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Title: Written communication from Wendy Eckley, Eckley Engineering, to Dallas Safriet, US EPA

Eckley, Wendy

Eckley Engineering

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Sec. 2 Ref. 15 Sec. 9 Ref. 7

AP-42 Section 9.10.2.1
Reference 7
Report Sect.
Reference

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July 7, 1993

MEMO

After talking with you this morning, I called Jim Ryals.

He informed me that you had told him that EPA had no interest in almond hulling and had no intention of using the AP-42 revision at all; therefore, you didn't care whether the information was accurate or not.

His explanation (attributed to you) was that since virtually all almonds were grown in one state, the federal regulators weren't interested in getting involved, but would rely on California to police itself.

He also told me the people he had appointed to study the draft. After hearing the names, I wish to repeat that our office has no interest in being part of careless or fraudulent work.

I am sending part of the critique I wrote two weeks ago. It is only a small fraction of what I had hoped EPA would want. We have developed emissions factors for varying types of shellers and hullers that have been used in California for permitting modifications and new construction, and for ERC applications.

The only way meaningful numbers can be provided is by producing pounds emissions per tons processed. There is too much to explain on how to develop these factors for this industry to try forcing the information on anyone who is not interested.

If you are not just "checking off an assignment" (as Jim Ryals said), I will be happy to share the test data, calculations, and other pertinent information.

wke

2.2.2
It does not appear to me that any distinction between hulling and shelling is made. Some facilities remove just the hull and sell in-shell almonds; other facilities remove the hull and shell and sell meats. In turn, the hulls are sold, often for the manufacture of cattle and horse food; the shells may be sold to co-generation plants for fuel.

In 2.2.2.2 [After the almonds are hulled, they are ready for further processing (roasting and salting) or raw consumption] the implication is clear that roasting and salting are performed in the shell or that we all consume the shells, roasted or raw. Pistachio's are, in fact, roasted and salted without shelling, but NOT almonds.

In Figure 2.1 I do not see anywhere the shell is discussed. I am inclined to think that the authors do not realize that the meat is covered by a shell, and the shell is covered by a hull.

Let's skip to Refernce 9 under 4.1. I provided the flow diagram of the Kerman facility (*EE Drawing D475A*) and discussed it with MRI people. They quoted from it in this draft (2-10), proving that they have it.

Under 2.4, the cyclone emission of 0.1 gr/dscf is true of some of the cyclone collector data we sent MRI. The range from 18 cyclones in four counties and seven facilities was from 0.0019 to 0.6729 gr/dscf. The pounds/field-weight ton processed PER SYSTEM (which is NOT the same as an emission factor per ton processed) was, in pre-cleaner cyclones from 0.152 to 1.388. In huller/sheller cyclone systems the range was from 4.120 to 0.085 pounds per meat ton processed. But I don't think any of the MRI people understand that those figures alone do NOT tell anything about the total emissions per ton.

To develop that emission factor, a flow diagram of each facility is needed. The airflows through EACH emission point have to be calculated along with the process rate and the grain loading. A facility may have multiple cyclones, a baghouse, and a multitude of airlegs venting to atmosphere. I provided MRI with the spreadsheet of testing we performed on seven airlegs at a Butte County facility. The range in pounds/hour emitted was from 0.0396 to 0.2859; in gr/dscf the range was 0.00079 to 0.2442.

I have calculated complete facilities' emissions and emission factors, but recall sending only one to MRI.

The sentence that starts "For high flow rates..." is misleading and wrong. It is excerpted from the 1974 CARB report and is totally non-sensical in terms of engineering. It is based on a "theory" that has

long since been discredited. Don't lend credence to a myth by perpetuating it, please. A properly designed, fabricated, and operated control device can be extremely efficient. High flow rates are not a factor.

