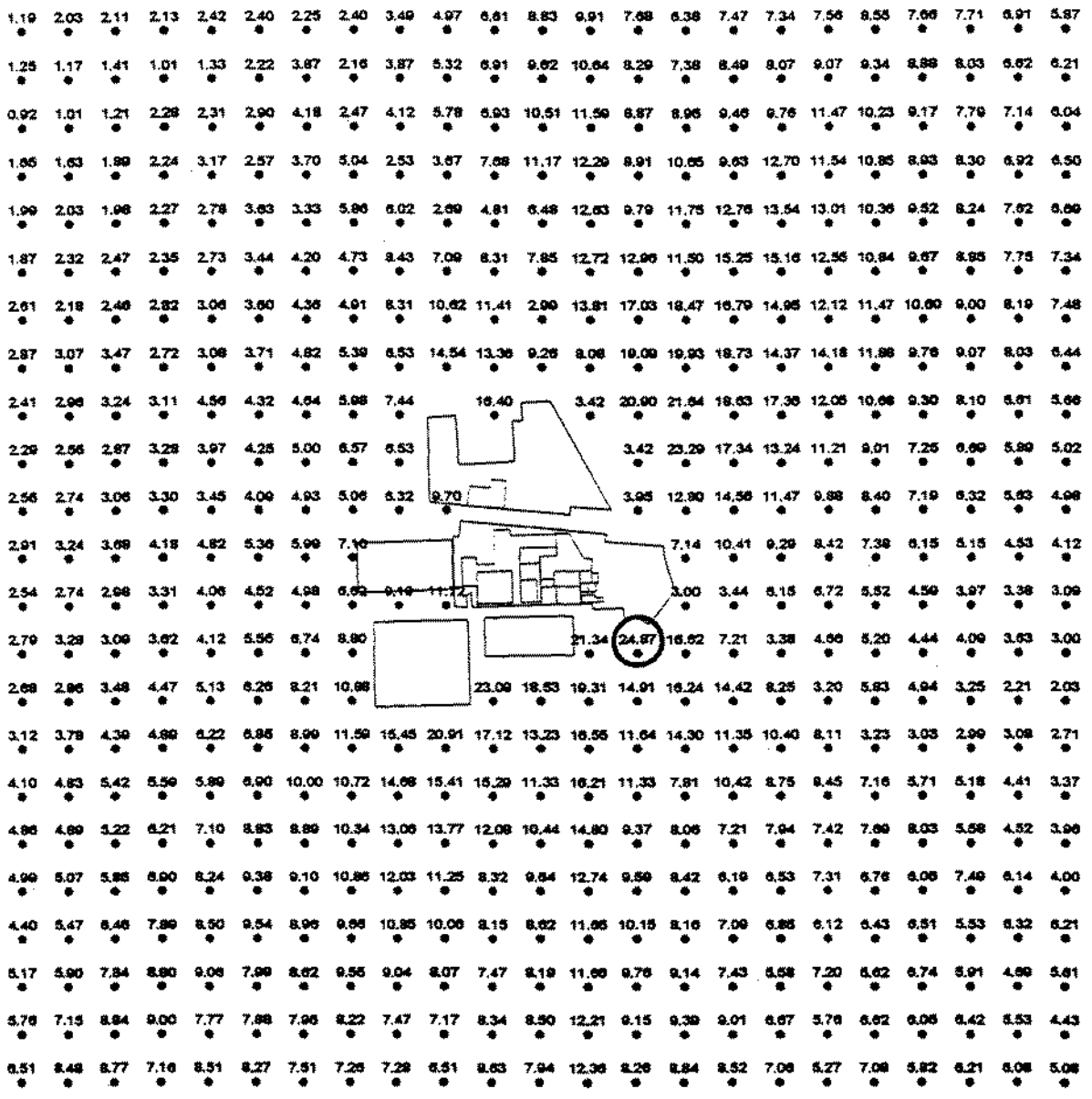


Highest Concentration

Lamb-Weston, Twin Falls
1991 PM10 Fenceline Annual Concentrations

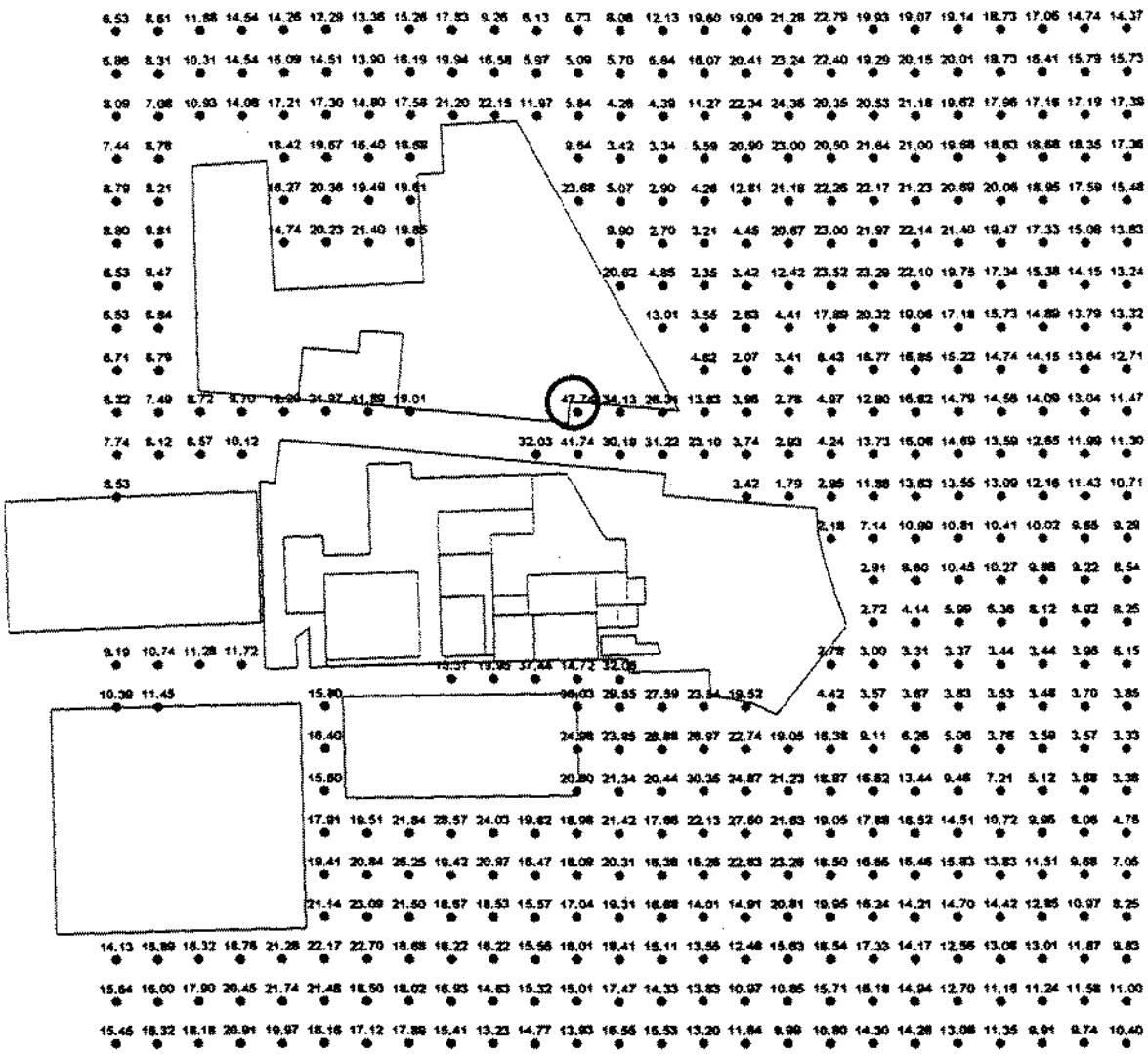
ATTACHMENT C

24 HOUR PM10 SECOND HIGH RESULTS MAPS



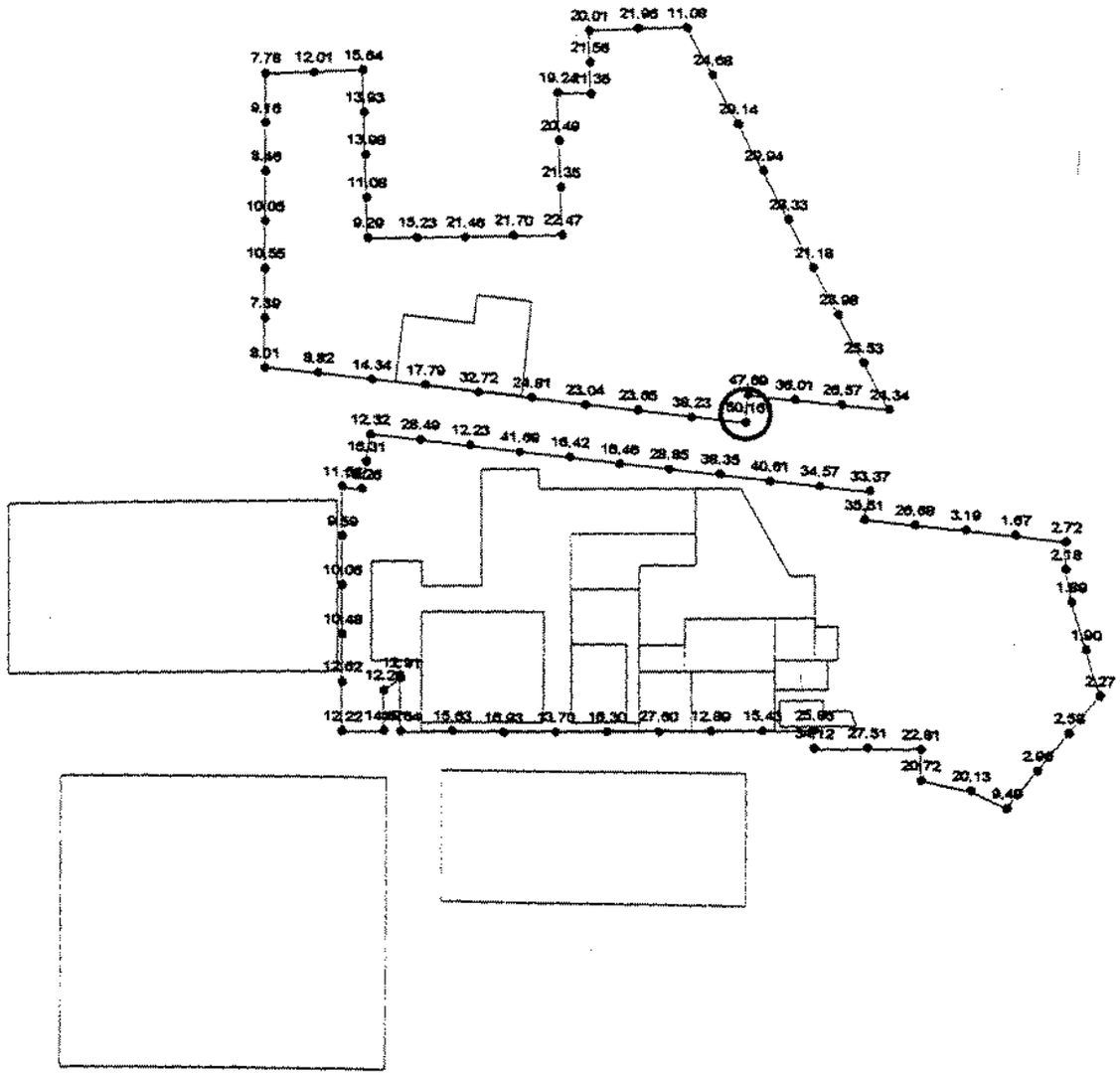
Highest Concentration

Lamb-Weston, Twin Falls
1987 PM10 Initial Grid 2nd High Concentrations



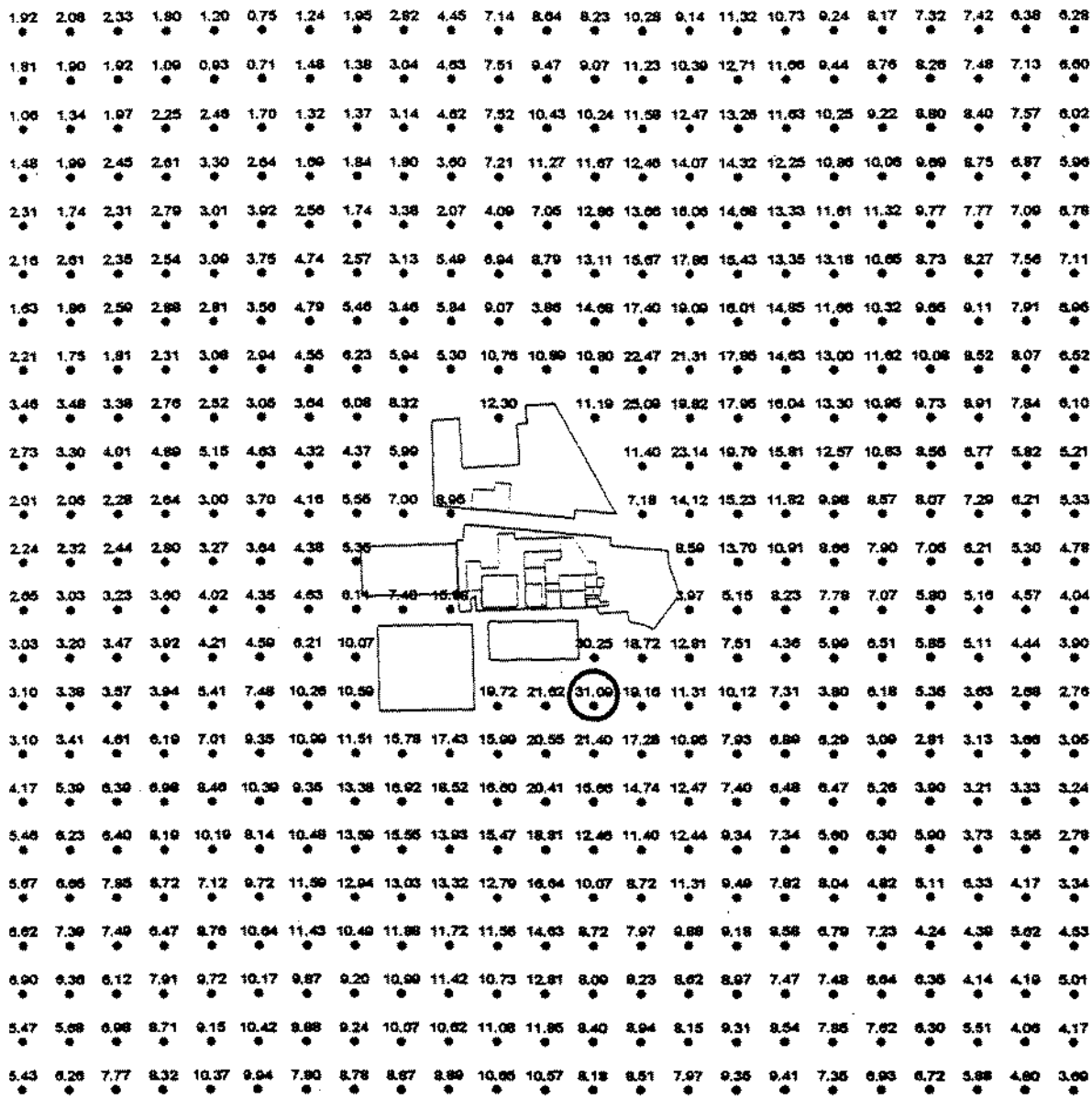
Highest Concentration

Lamb-Weston, Twin Falls
1987 PM10 Fine Grid 2nd Highest Concentrations



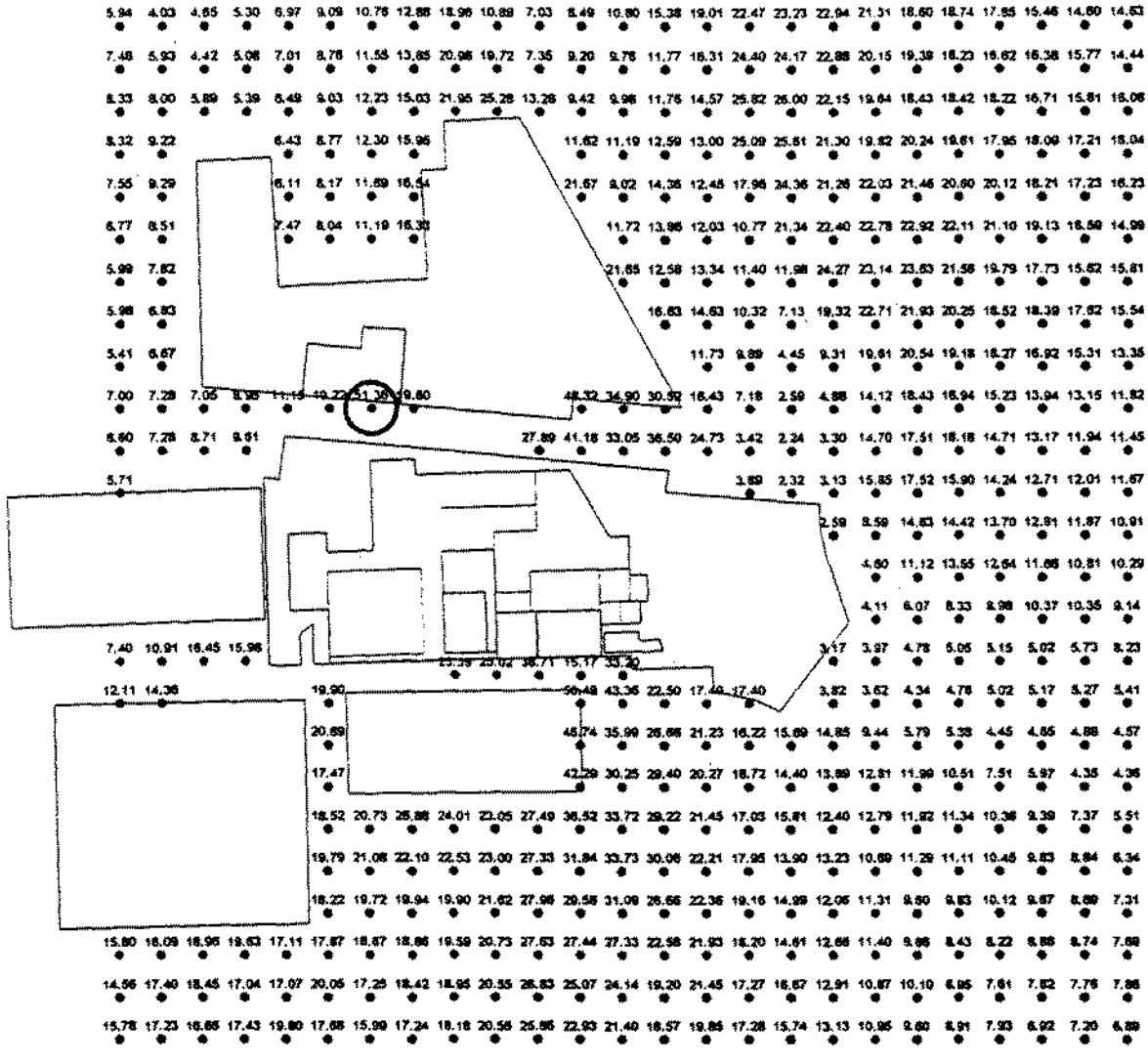
Highest Concentration for 1987

Lamb-Weston, Twin Falls
1987 PM10 Fenceline 2nd Highest Concentrations



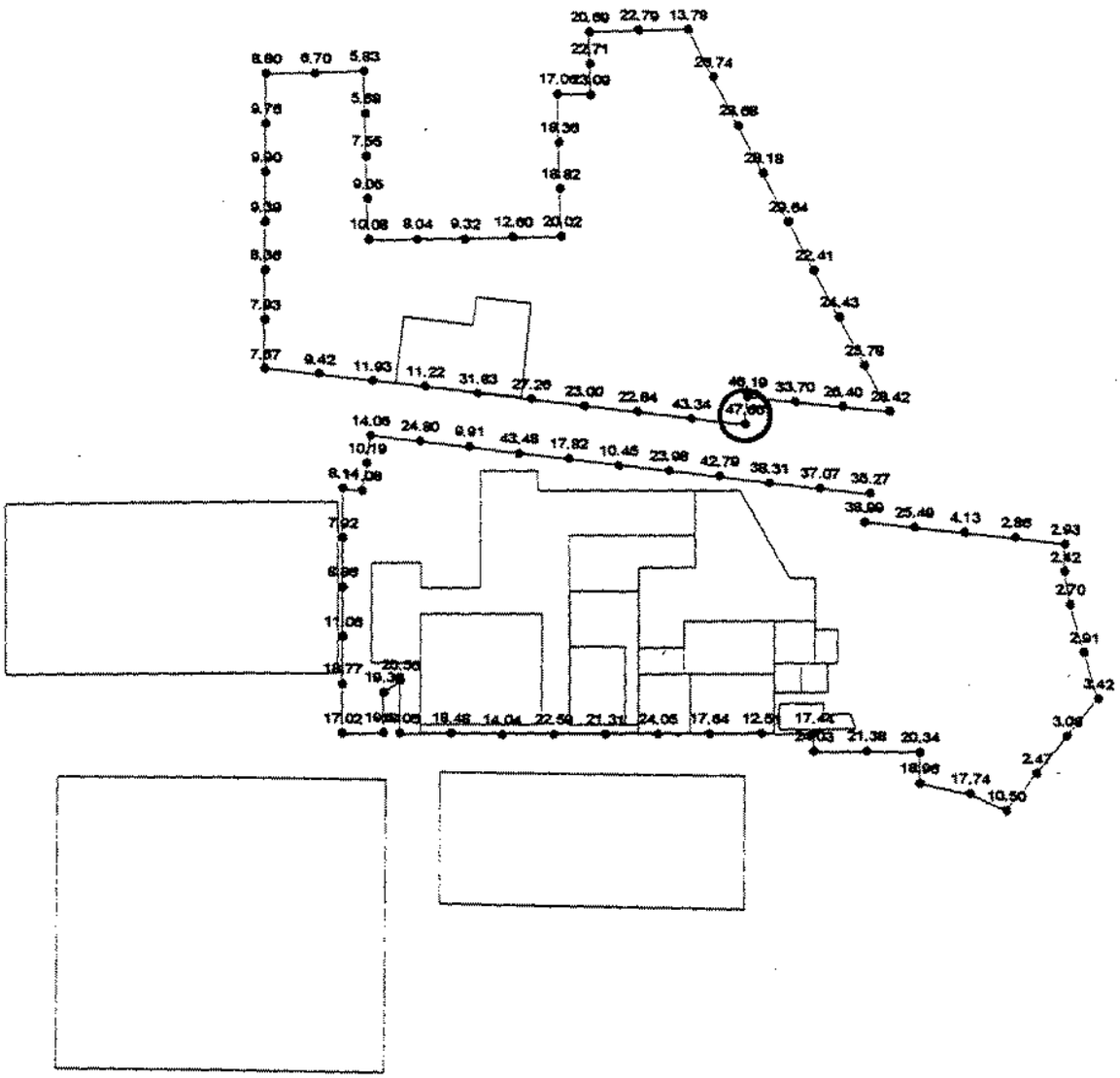
Highest Concentration

Lamb-Weston, Twin Falls
1988 PM10 Initial Grid 2nd High Concentrations



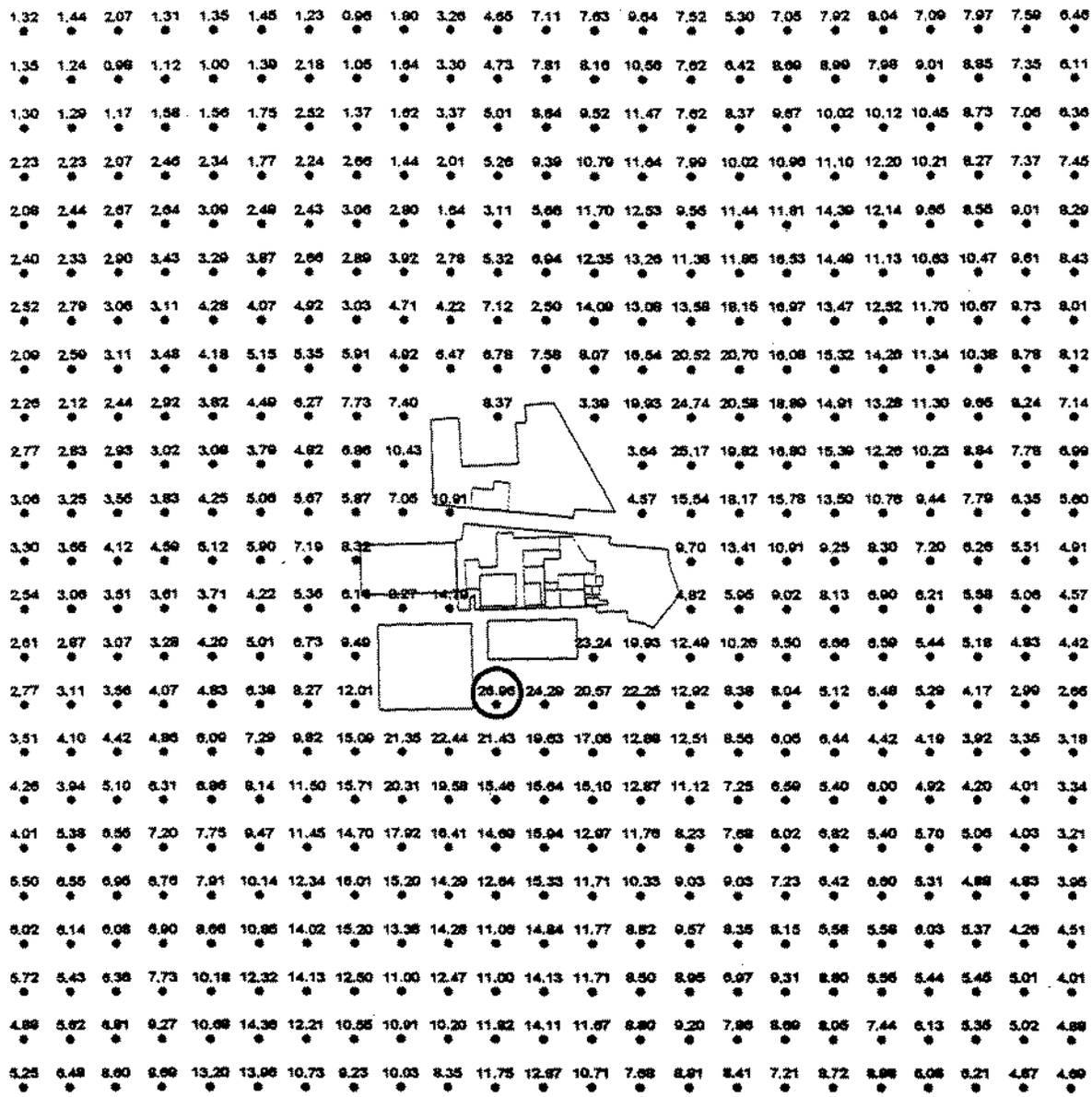
Highest Concentration for 1988

Lamb-Weston, Twin Falls
1988 PM10 Fine Grid 2nd Highest Concentrations



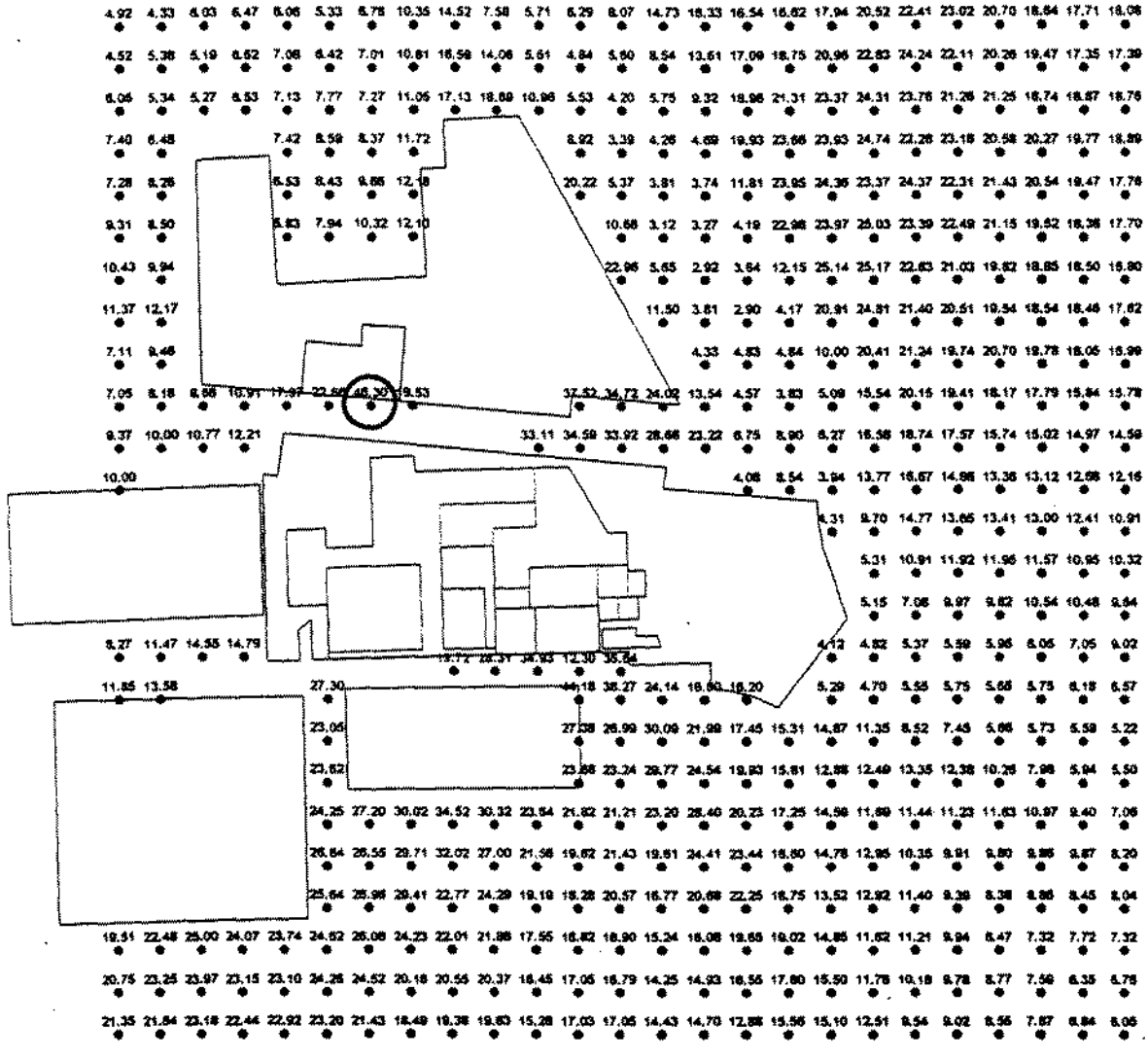
Highest Concentration

Lamb-Weston, Twin Falls
1988 PM10 Fenceline 2nd Highest Concentrations



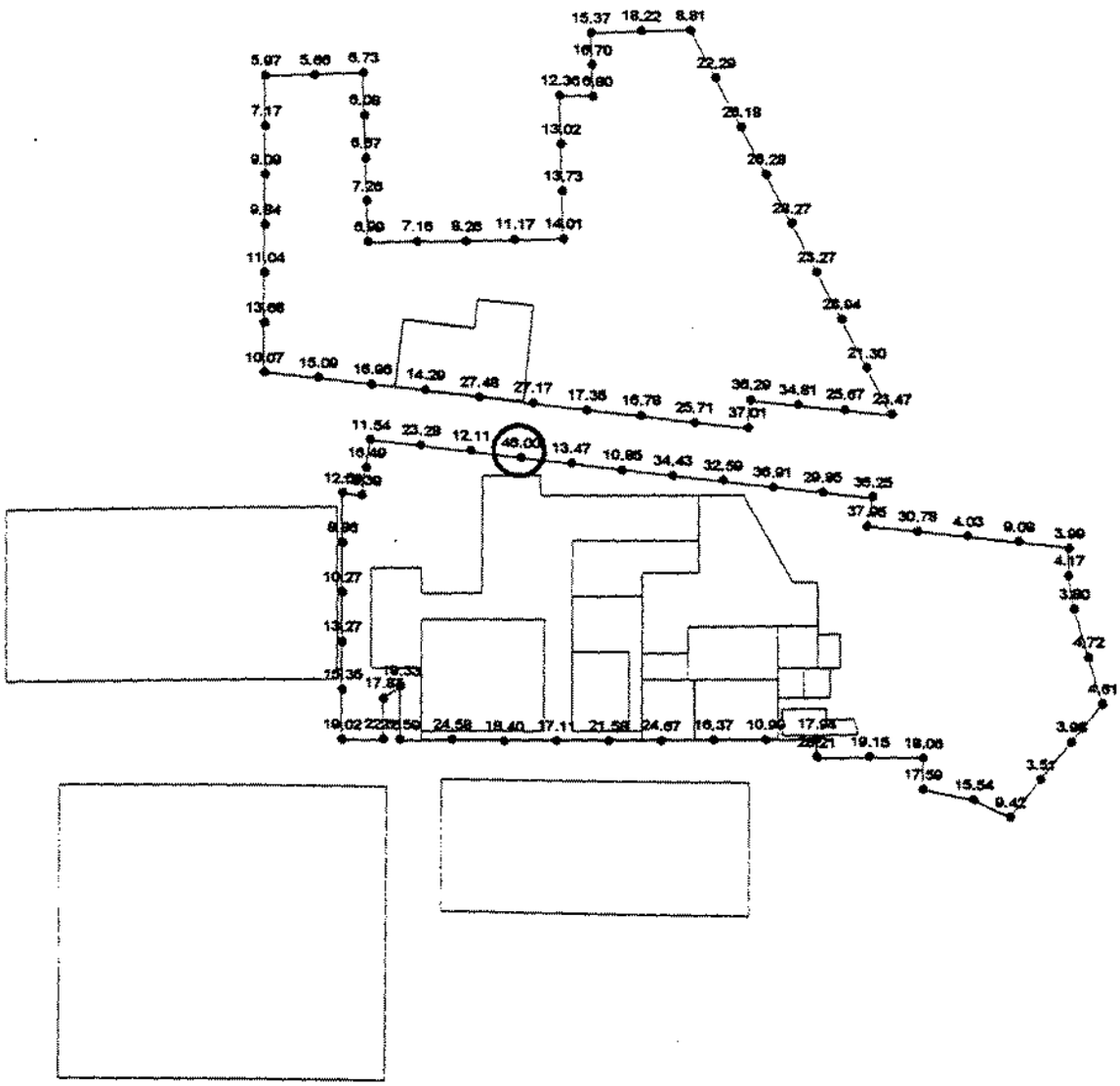
Highest Concentration

Lamb-Weston, Twin Falls
1989 PM10 Initial Grid 2nd High Concentrations



