Appendix C Aquatic Exposure Modeling: Additional information, Data and Modeling Examples

This appendix contains supporting data for aquatic exposure modeling as it includes information used to chose the application window and first application data **(Part A**) and an example for determination of Exposure EECs Using the RS method (**Part B**).

In addition the appendix contains data obtained for soil concentrations from EXAMS modeling **(Part C).**

Parts A: How Application window and first application dates were chosen for various crop use patterns?

This first application date was chosen within an application window which was based on three sources of information as follows:

I. **Label:** from types of pests, and associated stage of plant growth;

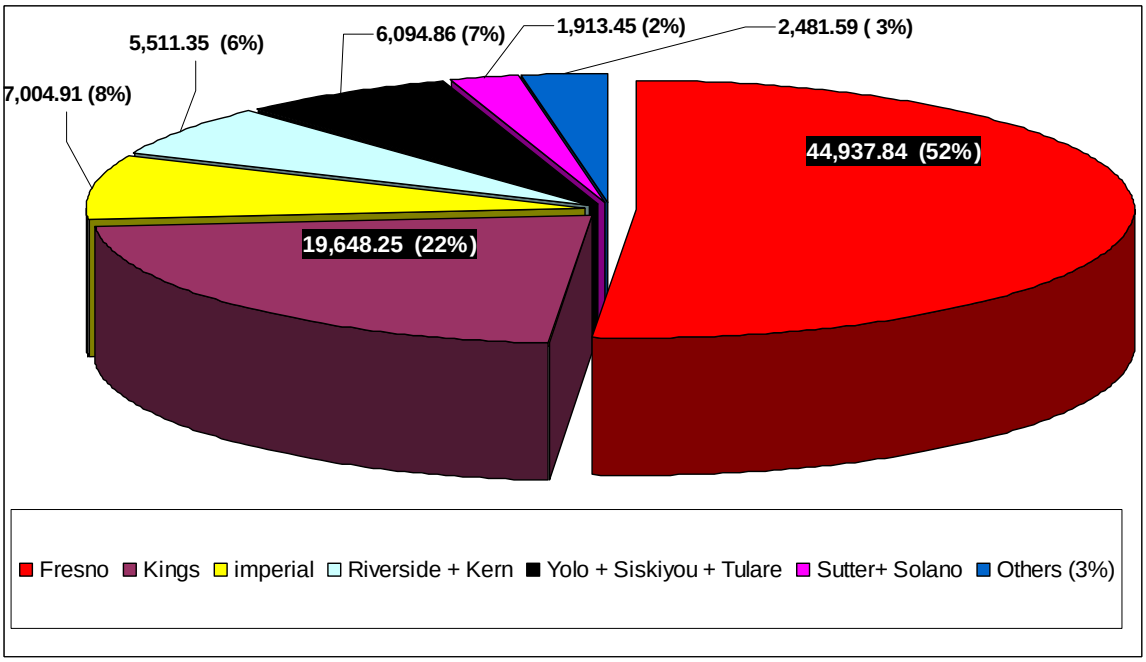
II. **Scenario information and crop profiles**: information obtained from various sources:

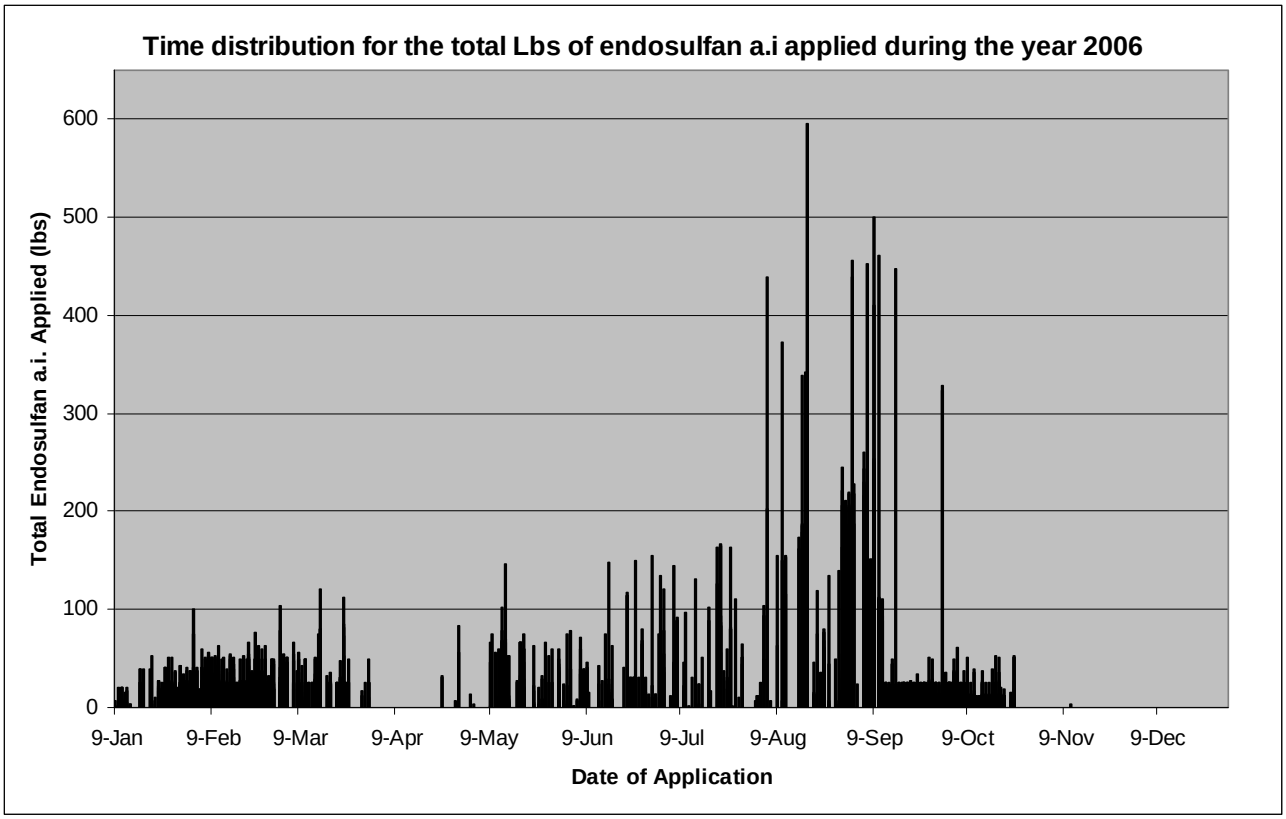
http://www.ipm.ucdavis.edu/PMG/crops-agriculture.html
http://vric.ucdavis.edu/veginfo/veginfor.htm http://vric.ucdavis.edu/veginfo/veginfor.htm
http://www.calstrawberry.com/commission/asurvey.asp
http://coststudies.ucdavis.edu/current.php

