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The Amalgamated Sugar Company

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PARTICULATE, ALDEHYDE, AND SEMI-VOLATILE ORGANIC COMPOUND (SVOC) TESTING REPORT FOR THE PULP DRYER STACKS, 1st AND 2nd CARBONATION TANK VENTS, AND THE EVAPORATOR HEATER VENTS

THE AMALGAMATED SUGAR COMPANY

Nampa, Idaho

May 14, 1993

Prepared by:

DEAN C. DeLOREY, Corporate Environmental Engineer

DENNIS STEGENGA, P.E., Nampa Plant Engineer

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CERTIFICATION

WE CERTIFY THAT INFORMATION CONTAINED IN THIS REPORT HAS BEEN CAREFULLY PREPARED AND THOROUGHLY REVIEWED.

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SECTION 1.0
INTRODUCTION

Particulate, aldehyde, and semi-volatile organic compound (SVOC) sampling was conducted on a variety of stack and vents at the Nampa facility to satisfy the requirements of the August 12, 1993, Consent Order between the Idaho Department of Health and Welfare and The Amalgamated Sugar Company (TASCO). As part of the Consent Order, on September 11, 1992, the Department and TASCO agreed to a stack sampling protocol.

The stack tests were completed during the 1992 beet processing campaign (i.e. October 1992 through January 1993). Emission sources which were tested included a selected number of the pulp dryer stacks, carbonation tank vents, and heater vents on 1st evaporator vapors. A summary of the emissions testing is shown in Table 1.0.

The objectives of the testing were to: 1) determine the aldehyde and SVOC emissions from the pulp drying process, carbonation process and evaporation process; 2) using the testing data, provided in this report and 1991 campaign testing data, estimate aldehyde and SVOC emissions from all vents associated with the pulp drying process, carbonation process, and evaporation process and; 3) determine the compliance status of the particulate emissions from the pulp dryer stacks.

The stack sampling methods employed were: EPA Method 1 - Sampling Point Determination; EPA Method 2 - Stack Gas Flow and Velocity; EPA Method 3 - Stack Gas Composition and Molecular Weight; EPA Method 4 - Stack Gas Moisture; Alignment Approach - Cyclonic Flows; EPA Method 5 - Particulates; SW846 Method 0010 - SVOC's; and Modified EPA Method TO5 (midget and standard impingers) - Aldehydes.

TASCO's stack testing crew consisted of Dean C. DeLorey, Glenn Jones, Matt Bunn, Ray Reno, Dennis Stegenga, and Homer Martinez. Jeff Kunstling of Entropy Environmentalist oversaw the initial particulate, aldehyde, and SVOC tests conducted on the north pulp dryer. Ron Hill of the Idaho Department of Health and Welfare was present during the 2nd SVOC test run conducted on the B-side evaporator heater vent.

All aldehyde and SVOC samples were extracted and analyzed by Triangle Laboratories.

TABLE 1.0 SUMMARY OF THE EMISSION SOURCES TESTED, TESTING DATES, TEST NUMBERS AND RUN NUMBERS

EMISSION SOURCE	POLLUTANT	TESTING PERIOD	TEST NO.	RUN NO.'S
NORTH PULP DRYER STACK	PARTICULATES	10/14/92 - 1/5/93	NA592	PART 5 - PART 17
	ALDEHYDES (FALL 92)	10/26/92	NA592	ALD 3 - ALD 5
	ALDEHYDES (WINTER 93)	1/11/93	NA592	ALD 6 - ALD 8
	SVOC'S (FALL 92)	10/19/92, 10/22/92 10/26/92	NA592	SVOC 1, SVOC 4, SVOC 5
	SVOC'S (WINTER 93)	1/6/93 - 1/8/93	NA592	SVOC 6 - SVOC 8
CENTER PULP DRYER EAST STACK	PARTICULATES	10/29/92, 10/30/92, 11/2/92	NA492	PART 2 - PART 4
CENTER PULP DRYER WEST STACK	PARTICULATES	11/3/92 - 11/5/92, 11/5/92	NA392	PART 1 - PART 3
	ALDEHYDES	1/25/93	NA392	ALD 1 - ALD 3
SOUTH PULP DRYER EAST STACK	PARTICULATES	11/23/92 - 11/25/93 12/29/92, 12/30/92	NA292	PART 1 - PART 5
B-SIDE 1ST CARBONATION TANK VENT	SVOC'S	11/17/92 - 11/19/92	NA892	SVOC 1 - SVOC 3
B-SIDE 2ND CARBONATION TANK VENT	ALDEHYDES	11/13/92	NA1392	ALD 1
A-SIDE EVAPORATOR HEATER VENT	ALDEHYDES	1/4/93	NA1192	ALD 1 - ALD 3
B-SIDE EVAPORATOR HEATER VENT	SVOC'S	1/18/93, 1/19/93, 1/22/93, 1/27/93	NA992	SVOC 1 - SVOC 4
	ALDEHYDES	1/21/93	NA992	ALD 1 - ALD 3

SECTION 2.0
SUMMARY OF RESULTS

This section includes as summary of the particulate, aldehyde, and SVOC testing at the Nampa facility. The following information is provided: 1) stack emissions and exhaust data; 2) estimated aldehyde and SVOC emissions from all vents associated with the pulp drying process, carbonation process, and evaporation process; and 3) sampling and analytical problems encountered during the testing. All supporting information is included in Appendix A through Appendix F.

Particulate emissions are expressed as grains per dry standard cubic foot (gr/dscf) and pounds per hour (lbs/h). Aldehyde and SVOC emissions are expressed as micrograms per cubic meter (ug/m^3) and pounds per hour. In addition to the emission rates, emission factors are also provided. These factors were calculated by dividing the hourly emission rates (lbs/hour) by the hourly production rates.

2.1 Pulp Dryer Stacks

Particulate, aldehyde and SVOC stack testing results for the pulp dryer stacks are included in Tables 2.1.1 through 2.1.9. A summary of the particulate, aldehyde and SVOC hourly emission rates for all pulp dryer stacks is included in Tables 2.1.10 and 2.1.11. Results of the SVOC and aldehyde testing blanks (i.e. field blank, proof blanks, and resin blanks) are provided in Section A.1 of Appendix A.

Due to the design of the pulp dryer emissions control equipment, cyclonic flows exist within each pulp dryer stack. Cyclonic flow angles (yaw angles) for each test conducted on the pulp dryer stacks were greater than 20°. Particulate and SVOC testing methods (EPA Method 5 and SW846 Method 0010) were modified according to the alignment approach to account for the cyclonic flow (see Appendix F).

All particulate, aldehyde, and SVOC testing was conducted while the dryers were fired on pulverized coal, except for one test run. The second particulate test run (part 2) on the center dryer east stack was conducted while the dryer was fired by natural gas.

As shown, particulate emissions from each pulp dryer stack are below the 0.1 grains per dry standard cubic foot (gr/dscf) permit limit. However, particulate emissions from the north pulp dryer stack were initially above 0.1 gr/dscf. On December 16, 1993, the north pulp dryer scrubber was repaired. As shown, except for the testing conducted December 28, 1992, particulate emissions were in compliance with the permit limit. The December 28, 1993, particulate testing results were not representative of normal operation, due to a fire which occurred in the pulp dryer building. Water flow to the scrubber was below normal because filters which screen scrubbing water were not cleaned as scheduled. Personnel responsible for cleaning the screens were extinguishing the fire.

The last 2 particulate test runs (Run No.'s Part 4 and Part 5) for the south pulp dryer east stack were conducted to determine the relationship between particulate emissions and the pressure drop across the scrubber.

The Department requested aldehyde and SVOC testing on the dryer stack with the highest amount of condensible particulates as determined by the back half catch of EPA Method 5 and Method 202. The Department required this testing to occur during late campaign. The north pulp dryer had the highest amount of condensible particulate. Therefore, the north pulp dryer was sampled for aldehydes and SVOC during the middle part of January.

In addition, the north pulp dryer stack was tested for aldehydes and SVOC's during the early part of campaign (i.e. October). Aldehyde testing was also conducted on the center pulp dryer west stack.

Particulate, aldehyde, and SVOC maximum hourly emission rates for all the pulp dryer stacks are given in Table 2.1.10 and 2.1.11. These emission rates were calculated using average emission factors and the maximum hourly production rates.

2.2 Carbonation Tank Vents

SVOC and aldehyde stack testing results for the B Side 1st carbonation tank and 2nd carbonation tank vents are given in Tables 2.2.1 through 2.2.3. A summary of the SVOC and aldehyde emissions for all carbonation tank vents are given in Tables 2.2.4 and 2.2.5. SVOC and aldehyde blank information is given in Section A.5 and A.6 of Appendix A.

2.3 Heater Vents on 1st Evaporator Vapors

The heater vents on 1st evaporator vapors were sampled by installing a temporary 4 inch diameter stack onto the heater vent pipes. Table 2.3.1 includes the aldehyde testing results for the A-side #2 thin juice evaporator heater vent. Aldehyde and SVOC testing results for the B-side 2nd carbonation evaporator heater vent are provided in Tables 2.3.2 through 2.3.5. SVOC and aldehyde testing blank information is provided in Sections A.7 and A.8 of Appendix A. A summary of the aldehyde and SVOC emissions from the evaporator heater vents are included in Table 2.3.6 and 2.3.7.

2.4 Sampling and Analytical Problems

This section discusses the sampling and analytical problems which occurred during the stack testing. Some of the problems required modification of the stack sampling equipment. Other problems required modification of the sampling procedures. TASCO notified the Department by phone and in writing anytime the pre-agreed upon Stack Sampling Protocol had to be modified. Appendix F provides a detailed discussion of the testing problems and how they were resolved.

2.4.1 Pulp Dryers

Initial particulate test runs, conducted on the north pulp dryer stack were aborted due to incompatible equipment within the sampling train. The sockets on the cyclone bypasses cracked due to the expansion of the ball joints on the stainless steel probes. It was discovered that the stainless steel probes purchased from NuTech were not compatible with Ace Glass cyclone bypasses. To correct the problem, the ball joints on the NuTech probes were removed and replaced with Ace Glass ball joints.

The particulate sample collection methods had to be slightly modified for some of the pulp dryer test runs. Acetone rinsing and brushing did not adequately remove particulates from the probe and nozzle. In order to remove all particulates, the probe and probe nozzle were additionally rinsed with hot deionized water followed by brushing. The acetone and DI rinses were kept separate for analysis in the laboratory.

Prior to analysis by the GC/MS system, Triangle Laboratories indicated that the SVOC samples collected from the north pulp dryer stack, had to be diluted due to precipitation occurring during the extraction. Final extract volumes were brought to a final volume of 5 ml. This resulted in a 1 to 5 dilution of the final sample.

The 6th SVOC test run on the north pulp dryer had to be stopped prior to collecting 60 dscf. Due to extremely cold weather conditions and moderate winds, the sampling train froze during the sampling in the last port. Prior to stopping the test, 51 dscf had been collected. The Department and TASCO agreed that this sample volume was adequate.

During the SVOC test runs, teflon tape was wrapped around the edges of the ball joints of the condenser and XAD II traps to prevent leakage into the sampling train. Again, XAD II traps and condensers which were purchased from NuTech were not compatible with Ace Glass glassware. Teflon tape was selected because of its inertness. Teflon tape was also applied to the XAD resin and condensers during the B side 1st carbonation and heater vent testing.

2.4.2 Carbonation Tank Vent

During the SVOC testing of the 1st carbonation tank vent, the temperature of the gases exiting the XAD II resin trap occasionally exceeded 20°C. Salt and dry ice was added to the impinger ice bath to maintain the gases below 20°C. The analytical results did not appear to be affected by this occurrence.

SVOC sample extracts from the B-Side 1st carbonation tank vent were also diluted. Firstly, the samples were diluted by a factor of 2 because the samples would not concentrate below 2 mls. Secondly, the samples were diluted by a factor of 2 due to high levels of target and non-target analyses. Finally, the sample for Run SVOC 2 was additionally diluted to bring benzaldehyde concentrations within the calibration range.

2.4.3 Evaporator Heater Vents

Evaporator heater vent sampling was very difficult due to the combination of the extremely high exhaust temperatures (greater than 200°F), high moisture content of the exhaust gas (greater than 98% H_2O), and presence of ammonia in the exhaust gas. In addition, heaters with vapors from the 2nd evaporator could not be sampled due to extremely low flows. For a complete discussion of the problems associated with heater vent sampling and solutions, see Sections F.6, F.8, F.10, F.12 and F.13 of Appendix F.

The high temperatures and moisture contents of the heater vent exhaust caused the following problems:

- Midget impingers could not be used for aldehyde sampling (Modified Method TO5). Condensed moisture would quickly overflow the midget impingers.

- During the 1st aldehyde test run on the A side heater vent, isoctane from the first 2 impingers volatized and condensed into the third impinger.

- Sampling times and volumes for the aldehyde and SVOC testing had to be drastically reduced due to the excessive amounts of moisture which condensed within the impingers.

- During the first 2 SVOC test runs on the B side heater vent, the temperatures of the gases exiting the XAD II resin regularly exceeded 20°C (68°F).

To correct the above problems, the following modifications to the testing equipment and methods were employed:

- An EPA Method 5 sampling train with standard impingers (approx. 600 mil capacity) was employed for the evaporator heater vent aldehyde sampling (see Section 4.0).

- During the aldehyde testing, a water cooled condenser was inserted prior to the 1st impinger. In addition, the probe heater and box heaters were shut off. Also, the sampling times were drastically reduced.

- To prevent degradation of the XAD II resin due to the high volume of condensed water, the sample volume was reduced to 1 dscf for the SVOC testing. This sample volume was employed for test runs no.'s 3 and 4. Approximately 2500 mls of condensed water was collected in the knockout impingers during each of these test runs.

- An additional condenser was inserted into the SVOC sampling train to ensure gases exiting the resin trap were below 68°F. In addition, the sampling flow rate was significantly reduced.