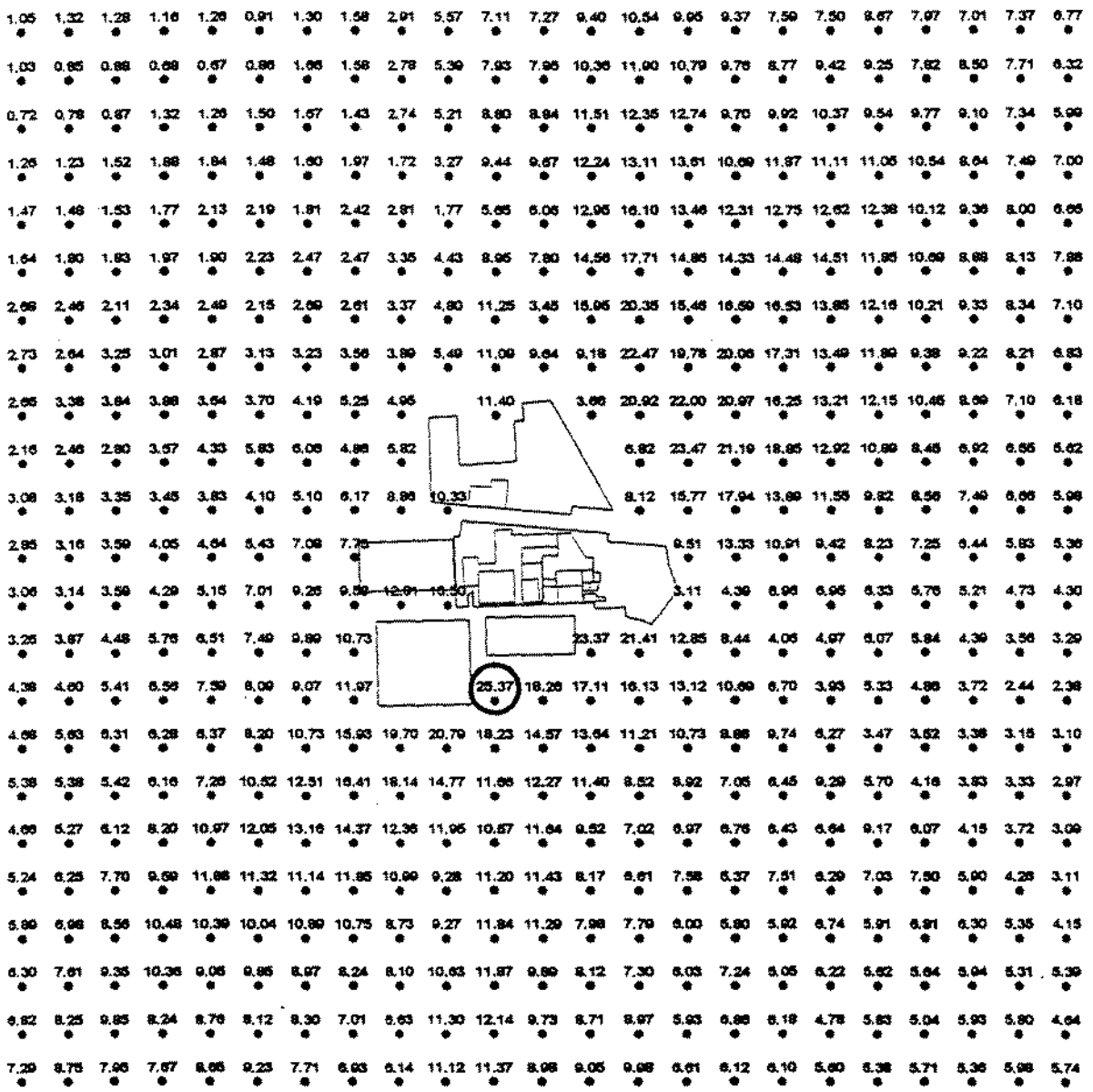
Highest Concentration for 1989

Lamb-Weston, Twin Falls
1989 PM10 Fine Grid 2nd Highest Concentrations



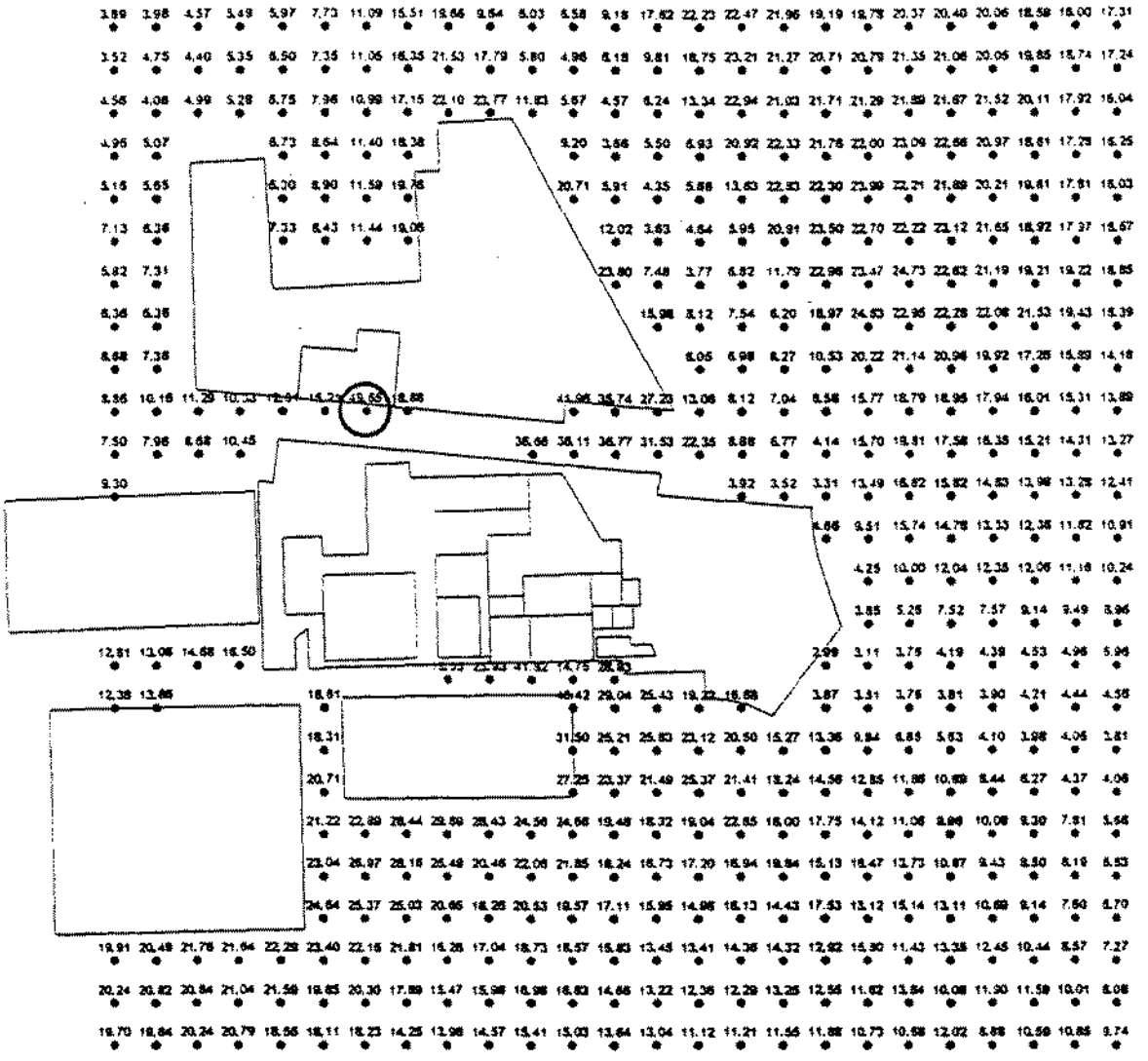
Highest Concentration

Lamb-Weston, Twin Falls
1989 PM10 Fenceline 2nd Highest Concentrations



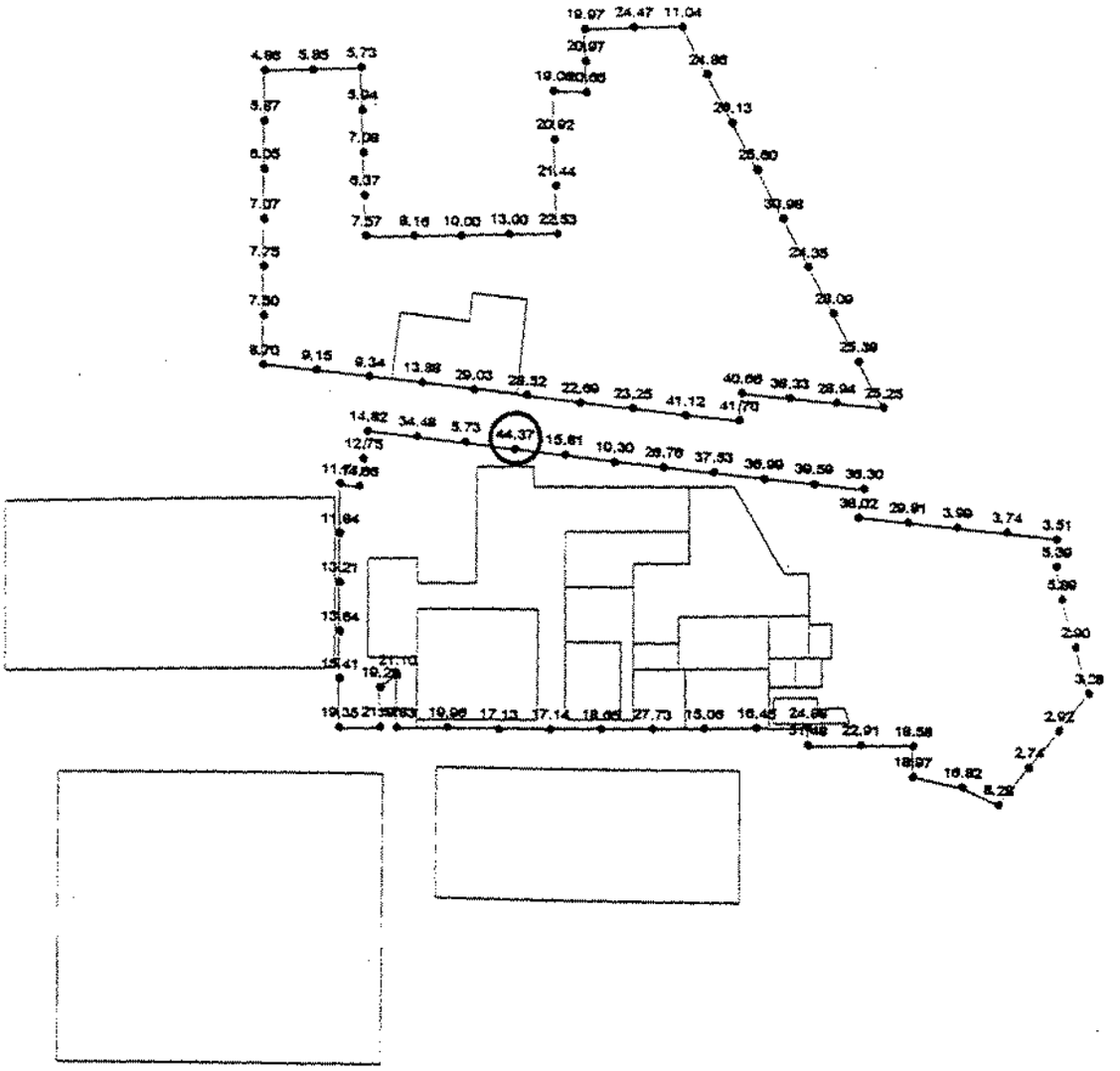
Highest Concentration

Lamb-Weston, Twin Falls
1990 PM10 Initial Grid 2nd High Concentrations



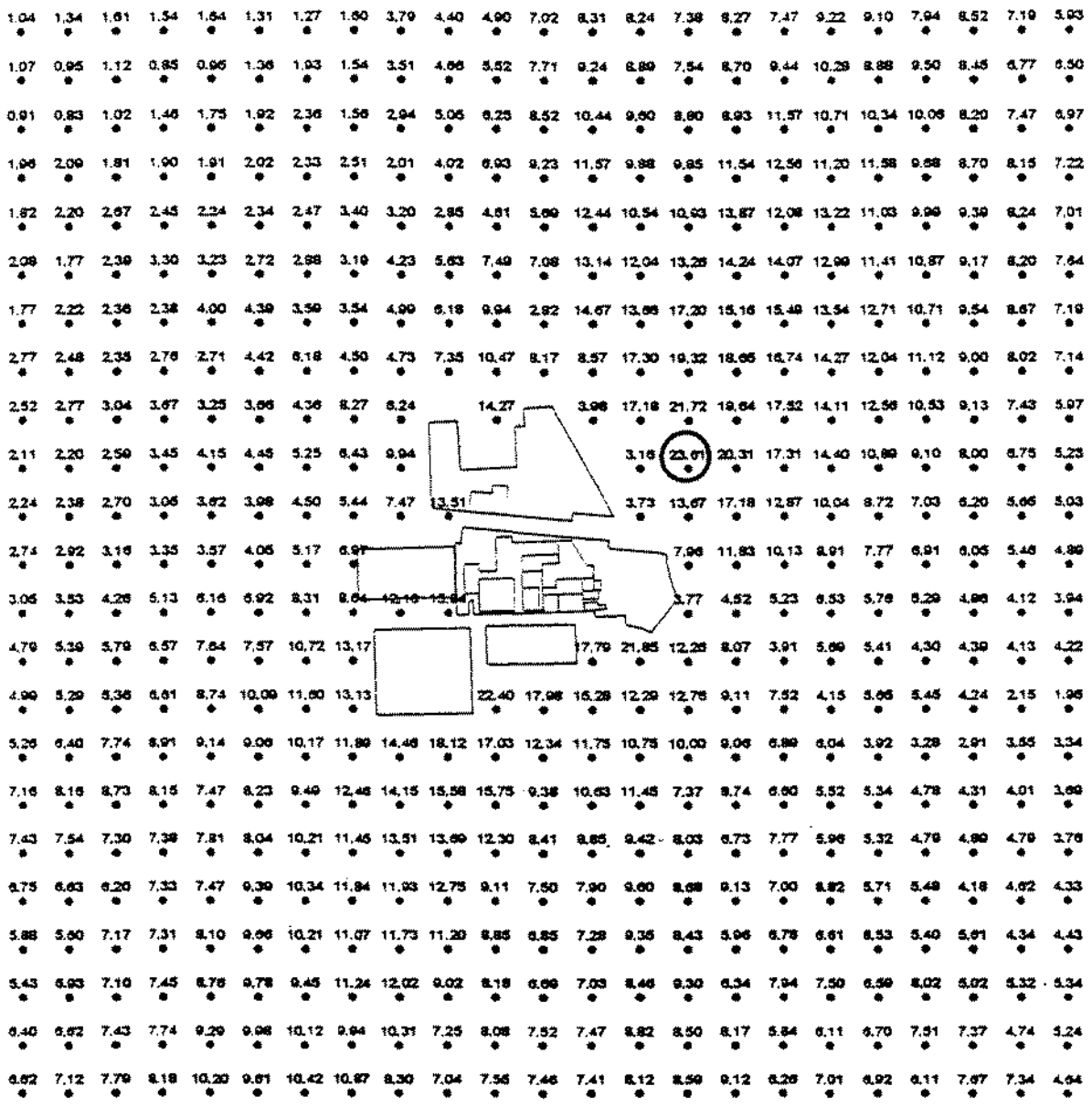
Highest Concentration for 1990

Lamb-Weston, Twin Falls
1990 PM10 Fine Grid 2nd Highest Concentrations



Highest Concentration

Lamb-Weston, Twin Falls
1990 PM10 Fenceline 2nd Highest Concentrations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1.07 0.95 1.12 0.85 0.96 1.36 1.93 1.54 3.51 4.66 5.52 7.71 9.24 8.89 7.54 8.70 9.44 10.29 8.88 9.50 8.45 6.77 6.50
0.91 0.83 1.02 1.46 1.75 1.92 2.36 1.56 2.94 5.06 6.25 8.52 10.44 9.60 8.80 8.93 11.57 10.71 10.34 10.06 8.20 7.47 6.97
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2.09 1.77 2.39 3.30 3.23 2.72 2.88 3.19 4.23 5.63 7.49 7.08 13.14 12.04 13.26 14.24 14.07 12.99 11.41 10.87 9.17 8.20 7.64
1.77 2.22 2.36 2.38 4.00 4.39 3.59 3.54 4.99 6.18 9.94 2.92 14.67 13.66 17.20 15.16 15.49 13.54 12.71 10.71 9.54 8.67 7.19
