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Date: April 30, 1997

Subject: Storage Tank Data and Results of Storage Tank Emission Calculations Using TANKS3 Software--Pesticide Active Ingredient Production Industry
EPA Contract 68D60012; Task Order No. 0004
ESD Project No. 93/59; MRI Project No. 4800-04

From: Karen L. Schmidtke

To: Lalit Banker
ESD/OCG (MD-13)
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Research Triangle Park, NC 27711

The purpose of this memorandum is to describe the method used to estimate hazardous air pollutant (HAP) emissions from storage tanks for the pesticide active ingredient (PAI) production industry. Uncontrolled emissions from each HAP storage tank were calculated using EPA's TANKS3 program.[1] This program requires several parameters for calculating emissions, including type of tank, tank dimensions, liquid height, location of the tank, and composition of the tank components. Facilities provided tank capacity, throughput, and tank composition in their responses to information requests.[2] A location contained within the city/state data base in the TANKS3 program closest to the facility was used. The following assumptions were made: (1) the tank roof is shaped like a cone, (2) throughput is divided equally among 12 months of the year, and (3) default values in the TANKS3 program were used for roof and shell color, roof and shell condition, roof slope, and pressure/vacuum vent settings. Other assumptions relating to the dimensions of each storage tank were also made. *This information is contained in the confidential addendum to this memorandum.*

Storage tank dimensions and annual throughputs for each tank are presented in Attachment 1. The emissions estimated by the TANKS3 program are provided in Attachment 2. The plant identification number and the tank number are listed for each tank. Facilities provided emission estimates for some storage tanks in their responses and these tanks are identified in Attachment 1.

Some of the storage tanks identified by facilities in the PAI industry are not shown in Attachment 1. These tanks were not included because: (1) the composition of tanks components was not provided, (2) the tanks were determined to be process tanks

not storage tanks, (3) throughput was zero for 1994, or (4) the tank contained hydrochloric acid.

REFERENCES

1. User's Guide to TANKS, Storage Tank Emissions Calculation Software, Version 3.0. Emissions Inventory Branch, U.S. Environmental Protection Agency. February 1996.

2. K. Schmidtke, MRI, to L. Banker, EPA:ESD. November 11, 1996. Documentation of Data Base Containing Information from Section 114 Responses and Site Visits for the Pesticide Active Ingredient Source Category.