And

III. **Application Dates as per CA data for 2006:** Application dates chosen were partly based on data shown below

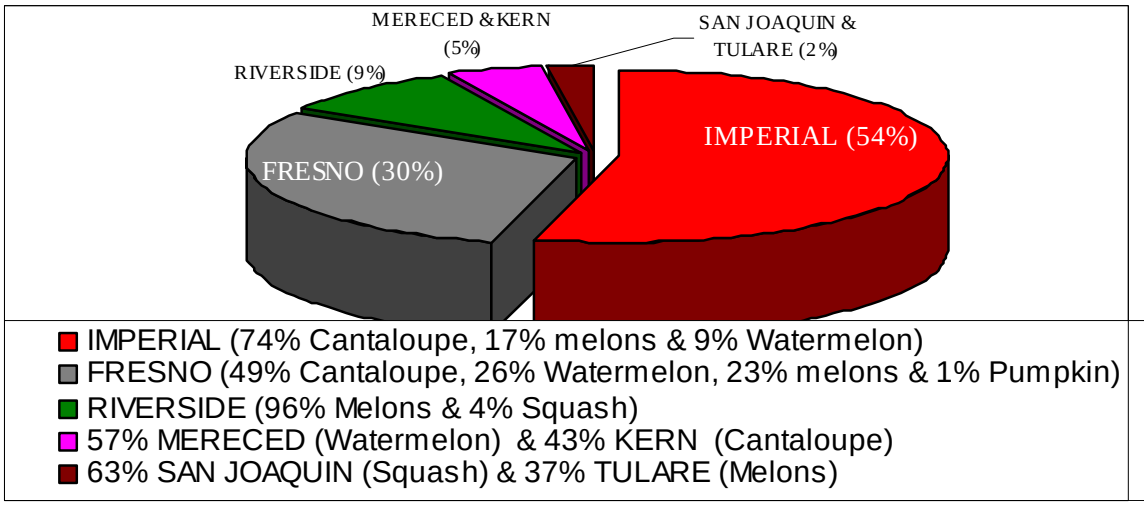
(1) All Crops

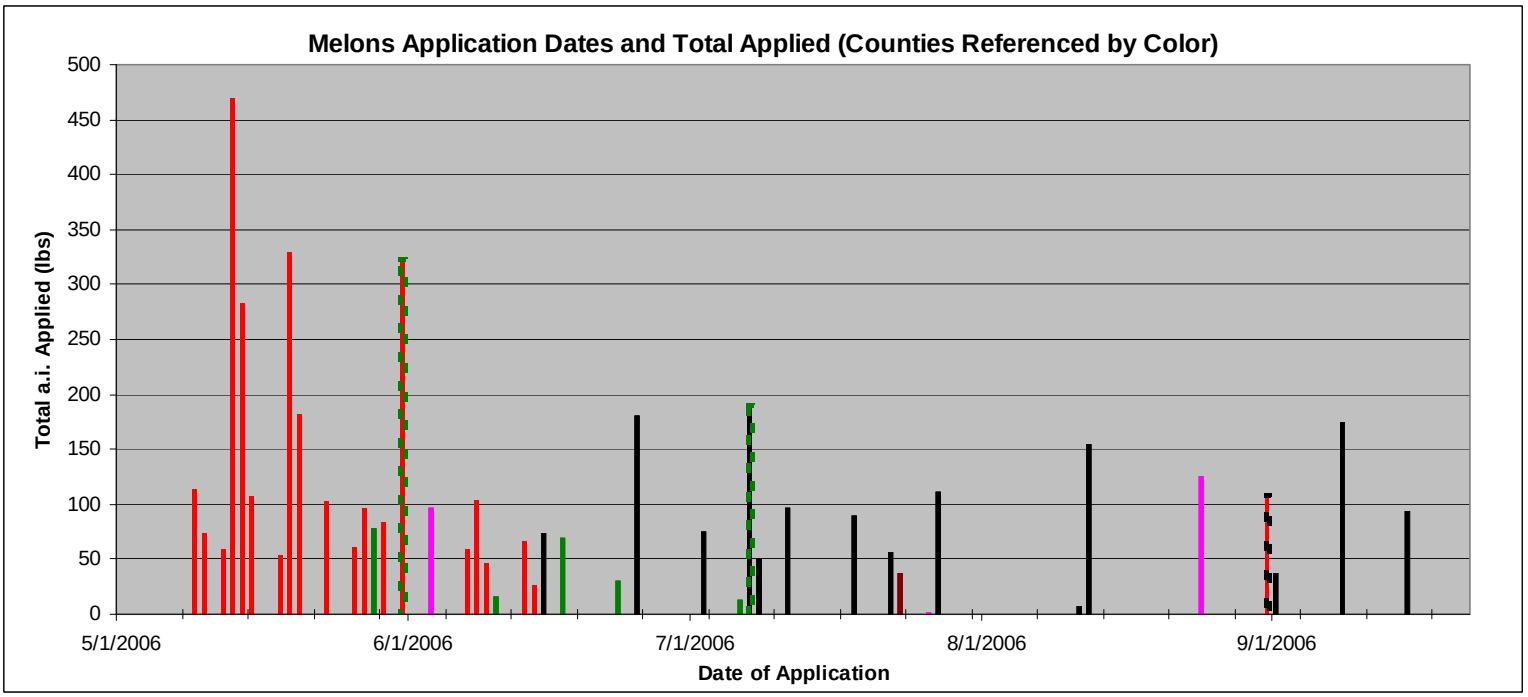

5,511.35 (6%)
6,094.86 (7%)
1,913.45 (2%)
2,481.59 (3%)
7,004.91 (8%)
44,937.84 (52%)
19,648.25 (22%)
Fresno
Kings
imperial
Riverside + Kern
Yolo + Siskiyou + Tulare
Sutter+ Solano
Others (3%)


Time distribution for the total Lbs of endosulfan a.i applied during the year 2006
Total Endosulfan a.i. Applied (lbs)
600
500
400
300
200
100
0
9-Jan
9-Feb
9-Mar
9-Apr
9-May
9-Jun
9-Jul
9-Aug
9-Sep
9-Oct
9-Nov
9-Dec
Date of Application

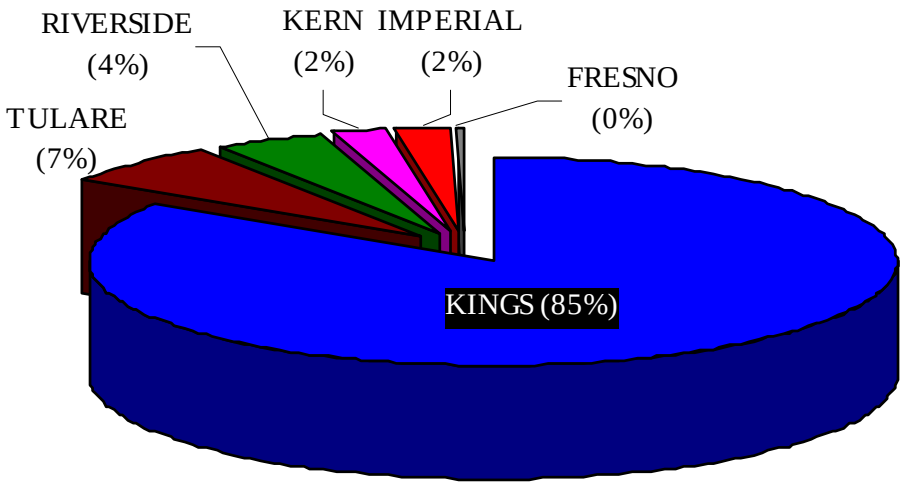
(2) Major Crops

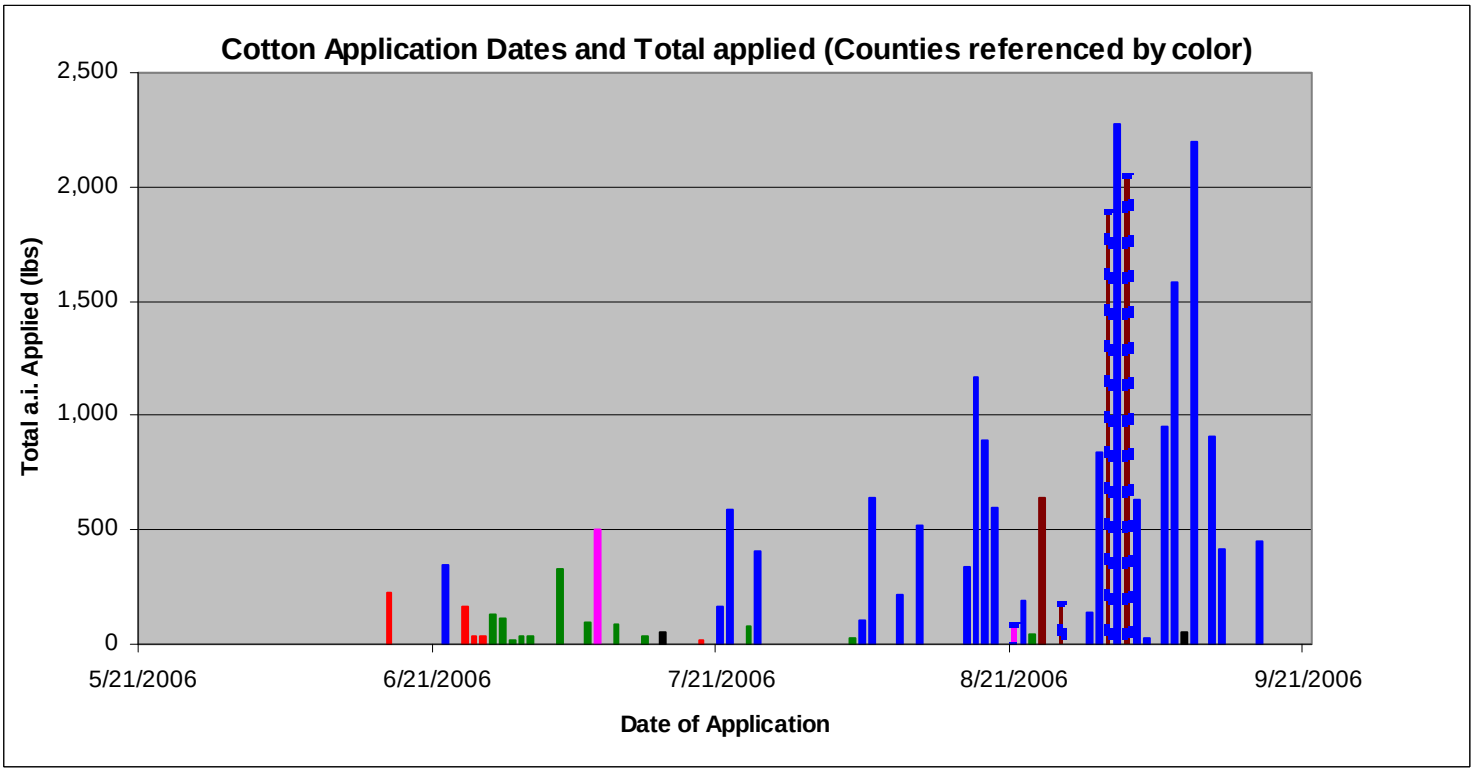
(a) Melons (Date used in Risk Assessment= May, 15)



