Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

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PEDCo Environmental Inc.

PEDCo Environmental Inc.

August 1979

Environmental Protection Agency
Planning and Standards
Research Triangle Park NC 27711
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Air

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EPA

Vegetable Oil Production (Meal Processing)

Emission Test Report Ralston Purina Company Bloomington, Illinois

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

EMB Report 79-VEG-6e
October 1979

Air

11663

EPA

Vegetable Oil Production (Meal Processing)

Emission Test Report Ralston Purina Company Bloomington, Illinois

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VEGETABLE OIL EXTRACTION PLANT MEAL SAMPLING AND OPACITY TEST RALSTON-PURINA BLOOMINGTON, ILLINOIS

AUGUST 10, 1979

Prepared by:

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79-VEG-6E
Contract No. 68-02-2811
Task No. 19

PN 3333-S

Project Technical Manager: Nancy McLaughlin

U.S. Environmental Protection Agency
Emission Measurement Branch

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SECTION 1

INTRODUCTION

On August 10, 1979 personnel from PEDCo Environmental, Inc. and Research Triangle Institute conducted a site visit to the Ralston-Purina vegetable oil extraction plant in Bloomington, Illinois for the purpose of collecting meal samples (to be analyzed for hexane), monitoring process conditions, and checking selected sites for visible emissions. Meal samples and opacity readings were taken by personnel from PEDCo Environmental, Inc. while Research Triangle Institute personnel monitored the process conditions. This test is part of an on-going study to gather emissions data from the vegetable oil industry.

Ralston-Purina operates two process lines for soybean meal. One line produces an edible meal for human consumption, while the other processes meal for animal feed. Meal samples were collected in triplicate every hour over a seven hour period after each of the following process steps:

1. Edible product meal cooler
2. Edible product stripper
3. Desolventizer-toaster (DT)
4. Meal dryer
5. Meal cooler
6. Final meal product

Stack opacity was read at nine different sites in the plant.

SECTION 2

SUMMARY OF RESULTS

2.1 MEAL SAMPLES

Hexane concentration in the meal was calculated on both a wet meal and dry meal basis. The dry weight of the meal was determined by placing the sample uncapped in an oven after analysis and reweighing the sample after the hexane and moisture had been driven off. The average change in hexane concentration from the wet to dry meal basis was 10 percent for the edible cooler samples, 13 percent at the edible stripper, 23 percent at the DT, and 14 percent for the dryer, cooler and final meal product samples.

The laboratory analysis report listing concentrations on a wet and dry basis, sample weights, and dates of analysis for each sample taken is in Appendix B of this report. Table 2-1 lists the average hexane concentration for each set of triplicate samples on a wet basis and the sample time. On the edible product line hexane concentration remained constant through the day until the sixth hour (14:00) when hexane concentration at both the cooler and stripper increased sharply.

On the other product line, all four sampling sites also show a considerable increase in hexane content during the sixth or seventh hours. This increase in hexane content does not

TABLE 2-1. HEXANE CONCENTRATION IN MEAL VS. TIME
RALSTON PURINA - BLOOMINGTON

AUGUST 10, 1979

Sample time	Hexane concentration[a] µg/g of wet meal					
	Edible cooler	Edible stripper	D.T.[b]	Dryer	Cooler	Final meal
9:00	1170	1470	310	220	190	140
10:00	1270	1370	260	220	170	140 (130)
11:00	1370 (1330)	1670	310	230	200	150
12:00	1270 (1230)	1470	240	210	190	110
1:00	1070	1100	240	180	170	120
2:00	2800	4130	630	180	190	130
3:00	1060	1130	720	1300	1370	1000

[a] Average of triplicate samples.

[b] D.T. - Desolventizer-Toaster.

Most Differences here because DEDCo rounded off to 2 significant digits since data [illegible] that precise

appear to be related to sample stability or analytical procedure as all samples were analyzed within the same week and those samples with the highest concentrations were analyzed last.

The meal sampling log is in Appendix A of this report and indicates that there were no special problems or deviations in the sampling procedure.

2.2 OPACITY

Stack opacity was read by a qualified observer according to the procedures of EPA Method 9 at the following sites:

Facility	Type of control device
1. Primary dehulling	Cyclone
1 Secondary dehulling	Cyclone
2. Meal grinding	Bag filter
3. Flaking roll aspirator	Cyclone
5. Bean cleaning	Cyclone
6. Flake transfer	Bag filter
7. Flake cooler	Bag filter
8. Hull transfer	Bag filter
9. Meal cooler	Cyclone

At the secondary dehulling site opacity ranged from 0 to 5 percent with an average of 3.75 percent. The flaking roll aspirator stack had opacity ranging from 0 to 5 percent with an average of 0.42 percent. The bean cleaning facility had an average opacity of 0.63 percent with values ranging from 0 to 5 percent. At all other sites there were no visible emissions. Opacity field data sheets are in Appendix C of this report. The meal cooler facility had an average of 0.31 percent with values ranging from 0 to 5 percent.

