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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

MEMORANDUM

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SUBJECT: Review of "Monitoring Terrestrial Drift and Run-off Zones for Non-target Plant Response to a Label-rate, Pre-emergence Application of Balance WDG Herbicide to Cornfields," MRID 451290-01, 1188 pp., dated April 28, 2000.

FROM: William P. Eckel
Environmental Risk Branch II
Environmental Fate and Effects Division (7507C)

William P. Eckel 6/7/01

TO: Dan Kenny
Registration Division (7505C)

THRU: Tom Bailey, Branch Chief
Environmental Risk Branch II / EFED (7507C)

Tom P. Bailey 6/7/01

Conclusions

EFED has classified this study as "Supplemental." The data on concentrations of isoxaflutole (Balance) in run-off are usable. However, the portions of the report that deal with observations of plant toxicity are deeply flawed, and probably cannot be used in other than a qualitative way. EFED rejects Aventis's analysis of the phytotoxicity data.

This study demonstrates that isoxaflutole (Balance herbicide) runs off treated fields in peak concentrations in the range of 3,000 to 50,000 parts-per-trillion. These concentrations exceed the EC₂₅ (effective concentration for vegetative vigor) of 22 ppt by factors of 136x to 2,272x.

EFED is still extremely concerned about the great potential for damage to non-target and endangered plants represented by this level of isoxaflutole in run-off.

Phytotoxicity

Illinois. The conclusions that Aventis has reported on plant toxicity are not supported by the data. The extensive statistical analyses do not include critical observations of phytotoxicity on day 5 in the Illinois study. EFED cannot accept any conclusions based on analyses that unjustifiably exclude critical data.

The greatest observed toxicity, 80% bleaching on day 5 after application, in the two quadrats nearest the field and 40% in quadrats 3 to 10, was discounted (p.22, 86) purportedly due to carry-over of herbicide from the previous growing season. The herbicide allegedly responsible for the damage was never named in the report. Comparison of day 5 chlorosis observations to later days is difficult at best, because the criteria for classifying chlorosis were changed by the "Botany Team Leader" after day 5 (p. 62), resulting in much less attribution of observed symptoms to isoxaflutole exposure.

The EFED reviewer contacted Aventis to ascertain what herbicide was believed to have caused the observed phytotoxicity in the Illinois study. Mr. Michael Dobbs of Aventis, in a June 4, 2001 fax, stated that "the chlorosis was indicative of damage due to atrazine holdover based on the botanist's expertise." However, it is stated on p. 51 that the study soils were analyzed for a list of 24 pesticides, including atrazine, and that none were found in the Illinois study plots. Aventis has not submitted any data to substantiate the presence of atrazine at the Illinois site, nor has it explained how isoxaflutole-induced plant bleaching was distinguished from other causes, if any.

Based on the absence of evidence for atrazine hold-over, the fact that isoxaflutole, a known plant bleacher, was sprayed just five days earlier, and the fact that a rainfall simulation was run on day 2 after application (water promotes the formation and transport of the phytotoxic degradate RPA202248), EFED must conclude that the phytotoxicity observed in Illinois was due to isoxaflutole.

Vegetative data collected after day 14 in Illinois are unreliable due to flooding of the rainfall simulation subplots, and trampling of the plots by cattle.

Iowa. Reference subplots were contaminated by runoff on the rainfall simulation plots. This precludes any comparison of treatment plots to reference plots, which was the entire basis of the statistical analysis presented in the report.

To account for contamination of the reference plots, Aventis excluded contaminated reference plots from the statistical analysis. However, because the contamination of the reference subplots was not directly observed, but inferred after the fact, we cannot be sure which subplots were uncontaminated. Thus, the statistical comparison of treatment and reference plots is invalid.

The results of this study confirm EFED's concern that non-target plants can be harmed by run-off from isoxaflutole-treated fields.

Concentrations in Run-off

Two rainfall simulations were conducted in Illinois, and two in Iowa. Three natural rainfalls also occurred in Iowa. The concentrations of isoxaflutole, RPA202248 and RPA203328

in each bucket of run-off water collected are given in Tables 38 to 41 (IL) and 44 to 51 (IA). The data are summarized graphically in Figures 40 to 48.

