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AP42 Section:	9.10.1.2
Background Chapter	4
Reference:	5
Title:	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.

APPENDIX E

REPORT EXCERPTS FROM REFERENCE 5

(The Amalgamated Sugar Company, May 14, 1993)

***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



THE AMALGAMATED SUGAR COMPANY

P.O. BOX 87 • NAMPA, IDAHO 83653 • PHONE (208) 466-3541

September 7, 1994

Mr. Tom Lapp
MRI, Suite 350
401 Harrison Oaks Blvd.
Cary, NC 27513

RE: Particulate, Aldehyde, and Semi-Volatile Organic Compound (SVOC)
Emission Testing Results

Dear Mr. Lapp:

In response to your request, attached is a summary of the report entitled "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 stack tests were approved by the Idaho Division of Environmental Quality. The stack tests were conducted during the 1992 beet processing campaign at The Amalgamated Sugar Company facility in Nampa, Idaho.

The stack testing results indicate that particulate emission concentrations varied from each pulp dryer. According to the stack testing results, the two scrubbers on the south pulp dryer had the lowest emissions, the two scrubbers on the center pulp dryer had the second lowest emissions, and the north pulp dryer had the highest emissions. One of the primary factors effecting particulate emissions is the design of the impingement type scrubbers. During the testing, the following were the differences in the design of the pulp dryer scrubbers:

- 1) South Pulp Dryer Scrubbers - Water spray system; highest impingement velocities of gases entering the scrubber; level controls on the scrubber water tub; pressure drop ~ 4 in. H₂O.
- 2) Center Pulp Dryer Scrubbers - No water sprays; lower impingement velocities than south pulp dryer scrubbers; level controls on the scrubber water tub; pressure drop ~ 4 in. H₂O.

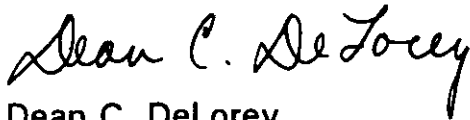
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3) North Pulp Dryer Scrubber - Water sprays; lower impingement velocities than south pulp dryer scrubbers; no automatic level controls; pressure drop ~ 2 in. H₂O.

Since completing these tests in 1992, the North Pulp Dryer Scrubber has been rebuilt and provides performance comparable to the South Pulp Dryer Scrubbers.

If you have any questions, feel free to contact either Edward G. Bulgin, Corporate Chief Engineer, or me at 208-466-3541.

Sincerely,



Dean C. DeLorey
Corporate Environmental Engineer

Attachment

DCD:ce

cc: George Hobbs
John Lemke
Ed Bulgin

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.

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 ($\mu\text{g}/\text{m}^3$) 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 TASCOT 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% H₂O), 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, isooctane from the first 2 impingers volatilized 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

DATE	SCRUBBER	RUN NO.	DRYER INPUT RATE (T/HR)	STACK GAS PARAMETERS					PARTICULATE EMISSIONS					SCRUBBER OPERATION	
				TEMP. (DEG. F)	H2O (%)	VELOCITY (FPM)	CYCLE ANGLE (DEG.)	ACTUAL FLOW (ACFM)	STD. FLOW (DSCFM)	FRONT HALF		BACK HALF		DELTA P (IN H2O)	H2O FLOW (GPM)
										GR/DSCF	LB/HR	LBS/TON	GR/DSCF	LB/HR	
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
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
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
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
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
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
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
AVG			19.3	189	39.4	653	55	32573	14782	0.2293	28.1	1.51	0.1168	14.7	0.9
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
12/28/92	N	15	21.9	187	41	957	42	47743	20819	0.2362	42.1	1.92	0.1179	21	1
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
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
AVG ^a			18.5	159	30.7	629	44	27141	17058	0.0811	11.6	0.63	0.0853	12.5	1.7

^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 (FALL 92) - RUN NOS. ALD 3-5

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)
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	5.23 5.23E-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	5.5E-03 4.39	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

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

RUN NO'S.	SVOC6			SVOC7			SVOC8		
	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)	(lbs/hr)
	BENZOIC ACID	635.83	4.31E-02	BENZOIC ACID	683.90	4.73E-02	BENZOIC ACID	721.15	5.05E-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
	BENZALDEHYDE	440.78	2.22E-02	BENZALDEHYDE	422.50	2.92E-02	BENZALDEHYDE	431.52	3.02E-02
	PHENOL	190.24	9.58E-03						
	4-METHYLPHENOL	44.69	2.25E-03	4-METHYLPHENOL	18.85	1.30E-03	4-METHYLPHENOL	25.95	1.82E-03
	NAPHTHALENE	23.81	1.20E-03	NAPHTHALENE	20.97	1.45E-03	NAPHTHALENE	18.60	1.30E-03
				4-NITROPHENOL	29.41	2.03E-03	4-NITROPHENOL	23.04	1.61E-03
	2-NITROPHENOL	25.90	1.30E-03	2-NITROPHENOL	24.44	1.69E-03			
	BENZYL ALCOHOL	27.42	1.38E-03				BENZYL ALCOHOL	19.97	1.40E-03
	2-METHYLPHENOL	9.86	4.96E-04	2-METHYLPHENOL	4.29	2.97E-04	2-METHYLPHENOL	6.19	4.34E-04
	2-METHYLNAPHTHALENE	5.75	2.89E-04	2-METHYLNAPHTHALENE	4.07	2.82E-04	2-METHYLNAPHTHALENE	3.74	2.62E-04
	NITROBENZENE	16.43	8.27E-04						
	2,4-DIMETHYLPHENOL	15.95	8.03E-04						
	PHENANTHRENE	7.87	3.96E-04				PHENANTHRENE	2.04	1.43E-04
	DI-N-BUTYLPHTHALATE	10.33	5.20E-04						
	BUTYLBENZYLPHTHALATE	10.29	5.18E-04						
	DIBENZOFURAN	5.09	2.56E-04	DIBENZOFURAN	2.20	1.52E-04			
	FLUORANTHRENE	5.73	2.88E-04						
	ACENAPHTHYLENE	2.45	1.23E-04	ACENAPHTHYLENE	1.85	1.28E-04			
	ANTHRACENE	4.76	2.40E-04						
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

DATE	SCRUBBER	RUN NO.	DRYER INPUT RATE (T/HR)	STACK GAS PARAMETERS						PARTICULATE EMISSIONS						SCRUBBER OPERATIO	
				TEMP. (DEG. F)	H2O (%)	VELOCITY (FPM)	CYCLE ANGLE (DEG.)	ACTUAL FLOW (ACFM)	STD. FLOW (D8CFM)	FRONT HALF			BACK HALF		DELTA P (IN H2O)	H2O FLOW (GPM)	
										GR/DSCF	LB/HR	LB9/TON	GR/D8CF	LB/HR			
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	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

DATE	SCRUBBER	RUN NO.	DRYER INPUT RATE (T/HR)	STACK GAS PARAMETERS					PARTICULATE EMISSIONS						SCRUBBER OPERATION		
				TEMP. (DEG. F)	H2O (%)	VELOCITY (FPM)	CYCLE ANGLE (DEG.)	ACTUAL FLOW (ACFM)	STD. FLOW (DSCFM)	FRONT HALF			BACK HALF			DELTA P (IN H2O)	H2O FLOW (GPM)
										GR/DSCF	LB/HR	LBS/TON	GR/DSCF	LB/HR	GR/DSCF		
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 NO'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)			
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