During the initial sampling, ammonia from the evaporator heater vents eroded the copper tubing within the console and caused the dry gas meter to operate erratically. To correct the problem, a 1% sulfuric solution was added to the last impinger.

TABLE 2.1.1 NORTH PULP DRYER STACK PARTICULATE EMISSION TESTING RESULTS

NAMPA IDAHO FACILITY - 1992 CAMPAIGN

				STACK GAS PARAMETERS						PARTICULATE EMISSIONS					SCRUBBER OPERATION	
										FRONT HALF			BACK HALF			
DATE	SCRUBBER	RUN NO.	DRYER INPUT RATE (T/HR)	TEMP. (DEG. F)	H20 (%)	VELOCITY (FPM)	CYCLE ANGLE (DEG.)	ACTUAL FLOW (ACFM)	DRY STD. FLOW (DSCFM)	GR/DSCF	LB/HR	LBS/TON	GR/DSCF	LB/HR	DELTA P (IN H20)	H2O FLOW (GPM)
10/14/92	N	5	17.5	187	41.6	668	58	33325	14548	0.2599	32.4	1.85	0.079	9.8	0.8	184
10/15/92	N	7	19.6	185	41.7	758	55	37835	16663.2	0.2243	32	1.63	0.12	16.9	0.9	198
10/21/92	N	8	20.8	171	40.8	744	47	37101	16810	0.1609	23.2	1.12	0.11	15.4	1.2	213
10/23/92	N	9	23.7	175	41.5	732	55	36520	16520	0.1512	21.4	0.9	0.13	18.3	1.4	240
11/6/92	N	10	20.4	180	35.9	585	58	29173	14279	0.1965	24	1.18	0.1586	19.4	0.9	235
11/30/92	N	11	15.7	210	37.6	612	54	30513	13967	0.2706	32.4	2.06	0.1031	12.3	0.4	94
12/3/92	N	13	17.3	214	36.8	472	56	23543	10685	0.3419	31.3	1.82	0.1169	10.7	NA	172
AVG			19.3	189	39.4	653	55	32573	14782	0.2293	28.1	1.51	0.1168	14.7	0.9	191
12/22/92	N	14	17.2	156	28.9	593	41	16936	16648	0.0747	10.7	0.62	0.0681	9.7	1.7	247
12/28/92	N	15	21.9	187	41	957	42	47743	20819	0.2362	42.1	1.92	0.1179	21	1	115
1/4/93	N	16	19.8	160	32.4	654	46	32607	17261	0.0882	13	0.66	0.1115	16.5	1.6	196
1/5/93	N	17	18.6	160	30.9	639	46	31880	17266	0.0805	11.2	0.60	0.0764	11.3	1.7	246
AVG a			18.5	159	30.7	629	44	27141	17058	0.0811	11.6	0.63	0.0853	12.5	1.7	230

a AVERAGE ONLY INCLUDES DATA FOR 12/22/92,1/4/93 AND 1/5/93. PARTICULATE RESULTS FOR 12/28/92 ARE NOT REPRESENTATIVE. ON 12/28/92, A FIRE OCCURRED IN THE PULP DRYER BUILDING. PERSONNEL RESPONSIBLE FOR CLEANING SCREENS WHICH FILTER SCRUBBING WATER, WERE INVOLVED IN PUTTING THE FIRE OUT. THEREFORE, WATER FLOW WAS BELOW NORMAL.

TABLE 2.1.2 SUMMARY OF NORTH PULP DRYER ALDEHYDE EMISSION TESTING RESULTS (FALL92) - RUN NOS. ALD 3-5

		TEST	FORMALDEHYDE			ACETALDEHYDE			ACROLEIN			CROTONALDEHYDE		
SOURCE	DATE	RUN NO.	(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)
N	10/26/92	ALD3	7.69E-03	59.3	3.22E-04	5.02E-02	386.5	2.10E-03	8.17E-02	629.4	3.42E-03	6.03E-02	464.9	2.52E-03
N	10/26/92	ALD4	3.29E-02	256.4	1.38E-03	9.19E-02	715.6	3.85E-03	1.25E-01	972.1	3.31E-03	7.91E-02	616.0	3.31E-03
N	10/26/92	ALD5	3.27E-02	254.6	1.37E-03	8.38E-02	653.3	3.51E-03	1.08E-01	841.5	4.52E-03	8.00E-02	624.0	3.35E-03
		AVG	2.44E-02	190.1	1.02E-03	7.53E-02	585.1	3.15E-03	1.05E-01	814.3	3.75E-03	7.32E-02	568.3	3.06E-03

TABLE 2.1.3 SUMMARY OF THE NORTH PULP DRYER STACK ALDEHYDE EMISSION TESTING RESULTS (WINTER 1993) - RUN NOS. ALD 6-8

		TEST	FORMALDEHYDE			ACETALDEHYDE			ACROLEIN			CROTONALDEHYDE		
SOURCE	DATE	RUN NO.	(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)
N	1/11/93	ALD6	2.69E-02	463.0	1.63E-03	7.51E-02	1293.6	4.55E-03	6.76E-02	1163.0	4.09E-03	1.75E-02	301.4	1.06E-03
N	1/11/93	ALD7	4.79E-01	8248.1	2.99E-02	5.24E-01	9026.7	3.28E-02	1.32E-01	2276.2	8.26E-03	2.87E-02	494.3	1.79E-03
N	1/11/93	ALD8	2.40E-01	4134.0	1.50E-02	4.63E-01	7977.4	2.90E-02	1.71E-01	2947.5	1.07E-02	3.49E-02	601.3	2.18E-03
		AVG	2.49E-01	4281.7	1.55E-02	3.54E-01	6099.2	2.21E-02	1.24E-01	2128.9	7.69E-03	2.71E-02	465.6	1.68E-03

TABLE 2.1.4 SUMMARY OF THE NORTH PULP DRYER STACK SVOC EMISSION TESTING RESULTS (FALL 92) - RUN NO'S. SVOC1,SVOC4,SVOC5

RUN NO'S.	SVOC1			SVOC4			SVOC5		AVERAGE	
COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	(ug/m3)	(lbs/hr)
BENZOIC ACID	736.56	4.293E-02	BENZOIC ACID	1173.08	7.470E-02	BENZOIC ACID	1148.48	7.531E-02	1019.37	6.43E-02
BENZALDEHYDE	397.30	2.316E-02	BENZALDEHYDE	394.67	2.513E-02	BENZALDEHYDE	372.25	2.441E-02	388.07	2.42E-02
BIS(2-ETHYLHEXYL)PHTHALATE)	219.42	1.279E-02	BIS(2-ETHYLHEXYL)PHTHALATE)	88.22	5.617E-03	BIS(2-ETHYLHEXYL)PHTHALATE)	281.72	1.847E-02	196.45	1.23E-02
PHENOL	342.00	1.993E-02	PHENOL	188.92	1.203E-02				176.97	1.07E-02
2-NITROPHENOL	22.54	1.314E-03	2-NITROPHENOL	91.82	5.847E-03	2-NITROPHENOL	212.84	1.396E-02	109.07	7.04E-03
4-NITROPHENOL	17.47	1.018E-03				4-NITROPHENOL	205.60	1.348E-02	74.36	4.83E-03
4-METHYLPHENOL	143.16	8.344E-03	4-METHYLPHENOL	41.72	2.656E-03				61.63	3.67E-03
NAPHTHALENE	47.23	2.753E-03	NAPHTHALENE	37.28	2.374E-03	NAPHTHALENE	64.12	4.205E-03	49.54	3.11E-03
DI-N-BUTYLPHTHALATE	26.07	1.519E-03	DI-N-BUTYLPHTHALATE	75.17	4.787E-03	DI-N-BUTYLPHTHALATE	5.07	3.324E-04	35.44	2.21E-03
BENZYL ALCOHOL	49.51	2.886E-03	BENZYL ALCOHOL	25.11	1.599E-03	BENZYL ALCOHOL	23.67	1.552E-03	32.76	2.01E-03
			2,4-DINITROPHENOL	18.46	1.175E-03	2,4-DINITROPHENOL	37.64	2.468E-03	18.70	1.21E-03
2-METHYLPHENOL	43.86	2.556E-03	2-METHYLPHENOL	7.86	5.004E-04				17.24	1.02E-03
NITROBENZENE	14.29	8.330E-04	NITROBENZENE	12.62	8.036E-04	NITROBENZENE	16.10	1.056E-03	14.34	8.97E-04
2,4-DIMETHYLPHENOL	13.88	8.087E-04	2,4-DIMETHYLPHENOL	12.52	7.975E-04	2,4-DIMETHYLPHENOL	11.70	7.675E-04	12.70	7.91E-04
2-METHYLNAPHTHALENE	11.02	6.421E-04				2-METHYLNAPHTHALENE	8.17	5.356E-04	6.40	3.93E-04
						4,6-DINITRO-2-METHYLPHENOL	16.78	1.101E-03	5.59	3.67E-04
DIBENZOFURAN	7.07	4.120E-04	DIBENZOFURAN	4.45	2.834E-04	DIBENZOFURAN	3.86	2.533E-04	5.13	3.16E-04
PHENANTHRENE	6.15	3.585E-04	PHENANTHRENE	4.61	2.937E-04	PHENANTHRENE	4.05	2.655E-04	4.94	3.06E-04
DIETHYLPHTHALATE	3.50	2.041E-04	DIETHYLPHTHALATE	4.49	2.861E-04	DIETHYLPHTHALATE	3.18	2.085E-04	3.72	2.33E-04
ACENAPHTHYLENE	2.13	1.243E-04	ACENAPHTHYLENE	1.92	1.225E-04				1.35	8.23E-05
									0.00	
TENTATIVELY IDENTIFIED COMPOUNDS										
SUBSTITUTED HC	9059.3	3.144E-01	SUBSTITUTED HC	1095.3	3.749E-02	SUBSTITUTED AROMATIC HC	354.69	1.168E-02		
SUBSTITUTED HC	945.66	3.282E-02	UNKNOWN	614.18	2.102E-02	SUBSTITUTED AROMATIC HC	299.05	9.851E-03		
ACID ESTER	580.8	2.016E-02	METHYLFURAN CARBOXALDEHYDE	389.52	1.333E-02	METHYLFURAN CARBOXALDEHYDE	143.75	4.735E-03		
UNKNOWN	571.9	1.985E-02	AROMATIC HC	270.95	9.274E-03	ACID ESTER	111.98	3.689E-03		
SUBSTITUTED CYCLIC HC	535.17	1.858E-02	SUBSTITUTED AROMATIC HC	241.53	8.267E-03	SUBSTITUTED AROMATIC HC	107.66	3.546E-03		
ALKYL ACID	480.92	1.669E-02								
ALKYL NITRILE	432.87	1.502E-02								

TABLE 2.1.5 SUMMARY OF THE NORTH PULP DRYER STACK SVOC EMISSION TESTING RESULTS (WINTER 1993) - RUN NO'S. SVOC6-SVOC8

RUN NO'S.	SVOC6			SVOC7			SVOC8		AVERAGE	
COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	(ug/m3)	(lbs/hr)
BENZOIC ACID	855.83	4.31E-02	BENZOIC ACID	683.90	4.73E-02	BENZOIC ACID	721.15	5.05E-02	753.63	4.70E-02
BIS(2-ETHYLHEXYL)PHTHALATE	1056.42	5.32E-02	BIS(2-ETHYLHEXYL)PHTHALATE	751.54	5.20E-02	BIS(2-ETHYLHEXYL)PHTHALATE	248.64	1.74E-02	685.53	4.09E-02
BENZALDEHYDE	440.78	2.22E-02	BENZALDEHYDE	422.50	2.92E-02	BENZALDEHYDE	431.52	3.02E-02	431.60	2.72E-02
PHENOL	190.24	9.58E-03							63.41	3.19E-03
4-METHYLPHENOL	44.69	2.25E-03	4-METHYLPHENOL	18.85	1.30E-03	4-METHYLPHENOL	25.95	1.82E-03	29.83	1.79E-03
NAPHTHALENE	23.81	1.20E-03	NAPHTHALENE	20.97	1.45E-03	NAPHTHALENE	18.60	1.30E-03	21.13	1.32E-03
			4-NITROPHENOL	29.41	2.03E-03	4-NITROPHENOL	23.04	1.61E-03	17.48	1.22E-03
2-NITROPHENOL	25.90	1.30E-03	2-NITROPHENOL	24.44	1.69E-03				16.78	9.98E-04
BENZYL ALCOHOL	27.42	1.38E-03				BENZYL ALCOHOL	19.97	1.40E-03	15.80	9.27E-04
2-METHYLPHENOL	9.86	4.96E-04	2-METHYLPHENOL	4.29	2.97E-04	2-METHYLPHENOL	6.19	4.34E-04	6.78	4.09E-04
2-METHYLNAPHTHALENE	5.75	2.89E-04	2-METHYLNAPHTHALENE	4.07	2.82E-04	2-METHYLNAPHTHALENE	3.74	2.62E-04	4.52	2.78E-04
NITROBENZENE	16.43	8.27E-04							5.48	2.76E-04
2,4-DIMETHYLPHENOL	15.95	8.03E-04							5.32	2.68E-04
PHENANTHRENE	7.87	3.96E-04				PHENANTHRENE	2.04	1.43E-04	3.30	1.80E-04
DI-N-BUTYLPHTHALATE	10.33	5.20E-04							3.44	1.73E-04
BUTYLBENZYLPHTHALATE	10.29	5.18E-04							3.43	1.73E-04
DIBENZOFURAN	5.09	2.56E-04	DIBENZOFURAN	2.20	1.52E-04				2.43	1.36E-04
FLUORANTHRENE	5.73	2.88E-04							1.91	9.61E-05
ACENAPHTHYLENE	2.45	1.23E-04	ACENAPHTHYLENE	1.85	1.28E-04				1.43	8.37E-05
ANTHRACENE	4.76	2.40E-04							1.59	7.98E-05
TENTATIVELY IDENTIFIED COMPOUNDS										
2-FURANCARBOXALDEHYDE	1441.32	7.26E-02	2-FURANCARBOXALDEHYDE	1335.25	9.24E-02	2-FURANCARBOXALDEHYDE	1060.98	7.43E-02		
UNKNOWN	632.38	3.18E-02	UNKNOWN	581.53	4.02E-02	UNKNOWN	263.96	1.85E-02		
2-FURANCARBOXALDEHYDE	246.38	1.24E-02	2-FURANCARBOXALDEHYDE	213.43	1.48E-02	PYRAZINE	231.48	1.62E-02		
PYRAZINE	191.63	9.65E-03	UNKNOWN	203.12	1.41E-02	2-FURANCARBOXALDEHYDE	186.63	1.31E-02		
SUBSTITUTED HYDROCARBON	181.36	9.13E-03	PYRAZINE	146.93	1.02E-02	UNKNOWN	153.63	1.08E-02		
PYRAZINE	140.98	7.10E-03	PYRAZINE	122.18	8.45E-03	PYRAZINE	134.56	9.43E-03		
SUBSTITUTED HYDROCARBON	132.09	6.65E-03	SUBSTITUTED HYDROCARBON	112.39	7.78E-03	SUBSTITUTED HYDROCARBON	118.57	8.31E-03		
SUBSTITUTED HYDROCARBON	112.24	5.65E-03	SUBSTITUTED HYDROCARBON	109.87	7.60E-03	SUBSTITUTED HYDROCARBON	109.81	7.69E-03		
SUBSTITUTED HYDROCARBON	107.45	5.41E-03	SUBSTITUTED HYDROCARBON	105.69	7.31E-03	DIMETHYL SULFONE	108.78	7.62E-03		
UNKNOWN	103.34	5.20E-03	UNKNOWN	79.91	5.53E-03	SUBSTITUTED HYDROCARBON	99.5	6.97E-03		