Illinois. In the first simulated rainfall, 17 buckets of run-off were collected (Table 38). The sum of the two phytotoxic species (isoxaflutole + 202248) was 504 ppt (23x EC₂₅) in the first bucket, and rose steadily to 16,000 ppt (730x EC₂₅) in the last bucket. In the supernatant water (Table 40), the corresponding numbers were 865 ppt in bucket #1 and 21,300 ppt (967x EC₂₅) in bucket #17.

Concentrations in the second rainfall simulation (Table 39) were somewhat lower, but still well over the EC₂₅. Thirty buckets of run-off were collected. In bucket #1, the sum of isoxaflutole + 202248 was 337 ppt (15x EC₂₅). Bucket #30 had the highest sum, at 3,100 ppt (140x EC₂₅). The corresponding concentrations in supernatant water (Table 41) were 429 ppt in bucket #1 and 3,000 ppt in bucket #30.

It is notable that in both simulations, the concentration was highest in the last bucket collected, and was rising at the time the simulation was terminated. Presumably, a high concentration would have been maintained if the simulation had continued.

Iowa. In the first rainfall simulation (Table 44), the sum (isoxaflutole + 202248) reached a peak of 54,300 ppt (2,468x EC₂₅) in bucket #9 of 30. The sum declined to 37,600 ppt (still 1,709x EC₂₅) in bucket #30. The corresponding supernatant water (Table 48) had peak sums in bucket #9 (51,400 ppt) and #12 (50,700 ppt), with 30,400 ppt in bucket #30.

In the second rainfall simulation (Table 47) a peak of 10,800 ppt (490x EC₂₅) was reached in bucket #4 of 30, with 6,600 ppt in the last bucket (#30). The corresponding peaks in the supernatant water (Table 51) were 11,000 ppt in bucket #4 and 7,700 ppt in bucket #15, with 6,500 ppt in bucket #30.

The first natural rainfall in Iowa (Table 45) yielded a peak sum concentration of 52,000 ppt (2,360x EC₂₅) in bucket #9 of 30, with 35,700 ppt in the last bucket (1,620x EC₂₅). The supernatant water (Table 49) had a peak concentration of 54,000 ppt (2,455x EC₂₅) in bucket #9 of 30, with 36,200 ppt (1,645x EC₂₅) in bucket #30.

The second and third natural rainfalls (Table 46) had a peak concentration of 23,800 ppt in bucket #28 (31,600 ppt in supernatant, Table 50).

Summary of Run-off Data

All concentrations of isoxaflutole + 202248 measured were at least 500 ppt in the first bucket of runoff, and as high as 37,000 ppt (Iowa, first natural rainfall). The concentrations rose quickly to exceed 1,000 ppt in all cases, and to exceed 10,000 ppt in most cases, with sustained concentrations at those levels through the end of simulated and natural rainfalls.

The highest sustained concentrations were in excess of 2,000 times the EC_{25} , and at the Illinois site, were rising at the time the simulations were ended. The EC_{25} was exceeded at all times.

These data definitively show that water, contaminated with isoxaflutole residues at concentrations far in excess of that known to cause adverse effects in non-target plants, runs off treated fields. This is entirely in keeping with what EFED knows about the stability and mobility of this chemical and its degradates, and confirms our predictions.

The observed behavior is also consistent with Aventis's claims that rainfall enhances the activity of isoxaflutole against weeds in the field.

Table 38: Analyte recovery from Illinois runoff water samples from the first rainfall simulation.