SECTION 3

SAMPLING AND ANALYTICAL PROCEDURES

3.1 MEAL SAMPLES

The meal sampling and analytical technique was adopted from a volitilization head-space sampling procedure developed at Texas A&M University.[1] Sample bottles used were 100 mℓ glass serum bottles with septum caps, tare weighed in the lab with two layers of filter paper in the bottom of each. In the field just prior to sampling, 0.5 mℓ of water was added to wet the filter paper, using an automatic pipette. A long handled scoop was used to take a sample from the conveyor belt. A small portion of this scoop was then transferred to each of the triplicate samples using a small spoon and a funnel. Septum caps were replaced immediately on the samples. An aluminum cap was then crimped tightly over the septum for a final seal. Each bottle was then weighed to determine the amount of sample collected. Meal samples were stored in a cooler with ice for shipment back to the PEDCo laboratory and stored in a refrigerator until analysis. Ideally a 2.0 gram sample should be taken each time. However, sampling had to be done quickly to prevent evaporation losses, and the actual sample weight varied from 1.34 g to 3.11 g.

---

[1] P. J. Wan, M. Chittwood, C. M. Cater, "Determination of Residual Hexane in Solvent Extracted Meal," Food Protein R&D Center, Texas A&M University.

Analysis was done by placing the sample bottle into a sand-bath for two hours at 125°C and then gradually cooling the sample to room temperature. A 1.0 mℓ head space sample is then injected into a gas chromatograph. Calibration standards are made by adding a known amount of 99 mole percent n-hexane to processed meal that has been completely dried. To determine the dry weight of the meal sampled after analysis, the samples were placed in a drying oven uncapped and reweighed after the moisture and hexane had been driven off.

3.2 OPACITY READINGS

Opacity was read by a qualified observer using the procedures of Federal Register* Method 9. Readings were taken every 15 seconds over a 12 minute period at each site.

*Federal Register, Vol. 42, No. 16, August 18, 1977.

APPENDIX A

MEAL SAMPLING LOG SHEET

CASCADE® L1-C2462 711-837 RALSTON - PURINA Bloomington IL

					DATE	TIME	SITE
	674	92.76					~~[illegible]~~
	675	92.44					
	676	92.63					
	677	92.71					
	678	92.96					
	679	92.69					
	680	92.82					
	681	92.65					
	682	92.48					
	683	92.43					
	684	92.63					
	685	92.27					
	686	92.41					
	687	92.76					
	688	92.85					
	689	92.61					
	690	93.00					
	691	93.09					
	692	92.99					
	693	92.86					
	694	92.65					
	695	92.32					
	696	92.49					
	697	92.76					
	698	92.40					
	699	92.51					
	700	92.77					
	701	92.29					
	702	92.61					
	703	93.06					
	704	92.25					
	705	92.69					
	706	92.62					
	707	92.69					
	708	92.76					
	709	[illegible]					
	710	[illegible]					
	711	[illegible]	94.59		8/10/79	9:03	EDIBLE COOLED

SCADE* L1-C7462

RALSTON PURINA BLOOMINGTON, ILLINOIS

	TARE	WEIGHT W/SAMPLE		DATE	TIME	SITE
712	92.83	95.07	.49	8/10/79	9:03	EDIBLE COOLED
713	[illegible]	94.73			9:03	EDIBLE COOLED
714	93.33	95.41			9:09	EDIBLE STRIPPER
715	92.91	95.05	.52		9:09	EDIBLE STRIPPER
716	92.73	94.77			9:09	EDIBLE STRIPPER
717	93.20	95.48			9:11	DT
718	92.50	94.74			9:11	DT
719	92.72	94.81			9:11	DT
720	93.26	96.01	.50		9:15	A.D.
721	92.88	95.95			9:15	A.D.
722	92.66	95.69			9:15	A.D.
723	92.78	95.68			9:20	FINAL MEAL
724	92.65	95.97			9:20	FINAL MEAL
725	92.62	96.40	.51		9:20	FINAL MEAL
726	92.86	95.62			9:17	COOLER
727	92.73	96.05			9:17	COOLER
728	92.84	96.09			9:17	COOLER
~~729~~ VIAL B	~~92.84~~					
730	92.43	94.50	.51		10:09	EDIBLE COOLED
731	92.74	94.79			10:09	EDIBLE COOLED
732	93.19	95.23			10:09	EDIBLE COOLED
733	92.97	94.84			10:11	EDIBLE STRIPPER
734	92.72	94.86			10:11	EDIBLE STRIPPER
735	92.43	94.62	.52		10:11	EDIBLE STRIPPER
736	92.29	94.68			10:13	DT
737	92.85	94.78			10:13	DT
738	92.79	95.35			10:13	DT
739	92.83	95.77			10:15	AD
740	92.78	96.20	.51		10:15	AD
741	92.51	95.61			10:15	AD
742	92.46	95.48			10:18	COOLER
743	92.92	95.65			10:18	COOLER
744	92.52	95.01			10:18	COOLER
745	92.56	95.54	.52		10:20	FINAL MEAL
746	92.42	95.68			10:20	FINAL MEAL
747	92.93	95.83			10:20	FINAL MEAL
748	93.22	95.41			11:04	EDIBLE COOLED
749	92.29	94.85			11:04	EDIBLE COOLED