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2.52 2.77 3.04 3.67 3.25 3.66 4.36 8.27 8.24 14.27 3.98 17.18 21.72 19.64 17.52 14.11 12.56 10.53 9.13 7.43 5.97
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5.26 6.40 7.74 8.91 9.14 9.06 10.17 11.89 14.46 18.12 17.03 12.34 11.75 10.75 10.00 9.06 6.89 6.04 3.92 3.28 2.91 3.55 3.34
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7.43 7.54 7.30 7.39 7.81 8.04 10.21 11.45 13.51 13.69 12.30 8.41 8.85 9.42 8.03 6.73 7.77 5.96 5.32 4.79 4.89 4.79 3.76
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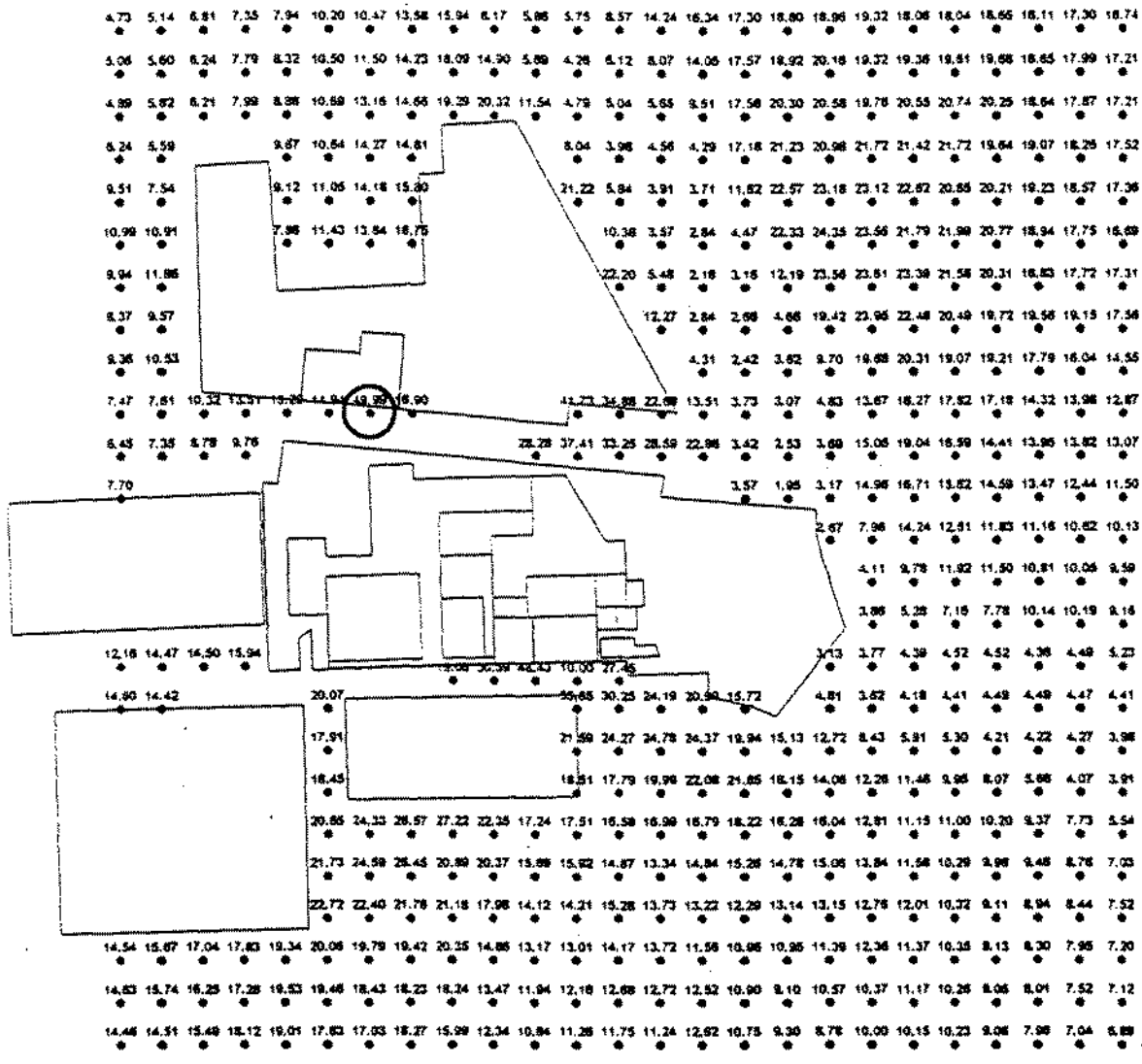
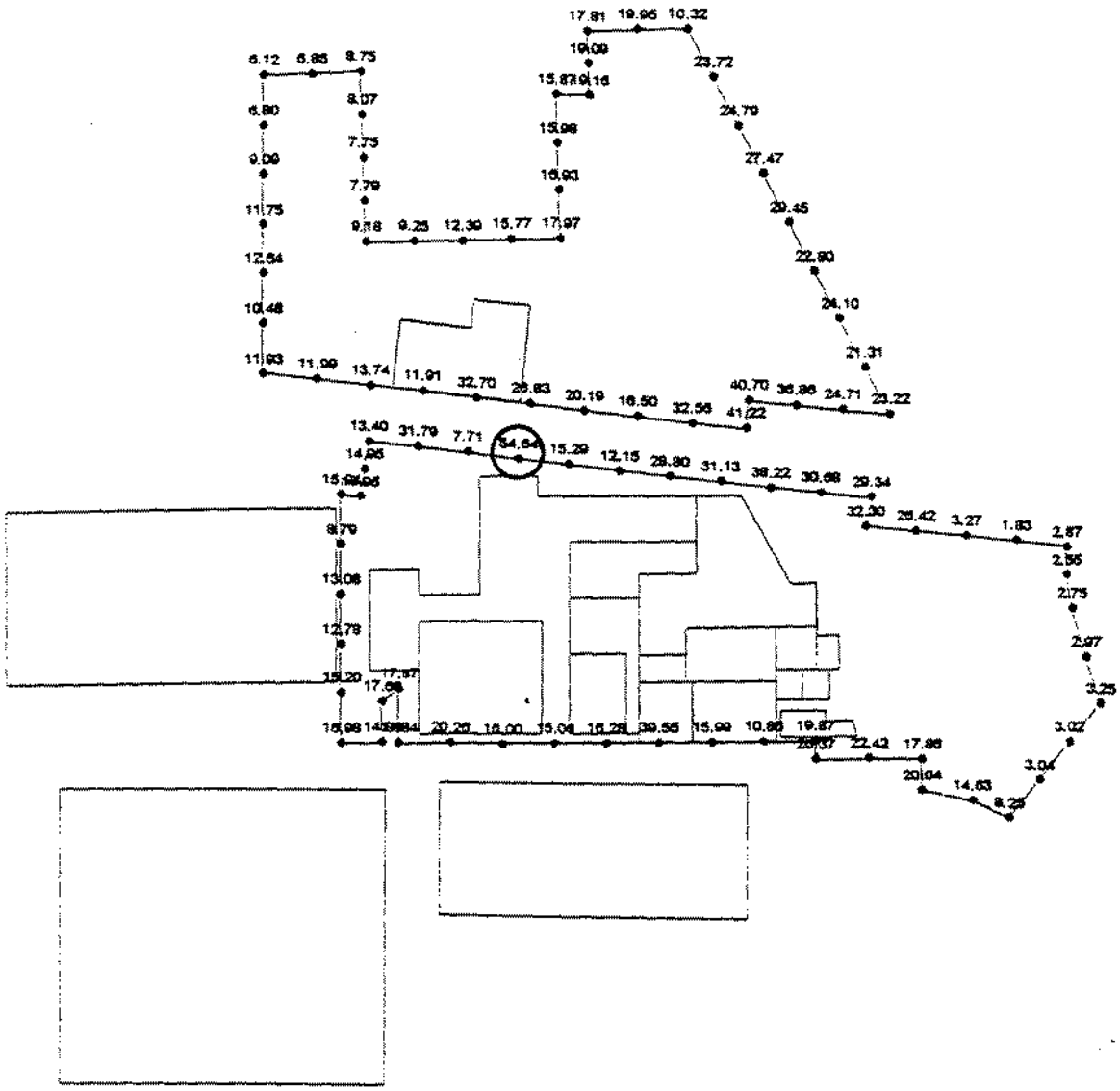
5.88 5.60 7.17 7.31 8.10 9.66 10.21 11.07 11.73 11.20 8.85 6.85 7.28 9.35 8.43 5.96 6.78 6.61 6.53 5.40 5.61 4.34 4.43
5.43 6.93 7.10 7.45 8.76 9.78 9.45 11.24 12.02 9.02 8.18 6.69 7.03 8.46 9.30 6.34 7.94 7.50 6.59 6.02 5.02 5.32 5.34
6.40 6.62 7.43 7.74 9.29 9.98 10.12 9.94 10.31 7.25 8.08 7.52 7.47 8.82 8.50 8.17 5.84 6.11 6.70 7.51 7.37 4.74 5.24
6.62 7.12 7.79 8.18 10.20 9.61 10.42 10.87 8.30 7.04 7.56 7.46 7.41 8.12 8.59 9.12 6.26 7.01 6.92 6.11 7.67 7.34 4.64
Highest Concentration
Lamb-Weston, Twin Falls
1991 PM10 Initial Grid 2nd High Concentrations