Event: Simulated Rain #1
 Substrate: Water
 Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	IFT, 248, 328
02-16368-1	SR-1	1	0.286	0.218	<LOQ (0.007)	June4
02-16368-2	SR-1	2	0.380	0.253	<LOQ (0.008)	June4
02-16368-3	SR-1	3	0.369	0.194	<LOQ (0.006)	June4
02-16368-4	SR-1	4	0.424	0.272	<LOQ (0.008)	June4
02-16368-5	SR-1	5	0.524	0.354	0.010	June4
02-16368-6	SR-1	6	0.757	0.461	0.015	June4
02-16368-7	SR-1	7	0.875	0.578	0.018	June7
02-16368-9	SR-1	9	0.880	0.575	0.018	June7
02-16368-10	SR-1	10	1.080	0.700	0.018	June7
02-16368-11	SR-1	11	1.263	0.684	0.018	June7
02-16368-12	SR-1	12	3.134	1.719	0.047	June7
02-16368-13	SR-1	13	1.950	3.534	0.088	June16, June7, June7
02-16368-14	SR-1	14	2.564	1.557	0.114	June16, June16, June7
02-16368-15	SR-1	15	5.492	3.213	0.154	June16, June16, June7
02-16368-16	SR-1	16	4.407	2.898	0.159	June16, June16, June7
02-16368-17	SR-1	17	9.888	6.058	0.417	June16, June16, June7

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 39: Analyte recovery from Illinois runoff water samples from the second rainfall simulation.

Event: Simulated Rain #2
Substrate: Water
Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	
02-16368-31	SR-2	1	0.039	0.298	0.039	June7
02-16368-32	SR-2	2	0.024	0.337	0.051	June7
02-16368-33	SR-2	3	0.039	0.455	0.068	June7
02-16368-34	SR-2	4	0.040	0.577	0.084	June7
02-16368-35	SR-2	5	0.053	0.672	0.095	June7
02-16368-36	SR-2	6	0.065	0.821	0.103	June7
02-16368-37	SR-2	7	0.071	0.882	0.118	June7
02-16368-38	SR-2	8	0.078	0.952	0.135	June7
02-16368-39	SR-2	9	0.080	1.033	0.150	June7
02-16368-40	SR-2	10	0.079	1.145	0.166	June7
02-16368-41	SR-2	11	0.097	1.437	0.191	June7
02-16368-42	SR-2	12	0.095	1.467	0.233	June7
02-16368-43	SR-2	13	0.110	1.685	0.287	June7
02-16368-44	SR-2	14	0.094	1.684	0.283	June7
02-16368-45	SR-2	15	0.101	1.579	0.249	June7
02-16368-46	SR-2	16	0.099	1.793	0.305	June7
02-16368-47	SR-2	17	0.093	1.684	0.282	June7
02-16368-48	SR-2	18	0.105	1.732	0.298	June7
02-16368-49	SR-2	19	0.103	1.698	0.305	June7
02-16368-50	SR-2	20	0.108	1.733	0.320	June7
02-16368-51	SR-2	21	0.105	1.747	0.314	June7
02-16368-52	SR-2	22	0.110	1.745	0.334	June7
02-16368-53	SR-2	23	0.112	1.913	0.354	June7
02-16368-54	SR-2	24	0.119	1.966	0.354	June7
02-16368-55	SR-2	25	0.105	2.002	0.369	June7
02-16368-56	SR-2	26	0.118	2.012	0.386	June7
02-16368-57	SR-2	27	0.121	2.011	0.379	June7
02-16368-58	SR-2	28	0.114	1.861	0.363	June7
02-16368-59	SR-2	29	0.101	1.825	0.356	June7
02-16368-60	SR-2	30	0.166	2.527	0.626	June7

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 40: Analyte recovery from Illinois runoff supernatant samples from the first rainfall simulation.

Event: Simulated Rain #1
Substrate: Supernatant
Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	
02-16368-1125	SR-1	1	0.259	0.606	0.010	June4
02-16368-1126	SR-1	2	0.313	0.584	0.011	June4
02-16368-1127	SR-1	3	0.282	0.665	0.012	June4
02-16368-1128	SR-1	4	0.263	0.654	0.012	June4
02-16368-1129	SR-1	5	0.286	0.744	0.014	June4
02-16368-1130	SR-1	6	0.415	1.101	0.020	June4
02-16368-1131	SR-1	7	0.506	1.267	0.020	June10
02-16368-1133	SR-1	9	0.444	1.498	0.022	June10
02-16368-1134	SR-1	10	0.523	1.478	0.023	June10
02-16368-1135	SR-1	11	0.481	1.402	0.022	June10
02-16368-1136	SR-1	12	1.945	3.379	0.056	June10
02-16368-1137	SR-1	13	2.825	2.320	0.106	June10, June16, June10
02-16368-1138	SR-1	14	2.174	3.834	0.138	June16, June16, June10
02-16368-1139	SR-1	15	2.248	4.734	0.179	June16, June16, June10
02-16368-1140	SR-1	16	2.979	7.131	0.147	June16, June16, June10
02-16368-1141	SR-1	17	9.665	11.614	0.294	June16, June16, June10

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 41: Analyte recovery from Illinois runoff supernatant samples from the second rainfall simulation.