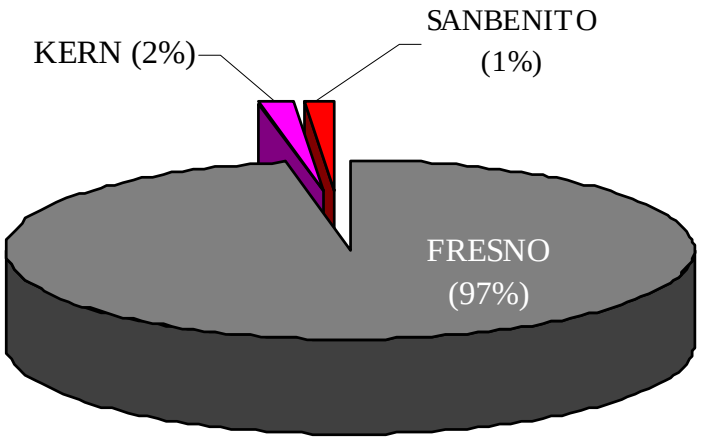


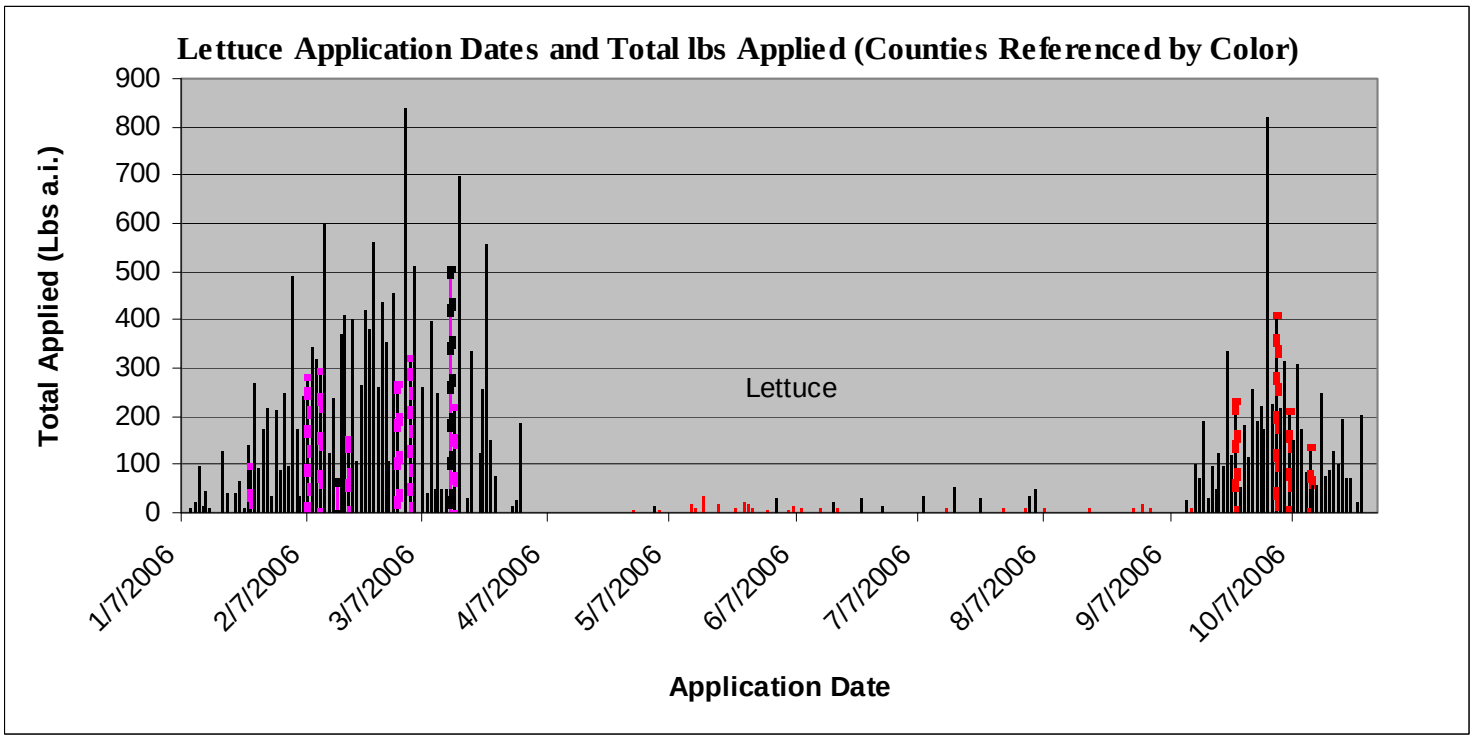
(b) **Cotton** (Date used in Risk Assessment= June 15 and August 30)



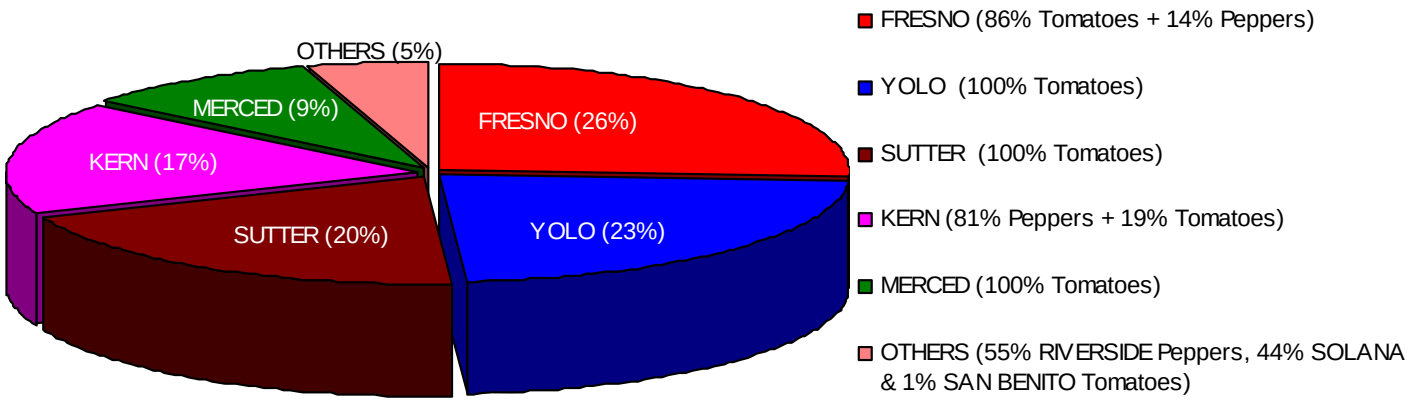


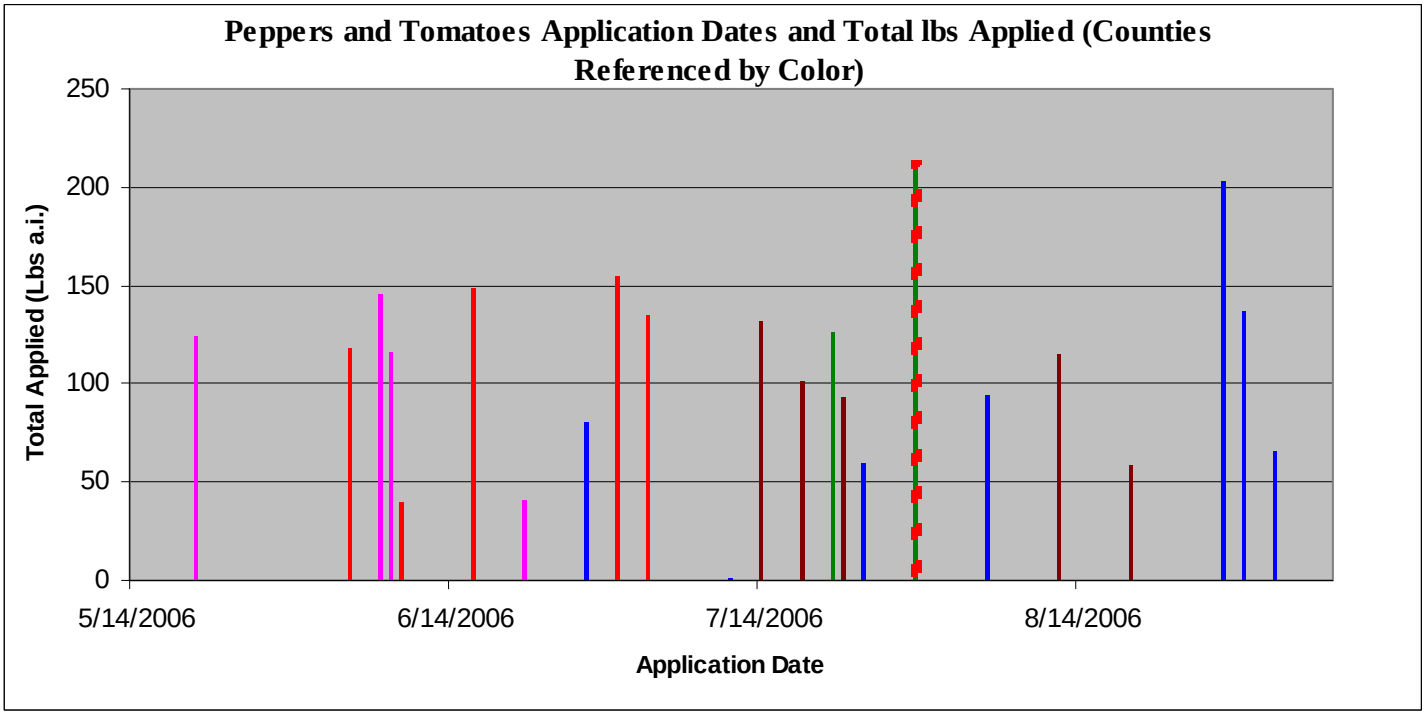
(c) **Lettuce** (Date used in Risk Assessment= February 14)