Highest Concentration

Lamb-Weston, Twin Falls
1991 PM10 Fine Grid 2nd Highest Concentrations

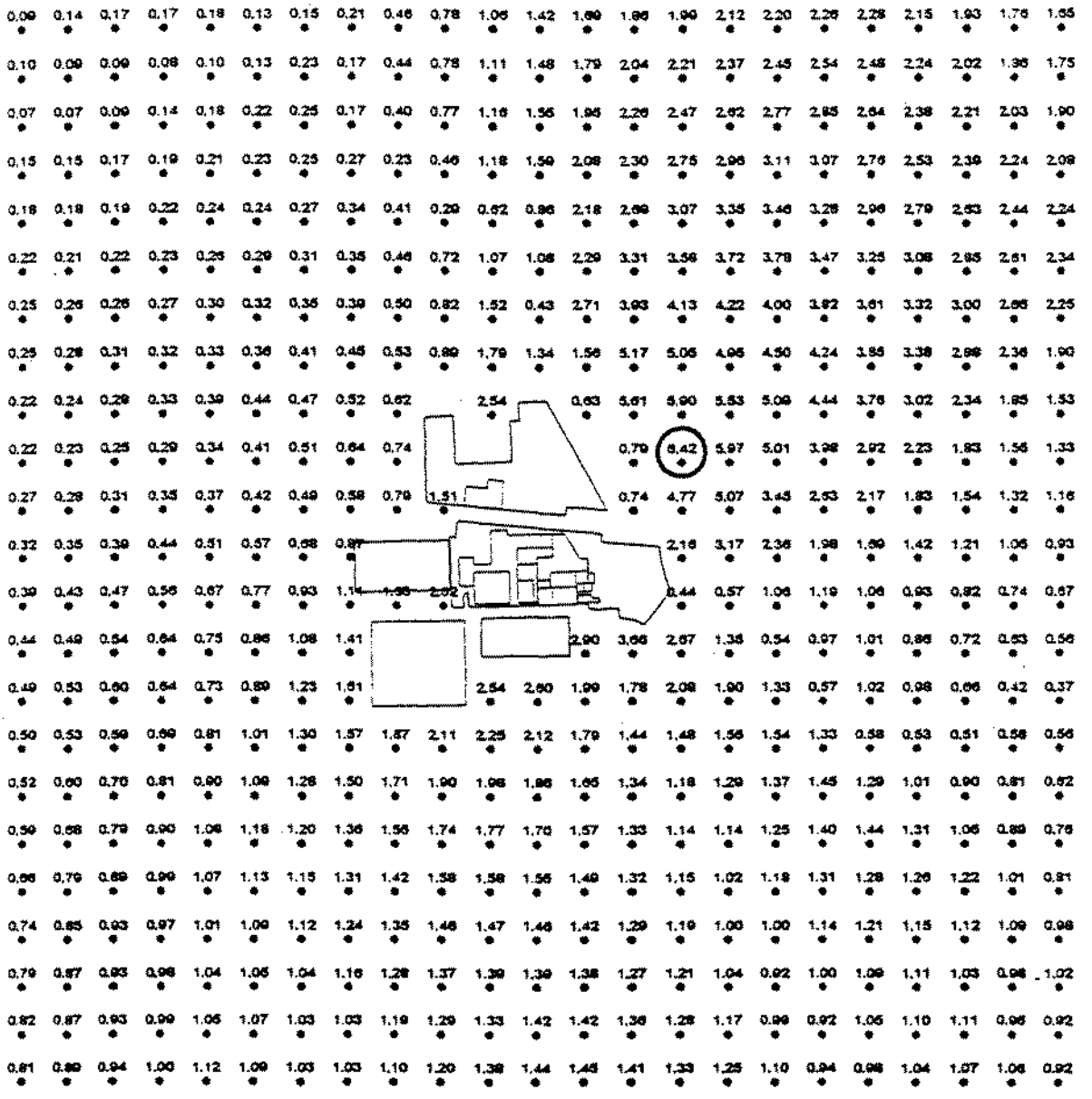


Highest Concentration
for 5 Years Modeled

Lamb-Weston, Twin Falls
1991 PM10 Fenceline 2nd Highest Concentrations

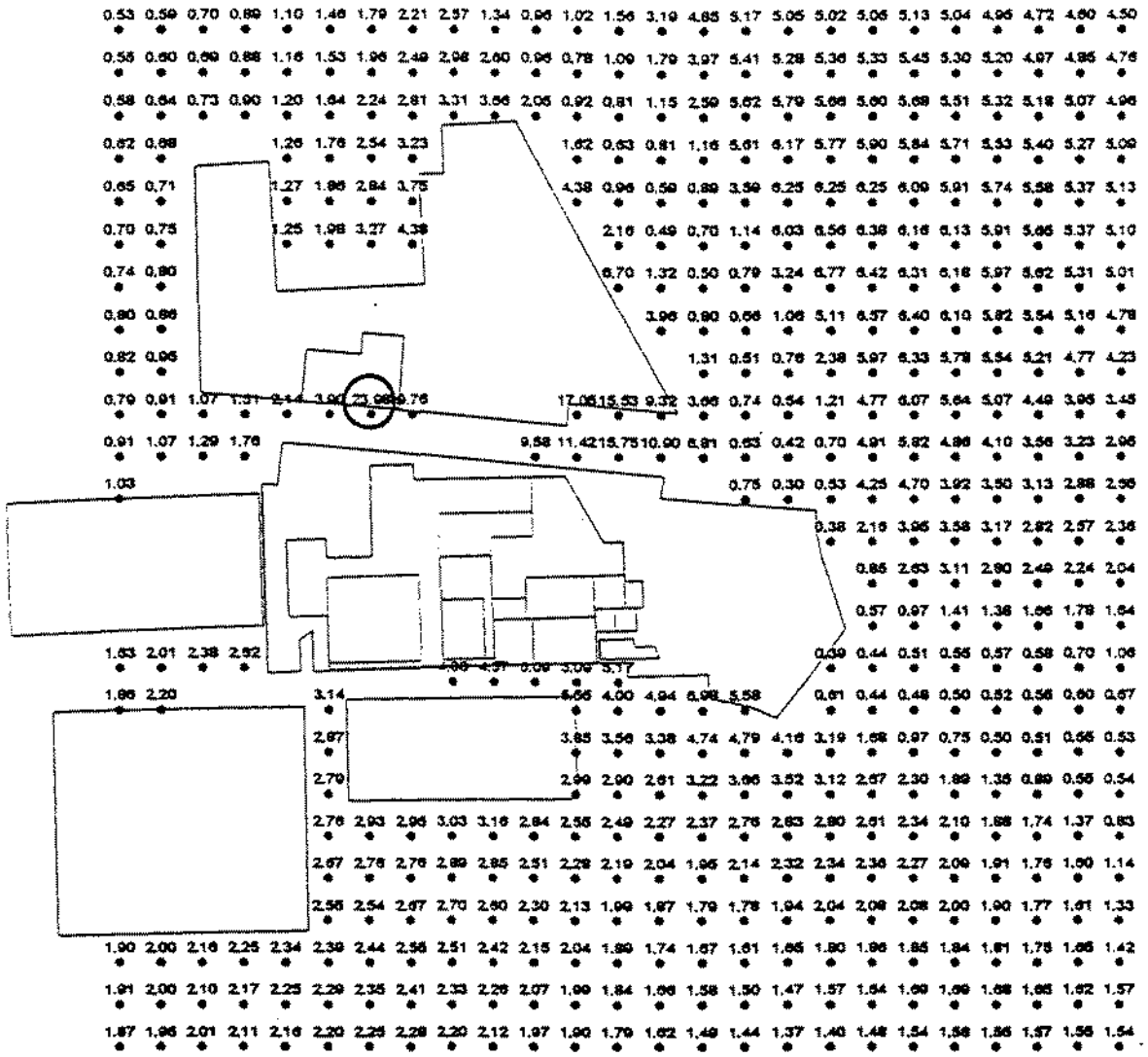
ATTACHMENT D

ANNUAL NOx RESULTS MAPS



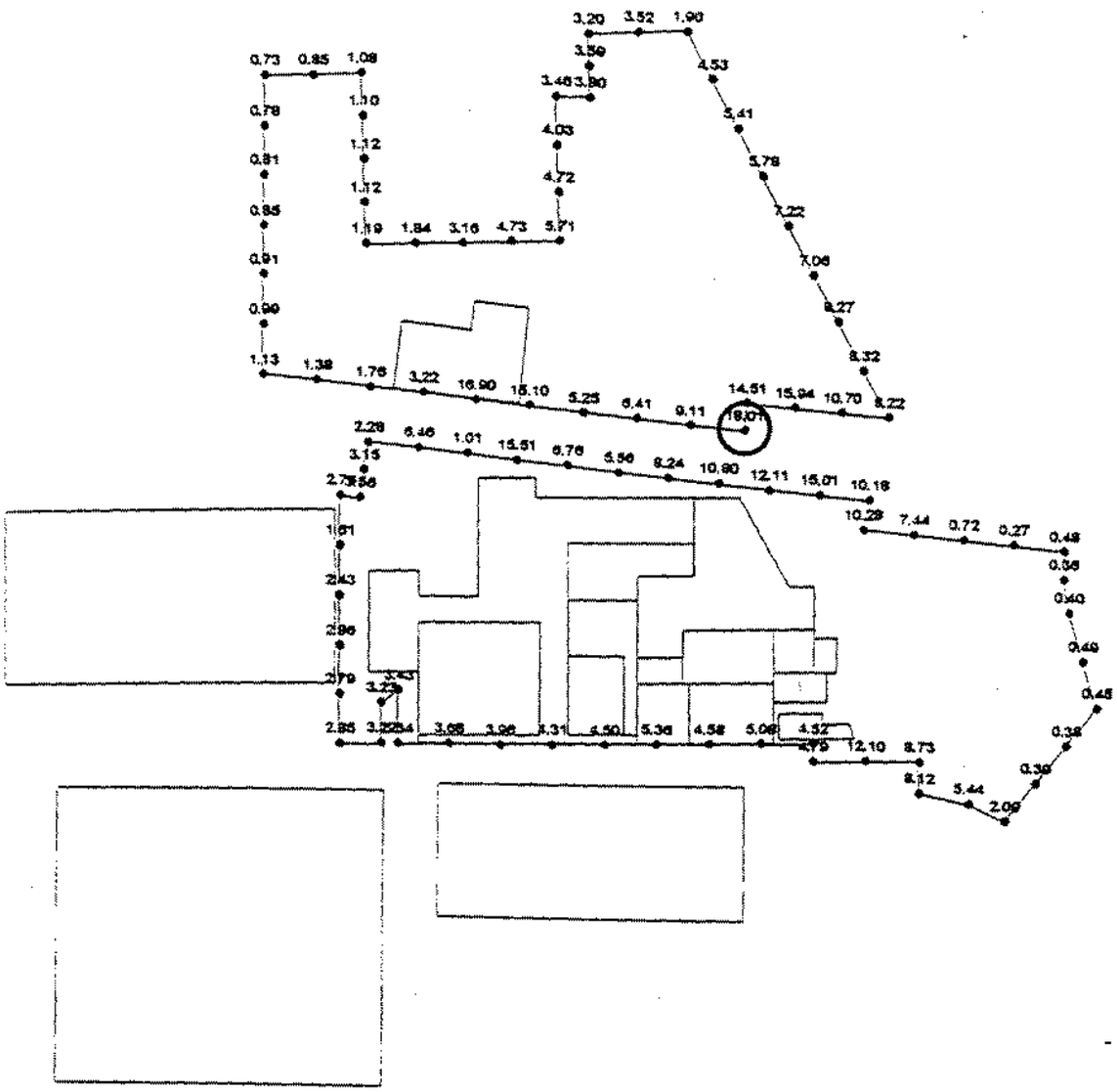
Highest Concentration

Lamb-Weston, Twin Falls
1987 NOx Course Grid Annual Concentrations



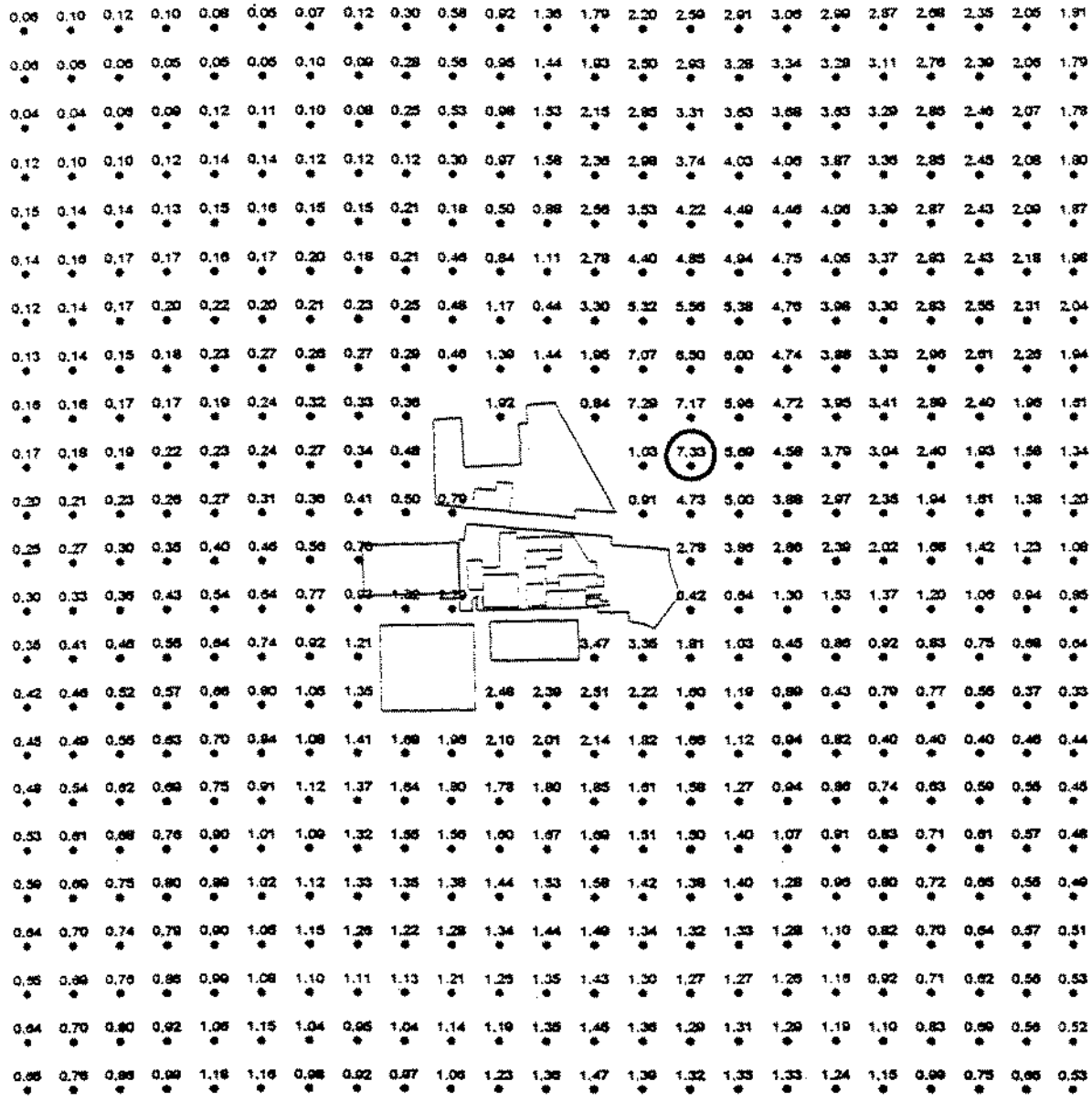
Highest Concentration for 1987

Lamb-Weston, Twin Falls