Event: Simulated Rain #2
 Substrate: Supernatant
 Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	
02-16368-1155	SR-2	1	0.054	0.375	0.043	June10
02-16368-1156	SR-2	2	0.047	0.423	0.055	June10
02-16368-1157	SR-2	3	0.031	0.552	0.074	June10
02-16368-1158	SR-2	4	0.021	0.475	0.067	June10
02-16368-1159	SR-2	5	0.023	0.517	0.072	June10
02-16368-1160	SR-2	6	0.021	0.490	0.070	June10
02-16368-1161	SR-2	7	0.036	0.801	0.108	June10
02-16368-1162	SR-2	8	0.037	0.814	0.117	June10
02-16368-1163	SR-2	9	0.036	0.813	0.115	June10
02-16368-1164	SR-2	10	0.041	0.969	0.144	June10
02-16368-1165	SR-2	11	0.049	1.188	0.190	June10
02-16368-1166	SR-2	12	0.059	1.295	0.211	June10
02-16368-1167	SR-2	13	0.056	1.366	0.223	June10
02-16368-1168	SR-2	14	0.033	0.971	0.168	June10
02-16368-1169	SR-2	15	0.041	1.227	0.215	June10
02-16368-1170	SR-2	16	0.062	1.584	0.277	June10
02-16368-1171	SR-2	17	0.076	1.856	0.333	June10
02-16368-1172	SR-2	18	0.077	1.770	0.320	June10
02-16368-1173	SR-2	19	0.078	1.674	0.306	June10
02-16368-1174	SR-2	20	0.058	1.335	0.238	June10
02-16368-1175	SR-2	21	0.049	1.303	0.248	June10
02-16368-1176	SR-2	22	0.066	1.528	0.288	June10
02-16368-1177	SR-2	23	0.072	1.899	0.356	June10
02-16368-1178	SR-2	24	0.077	1.926	0.358	June10
02-16368-1179	SR-2	25	0.079	1.953	0.365	June10
02-16368-1180	SR-2	26	0.068	1.579	0.296	June10
02-16368-1181	SR-2	27	0.057	1.407	0.263	June10
02-16368-1182	SR-2	28	0.067	1.540	0.289	June10
02-16368-1183	SR-2	29	0.067	1.769	0.340	June10
02-16368-1184	SR-2	30	0.140	2.869	0.562	June10

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 44. Analyte recovery from Iowa runoff water samples from the first rainfall simulation.