TABLE 2.1.6 CENTER PULP DRYER EAST STACK PARTICULATE EMISSION TESTING RESULTS

NAMPA IDAHO FACILITY - 1992 CAMPAIGN

			DRYER INPUT RATE	STACK GAS PARAMETERS						PARTICULATE EMISSIONS					SCRUBBER OPERATIO	
										FRONT HALF			BACK HALF			
DATE	SCRUBBER	RUN NO.	(T/HR)	TEMP. (DEG. F)	H20 (%)	VELOCITY (FPM)	CYCLE ANGLE (DEG.)	ACTUAL FLOW (ACFM)	DRY STD. FLOW (DSCFM)	GR/DSCF	LB/HR	LBS/TON	GR/DSCF	LB/HR	DELTA P (IN H20)	H2O FLOW (GPM)
10/28/92	CE	1	50.2	173	47.4	1011	49	38894	15674	0.0939	12.6	0.25	0.19	24.9	3.5	119.5
10/29/92	CE a	2	47.4	171	44.3	1081	53	41616	17613	0.0668	10.1	0.21	0.05	6.9	3.9	167
10/30/92	CE	3	55.2	170	44.6	1146	52	44102	18534	0.0601	9.5	0.17	0.06	9.9	3.6	170
11/2/92	CE	4	49.7	175	46.7	1050	54	40393	16480	0.0873	12.3	0.25	0.0614	8.7	3.1	166
AVG			50.6	172.25	45.75	1072	52	41251.3	17075	0.077025	11.1	0.22	0.090	12.6	3.5	156

a DRYER FIRED BY NATURAL GAS

TABLE 2.1.7 CENTER PULP DRYER WEST STACK PARTICULATE EMISSION TESTING RESULTS

NAMPA IDAHO FACILITY - 1992 CAMPAIGN

			DRYER	STACK GAS PARAMETERS						PARTICULATE EMISSIONS					SCRUBBER OPERATION	
										FRONT HALF			BACK HALF			
DATE	SCRUBBER	RUN NO.	INPUT RATE (T/HR)	TEMP. (DEG. F)	H20 (%)	VELOCITY (FPM)	CYCLE ANGLE (DEG.)	ACTUAL FLOW (ACFM)	DRY STD. FLOW (DSCFM)	GR/DSCF	LB/HR	LBS/TON	GR/DSCF	LB/HR	DELTA P (IN H20)	H2O FLOW (GPM)
11/3/92	CW	1	55.3	173	42.6	994	48	37491	16691	0.0805	11.6	0.21	0.0652	9.4	3.7	165
11/4/92	CW	2	55.8	171	42.2	1015	47	39063	17538	0.0706	10.6	0.19	0.0695	10.4	4	164
11/5/92	CW	3	55.7	169	43.2	971	49	37381	16515	0.0684	9.7	0.17	0.0773	10.9	4.4	156
AVG			55.6	171	42.7	993	48	37978	16915	0.0732	10.6	0.19	0.0707	10.2	4.0	162

TABLE 2.1.8 SUMMARY OF THE CENTER PULP DRYER WEST STACK ALDEHYDE TESTING RESULTS(WINTER 1993) - RUN N0'S. ALD 1-3

SOURCE	DATE	TEST RUN NO.	FORMALDEHYDE			ACETALDEHYDE			ACROLEIN			CROTONALDEHYDE		
			(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)	(lbs/hr)	(ug/m3)	(lbs/ton)
CW	1/25/93	ALD1	1.08E-01	1815.0	2.61E-03	4.25E-01	7124.1	1.03E-02	4.25E-01	7135.6	1.03E-02	7.11E-02	1192.5	1.72E-03
CW	1/25/93	ALD2	1.57E-01	2638.9	3.80E-03	5.42E-01	9091.8	1.31E-02	4.99E-01	8367.3	1.20E-02	7.65E-02	1284.3	1.85E-03
CW	1/25/93	ALD3	4.83E-01	8107.2	1.12E-02	1.09E+00	18355.4	2.53E-02	2.28E-01	3827.4	5.27E-03	5.20E-02	872.4	1.20E-03
		AVG	2.50E-01	4187.0	5.86E-03	6.87E-01	11523.8	1.62E-02	3.84E-01	6443.4	9.20E-03	6.65E-02	1116.4	1.59E-03

TABLE 2.1.9 SOUTH PULP DRYER EAST STACK PARTICULATE EMISSION TESTING RESULTS

NAMPA IDAHO FACILITY - 1992 CAMPAIGN

			DRYER	STACK GAS PARAMETERS						PARTICULATE EMISSIONS					SCRUBBER OPERATION	
										FRONT HALF			BACK HALF			
DATE	SCRUBBE	RUN NO.	INPUT RATE (T/HR)	TEMP. (DEG. F)	H20 (%)	VELOCITY (FPM)	CYCLE ANGLE (DEG.)	ACTUAL FLOW (ACFM)	DRY STD. FLOW (DSCFM)	GR/DSCF	LB/HR	LBS/TON	GR/DSCF	LB/HR	DELTA P (IN H20)	H2O FLOW (GPM)
11/23/92	SE	1	47.1	165	39.2	891	24	34287	16192	0.0619	8.6	0.18	0.0387	5.4	3.1	137
11/24/92	SE	2	47.1	165	37.5	816	29	31421	15319	0.0497	6.5	0.14	0.0402	5.3	4.9	145
11/25/92	SE	3	47.2	165	37.9	724	40	27870	13630	0.0467	5.5	0.12	0.0763	8.9	5.2	131
12/29/92	SE	4	38.9	156	36.8	609	41	23435	11484	0.0922	9.1	0.23	0.0992	9.8	4.6	136
12/30/92	SE	5	39.8	160	37.1	478	59	18387	8995	0.1082	8.3	0.21	0.078	6	2.7	104
AVG a			47.1	165	38.2	810	31	31193	15047	0.0528	6.9	0.15	0.0517	6.5	4.4	138

a AVERAGE CALCULATED FOR RUN NO.'S 1 THROUGH 3 ONLY. RUNS 4 AND 5 WERE CONDUCTED TO DETERMINE THE IMPACT OF EMISSIONS VS. PRESSURE DROP

TABLE 2.1.10 ESTIMATED MAXIMUM HOURLY PARTICULATE AND ALDEHYDE EMISSION RATES (LBS/HR) FOR THE PULP DRYERS [a]

SOURCE	PARTICULATES [b] (LBS/HR)	ALDEHYDES [c] FORMALDEHYDE (LBS/HR)	ACETALDEHYDE (LBS/HR)	ACROLEIN (LBS/HR)	CROTONALDEHYDE (LBS/HR)
NORTH PULP DRYER STACK	15.1	0.18	0.33	0.17	0.05
CENTER PULP DRYER - EAST STACK	13.2	0.23	0.42	0.21	0.06
CENTER PULP DRYER - WEST STACK	13.2	0.23	0.42	0.21	0.06
SOUTH PULP DRYER - EAST STACK	7.8	0.20	0.36	0.18	0.05
SOUTH PULP DRYER - WEST STACK	7.8	0.20	0.36	0.18	0.05

a THE MAXIMUM CAPACITIES OF THE NORTH, CENTER AND SOUTH PULP DRYERS ARE 24.0 T/H, 60.2 T/H AND 52.1 T/H, RESPECTIVELY.

b PARTICULATE EF'S FOR THE NORTH, CENTER AND SOUTH DRYERS STACKS ARE 0.63 LB/TON, 0.22 LB/TON AND 0.15 LB/TON, RESPECTIVELY.

c ALDEHYDE EF'S ARE BASED ON AVERAGE EMISSION FACTORS CALCULATED FROM THE TESTS CONDUCTED ON THE NORTH PULP DRYER ON 10-26-92 AND 1-11-93, AND THE CENTER PULP DRYER ON 1-25-93. THE FORMALDEHYDE, ACETALDEHYDE, ACROLEIN AND CROTONALDEHYDE EMISSION FACTORS ARE 0.0075, 0.0138, 0.0074 AND 0.0021 LBS/TON, RESPECTIVELY.

TABLE 2.1.11 ESTIMATED MAXIMUM HOURLY SVOC EMISSION RATES (LBS/HR) FOR THE PULP DRYERS [a & b]

SOURCE	SVOC'S [c]			
	BENZOIC ACID	BENZALDEHYDE	BIS (2-ETHYL HEXYL) PHTHLATE	PHENOL
NORTH PULP DRYER STACK	0.07	0.03	0.03	0.01
CENTER PULP DRYER E. STACK	0.08	0.04	0.04	0.01
CENTER PULP DRYER W. STACK	0.08	0.04	0.04	0.01
SOUTH PULP DRYER E. STACK	0.07	0.03	0.04	0.01
SOUTH PULP DRYER W. STACK	0.07	0.03	0.04	0.01

a THIS TABLE ONLY INCLUDES THE 4 SVOC COMPOUNDS EMITTED IN THE HIGHEST QUANTITIES.

b THE MAXIMUM CAPACITIES OF THE NORTH, CENTER AND SOUTH PULP DRYERS ARE 24.0 T/H, 60.2 T/H AND 52.1 T/H.

c SVOC EF'S ARE BASED ON THE AVERAGE EMISSION FACTORS FROM THE FALL '92 AND WINTER '93 TESTS CONDUCTED ON THE NORTH PULP DRYER STACK.

TABLE 2.2.1 SUMMARY OF THE 1ST CARBONATION TANK VENT SVOC EMISSION TESTING RESULTS - RUN NO'S. SVOC1-SVOC3

RUN NO'S.	SVOC1			SVOC2			SVOC3		AVERAGE	
COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	(ug/m3)	(lbs/hr)
BENZALDEHYDE	1341.88	7.312E-03	BENZALDEHYDE	1635.15	9.044E-03	BENZALDEHYDE	1400.87	8.073E-03	1459.30	8.14E-03
BIS(2-ETHYLHEXYL)PHTHALATE	252.09	1.374E-03	BIS(2-ETHYLHEXYL)PHTHALATE	133.42	7.380E-04	BIS(2-ETHYLHEXYL)PHTHALATE	127.69	7.359E-04	171.07	9.49E-04
BENZOIC ACID	171.13	9.324E-04	BENZOIC ACID	85.43	4.725E-04	BENZOIC ACID	91.79	5.290E-04	116.12	6.45E-04
BENZYL ALCOHOL	66.52	3.624E-04	BENZYL ALCOHOL	66.18	3.661E-04	BENZYL ALCOHOL	71.99	4.149E-04	68.23	3.81E-04
						2,4-DINITROPHENOL	141.55	8.155E-04	47.18	2.72E-04
NAPHTHALENE	21.62	1.178E-04	NAPHTHALENE	33.28	1.841E-04	NAPHTHALENE	27.48	1.583E-04	27.46	1.53E-04
PHENANTHRENE	17.91	9.760E-05	PHENANTHRENE	19.62	1.085E-04	PHENANTHRENE	18.78	1.082E-04	18.77	1.05E-04
PHENOL	20.27	1.105E-04	PHENOL	19.48	1.078E-04	PHENOL	14.28	8.228E-05	18.01	1.00E-04
4-METHYLPHENOL	12.22	6.660E-05	4-METHYLPHENOL	8.14	4.504E-05	4-METHYLPHENOL	6.94	3.999E-05	9.10	5.05E-05
2-METHYLNAPHTHALENE	3.98	2.168E-05	2-METHYLNAPHTHALENE	8.90	4.922E-05	2-METHYLNAPHTHALENE	8.18	4.713E-05	7.02	3.93E-05
						ACENAPHTHENE	19.29	1.112E-04	6.43	3.71E-05
TENTATIVELY IDENTIFIED COMPOUNDS										
SATURATED HYDROCARBON	1632.20	8.894E-03	SATURATED HYDROCARBON	1735.40	9.599E-03	SATURATED HYDROCARBON	1737.68	1.001E-02		
DIMETHYL PYRAZINE	1227.86	6.690E-03	SATURATED HYDROCARBON	1337.91	7.400E-03	DIMETHYL PYRAZINE	862.19	4.969E-03		
SATURATED HYDROCARBON	956.85	5.214E-03	DIMETHYL PYRAZINE	1058.17	5.853E-03	ACID ESTER	726.05	4.184E-03		
TRIMETHYL PYRAZINE	783.94	4.272E-03	SUBSTITUED CYCLIC HC	902.88	4.994E-03	UNKNOWN HYDROCARBON	636.45	3.668E-03		
SATURATED HYDROCARBON	777.12	4.234E-03	TRIMETHYL PYRAZINE	644.30	3.564E-03	SATURATED HYDROCARBON	579.13	3.338E-03		
SUBSTITUED HYDROCARBON	653.67	3.562E-03	SATURATED HYDROCARBON	612.21	3.386E-03	SATURATED HYDROCARBON	477.74	2.753E-03		
UNKNOWN HYDROCARBON	586.00	3.193E-03	UNKNOWN HYDROCARBON	588.58	3.256E-03	TRIMETHYL PYRAZINE	476.12	2.744E-03		
SATURATED HYDROCARBON	553.46	3.016E-03	SATURATED HYDROCARBON	532.48	2.945E-03	SATURATED HYDROCARBON	405.03	2.334E-03		
BRANCHED HYDROCARBON	526.56	2.869E-03	SATURATED HYDROCARBON	417.80	2.311E-03	SATURATED HYDROCARBON	394.2	2.272E-03		
ALCOHOL	371.16	2.022E-03	SATURATED HYDROCARBON	279.26	1.545E-03	SATURATED HYDROCARBON	362.78	2.091E-03		