Attachments

Attachment 1

STORAGE TANK PARAMETERS

PLANT	NUMBER		SIZE-GAL	THROUGHPUT, GAL	SIZE, FT3	H SHELL, FT	DIAMETER, FT	H LIQUID, FT
1	ST001		6,000	60,000	802.1390			
1	ST006		500,000	56,000,000	66,844.9198			
1	ST007		500,000	56,000,000	66,844.9198			
1	ST009		500,000	64,000,000	66,844.9198			
1	ST010		500,000	64,000,000	66,844.9198			
3	ST003		2,500	9,800	334.2246			
3	ST004		14,000	119,000	1,871.6578			
3	ST005		7,500	38,000	1,002.6738			
3	ST006		10,000	81,000	1,336.8984			
3	ST007		22,000	262,940	2,941.1765			
5	ST001		66,000	176,440	8,823.5294			
5	ST002		66,000	176,440	8,823.5294			
5	ST003		66,000	176,440	8,823.5294			
7	ST001	Plant em calc	14,500	27,000	1,938.5027			
8	ST001		220,000	4,840,000	29,411.7647			
8	ST002	Breathing losses only	35,000	Constant level	4,679.1444			
8	ST003		100,000	500,000	13,368.9840			
8	ST004		500,000	1,000,000	66,844.9198			
8	ST005		27,000	40,300	3,609.6257			
8	ST006		7,000	77,000	935.8289			
8	ST007		7,000	77,000	935.8289			
8	ST008		7,000	224,000	935.8289			
8	ST017		10,000	3,670	1,336.8984			
10	ST001		5,200	348,700	695.1872			
10	ST002		15,750	324,900	2,105.6150			
10	ST003		15,750	324,900	2,105.6150			
10	ST004		8,400	537,700	1,122.9947			
10	ST005		33,000	179,200	4,411.7647			
11	ST001		12,690	2,120,260	1,696.5241			
11	ST002		30,000	455,000	4,010.6952			
11	ST003		7,900	175,000	1,056.1497			
11	ST004		6,540	52,980	874.3316			
11	ST005		13,500	322,530	1,804.8128			
11	ST006		13,500	755,800	1,804.8128			
11	ST007		1,567,000	5,342,000	209,491.9786			
11	ST008		144,000	2,890,000	19,251.3369			
11	ST010		27,000	3,140,000	3,609.6257			
11	ST011		30,600	815,000	4,090.9091			
12	ST001		40,000	31,000	5,347.5936			
12	ST002		32,000	79,000	4,278.0749			
12	ST003		84,000	68,000	11,229.9465			
12	ST004		40,000	56,000	5,347.5936			
12	ST005		10,500	33,000	1,403.7433			
12	ST006		7,000	11,000	935.8289			
12	ST007		10,300	75,000	1,377.0053			
12	ST008		10,300	213,000	1,377.0053			
12	ST009		10,300	111,000	1,377.0053			
12	ST010		30,000	31,200	4,010.6952			
12	ST011		20,000	33,800	2,673.7968			
12	ST012		7,500	7,800	1,002.6738			
12	ST013		20,000	369,000	2,673.7968			
13	ST001		17,500	160,000	2,339.5722			
14	ST001		47,000	620,800	6,283.4225			
14	ST002		32,000	747,310	4,278.0749			
14	ST003		47,000	1,226,040	6,283.4225			
14	ST004		30,000	91,823	4,010.6952			
14	ST005		32,000	308,147	4,278.0749			
15	ST002		5,313	146,160	710.2941			
15	ST003		6,423	146,160	858.6898			
15	ST004		12,847	146,160	1,717.5134			
17	ST005		17,760	600	2,374.3316			
20	ST001		25,600	119,742	3,422.4599			
20	ST002		30,000	464,997	4,010.6952			

CONFIDENTIAL BUSINESS INFORMATION

STORAGE TANK PARAMETERS

PLANT	NUMBER		SIZE-GAL	THROUGHPUT, GAL	SIZE, FT3	H SHELL, FT	DIAMETER, FT	H LIQUID, FT
20	ST003	Plant em calculation	16,000	177,681	2,139.0374			
20	ST005		12,000	13,330	1,604.2781			
20	ST006		14,000	12,540	1,871.6578			
20	ST007		12,387	7,120	1,656.0160			
21	ST001		15,000	213,950	2,005.3476			
21	ST002		15,000	19,914	2,005.3476			
21	ST003		30,000	2,250,000	4,010.6952			
21	ST007		15,000	490,000	2,005.3476			
21	ST008		15,000	10,800,000	2,005.3476			
21	ST009		15,000	3,640,000	2,005.3476			
21	ST010		15,000	1,810,000	2,005.3476			
21	ST011		15,000	14,700,000	2,005.3476			
22	ST006		31,600	68,478	4,224.5989			
22	ST007		102,000	288,954	13,636.3636			
23	ST001	Plant em calculations	20,000	20,540	2,673.7968			
23	ST002	Plant em calculations	20,000	20,540	2,673.7968			
23	ST003	Plant em calculations	75,000	816,334	10,026.7380			
23	ST004	Plant em calculations	30,000	1,375,248	4,010.6952			
23	ST005	Plant em calculations	50,000	3,069,544	6,684.4920			

Attachment 2

Annual Emissions Report

01.001 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	99.39
Total:	99.39

01.006 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	25396.12
Total:	25396.12

01.007 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	25396.12
Total:	25396.12

01.009 Vertical Fixed Roof

Components	Emissions (lbs.)
TOLUENE/CYANURIC CHLORIDE	277338.49
Toluene	11058.72
CYANURIC CHLORIDE	266279.77
Total:	277338.49

01.010 Vertical Fixed Roof

Components	Emissions (lbs.)
TOLUENE/CYANURIC CHLORIDE	277338.49
Toluene	11058.72

	CYANURIC CHLORIDE	266279.77
Total:		277338.49

03.003 Vertical Fixed Roof

Components	Emissions (lbs.)
CHLOROACETIC ACID/WATER/ETHYL	2.24
CHLOROACETIC ACID	0.00
WATER	1.75
ETHYL CHLOROACETATE	0.05
Ethyl alcohol	0.43
Total:	2.24