CASCADE L1-C24G2

	TARE	WEIGHT W/SAMPLE		DATE	TIME	SITE
750	92.68	95.09	.53	8/10/79	11:04	EDIBLE COOLED
751	93.81	96.05			11:07	EDIBLE STRIPPE
752	92.51	94.90	–		11:07	EDIBLE STRIPPE
753	92.79	95.28	–		11:07	EDIBLE STRIPPE
754	93.00	95.58	–		11:10	DT
755	92.14	94.78	.52		11:10	DT
756	93.18	95.76	–		11:10	DT
757	92.54	94.97	–		11:14	AD
758	93.51	95.91	–		11:14	AD
759	94.11	96.59			11:14	AD
760	92.89	96.18	↑.50		11:15	COOLER
761	92.15	95.45	↑		11:15	COOLER
762	92.15	94.91	↑		11:15	COOLER
763	93.65	96.53	↑		11:19	FINAL MEAL
764	92.27	95.00	↑		11:19	FINAL MEAL
765	92.93	95.21	↓.50		11:19	FINAL MEAL
766	92.54	95.08			12:00	EDIBLE COOLED
767	93.89	96.32			12:00	EDIBLE COOLED
768	92.54	95.13			12:00	EDIBLE COOLED
769	92.76	94.76			12:02	EDIBLE STRIPPED
770	92.56	94.73	.51		12:02	EDIBLE STRIPPE
771	92.47	94.90			12:02	EDIBLE STRIPPE
772	93.59	96.50			12:03	DT
773	92.74	95.65			12:03	DT
774	93.68	96.06			12:03	DT
775	93.10	95.32	.53		12:06	AD
776	92.48	95.39			12:06	AD
777	93.24	96.03			12:06	AD
778	92.55	95.22			12:09	COOLER
779	93.01	95.50			12:09	COOLER
780	92.94	96.12	.51		12:09	COOLER
781	93.97	96.57			12:10	F.M.
782	92.74	95.83			12:10	FM
783	92.46	95.09			12:10	FM
784	93.97	96.80	.52		13:03	EDIBLE COOLED
785	92.21	94.63			13:03	EDIBLE COOLED
786	92.63	94.92			13:03	EDIBLE COOLED
787	92.74	95.28			13:05	EDIBLE STRIPPE

CADE L1-C2462

	TARE	WEIGHT W/SAMPLE		DATE	TIME	SITE
788	92.75	94.98		8/10/79	13:05	EDIBLE STRIPPER
789	92.74	95.14			13:05	EDIBLE STRIPPER
790	92.27	95.18	.53		13:09	DT
791	92.46	95.41			13:09	DT
792	92.61	94.81			13:10	DT
793	92.61	95.57			13:12	AD
794	92.90	95.72			13:12	AD
795	92.73	95.94	.49		13:12	AD
796	92.59	96.18			13:14	COOLER
797	92.83	96.11			13:14	COOLER
798	92.82	96.04			13:14	COOLER
799	92.68	95.73			13:16	FINAL MEAL
800	93.08	96.23	.40		13:16	FINAL MEAL
801	92.76	95.72			13:16	FINAL MEAL
802	92.97	95.62			14:02	EDIBLE COOLED
803	92.33	95.19			14:02	EDIBLE COOLED
804	92.55	95.71			14:02	EDIBLE COOLED
805	93.07	95.53	.48		14:04	EDIBLE STRIPPER
806	92.47	95.23			14:04	EDIBLE STRIPPER
807	92.82	95.48			14:04	EDIBLE STRIPPER
808	92.69	95.58			14:07	DT
809	93.07	95.70			14:07	DT
810	92.98	95.59	.53		14:07	DT
811	92.42	95.16			14:10	AD
812	92.53	95.50			14:10	AD
813	92.50	95.28			14:10	AD
814	92.86	96.21			14:11	COOLER
815	92.59	95.45	.51		14:11	COOLER
816	92.69	95.75			14:11	COOLER
817	92.29	94.95			14:13	FM
818	92.78	95.91			14:13	FM
819	92.88	95.58			14:13	FM
820	92.97	95.18	.51		14:58	EDIBLE COOLED
821	92.82	94.91			14:58	EDIBLE COOLED
822	93.30	95.77			14:58	EDIBLE COOLED
823	92.75	95.28			15:00	EDIBLE STRIPPER
824	92.68	94.63			15:00	EDIBLE STRIPPER
825	92.29	94.53	.51		15:00	EDIBLE STRIPPER