DATE	SCRUBBER	RUN NO.	DRYER INPUT RATE (T/HR)	STACK GAS PARAMETERS					PARTICULATE EMISSIONS						SCRUBBER OPERATION	
				TEMP. (DEG. F)	H2O (%)	VELOCITY (FPM)	CYCLE ANGLE (DEG.)	ACTUAL FLOW (ACFM)	STD. FLOW (DSCFM)	FRONT HALF		BACK HALF		DELTA P (IN H2O)	H2O FLOW (GPM)	
										GR/DSCF	LB/HR	LBS/TON	GR/DSCF			LB/HR
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			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 2.2.1 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	252.08	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	9.780E-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	3.998E-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	SUBSTITUTED 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		
	SUBSTITUTED 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			CONCENTRATION (ug/m3)	EMISSION RATE (lbs/hr)	EMISSION FACTOR (lbs/gal)		
		BLANK (ug)	IMP 1 & 2 (ug)	IMP 3 (ug)					TOTAL (ug)
FORMALDEHYDE	0.0079	1.62	5.15	1.54	271.81	1.592E-08	1.115E-03	1.555E-08	
ACETALDEHYDE	0.0131	2.77	945.57	11.34	74955.48	4.390E-06	3.074E-01	4.287E-06	
ACROLEIN	0.0046	2.13	52.99	3.42	4108.74	2.406E-07	1.685E-02	2.350E-07	
CROTONALDEHYDE	0.0295	0.83	7.38	0.83	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

DATE	CARB TANK VENT	RUN NO.	STACK GAS PARAMETERS				
			TEMP (DEG. F)	H2O (%)	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 2.3.1 SUMMARY OF THE A-SIDE #2 THIN JUICE HEATER VENT ALDEHYDE EMISSION TESTING RESULTS - RUN NO'S. ALD1 - ALD3

SOURCE	DATE	TEST RUN NO.	FORMALDEHYDE		ACETALDEHYDE		ACROLEIN		CROTONALDEHYDE	
			(lbs/hr)	(ug/m ³)	(lbs/gal)	(ug/m ³)	(lbs/hr)	(ug/m ³)	(lbs/gal)	(ug/m ³)
A HTR	1/13/93	ALD1	2.11E-04	26886	2.83E-09	1.06E-02	1.42E-07	1.93E-05	2.58E-10	2.21E-05
A HTR	1/13/93	ALD2	5.79E-05	7369	7.88E-10	8.64E-03	1.18E-07	8.94E-06	1.22E-10	1.29E-05
A HTR	1/13/93	ALD3	1.87E-05	2374	2.53E-10	4.55E-03	6.17E-08	4.76E-06	6.45E-11	7.22E-06
		AVG	9.59E-05	12203	1.29E-09	7.94E-03	1.07E-07	1.10E-05	1.48E-10	1.41E-05

Run 1
74560
74648
74806
74660
74600

Run 2
73477 }
73220 } 73400
73278 }
73714 }

Run 3
73913 }
73744 } 73800
73798 }
73824 }

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

SOURCE	DATE	TEST RUN NO.	FORMALDEHYDE			ACETALDEHYDE			ACROLEIN			CROTONALDEHYDE		
			(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

Prod. Rates - Backcalculated 12/5/94 (MRI)

$$\text{Run 1 } \frac{(73793 + 73414 + 73325 + 73388)}{4} = 73480 \approx 73500$$

$$\text{Run 2 } \frac{(73782 + 73684 + 73771 + 73699)}{4} \approx 73700$$

$$\text{Run 3 } \frac{(73059 + 73305 + 73481 + 73375)}{4} \approx 73300$$

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		
	CONC. (ug/m3)	EMISSION RATE (lb/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lb/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lb/hr)	COMPOUND	CONC. (ug/m3)	EMISSION RATE (lb/hr)	AVERAGE (ug/m3)
BENZALDEHYDE	80517.0	2.63E-04	BENZALDEHYDE	49269.9	1.66E-04	BENZALDEHYDE	48757.4	6.88E-05	BENZALDEHYDE	74728.6	1.81E-04	83588.2
BIS(2-ETHYLHEXYL)PHTHALATE	1801.9	5.83E-08	BIS(2-ETHYLHEXYL)PHTHALATE	8805.1	2.29E-05	BIS(2-ETHYLHEXYL)PHTHALATE	44883.2	8.30E-05	BIS(2-ETHYLHEXYL)PHTHALATE	8245.8	1.77E-05	15434.0
BENZYL ALCOHOL	2510.6	8.27E-08	BENZYL ALCOHOL	1289.9	4.28E-08	BENZYL ALCOHOL			BENZYL ALCOHOL	2728.8	5.87E-08	1827.6
NAPHTHALENE	749.3	2.47E-08	NAPHTHALENE	354.7	1.18E-08	NAPHTHALENE			NAPHTHALENE	1844.3	3.87E-08	737.1
4-METHYLPHENOL	2214.8	7.29E-08										553.7
PHENANTHRENE	320.9	1.08E-08	PHENANTHRENE	285.3	8.81E-07	PHENANTHRENE	357.3	5.01E-07	PHENANTHRENE	1073.5	2.31E-08	508.3
			ISOPHORONE	1304.1	4.38E-08							328.0
			BENZOLIC ACID	1133.43	3.82E-08							283.4
			PHENOL	352.2	1.18E-08	PHENOL	1825.0	2.56E-08	DIETHYLPHTHALATE	1640.4	3.53E-08	544.3
			PYRIDINE	528.1	1.78E-08				PYRIDINE	784.2	1.88E-08	410.1
						DIBENZOFURAN	85.3	1.34E-07				328.1
												23.8
TENTATIVELY IDENTIFIED COMPOUNDS												
TRIMETHYL PYRAZINE	284248.3	9.89E-04	UNKNOWN AROMATIC HC	30898.2	1.04E-04	ALKYL PYRAZINE	14550.7	2.04E-05	TRIMETHYL PYRAZINE (SAT)	83838.1	1.81E-04	
UNKNOWN AROMATIC HC	147878.5	4.88E-04	DIMETHYL PYRAZINE	18161.8	5.44E-05	UNKNOWN AROMATIC HC	11041.8	1.55E-05	DIMETHYL PYRAZINE (SAT)	65628.9	1.42E-04	
DIMETHYL PYRAZINE	27780.3	9.15E-05	DIMETHYL PYRAZINE	15288.5	5.18E-05	UNKNOWN AROMATIC HC (SAT)	11041.8	1.55E-05	UNKNOWN AROMATIC HC	34784.8	7.48E-05	
METHYL PYRAZINE	11853.5	3.80E-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	10884.4	3.59E-05	UNKNOWN AROMATIC HC	8763.8	2.28E-05	ALKYL PYRAZINE	7585.1	1.08E-05	METHYL PYRAZINE	4800.0	1.03E-05	
ALKYL PYRAZINE	3884.3	1.21E-05	TETRAMETHYL PYRAZINE	4003.8	1.35E-05	TRIMETHYL PYRAZINE (SAT)	5311.7	7.45E-08	UNKNOWN AROMATIC HC	4178.7	8.99E-08	
ALKYL PYRAZINE	2705.2	8.81E-08	ALKYL PYRAZINE	3640.5	1.23E-05	DIMETHYL PYRAZINE (SAT)	4281.5	6.01E-08	UNKNOWN CYCLIC HC	3085.7	8.64E-08	
ALKYL PYRAZINE	2410.0	7.84E-08	UNKNOWN AROMATIC HC	2131.2	7.18E-08	SUBSTITUTED PYRAZINE (SAT)	2883.8	4.20E-08	DIMETHYL SULFOXIDE	2805.2	8.04E-08	
UNKNOWN AROMATIC HC	1686.9	5.59E-08	UNKNOWN AROMATIC HC	1725.9	5.81E-08	ALKYL PYRAZINE	1223.3	1.72E-06	UNKNOWN AROMATIC HC	2244.2	4.83E-08	
UNKNOWN AROMATIC HC	1573.9	5.18E-08	ALKYL PYRAZINE	1397.5	4.71E-08	UNKNOWN AROMATIC HC	811.7	8.58E-07	ALKYL PYRAZINE	2181.8	4.68E-08	