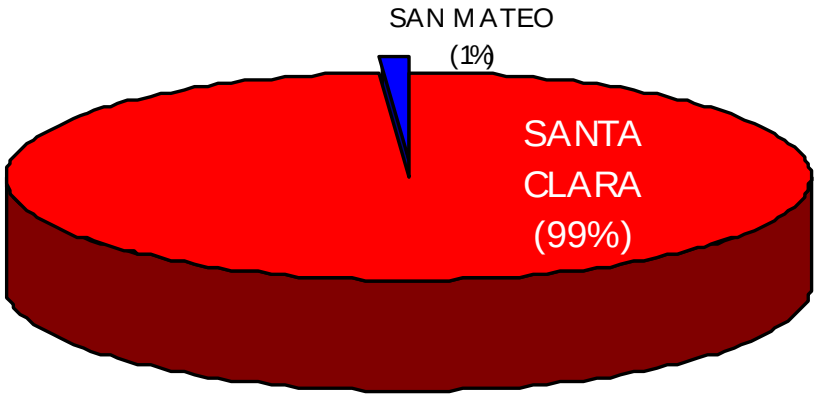


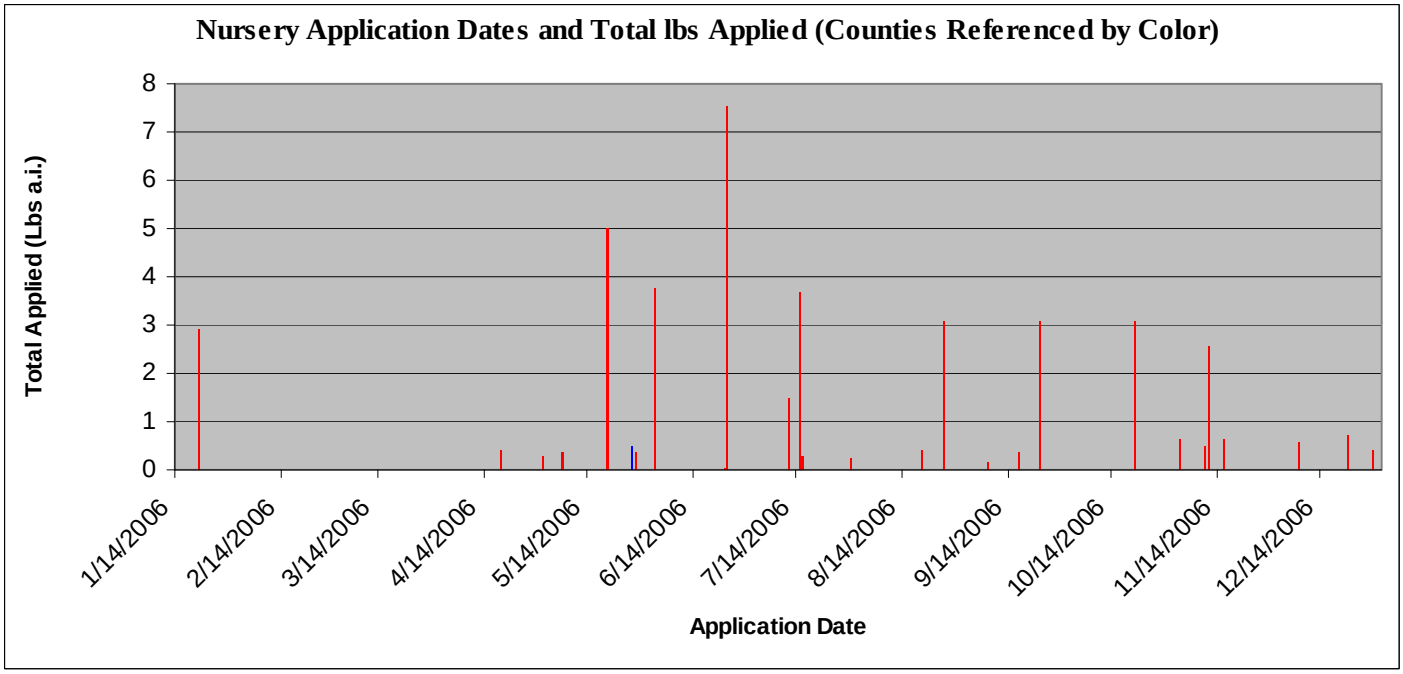
(d) **Tomatoes and Peppers** (Date used in Risk Assessment= April 15 and July, 15)





(e) **Nursery** (Date used in Risk Assessment= February, 21)





(f) Other crops

Crop (County)	*Application Window*		*Total Applied (lb a.i)*	*Date Used In Risk Assessment**
	From	*To*		
Potato (Kern)	29-Mar-06	29-Apr-06	156	14 April
Carrots (Kern)	24-Apr-06	No data	62	15 March
Apple (San Joaquin)	9-May-06	No data	2	15 April
Corn (Fresno)	11-May-06	12-May-06	111	15 May
Eggplant (Fresno)	25-Jun-06	29-Aug-06	7	15 May
Beans (Fresno)	12-Aug-06	No data	153	15 July

* If the date does not match, then application date was based on other information.

Parts B: Determination of Exposure EECs Using the RS method: An Example

Example is for Almonds which is applied at a single rate of 2 lbs a.i. /A (2.242 kg a.i/ha). Rates used in the simulations were 1.009 kg a.i/ha for α-endosulfan and 0.426 kg a.i/ha for β-endosulfan and 0.839 kg a.i/ha for endosulfan sulfate. All of the three chemicals were assumed to be applied at time zero. Three PRZM/EXAMS modeling runs were executed using PE-5:

The first modeling run gives 1-in-10 years exposure EECs for α-endosulfan as shown below:

stored as EndoAlfa_01-0.out
Chemical: EndosulfanAlfa
PRZM environment:
CAalmond_WirrigSTD.txt modified Wedday, 13 June 2007 at 12:17:16
EXAMS environment:
pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23232.dvf modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	1.18	0.7904	0.2847	0.1348	0.1071	0.0476
1962	1.756	1.37	0.6848	0.3392	0.2713	0.1214
1963	1.224	0.8397	0.3461	0.1961	0.1651	0.08297
1964	1.21	0.8184	0.3119	0.161	0.1325	0.06554
1965	1.203	0.8116	0.3054	0.1542	0.1252	0.06105
1966	1.202	0.811	0.3048	0.1547	0.126	0.06097
1967	1.202	0.8139	0.3075	0.1606	0.13	0.06243
1968	1.202	0.8124	0.3067	0.1566	0.1277	0.06095
1969	1.202	0.8091	0.3686	0.188	0.1517	0.07095
1970	1.204	0.8139	0.3094	0.1595	0.1307	0.06338
1971	1.202	0.8114	0.3051	0.155	0.1255	0.06106
1972	1.202	0.8126	0.3062	0.1556	0.1263	0.06108
1973	1.202	0.8463	0.349	0.2046	0.1664	0.07784
1974	1.207	0.8158	0.3094	0.1608	0.1309	0.06386
1975	1.202	0.8563	0.3416	0.1774	0.1436	0.06797
1976	1.203	0.8113	0.305	0.1558	0.1267	0.06249
1977	1.202	0.8127	0.3064	0.1559	0.1273	0.06192
1978	1.424	0.9595	0.3614	0.1916	0.1536	0.07242
1979	1.205	0.8148	0.3566	0.1826	0.1479	0.07054
1980	1.204	0.8117	0.4046	0.2097	0.1695	0.07914
1981	1.207	0.8171	0.3106	0.1622	0.1322	0.06477
1982	1.203	0.8125	0.3531	0.2015	0.1701	0.08191
1983	1.501	1.012	0.3829	0.2129	0.1753	0.08336
1984	1.208	0.8178	0.3113	0.1591	0.1303	0.06348
1985	1.203	0.8771	0.3337	0.1671	0.1355	0.06433
1986	1.438	1.111	0.63	0.3304	0.265	0.1189
1987	1.22	0.8294	0.35	0.1959	0.1615	0.07955
1988	1.207	0.8179	0.3114	0.1621	0.1333	0.06446

1989	1.202	0.8131	0.3065	0.1614	0.1312	0.06314
1990	1.203	0.8123	0.3567	0.1817	0.1475	0.06958

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	1.756	1.37	0.6848	0.3392	0.2713	0.1214
0.064516	1.501	1.111	0.63	0.3304	0.265	0.1189
0.096774	1.438	1.012	0.4046	0.2129	0.1753	0.08336
0.129032	1.424	0.9595	0.3829	0.2097	0.1701	0.08297
0.16129	1.224	0.8771	0.3686	0.2046	0.1695	0.08191
0.193548	1.22	0.8563	0.3614	0.2015	0.1664	0.07955
0.225806	1.21	0.8463	0.3567	0.1961	0.1651	0.07914
0.258065	1.208	0.8397	0.3566	0.1959	0.1615	0.07784
0.290323	1.207	0.8294	0.3531	0.1916	0.1536	0.07242
0.322581	1.207	0.8184	0.35	0.188	0.1517	0.07095
0.354839	1.207	0.8179	0.349	0.1826	0.1479	0.07054
0.387097	1.205	0.8178	0.3461	0.1817	0.1475	0.06958
0.419355	1.204	0.8171	0.3416	0.1774	0.1436	0.06797
0.451613	1.204	0.8158	0.3337	0.1671	0.1355	0.06554
0.483871	1.203	0.8148	0.3119	0.1622	0.1333	0.06477
0.516129	1.203	0.8139	0.3114	0.1621	0.1325	0.06446
0.548387	1.203	0.8139	0.3113	0.1614	0.1322	0.06433
0.580645	1.203	0.8131	0.3106	0.161	0.1312	0.06386
0.612903	1.203	0.8127	0.3094	0.1608	0.1309	0.06348
0.645161	1.202	0.8126	0.3094	0.1606	0.1307	0.06338
0.677419	1.202	0.8125	0.3075	0.1595	0.1303	0.06314
0.709677	1.202	0.8124	0.3067	0.1591	0.13	0.06249
0.741935	1.202	0.8123	0.3065	0.1566	0.1277	0.06243
0.774194	1.202	0.8117	0.3064	0.1559	0.1273	0.06192
0.806452	1.202	0.8116	0.3062	0.1558	0.1267	0.06108
0.83871	1.202	0.8114	0.3054	0.1556	0.1263	0.06106
0.870968	1.202	0.8113	0.3051	0.155	0.126	0.06105
0.903226	1.202	0.811	0.305	0.1547	0.1255	0.06097
0.935484	1.202	0.8091	0.3048	0.1542	0.1252	0.06095
0.967742	1.18	0.7904	0.2847	0.1348	0.1071	0.0476
0.1	**1.4366**	1.00675	**0.40243**	**0.21258**	0.17478	0.083321
					Average of yearly averages:	0.070968

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: EndoAlfa_01-0

Metfile:	w23232.dvf
PRZM scenario:	CAalmond_WirrigSTD.txt
EXAMS environment file:	pond298.exv
Chemical Name:	EndosulfanAlfa

Description	Variable Name	Value	Units	Comments

Molecular weight	mwt	406.9	g/mol	
Henry's Law Const.	henry	3.00E-06	atm-m^3/mol	
Vapor Pressure	vapr		torr	
Solubility	sol	0.53	mg/L	
Kd	Kd		mg/L	
Koc	Koc	10600	mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	114	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	230	days	Halfife
Aerobic Soil Metabolism	asm	57	days	Halfife
Hydrolysis:	pH 7	19	days	Half-life
Method:	CAM	2	integer	See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	1.009	kg/ha	
Application Efficiency:	APPEFF	0.95	fraction	
Spray Drift	DRFT	0.024	fraction of application rate applied to pond	
Application Date	Date	2-Jul	dd/mm or dd/mmm or dd-mm or dd-mmm	
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	EPA Pond		
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)	

In addition the run gives Daily concentrations for 30-years as shown below (Start and End of data is shown only):

day	date	conc.ppm
0	1/1/1961	0.00E+00
1	1/2/1961	0.00E+00
2	1/3/1961	0.00E+00
3	1/4/1961	0.00E+00
4	1/5/1961	0.00E+00
5	1/6/1961	0.00E+00
6	1/7/1961	0.00E+00
7	1/8/1961	0.00E+00
8	1/9/1961	0.00E+00
9	1/10/1961	0.00E+00
10	1/11/1961	0.00E+00
11	1/12/1961	0.00E+00
12	1/13/1961	0.00E+00
13	1/14/1961	0.00E+00
14	1/15/1961	0.00E+00
15	1/16/1961	0.00E+00
16	1/17/1961	0.00E+00
17	1/18/1961	0.00E+00
18	1/19/1961	0.00E+00
19	1/20/1961	0.00E+00