CASCADE L1-C2462

	TARE	WEIGHT W/SAMPLE		DATE	TIME	SITE
826	92.93	95.64		8/10/79	15:02	DT
827	92.68	95.56			15:02	DT
828	92.86	95.73			15:02	DT
829	92.94	95.84			15:04	AD
830	92.45	96.04	.51		15:04	AD
831	92.44	95.52			15:04	AD
832	92.71	96.26			15:05	COOLER
833	92.52	95.69			15:05	COOLER
834	93.25	96.65			15:05	COOLER
835	92.89	95.52	.50		15:08	FINAL MEAL
836	92.50	95.17			15:08	FINAL MEAL
837	92.88	95.40			15:08	FINAL MEAL
838	92.41					
839	92.68					
840	93.06					
841	92.97					
842	92.25					
843	93.20					
844	92.43					
845	92.40					
846	92.42					
847	92.61					
848	92.64					
849	92.86					
850	92.40					
851	92.54					
852	92.54					
853	92.49					
854	92.74					
855	92.43					
856	92.70					
857	92.54					
858	92.49					
859	92.51					
860	92.46					
861	92.77					
862	92.70					
863	93.05					

APPENDIX B

MEAL SAMPLE LABORATORY ANALYSIS REPORT

DATA SHEET

Plant: Ralston-Purina Bloomington, Illinois Date: August 10, 1979

Date Analysis	Sample No.- Location		Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
9/26/79	711	Edible Cooled	8/10/79	9:03	1.35	1200	1400
9/26/79	712	Edible Cooled	8/10/79	9:03	1.75	1200	1300
9/26/79	713	Edible Cooled	8/10/79	9:03	1.78	1100	1200
9/26/79	714	Edible Stripper	8/10/79	9:09	1.57	1400	1600
9/26/79	715	Edible Stripper	8/10/79	9:09	1.62	1500	1700
9/26/79	716	Edible Stripper	8/10/79	9:09	1.54	1500	1700
9/26/79	717 ①	D.T.	8/10/79	9:11	1.77	260	380
9/26/79	718 ①	D.T.	8/10/79	9:11	1.75	400	570
9/26/79	719	D.T.	8/10/79	9:11	1.58	280	390
9/26/79	720	A.D.	8/10/79	9:15	2.25	190	230
9/26/79	721	A.D.	8/10/79	9:15	2.55	250	300
9/26/79	722	A.D.	8/10/79	9:15	2.53	230	270
9/26/79	723	Final Meal	8/10/79	9:20	2.39	160	190
9/26/79	724	Final Meal	8/10/79	9:20	2.82	140	160
9/26/79	725	Final Meal	8/10/79	9:20	3.27	120	140
9/26/79	726	Cooler	8/10/79	9:17	2.26	220	260
9/26/79	727	Cooler	8/10/79	9:17	2.82	180	210
9/26/79	728	Cooler	8/10/79	9:17	2.74	180	210
9/26/79	730	Edible Cooled	8/10/79	10:09	1.56	1200	1400
9/26/79	731	Edible Cooled	8/10/79	10:09	1.55	1300	1500
9/26/79	732	Edible Cooled	8/10/79	10:09	1.54	1300	1400
9/26/79	733	Edible Stripper	8/10/79	10:11	1.38	1200	1500
9/26/79	734	Edible Stripper	8/10/79	10:11	1.61	1500	1700
9/26/79	735	Edible Stripper	8/10/79	10:11	1.67	1400	1600
9/26/79	736	D.T.	8/10/79	10:13	1.87	260	350
9/26/79	737	D.T.	8/10/79	10:13	1.43	260	350
9/26/79	738	D.T.	8/10/79	10:13	2.06	260	340
9/27/79	739	A.D.	8/10/79	10:15	2.43	220	260
9/27/79	740	A.D.	8/10/79	10:15	2.81	210	250
9/27/79	741	A.D.	8/10/79	10:15	2.58	220	260
9/27/79	742[1]	Cooler	8/10/79	10:18	2.87	130	160
9/27/79	743	Cooler	8/10/79	10:18	2.20	190	220
9/27/79	744	Cooler	8/10/79	10:18	1.98	190	210

① Reanalysis of this sample yielded same results.