Under 2.3, I have no idea why the statements are made as they are. We tested for metals and both total and crystalline silica. I have the certified lab reports for thirteen samples and the emissions factors as submitted to CARB and to all concerned APCD's for AB-2588 reporting. I don't recognize "small" as a scientific term, but the substances and their values follow:

Air Toxic	Pounds of toxic/pound of emissions
Arsenic	$2x10^{-6}$
Beryllium	$2x10^{-7}$
Cadmium	$3x10^{-6}$
Copper	$1x10^{-4}$
Lead	$4x10^{-5}$
Manganese	$5x10^{-4}$
Mercury	$5x10^{-11}$
Nickel	$3x10^{-5}$
Crystalline Silica	$7x10^{-3}$

Of the metals, only Cu, Pb, Mn, and Ni were found in all samples.

"The source of these metals....." is an irresponsible sentence. There are many sources besides the soil - fertilizers, sprays, elements picked up through the tree roots from both soil and water. Botanists realize that each plant has a propensity for certain substances. That is why planting oleanders around selenium-laden ponding basins has been considered. Cotton plants "attract" (to be facetious in word choice) arsenic, and so on.

The second sentence in 2.3 isn't true either. There are uncontrolled emission points in some almond facilties, just as there are in some cotton gins.

The last sentence in 2.4 is the type of irresponsible writing that makes me wonder why I care about helping. In the CCAGA test cited, the three runs showed PM_{10} to be 47%, 100%, and 21%. In the Particle Measurement Technology data in which a microprocessor controlled sonic siever was used to separate and collect the sample fractions from one of our airleg tests, only 0.4% of the sample was less than 10 microns and 3.1% fell into the range between 10 and 20 microns. It has been known (and published) for years that even baghouse emissions are NOT all PM_{10}, but one still finds statements like the "it might be expected" one in 2.4. I am always tempted to ask: "By whom?"

If the MRI people can't grasp the concepts involved, how can you possibly publish meaningful numbers? If nobody in MRI or EPA realizes that the nutmeat is surrounded by a shell and the shell is encased in a hull, how can they even begin to write about almond hulling/shelling? If there is no understanding that there must be a units emissions/units processed (e.g. pounds/meats-ton, pounds/bale) to discuss the subject sanely, how can you even generate meaningful AP-42's?

Somebody has to understand the process - no matter whether that process in in hullers or gins or anything else. The two most blatant flaws in the cotton gin AP-42 are so obvious that fifth-graders could spot them with only a few sentences explanation - one is a misprint and one is just utter nonsense. And yet, the gin numbers have been used for years with all of the conflicting data being almost universally ignored.

GIGO may be used for computers, but it applies equally to human minds. Can't we at least correct the most obvious errors? We've spent several years digging out material; analyzing source tests and publications; and performing research, testing, and modifications. We have documented information galore, especially on gins and hullers.

Even if Jim Ryals quoted you correctly, and EPA has no interest in a process that is limited to California, that is not justification for knowingly publishing an inaccurate document that will be used to determine whether facilities survive. Under current legislation, a facility must provide offsets in order to perform modifications that increase emissions. The cheapest way is to clean-up existing emissions enough to allow the increase. But because of the demand for meats (rather than in-shell product), many hullers are having to add shelling lines or to go out of business. AP-42's have enough influence that a carelessly written one could, in fact, cause decisions to be made that cause companies to fold.

After talking at length with involved people today and learning that they are planning to invite you to California to observe hulling, shelling, and processing operations, I would like to offer to make our records available to you. We have collected data from many sources, established the pooled source test and reporting figures for AB-2588, performed two major surveys and extensive testing, reduced the data, and worked with the regulatory agencies in permitting and air toxics recording. We also have designed equipment for a number of ag related fields. Our drawing and disk package of plans and specifications for 1D-3D cyclone collectors with low turbulence inlet transitions we make available to anyone throughout the country at no charge (although, since requests are becoming more frequent, I plan to ask a small fee to cover postage and printing). Since we don't sell any equipment, nor do we accept any percentage from manufacturers (as most engineers and architects do), we are not reimbursed for any of this educational work with regulatory agencies.