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		AVERAGE	
	CONC. [ug/m3]	EMISSION RATE [lbs/hr]	CONC. [ug/m3]	EMISSION RATE [lbs/hr]	CONC. [ug/m3]	EMISSION RATE [lbs/hr]	CONC. [ug/m3]	EMISSION RATE [lbs/hr]	[ug/m3]	[lbs/hr]
BENZYL ALCOHOL	2741.5	9.03E-06	4336.5	1.46E-05	3484.4	4.80E-06	3957.2	8.32E-08	3632.4	8.28E-08
BENZALDEHYDE	240.0	7.90E-07	5058.3	1.70E-05	1202.0	1.89E-06	1287.3	2.73E-08	1842.2	5.58E-08
PYRIDINE	686.4	2.30E-06	528.1	1.78E-06	783.2	1.10E-06	784.2	1.88E-08	868.7	1.72E-08
BIS(2-ETHYLHEXYL)PHTHALATE	72.8	2.38E-07	80.8	2.72E-07	85.0	1.33E-07	1321.6	2.84E-08	382.4	8.72E-07
DI-N-BUTYLPHTHALATE	34.8	1.15E-07			71.8	1.01E-07			26.7	5.38E-08
									0.0	0.00E+00
									0.0	0.00E+00
TENTATIVELY IDENTIFIED COMPOUNDS										
SUBSTITUTED PYRIDINE (SAT.)	132724.4	4.37E-04	127587.5	4.30E-04	245388.8	3.44E-04	308074.4	6.63E-04		
SUBSTITUTED PYRAZINE (SAT.)	43828.7	1.44E-04	81181.0	2.08E-04	157031.8	2.20E-04	184634.7	3.54E-04		
SUBSTITUTED PYRAZINE (SAT.)	43184.0	1.42E-04	60525.1	2.04E-04	88826.9	9.38E-05	108340.9	2.35E-04		
UNKNOWN	35142.3	1.18E-04	28417.9	9.57E-05	40754.9	5.72E-05	84442.1	2.03E-04		
UNKNOWN	34578.7	1.14E-04	12587.5	4.21E-05	35121.3	4.83E-05	35314.5	7.80E-05		
SUBSTITUTED PYRAZINE (SAT.)	18528.0	5.44E-05	10821.4	3.88E-05	28428.5	3.71E-05	34130.1	7.34E-05		
UNKNOWN	13943.8	4.59E-05	7188.1	2.41E-05	25208.2	3.54E-05	18638.5	4.23E-05		
SUBSTITUTED HYDROCARBON	10820.8	3.56E-05	8831.5	2.33E-05	24240.5	3.40E-05	18638.5	4.23E-05		
SUBSTITUTED HYDROCARBON	10181.2	3.35E-05	5887.4	1.88E-05	18884.8	2.78E-05	18044.3	4.10E-05		
SUBSTITUTED PYRAZINE	5582.4	1.84E-05	5247.8	1.77E-05	18830.2	2.78E-05	17810.5	3.78E-05		

TABLE 2.3.5 EXHAUST DATA FOR THE EVAPORATOR HEATER VENTS

NAMPA IDAHO FACILITY - 1992 CAMPAIGN

DATE	HEATER VENT	RUN NO.	STACK GAS PARAMETERS				DRY FLOW (DSCFM)
			TEMP (DEG. F)	H2O (%)	VEL (FPM)	ACTUAL FLOW (ACFM)	
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

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 ($\text{Ca}(\text{OH})_2$) 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
$\text{Ca}(\text{OH})_2$ 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-condensable gases (air, carbon dioxide, ammonia, and oxygen) and water vapor from the 1st three evaporators are exhausted to the heaters. Non-condensable gases must be vented to allow for efficient heating within the evaporators. Non-condensable 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:

		<u>A SIDE</u>	<u>B SIDE</u>
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).

BET SUGAR PROCESS

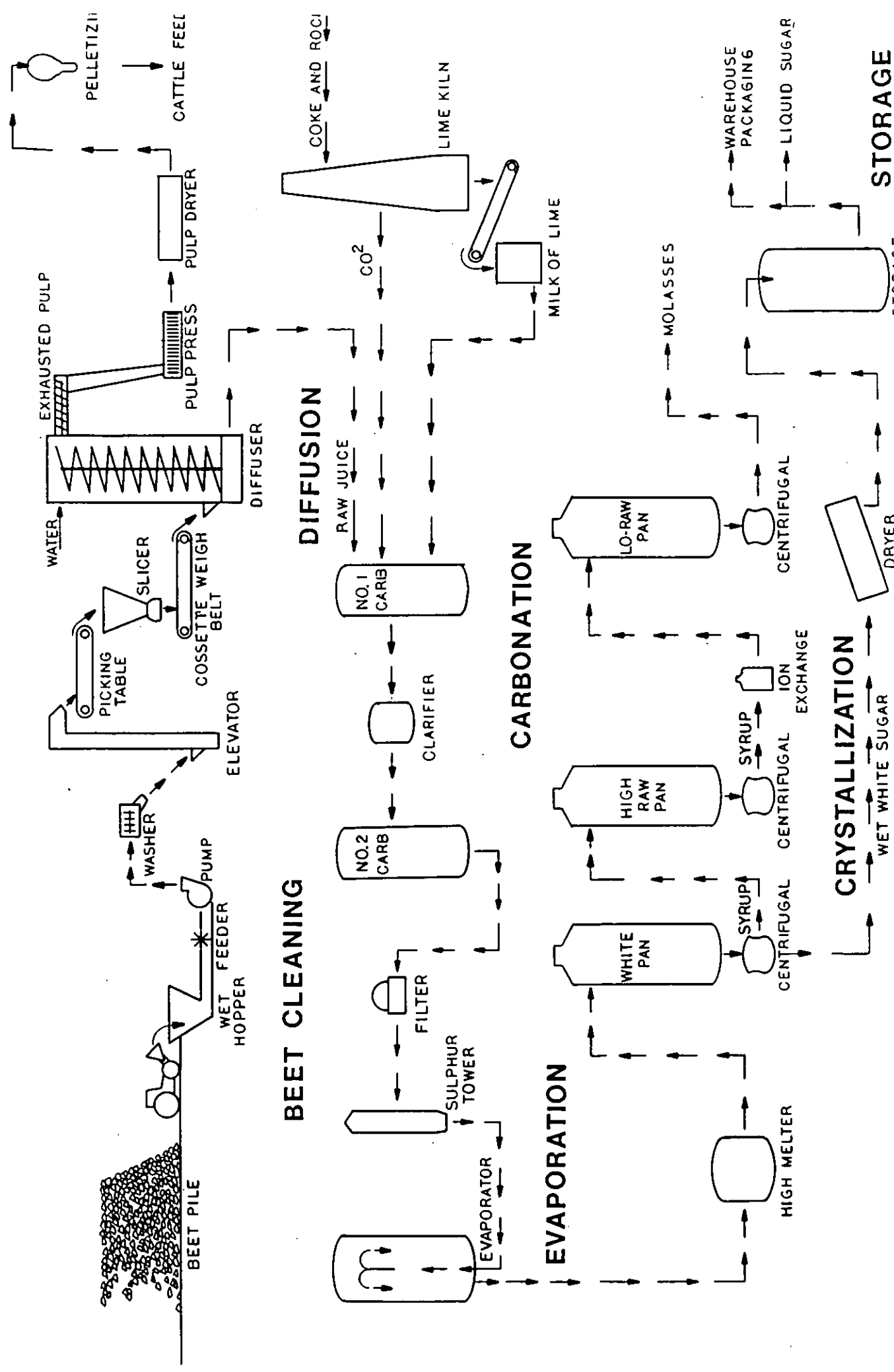


FIGURE 3.0

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 b (T/H)	DRYER TEMPERATURES		SCRUBBER OPERATION	
			THROAT (DEG. F)	DISCHARGE (DEG. F)	PRES. DROP (IN H ₂ O)	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.