1987 NOx Fine Grid Annual Concentrations



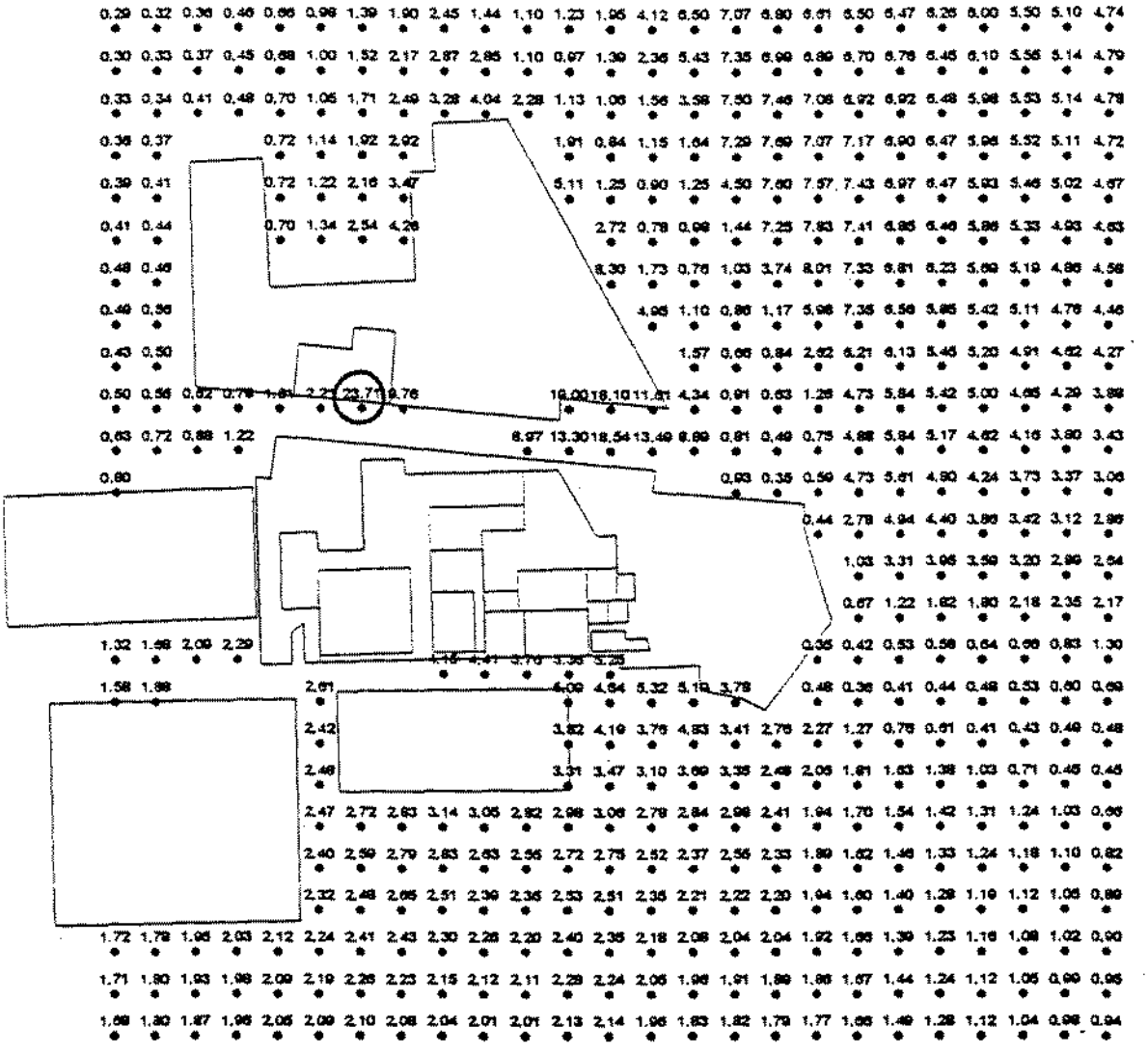
Highest Concentration

Lamb-Weston, Twin Falls
1987 NOx Fenceline Annual Concentrations



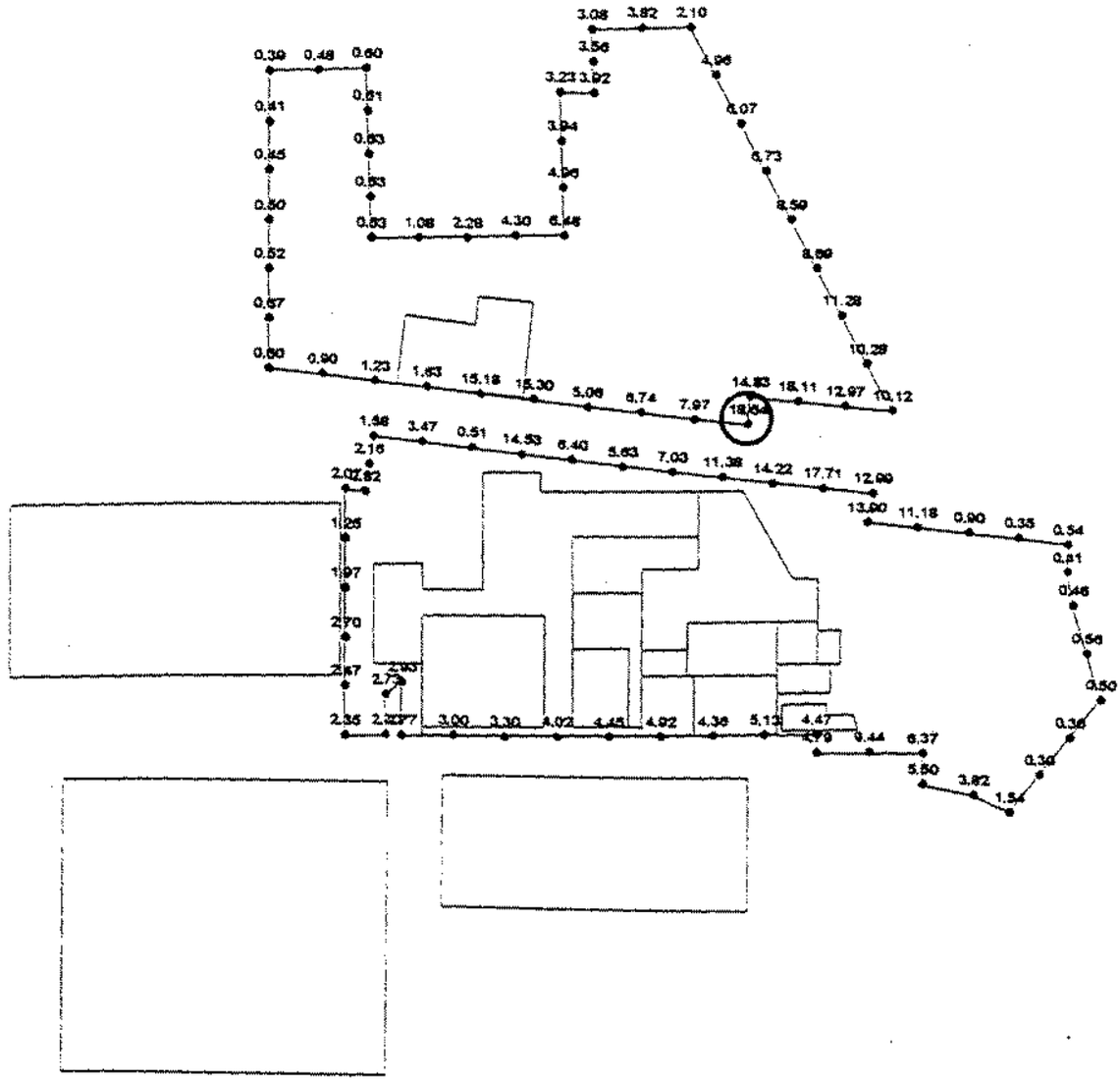
Highest Concentration

Lamb-Weston, Twin Falls
1988 NOx Course Grid Annual Concentrations



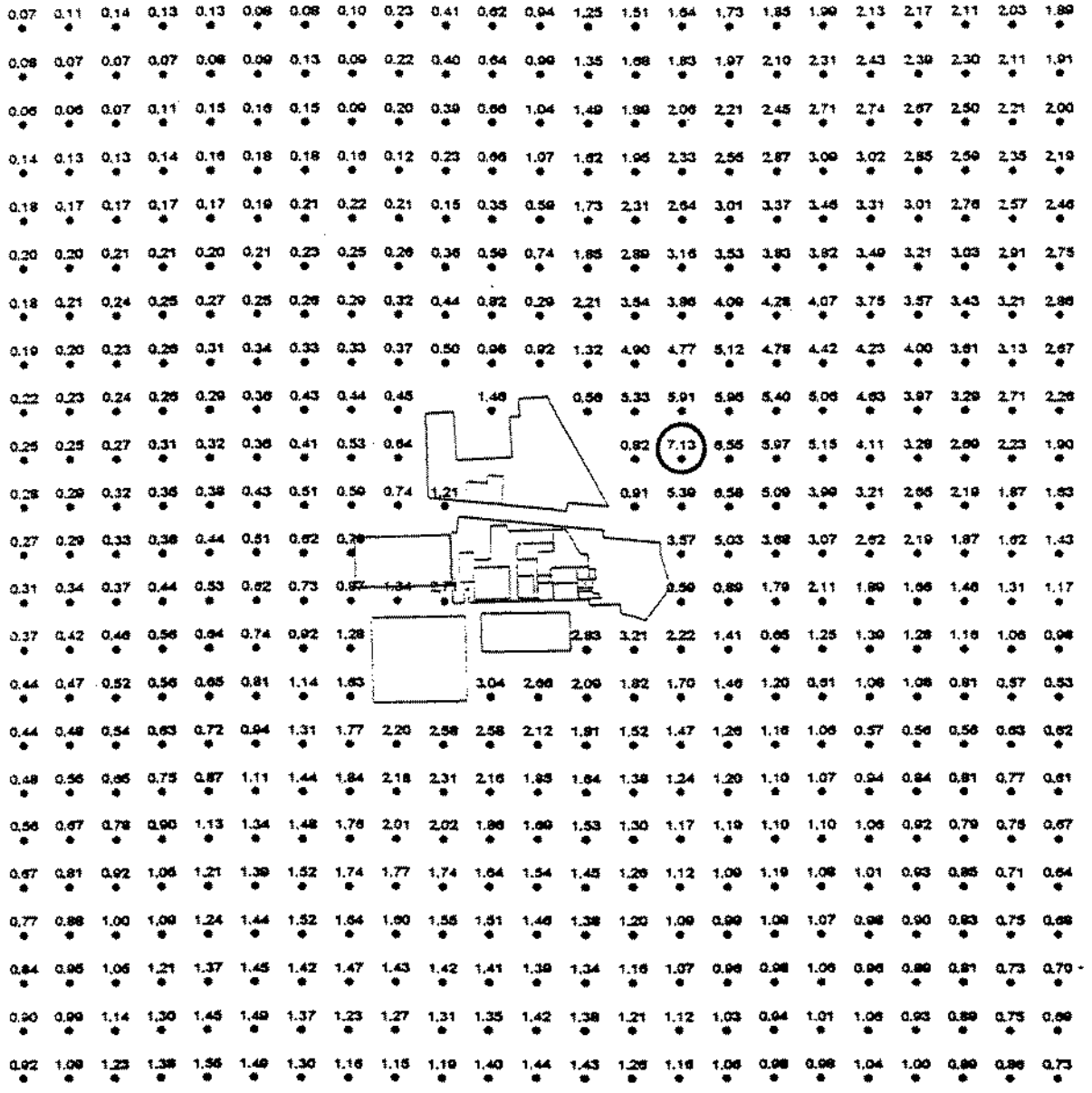
Highest Concentration for 1988

Lamb-Weston, Twin Falls
1988 NOx Fine Grid Annual Concentrations



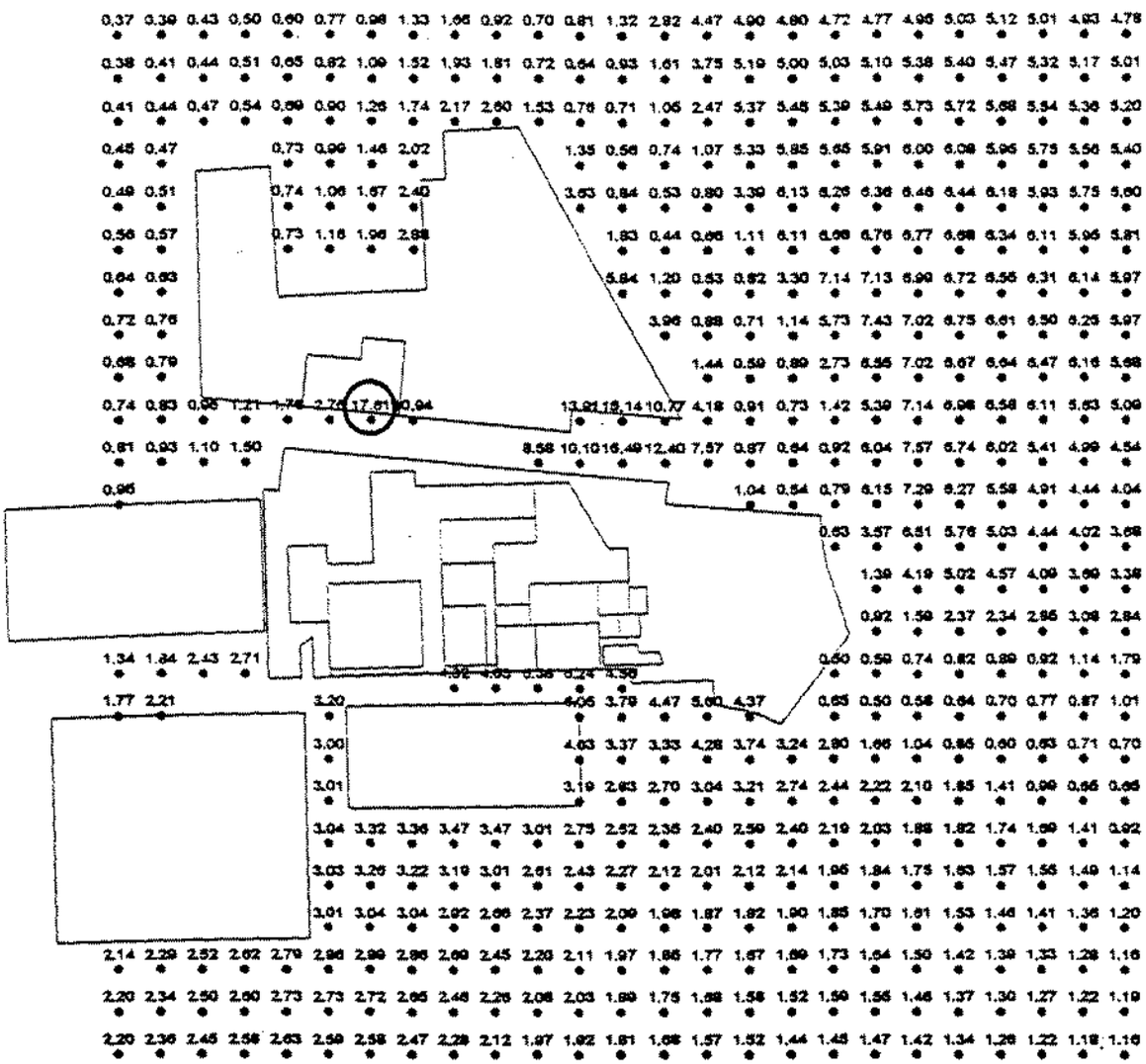
Highest Concentration

Lamb-Weston, Twin Falls
1988 NOx Fenceline Annual Concentrations