Let me make one more effort to communicate with you. If it is true, as Jim Ryals insists you told him, that you really don't care what you publish because almond hulling is limited to one state, then admit it. If his statement is not true, then try to understand the process.

You must be made aware that the process rate is normally an estimate given to the source testing technicians, whether or not it is published in the lab report. The source testing company takes no responsibility for its accuracy. On our CCAGA test we recorded the actual weights at unloading; therefore, the field weight processed is accurate. One of the most common ways to change the emission factors is to use inaccurate process rates/weights.

Without a flow diagram of a facility, there is no way to develop an emissions factor. All emissions points must be accounted for. On the 1974 CARB tests we have no way of knowing how many cyclones were in each pre-cleaner system, for example. The information is only given per cyclone. We also have no knowledge of other emissions points, such as airlegs. Look at the Butte Co. flow chart: it has one cyclone for the pre-cleaner, one from the huller, and one serving both. It also has seven airlegs from the huller, six of which vent directly to atmosphere.

Now look at items 1023, 1028, 1031, 3014, and 3022 on the two cyclone print-out sheets from the testing we did last fall. Those systems have from three to ten cyclones each. If a source test by the CARB approved testing lab had been performed, the data would have been printed as gr/dscf, pounds/hour, and, IF the management gave the lab process numbers (right or wrong), as pounds/ton processed.

BUT THE POUNDS/TON PROCESSED WOULD APPLY TO ONLY ONE CYCLONE! If the only emissions point in that pre-cleaner were one cyclone, the number could reflect emissions. If there were multiple cyclones on a splitter serving that pre-cleaner, the number would be wrong. By the same token, the labs are printing "pound/bale" figures for cotton gins BUT WITH RESPECT TO ONLY ONE OF MULTIPLE CYCLONES ON A SPLITTER. The unsophisticated engineer writing permits for an air district, assumes "pounds/bale" means pounds/bale. The practice is misleading at best.

With respect to flow rate, there is even more confusion. Roughly five tons must run through a pre-cleaner to produce one ton of meats. That means that to generate a pounds/meat-ton emissions factor, five times the pre-cleaner factor must be added to the huller-sheller factor. But only about 70% of the material coming into a plant enters the huller and only about 30% enters the sheller. Because there is no way to weigh the intermediate process, it is necessary to calculate from both ends towards the middle to develop an emissions factor. We can determine field-weight; we can determine end-product weight (whether it is in-shell or meats). I have developed a series of equations to make these calculations easier and given them to interested air quality engineers.

Example of illustrated problem w/ interpreting source tests. The unsophisticated air quality engineer would assume a meaning not justified.

	Run #1	Run #2	Run #3	Average
Total Particulate				
gr/DSCF	0.0130	0.0124	0.0113	*0.0122*
lb/hr	0.45	0.43	0.39	*0.42*
lb/Bale	0.04	0.04	0.04	*0.04*
Particule Size Distribution				
+10μ (%)	57.08	62.74	73.10	*64.31*
+10μ (lb/hr)	0.26	0.27	0.29	*0.27*
+10μ (lb/Bale)	0.02	0.03	0.03	*0.03*
-10μ (%)	42.92	37.26	26.90	*35.69*
-10μ (lb/hr)	0.19	0.16	0.10	*0.15*
-10μ (lb/Bale)	0.02	0.01	0.01	*0.01*

Full facility (FF)
See bottom line

Cale sheet FF
Flow chart, raw data, etc. available

Est. airleg emissions

3 ~ 48"

$$\frac{(3)(48)(12)(1200)}{144} \doteq 14,400 \text{ cfm}$$

average gr/ft³ (from chart)

.00079
.00088
.00269
.00624
.00187
.00291

$\bar{x} = 0.00256$

$$\frac{(14,400)(0.003)(60)}{7000} = 0.37 \text{ lb TSP/hr}$$

$$\overset{50\% \text{ convention}}{=} 0.18 \text{ lb } PM_{10}/\text{hr}$$

ave. process wt = 0.852 tons/hr

airleg emissions/ton = 0.21 lb/ton PM_{10}

Est cyclone emissions (50% convention)

if 5 Tons held wt → 1 ton meats

cyc # 3038	5(0.143) =	0.715	lb/ton meats PM_{10}
# 1057		0.278	
# 1058		0.203	

Total PM_{10} emissions/ton meats

0.21 + 0.715 + 0.278 + 0.203 = 1.4 lb.