TABLE 2.2.2 B-SIDE 2ND CARBONATION TANK VENT ALDEHYDE TESTING RESULTS - RUN NO. ALD1

STACK SAMPLING DATA

DATE:	11/13/92	SAMPLE FLOW(ml/min):	180	ACTUAL STACK FLOW(ACFM) :	1167
TEST & RUN NO.:	NA1392 ALD1	SAMPLE TIME(min):	60	MOISTURE (% H2O):	77.3
SOURCE THRPT (GAL/HR):	71700	STACK TEMP(DEG F):	194	DRY STD STACK FLOW(DSCFM):	200
		LAB TEMP(DEG F):	62.5	LAB PRESSURE (in hg)	27.8
		SAMPLE VOLUME(ACM):	0.0135		
		SAMPLE VOLUME(ACF):	0.4774		

COMPOUND	MDL (ug/ml)	MASS BLANK (ug)	IMP 1 & 2 (ug)	IMP 3 (ug)	TOTAL (ug)	CONCENTRATION (ug/m3)	(lb/acf)	EMISSION RATE (lbs/hr)	EMISSION FACTOR (lbs/gal)
FORMALDEHYDE	0.0079	1.62	5.15	1.54	3.45	271.81	1.592E-08	1.115E-03	1.555E-08
ACETALDEHYDE	0.0131	2.77	945.57	11.34	951.37	74955.48	4.390E-06	3.074E-01	4.287E-06
ACROLEIN	0.0046	2.13	52.99	3.42	52.15	4108.74	2.406E-07	1.685E-02	2.350E-07
CROTONALDEHYDE	0.0295	0.83	7.38	0.83	6.55	516.05	3.022E-08	2.116E-03	2.951E-08

TABLE 2.2.3 CARBONATION TANK VENT EXHAUST DATA

NAMPA IDAHO FACILITY - 1992 CAMPAIGN

			STACK GAS PARAMETERS				
DATE	CARB TANK VENT	RUN NO.	TEMP (DEG. F)	H20 (%)	VEL (FPM)	ACTUAL FLOW (ACFM)	DRY FLOW (DSCFM)
11/13/92	B SIDE 2ND	ALD 1	194	77.3	563	1167	200
11/17/92	B SIDE 1ST	SVOC 1	188	66.9	3305	5841	1456
11/18/92	B SIDE 1ST	SVOC 2	188	67.6	3430	5061	1478
11/19/92	B SIDE 1ST	SVOC 3	186	67.0	3517	6215	1540

TABLE 2.2.4 ESTIMATED MAXIMUM HOURLY ALDEHYDE EMISSION RATES (LBS/HR) FOR THE CARBONATION TANK VENTS [a]

	ALDEHYDES [c]			
SOURCE	FORMALDEHYDE (LBS/HR)	ACETALDEHYDE (LBS/HR)	ACROLEIN (LBS/HR)	CROTONALDEHYDE (LBS/HR)
A SIDE 1ST CARBONATION TANK VENT	0.19	1.64	0	0
A SIDE 2ND CARBONATION TANK VENT	0.22	0.35	0.01	0.002
A SIDE 2ND CARBONATION MAGOX REACTION TANK VENT	0.0008	0.06	0	0
B SIDE 1ST CARBONATION TANK VENT	0.19	1.64	0	0
B SIDE 2ND CARBONATION TANK VENT	0.22	0.35	0.01	0.002
B SIDE 2ND CARBONATION TANK VENT	0.0008	0.06	0	0

a MAXIMUM HOURLY EMISSIONS ARE BASED ON AVERAGE EMISSION FACTORS AND THE MAXIMUM RAW AND THIN JUICE FLOWS MAXIMUM RAW AND THIN JUICE FLOWS THROUGH EACH SIDE (A OR B) IS 88,600 GAL/HR AND 83,400 GAL/HR, RESPECTFULLY.

b ALDEHYDE EMISSION FACTORS ARE BASED ON STACK TESTING CONDUCTED ON 2-11-92, 2-12-92 AND 11-13-92. SEE SECTION A.10 IN APPENDIX A.

TABLE 2.2.5 ESTIMATED MAXIMUM HOURLY SVOC EMISSION RATES (LBS/HR) FOR THE 1ST CARBONATION TANK VENTS a & b

SOURCE	SVOC'S c				
	BENZALDEHYDE	BENZOIC ACID	BIS (2-ETHYL HEXYL) PHTHLATE	BENZYL ALCOHOL	2,4 DINTRO PHENOL
A SIDE 1ST CARBONATION TANK VENT	0.006	0.0007	0.001	0.0004	0.0003
B SIDE 1ST CARBONATION TANK VENT	0.006	0.0007	0.001	0.0004	0.0003

a MAXIMUM HOURLY EMISSION RATES ARE BASED ON AVERAGE EMISSION FACTORS AND THE MAXIMUM RAW JUICE OF 88,000 THROUGH THE 1ST CARBONATION TANKS.

b THIS TABLE INCLUDES ONLY THE FOUR SVOC COMPOUNDS EMITTED IN THE HIGHEST QUANTITIES.

c SVOC EF'S ARE BASED ON AN AVERAGE EMISSION FACTORS CALCULATED FROM THE 3 TEST RUNS CONDUCTED ON THE B SIDE 1ST CARBONATION TANK.

TABLE 2.3.1 SUMMARY OF THE A-SIDE #2 THIN JUICE HEATER VENT ALDEHYDE EMISSION TESTING RESULTS - RUN NO'S. ALD1 - ALD3

		TEST	FORMALDEHYDE			ACETALDEHYDE			ACROLEIN			CROTONALDEHYDE		
SOURCE	DATE	RUN NO.	(lbs/hr)	(ug/m3)	(lbs/gal)	(lbs/hr)	(ug/m3)	(lbs/gal)	(lbs/hr)	(ug/m3)	(lbs/gal)	(lbs/hr)	(ug/m3)	(lbs/gal)
A HTR	1/13/93	ALD1	2.11E-04	26866	2.83E-09	1.06E-02	1352228	1.42E-07	1.93E-05	2455	2.58E-10	2.21E-05	2812	2.96E-10
A HTR	1/13/93	ALD2	5.79E-05	7369	7.88E-10	8.64E-03	1099809	1.18E-07	8.94E-06	1137	1.22E-10	1.29E-05	1638	1.75E-10
A HTR	1/13/93	ALD3	1.87E-05	2374	2.53E-10	4.55E-03	579289	6.17E-08	4.76E-06	605	6.45E-11	7.22E-06	918	9.78E-11
		AVG	9.59E-05	12203	1.29E-09	7.94E-03	1010442	1.07E-07	1.10E-05	1399	1.48E-10	1.41E-05	1789	1.90E-10

TABLE 2.3.2 SUMMARY OF THE B - SIDE 2ND CARBONATION HEATER VENT ALDEHYDE EMISSION TESTING RESULTS - RUN NO'S. ALD1-ALD3

		TEST	FORMALDEHYDE			ACETALDEHYDE			ACROLEIN			CROTONALDEHYDE		
SOURCE	DATE	RUN NO.	(lbs/hr)	(ug/m3)	(lbs/gal)	(lbs/hr)	(ug/m3)	(lbs/gal)	(lbs/hr)	(ug/m3)	(lbs/gal)	(lbs/hr)	(ug/m3)	(lbs/gal)
BHTR	1/21/93	ALD1	1.07E-05	4745	1.45E-10	2.43E-03	1081023	3.31E-08	5.80E-05	25835	7.91E-10	7.17E-06	3193	9.77E-11
BHTR	1/21/93	ALD2	7.12E-06	3170	9.65E-11	1.68E-03	749815	2.28E-08	4.98E-05	22168	6.75E-10	5.10E-06	2273	6.92E-11
BHTR	1/21/93	ALD3	5.07E-06	2260	6.94E-11	1.08E-03	481552	1.48E-08	4.10E-05	18245	5.61E-10	8.72E-06	3885	1.19E-10
		AVG	7.61E-06	3391	1.04E-10	1.73E-03	770797	2.36E-08	4.96E-05	22083	6.75E-10	7.00E-06	3117	9.54E-11

TABLE 2.3.3 SUMMARY OF THE B SIDE 2ND CARBONATION HEATER VENT SVOC EMISSION TESTING RESULTS (XAD & RINSES) - RUN NO'S. SVOC1 - 4

RUN NO'S.	SVOC1			SVOC2			SVOC3			SVOC4		AVERAGE	
COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	(ug/m3)	(lbs/hr)
BENZALDEHYDE	80517.0	2.65E-04	BENZALDEHYDE	49269.9	1.66E-04	BENZALDEHYDE	49757.4	6.98E-05	BENZALDEHYDE	74728.6	1.61E-04	63568.2	1.65E-04
BIS(2-ETHYLHEXYL)PHTHALATE	1801.9	5.93E-06	BIS(2-ETHYLHEXYL)PHTHALATE	6805.1	2.29E-05	BIS(2-ETHYLHEXYL)PHTHALATE	44883.2	6.30E-05	BIS(2-ETHYLHEXYL)PHTHALATE	8245.6	1.77E-05	15434.0	2.74E-05
BENZYL ALCOHOL	2510.6	8.27E-06	BENZYL ALCOHOL	1269.9	4.28E-06				BENZYL ALCOHOL	2729.6	5.87E-06	1627.6	4.60E-06
NAPHTHALENE	749.3	2.47E-06	NAPHTHALENE	354.7	1.19E-06				NAPHTHALENE	1844.3	3.97E-06	737.1	1.91E-06
4-METHYLPHENOL	2214.8	7.29E-06										553.7	1.82E-06
PHENANTHRENE	320.9	1.06E-06	PHENANTHRENE	285.3	9.61E-07	PHENANTHRENE	357.3	5.01E-07	PHENANTHRENE	1073.5	2.31E-06	509.3	1.21E-06
			ISOPHORONE	1304.1	4.39E-06							326.0	1.10E-06
			BENZOIC ACID	1133.43	3.82E-06							283.4	9.55E-07
			PHENOL	352.2	1.19E-06	PHENOL	1825.0	2.56E-06				544.3	9.37E-07
									DIETHYLPHTHLATE	1640.4	3.53E-06	410.1	8.83E-07
			PYRIDINE	528.1	1.78E-06				PYRIDINE	784.2	1.69E-06	328.1	8.67E-07
						DIBENZOFURAN	95.3	1.34E-07				23.8	3.34E-08
			TENTATIVELY IDENTIFIED COMPOUNDS										
TRIMETHYL PYRAZINE	294246.3	9.69E-04	UNKNOWN AROMATIC HC	30996.2	1.04E-04	ALKYL PYRAZINE	14550.7	2.04E-05	TRIMETHYL PYRAZINE (SAT)	83938.1	1.81E-04		
UNKNOWN AROMATIC HC	147676.5	4.86E-04	DIMETHYL PYRAZINE	16161.9	5.44E-05	UNKNOWN AROMATIC HC	11041.6	1.55E-05	DIMETHYL PYRAZINE (SAT)	65828.9	1.42E-04		
DIMETHYL PYRAZINE	27789.3	9.15E-05	DIMETHYL PYRAZINE	15288.5	5.15E-05	UNKNOWN AROMATIC HC (SAT)	11041.6	1.55E-05	UNKNOWN AROMATIC HC	34784.6	7.49E-05		
METHYL PYRAZINE	11853.5	3.90E-05	UNKNOWN AROMATIC HC	10027.0	3.38E-05	UNKNOWN AROMATIC HC	8080.2	1.13E-05	ALKYL PYRAZINE	20607.7	4.43E-05		
UNKNOWN AROMATIC HC	10894.4	3.59E-05	UNKNOWN AROMATIC HC	6763.8	2.28E-05	ALKYL PYRAZINE	7565.1	1.06E-05	METHYL PYRAZINE	4800.0	1.03E-05		
ALKYL PYRAZINE	3664.3	1.21E-05	TETRAMETHYL PYRAZINE	4003.8	1.35E-05	TRIMETHYL PYRAZINE (SAT)	5311.7	7.45E-06	UNKNOWN AROMATIC HC	4176.7	8.99E-06		
ALKYL PYRAZINE	2705.2	8.91E-06	ALKYL PYRAZINE	3640.5	1.23E-05	DIMETHYL PYRAZINE (SAT)	4281.5	6.01E-06	UNKNOWN CYCLIC HC	3085.7	6.64E-06		
ALKYL PYRAZINE	2410.0	7.94E-06	UNKNOWN AROMATIC HC	2131.2	7.18E-06	SUBSTITUTED PYRAZINE (SAT.)	2993.8	4.20E-06	DIMETHYL SULFOXIDE	2805.2	6.04E-06		
UNKNOWN AROMATIC HC	1696.9	5.59E-06	UNKNOWN AROMATIC HC	1725.9	5.81E-06	ALKYL PYRAZINE	1223.3	1.72E-06	UNKNOWN AROMATIC HC	2244.2	4.83E-06		
UNKNOWN AROMATIC HC	1573.9	5.18E-06	ALKYL PYRAZINE	1397.5	4.71E-06	UNKNOWN AROMATIC HC	611.7	8.58E-07	ALKYL PYRAZINE	2181.8	4.69E-06		