03.004 Vertical Fixed Roof

Components	Emissions (lbs.)
BUTYL CELLOSOLVE/ETHYL ALC/WAT	78.50
BUTYL CELLOSOLVE	0.01
Ethyl alcohol	73.35
WATER	3.97
TRIETHYLAMINE	1.17
Total:	78.50

03.005 Vertical Fixed Roof

Components	Emissions (lbs.)
Methyl alcohol	70.17
Total:	70.17

03.006 Vertical Fixed Roof

Components	Emissions (lbs.)
Methyl alcohol	116.71
Total:	116.71

03.007 Vertical Fixed Roof

Components	Emissions (lbs.)
BUTYL CELLOSOLVE	3.79
Total:	3.79

05.001 Vertical Fixed Roof

	Components	Emissions (lbs.)
	GLYCOL ETHERS	1474.33
Total:		1474.33

05.002 Vertical Fixed Roof

	Components	Emissions (lbs.)
	GLYCOL ETHERS	1474.33
Total:		1474.33

05.003 Vertical Fixed Roof

	Components	Emissions (lbs.)
	GLYCOL ETHERS	1474.33
Total:		1474.33

08.001 Vertical Fixed Roof

	Components	Emissions (lbs.)
	TRICHLOROBENZENE (1,2,4-)	216.46
Total:		216.46

08.003 Vertical Fixed Roof

	Components	Emissions (lbs.)
	Methyl alcohol	1524.82
Total:		1524.82

08.004 Vertical Fixed Roof

	Components	Emissions (lbs.)
	TRICHLOROBENZENE (1,2,4-)	148.30
Total:		148.30

08.005 Vertical Fixed Roof

	Components	Emissions (lbs.)
	Xylene (-m)	109.47
Total:		109.47

08.006 Vertical Fixed Roof

	Components	Emissions (lbs.)
	ETHYLENE GLYCOL/WATER	14.04

ETHYLENE GLYCOL	0.08

Annual Emissions Report Tank 8.002

Liquid Contents	Losses (lbs.): Standing	Working	Total
METHANOL/WATER	100.22	76.11	176.33
Methyl alcohol	70.94	53.87	124.81
WATER	29.28	22.24	51.52
Total:	100.22	76.11	176.33

	WATER	13.97
Total:		14.04

08.007 Vertical Fixed Roof

Components	Emissions (lbs.)
ETHYLENE GLYCOL/WATER	14.04
ETHYLENE GLYCOL	0.08
WATER	13.97
Total:	14.04

08.008 Vertical Fixed Roof

Components	Emissions (lbs.)
ETHYLENE GLYCOL/WATER	28.72
ETHYLENE GLYCOL	0.18
WATER	28.54
Total:	28.72

08.017 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	75.88
Total:	75.88

10.001 Vertical Fixed Roof

Components	Emissions (lbs.)
Tetrachloroethylene	267.46
Total:	267.46

10.002 Vertical Fixed Roof

Components	Emissions (lbs.)
CARBON TET/TETRACHLOROETHYLENE	2316.54
Carbon tetrachloride	2230.97

	Tetrachloroethylene	85.56
Total:		2316.54

10.003 Vertical Fixed Roof

Components	Emissions (lbs.)
CARBON TET/TETRACHLOROETHYLENE	2316.54
Carbon tetrachloride	2230.97
Tetrachloroethylene	85.56
Total:	2316.54

10.004 Vertical Fixed Roof

Components	Emissions (lbs.)
CARBON TET/TETRACHLOROETHY/HEX	658.40
Tetrachloroethylene	344.29
HEXACHLOROETHANE (PERCHLOROETH	0.10
HEXACHLOROBENZENE	0.00
[redacted]	33.47
Carbon tetrachloride	280.54
Total:	658.40

10.005 Vertical Fixed Roof

Components	Emissions (lbs.)
CARBON TET/TETRACHLOROETHY/HEX	1404.23
Carbon tetrachloride	1251.00
Tetrachloroethylene	139.57
HEXACHLOROETHANE (PERCHLOROETH	0.08
HEXACHLOROBENZENE	0.00
[redacted]	13.57
Total:	1404.23