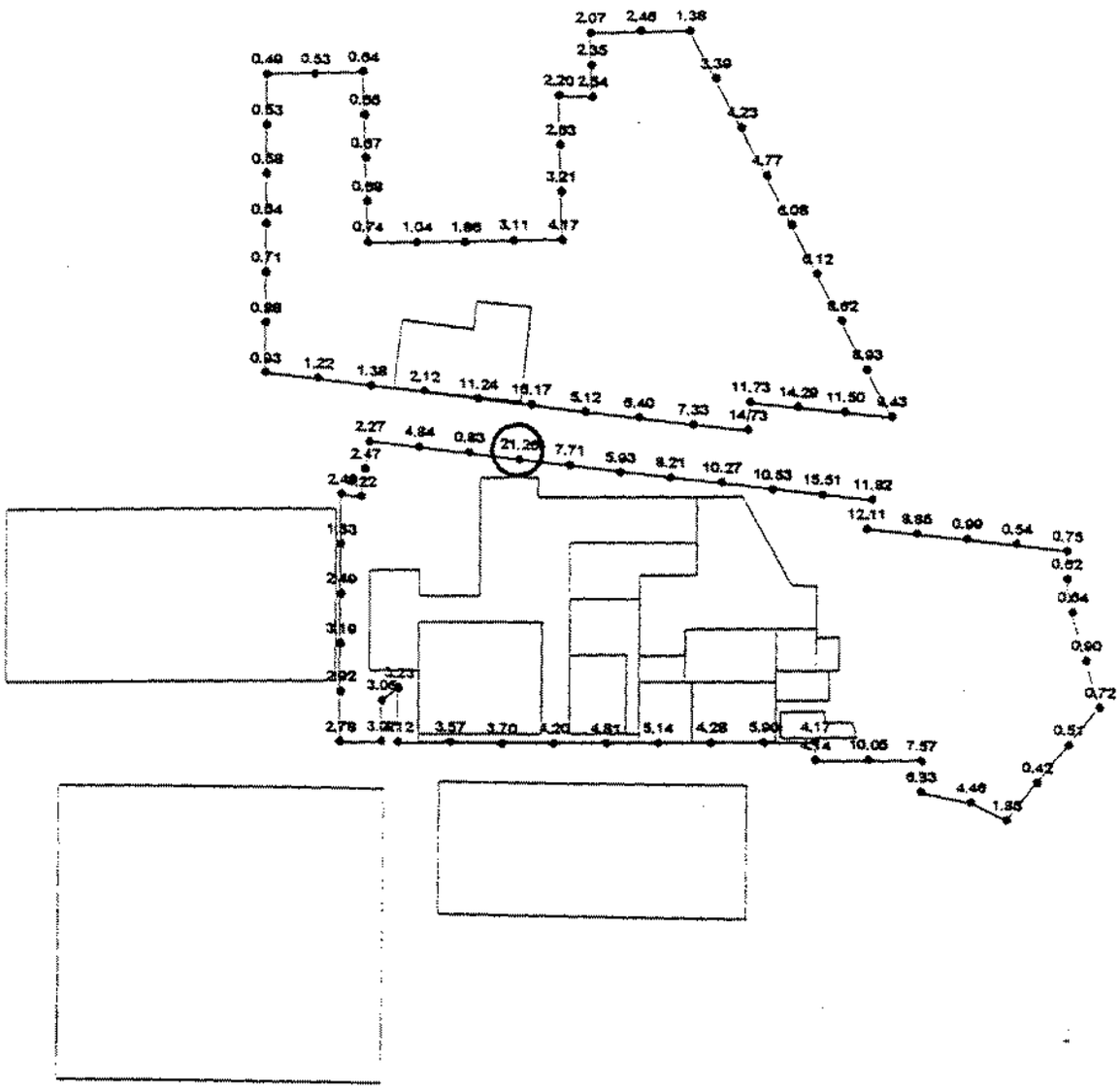
Highest Concentration

Lamb-Weston, Twin Falls
1989 NOx Course Grid Annual Concentrations



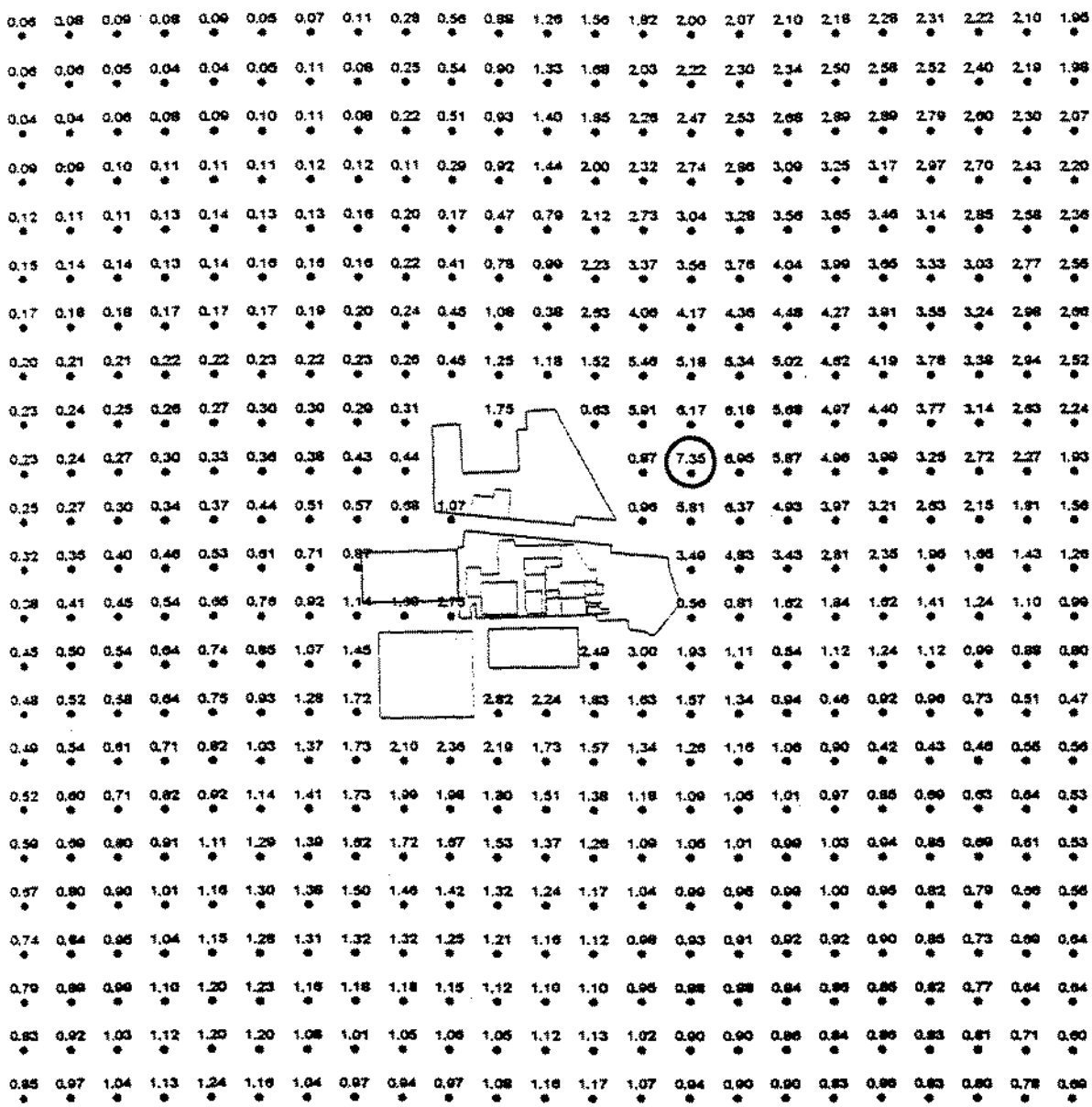
Highest Concentration

Lamb-Weston, Twin Falls
1989 NOx Fine Grid Annual Concentrations



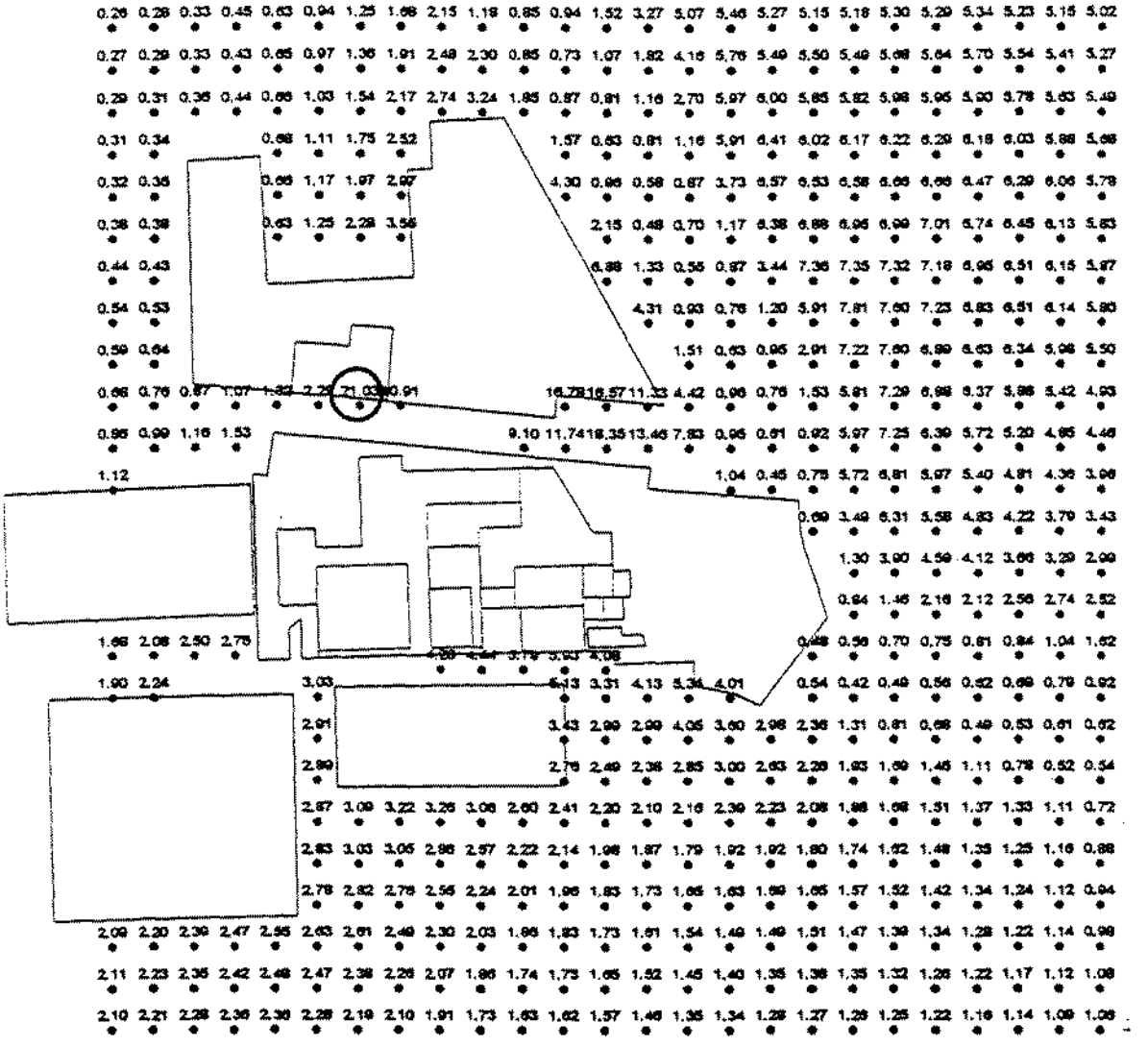
Highest Concentration for 1989

Lamb-Weston, Twin Falls
1989 NOx Fenceline Annual Concentrations



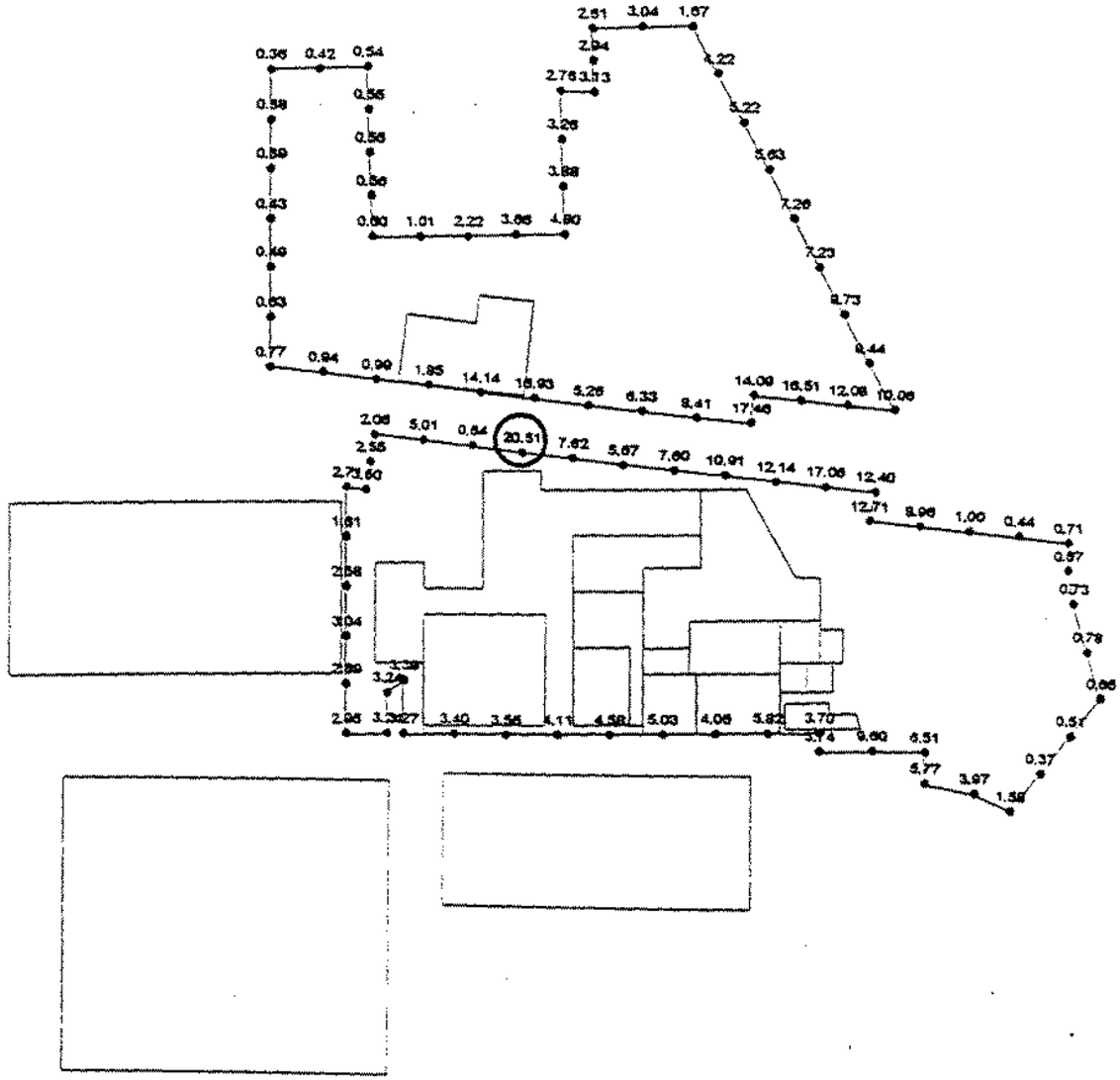
Highest Concentration

Lamb-Weston, Twin Falls
1990 NOx Course Grid Annual Concentrations



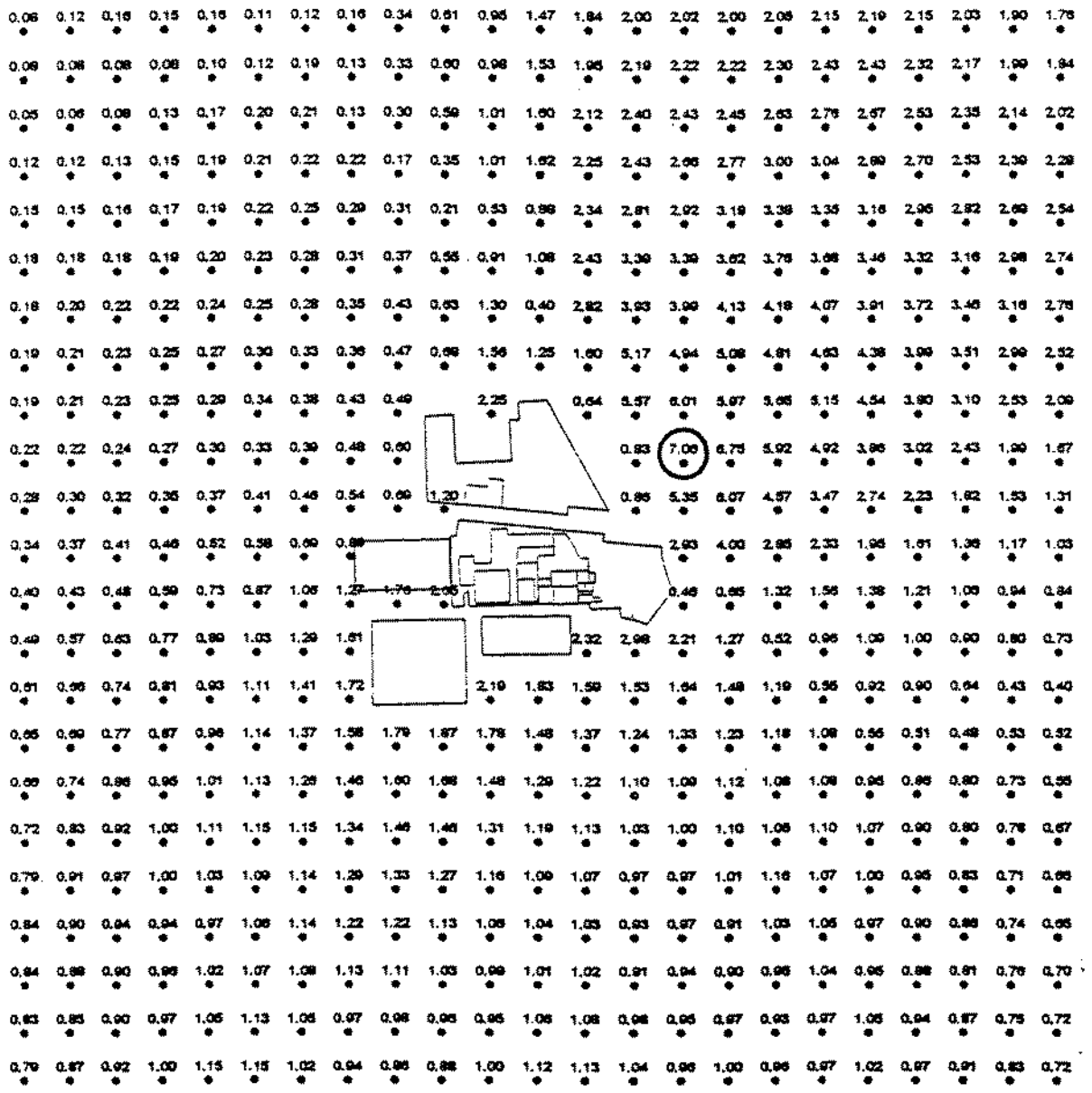
Highest Concentration for 1990