TABLE 2.3.4 SUMMARY OF THE B-SIDE 2ND CARBONATION HEATER VENT SVOC EMISSION TESTING RESULTS (KNOCKOUT IMPINGER WATER) - RUN NO'S. SVOC1-SVOC4

RUN NO'S.	SVOC1			SVOC2			SVOC3			SVOC4			
COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lbs/hr)	AVERAGE (ug/m3)	AVERAGE (lbs/hr)
BENZYL ALCOHOL	2741.5	9.03E-06	BENZYL ALCOHOL	4336.5	1.46E-05	BENZYL ALCOHOL	3494.4	4.90E-06	BENZYL ALCOHOL	3957.2	8.52E-06	3632.4	9.26E-06
BENZALDEHYDE	240.0	7.90E-07	BENZALDEHYDE	5059.3	1.70E-05	BENZALDEHYDE	1202.0	1.69E-06	BENZALDEHYDE	1267.3	2.73E-06	1942.2	5.56E-06
PYRIDINE	699.4	2.30E-06	PYRIDINE	528.1	1.78E-06	PYRIDINE	783.2	1.10E-06	PYRIDINE	784.2	1.69E-06	698.7	1.72E-06
BIS(2-ETHYLHEXYL)PHTHALATE	72.6	2.39E-07	BIS(2-ETHYLHEXYL)PHTHALATE	80.6	2.72E-07	BIS(2-ETHYLHEXYL)PHTHALATE	95.0	1.33E-07	BIS(2-ETHYLHEXYL)PHTHALATE	1321.6	2.84E-06	392.4	8.72E-07
DI-N-BUTYLPHTHALATE	34.9	1.15E-07				DI-N-BUTYLPHTHALATE	71.6	1.01E-07				26.7	5.39E-08
												0.0	0.00E+00
												0.0	0.00E+00
TENTATIVELY IDENTIFIED COMPOUNDS													
SUBSTITUTED PYRIMIDINE (SAT)	132724.4	4.37E-04	SUBSTITUTED PYRIMIDINE (SAT)	127597.5	4.30E-04	SUBSTITUTED PYRIMIDINE (SAT)	245269.8	3.44E-04	SUBSTITUTED PYRIMIDINE (SAT)	308074.4	6.63E-04		
SUBSTITUTED PYRAZINE (SAT.)	43626.7	1.44E-04	SUBSTITUTED PYRAZINE (SAT.)	61161.0	2.06E-04	SUBSTITUTED PYRAZINE (SAT.)	157031.9	2.20E-04	SUBSTITUTED PYRAZINE (SAT)	164634.7	3.54E-04		
SUBSTITUTED PYRAZINE (SAT.)	43184.0	1.42E-04	SUBSTITUTED PYRAZINE	60525.1	2.04E-04	SUBSTITUTED PYRAZINE (SAT.)	66926.9	9.39E-05	UNKNOWN AROMATIC	109340.9	2.35E-04		
UNKNOWN	35142.3	1.16E-04	SUBSTITUTED PYRAZINE (SAT.)	28417.9	9.57E-05	UNKNOWN AROMATIC	40754.9	5.72E-05	SUBSTITUTED PYRAZINE (SAT)	94442.1	2.03E-04		
UNKNOWN	34576.7	1.14E-04	SUBSTITUTED HYDROCARBON	12507.5	4.21E-05	SUBSTITUTED AROMATIC	35121.3	4.93E-05	SUBSTITUTED AROMATIC	35314.5	7.60E-05		
SUBSTITUTED PYRAZINE (SAT.)	16526.0	5.44E-05	SUBSTITUTED HYDROCARBON	10921.4	3.68E-05	SUBSTITUTED HYDROCARBON	26429.5	3.71E-05	UNKNOWN AROMATIC	34130.1	7.34E-05		
UNKNOWN	13943.8	4.59E-05	UNKNOWN AROMATIC	7169.1	2.41E-05	SUBSTITUTED PYRAZINE	25206.2	3.54E-05	SUBSTITUTED PYRAZINE	19636.5	4.23E-05		
SUBSTITUTED HYDROCARBON	10820.6	3.56E-05	SUBSTITUTED BENZALDEHYDE	6931.5	2.33E-05	SUBSTITUTED HYDROCARBON	24240.5	3.40E-05	UNKNOWN AROMATIC	19636.5	4.23E-05		
SUBSTITUTED HYDROCARBON	10181.2	3.35E-05	SUBST. CYCLIC HYDROCARBON	5897.4	1.99E-05	UNKNOWN AROMATIC	19894.6	2.79E-05	UNKNOWN AROMATIC	19044.3	4.10E-05		
SUBSTITUTED PYRAZINE	5582.4	1.84E-05	SUBSTITUTED PYRAZINE	5247.6	1.77E-05	SUBST. CYCLIC HC	19830.2	2.78E-05	SUBSTITUTED HYDROCARBON	17610.5	3.79E-05		

TABLE 2.3.5 EXHAUST DATA FOR THE EVAPORATOR HEATER VENTS

NAMPA IDAHO FACILITY - 1992 CAMPAIGN

			STACK GAS PARAMETERS				
DATE	HEATER VENT	RUN NO.	TEMP (DEG. F)	H20 (%)	VEL (FPM)	ACTUAL FLOW (ACFM)	DRY FLOW (DSCFM)
1/14/93	A SIDE #2 THIN JUICE	ALD 1-3	207	98.6	2426	212	2.1
1/18/93	B SIDE 2ND CARB	SVOC 1	206	98.5	957	83.5	0.9
11/19/92	B SIDE 2ND CARB	SVOC 2	207	98.4	891	77.8	0.9
1/21/93	B SIDE 1ST 2ND CARB	ALD 1-3	211	98.9	830	72.5	0.6
1/22/93	B SIDE 2ND CARB	SVOC 3	207	99.1	678	59.2	0.4
1/27/93	B SIDE 2ND CARB	SVOC 4	207	99.0	903	78.8	0.6

TABLE 2.3.6 MAXIMUM HOURLY ALDEHYDE EMISSION RATES (LBS/HR) FROM THE EVAPORATOR HEATER VENTS [a]

SOURCE	ALDEHYDES [b]			
	FORMALDEHYDE (LBS/HR)	ACETALDEHYDE (LBS/HR)	ACROLEIN (LBS/HR)	CROTONALDEHYDE (LBS/HR)
A SIDE HEATER VENTS (1ST EVAPORATOR VAPORS) - 6 VENTS	5.2E-05	0.01	0.0003	4.8E-05
B SIDE HEATER VENTS (1ST EVAPORATOR VAPORS) - 6 VENTS	5.2E-05	0.01	0.0003	4.8E-05
VACUUM PAN VENTS (1ST EVAPORATOR VAPORS) - 6 VENTS	5.2E-05	0.01	0.0003	4.8E-05

a MAXIMUM ALDEHYDE EMISSION RATES ARE BASED ON AVERAGE EMISSION FACTORS AND THIN JUICE FLOW RATE OF 83,400 GAL/HOUR THROUGH THE 1ST EVAPORATORS.

b AVERAGE EMISSION FACTORS WERE CALCULATED FROM THE TEST RUNS CONDUCTED ON THE B SIDE 2ND CARBONATION TANK VENT ON 1-21-93. THE AVERAGE EMISSION FACTORS ARE EXPRESSED AS LBS OF POLLUTANT PER GAL OF THIN JUICE AND ARE AS FOLLOWS: FORMALDEHYDE 1.04E-10; ACETALDEHYDE 2.36E-8; ACROLEIN 6.75E-10; AND CROTONALDEHYDE 9.5E-11.

TABLE 2.3.7 MAXIMUM HOURLY SVOC EMISSION RATES (LBS/HR) FROM THE EVAPORATOR HEATER VENTS a & b

SOURCE	SVOC'S c		
	BENZALDEHYDE	BIS (2-ETHYL HEXYL) PHTHLATE	BENZYL ALCOHOL
A SIDE HEATER VENTS (1ST EVAPORATOR VAPORS) - 6 VENTS	0.001	0.0002	0.0002
B SIDE HEATER VENTS (1ST EVAPORATOR VAPORS) - 6 VENTS	0.001	0.0002	0.0002
PAN HEATER VENTS (1ST EVAPORATOR VAPORS) - 6 VENTS	0.001	0.0002	0.0002

a MAXIMUM SVOC EMISSION RATES ARE BASED ON AVERAGE EMISSION FACTORS AND A MAXIMUM THIN JUICE FLOW RATE OF 83,400 GAL/HR.

b AVERAGE EMISSION FACTORS WERE CALCULATED FROM THE TEST RUNS CONDUCTED ON THE B SIDE 2ND CARBONATION TANK VENTS ON 1-18-93, 1-19-93, 1-22-93 AND 1-27-93.

SECTION 3.0
PROCESS DESCRIPTION AND OPERATION

A general flow diagram of the beet sugar production process is shown in Figure 3.0. The process can be divided into 2 operations; the beet end and the sugar end. The "beet end" involves the production of thick sugar juice and includes all process equipment from the beet flumes (where beets enter the factory) through the evaporators. The Nampa facility operates 2 parallel beet end production lines, referred to as the A and B sides. The "sugar end" (A side only) involves the production of granulated sugar and molasses, and includes all process equipment after the evaporators. The tank farm (B side only) stores thick juice for processing after all the sugar beets are processed.

Stack testing was conducted on the pulp drying, carbonation and evaporation processes. The following sections briefly discuss these processes and the operation of the process equipment during the testing.

3.1 Pulp Drying

The purpose of the pulp drying process is to dry pressed pulp. Dried pulp is a highly desirable livestock feed.

The Nampa facility operates 3 pulp dryers: the north pulp dryer; the center pulp dryer; and the south pulp dryer. Each pulp dryer consists of a rotating drum and a furnace. The dryers are direct fired by pulverized coal. The dryers can also be fired by natural gas. Temperature sensors are located in the furnace, throat and the discharge end of the dryer.

Pressed pulp and varying amounts of sugar juice additives are screw conveyed into each dryer. Sugar juice additives include molasses and concentrated separator byproduct (CSB). The amount of the molasses and CSB added to the pressed pulp is dependent on customer needs. Once dried, the dried pulp is either conveyed to the pellet mills or sold in bulk.

The total amount of material added to each dryer was calculated using the total amount of dried pulp produced per hour; percent throughput to each dryer; pressed pulp moisture; dried pulp moisture; molasses characteristics; CSB characteristics; coal heating value; and coal throughput. Example calculations are provided in Appendix C.

Emissions from the north pulp dryer are controlled by a cyclone and impingement type wet scrubber in series. Both the south and center dryer emissions are controlled by a parallel pair of cyclones and impingement type scrubbers in series. When the dryer stacks were tested, the pressure drop across the scrubber and scrubbing liquid flow rate was recorded.

A summary of the process data for each dryer is shown in Table 3.1.1. The table provides the average operations for all testing. Because the north pulp dryer scrubber was modified during the testing, 2 sets of process data are provided. Appendix C includes all process data information.

3.2 Carbonation

The 1st and 2nd carbonation tanks are used to precipitate non-sugar substances from raw juice. Prior to entering the carbonation tanks, milk of lime ($Ca(OH)_2$) is added to the raw juice. The limed raw juice is transferred into the 1st carbonation tank where CO_2 is added. The milk of lime combines with the CO_2 to form a precipitate of calcium carbonate ($CaCO_3$) and non-sugars. To ensure that all milk of lime has reacted, the juice is transferred from the 1st carbonation tank to the second (2nd) carbonation tank where CO_2 is also added.

The following operating data for the B side 1st and 2nd carbonation tanks are averages for all test runs:

Raw Juice Flow	(GPM)	1,274
	(GPH)	76,955
Juice Temperature	(°F)	191
Juice pH		9.7
Juice CaO	(%)	1.0
Milk of Lime	(%CaO)	18
$Ca(OH)_2$ Feed Rate	(GPM)	0
Kiln Gas CO_2	(%)	29.1
O_2	(%)	2.9
CO_2	(%)	0.4

3.3 Evaporator

Sugar juices are heated at various stages of the juice purification process using heaters. Thermoenergy in the form of steam is supplied to the heaters from the evaporators.

Evaporators are used to drive off water from the beet juices. At Nampa, both the A and B sides operate 5 effect evaporator systems. Each evaporator consists of a calandria and dome. Steam from the factory boilers supply heat to 1st evaporator. Water vapor driven off from the juices in the 1st evaporator supplies the heat for the 2nd effect. This scheme is continued for each successive effect.

The pressure and temperature vary from one evaporator effect to the next. The highest pressures and temperatures occur in the 1st evaporator. The pressure and temperature decrease through each subsequent effect. The 5th effect operates under a vacuum.

Non-condensible gases (air, carbon dioxide, ammonia, and oxygen) and water vapor from the 1st three evaporators are exhausted to the heaters. Non-condensible gases must be vented to allow for efficient heating within the evaporators. Non-condensible gases and water vapor are vented through heaters to the atmosphere through pipes with 1/8" to 3/8" orifices.