11.001 Vertical Fixed Roof

Components	Emissions (lbs.)
TOLUENE/OTHER	518.16
Toluene	509.48

	Ethylbenzene	8.68
Total:		518.16

11.002 Vertical Fixed Roof

Components	Emissions (lbs.)
TOLUENE/AMINONITRILE	229.88
Toluene	96.64
[redacted]	133.24
Total:	229.88

11.003 Vertical Fixed Roof

Components	Emissions (lbs.)
Methyl isobutyl ketone	100.52
Total:	100.52

11.004 Vertical Fixed Roof

Components	Emissions (lbs.)
DICHLOROMETHANE/OTHER	1225.90
Methylene chloride	1222.25
Toluene	3.65
Total:	1225.90

11.005 Vertical Fixed Roof

Components	Emissions (lbs.)
TOLUENE/OTHER	263.09
Toluene	259.59
Ethylbenzene	3.50
Total:	263.09

11.006 Vertical Fixed Roof

Components	Emissions (lbs.)
METHANOL/WATER	578.40
Methyl alcohol	574.22

	WATER	4.18
Total:		578.40

11.007 Vertical Fixed Roof

Components	Emissions (lbs.)
XYLENE/OTHER	2455.44
Ethylbenzene	56.06
Xylene (-o)	2399.39
Total:	2455.44

11.008 Vertical Fixed Roof

Components	Emissions (lbs.)
ETHYLENE DICHLORIDE/OTHER	7122.15
Dichloroethane (1,2)	7105.93
Ethylbenzene	16.22
Total:	7122.15

11.010 Vertical Fixed Roof

Components	Emissions (lbs.)
ETHYLENE DICHLORIDE/OTHER	3011.92
Dichloroethane (1,2)	3005.06
Ethylbenzene	6.86
Total:	3011.92

11.011 Vertical Fixed Roof

Components	Emissions (lbs.)
FORMALDEHYDE/METHANOL/WATER	15.54
Methyl alcohol	6.52

	FORMALDEHYDE (37%)	9.02
Total:		15.54

12.001 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	280.80
Total:	280.80

12.002 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	255.38
Total:	255.38

12.003 Vertical Fixed Roof

Components	Emissions (lbs.)
CYANOHYDRIN/TOLUENE	237.32
CYANOHYDRIN	1.59
Toluene	235.72
Total:	237.32

12.004 Vertical Fixed Roof

Components	Emissions (lbs.)
PSEUDOCUMENE/TRIMETHYLBENZ/XYL	62.09
PSEUDOCUMENE (1,2,4-TRIMETHYLB	7.58
TRIMETHYLBENZENE (1,3,5-)	15.31
Xylene (-m)	33.81
PROPYL BENZENE (N-)	2.68
Ethylbenzene	2.71

Total:		62.09

12.005 Vertical Fixed Roof

Components	Emissions (lbs.)
Methyl alcohol	169.31
Total:	169.31

12.006 Vertical Fixed Roof

Components	Emissions (lbs.)
FORMALDEHYDE (37%)	0.83
Total:	0.83

12.007 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	140.90
Total:	140.90

12.008 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	273.71
Total:	273.71

12.009 Vertical Fixed Roof

Components	Emissions (lbs.)
TOLUENE/METHYLENE CHLORIDE [redacted]	284.30
Heptane (-n)	138.15

	Toluene	83.00
	Methylene chloride	61.52
	[redacted]	0.07
		0.00
	WATER	1.56
Total:		284.30

12.010 Vertical Fixed Roof

Components	Emissions (lbs.)
TRICHLOROBENZENE (1,2,4-)	7.50
Total:	7.50

12.011 Vertical Fixed Roof

Components	Emissions (lbs.)
Hexane (-n)	766.83
Total:	766.83

12.012 Vertical Fixed Roof

Components	Emissions (lbs.)
HEXANE/TRICHLOROBENZ/RABON/PCA	93.55
Hexane (-n)	72.06
TRICHLOROBENZENE (1,2,4-)	0.25
[redacted]	0.00
	0.00
	21.24
	0.00
Total:	93.55