VOID
DATA
- SCRUBBER NOT
OPERATING CORRECTLY

D. Emission Data/Mass Flux Rates/Emission Factors

[illegible]

Filename: BEET5A.WQ1

Date: 02-Dec-94

Facility: The Amalgamated Sugar Company

Location: Nampa, Idaho

Source: CENTRAL PULP DRYER

Coal-fired rotary drum beet pulp dryer controlled with cyclones and wet impingement type scrubbers in series (two parallel stacks each w/controls)

Note: Run 2--east stack: dryer fired by natural gas

Test date: Oct. 28-Nov. 2, 1992

North Pulp Dryer
Stack PM
Date (1992)
Not representative of
typical control systems.
Data Not used

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2**	Run 3	Run 4
EAST STACK	Stack temperature	Deg F	173	171	170	175
	Moisture	%	47.4	44.3	44.6	46.7
	Oxygen	%	nd	nd	nd	nd
	Volumetric flow, actual	acfm	38894	41616	44102	40393
	Volumetric flow, standard*	dscfm	15674	17613	18534	16480
	Isokinetic variation	%	nd	nd	nd	nd
Process rate: Beet pulp feed to dryer		TPH	50.20	47.40	55.20	49.7
Pollutant concentrations:						
	Filterable PM	G/dscf	0.0939	0.0668	0.0601	0.0873
	Condensable PM	G/dscf	0.185	0.0457	0.0623	0.0614
Pollutant mass flux rates:						
	Filterable PM	lb/hr	12.6	10.1	9.55	12.3
	Condensable PM	lb/hr	24.9	6.90	9.90	8.67
Emission factors (ENGLISH UNITS):						
	Filterable PM	lb/ton	0.251	0.213	0.173	0.248
	Condensable PM	lb/ton	0.495	0.146	0.179	0.175
Emission factors (METRIC UNITS):						
	Filterable PM	kg/Mg	0.126	0.106	0.0865	0.124
	Condensable PM	kg/Mg	0.248	0.0728	0.0896	0.0873

TOTAL EMISSION FACTORS FOR BOTH STACKS (EAST RUNS 1,3,4 + WEST RUNS 1,2,3)

	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.460	0.363	0.422	0.415
	Condensible PM	lb/ton	0.664	0.367	0.371	0.467
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.230	0.182	0.211	0.207
	Condensible PM	kg/Mg	0.332	0.183	0.185	0.234

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
WEST STACK	2 Stack temperature	Deg F	173	171	169	
	Moisture	%	42.6	42.2	43.2	
	Oxygen	%	nd	nd	nd	
	Volumetric flow, actual	acfm	37491	39063	37381	
	Volumetric flow, standard*	dscfm	16691	17538	16515	
	Isokinetic variation	%	nd	nd	nd	
Process rate: Beet pulp feed to dryer		TPH	55.30	55.80	55.70	
Pollutant concentrations:						
	Filterable PM	G/dscf	0.0805	0.0706	0.0684	
	Condensable PM	G/dscf	0.0652	0.0695	0.0773	
Pollutant mass flux rates:						
	Filterable PM	lb/hr	11.5	10.6	9.7	
	Condensable PM	lb/hr	9.3	10.4	10.9	
Emission factors (ENGLISH UNITS):						AVERAGE
	Filterable PM	lb/ton	0.208	0.190	0.174	0.191
	Condensable PM	lb/ton	0.169	0.187	0.196	0.184
Emission factors (METRIC UNITS):						AVERAGE
	Filterable PM	kg/Mg	0.104	0.0951	0.0869	0.0954
	Condensable PM	kg/Mg	0.0843	0.0936	0.0982	0.0921

Filename: BEET5C.WQ1

Date: 07-Dec-94

Facility: The Amalgamated Sugar Company

Location: Nampa, Idaho

Source: SOUTH PULP DRYER--east stack

Coal-fired rotary drum beet pulp dryer controlled with cyclones and wet impingement type scrubbers in series (two parallel stacks each w/controls)

Note: Only one of the two stacks was tested; emission rates are doubled to account for both stacks.

Test date: Oct. 28-Nov. 2, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Emission Data/Mass Flux Rates/Emission Factors			Values reported			
Test ID	Parameter	Units	Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	165	165	165	156
EAST STACK	Moisture	%	39.2	37.5	37.9	36.8
	Oxygen	%	nd	nd	nd	nd
	Volumetric flow, actual	acfm	34287	31421	27870	23435
	Volumetric flow, standard*	dscfm	16192	15319	13630	11484
	Isokinetic variation	%	nd	nd	nd	nd
Process rate:		TPH	47.10	47.10	47.20	38.9
Beet pulp feed to dryer						
Pollutant concentrations:						
Filterable PM		G/dscf	0.0619	0.0497	0.0467	0.0922
Condensible PM		G/dscf	0.0387	0.0402	0.0763	0.0992
Pollutant mass flux rates:						
Filterable PM		lb/hr	8.59	6.53	5.46	9.08
Condensible PM		lb/hr	5.37	5.28	8.91	9.76
Multiply mass flux rate by number of emission points:			2			
Emission factors (ENGLISH UNITS):						AVERAGE
Filterable PM		lb/ton	0.365	0.277	0.231	0.467
Condensible PM		lb/ton	0.228	0.224	0.378	0.502
Emission factors (METRIC UNITS):						AVERAGE
Filterable PM		kg/Mg	0.182	0.139	0.1156	0.233
Condensible PM		kg/Mg	0.114	0.1121	0.1889	0.2510

RUN 5 DATA ARE NOT PRESENTED BECAUSE THE PRESSURE DROP ACROSS THE SCRUBBER WAS 2.7" H2O.
RUNS 1-4 PRESSURE DROP >3" H2O.

Aldehyde and SVOC data for Amalgamated Sugar--North Pulp Dryer

Test date	No. of runs detected*	Pollutant	Concentration (ug/m ³)	Emission Rate (lb/hr)	Emission factor (lb/ton)		
ALDEHYDES						AVG. OF 2 TESTS	
10/26/92	3	Formaldehyde	190.1	0.0244	0.00102	0.0083	
	3	Acetaldehyde	585.1	0.0753	0.00315	0.013	
	3	Acrolein	814.3	0.105	0.00439	0.0060	
	3	Crotonaldehyde	568.3	0.0732	0.00306	0.0024	
01/11/93	3	Formaldehyde	4281.7	0.249	0.0155		
	3	Acetaldehyde	6099.2	0.354	0.0221		
	3	Acrolein	2128.9	0.124	0.00769		
	3	Crotonaldehyde	465.6	0.0271	0.00168		
SVOC						AVG. OF 2 TESTS	TOTAL # OF RUNS DETECTED
10/92	3	Benzoic acid	1019.37	6.43E-02	0.00269	0.0028	6
	3	Benzaldehyde	388.07	2.42E-02	0.00101	0.0014	6
	3	Bis(2-ethylhexyl)phthalate	196.45	1.23E-02	0.000515	0.0015	6
	2	Phenol	176.97	1.07E-02	0.000448	0.00032	3
	3	2-Nitrophenol	109.07	7.04E-03	0.000295	0.00018	5
	2	4-Nitrophenol	74.36	4.83E-03	0.000202	0.00014	4
	2	4-Methylphenol	61.63	3.67E-03	0.000154	0.00013	5
	3	Naphthalene	49.54	3.11E-03	0.000130	0.00011	6
	3	Di-n-butylphthalate	35.44	2.21E-03	9.25E-05	5.16E-05	4
	3	Benzyl alcohol	32.76	2.01E-03	8.41E-05	7.08E-05	5
	2	2,4-Dinitrophenol	18.7	1.21E-03	5.06E-05	5.06E-05	2
	2	2-Methylphenol	17.24	1.02E-03	4.27E-05	3.40E-05	5
	3	Nitrobenzene	14.34	8.97E-04	3.75E-05	1.88E-05	4
	3	2,4-Dimethylphenol	12.7	7.91E-04	3.31E-05	2.49E-05	4
	2	2-Methylnaphthalene	6.4	3.93E-04	1.64E-05	1.69E-05	5
	1	4,6-Dinitro-2-methylphenol	5.59	3.67E-04	1.54E-05	1.54E-05	1
	3	Dibenzofuran	5.13	3.16E-04	1.32E-05	1.08E-05	5
	3	Phenanthrene	4.94	3.06E-04	1.28E-05	1.20E-05	5
	3	Diethylphthalate	3.72	2.33E-04	9.75E-06	9.75E-06	3
	2	Acenaphthylene	1.35	8.23E-05	3.44E-06	1.72E-06	4
1/93	3	Benzoic acid	753.63	0.047	0.00292		
	3	Bis(2-ethylhexyl)phthalate	685.53	0.0409	0.00254		
	3	Benzaldehyde	431.6	0.0272	0.00169		
	1	Phenol	63.41	0.00319	0.000198		
	3	4-Methylphenol	29.83	0.00179	0.000111		
	3	Naphthalene	21.13	0.00132	8.20E-05		
	2	4-Nitrophenol	17.48	0.00122	7.58E-05		
	2	2-Nitrophenol	16.78	0.000998	6.20E-05		
	2	Benzyl alcohol	15.8	0.000927	5.76E-05		
	3	2-Methylphenol	6.78	0.000409	2.54E-05		
	3	2-Methylnaphthalene	4.52	0.000278	1.73E-05		
	1	Nitrobenzene	5.48	0.000276	1.71E-05		
	1	2,4-Dimethylphenol	5.32	0.000268	1.66E-05		
	2	Phenanthrene	3.3	0.00018	1.12E-05		
	1	Di-n-butylphthalate	3.44	0.000173	1.07E-05		
	1	Butylbenzylphthalate	3.43	0.000173	1.07E-05	1.07E-05	1
	2	Dibenzofuran	2.43	0.000136	8.45E-06		
	1	Fluoranthene	1.91	9.61E-05	5.97E-06	5.97E-06	1
	2	Acenaphthylene	1.43	8.37E-05	5.20E-06		
	1	Anthracene	1.59	7.98E-05	4.96E-06	4.96E-06	1