The average operating data for the A side 1st evaporator and the B side 1st evaporator data is as follows:

		A SIDE	B SIDE
Thin Juice Flow	(GPM)	1,233	1,212
Thin Juice Flow	(GPH)	74,000	72,703
Evaporator Temp	(°F)	245	253
Evaporator Pressure			
♦ Chest	(PSI)	27.7	27.1
♦ Dome	(PSI)	13.8	14.2
Steam Feed Rate	(lb/hr)	5,152	7,979

3.4 Biocide Additions

Biocides are added at various points of the beet end operations to control bacterial growth. Biocides are typically added at the cossette mixer, diffusion tower, and press water from the pulp presses.

The biocides used during the 1992 campaign were formaldehyde, ammonium bisulfite, and Busan 1007. Brocide 900 was not used during 1992 campaign.

The formaldehyde biocide consists of 37% formaldehyde and 21% methanol. The usage of formaldehyde during the 1992 campaign was significantly reduced compared to previous campaigns. During the testing, only one addition occurred. On October 14, 1993, 10,500 lbs of formaldehyde was added to the A and B side mixers, towers and press water. Formaldehyde was not used for the remainder of the testing.

Both ammonium bisulfite solution and Busan 1007 were continuously added throughout the 1992 campaign. Since these biocides were continuously added at a constant rate, hourly records were not maintained during the testing. Ammonium bisulfite solution (67% NH_4HSO_3) was added to the A and B side cossette mixers and diffusion towers. The amount of ammonium bisulfite added to each side was 20.5 gallons per hour (238 lbs/hour). Busan 1007 is a FDA approved biocide consisting of 14.7% cyanodithiomido-carbonate and 23.3% potassium-N-methyldithiocarbamate. Busan 1007 was added to the diffusion towers via press water at a concentration of 20 ppm. The average amount of Busan added to each side was 2.0 gallons per hour (20.4 lbs/hour).

BEET SUGAR PROCESS

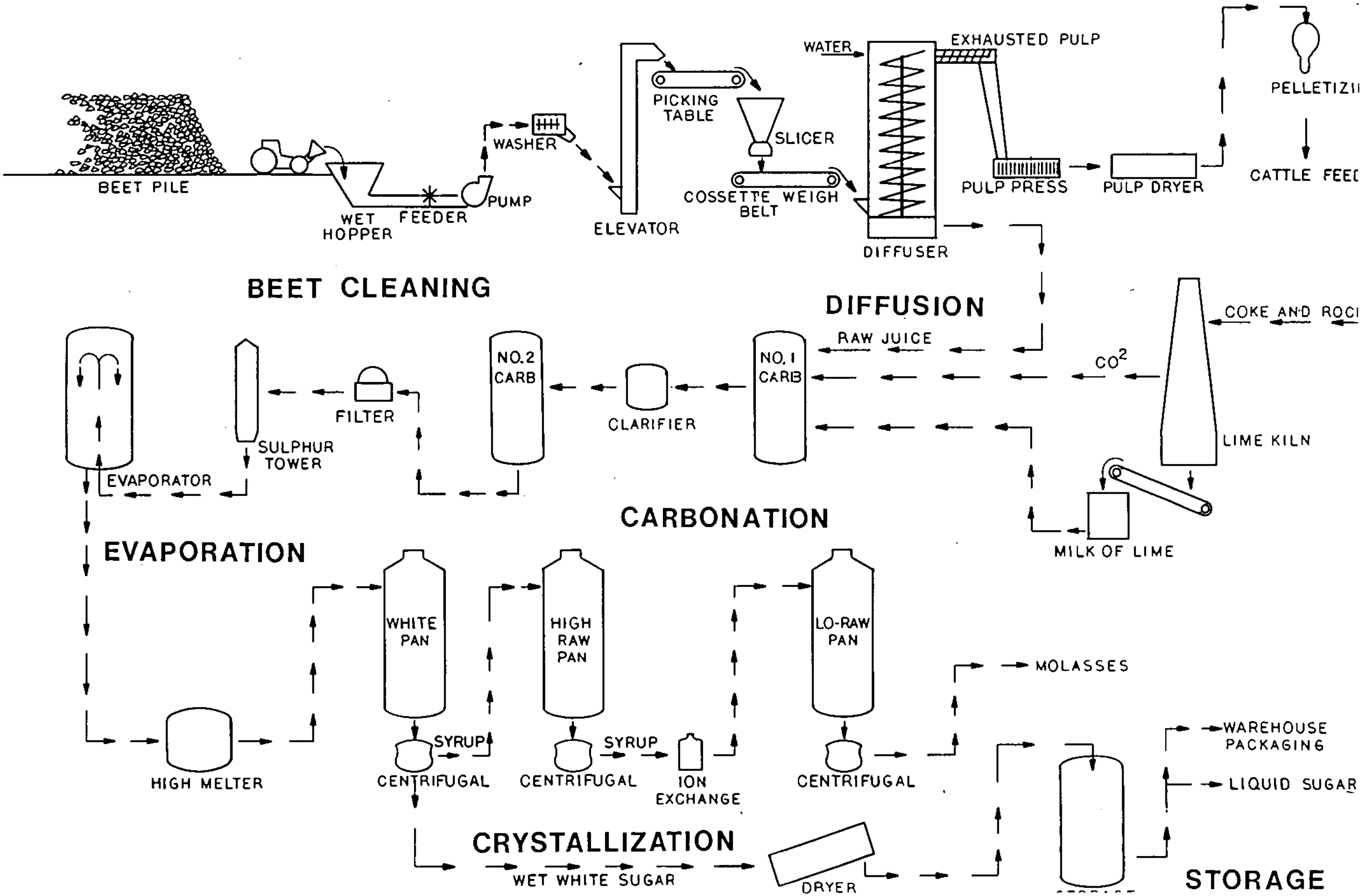

FIGURE 3.0

TABLE 3.1.1 SUMMARY OF THE PROCESS DATA FOR THE PULP DRYERS
NAMPA IDAHO FACILITY - 1992 CAMPAIGN

DRYER	TOTAL THROUGHPUT RATE (T/H) [a]	COAL (T/H) [b]	DRYER TEMPERATURES		SCRUBBER OPERATION	
			THROAT (DEG. F)	DISCHARGE (DEG. F)	PRES. DROP (IN H2O)	WATER FLOW (GPM)
NORTH [c]	20.1	1.6	1,616	288	1.0	199
NORTH [d]	18.3	1.5	1,640	282	2.0	243
CENTER	51.4	4.6	1,769	297	4.0	162
SOUTH	44.0	5.3	1,367	253	4.4	138

a TOTAL THROUGHPUT RATE TO EACH DRYER WAS BACK CALCULATED BASED ON: THE TOTAL AMOUNT OF DRIED PULP PRODUCED PER HOUR; PULP MOISTURES; GRAVIMETRIC ANALYSIS OF MOLASSES, CSB, DRYER HEAT INPUT AND COAL HEATING VALUE.

b THE AVERAGE ASH AND SULFUR CONTENTS OF THE COAL WERE 5.7% AND 0.72%, RESPECTIVELY.

c PROCESS DATA PRIOR TO THE 12-16-92 MODIFICATION TO THE INTERNAL SKIRT OF THE SCRUBBER.

d PROCESS DATA AFTER THE 12-16-92 MODIFICATION TO THE INTERNAL SKIRT TO THE SCRUBBER.

SECTION 4.0
SAMPLING AND ANALYTICAL PROCEDURES

Sampling and analytical procedures for the particulate, aldehyde, and SVOC testing are provided in Appendix F. Appendix F consists of the original stack Sampling Protocol which TASCO and the Department agreed to entitled "Protocol to Perform Sampling and Analytical Testing Program for the Amalgamated Sugar Company in Nampa, Idaho". Modifications to the protocol and analytical procedures are also provided in Appendix F.

4.1 Sampling Location are Traverse Points

Diagrams of all stacks which were sampled are provided in Figures 4.1 through 4.8. Traverse point locations were determined according to EPA Method 1.

4.2 Flue Gas Measurements

The procedures outlined in EPA Methods 2 through 4 were employed for flue gas measurements. Stack gas velocity and volumetric flows were determined according to the procedures in EPA Method 2. Carbon dioxide (%CO_2), carbon monoxide (%CO) oxygen (%O_2) and dry molecular weight of the flue gases were determined using EPA Method 3. The moisture content of the flue gases was determined using EPA Method 4.

4.3 Alignment Approach

The alignment approach was employed for particulate and SVOC testing conducted on the pulp dryer stacks. This method was required due to the unacceptable cyclonic flows (see EPA Method 1 for requirements) within these stacks.

4.4 Particulates

Particulate sampling, recovery, and analysis was conducted according to EPA Method 5 and Draft EPA Method 202 procedures.

4.5 Aldehydes

Two similar aldehyde sampling methods were used for the testing at the Nampa facility. The first method was Modified Method TO5 which is described in Section F.1 of Appendix F. The sampling equipment employed for this method included a heated teflon probe, midget impingers and a 1/2 horsepower pump. The second aldehyde sampling method was a slight variation of the Modified Method TO5 procedures. The sampling equipment for this method included a EPA Method 5 sampling train. The primary difference between each method is the size of impingers which contain the DNPH and isoctane. Midget impingers are used for the first testing method. Standard impingers were used for the second testing method.

For both testing methods, DNPH and isoctane were added in to three separate impingers. Each midget impinger contained 10 milliliters (mls) each of DNPH and 10 mls of isoctane. Each standard impingers contained 50 milliliters (mls) of DNPH and 50 mls of isoctane. Prior to laboratory analysis, the contents of impingers #1 and impingers #2 were combined. The combined sample and the contents of impinger 3 were each analyzed separately for aldehydes. Each sample was analyzed for formaldehyde, acetaldehyde, acrolein, and crotonaldehyde by Triangle laboratories of Columbus Incorporated.

The first aldehyde sampling method (midget impingers) was used for the initial testing on the north pulp dryer stack (Run No.'s ALD 3 through ALD 5) and the single test run conducted on the B Side 2nd Carbonation tank vent. The second aldehyde sampling method (standard impingers) was employed for all other sampling.

Details of the aldehyde sampling using the EPA Method 5 sampling train and standard impingers is as follows:

- Probe nozzles were not used during any of the aldehyde sampling.

- A heated stainless steel probe was employed for the aldehyde tests conducted the north pulp dryer stack (Run No.'s 6 through 8) and heater vents (A and B Side).

- A heated glass probe was employed for the aldehyde testing conducted on the center pulp dryer was stack.

- A heated filter was used for the test Run No.'s 6 through 8 on the north pulp dryer.

- After each run a charcoal filter was attached to the probe, and the sampling train was purged for 5 minutes.

4.6 Semi-Volatile Organic Compounds (SVOC's)

SVOC testing on north pulp dryer stack and the B side 1st carbonation tank vent were sampled according to the procedures in SW846 Method 0010. SVOC sample extraction and analysis procedures were prepared by Mr. Hani Karam of Triangle Laboratories. All SVOC extracts from a test run were combined into a single sample. Each sample was analyzed according to the procedures in Method 8170 for the following SVOC compounds: Method 8270 List of SVOC Compounds; benzaldehyde and pyridine. In addition, the 10 highest peaks were tentatively identified and semi-quantitated.

The SW846 Method 0010 procedures were slightly modified for the B side heater vent. Due to the extremely high moisture contents, sampling was conducted non-isokinetically. A 5 dscf sample was collected for the 2nd test run. A sample volume of just over 1 dscf was collected for each of the other 3 test runs. Due to the significant quantities of water collected during the sampling of the heater vent, Triangle Labs analyzed the knockout impinger water separately from the XAD II resin and rinses. These samples were analyzed for the same SVOC compounds as previously described.