12.013 Vertical Fixed Roof

Components	Emissions (lbs.)
Trichloroethylene	1656.80
Total:	1656.80

13.001 Vertical Fixed Roof

Components	Emissions (lbs.)
Methyl ethyl ketone	592.36
Total:	592.36

14.001 Vertical Fixed Roof

Components	Emissions (lbs.)
Xylene (-m)	491.21
Total:	491.21

14.002 Vertical Fixed Roof

Components	Emissions (lbs.)
Xylene (-m)	534.29
Total:	534.29

14.003 Vertical Fixed Roof

Components	Emissions (lbs.)
Xylene (-m)	869.26
Total:	869.26

14.004 Vertical Fixed Roof

Components	Emissions (lbs.)
Methyl alcohol	410.03
Total:	410.03

14.005 Vertical Fixed Roof

Components	Emissions (lbs.)
Xylene (-m)	259.65
Total:	259.65

15.002 Vertical Fixed Roof

Components	Emissions (lbs.)
Xylene (-m)	55.16
Total:	55.16

15.003 Vertical Fixed Roof

Components	Emissions (lbs.)
Xylene (-m)	56.50
Total:	56.50

15.004 Vertical Fixed Roof

Components	Emissions (lbs.)

	Xylene (-m)	71.66
Total:		71.66

17.005 Vertical Fixed Roof

Components	Emissions (lbs.)
ETHYLENE GLYCOL/WATER	10.76
ETHYLENE GLYCOL	0.02

	WATER	10.75
Total:		10.76

20.001 Vertical Fixed Roof

Components	Emissions (lbs.)
HYDRAZINE/WATER	53.35
WATER	25.29
HYDRAZINE	28.06
Total:	53.35

20.002 Vertical Fixed Roof

Components	Emissions (lbs.)
HYDRAZINE/WATER	125.87
HYDRAZINE	66.21
WATER	59.67
Total:	125.87

20.005 Vertical Fixed Roof

Components	Emissions (lbs.)
Dimethyl hydrazine (1,1)	362.54
Total:	362.54

20.006 Vertical Fixed Roof

Components	Emissions (lbs.)
Dimethyl hydrazine (1,1)	423.04
Total:	423.04

20.007 Vertical Fixed Roof

Components	Emissions (lbs.)
Acetonitrile	137.15
Total:	137.15

21.001 Vertical Fixed Roof

Components	Emissions (lbs.)
Methyl alcohol	467.73

Total:		467.73

21.002 Vertical Fixed Roof

Components	Emissions (lbs.)
Toluene	110.15
Total:	110.15

21.003 Vertical Fixed Roof

Components	Emissions (lbs.)
METHANOL/TOLUENE/OTHER	1326.98
Methyl alcohol	875.14

	Toluene	392.63
	WATER	59.21
Total:		1326.98

21.007 Vertical Fixed Roof

	Components	Emissions (lbs.)
	Methyl alcohol	869.50
Total:		869.50

21.008 Vertical Fixed Roof

	Components	Emissions (lbs.)
	Toluene	2215.21
Total:		2215.21

21.009 Vertical Fixed Roof

	Components	Emissions (lbs.)
	Toluene	1065.62
Total:		1065.62

21.010 Vertical Fixed Roof

	Components	Emissions (lbs.)
	Toluene	771.72
Total:		771.72

21.011 Vertical Fixed Roof

	Components	Emissions (lbs.)
	Toluene	2841.41
Total:		2841.41

22.006 Vertical Fixed Roof

	Components	Emissions (lbs.)
	Toluene	247.06
Total:		247.06

22.007 Vertical Fixed Roof

Components	Emissions (lbs.)
Methyl alcohol	1155.60
Total:	1155.60

Attachment 3

Docket No. A-95-20

Category II-B

The following information is located in the confidential files of the Director, Emission Standards Division, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. This information is confidential pending final determination by the Administrator and is not available for public inspection.

Attachment 3 to Storage Tanks Data and Results of Storage Tank Emission Calculations Using TANKS3 Software Memorandum (part of docket item II-B-21).

This attachment consists of the full citations for the confidential references in this memorandum, tank dimension data provided by one plant, and the calculated dimensions for each tank in Attachment 1.