20	1/21/1961	0.00E+00
21	1/22/1961	0.00E+00
22	1/23/1961	0.00E+00
23	1/24/1961	0.00E+00
24	1/25/1961	0.00E+00
25	1/26/1961	0.00E+00
26	1/27/1961	0.00E+00
27	1/28/1961	0.00E+00
28	1/29/1961	0.00E+00
29	1/30/1961	0.00E+00
30	1/31/1961	0.00E+00

Up to

10925	11/30/1990	2.95E-05
10926	12/1/1990	2.94E-05
10927	12/2/1990	2.93E-05
10928	12/3/1990	2.92E-05
10929	12/4/1990	2.91E-05
10930	12/5/1990	2.91E-05
10931	12/6/1990	2.90E-05
10932	12/7/1990	2.89E-05
10933	12/8/1990	2.88E-05
10934	12/9/1990	2.87E-05
10935	12/10/1990	2.91E-05
10936	12/11/1990	2.89E-05
10937	12/12/1990	2.88E-05
10938	12/13/1990	2.86E-05
10939	12/14/1990	2.85E-05
10940	12/15/1990	2.84E-05
10941	12/16/1990	2.82E-05
10942	12/17/1990	2.81E-05
10943	12/18/1990	2.80E-05
10944	12/19/1990	2.79E-05
10945	12/20/1990	2.78E-05
10946	12/21/1990	2.77E-05
10947	12/22/1990	2.76E-05
10948	12/23/1990	2.75E-05
10949	12/24/1990	2.74E-05
10950	12/25/1990	2.73E-05
10951	12/26/1990	2.72E-05
10952	12/27/1990	2.71E-05
10953	12/28/1990	2.70E-05
10954	12/29/1990	2.70E-05
10955	12/30/1990	2.69E-05
10956	12/31/1990	2.68E-05

The second is 1-10 years EECs for β-endosulfan

stored as EndoBeta.out
Chemical: EndosulfanBeta
PRZM environment:
CAalmond_WirrigSTD.txt modified Wedday, 13 June 2007 at 12:17:16
EXAMS environment:
pond298.exv modified Thuday, 29 August 2002 at 16:33:30
Metfile: w23232.dvf modified Wedday, 3 July 2002 at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.4949	0.2993	0.09474	0.04428	0.03554	0.01978
1962	0.6725	0.5048	0.2314	0.115	0.09288	0.04927
1963	0.5253	0.3292	0.1255	0.07629	0.06659	0.03837
1964	0.5119	0.3159	0.1107	0.05948	0.05034	0.03098
1965	0.5092	0.3132	0.1083	0.05672	0.04717	0.02787
1966	0.5068	0.3109	0.1058	0.05515	0.04611	0.02785
1967	0.5115	0.3157	0.1102	0.06088	0.05094	0.0297
1968	0.5079	0.312	0.1069	0.05627	0.04726	0.02741
1969	0.5107	0.3133	0.1291	0.06768	0.05562	0.03132
1970	0.5088	0.313	0.1086	0.0583	0.04908	0.03005
1971	0.5089	0.313	0.1081	0.05727	0.04735	0.02828
1972	0.5081	0.312	0.1064	0.0557	0.04623	0.02765
1973	0.5088	0.3263	0.1247	0.07595	0.06327	0.03548
1974	0.5092	0.3134	0.1084	0.05809	0.04835	0.02805
1975	0.5062	0.3271	0.1178	0.063	0.05185	0.02919
1976	0.506	0.3101	0.1052	0.05492	0.04563	0.02799
1977	0.5063	0.3108	0.1058	0.0554	0.04633	0.02813
1978	0.6002	0.3689	0.1277	0.07098	0.058	0.03335
1979	0.5092	0.3135	0.1258	0.06594	0.05441	0.03143
1980	0.5085	0.3124	0.1445	0.07619	0.06256	0.0337
1981	0.5091	0.3131	0.1078	0.05794	0.04806	0.02953
1982	0.5113	0.3155	0.127	0.07873	0.06864	0.03965
1983	0.6244	0.3843	0.134	0.0786	0.0667	0.03738
1984	0.5105	0.3148	0.1097	0.05815	0.04896	0.02893
1985	0.5067	0.3343	0.1145	0.05839	0.04839	0.02782
1986	0.6013	0.4412	0.2303	0.1208	0.09767	0.04845
1987	0.513	0.317	0.1209	0.06972	0.05851	0.03336
1988	0.5079	0.3124	0.1074	0.05739	0.04826	0.02802
1989	0.5061	0.3107	0.1057	0.05746	0.04766	0.02811
1990	0.5087	0.3129	0.1263	0.06618	0.05503	0.03147

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	0.6725	0.5048	0.2314	0.1208	0.09767	0.04927
0.064516	0.6244	0.4412	0.2303	0.115	0.09288	0.04845
0.096774	0.6013	0.3843	0.1445	0.07873	0.06864	0.03965
0.129032	0.6002	0.3689	0.134	0.0786	0.0667	0.03837
0.16129	0.5253	0.3343	0.1291	0.07629	0.06659	0.03738
0.193548	0.513	0.3292	0.1277	0.07619	0.06327	0.03548
0.225806	0.5119	0.3271	0.127	0.07595	0.06256	0.0337

0.258065	0.5115	0.3263	0.1263	0.07098	0.05851	0.03336
0.290323	0.5113	0.317	0.1258	0.06972	0.058	0.03335
0.322581	0.5107	0.3159	0.1255	0.06768	0.05562	0.03147
0.354839	0.5105	0.3157	0.1247	0.06618	0.05503	0.03143
0.387097	0.5092	0.3155	0.1209	0.06594	0.05441	0.03132
0.419355	0.5092	0.3148	0.1178	0.063	0.05185	0.03098
0.451613	0.5092	0.3135	0.1145	0.06088	0.05094	0.03005
0.483871	0.5091	0.3134	0.1107	0.05948	0.05034	0.0297
0.516129	0.5089	0.3133	0.1102	0.05839	0.04908	0.02953
0.548387	0.5088	0.3132	0.1097	0.0583	0.04896	0.02919
0.580645	0.5088	0.3131	0.1086	0.05815	0.04839	0.02893
0.612903	0.5087	0.313	0.1084	0.05809	0.04835	0.02828
0.645161	0.5085	0.313	0.1083	0.05794	0.04826	0.02813
0.677419	0.5081	0.3129	0.1081	0.05746	0.04806	0.02811
0.709677	0.5079	0.3124	0.1078	0.05739	0.04766	0.02805
0.741935	0.5079	0.3124	0.1074	0.05727	0.04735	0.02802
0.774194	0.5068	0.312	0.1069	0.05672	0.04726	0.02799
0.806452	0.5067	0.312	0.1064	0.05627	0.04717	0.02787
0.83871	0.5063	0.3109	0.1058	0.0557	0.04633	0.02785
0.870968	0.5062	0.3108	0.1058	0.0554	0.04623	0.02782
0.903226	0.5061	0.3107	0.1057	0.05515	0.04611	0.02765
0.935484	0.506	0.3101	0.1052	0.05492	0.04563	0.02741
0.967742	0.4949	0.2993	0.09474	0.04428	0.03554	0.01978
0.1	**0.60119**	0.38276	**0.14345**	**0.078717**	0.068446	0.039522
					Average of yearly averages:	0.031619

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: EndoBeta

Metfile:	w23232.dvf
PRZM scenario:	CAalmond_WirrigSTD.txt
EXAMS environment file:	pond298.exv
Chemical Name:	EndosulfanBeta

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	406.9	g/mol	
Henry's Law Const.	henry	1.40E-06	atm-m^3/mol	
Vapor Pressure	vapr		torr	
Solubility	sol	0.28	mg/L	
Kd	Kd		mg/L	
Koc	Koc	13500	mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	416	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	298	days	Halfife
Aerobic Soil Metabolism	asm	208	days	Halfife
Hydrolysis:	pH 7	11	days	Half-life
Method:	CAM	2	integer	See PRZM

			manual
Incorporation Depth:	DEPI	0	cm
Application Rate:	TAPP	0.426	kg/ha
Application Efficiency:	APPEFF	0.95	fraction
Spray Drift	DRFT	0.024	fraction of application rate applied to pond
Application Date	Date	2-Jul	dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17:	FILTRA		
	IPSCND	1	
	UPTKF		
Record 18:	PLVKRT		
	PLDKRT		
	FEXTRC	0.5	
Flag for Index Res. Run	IR	EPA Pond	
Flag for runoff calc.	RUNOFF	none	none, monthly or total(average of entire run)

In addition the run gives Daily concentrations for 30-years as shown below (Start and End of data is shown only):

day	date	conc.ppm
0	1/1/1961	0.00E+00
1	1/2/1961	0.00E+00
2	1/3/1961	0.00E+00
3	1/4/1961	0.00E+00
4	1/5/1961	0.00E+00
5	1/6/1961	0.00E+00
6	1/7/1961	0.00E+00
7	1/8/1961	0.00E+00
8	1/9/1961	0.00E+00
9	1/10/1961	0.00E+00
10	1/11/1961	0.00E+00
11	1/12/1961	0.00E+00
12	1/13/1961	0.00E+00
13	1/14/1961	0.00E+00
14	1/15/1961	0.00E+00
15	1/16/1961	0.00E+00
16	1/17/1961	0.00E+00
17	1/18/1961	0.00E+00
18	1/19/1961	0.00E+00
19	1/20/1961	0.00E+00
20	1/21/1961	0.00E+00
21	1/22/1961	0.00E+00
22	1/23/1961	0.00E+00
23	1/24/1961	0.00E+00
24	1/25/1961	0.00E+00
25	1/26/1961	0.00E+00
26	1/27/1961	0.00E+00
27	1/28/1961	0.00E+00
28	1/29/1961	0.00E+00
29	1/30/1961	0.00E+00