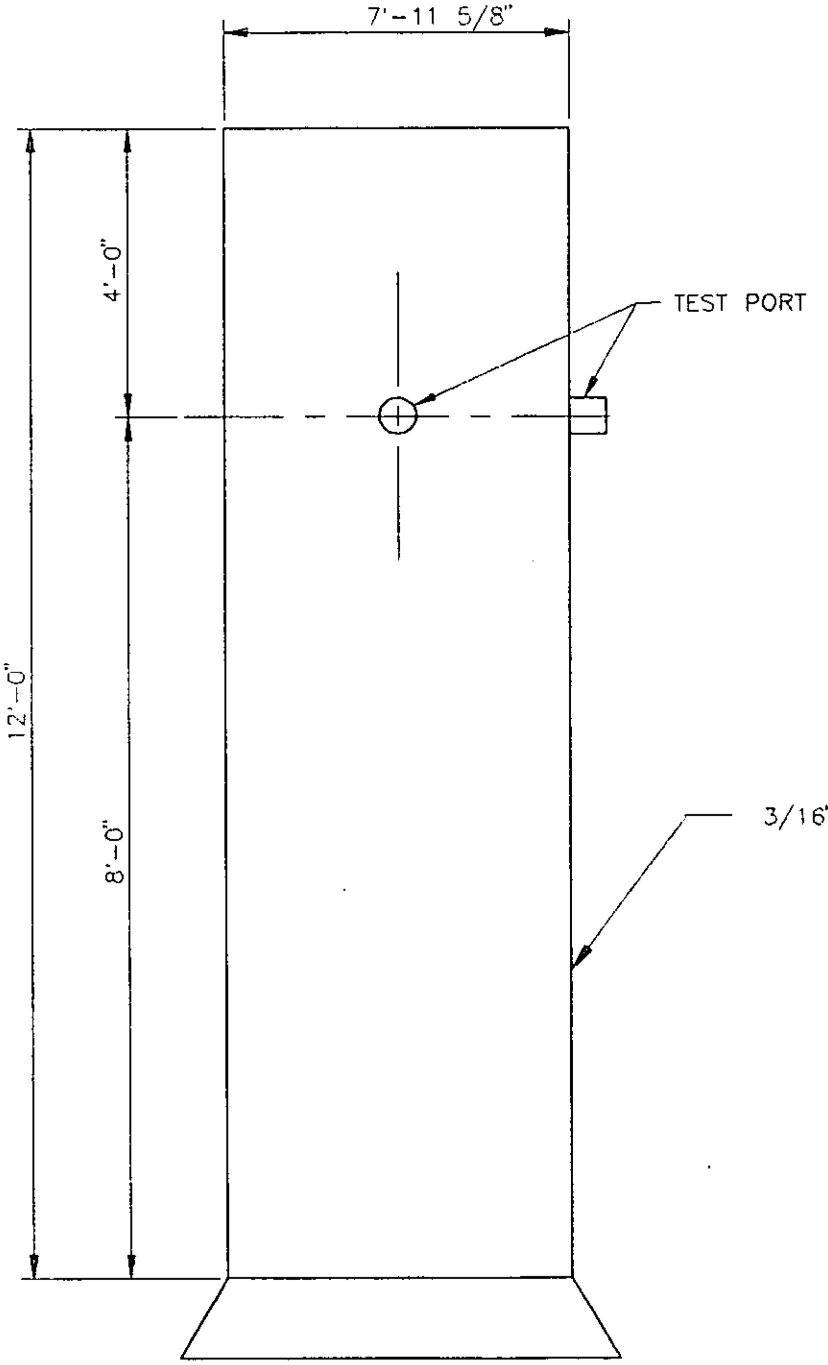

FIG 4.1 NORTH PULP DRYER STACK SAMPLING TEST PORT LOCATIONS

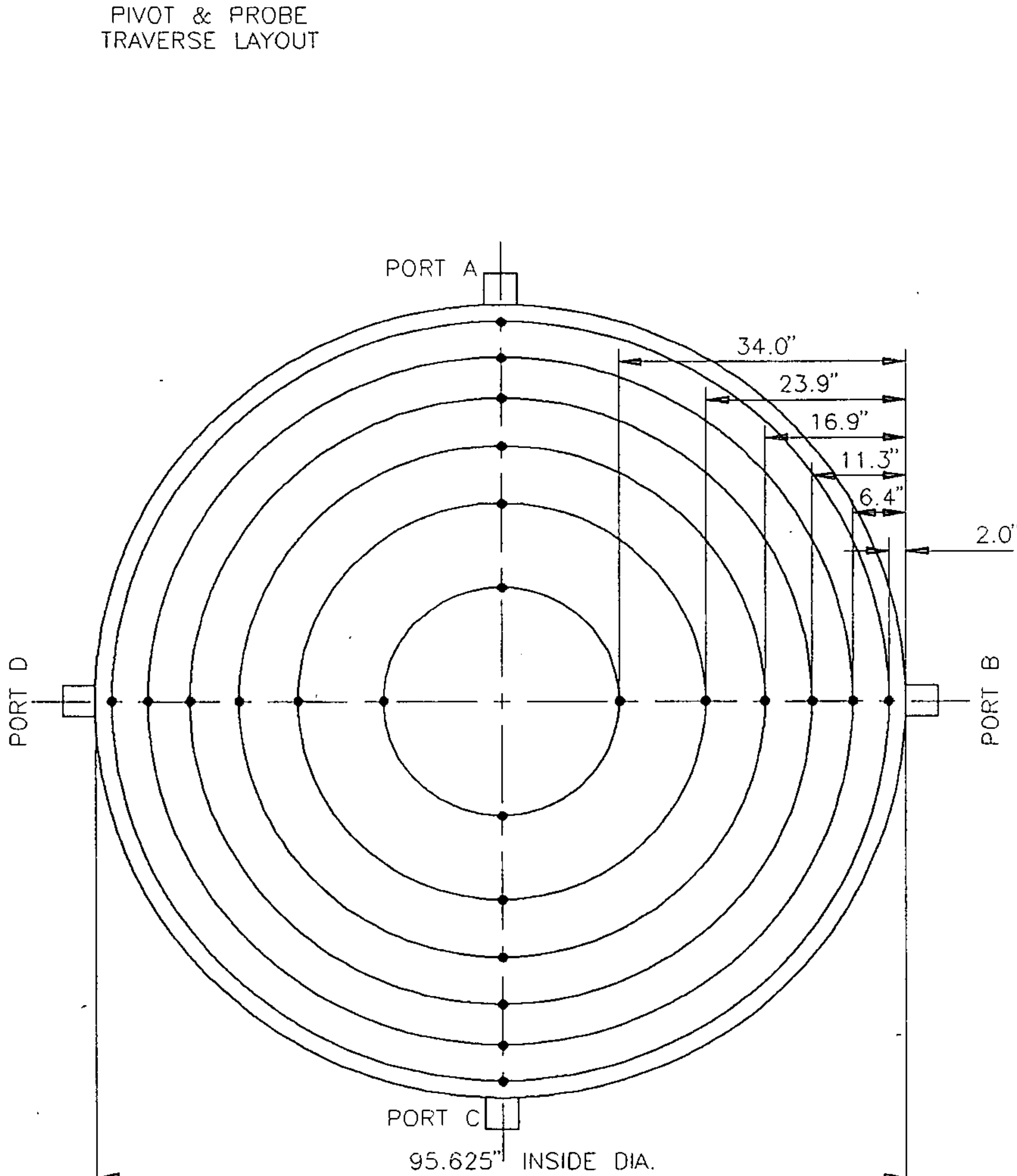

FIG 4.2 NORTH PULP DRYER STACK TRAVERSE POINT LOCATION

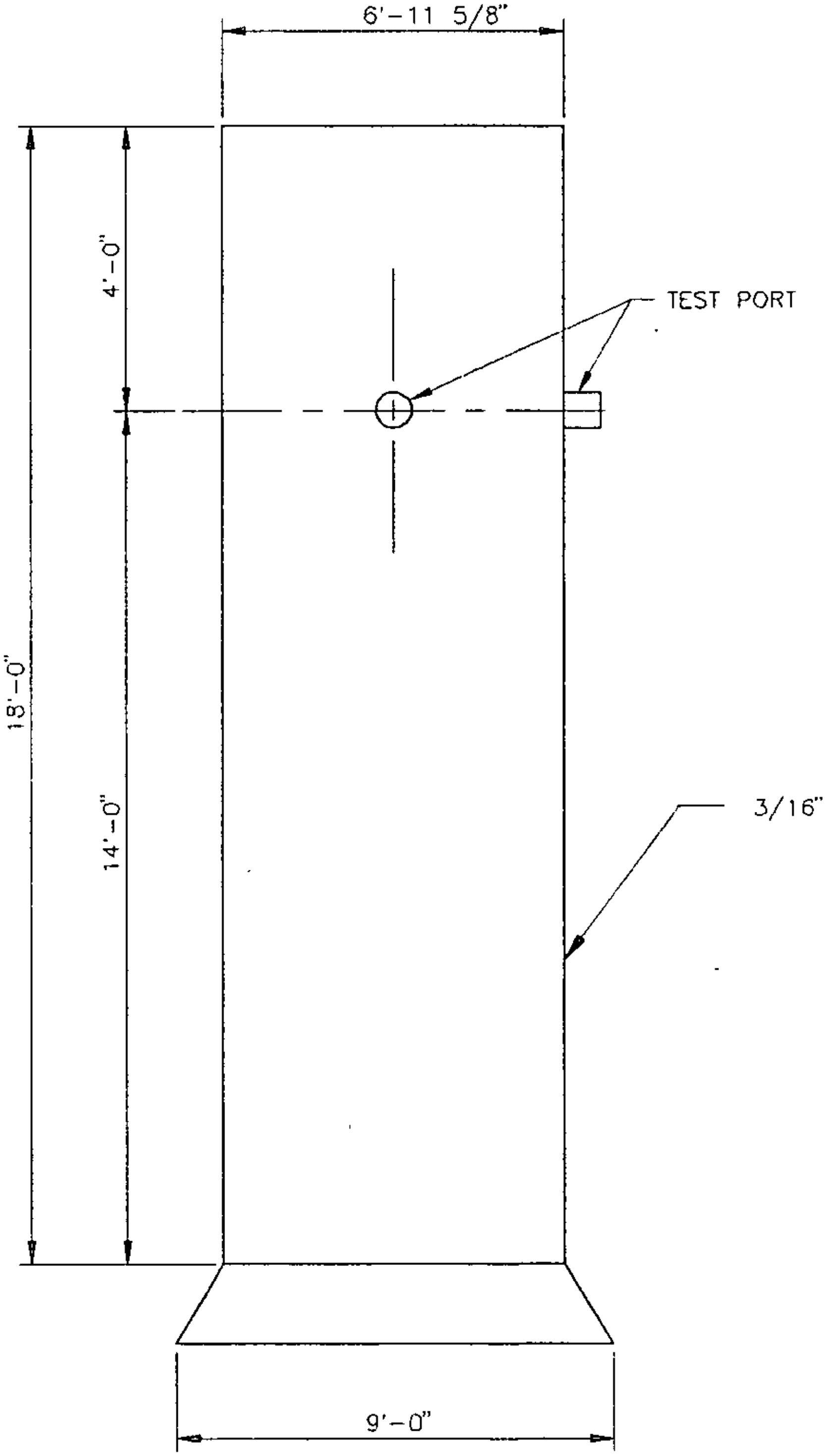

FIG 4.3 CENTER PULP DRYER EAST AND WEST STACKS
TEST PORT LOCATIONS

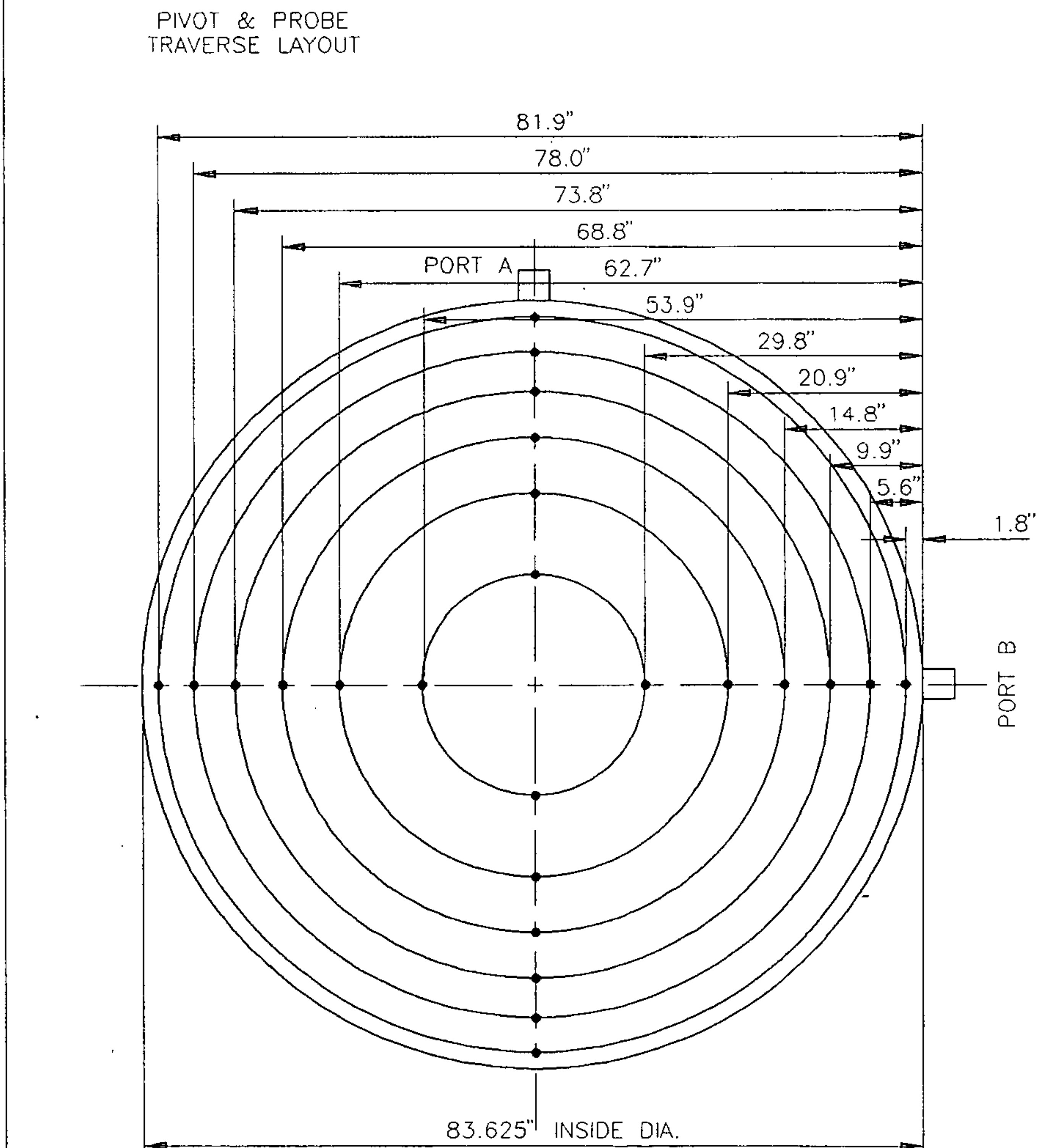

FIG 4.4 CENTER PULP DRYER EAST AND WEST STACKS
TRAVERSE POINT LOCATIONS

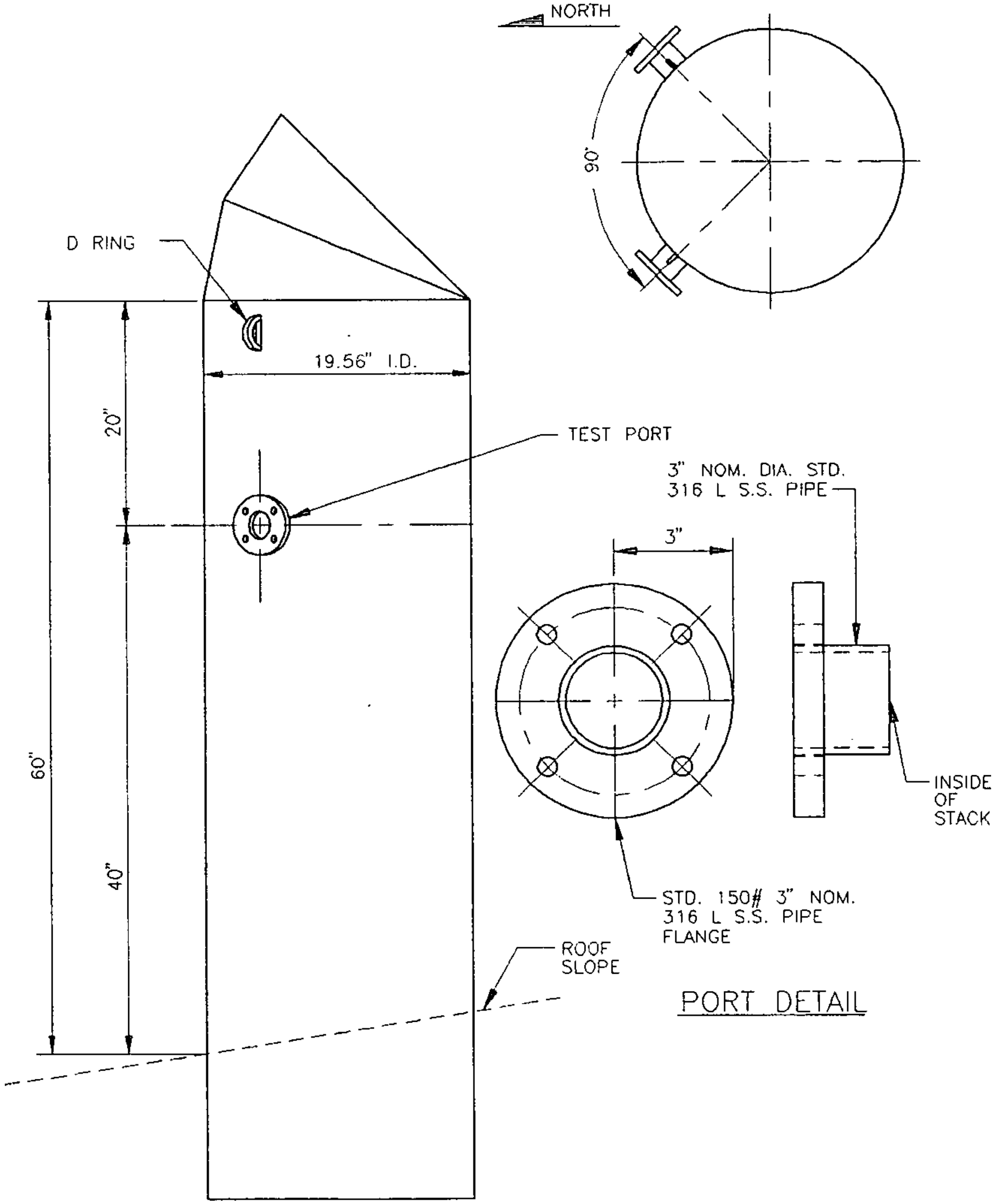