Event: Simulated Rain #1
 Substrate: Water
 Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	IFT, 248, 328
02-16368-541	SR-1	1	0.540	0.995	0.035	July8, July8, June29
02-16368-542	SR-1	2	1.480	2.260	0.076	July8, July8, June29
02-16368-543	SR-1	3	3.400	5.340	0.227	July8, July8, June29
02-16368-544	SR-1	4	4.400	7.900	0.325	July8, July8, June29
02-16368-545	SR-1	5	6.300	9.550	0.411	July8, July8, June29
02-16368-546	SR-1	6	14.000	22.200	1.076	July8, July8, June29
02-16368-547	SR-1	7	20.800	29.400	1.353	July8, July8, June29
02-16368-548	SR-1	8	23.500	28.600	1.443	July8, July8, June29
02-16368-549	SR-1	9	24.400	29.900	1.468	July8, July8, June29
02-16368-550	SR-1	10	23.500	29.200	1.458	July8, July8, June29
02-16368-551	SR-1	11	21.700	26.700	1.369	July8, July8, June29
02-16368-552	SR-1	12	18.000	20.100	0.983	July8, July8, June29
02-16368-553	SR-1	13	21.800	24.200	1.249	July8, July8, June29
02-16368-554	SR-1	14	20.000	25.500	1.209	July8, July8, June29
02-16368-555	SR-1	15	17.700	20.200	0.917	July8, July8, June29
02-16368-556	SR-1	16	20.300	23.900	1.129	July8, July8, June29
02-16368-557	SR-1	17	20.200	23.400	1.123	July8, July8, June29
02-16368-558	SR-1	18	20.900	22.200	1.072	July8, July8, June29
02-16368-559	SR-1	19	19.100	21.600	1.017	July8, July8, June29
02-16368-560	SR-1	20	17.900	19.100	0.904	July8, July8, June29
02-16368-561	SR-1	21	17.600	18.300	0.824	July8, July8, June29
02-16368-562	SR-1	22	17.100	18.000	0.773	July8, July8, June29
02-16368-563	SR-1	23	17.400	19.400	0.878	July8, July8, June29
02-16368-564	SR-1	24	17.000	19.700	0.900	July8, July8, June29
02-16368-565	SR-1	25	17.400	18.000	0.777	July8, July8, June29
02-16368-566	SR-1	26	15.900	19.100	0.794	July8, July8, June29
02-16368-567	SR-1	27	17.000	18.300	0.781	July8, July8, June29
02-16368-568	SR-1	28	15.900	18.500	0.747	July8, July8, June29
02-16368-569	SR-1	29	15.400	17.900	0.753	July8, July8, June29
02-16368-570	SR-1	30	18.700	18.900	0.788	July8, July8, June29

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 45 Analyte recovery from Iowa runoff water samples from the first natural rainfall event.

Event: Natural Rain
#1
Substrate: Water
Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s) IFT, 248, 328
			RPA201772	RPA202248	RPA203328	
02-16368-601	NR-1	1	3.428	34.090	3.273	July13, July19, July13
02-16368-602	NR-1	2	3.436	37.160	3.409	July13, July19, July13
02-16368-603	NR-1	3	3.513	37.170	3.440	July13, July19, July13
02-16368-604	NR-1	4	3.534	36.980	3.359	July13, July19, July13
02-16368-605	NR-1	5	4.680	39.520	3.760	July19, July19, July19
02-16368-606	NR-1	6	4.370	40.260	3.944	July19, July19, July13
02-16368-607	NR-1	7	3.752	40.140	3.791	July13, July19, July13
02-16368-608	NR-1	8	3.820	36.960	3.505	July13, July19, July13
02-16368-609	NR-1	9	4.890	47.120	4.490	July19, July19, July19
02-16368-610	NR-1	10	3.781	44.680	4.100	July13, July19, July19
02-16368-611	NR-1	11	3.659	38.600	3.772	July13, July19, July13
02-16368-612	NR-1	12	3.748	38.150	3.600	July13, July19, July13
02-16368-613	NR-1	13	3.242	30.040	2.898	July13, July19, July13
02-16368-614	NR-1	14	3.317	28.120	2.581	July13, July19, July13
02-16368-615	NR-1	15	3.256	26.260	2.505	July13, July19, July13
02-16368-616	NR-1	16	3.143	23.600	2.275	July13, July19, July13
02-16368-617	NR-1	17	3.350	23.280	2.253	July13, July19, July13
02-16368-618	NR-1	18	3.278	24.040	2.289	July13, July19, July13
02-16368-619	NR-1	19	3.683	25.770	2.503	July13, July19, July13
02-16368-620	NR-1	20	4.690	32.430	3.127	July19, July19, July13
02-16368-621	NR-1	21	4.440	39.670	3.870	July19, July19, July13
02-16368-622	NR-1	22	3.802	37.990	3.569	July13, July19, July13
02-16368-623	NR-1	23	3.526	35.230	3.236	July13, July19, July13
02-16368-624	NR-1	24	3.319	38.240	3.487	July13, July19, July13
02-16368-625	NR-1	25	3.799	36.050	3.374	July13, July19, July13
02-16368-626	NR-1	26	3.742	35.620	3.381	July13, July19, July13
02-16368-627	NR-1	27	3.739	35.990	3.426	July13, July19, July13
02-16368-628	NR-1	28	3.657	35.520	3.430	July13, July19, July13
02-16368-629	NR-1	29	3.895	34.590	3.365	July13, July19, July13
02-16368-630	NR-1	30	3.542	32.180	3.093	July13, July19, July13

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 46: Analyte recovery from Iowa runoff water samples from the second and third natural rainfall event.