Aldehyde data for Amalgamated Sugar--Central Pulp Dryer

Test date	No. of runs detected*	Pollutant	Concentration (ug/m ³)	Emission Rate (lb/hr)	Emission factor (lb/ton)
ALDEHYDES					
01/25/93	3	Formaldehyde	4187	0.25	0.00586
	3	Acetaldehyde	11523.8	0.687	0.0162
	3	Acrolein	6443.4	0.384	0.0092
	3	Crotonaldehyde	1116.4	0.0665	0.00159

SVOC data for Amalgamated Sugar--B-side 1st carbonation tank vent

Test date	Run #	Pollutant	Concentration (ug/m ^ 3)	Flow rate (dscfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
SVOC						
Process throughput rate (1000 gal/hr) =			76.955			
11/17/92 to 11/19/92	1	Benzaldehyde	1341.88	1456	7.32E-03	9.51E-05
	2	Benzaldehyde	1635.15	1478	9.05E-03	1.18E-04
	3	Benzaldehyde	1400.87	1540	8.08E-03	1.05E-04
AVERAGE						1.06E-04
	1	Bis(2-ethylhexyl)phthalate	252.09	1456	1.37E-03	1.79E-05
	2	Bis(2-ethylhexyl)phthalate	133.42	1478	7.39E-04	9.60E-06
	3	Bis(2-ethylhexyl)phthalate	127.69	1540	7.37E-04	9.57E-06
AVERAGE						1.23E-05
	1	Benzoic acid	171.13	1456	9.33E-04	1.21E-05
	2	Benzoic acid	85.43	1478	4.73E-04	6.15E-06
	3	Benzoic acid	91.79	1540	5.29E-04	6.88E-06
AVERAGE						8.38E-06
	1	Benzyl alcohol	66.52	1456	3.63E-04	4.71E-06
	2	Benzyl alcohol	66.18	1478	3.66E-04	4.76E-06
	3	Benzyl alcohol	71.99	1540	4.15E-04	5.40E-06
AVERAGE						4.96E-06
	1	2,4-Dinitrophenol	ND	1456	0.00E+00	ND
	2	2,4-Dinitrophenol	ND	1478	0.00E+00	ND
	3	2,4-Dinitrophenol	141.55	1540	8.16E-04	1.06E-05
AVERAGE						ND
	1	Naphthalene	21.62	1456	1.18E-04	1.53E-06
	2	Naphthalene	33.28	1478	1.84E-04	2.39E-06
	3	Naphthalene	27.48	1540	1.59E-04	2.06E-06
AVERAGE						2.00E-06
	1	Phenanthrene	17.91	1456	9.77E-05	1.27E-06
	2	Phenanthrene	19.62	1478	1.09E-04	1.41E-06
	3	Phenanthrene	18.78	1540	1.08E-04	1.41E-06
AVERAGE						1.36E-06
	1	Phenol	20.27	1456	1.11E-04	1.44E-06
	2	Phenol	19.48	1478	1.08E-04	1.40E-06
	3	Phenol	14.28	1540	8.24E-05	1.07E-06
AVERAGE						1.30E-06
	1	4-Methylphenol	12.22	1456	6.66E-05	8.66E-07
	2	4-Methylphenol	8.14	1478	4.51E-05	5.86E-07
	3	4-Methylphenol	6.94	1540	4.00E-05	5.20E-07
AVERAGE						6.57E-07
	1	2-Methylnaphthalene	3.98	1456	2.17E-05	2.82E-07
	2	2-Methylnaphthalene	8.9	1478	4.93E-05	6.40E-07
	3	2-Methylnaphthalene	8.18	1540	4.72E-05	6.13E-07
AVERAGE						5.12E-07
	1	Acenaphthene	ND	1456	0.00E+00	ND
	2	Acenaphthene	ND	1478	0.00E+00	ND
	3	Acenaphthene	19.29	1540	1.11E-04	1.45E-06
AVERAGE						ND

Aldehyde data for Amalgamated Sugar--B-side 2nd carbonation tank vent

Test date	No. of test runs	Pollutant	Concentration (lb/acf)	Flow rate (acfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
ALDEHYDES		Process throughput rate (1000 gal/hr) =		71.7		
11/13/92	1	Formaldehyde	1.592E-08	1167	0.00111	1.55E-05
	1	Acetaldehyde	4.39E-06	1167	0.307	0.00429
	1	Acrolein	2.406E-07	1167	0.0168	0.000235
	1	Crotonaldehyde	3.022E-08	1167	0.00212	2.95E-05

Aldehyde data for Amalgamated Sugar--A-side No.2 thin juice heater vent

Test date	Test run #	Pollutant	Concentration (ug/m ³)	Flow rate (dscfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
ALDEHYDES		Process throughput rate (1000 gal/hr) =		Run 1--74.6	Run 2--73.4	Run 3--73.8
01/13/93	1	Formaldehyde	26866	2.1	2.11E-04	2.83E-06
	2	Formaldehyde	7369	2.1	5.80E-05	7.90E-07
	3	Formaldehyde	2374	2.1	1.87E-05	2.53E-07
	AVERAGE					1.29E-06
	1	Acetaldehyde	1352228	2.1	1.06E-02	1.43E-04
	2	Acetaldehyde	1099809	2.1	8.65E-03	1.18E-04
	3	Acetaldehyde	579289	2.1	4.56E-03	6.17E-05
	AVERAGE					1.07E-04
	1	Acrolein	2455	2.1	1.93E-05	2.59E-07
	2	Acrolein	1137	2.1	8.94E-06	1.22E-07
	3	Acrolein	605	2.1	4.76E-06	6.45E-08
	AVERAGE					1.48E-07
	1	Crotonaldehyde	2812	2.1	2.21E-05	2.96E-07
	2	Crotonaldehyde	1638	2.1	1.29E-05	1.76E-07
	3	Crotonaldehyde	918	2.1	7.22E-06	9.78E-08
	AVERAGE					1.90E-07