FIG 4.5 B-SIDE FIRST CARBONATION VENT
TEST PORT LOCATIONS

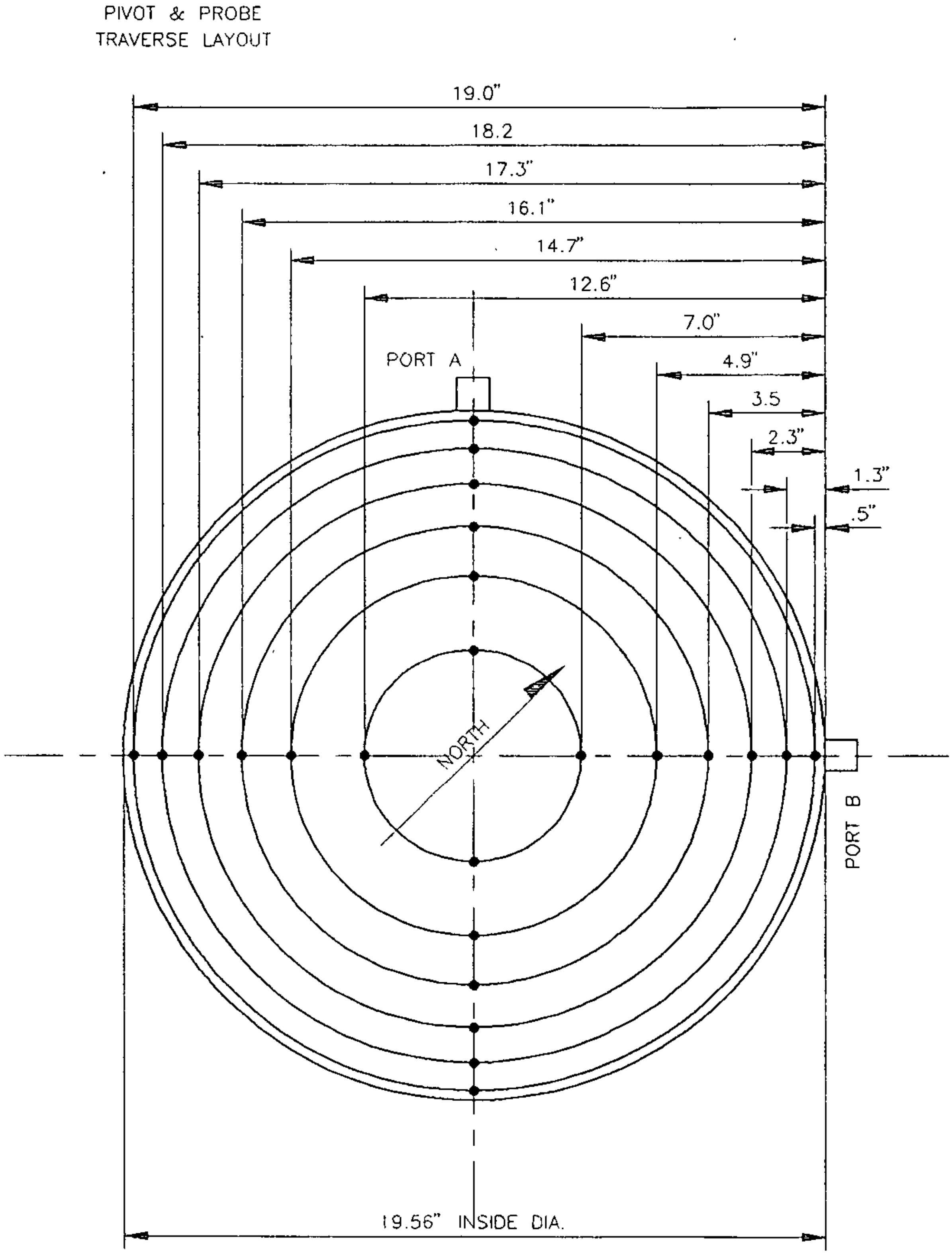

FIG 4.6 B-SIDE FIRST CARBONATION VENT
TRAVERSE POINT LOCATIONS

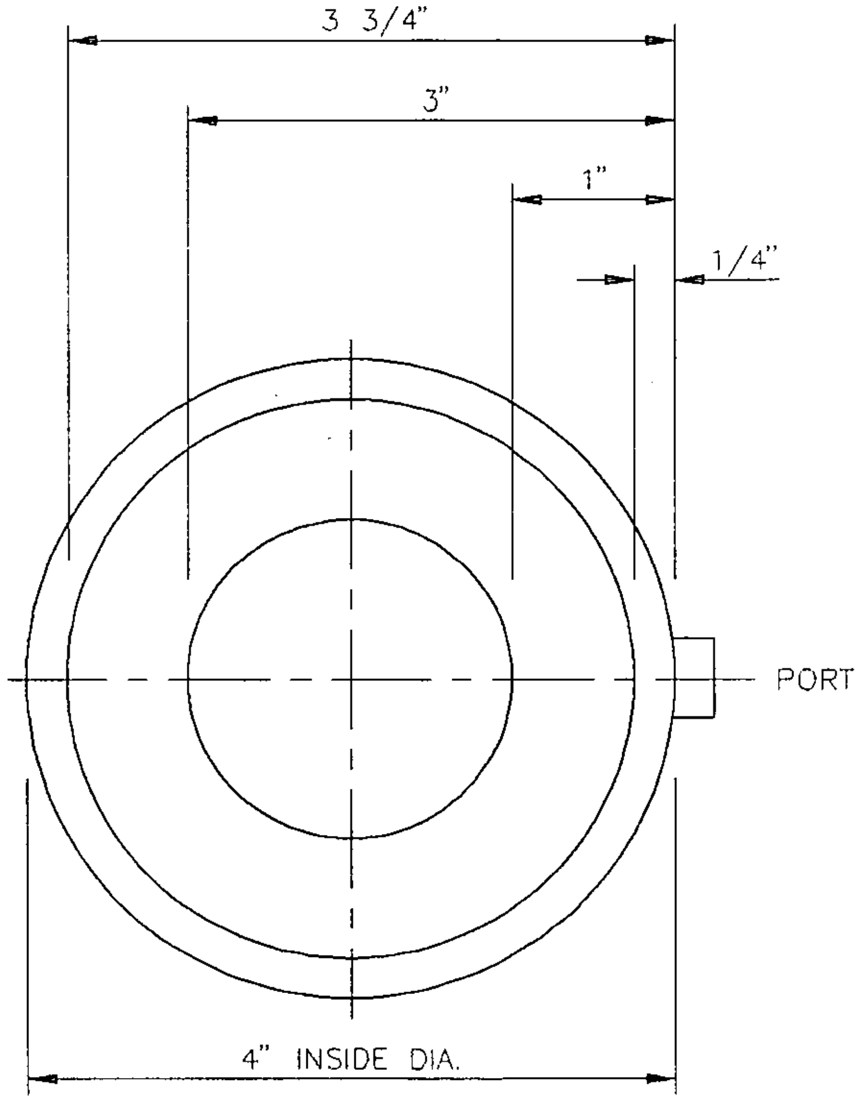

FIG 4.7 STACK EXTENSION TRAVERSE POINT LOCATIONS
FOR THE #1 AND #2 EVAPORATOR HEATER VENTS

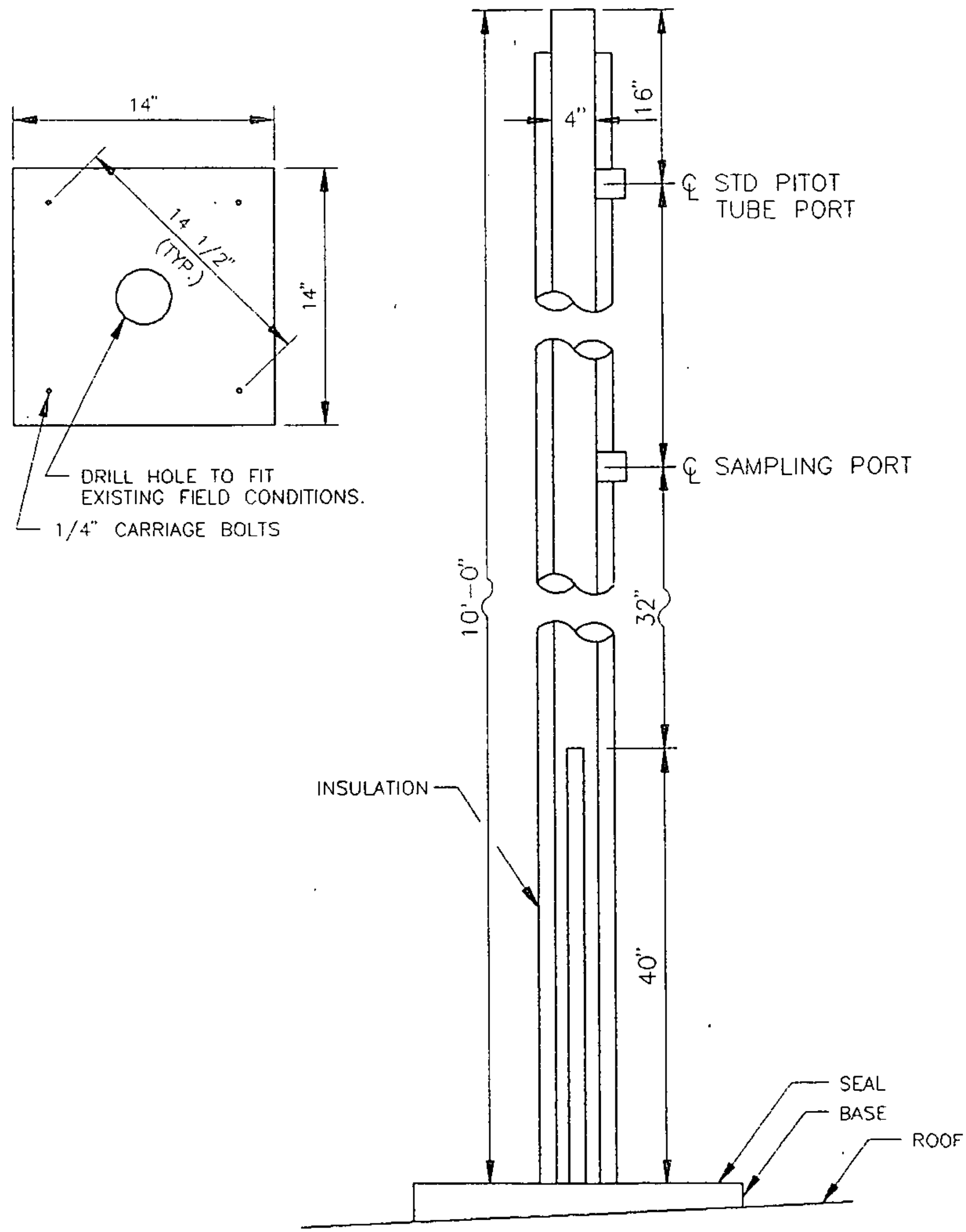

FIG 4.8 STACK EXTENSION DIMENSIONS AND TEST PORT LOCATIONS FOR THE #1 AND #2 EVAPORATOR HEATER VENTS