DATA SHEET

Plant: Ralston-Purina Bloomington, Illinois Date: August 10, 1979

Date Analysis	Sample No.- Location		Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
9/27/79	745	Final Meal	8/10/79	10:20	2.46	130	150
9/27/79	746	Final Meal	8/10/79	10:20	2.74	130	150
9/27/79	747	Final Meal	8/10/79	10:20	2.37	140	150
9/27/79	748	Edible Cooled	8/10/79	11:04	1.88	1400	1500
10/3/79	749	Edible Cooled	8/10/79	11:04	2.04	1300	1400
10/3/79	750	Edible Cooled	8/10/79	11:04	1.88	1300	1500
10/3/79	751	Edible Stripper	8/10/79	11:07	1.73	1500	1700
10/3/79	752	Edible Stripper	8/10/79	11:07	1.86	1600	1900
10/3/79	753	Edible Stripper	8/10/79	11:07	1.97	1900	2200
10/3/79	754	D.T.	8/10/79	11:10	2.06	300	410
10/3/79	755	D.T.	8/10/79	11:10	2.12	320	410
10/3/79	756	D.T.	8/10/79	11:10	2.09	300	400
10/2/79	757	A.D.	8/10/79	11:14	1.93	210	250
10/2/79	758	A.D.	8/10/79	11:14	1.87	240	280
10/2/79	759	A.D.	8/10/79	11:14	1.96	230	260
10/2/79	760	Cooler	8/10/79	11:15	2.79	220	250
10/2/79	761 (1)	Cooler	8/10/79	11:15	2.19	160	180
10/2/79	762	Cooler	8/10/79	11:15	2.23	220	260
10/2/79	763	Final Meal	8/10/79	11:19	2.36	150	170
10/2/79	764	Final Meal	8/10/79	11:19	2.19	150	170
10/2/79	765	Final Meal	8/10/79	11:19	1.78	140	170
10/2/79	766	Edible Cooled	8/10/79	12:00	2.03	1200	1300
10/2/79	767	Edible Cooled	8/10/79	12:00	1.91	1200	1500
10/2/79	768	Edible Cooled	8/10/79	12:00	2.07	1300	1400
10/3/79	769	Edible Stripper	8/10/79	12:02	1.04	1800	1400
10/3/79	770	Edible Stripper	8/10/79	12:02	1.36	1200	1300
10/3/79	771	Edible Stripper	8/10/79	12:02	1.91	1400	1600
10/3/79	772 (1)	D.T.	8/10/79	12:03	2.42	180	240
10/3/79	773	D.T.	8/10/79	12:03	2.37	270	340
10/3/79	774	D.T.	8/10/79	12:03	1.87	280	260
10/3/79	775	A.D.	8/10/79	12:06	1.69	230	270
10/3/79	776	A.D.	8/10/79	12:06	2.37	220	250
10/3/79	777	A.D.	8/10/79	12:06	2.28	170	210

(1) Reanalysis of this sample yielded same results.

DATA SHEET

Plant: Ralston-Purina Bloomington, Illinois Date: August 10, 1979

Date Analysis	Sample No.- Location		Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
10/3/79	778	Cooler	8/10/79	12:09	2.16	170	190
10/3/79	779	Cooler	8/10/79	12:09	1.97	210	240
10/3/79	780	Cooler	8/10/79	12:09	2.67	180	220
10/5/79	781	Final Meal	8/10/79	12:10	2.08	130	160
10/5/79	782	Final Meal	8/10/79	12:10	2.56	81	92
10/5/79	783	Final Meal	8/10/79	12:10	2.13	120	140
10/5/79	784	Edible Cooled	8/10/79	13:03	2.31	1000	1100
10/5/79	785	Edible Cooled	8/10/79	13:03	1.80	1100	1200
10/5/79	786	Edible Cooled	8/10/79	13:03	2.35	1100	1200
10/5/79	787	Edible Stripper	8/10/79	13:05	2.01	1300	1400
10/5/79	788	Edible Stripper	8/10/79	13:05	1.70	1000	1200
10/5/79	789	Edible Stripper	8/10/79	13:05	1.88	1000	1200
10/5/79	790	D.T.	8/10/79	13:09	2.38	220	280
10/5/79	791	D.T.	8/10/79	13:09	2.43	250	310
10/5/79	792	D.T.	8/10/79	13:09	1.68	250	310
10/5/79	793	A.D.	8/10/79	13:12	2.45	200	230
10/5/79	794	A.D.	8/10/79	13:12	2.32	180	200
10/5/79	795	A.D.	8/10/79	13:12	2.72	170	200
10/5/79	796	Cooler	8/10/79	13:14	3.09	170	220
10/5/79	797	Cooler	8/10/79	13:14	2.77	170	190
10/5/79	798	Cooler	8/10/79	13:14	2.73	180	210
10/5/79	799 (1)	Final Meal	8/10/79	13:16	2.02	130	150
10/5/79	800	Final Meal	8/10/79	13:16	2.75	110	140
10/5/79	801	Final Meal	8/10/79	13:16	2.47	120	140
10/5/79	802 (1)	Edible Cooled	8/10/79	14:02	2.16	2500	3000
10/5/79	803	Edible Cooled	8/10/79	14:02	2.34	2900	3000
10/5/79	804	Edible Cooled	8/10/79	14:02	2.68	3000	3500
10/5/79	805	Edible Stripper	8/10/79	14:04	1.98	3600	4200
10/5/79	806	Edible Stripper	8/10/79	14:04	2.28	4400	4900
10/5/79	807	Edible Stripper	8/10/79	14:04	2.10	4400	4900
10/5/79	808	D.T.	8/10/79	14:07	2.39	590	760
10/5/79	809[1]	D.T.	8/10/79	14:07	2.12	760	1000
10/5/79	810[1]	D.T.	8/10/79	14:07	2.08	540	730

(1) Reanalysis of this sample yielded same results.