Event: Natural Rain #2 and 3
Substrate: Water
Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	IFT, 248, 328
02-16368-631	NR-2	1	0.319	5.780	0.709	July27, Aug2a, July27
02-16368-632	NR-2	2	0.785	9.640	1.150	July27, Aug2a, July27
02-16368-633	NR-2	3	0.996	8.200	1.176	July27, Aug2a, July27
02-16368-634	NR-2	4	0.829	8.160	0.921	July27, Aug2a, July27
02-16368-635	NR-2	5	0.717	5.960	0.825	July27, Aug2a, July27
02-16368-636	NR-2	6	0.720	6.120	0.766	July27, Aug2a, July27
02-16368-637	NR-2	7	0.794	5.760	0.672	July27, Aug2a, July27
02-16368-638	NR-2	8	1.029	6.200	0.765	July27, Aug2a, July27
02-16368-639	NR-2	9	0.964	7.360	0.887	July27, Aug2a, July27
02-16368-640	NR-2	10	0.793	10.210	0.825	July27, Aug2a, July27
02-16368-641	NR-2	11	0.892	12.960	1.243	July27, Aug2a, July27
02-16368-642	NR-2	12	0.796	10.410	1.577	July27, Aug2a, July27
02-16368-643	NR-2	13	0.619	7.490	1.158	July27, Aug2a, July27
02-16368-644	NR-2	14	0.417	6.390	0.571	July27, Aug2a, July27
02-16368-645	NR-2	15	0.951	5.610	1.313	July27, Aug2a, July27
02-16368-646	NR-2	16	0.909	6.220	1.007	July27, Aug2a, July27
02-16368-647	NR-2	17	0.524	6.160	0.627	July27, Aug2a, July27
02-16368-648	NR-2	18	0.622	6.300	0.816	July27, Aug2a, July27
02-16368-649	NR-2	19	0.550	5.860	0.652	July27, Aug2a, July27
02-16368-650	NR-2	20	0.670	6.900	0.774	July27, Aug2a, July27
02-16368-651	NR-2	21	0.688	7.320	0.896	July27, Aug2a, July27
02-16368-652	NR-2	22	1.075	8.750	1.196	July27, Aug2a, July27
02-16368-653	NR-2	23	1.007	10.820	1.434	July27, Aug2a, July27
02-16368-654	NR-2	24	0.997	13.930	1.663	July27, Aug2a, July27
02-16368-655	NR-2	25	1.066	13.670	1.871	July27, Aug2a, July27
02-16368-656	NR-2	26	1.023	15.990	1.630	July27, Aug2a, July27
02-16368-657	NR-2	27	1.180	19.110	2.006	July27, Aug2a, July27
02-16368-658	NR-2	28	1.317	22.500	2.865	July27, Aug2a, July27
02-16368-661	NR-3	1	0.271	7.410	1.830	July27, Aug2a, Aug2a
02-16368-662	NR-3	2	0.115	25.090	2.068	July27, Aug2a, July27

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 47: Analyte recovery from Iowa runoff water samples from the second rainfall simulation.