Pre-Cleaner Cyclones

	SYSTEM		Gr/ DSCF	DSCFM	Cyl - Cone - ϕ Inches	Field tons/hr	TSP lb/hr	TSP lb/ton
# 3008	Leaf & Dust		0.6046	4436	80 - 80 - 40	18.44	25.59	1.388
			0.7147					
			0.6994					
		$\bar{X}$=	0.6729					
# 3014	Destoner		0.0146	4752	80 - 80 - 40	18.41	1.29	0.559
			0.0485				Note: 8 Cyclones	
		$\bar{X}$=	0.0316				10.30	
# 3022	Off-Pit		0.0374	2377	80 - 80 - 40	18.34	0.70	0.152
			0.0310				Note: 4 Cyclones	
		$\bar{X}$=	0.0342				2.79	
# 3028	Leaf Aspirator		0.0450	6229	59 - 50 - 39	11.67	2.61	0.224
			0.0461					
			0.0557					
		$\bar{X}$=	0.0489					
# 3032	Sand Screen		0.1269	4289	78 - 78 - 54	21.36	5.20	0.243
			0.2284					
			0.0690					
		$\bar{X}$=	0.1414					
# 3037	Destoner		0.0472	7355	48 - 117 - 88	13.20	2.41	0.183
			0.0323					
			0.0351					
		$\bar{X}$=	0.0382					
# 3038	Pit, Deleafer, & Destoner		0.0382	7186	120 - 130 - 60	7.16	2.05	0.286
			0.0282					
			0.0333					
		$\bar{X}$=	0.0332					

Data sheets supplied to MRI previously

All documentation, raw data, etc. in our office

HULLER CYCLONES

	SYSTEM		Gr/DSCF	DSCFM	Cyl - Cone- ϕ	Meats tons/hr	TSP lb/hr	TSP lb/ton
# 1016	Gravity Table		0.0042	7079	60 - 60 - 44	2.89	0.1638	0.057
			0.0012					
		$\bar{X}$=	0.0027					
# 1017	Shell Aspirator		0.0212	2388	72 - 72 - 34	1.96	0.4514	0.230
			0.0230					
		$\bar{X}$=	0.0221					
# 1019	Huller Aspirator		0.0264	1626	72 - 72 - 34	2.89	0.3512	0.122
			0.0239					
		$\bar{X}$=	0.0252					
# 1023	2 ~ 48" Airlegs		0.0030	5027	88 - 88 - 44	2.52	0.1293	0.154
			0.0031				Note: 3 Cyclones	
		$\bar{X}$=	0.0030				0.3878	
# 1028	1 ~ 60" Meat Airleg		0.0055	2707	66 - 84 - 42	2.52	0.1114	0.133
			0.0042				Note: 3 Cyclones	
		$\bar{X}$=	0.0048				0.3341	
# 1031	8 ~ Sheller Decks		0.0645	1767	68 - 69 - 26	2.52	1.0375	4.120
			0.0725				Note: 10 Cyclones	
		$\bar{X}$=	0.0685				10.37	
# 1046	Decks		0.0016	6175	61 - 104 - 46	1.18	0.1006	0.085
			0.0018					
			0.0023					
		$\bar{X}$=	0.0019					
# 1048	Shell		0.1320	3450	78 - 78 - 56	2.09	4.1016	1.960
			0.1430					
			0.1411					
		$\bar{X}$=	0.1387					
# 1055	Huller		0.3641	2545	43 - 77 - 42	6.78	7.58	1.120
			0.3264			Note: In-shell tons		
			0.3517					
		$\bar{X}$=	0.3474					
# 1057	Shear Rolls		0.0146	3328	68 - 80 - 72	0.852	0.4735	0.556
			0.0175					
			0.0178					
		$\bar{X}$=	0.0166					
# 1058	Huller		0.0170	2842	68 - 80 - 64	0.852	0.3459	0.406
			0.0141					
			0.0114					
		$\bar{X}$=	0.0142					