DATA SHEET

Plant: Ralston-Purina Bloomington, Illinois Date: August 10, 1979

Date Analysis	Sample No.- Location		Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
10/5/79	811	A.D.	8/10/79	14:10	2.24	170	210
10/5/79	812	A.D.	8/10/79	14:10	2.50	170	200
10/5/79	813	A.D.	8/10/79	14:10	2.27	190	230
10/5/79	814	Cooler	8/10/79	14:11	2.86	180	210
10/5/79	815	Cooler	8/10/79	14:11	2.35	200	220
10/5/79	816	Cooler	8/10/79	14:11	2.61	180	210
10/5/79	817	Final Meal	8/10/79	14:13	2.15	130	140
10/5/79	818	Final Meal	8/10/79	14:13	2.64	118	140
10/5/79	819	Final Meal	8/10/79	14:13	2.18	140	160
10/5/79	820	Edible Cooled	8/10/79	14:58	1.70	970	1100
10/5/79	821	Edible Cooled	8/10/79	14:58	1.58	1100	1200
10/5/79	822	Edible Cooled	8/10/79	14:58	1.95	1100	1200
10/5/79	823	Edible Stripper	8/10/79	15:00	2.01	1100	1200
10/5/79	824	Edible Stripper	8/10/79	15:00	1.42	1100	1400
10/5/79	825	Edible Stripper	8/10/79	15:00	1.73	1200	1300
10/5/79	826	D.T.	8/10/79	15:02	2.20	540	700
10/5/79	827 (1)	D.T.	8/10/79	15:02	2.38	980	1200
10/5/79	828 (1)	D.T.	8/10/79	15:02	2.36	650	850
10/5/79	829	A.D.	8/10/79	15:04	2.39	1500	1800
10/5/79	830	A.D.	8/10/79	15:04	3.08	1400	1600
10/5/79	831 (1)	A.D.	8/10/79	15:04	2.64	1000	1100
10/5/79	832	Cooler	8/10/79	15:05	3.09	1200	1300
10/5/79	833	Cooler	8/10/79	15:05	2.68	1200	1400
10/5/79	834 (1)	Cooler	8/10/79	15:05	2.89	1700	1900
10/5/79	835	Final Meal	8/10/79	15:08	2.13	1000	1200
10/5/79	836	Final Meal	8/10/79	15:08	2.18	1100	1300
10/5/79	837	Final Meal	8/10/79	15:08	2.01	900	1200

(1) Reanalysis of this sample yielded same results.

APPENDIX C

OPACITY FIELD DATA SHEETS

METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 1a, b
DATE 8/10/79
TYPE FACILITY Secondary dehulling
CONTROL DEVICE cyclone

HOURS OF OBSERVATION
OBSERVER David Solomon
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pedco Environmental
POINT OF EMISSIONS Roof stack
HEIGHT OF DISCHARGE POINT 66'

	Initial			Final
CLOCK TIME	9:29			9:40
OBSERVER LOCATION Distance to Discharge	10'			
Direction from Discharge	90°			
Height of Observation Point	60'			
BACKGROUND DESCRIPTION	Red Brick			
WEATHER CONDITIONS Wind Direction	—			
Wind Speed	5 mph			
Ambient Temperature	75°			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	overcast			
PLUME DESCRIPTION Color	white			
Distance Visible	—			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1a	9:29 - 9:34	40	1.67
1b	9:35 - 9:40	10	0.42

Readings ranged from 0 to 5 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2 OF 2

COMPANY Ralston Purina
OBSERVER David Solomon
LOCATION Bloomington, Ill
TYPE FACILITY secondary dehulling
TEST NO. 1a,b
POINT OF EMISSIONS Roof stack
DATE 8/10/79

	Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	9	29	5	5	5	5			
	9	30	5	5	0	0			
	9	31	0	0	5	0			
a	9	32	5	0	0	0			
	9	33	0	0	0	0			
	9	34	0	0	0	0			
									Short puffs occasionally
	9	35	0	0	5	0			
b	9	36	0	0	0	0			
	9	37	0	0	0	0			
	9	38	0	0	0	5			
	9	39	0	0	0	0			
	9	40	0	0	0	0			

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METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 2a, b
DATE 8/10/79
TYPE FACILITY Meal Grinding
CONTROL DEVICE Bag filter

HOURS OF OBSERVATION
OBSERVER David Solomon
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pedco Environmental
POINT OF EMISSIONS R.F stack
HEIGHT OF DISCHARGE POINT 67'

	Initial			Final
CLOCK TIME	9:45			9:56
OBSERVER LOCATION Distance to Discharge	10'			
Direction from Discharge	90°			
Height of Observation Point	60'			
BACKGROUND DESCRIPTION	Dark Bldg.			
WEATHER CONDITIONS Wind Direction	--			
Wind Speed	5 mph			
Ambient Temperature	75°			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	over cast			
PLUME DESCRIPTION Color	white			
Distance Visible				
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
2a	9:45-9:50	98	3.96
2b	9.51-9:56	85	3.54

Readings ranged from 0 to 5 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2 OF 2

COMPANY Ralston-Purina
LOCATION Bloomington, Ill
TEST NO. 2 a, b
DATE 8-10-79

OBSERVER David Solomon
TYPE FACILITY Meal Grinding Bag Filter
POINT OF EMISSIONS Roof stack

	Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	9	45	5	5	5	0			
	9	46	5	0	5	5			
	9	47	5	5	5	0			
a	9	48	5	5	0	5			
	9	49	5	0	5	5			
	9	50	5	5	5	5			
	9	51	5	5	0	5			
	9	52	5	5	5	0			
b	9	53	5	0	5	5			
	9	54	5	5	5	0			
	9	55	0	5	5	5			
	9	56	5	0	5	0			