Aldehyde data for Amalgamated Sugar--B-side 2nd carbonation heater vent

Test date	Test run #	Pollutant	Concentration (ug/m ³)	Flow rate (dscfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
ALDEHYDES Process throughput rate (1000 gal/hr) =						
			Run 1--73.5	Run 2--73.7	Run 3--73.3	
01/21/93	1	Formaldehyde	4745	0.6	1.07E-05	1.45E-07
	2	Formaldehyde	3170	0.6	7.12E-06	9.67E-08
	3	Formaldehyde	2260	0.6	5.08E-06	6.93E-08
	AVERAGE					1.04E-07
	1	Acetaldehyde	1081023	0.6	2.43E-03	3.31E-05
	2	Acetaldehyde	749815	0.6	1.69E-03	2.29E-05
	3	Acetaldehyde	481552	0.6	1.08E-03	1.48E-05
	AVERAGE					2.36E-05
	1	Acrolein	25835	0.6	5.81E-05	7.90E-07
	2	Acrolein	22168	0.6	4.98E-05	6.76E-07
	3	Acrolein	18245	0.6	4.10E-05	5.59E-07
	AVERAGE					6.75E-07
	1	Crotonaldehyde	3193	0.6	7.18E-06	9.76E-08
	2	Crotonaldehyde	2273	0.6	5.11E-06	6.93E-08
	3	Crotonaldehyde	3885	0.6	8.73E-06	1.19E-07
	AVERAGE					9.54E-08

SVOC data for Amalgamated Sugar--B-side 2nd carbonation heater vent

Test date	Run #	Pollutant	Concentration (ug/m ³)	Flow rate (dscfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
SVOC		Process throughput rate (1000 gal/hr) =		76.955		
01/18/93 to 01/27/93	1	Benzaldehyde	80757	0.879	2.68E-04	3.45E-06
	2	Benzaldehyde	54329.2	0.901	1.83E-04	2.38E-06
	3	Benzaldehyde	50959.4	0.375	7.15E-05	9.29E-07
	4	Benzaldehyde	75995.9	0.574	1.63E-04	2.12E-06
	AVERAGE					2.22E-06
	1	Bis(2-ethylhexyl)phthalate	1874.5	0.879	6.17E-06	8.02E-08
	2	Bis(2-ethylhexyl)phthalate	6885.7	0.901	2.32E-05	3.02E-07
	3	Bis(2-ethylhexyl)phthalate	44978.2	0.375	6.31E-05	8.20E-07
	4	Bis(2-ethylhexyl)phthalate	9567.4	0.574	2.06E-05	2.67E-07
	AVERAGE					3.67E-07
	1	Benzyl alcohol	5252.1	0.879	1.73E-05	2.25E-07
	2	Benzyl alcohol	5606.4	0.901	1.89E-05	2.46E-07
	3	Benzyl alcohol	3494.4	0.375	4.90E-06	6.37E-08
	4	Benzyl alcohol	6327	0.574	1.36E-05	1.77E-07
	AVERAGE					1.78E-07
	1	Naphthalene	749.3	0.879	2.47E-06	3.21E-08
	2	Naphthalene	354.7	0.901	1.20E-06	1.56E-08
	3	Naphthalene	ND	0.375	ND	ND
	4	Naphthalene	1844.3	0.574	3.96E-06	5.15E-08
	AVERAGE					2.48E-08
	1	4-Methylphenol	2214.8	0.879	7.29E-06	9.47E-08
	2	4-Methylphenol	ND	0.901	ND	ND
	3	4-Methylphenol	ND	0.375	ND	ND
	4	4-Methylphenol	ND	0.574	ND	ND
	AVERAGE					ND
	1	Phenanthrene	320.9	0.879	1.06E-06	1.37E-08
	2	Phenanthrene	285.3	0.901	9.63E-07	1.25E-08
	3	Phenanthrene	357.3	0.375	5.01E-07	6.52E-09
	4	Phenanthrene	1073.5	0.574	2.31E-06	3.00E-08
	AVERAGE					1.57E-08
	1	Isophorone	ND	0.879	ND	ND
	2	Isophorone	1304.1	0.901	4.40E-06	5.72E-08
	3	Isophorone	ND	0.375	ND	ND
	4	Isophorone	ND	0.574	ND	ND
	AVERAGE					ND
	1	Benzoic acid	ND	0.879	ND	ND
	2	Benzoic acid	1133.43	0.901	3.82E-06	4.97E-08
	3	Benzoic acid	ND	0.375	ND	ND
	4	Benzoic acid	ND	0.574	ND	ND
	AVERAGE					ND
	1	Phenol	ND	0.879	ND	ND
	2	Phenol	352.2	0.901	1.19E-06	1.54E-08
	3	Phenol	1825	0.375	2.56E-06	3.33E-08
	4	Phenol	ND	0.574	ND	ND
	AVERAGE					1.22E-08
	1	Diethylphthalate	ND	0.879	ND	ND
	2	Diethylphthalate	ND	0.901	ND	ND
	3	Diethylphthalate	ND	0.375	ND	ND
	4	Diethylphthalate	1640.4	0.574	3.52E-06	4.58E-08
	AVERAGE					ND
	1	Pyridine	699.4	0.879	2.30E-06	2.99E-08
	2	Pyridine	1056.2	0.901	3.56E-06	4.63E-08
	3	Pyridine	783.2	0.375	1.10E-06	1.43E-08
	4	Pyridine	1568.4	0.574	3.37E-06	4.38E-08
	AVERAGE					3.36E-08
	1	Dibenzofuran	ND	0.879	ND	ND
	2	Dibenzofuran	ND	0.901	ND	ND
	3	Dibenzofuran	95.3	0.375	1.34E-07	1.74E-09
	4	Dibenzofuran	ND	0.574	ND	ND
	AVERAGE					ND
	1	Di-n-butylphthalate	34.9	0.879	1.15E-07	1.49E-09
	2	Di-n-butylphthalate	ND	0.901	ND	ND
	3	Di-n-butylphthalate	167.1	0.375	2.35E-07	3.05E-09
	4	Di-n-butylphthalate	ND	0.574	ND	ND
	AVERAGE					1.14E-09

**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
	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

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

SOURCE	PARTICULATES (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 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 2.2.4 ESTIMATED MAXIMUM HOURLY ALDEHYDE EMISSION RATES (LBS/HR)
FOR THE CARBONATION TANK VENTS a

SOURCE	ALDEHYDES c			
	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) PHTHALATE	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 2.3.6 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) PHTHALATE	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 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, midjet 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 isooctane. Midjet impingers are used for the first testing method. Standard impingers were used for the second testing method.

For both testing methods, DNPH and isooctane were added in to three separate impingers. Each midjet impinger contained 10 milliliters (mls) each of DNPH and 10 mls of isooctane. Each standard impingers contained 50 milliliters (mls) of DNPH and 50 mls of

isooctane. 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.