Lamb-Weston, Twin Falls
1990 NOx Fine Grid Annual Concentrations



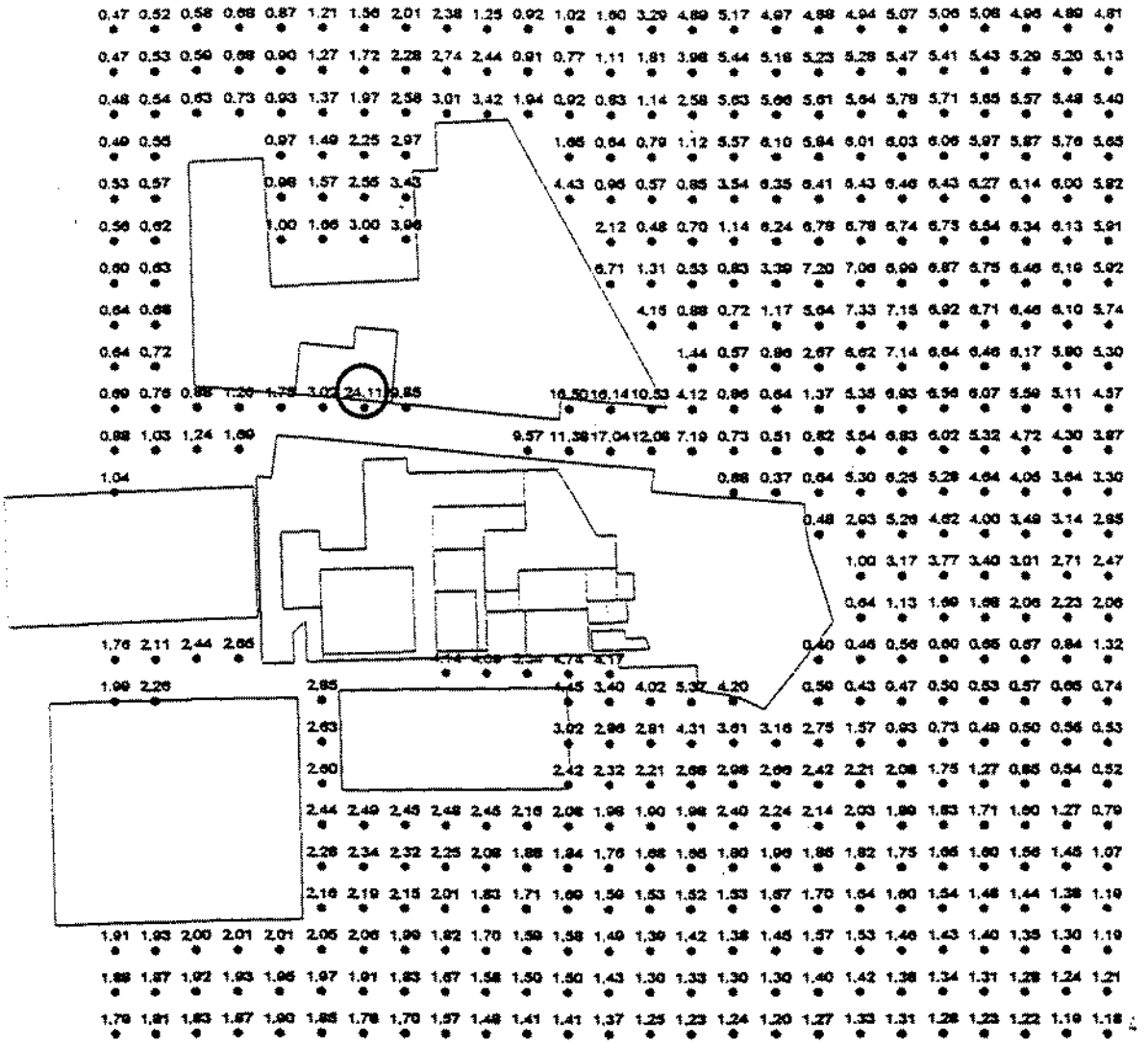
Highest Concentration

Lamb-Weston, Twin Falls
1990 NOx Fenceline Annual Concentrations



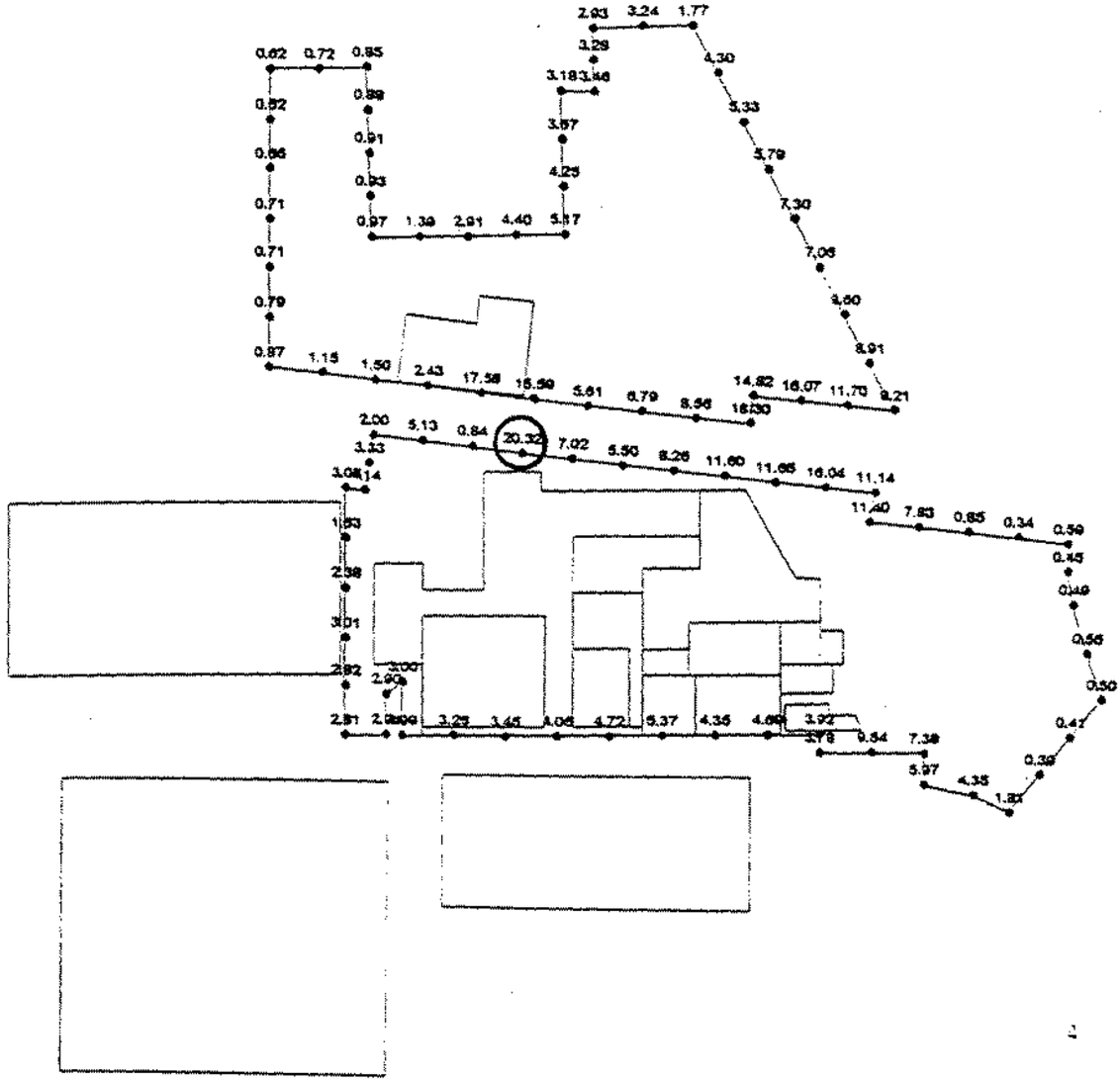
Highest Concentration

Lamb-Weston, Twin Falls
1991 NOx Course Grid Annual Concentrations



Highest Concentration
for 5 Years Modeled

Lamb-Weston, Twin Falls
1991 NOx Fine Grid Annual Concentrations



Highest Concentration

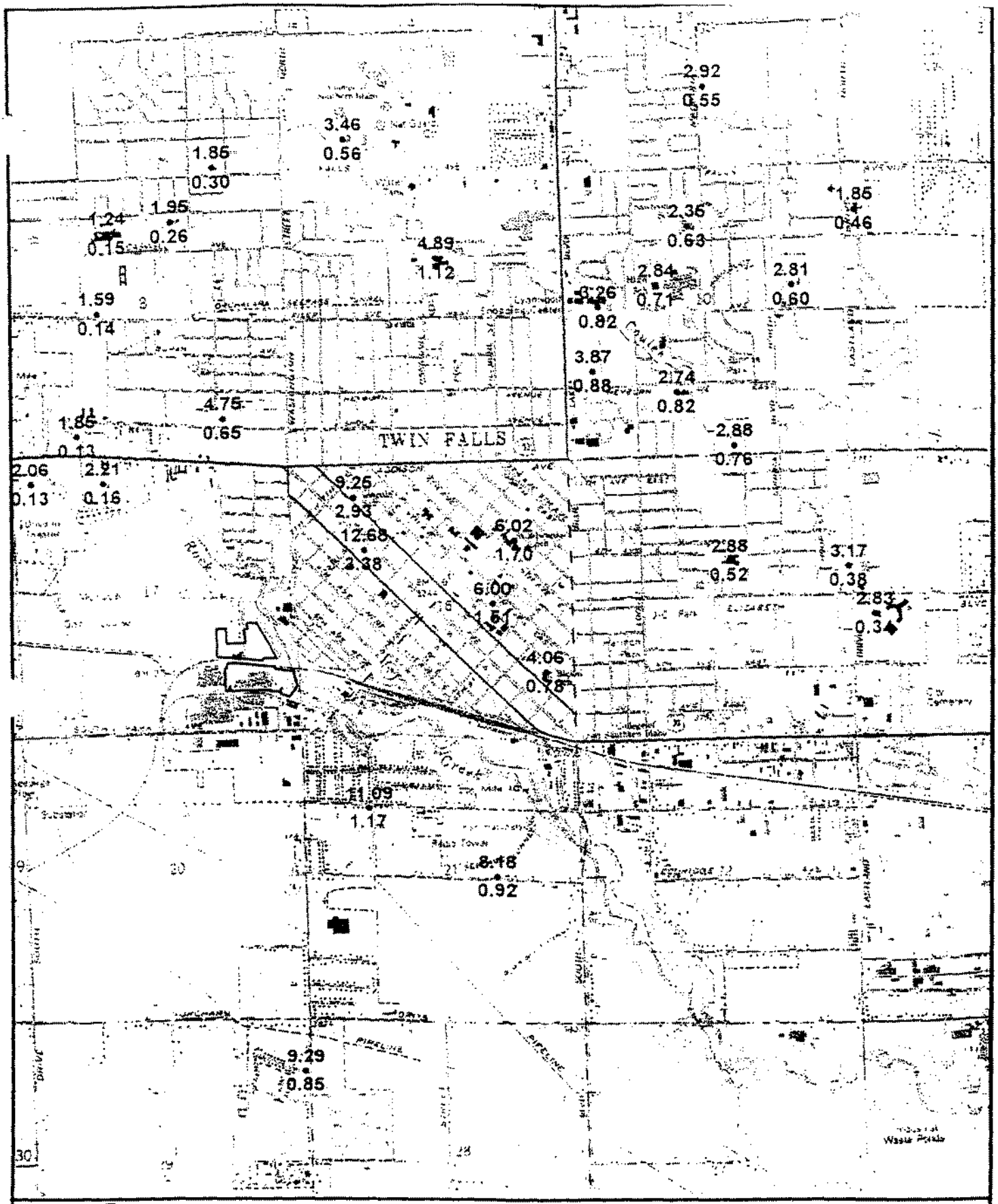
Lamb-Weston, Twin Falls
1991 NOx Fenceline Annual Concentrations