Event: Simulated Rain #2
 Substrate: Water
 Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	IFT, '248, '328
02-16368-571	SR-2	1	0.054	7.410	3.247	Aug2b, Aug5, Aug2b
02-16368-572	SR-2	2	0.060	6.830	2.507	Aug2b, Aug5, Aug2b
02-16368-573	SR-2	3	0.095	10.250	3.751	Aug2b, Aug5, Aug2b
02-16368-574	SR-2	4	0.108	10.750	3.753	Aug2b, Aug5, Aug2b
02-16368-575	SR-2	5	0.122	10.650	3.753	Aug2b, Aug5, Aug2b
02-16368-576	SR-2	6	0.120	10.290	3.537	Aug2b, Aug5, Aug2b
02-16368-577	SR-2	7	0.120	8.000	2.621	Aug2b, Aug5, Aug2b
02-16368-578	SR-2	8	0.123	8.140	2.859	Aug2b, Aug5, Aug2b
02-16368-579	SR-2	9	0.095	7.740	2.600	Oct7, Aug5, Aug5
02-16368-580	SR-2	10	0.121	8.370	3.044	Aug2b, Aug5, Aug2b
02-16368-581	SR-2	11	0.113	8.100	3.061	Aug2b, Aug5, Aug2b
02-16368-582	SR-2	12	0.105	7.730	2.885	Aug2b, Aug5, Aug2b
02-16368-583	SR-2	13	0.083	8.800	2.209	Aug2b, Oct7, Aug2b
02-16368-584	SR-2	14	0.113	7.300	2.874	Aug2b, Oct7, Aug2b
02-16368-585	SR-2	15	0.099	6.890	2.551	Aug2b, Aug5, Aug2b
02-16368-586	SR-2	16	0.113	7.130	2.795	Aug2b, Aug5, Aug2b
02-16368-587	SR-2	17	0.104	6.800	2.731	Aug2b, Aug5, Aug2b
02-16368-588	SR-2	18	0.104	6.700	2.600	Aug2b, Aug5, Aug5
02-16368-589	SR-2	19	0.120	6.640	2.656	Aug2b, Aug5, Aug2b
02-16368-590	SR-2	20	0.094	4.570	2.588	Aug2b, Aug5, Aug2b
02-16368-591	SR-2	21	0.108	6.330	2.490	Aug2b, Aug5, Aug2b
02-16368-592	SR-2	22	0.073	6.180	1.793	Aug2b, Aug5, Aug2b
02-16368-593	SR-2	23	0.091	6.150	2.515	Aug2b, Aug5, Aug2b
02-16368-594	SR-2	24	0.103	6.100	2.481	Aug2b, Aug5, Aug2b
02-16368-595	SR-2	25	0.109	5.800	2.490	Aug2b, Aug5, Aug2b
02-16368-596	SR-2	26	0.091	5.870	2.401	Aug2b, Aug5, Aug2b
02-16368-597	SR-2	27	0.103	5.760	2.374	Aug2b, Aug5, Aug2b
02-16368-598	SR-2	28	0.086	5.710	2.324	Aug2b, Aug5, Aug2b
02-16368-599	SR-2	29	0.088	5.600	2.391	Aug2b, Aug5, Aug2b
02-16368-600	SR-2	30	0.098	6.500	2.695	Aug2b, Aug5, Aug2b

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 48: Analyte recovery from Iowa runoff supernatant samples from the first rainfall simulation.