Aldehyde and SVOC data for Amalgamated Sugar--North Pulp Dryer

Test date	No. of runs detected*	Pollutant	Concentration (ug/m ³)	Emission Rate (lb/hr)	Emission factor (lb/ton)
ALDEHYDES					
10/26/92	3	Formaldehyde	190.1	0.0244	0.00102
	3	Acetaldehyde	585.1	0.0753	0.00315
	3	Acrolein	814.3	0.105	0.00439
	3	Crotonaldehyde	568.3	0.0732	0.00306
01/11/93	3	Formaldehyde	4281.7	0.249	0.0155
	3	Acetaldehyde	6099.2	0.354	0.0221
	3	Acrolein	2128.9	0.124	0.00769
	3	Crotonaldehyde	465.6	0.0271	0.00168
SVOC					
10/92	3	Benzoic acid	1019.37	6.43E-02	0.00269
	3	Benzaldehyde	388.07	2.42E-02	0.00101
	3	Bis(2-ethylhexyl)phthalate	196.45	1.23E-02	0.000515
	2	Phenol	176.97	1.07E-02	0.000448
	3	2-Nitrophenol	109.07	7.04E-03	0.000295
	2	4-Nitrophenol	74.36	4.83E-03	0.000202
	2	4-Methylphenol	61.63	3.67E-03	0.000154
	3	Naphthalene	49.54	3.11E-03	0.000130
	3	Di-n-butylphthalate	35.44	2.21E-03	9.25E-05
	3	Benzyl alcohol	32.76	2.01E-03	8.41E-05
	2	2,4-Dinitrophenol	18.7	1.21E-03	5.06E-05
	2	2-Methylphenol	17.24	1.02E-03	4.27E-05
	3	Nitrobenzene	14.34	8.97E-04	3.75E-05
	3	2,4-Dimethylphenol	12.7	7.91E-04	3.31E-05
	2	2-Methylnaphthalene	6.4	3.93E-04	1.64E-05
	1	4,6-Dinitro-2-methylphenol	5.59	3.67E-04	1.54E-05
	3	Dibenzofuran	5.13	3.16E-04	1.32E-05
	3	Phenanthrene	4.94	3.06E-04	1.28E-05
	3	Diethylphthalate	3.72	2.33E-04	9.75E-06
	2	Acenaphthylene	1.35	8.23E-05	3.44E-06
1/93	3	Benzoic acid	753.63	0.047	0.00292
	3	Bis(2-ethylhexyl)phthalate	685.53	0.0409	0.00254
	3	Benzaldehyde	431.6	0.0272	0.00169
	1	Phenol	63.41	0.00319	0.000198136646
	3	4-Methylphenol	29.83	0.00179	0.000111480424
	3	Naphthalene	21.13	0.00132	8.20E-05
	2	4-Nitrophenol	17.48	0.00122	7.58E-05
	2	2-Nitrophenol	16.78	0.000998	6.20E-05
	2	Benzyl alcohol	15.8	0.000927	5.76E-05
	3	2-Methylphenol	6.78	0.000409	2.54E-05
	3	2-Methylnaphthalene	4.52	0.000278	1.73E-05
	1	Nitrobenzene	5.48	0.000276	1.71E-05
	1	2,4-Dimethylphenol	5.32	0.000268	1.66E-05
	2	Phenanthrene	3.3	0.00018	1.12E-05
	1	Di-n-butylphthalate	3.44	0.000173	1.07E-05
	1	Butylbenzylphthalate	3.43	0.000173	1.07E-05
	2	Dibenzofuran	2.43	0.000136	8.45E-06
	1	Fluoranthene	1.91	9.61E-05	5.97E-06
	2	Acenaphthylene	1.43	8.37E-05	5.20E-06
	1	Anthracene	1.59	7.98E-05	4.96E-06

Complete Data
Sets not provided
in report.
C rating

Production Rates
for SVOC:
10/92 assumed
same as 10/26/92
aldehyde runs.
1/93 assumed
same as 1/11/93
aldehyde runs

Aldehyde data for Amalgamated Sugar-Central Pulp Dryer

Test date	No. of runs detected*	Pollutant	Concentration (ug/m ³)	Emission Rate (lb/hr)	Emission factor (lb/ton)
ALDEHYDES					
01/25/93	3	Formaldehyde	4187	0.25	0.00586
	3	Acetaldehyde	11523.8	0.687	0.0162
	3	Acrolein	6443.4	0.384	0.0092
	3	Crotonaldehyde	1116.4	0.0665	0.00159

in complete data set
C rating

SVOC data for Amalgamated Sugar-1st carbonation tank vent

Test date	Run #	Pollutant	Concentration (ug/m ³)	Flow rate (dscfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
SVOC			Process throughput rate (1000 gal/hr) =		76.955	
11/17/92 to 11/19/92	1	Benzaldehyde	1341.88	1456	7.32E-03	9.51E-05
	2	Benzaldehyde	1635.15	1478	9.05E-03	1.18E-04
	3	Benzaldehyde	1400.87	1540	8.08E-03	1.05E-04
	AVERAGE					1.06E-04
	1	Bis(2-ethylhexyl)phthalate	252.09	1456	1.37E-03	1.79E-05
	2	Bis(2-ethylhexyl)phthalate	133.42	1478	7.39E-04	9.60E-06
	3	Bis(2-ethylhexyl)phthalate	127.69	1540	7.37E-04	9.57E-06
	AVERAGE					1.23E-05
	1	Benzoic acid	171.13	1456	9.33E-04	1.21E-05
	2	Benzoic acid	85.43	1478	4.73E-04	6.15E-06
	3	Benzoic acid	91.79	1540	5.29E-04	6.88E-06
	AVERAGE					8.38E-06
	1	Benzyl alcohol	66.52	1456	3.63E-04	4.71E-06
	2	Benzyl alcohol	66.18	1478	3.66E-04	4.76E-06
	3	Benzyl alcohol	71.99	1540	4.15E-04	5.40E-06
	AVERAGE					4.96E-06
	1	2,4-Dinitrophenol	ND	1456	0.00E+00	ND
	2	2,4-Dinitrophenol	ND	1478	0.00E+00	ND
	3	2,4-Dinitrophenol	141.55	1540	8.16E-04	1.06E-05
	AVERAGE					ND
	1	Naphthalene	21.62	1456	1.18E-04	1.53E-06
	2	Naphthalene	33.28	1478	1.84E-04	2.39E-06
	3	Naphthalene	27.48	1540	1.59E-04	2.06E-06
	AVERAGE					2.00E-06
	1	Phenanthrene	17.91	1456	9.77E-05	1.27E-06
	2	Phenanthrene	19.62	1478	1.09E-04	1.41E-06
	3	Phenanthrene	18.78	1540	1.08E-04	1.41E-06
	AVERAGE					1.36E-06
	1	Phenol	20.27	1456	1.11E-04	1.44E-06
	2	Phenol	19.48	1478	1.08E-04	1.40E-06
	3	Phenol	14.28	1540	8.24E-05	1.07E-06
	AVERAGE					1.30E-06
	1	4-Methylphenol	12.22	1456	6.66E-05	8.66E-07
	2	4-Methylphenol	8.14	1478	4.51E-05	5.86E-07
	3	4-Methylphenol	6.94	1540	4.00E-05	5.20E-07
	AVERAGE					6.57E-07
	1	2-Methylnaphthalene	3.98	1456	2.17E-05	2.82E-07
	2	2-Methylnaphthalene	8.9	1478	4.93E-05	6.40E-07
	3	2-Methylnaphthalene	8.18	1540	4.72E-05	6.13E-07
	AVERAGE					5.12E-07
	1	Acenaphthene	ND	1456	0.00E+00	ND
	2	Acenaphthene	ND	1478	0.00E+00	ND
	3	Acenaphthene	19.29	1540	1.11E-04	1.45E-06
	AVERAGE					ND

Avg. process rate
B rating

B-side
Aldehyde data for Amalgamated Sugar--2nd carbonation tank vent

Test date	No. of test runs	Pollutant	Concentration (lb/acf)	Flow rate (acfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
ALDEHYDES		Process throughput rate (1000 gal/hr) =		71.7		
11/13/92	1	Formaldehyde	1.592E-08	1167	0.00111	1.55E-05
	1	Acetaldehyde	4.39E-06	1167	0.307	0.00429
	1	Acrolein	2.406E-07	1167	0.0168	0.000235
	1	Crotonaldehyde	3.022E-08	1167	0.00212	2.95E-05

Only 1 test run conducted
D rating

Aldehyde data for Amalgamated Sugar--A-side No.2 thin juice heater vent

Test date	Test run #	Pollutant	Concentration (ug/m ³)	Flow rate (dscfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
ALDEHYDES		Process throughput rate (1000 gal/hr) =		Run 1--74.6	Run 2--73.4	Run 3--73.8
01/13/93	1	Formaldehyde	26866	2.1	2.11E-04	2.83E-06
	2	Formaldehyde	7369	2.1	5.80E-05	7.90E-07
	3	Formaldehyde	2374	2.1	1.87E-05	2.53E-07
	AVERAGE					1.29E-06
	1	Acetaldehyde	1352228	2.1	1.06E-02	1.43E-04
	2	Acetaldehyde	1099809	2.1	8.65E-03	1.18E-04
	3	Acetaldehyde	579289	2.1	4.56E-03	6.17E-05
	AVERAGE					1.07E-04
	1	Acrolein	2455	2.1	1.93E-05	2.59E-07
	2	Acrolein	1137	2.1	8.94E-06	1.22E-07
	3	Acrolein	605	2.1	4.76E-06	6.45E-08
	AVERAGE					1.48E-07
	1	Crotonaldehyde	2812	2.1	2.21E-05	2.96E-07
	2	Crotonaldehyde	1638	2.1	1.29E-05	1.76E-07
	3	Crotonaldehyde	918	2.1	7.22E-06	9.78E-08
	AVERAGE					1.90E-07

← Process rates backcalc. from test data provided. Consistent w/ average rate of 74000 gal/hr provided in text.