Up to

10925	11/30/1990	1.52E-05
10926	12/1/1990	1.52E-05
10927	12/2/1990	1.51E-05
10928	12/3/1990	1.51E-05
10929	12/4/1990	1.50E-05
10930	12/5/1990	1.50E-05
10931	12/6/1990	1.49E-05
10932	12/7/1990	1.49E-05
10933	12/8/1990	1.48E-05
10934	12/9/1990	1.48E-05
10935	12/10/1990	1.79E-05
10936	12/11/1990	1.73E-05
10937	12/12/1990	1.66E-05
10938	12/13/1990	1.61E-05
10939	12/14/1990	1.57E-05
10940	12/15/1990	1.55E-05
10941	12/16/1990	1.52E-05
10942	12/17/1990	1.50E-05
10943	12/18/1990	1.48E-05
10944	12/19/1990	1.46E-05
10945	12/20/1990	1.45E-05
10946	12/21/1990	1.44E-05
10947	12/22/1990	1.43E-05
10948	12/23/1990	1.42E-05
10949	12/24/1990	1.42E-05
10950	12/25/1990	1.41E-05
10951	12/26/1990	1.40E-05
10952	12/27/1990	1.40E-05
10953	12/28/1990	1.39E-05
10954	12/29/1990	1.39E-05
10955	12/30/1990	1.38E-05
10956	12/31/1990	1.38E-05

The third is 1-10 years EECs for endosulfan sulfate:

stored as EndoAlfaSO4.out
Chemical: EndosulfanSO4
PRZM environment:
CAalmond_WirrigSTD.txt modified Wedday, 13 June 2007 at 12:17:16
EXAMS environment: pond298.exv modified Thuday, 29 August 2002 at 16:33:30
modified Wedday, 3 July 2002
Metfile: w23232.dvf at 09:04:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.978	0.6532	0.2372	0.1159	0.09529	0.06707
1962	1.546	1.203	0.6184	0.3305	0.2773	0.1964
1963	1.226	0.8875	0.4869	0.3339	0.3091	0.2225
1964	1.139	0.8068	0.3856	0.275	0.2463	0.1885
1965	1.108	0.7772	0.3587	0.2345	0.2101	0.1617
1966	1.086	0.7558	0.3357	0.2135	0.1915	0.1542
1967	1.137	0.8097	0.3844	0.2869	0.2525	0.1801
1968	1.105	0.7784	0.3559	0.2292	0.2058	0.1564
1969	1.12	0.7766	0.4075	0.2562	0.226	0.167
1970	1.097	0.771	0.3544	0.2308	0.2081	0.1678
1971	1.097	0.7684	0.3502	0.226	0.2007	0.1554
1972	1.091	0.7636	0.3403	0.2144	0.1899	0.1487
1973	1.096	0.8013	0.3941	0.2783	0.2456	0.1803
1974	1.091	0.7622	0.3442	0.2224	0.1983	0.149
1975	1.069	0.7822	0.3553	0.2226	0.1951	0.1445
1976	1.065	0.7353	0.3173	0.1969	0.1748	0.1419
1977	1.072	0.7491	0.3314	0.2054	0.1831	0.1483
1978	1.37	0.9529	0.4265	0.2848	0.2558	0.1866
1979	1.105	0.7777	0.4092	0.2619	0.2319	0.1754
1980	1.097	0.7645	0.4503	0.281	0.2462	0.1734
1981	1.099	0.7689	0.3461	0.2262	0.201	0.165
1982	1.127	0.7993	0.4273	0.3149	0.2919	0.2225
1983	1.414	0.9847	0.4474	0.3135	0.2835	0.2064
1984	1.114	0.787	0.3681	0.2389	0.2149	0.1652
1985	1.08	0.8162	0.3612	0.2209	0.1961	0.1491
1986	1.584	1.226	0.674	0.3987	0.3386	0.2124
1987	1.106	0.777	0.3836	0.26	0.2323	0.1717
1988	1.087	0.7641	0.3459	0.2232	0.2014	0.1516
1989	1.072	0.747	0.329	0.2133	0.1899	0.1502
1990	1.102	0.7747	0.4083	0.2661	0.2368	0.1732

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258	1.584	1.226	0.674	0.3987	0.3386	0.2225
0.064516	1.546	1.203	0.6184	0.3339	0.3091	0.2225
0.096774	1.414	0.9847	0.4869	0.3305	0.2919	0.2124
0.129032	1.37	0.9529	0.4503	0.3149	0.2835	0.2064
0.16129	1.226	0.8875	0.4474	0.3135	0.2773	0.1964
0.193548	1.139	0.8162	0.4273	0.2869	0.2558	0.1885
0.225806	1.137	0.8097	0.4265	0.2848	0.2525	0.1866

0.258065	1.127	0.8068	0.4092	0.281	0.2463	0.1803
0.290323	1.12	0.8013	0.4083	0.2783	0.2462	0.1801
0.322581	1.114	0.7993	0.4075	0.275	0.2456	0.1754
0.354839	1.108	0.787	0.3941	0.2661	0.2368	0.1734
0.387097	1.106	0.7822	0.3856	0.2619	0.2323	0.1732
0.419355	1.105	0.7784	0.3844	0.26	0.2319	0.1717
0.451613	1.105	0.7777	0.3836	0.2562	0.226	0.1678
0.483871	1.102	0.7772	0.3681	0.2389	0.2149	0.167
0.516129	1.099	0.777	0.3612	0.2345	0.2101	0.1652
0.548387	1.097	0.7766	0.3587	0.2308	0.2081	0.165
0.580645	1.097	0.7747	0.3559	0.2292	0.2058	0.1617
0.612903	1.097	0.771	0.3553	0.2262	0.2014	0.1564
0.645161	1.096	0.7689	0.3544	0.226	0.201	0.1554
0.677419	1.091	0.7684	0.3502	0.2232	0.2007	0.1542
0.709677	1.091	0.7645	0.3461	0.2226	0.1983	0.1516
0.741935	1.087	0.7641	0.3459	0.2224	0.1961	0.1502
0.774194	1.086	0.7636	0.3442	0.2209	0.1951	0.1491
0.806452	1.08	0.7622	0.3403	0.2144	0.1915	0.149
0.83871	1.072	0.7558	0.3357	0.2135	0.1899	0.1487
0.870968	1.072	0.7491	0.3314	0.2133	0.1899	0.1483
0.903226	1.069	0.747	0.329	0.2054	0.1831	0.1445
0.935484	1.065	0.7353	0.3173	0.1969	0.1748	0.1419
0.967742	0.978	0.6532	0.2372	0.1159	0.09529	0.06707
0.1	**1.4096**	0.98152	**0.48324**	**0.32894**	0.29106	0.2118
					Average of yearly averages:	0.167749

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:
Output File: EndoAlfaSO4

Metfile:	w23232.dvf			
PRZM scenario:	CAalmond_WirrigSTD.txt			
EXAMS environment file:	pond298.exv			
Chemical Name:	EndosulfanSO4			
Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	422.9	g/mol	
Henry's Law Const.	henry	1.60E-05	atm-m^3/mol	
Vapor Pressure	vapr		torr	
Solubility	sol	0.33	mg/L	
Kd	Kd		mg/L	
Koc	Koc	12050	mg/L	
Photolysis half-life	kdp	0	days	Half-life
Aerobic Aquatic Metabolism	kbacw	0	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	286	days	Halfife
Aerobic Soil Metabolism	asm	0	days	Halfife
Hydrolysis:	pH 7	184	days	Half-life
Method:	CAM	2	integer	See PRZM

			manual
Incorporation Depth:	DEPI	0	cm
Application Rate:	TAPP	0.839	kg/ha
Application Efficiency:	APPEFF	0.95	fraction
Spray Drift	DRFT	0.024	fraction of application rate applied to pond
Application Date	Date	2-Jul	dd/mm or dd/mmm or dd-mm or dd-mmm
Record 17:	FILTRA		
	IPSCND	1	
	UPTKF		
Record 18:	PLVKRT		
	PLDKRT		
	FEXTRC	0.5	
Flag for Index Res. Run	IR	EPA Pond	
Flag for runoff calc.	RUNOFF	none	

In addition the run gives Daily concentrations for 30-years as shown below (Start and End of data is shown only):

day	date	conc.ppm
0	1/1/1961	0.00E+00
1	1/2/1961	0.00E+00
2	1/3/1961	0.00E+00
3	1/4/1961	0.00E+00
4	1/5/1961	0.00E+00
5	1/6/1961	0.00E+00
6	1/7/1961	0.00E+00
7	1/8/1961	0.00E+00
8	1/9/1961	0.00E+00
9	1/10/1961	0.00E+00
10	1/11/1961	0.00E+00
11	1/12/1961	0.00E+00
12	1/13/1961	0.00E+00
13	1/14/1961	0.00E+00
14	1/15/1961	0.00E+00
15	1/16/1961	0.00E+00
16	1/17/1961	0.00E+00
17	1/18/1961	0.00E+00
18	1/19/1961	0.00E+00
19	1/20/1961	0.00E+00
20	1/21/1961	0.00E+00
21	1/22/1961	0.00E+00
22	1/23/1961	0.00E+00
23	1/24/1961	0.00E+00
24	1/25/1961	0.00E+00
25	1/26/1961	0.00E+00
26	1/27/1961	0.00E+00
27	1/28/1961	0.00E+00
28	1/29/1961	0.00E+00

29	1/30/1961	0.00E+00

Up to

10925	11/30/1990	1.16E-04
10926	12/1/1990	1.16E-04
10927	12/2/1990	1.15E-04
10928	12/3/1990	1.15E-04
10929	12/4/1990	1.15E-04
10930	12/5/1990	1.15E-04
10931	12/6/1990	1.15E-04
10932	12/7/1990	1.15E-04
10933	12/8/1990	1.15E-04
10934	12/9/1990	1.14E-04
10935	12/10/1990	1.36E-04
10936	12/11/1990	1.33E-04
10937	12/12/1990	1.29E-04
10938	12/13/1990	1.26E-04
10939	12/14/1990	1.24E-04
10940	12/15/1990	1.22E-04
10941	12/16/1990	1.21E-04
10942	12/17/1990	1.19E-04
10943	12/18/1990	1.18E-04
10944	12/19/1990	1.17E-04
10945	12/20/1990	1.16E-04
10946	12/21/1990	1.15E-04
10947	12/22/1990	1.15E-04
10948	12/23/1990	1.14E-04
10949	12/24/1990	1.14E-04
10950	12/25/1990	1.13E-04
10951	12/26/1990	1.13E-04
10952	12/27/1990	1.13E-04
10953	12/28/1990	1.12E-04
10954	12/29/1990	1.12E-04
10955	12/30/1990	1.12E-04
10956	12/31/1990	1.12E-04