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METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 3a, b
DATE 8/10/79
TYPE FACILITY Flaking Roll Applicator
CONTROL DEVICE Cyclone

HOURS OF OBSERVATION
OBSERVER David Solomon
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pedco Environmental
POINT OF EMISSIONS Roof stack
HEIGHT OF DISCHARGE POINT 75'

	Initial			Final
CLOCK TIME	10:25			10:36
OBSERVER LOCATION Distance to Discharge	15'			
Direction from Discharge	90°			
Height of Observation Point	60'			
BACKGROUND DESCRIPTION	Green			
WEATHER CONDITIONS Wind Direction				
Wind Speed	0-5			
Ambient Temperature	70°			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Over cast			
PLUME DESCRIPTION Color	white			
Distance Visible	—			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
3a	10:25-10:30	5	0.21
3b	10:31-10:36	15	0.63

Readings ranged from 0 to 5 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2 OF 2

COMPANY Ralston Purina
OBSERVER David Solomon
LOCATION Bloomington, Ill
TYPE FACILITY Flaking Roll Aspiration Cyclon
TEST NO. 39.b
POINT OF EMISSIONS Roof stack
DATE 8/10/79

	Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	10	25	0	0	0	0			
(a)	10	26	0	0	0	0			
	10	27	5	0	0	0			
	10	28	0	0	0	0			
	10	29	0	0	0	0			
	10	30	0	0	0	0			
	10	31	0	0	0	0			
	10	32	0	0	0	5			
(b)	10	33	0	0	0	0			
	10	34	0	0	0	5			
	10	35	0	0	0	5			
	10	36	0	0	0	0			

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METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 4a,b
DATE 8/10/79
TYPE FACILITY Primary Dehulling
CONTROL DEVICE Cyclone

HOURS OF OBSERVATION
OBSERVER David Solomon
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pedco Environmental
POINT OF EMISSIONS Roof stack
HEIGHT OF DISCHARGE POINT 75'

	Initial			Final
CLOCK TIME	10:39			10:50
OBSERVER LOCATION Distance to Discharge	15'			
Direction from Discharge	90°			
Height of Observation Point	60'			
BACKGROUND DESCRIPTION	Dark Bldg			
WEATHER CONDITIONS Wind Direction	—			
Wind Speed	5-10 mph			
Ambient Temperature	70°			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Overcast			
PLUME DESCRIPTION Color	—			
Distance Visible	—			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
4a	10:39-10:44	0	0
4b	10:45-10:50	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 4 a, b
DATE 8/10/79

OBSERVER David Solomon
TYPE FACILITY PRIMARY dehulling cyclone
POINT OF EMISSIONS Roof Stack

	Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	10	39	0	0	0	0			
a	10	40	0	0	0	0			
	10	41	0	0	0	0			
	10	42	0	0	0	0			
	10	43	0	0	0	0			
	10	44	0	0	0	0			
	10	45	0	0	0	0			
b	10	46	0	0	0	0			
	10	47	0	0	0	0			
	10	48	0	0	0	0			
	10	49	0	0	0	0			
	10	50	0	0	0	0			

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METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 5a, b
DATE 8/10/79
TYPE FACILITY Bean cleaning
CONTROL DEVICE cyclone

HOURS OF OBSERVATION
OBSERVER David Solomon
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pepco Environmental
POINT OF EMISSIONS Roof stack
HEIGHT OF DISCHARGE POINT 90'

	Initial			Final
CLOCK TIME	11.26			11.37
OBSERVER LOCATION Distance to Discharge	10'			
Direction from Discharge	90°			
Height of Observation Point	80'			
BACKGROUND DESCRIPTION	DARK exempt			
WEATHER CONDITIONS Wind Direction				
Wind Speed	0-5			
Ambient Temperature	70°			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Over cast			
PLUME DESCRIPTION Color	white			
Distance Visible	—			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
5a	11:26-11:31	15	0.63
5b	11:32-11:37	15	0.63

Readings ranged from 0 to 5 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 5a, b
DATE 8/10/79

OBSERVER David Solomon
TYPE FACILITY Bean cleaning cyclone
POINT OF EMISSIONS Root stock

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
11	26	0	0	0	0			
11	27	5	0	5	0			
11	28	0	0	5	0			
11	29	0	0	0	0			
11	30	0	0	0	0			
11	31	0	0	0	0			
11	32	0	0	0	0			
11	33	0	0	0	0			
11	34	0	0	0	0			
11	35	0	0	0	0			
11	36	0	5	0	5			
11	37	0	5	0	0			

Form 1403 Date 6/78

METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 6a, b
DATE 8/10/79
TYPE FACILITY Flake Transfer
CONTROL DEVICE Bag filter

HOURS OF OBSERVATION
OBSERVER David Salomon
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pedco Environmental
POINT OF EMISSIONS Storage Bin Root stock
HEIGHT OF DISCHARGE POINT 55'