ATTACHMENT E

SENSITIVE RECEPTORS

Lamb-Weston Twin Falls
Sensitive Receptors within 2.5 Miles

	Distance			UTM Coordinates		PM10 Max 24 Hr		NOx Max Annual	
	mi.	Name	Address	X	Y	ug/m³	Year	ug/m³	Year
Elementary & Secondary Schools & Colleges	0.6	Magic Valley Alternative School	512 Main Ave. N	707370	4714700	12.68	1989	3.38	1988
	0.7	Lincoln Elementary School	238 7th St. N	707310	4715000	9.25	1990	2.93	1988
	1.0	Bickel Elementary School	607 2nd Ave. E.	708420	4714010	4.06	1988	0.78	1989
	1.0	Saint Edwards Parish School	139 6th Ave. E	708240	4714760	6.02	1988	1.70	1989
	1.0	Magic Valley Christian High School	601 Shoshone N	708120	4714820	5.82	1990	1.75	1989
	1.4	Oregon Trail Elementary School	660 Park Ave.	708150	4712840	8.18	1987	0.92	1987
	1.5	Perrine Elementary School	452 Caswell Ave. W.	706260	4716560	1.95	1990	0.26	1987
	1.5	Stuart Junior High School	644 Caswell Ave. W.	705900	4716500	1.24	1987	0.15	1987
	1.5	Harrison Elementary School	600 Harrison St.	707790	4716350	4.89	1988	1.12	1988
	1.8	Morningside Elementary School	701 Morningside Dr.	709470	4714640	2.88	1991	0.52	1989
	1.8	College of Southern Idaho	315 Falls Ave.	707250	4717010	3.46	1988	0.56	1988
	1.9	Benjamin Franklin Academy	1708 Heyburn Ave. E.	709170	4715600	2.74	1989	0.82	1989
	2.0	Twin Falls Senior High School	1615 Filer Ave. E.	709050	4716200	2.84	1989	0.71	1989
	2.1	Sawtooth Elementary School	1771 Stadium Blvd.	709230	4716530	2.35	1991	0.63	1989
	2.3	Immanuel Lutheran School	2055 Filer Ave. E.	709830	4716200	2.81	1988	0.60	1989
	2.4	O'Leary Junior High School	2350 Elizabeth Blvd.	710310	4714340	2.83	1988	0.34	1990
	2.4	Twin Falls Christian Academy	798 Eastland Dr. N	710190	4716620	1.85	1988	0.46	1989
Nursery Schools, Kindergartens & Day Care	0.5	Learn to Grow Preschool	310 Lois	707400	4713230	11.09	1991	1.17	1987
	0.9	Kinderland Christian Daycare	338 3rd. St. E.	708120	4714400	6.00	1989	1.51	1989
	1.0	Agape Christian Daycare	181 Morrison St.	705870	4715090	2.21	1989	0.16	1987
	1.4	Idaho Migrant Headstart	1122 Washington St. S.	707040	4711730	9.29	1990	0.85	1987
	1.5	Valley Christian Daycare	131 Grandview Dr.	705450	4715090	2.06	1987	0.13	1987
	1.7	Kalico Kids Preschool-Day Care	356 Elm St. N.	708690	4715720	3.87	1989	0.88	1990
	1.8	Char-Rees Play House	1830 Addison Ave. E.	709500	4715300	2.88	1988	0.76	1989
	1.8	Acorn Learning Center	1306 Filer Ave. E.	708720	4716080	3.26	1991	0.82	1990
	1.8	Head Start	296 Falls Ave. W.	706500	4716860	1.85	1990	0.30	1987
	1.8	Best Beginning Preschool	1410 Filer Ave. E.	708780	4716080	2.98	1991	0.79	1989
Emergency Services Nursing Care Facilities	0.9	Canyon View Hospital	228 Shoup Ave. W.	706560	4715450	4.75	1990	0.65	1987
	1.0	Twin Falls Clinic & Hospital	660 Shoshone E.	708150	4714850	5.72	1990	1.71	1991
	1.0	Magic Valley Regional Medical Center	650 Addison Ave. W	705720	4715360	1.85	1987	0.13	1987
	1.4	Rock Creek Rehabilitation & Medical Ctr	640 Filer Ave. W	705840	4716050	1.59	1987	0.14	1987
	2.2	Twin Falls Care Center	674 Eastland Dr.	710160	4714610	3.17	1991	0.38	1989
	2.4	Apres Residential Care Facility	1871 Julie Lane	709320	4717310	2.92	1991	0.55	1990
	2.5	Tatamantes Living Center	4108 N 2700 E	703890	4717010	1.12	1989	0.06	1987



FROM
USGS 7.5 MINUTE
TWIN FALLS
QUADRANGLE

— Site Boundary
● Sensitive Receptor
0.00 PM10 24 Hour Maximum for 5 Year Period
0.00 NOx Annual Maximum for 5 Year Period

LAMB-WESTON
TWIN FALLS, IDAHO
SENSITIVE RECEPTOR

ATTACHMENT F

INPUT-OUTPUT FILES

Files on Diskette

Files are compressed using PKZIP

		1987	1988	1989	1990	1991
Annual PM10	Input	anpm__87.dta	anpm__88.dta	anpm__89.dta	anpm__90.dta	anpm__91.dta
	Output	anpm__87.lst	anpm__88.lst	anpm__89.lst	anpm__90.lst	anpm__91.lst
Annual NOx	Input	anno__87.dta	anno__88.dta	anno__89.dta	anno__90.dta	anno__91.dta
	Output	anno__87.lst	anno__88.lst	anno__89.lst	anno__90.lst	anno__91.lst
24 Hour PM10	Input	24pmal87.dta	24pmal88.dta	24pmal89.dta	24pmal90.dta	24pmal91.dta
	Output	24pmal87.lst	24pmal88.lst	24pmal89.lst	24pmal90.lst	24pmal91.lst
Met Data		Poc87.asc	Poc88.asc	Poc89.asc	Poc90.asc	Poc91.asc

Response to Comments and Questions Submitted During a Public Comment Period on Lamb-Weston, Incorporated (Twin Falls) Proposed Tier II Operating Permit

PUBLIC COMMENTS AND THE IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) RESPONSES

Comment #1: **MEMORANDUM**
To Orville D. Green, Program Administrator, From Harbi Elshafei, Air Quality Engineer
DISCUSSION

1. Process Description

1.1 Line 1 Fryer-The Tier II OP application of April 7, 1999, shows that the fryer was constructed or modified in 1988 without applying for a Permit to Construct (PTC) prior to the construction or modification and 1.2 PTC, 1.3 PTC, 1.4 PTC, 1.5 PTC, 1.6 PTC, 1.7 PTC, 1.8 PTC, 1.9 PTC, 1.11 PTC. These PTC voids were discuss in a meeting with LW and DEQ between the dates of December 24,1998 and April 7, 1999 and the DEQ representatives (Dan Salgado and Tim Trumbull) agreed these PTC's were disclosed to DEQ on March 6, 1996 when LW and DEQ signed the "Voluntary Consent Order."

DEQ Response: The information in the above referenced DEQ's Technical Analysis regarding construction of some emissions units at the facility without applying for a Permit to Construct (PTC) prior to the construction or modification was obtained from the Lamb-Weston, Inc. (LW) Tier II Operating Permit (OP) application and the revision to the application that were submitted to DEQ on April 7, 1999, and on June 3, 1999. The information is a statement of fact about the emissions units which are included in DEQ's Technical Analysis. According to LW, the emissions units were constructed prior to the merger of LW with the Universal Frozen Foods Company. The merger occured on August 1, 1994.

Comment #2: **Air Pollution Operating Permit**
General: What is the definition of a "Log"?

DEQ Response: To eliminate confusion, the word "log" in the Tier II OP was changed to "record."

Comment #3: **Facility-Wide Conditions**

2. OPACITY LIMIT

2.2 **Strike this section because section 2.1 covers the visible emission.** The Permittee shall conduct a monthly, facility-wide, visible emission inspection of potential sources of visible emissions, during daylight hours and under normal operating conditions. If any emissions are present, the Permittee shall take appropriate action. If opacity is greater than twenty percent for a period or periods aggregating more than three minutes in a sixty-minute period, the Permittee shall report the exceedance in accordance with IDAPA 58.01.01.130-136. The Permittee shall maintain a log of the results of each monthly, visible emission inspection. The log at a minimum, includes the date of each inspection and a description of the following: the Permittee's assessment of the conditions existing at the time visible emissions are recent, any corrective action taken in response to the visible emissions, and the date corrective action was taken. The most

recent two years compilation of data shall be kept on site and shall be made available to DEQ upon request.

DEQ Response: DEQ did not revise the final Tier II OP to reflect this comment. The purpose of Section 2.2 of the Facility-Wide Conditions in Tier II OP is to determine compliance with the opacity limits pursuant to IDAPA 58.01.01.625. However, to clarify the statement, the word "inspection" in this section of the Tier II OP was changed to "walk around." Section 2.2 of the Facility-Wide Conditions will require the Permittee to make a routine visible emissions inspection and make a determination if visible emissions occurred at any of the facilty's potential sources of visible emissions. If any visible emissions are present from any point of emissions, the Permittee must take corrective action and report the exceedance in accordance with the excess emissions rules in IDAPA 58.01.01.130-136.

Comment #4: **NATURAL GAS CONSUMPTION MONITORING AND RECORDING**

4.1 The Permitted shall install, calibrate, maintain, and operate a natural gas flow meter to monitor the monthly and annual gas consumption from the entire facility. **Reword to: The Permittee shall monitor the monthly and annual gas consumption for the entire facility using Intermountain Gas Company gas flow meter.**

DEQ Response: DEQ combined Sections 4.1 and 4.2 of the Facility-Wide Conditions of the Tier II OP to read as follows:

4.1 The Permittee shall monitor and record the following parameters to verify compliance with Section 3.1 of this permit. The records shall be kept at the facility for the most recent two-year period and shall be made available to DEQ representatives upon request.

4.1.1 Calendar date and amount of natural gas burned, in cubic feet (cf) per month or therms per month, and cubic feet or therms per any consecutive 12-month period.

Comment #5: **SOURCE**

Line 1 Fryer, Line 2 Fryer, Line 4 Fryer, and Special Products Fryer

2.4 Pressure Drop Across Air Pollution Control Devices **Strike this Section based on Section 2.2.**
The pressure drop across the air pollution control devices shall be maintained within the manufacturer's and O&M Manual's specifications. Documentation of both the manufacturer's and O&M Manual's operating pressure drop specifications shall remain on-site at all times and shall be made available to DEQ upon request.

2.5 Scrubbing Media Flowrate **Strike this Section on the basis of Section 2.3.**
The scrubbing media flow rate to the air pollution control devices shall be maintained within manufacturer's and O&M Manual's specifications. Documentation of the manufacturer's and O&M Manual' operating scrubbing media specification shall remain on-site at all times and shall be made available to DEQ upon request.

DEQ Response: DEQ did not revise the final Tier II OP to reflect this comment. Section 2.2 (Monitoring Equipment) of the Tier II OP is a standard language that DEQ uses

for the installation of air pollution control equipment, in accordance with manufacturer's specifications. Section 2.4 (Pressure Drop Across Air Pollution Control Devices) is the compliance determination method of the pressure drop for the control equipment which is specified in Section 2.2.

Section 2.3 (Operation and Maintenance Manual Requirements) is required in the Tier II OP to satisfy the requirements set forth in the General Provision B and the air pollution control requirements contained in the Tier II OP. Section 2.5 (Scrubbing Media Flowrate) is for reading the scrubbing media flowrate and to ensure it is operating within the manufacturer's and O&M Manual's specifications.

LW is required to prepare an O&M manual for the fryer's air pollution control device(s). The manual must contain the operating parameter ranges by which the air pollution control devices will be limited for correct operation. Operating parameter ranges are best taken and recorded during the PM-10 source tests of the emission unit stack(s). These parameters are pressure drop and scrubbing media flowrate, which must be monitored and recorded once daily. The parameters should be supported by manufacturer's documentation, if available.

Comment #6: **3. MONITORING AND RECORD KEEPING REQUIREMENTS**

3.1 Throughput
Reword to: The Permittee shall monitor annually the throughput of finished product from lines 1, 2, 4, and S/P fryers to demonstrate compliance with Section 2.1 of his permit. The information shall be made available to DEQ upon request.

DEQ Response: DEQ did not revise the final Tier II OP to reflect this comment. Monitoring of short-term (daily) production rates of finished potato products from the fryers are included in the Tier II OP to protect the PM-10 National Ambient Air Quality Standards (NAAQS). PM-10 emission limits are based on emission factors (EF) that are derived from source tests conducted on one of the fryer's stack. The production rate of finished potato products in tons per hour was reported during the source tests. Therefore, the daily production rate limits are included in the Tier II OP.

The last sentence of Section 3.1 was reworded to read as follows:

"The respective throughput for each day may be determined using monthly throughput records. Records of the most recent two-year period shall be maintained on site and shall be made available to DEQ representatives upon request."

Comment #7: **3.3 Initial Performance Tests Remove this section; initial performance tests are addressed in the cover letter.**

3.3.1 PM-10 Performance Tests
At least once during the permit term, the Permittee shall conduct a performance test to measure PM-10 emissions from the line 4-fryer stack. Etc.

3.3.1.1 Visible emissions shall be observed during each performance test run using methods specified in IDAPA 58.01.01.157.

3.3.1.2 The pressure drop across the air pollution control equipment of line 4 fryer shall be recorded during each performance test.

3.3.1.3 The throughput of finished potato product in tons per hour

Comment #12: **SOURCE**
Boiler #1

1. EMISSION LIMITS

1.1 Natural Gas Combustion **Strike**
The particulate matter (PM) emission shall not exceed 0.015 grains per dry standard cubic foot of effluent gas adjusted to three percent (3%) oxygen by volume when natural gas is combusted, as required in IDAPA 58.01.01675.

DEQ Response: DEQ did not revise the final Tier II OP to reflect this comment. IDAPA 58.01.01.675 is the applicable requirement for the fuel burning equipment and it applies to Boiler #1 at the facility. To eliminate confusion, the title "Natural Gas Combustion" was reworded to "Particulate Matter Emission Limits."

Sections 2.1 (Fuel Throughput Limitation) and 2.2 (Natural Gas Fuel Meter Installation) were deleted from the permit. For explanation, refer to that of Comment #8 above which deals with a similar issue.

Comment #13: **3. MONITORING AND RECORD KEEPING REQUIREMENTS**

3.1 Operation Parameters Monitors **Strike Sections 3.1.2 and 3.1.3 on the basis that the boiler #1 is derated.**

The Permittee shall record the following parameters in a log to verify compliance with Section 2.1 of this permit. The log shall be kept at the facility for the most recent two-year period and shall be made available to DEQ upon request.

3.1.1 Calendar date and amount of natural gas burned, in cf/month or therms /month, and cf or therms per any consecutive 12-month period.

3.1.2 The Permittee shall monitor and record in a log the amount of natural gas used for boiler #1 on a daily basis, as required in 40 CFR 60.48c(g). The Permittee shall maintain records for a period of two years following the date of such records.

3.1.3 The Permittee shall submit written notification to EPA Region 10 and to DEQ following the procedures listed in 40 CFR 60.48c(a). The notification shall include the date of construction or reconstruction; anticipated startup date; the design heat input capacity; and fuel combusted in the affected facility.

3.1.4 The Permittee shall monitor and maintain records of t he natural gas flow rate ft^3/min, no less frequently than on a continuous basis and shall report to EPA and DEQ on a quarterly basis the natural gas-fired heat input of boiler #1 MMBtu/hr for each boiler operating day.

DEQ Response: DEQ did not revise the final Tier II OP to reflect this comment. Even though the boiler is derated from 40 CFR 60 Subpart Db to 40 CFR 60 Subpart Dc, Sections 3.1.2 and 3.1.3 in the Tier II OP are applicable requirements, pursuant to 40 CFR 60.48c(a) and 40 CFR 60.48c(g). The New Source Performance Standard (NSPS) that now applies to Boiler #1 is 40 CFR 60 Subpart Dc - Standards of Performance for Small Industrial-Commercial-

Institutional Steam Generating Units.

Section 3.1.1 of the Tier II OP is deleted because it is already covered in Section 3.1.4.

Comment #14:

SOURCE
Boiler #2 and 3

1. Emission Limits

1.1 Natural Gas Combustion **Strike**
The particulate matter (PM) emission shall not exceed 0.015 grains per dry standard cubic foot of effluent gas adjusted to three percent (3%) oxygen by volume when natural gas is combusted, as required in IDAPA 58.01.01.675.

DEQ Response:

DEQ did not revise the final Tier II OP to reflect this comment. IDAPA 58.01.01.675 is applicable requirement for the fuel burning equipment and it applies to Boilers #2 and #3 at the facility. To eliminate confusion, the title "Natural Gas Combustion" was reworded to "Particulate Matter Emission Limits."

Sections 2.1 (Fuel Throughput Limitation) and 2.2 (Natural Gas Fuel Meter Installation) were deleted from the permit. For explanation, see that of Comment #8 above which deals with a similar issue.

Comment #15:

2. **OPERATING REQUIREMENTS**

2.1 Fuel Throughput Limitation **Strike this section on the basis that all the dryers, boilers, and heater and burners except Boiler #1 have a Nox emission factor of 100 lb/mmcf of gas (Boiler #1 is 83.73 lb/mmcf). Multiplying 100 lb/mmcf by the plant annual gas limit of 1844 mmcf/yr gives 92.2 tons/yr. Thus all we need to monitor to avoid going over 100 tons/yr NOx is total plant natural gas usage for a 12-month period which is required on page 3, Section 4.2.1.**

2.1.1 The maximum combustion of natural gas for boiler #2 shall not exceed 551 MM cf/yr.
2.1.2 The maximum combustion of natural gas for boiler #3 shall not exceed 275 MM cf/yr.

3. MONITORING AND RECORDKEEPING REQUIREMENTS

3.1.1 Reword to: Calendar date and amount of natural gas burned, in cubic feet (cf), per month, and cubic feet or therms per any consecutive 12-month period for boiler #2 and boiler #3.

DEQ Response:

DEQ revised the final Tier II OP to reflect this comment. See previous response in Comment #8 for explanation.

Comment #16: **SOURCE**
HEATER AND BURNERS

2. OPERATING REQUIREMENTS

2.1 Fuel Throughput Limitation **Strike this section on the basis that all the dryers, boilers, and heater and burners except Boiler #1 have a NOx emission factor of 100 lb/mmcf of gas (Boiler #1 is 83.73 lb/mmcf). Multiplying 100 lb/mmcf by the plant annual gas limit of 1844 mmcf/yr gives 92.2 tons/yr. Thus all we need to monitor to avoid going over 100 tons/yr NOx is total plant natural gas usage for a 12-month period which is required on page 3, Section 4.2.1.**

The maximum combustion of natural gas for the heaters and burners shall not exceed a maximum of 94 MM cf/yr.

DEQ Response: DEQ revised the final Tier II OP to reflect this comment.

Comment #17: **SOURCE**

Emergency Diesel Generators (100kW and 230kW)

1. EMISSION LIMITS

1.1 Diesel Liquid Combustion **Strike**
Particulate matter (PM) emissions shall not exceed 0.05 grains per dry standard cubic foot of effluent gas adjusted to three percent (3%) oxygen by volume when diesel liquid is combusted, as required in IDAPA.

DEQ Response: DEQ did not revise the final Tier II OP to reflect this comment. IDAPA 58.01.01.675 is the applicable requirement for the fuel burning equipment and it applies to the Emergency Diesel Generators at the facility. To eliminate confusion, the title "Diesel Liquid Combustion" was reworded to "Particulate Matter Emission Limits."