EECs for the total residue of concern, or the stressor, are calculated by combining daily concentrations from the three chemicals by simple addition as follow:

----------Data from daily concentration above--------

day	date	conc.ppm (Alpha)	conc.ppm (Beta)	conc.ppm (Sulfate)	Alph+Beta+Sulfate
0	1/1/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
1	1/2/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1/3/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	1/4/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4	1/5/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
5	1/6/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	1/7/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7	1/8/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
8	1/9/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	1/10/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	1/11/1961	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Up to

10940	12/15/1990	2.84E-05	1.55E-05	1.22E-04	1.66E-04
10941	12/16/1990	2.82E-05	1.52E-05	1.21E-04	1.64E-04
10942	12/17/1990	2.81E-05	1.50E-05	1.19E-04	1.62E-04
10943	12/18/1990	2.80E-05	1.48E-05	1.18E-04	1.61E-04
10944	12/19/1990	2.79E-05	1.46E-05	1.17E-04	1.60E-04
10945	12/20/1990	2.78E-05	1.45E-05	1.16E-04	1.58E-04
10946	12/21/1990	2.77E-05	1.44E-05	1.15E-04	1.57E-04
10947	12/22/1990	2.76E-05	1.43E-05	1.15E-04	1.57E-04
10948	12/23/1990	2.75E-05	1.42E-05	1.14E-04	1.56E-04
10949	12/24/1990	2.74E-05	1.42E-05	1.14E-04	1.56E-04
10950	12/25/1990	2.73E-05	1.41E-05	1.13E-04	1.54E-04
10951	12/26/1990	2.72E-05	1.40E-05	1.13E-04	1.54E-04
10952	12/27/1990	2.71E-05	1.40E-05	1.13E-04	1.54E-04
10953	12/28/1990	2.70E-05	1.39E-05	1.12E-04	1.53E-04
10954	12/29/1990	2.70E-05	1.39E-05	1.12E-04	1.53E-04
10955	12/30/1990	2.69E-05	1.38E-05	1.12E-04	1.53E-04
10956	12/31/1990	2.68E-05	1.38E-05	1.12E-04	1.53E-04

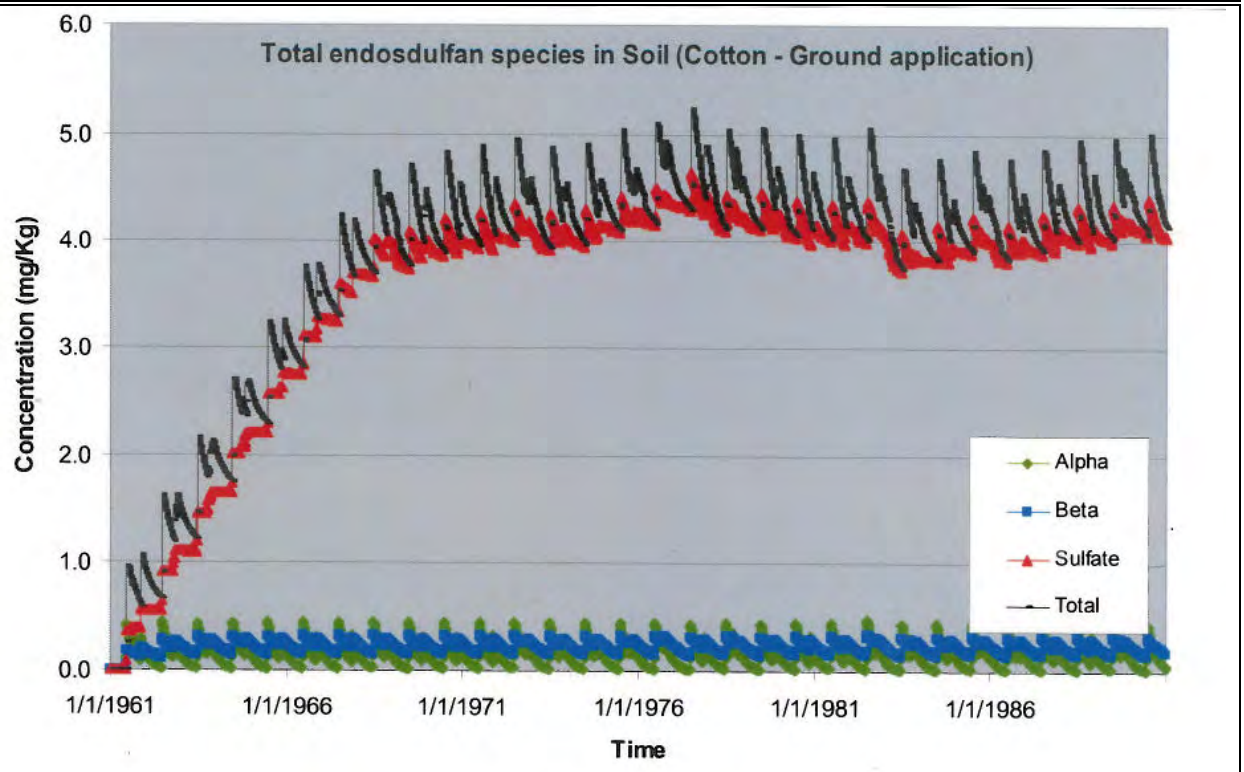
Then running averages are obtained for data from the last column for the 30-years and the maximum for each of the 30 years is recorded. Then the 90th % (considered equal to the 1-10 years) is calculated shown below:

Year	Max Peak	4-day	Max 14 day	Max 21 day	Max 30 day	Max 60 day	Max 90 day	Annual
1961	2.62E-03	1.91E-03	9.17E-04	6.67E-04	5.05E-04	3.12E-04	3.47E-04	2.79E-04
1962	3.91E-03	3.35E-03	2.20E-03	1.65E-03	1.28E-03	8.23E-04	6.66E-04	3.92E-04
1963	2.93E-03	2.22E-03	1.25E-03	9.80E-04	8.13E-04	6.13E-04	5.48E-04	3.69E-04
1964	2.82E-03	2.11E-03	1.10E-03	8.53E-04	6.89E-04	4.95E-04	4.28E-04	3.03E-04
1965	2.78E-03	2.07E-03	1.07E-03	8.18E-04	6.55E-04	4.58E-04	3.90E-04	2.66E-04
1966	2.76E-03	2.05E-03	1.04E-03	7.93E-04	6.30E-04	4.37E-04	3.72E-04	2.69E-04
1967	2.81E-03	2.10E-03	1.10E-03	8.47E-04	6.96E-04	5.10E-04	4.35E-04	2.79E-04
1968	2.77E-03	2.07E-03	1.07E-03	8.16E-04	6.51E-04	4.56E-04	3.89E-04	2.63E-04
1969	2.79E-03	2.07E-03	1.26E-03	9.65E-04	7.74E-04	5.28E-04	4.42E-04	2.73E-04
1970	2.77E-03	2.06E-03	1.07E-03	8.19E-04	6.55E-04	4.63E-04	3.96E-04	2.65E-04
1971	2.77E-03	2.06E-03	1.06E-03	8.09E-04	6.46E-04	4.52E-04	3.81E-04	2.56E-04
1972	2.76E-03	2.05E-03	1.05E-03	7.99E-04	6.34E-04	4.40E-04	3.71E-04	2.81E-04
1973	2.77E-03	2.15E-03	1.15E-03	9.23E-04	8.44E-04	5.80E-04	4.89E-04	2.97E-04
1974	2.77E-03	2.06E-03	1.06E-03	8.08E-04	6.58E-04	4.55E-04	3.86E-04	2.56E-04
1975	2.74E-03	2.14E-03	1.15E-03	8.69E-04	6.85E-04	4.81E-04	4.02E-04	2.45E-04
1976	2.73E-03	2.02E-03	1.02E-03	7.74E-04	6.13E-04	4.22E-04	3.56E-04	2.38E-04
1977	2.74E-03	2.04E-03	1.04E-03	7.90E-04	6.25E-04	4.31E-04	3.66E-04	2.84E-04
1978	3.34E-03	2.48E-03	1.28E-03	9.72E-04	8.07E-04	5.63E-04	4.69E-04	2.96E-04
1979	2.79E-03	2.07E-03	1.19E-03	9.48E-04	7.61E-04	5.27E-04	4.44E-04	2.89E-04
1980	2.77E-03	2.06E-03	1.28E-03	1.07E-03	8.60E-04	5.88E-04	4.91E-04	2.90E-04
1981	2.78E-03	2.07E-03	1.06E-03	8.11E-04	6.49E-04	4.59E-04	3.89E-04	3.20E-04
1982	2.80E-03	2.09E-03	1.23E-03	9.62E-04	8.02E-04	6.16E-04	5.44E-04	3.50E-04
1983	3.48E-03	2.59E-03	1.33E-03	1.02E-03	8.39E-04	6.25E-04	5.38E-04	3.39E-04
1984	2.79E-03	2.08E-03	1.09E-03	8.35E-04	6.71E-04	4.69E-04	4.02E-04	2.83E-04
1985	2.75E-03	2.21E-03	1.14E-03	8.61E-04	6.82E-04	4.62E-04	3.89E-04	3.47E-04
1986	3.56E-03	3.02E-03	1.86E-03	1.65E-03	1.32E-03	8.90E-04	7.26E-04	3.88E-04
1987	2.80E-03	2.09E-03	1.18E-03	9.06E-04	7.63E-04	5.43E-04	4.63E-04	3.08E-04
1988	2.77E-03	2.06E-03	1.06E-03	8.11E-04	6.50E-04	4.57E-04	3.92E-04	2.57E-04
1989	2.74E-03	2.04E-03	1.04E-03	7.88E-04	6.26E-04	4.47E-04	3.78E-04	2.72E-04
1990	2.77E-03	2.06E-03	1.21E-03	9.47E-04	7.57E-04	5.25E-04	4.44E-04	2.82E-04
90th % (ppb)	**3.3524**	**2.4941**	**1.2832**	**1.0264**	**0.8458**	**0.6170**	**0.5446**	**0.3521**

Results in **RED** are those entered for Almond, Hazelnuts & Walnuts in Table 3.4 (in the main document) for alpha & Beta-endosulfan, and Tables 3.5 (in the main document) for endosulfan sulfate.