A rating

Aldehyde data for Amalgamated Sugar--B-side 2nd carbonation heater vent

Test date	Test run #	Pollutant	Concentration (ug/m ³)	Flow rate (dscfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
ALDEHYDES		Process throughput rate (1000 gal/hr) =	Run 1--73.5	Run 2--73.7	Run 3--73.3	
01/21/93	1	Formaldehyde	4745	0.6	1.07E-05	1.45E-07
	2	Formaldehyde	3170	0.6	7.12E-06	9.67E-08
	3	Formaldehyde	2260	0.6	5.08E-06	6.93E-08
	AVERAGE					1.04E-07
	1	Acetaldehyde	1081023	0.6	2.43E-03	3.31E-05
	2	Acetaldehyde	749815	0.6	1.69E-03	2.29E-05
	3	Acetaldehyde	481552	0.6	1.08E-03	1.48E-05
	AVERAGE					2.36E-05
	1	Acrolein	25835	0.6	5.81E-05	7.90E-07
	2	Acrolein	22168	0.6	4.98E-05	6.76E-07
	3	Acrolein	18245	0.6	4.10E-05	5.59E-07
	AVERAGE					6.75E-07
	1	Crotonaldehyde	3193	0.6	7.18E-06	9.76E-08
	2	Crotonaldehyde	2273	0.6	5.11E-06	6.93E-08
	3	Crotonaldehyde	3885	0.6	8.73E-06	1.19E-07
	AVERAGE					9.54E-08

B-rated
only 1 set
of flow data
for 3 test
runs.

can we get a
better flow rate?

SVOC data for Amalgamated Sugar-2nd carbonation heater vent

Test date	Run #	Pollutant	Concentration (ug/m ³)	Flow rate (dscfm)	Emission Rate (lb/hr)	Emission factor (lb/1000 gal)
SVOC		Process throughput rate (1000 gal/hr) =		76.955		
01/18/93 to 01/27/93	1	Benzaldehyde	80757	0.879	2.66E-04	3.45E-06
	2	Benzaldehyde	54329.2	0.901	1.83E-04	2.38E-06
	3	Benzaldehyde	50959.4	0.375	7.15E-05	9.29E-07
	4	Benzaldehyde	75995.9	0.574	1.63E-04	2.12E-06
	AVERAGE					2.22E-06
	1	Bis(2-ethylhexyl)phthalate	1874.5	0.879	6.17E-06	8.02E-08
	2	Bis(2-ethylhexyl)phthalate	6885.7	0.901	2.32E-05	3.02E-07
	3	Bis(2-ethylhexyl)phthalate	44978.2	0.375	6.31E-05	8.20E-07
	4	Bis(2-ethylhexyl)phthalate	9567.4	0.574	2.06E-05	2.67E-07
	AVERAGE					3.67E-07
	1	Benzyl alcohol	5252.1	0.879	1.73E-05	2.25E-07
	2	Benzyl alcohol	5606.4	0.901	1.89E-05	2.46E-07
	3	Benzyl alcohol	3494.4	0.375	4.90E-06	6.37E-08
	4	Benzyl alcohol	6327	0.574	1.36E-05	1.77E-07
	AVERAGE					1.78E-07
	1	Naphthalene	749.3	0.879	2.47E-06	3.21E-08
	2	Naphthalene	354.7	0.901	1.20E-06	1.56E-08
	3	Naphthalene	ND	0.375	0.00E+00	ND -0.00E+00
	4	Naphthalene	1844.3	0.574	3.96E-06	5.15E-08
	AVERAGE					2.48E-08
	1	4-Methylphenol	2214.8	0.879	7.29E-06	9.47E-08
	2	4-Methylphenol	ND	0.901	0.00E+00	ND -0.00E+00
	3	4-Methylphenol	ND	0.375	0.00E+00	ND -0.00E+00
	4	4-Methylphenol	ND	0.574	0.00E+00	ND -0.00E+00
	AVERAGE					ND -2.37E-08
	1	Phenanthrene	320.9	0.879	1.06E-06	1.37E-08
	2	Phenanthrene	285.3	0.901	9.63E-07	1.25E-08
	3	Phenanthrene	357.3	0.375	5.01E-07	6.52E-09
	4	Phenanthrene	1073.5	0.574	2.31E-06	3.00E-08
	AVERAGE					1.57E-08
	1	Isophorone	ND	0.879	0.00E+00	ND -0.00E+00
	2	Isophorone	1304.1	0.901	4.40E-06	5.72E-08
	3	Isophorone	ND	0.375	0.00E+00	ND -0.00E+00
	4	Isophorone	ND	0.574	0.00E+00	ND -0.00E+00
	AVERAGE					ND -1.43E-08
	1	Benzoic acid	ND	0.879	0.00E+00	ND -0.00E+00
	2	Benzoic acid	1133.43	0.901	3.82E-06	4.97E-08
	3	Benzoic acid	ND	0.375	0.00E+00	ND -0.00E+00
	4	Benzoic acid	ND	0.574	0.00E+00	ND -0.00E+00
	AVERAGE					ND -1.24E-08
	1	Phenol	ND	0.879	0.00E+00	ND -0.00E+00
	2	Phenol	352.2	0.901	1.19E-06	1.54E-08
	3	Phenol	1825	0.375	2.56E-06	3.33E-08
	4	Phenol	ND	0.574	0.00E+00	ND -0.00E+00
	AVERAGE					1.22E-08
	1	Diethylphthalate	ND	0.879	0.00E+00	ND -0.00E+00
	2	Diethylphthalate	ND	0.901	0.00E+00	ND -0.00E+00
	3	Diethylphthalate	ND	0.375	0.00E+00	ND -0.00E+00
	4	Diethylphthalate	1640.4	0.574	3.52E-06	4.58E-08
	AVERAGE					ND -1.14E-08
	1	Pyridine	699.4	0.879	2.30E-06	2.99E-08
	2	Pyridine	1056.2	0.901	3.56E-06	4.63E-08
	3	Pyridine	783.2	0.375	1.10E-06	1.43E-08
	4	Pyridine	1568.4	0.574	3.37E-06	4.38E-08
	AVERAGE					3.36E-08
	1	Dibenzofuran	ND	0.879	0.00E+00	ND -0.00E+00
	2	Dibenzofuran	ND	0.901	0.00E+00	ND -0.00E+00
	3	Dibenzofuran	95.3	0.375	1.34E-07	1.74E-09
	4	Dibenzofuran	ND	0.574	0.00E+00	ND -0.00E+00
	AVERAGE					ND -1.34E-10
	1	Di-n-butylphthalate	34.9	0.879	1.15E-07	1.49E-09
	2	Di-n-butylphthalate	ND	0.901	0.00E+00	ND -0.00E+00
	3	Di-n-butylphthalate	167.1	0.375	2.35E-07	3.05E-09
	4	Di-n-butylphthalate	ND	0.574	0.00E+00	ND -0.00E+00
	AVERAGE					1.14E-09