	Initial			Final
CLOCK TIME	11:45			11:56
OBSERVER LOCATION Distance to Discharge	40'			
Direction from Discharge	90°			
Height of Observation Point	Ground			
BACKGROUND DESCRIPTION	Dark Red Brick			
WEATHER CONDITIONS Wind Direction	—			
Wind Speed	0-5			
Ambient Temperature	70°			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Overcast			
PLUME DESCRIPTION Color				
Distance Visible	—			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
6a	11:45-11:50	0	0
6b	11:51-11:56	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 6 a, b
DATE 8/10/79

OBSERVER David Solomon
TYPE FACILITY Flake transfer bag filter
POINT OF EMISSIONS Storage Bin Roof Stack

	Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	11	45	0	0	0	0			
	11	46	0	0	0	0			
	11	47	0	0	0	0			
a	11	48	0	0	0	0			
	11	49	0	0	0	0			
	11	50	0	0	0	0			
	11	51	0	0	0	0			
	11	52	0	0	0	0			
b	11	53	0	0	0	0			
	11	54	0	0	0	0			
	11	55	0	0	0	0			
	11	56	0	0	0	0			

Form 1403 Date 6/78

METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 7a, b
DATE 8/10/79
TYPE FACILITY Flake Cooler
CONTROL DEVICE Bag Filter

HOURS OF OBSERVATION
OBSERVER David Solomon
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pedco Environmental
POINT OF EMISSIONS Above ground stack
HEIGHT OF DISCHARGE POINT 10'

	Initial			Final
CLOCK TIME	12:45			12:56
OBSERVER LOCATION Distance to Discharge	15'			
Direction from Discharge	90°			
Height of Observation Point	Ground			
BACKGROUND DESCRIPTION	Green			
WEATHER CONDITIONS Wind Direction	—			
Wind Speed	—			
Ambient Temperature	70°			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Overcast			
PLUME DESCRIPTION Color				
Distance Visible	—			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
7a	12:45-12:50	0	0
7b	12:51-12:56	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2 OF 2

COMPANY Ralston Purina
LOCATION Bloomington, Ill
TEST NO. 7a, b
DATE 8/12/99

OBSERVER David Solomon
TYPE FACILITY Flake cooler Bag filter
POINT OF EMISSIONS Ground Stack

	Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	12	45	0	0	0	0			
	12	46	0	0	0	0			
a	12	47	0	0	0	0			
	12	48	0	0	0	0			
	12	49	0	0	0	0			
	12	50	0	0	0	0			
b	12	51	0	0	0	0			
	12	52	0	0	0	0			
	12	53	0	0	0	0			
	12	54	0	0	0	0			
	12	55	0	0	0	0			
	12	56	0	0	0	0			

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD

COMPANY Ralston Purina

LOCATION Bloomington, Ill

TEST NO. 3a, b

DATE 8/10/79

OBSERVER David Solomon

TYPE FACILITY Hulls Transfer BAG FILTER

POINT OF EMISSIONS Roof Stack

	Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	1	22	0	0	0	0			
	1	23	0	0	0	0			
a	1	24	0	0	0	0			
	1	25	0	0	0	0			
	1	26	0	0	0	0			
	1	27	0	0	0	0			
	1	28							
	1	29							
	1	30							
	1	31							
	1	32							
	1	33							
	1	40	0	0	0	0			
	1	41	0	0	0	0			
b	1	42	0	0	0	0			
	1	43	0	0	0	0			
	1	44	0	0	0	0			
	1	45	0	0	0	0			

Form 1403 Date 6/78

METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 2

COMPANY Ralston Purina
LOCATION Bloomington Ill
TEST NO. 9a,b
DATE 8/10/79
TYPE FACILITY Meal cooler
CONTROL DEVICE cyclone

HOURS OF OBSERVATION
OBSERVER Dave Salomon
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pedco Env. Commental
POINT OF EMISSIONS Roof stack
HEIGHT OF DISCHARGE POINT 35'

	Initial			Final
CLOCK TIME	1:49			2:00
OBSERVER LOCATION Distance to Discharge	20'			
Direction from Discharge	90°			
Height of Observation Point	Ground			
BACKGROUND DESCRIPTION	Red Brick			
WEATHER CONDITIONS Wind Direction	–			
Wind Speed	0-5			
Ambient Temperature	70°			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Over-cast			
PLUME DESCRIPTION Color	white			
Distance Visible	–			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
9a	1:49-1:54	15	0.63
9b	1:55-2:00	0	0

Readings ranged from 0 to 5 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD

COMPANY Ralston-Purina

OBSERVER David Solomon

LOCATION Bloomington, Ill

TYPE FACILITY Meal cooler cyclone

TEST NO. 9a, b

POINT OF EMISSIONS Cook stack

DATE 9/10/79

	Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
	1	49	0	0	0	0			
	1	50	0	5	0	0			
a	1	51	0	5	5	0			
	1	52	0	0	0	0			
	1	53	0	0	0	0			
	1	54	0	0	0	0			
	1	55	0	0	0	0			
	1	56	0	0	0	0			
b	1	57	0	0	0	0			
	1	58	0	0	0	0			
	1	59	0	0	0	0			
	2	00	0	0	0	0			

Form 1403 Date 6/78