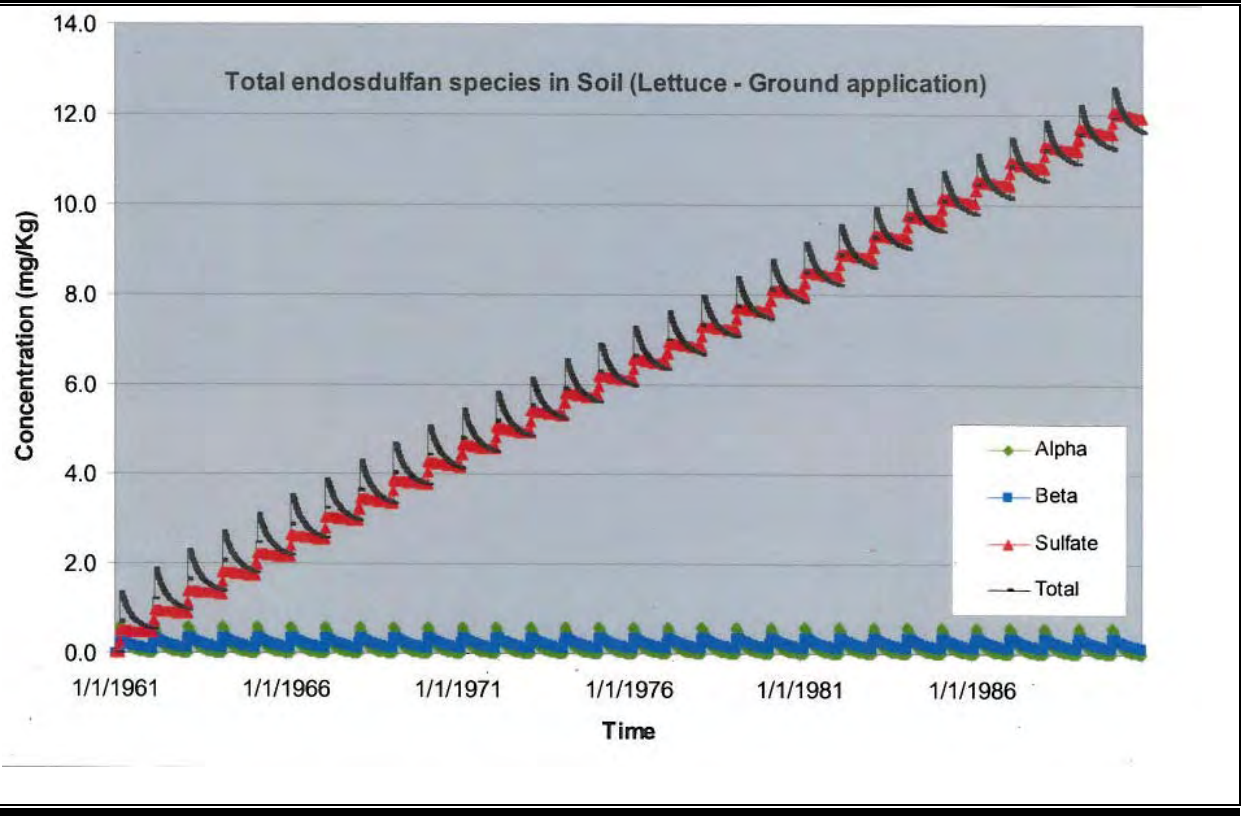
Part C: Data obtained for soil concentrations from EXAMS modeling.

Figure C-1 Modeled total soil concentration of the stressor for a soil cropped with cotton and treated with endosulfan



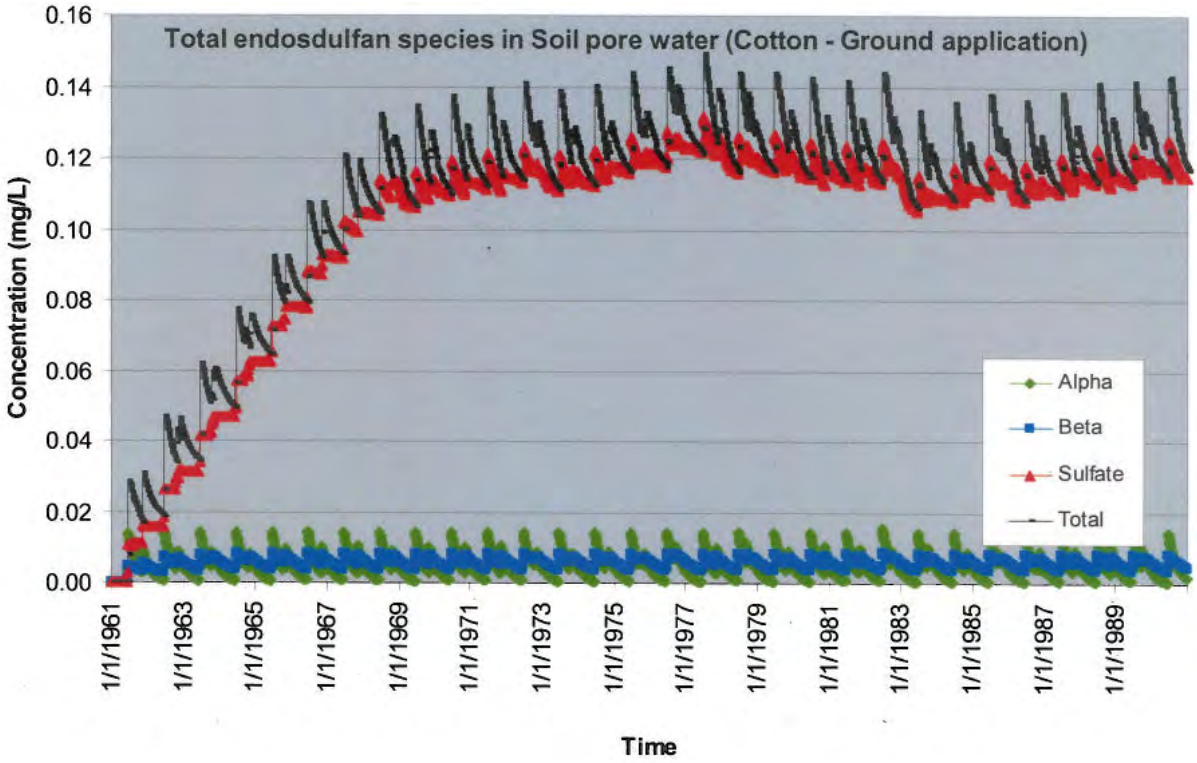
Maximum at steady state = 4.61 mg/kg

Figure C-2 Modeled total soil concentration of the stressor for a soil cropped with lettuce and treated with endosulfan



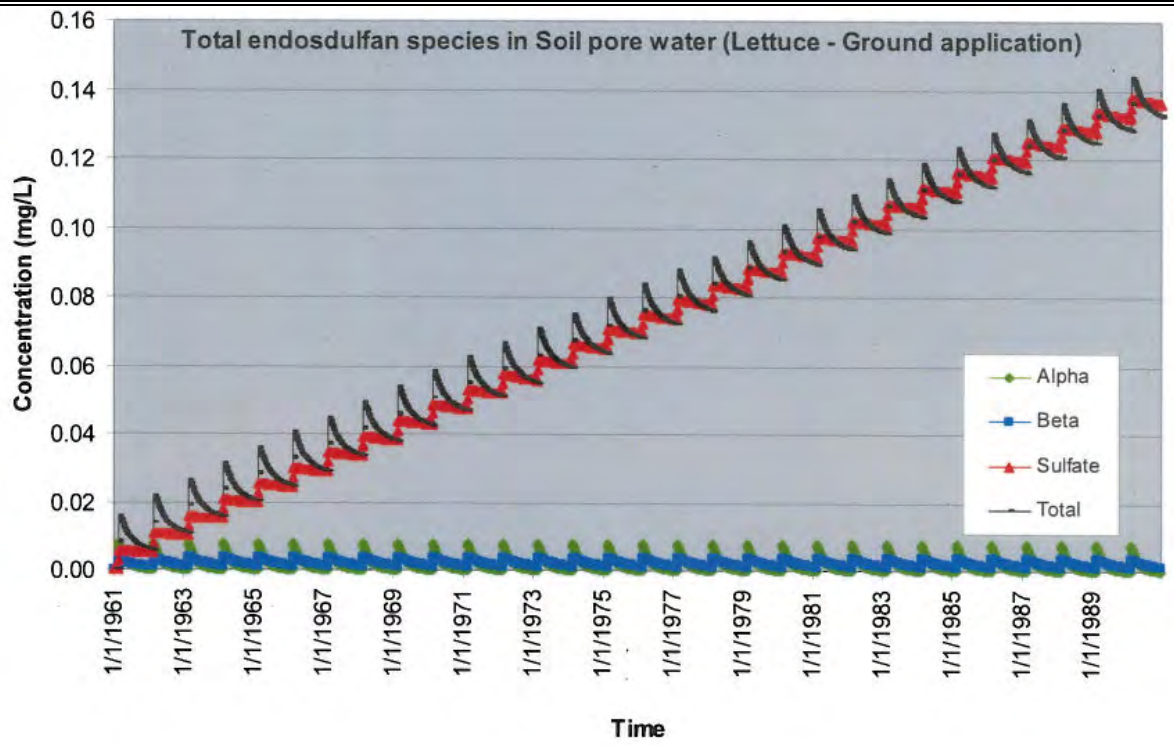
Maximum reached= 12 mg/Kg (steady state was not reached)

Figure C-3 Modeled soil pore water concentration of the stressor for a soil cropped with cotton and treated with endosulfan



Maximum concentration at steady state= 0.13 mg/L

Figure C-4 Modeled soil pore water concentration of the stressor for a soil cropped with lettuce and treated with endosulfan



Maximum soil pore water concentration= 0.14 mg/L (steady state was not reached)