Sample number	Emission Point	Run number	Filter wt. empty (gm) Carbon	Filter wt. Stop (gm) Packing	Filter gain (gm)	Run Time (min)	Sample Flow cfm	Sample grains/scf collected	Sample grains/min collected	Grains/scf	% excess	System ACFM	System grains/hr	System pounds/hr	Destination	Assumed % controlled	Pounds/hr emitted
	(Repeat)																
7	22 Airleg N	L	20.763	21.069	0.306	48	102.5	0.0064	0.6875	0.00096	0.00079	5852	277	0.0396	atmosphere	100	0.0396
11		2	21.207	21.405	0.198	48	102.5	0.0041	0.06326	0.00062							
4	22 Airleg S	L	20.622	21.019	0.397	48	106.8	0.0083	0.1276	0.00119	0.00088	6290	392	0.0414	atmosphere	100	0.0414
8		2	20.899	21.067	0.190	48	106.8	0.0040	0.0611	0.00057							
	(Re-Finish)																
6	E Airleg S	L	20.951	21.838	0.887	48	120.4	0.01848	0.2851	0.00237	0.00269	6212	1003	0.1432	atmosphere	100	0.1432
4		2	21.101	22.227	1.126	48	120.4	0.02346	0.3620	0.00301							
1	E Airleg N	L	21.278	23.730	2.452	60	99.4	0.0109	0.6506	0.00705	0.00624	5945	2001	0.2859	atmosphere	100	0.2859
2		2	20.914	22.421	1.507	48	99.4	0.0314	0.4844	0.00542							
9	Mach Airleg S	L	21.233	21.984	0.951	60	116.8	0.0126	0.1931	0.00165	0.00189	4286	451	0.0687	hull house	100	0.0687
12		2	20.951	21.862	0.911	60	111.9	0.0162	0.2483	0.00209							
10	Mach Airleg N	L	21.133	21.673	0.540	30	96.5	0.0180	0.2777	0.00238	0.00291	3700	646	0.0923	hull house	100	0.0923
13		2	21.068	21.620	0.552	30	96.5	0.0184	0.2839	0.00244							
5	Dryer	L	23.571	23.581	0.010	60	45.5	0.00017	0.00257	0.000056	0.000064	41,443	164	0.02346	atmosphere	100	0.02846
3		2	28.693	23.706	0.012	60	44	0.00020	0.00302	0.000076							
	(Repeat)																
15	500 Airleg	L	23.269	66.276	43.007	18	136.6	2.389	36.862	0.1975	0.2442	2928	42,901	6.129	hull house	$\frac{3.5}{20}$	0.2145
16		2	21.420	42.524	21.104	6	136.6	3.517	54.267	0.2908							
														Σ 7 airlegs			0.8936

1992 Cyclone Collector Testing Program by County

STANISLAUS

Fraser Almond Farms
3530 Geer Road, Hughson 95326

Waterford Almond Huller & Sheller
12013 El Pomar Avenue, Waterford 95386

MERCED

Monte Cristo Packing Company
11173 W. Mercedes Ave., Livingston 95334

Swanson Hulling
19835 Fowler Road, Turlock 95380

MADERA

Minturn Huller Cooperative, Inc.
9080 S. Minturn Rd., Chowchilla 93610

BUTTE

Almont Orchards, Inc.
3108 Burdick Road, Chico 95928

Shasta Vista Almond Huller
4471 Nord Highway, Chico 95926