Event: Simulated Rain #1
Substrate: Supernatant
Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	IFT, 248, 328
02-16368-1485	SR-1	1	0.360	1.080	0.035	July8, July8, June30
02-16368-1486	SR-1	2	0.990	2.590	0.080	July8, July8, June30
02-16368-1487	SR-1	3	2.100	6.040	0.235	July8, July8, June30
02-16368-1488	SR-1	4	3.050	8.600	0.333	July8, July8, June30
02-16368-1489	SR-1	5	4.650	11.950	0.504	July8, July8, June30
02-16368-1490	SR-1	6	9.800	23.800	1.130	July8, July8, June30
02-16368-1491	SR-1	7	15.800	31.700	1.464	July8, July8, June30
02-16368-1492	SR-1	8	16.500	33.700	1.506	July8, July8, June30
02-16368-1493	SR-1	9	18.400	33.000	1.490	July8, July8, June30
02-16368-1494	SR-1	10	19.500	30.800	1.423	July8, July8, June30
02-16368-1495	SR-1	11	18.600	31.200	1.417	July8, July8, June30
02-16368-1496	SR-1	12	20.100	30.600	1.334	July8, July8, June30
02-16368-1497	SR-1	13	15.700	29.300	1.311	July8, July8, Aug28
02-16368-1498	SR-1	14	16.400	28.600	1.239	July8, July8, June30
02-16368-1499	SR-1	15	14.900	28.800	1.216	July8, July8, June30
02-16368-1500	SR-1	16	15.600	24.500	1.054	July8, July8, June30
02-16368-1501	SR-1	17	12.900	26.400	1.056	July8, July8, June30
02-16368-1502	SR-1	18	12.400	26.600	1.060	July8, July8, June30
02-16368-1503	SR-1	19	14.600	24.700	1.044	July8, July8, June30
02-16368-1504	SR-1	20	14.300	23.800	1.025	July8, July8, June30
02-16368-1505	SR-1	21	12.900	26.500	0.983	July8, July8, June30
02-16368-1506	SR-1	22	11.500	25.200	0.927	July8, July8, June30
02-16368-1507	SR-1	23	15.000	21.900	0.889	July8, July8, June30
02-16368-1508	SR-1	24	13.600	22.700	0.887	July8, July8, June30
02-16368-1509	SR-1	25	14.200	22.100	0.855	July8, July8, June30
02-16368-1510	SR-1	26	12.500	22.200	0.833	July8, July8, June30
02-16368-1511	SR-1	27	13.000	21.500	0.848	July8, July8, June30
02-16368-1512	SR-1	28	13.200	20.600	0.805	July8, July8, June30
02-16368-1513	SR-1	29	12.800	19.900	0.765	July8, July8, June30
02-16368-1514	SR-1	30	10.200	20.200	0.893	July8, July8, June30

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 49: Analyte recovery from Iowa runoff supernatant samples from the first natural rainfall event.

Event: Natural Rain #1
Substrate: Supernatant
Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s) IFT, 248, 328
			RPA201772	RPA202248	RPA203328	
02-16368-1545	NR-1	1	1.920	34.660	3.130	Aug2
02-16368-1546	NR-1	2	1.800	33.600	3.100	Aug2
02-16368-1547	NR-1	3	2.530	28.970	2.600	Aug2
02-16368-1548	NR-1	4	3.400	36.500	3.340	Aug2
02-16368-1549	NR-1	5	3.630	38.590	3.620	Aug2
02-16368-1550	NR-1	6	3.690	40.780	3.980	Aug2
02-16368-1551	NR-1	7	3.080	40.310	3.760	Aug2
02-16368-1552	NR-1	8	3.810	40.530	3.890	Aug2
02-16368-1553	NR-1	9	4.720	49.450	4.580	Aug2
02-16368-1554	NR-1	10	3.430	44.560	4.230	Aug2
02-16368-1555	NR-1	11	3.350	41.000	3.750	Aug2
02-16368-1556	NR-1	12	3.700	35.630	3.320	Aug2
02-16368-1557	NR-1	13	2.300	30.590	2.760	Aug2
02-16368-1558	NR-1	14	2.100	27.280	2.550	Aug2
02-16368-1559	NR-1	15	2.660	26.900	2.530	Aug2
02-16368-1560	NR-1	16	2.010	24.140	2.180	Aug2
02-16368-1561	NR-1	17	1.700	18.020	1.670	Aug2
02-16368-1562	NR-1	18	1.830	16.850	1.520	Aug2
02-16368-1563	NR-1	19	2.580	24.330	2.290	Aug2
02-16368-1564	NR-1	20	3.450	33.200	3.070	Aug2
02-16368-1565	NR-1	21	3.860	41.260	3.600	Aug2
02-16368-1566	NR-1	22	2.550	33.180	2.970	Aug2
02-16368-1567	NR-1	23	2.920	32.480	2.850	Aug2
02-16368-1568	NR-1	24	2.960	37.960	3.400	Aug2
02-16368-1569	NR-1	25	2.990	34.510	3.200	Aug2
02-16368-1570	NR-1	26	3.290	36.320	3.370	Aug2
02-16368-1571	NR-1	27	3.090	38.690	3.460	Aug2
02-16368-1572	NR-1	28	3.460	37.960	3.200	Aug5
02-16368-1573	NR-1	29	2.770	33.790	2.990	Aug2
02-16368-1574	NR-1	30	3.150	33.050	3.030	Aug2

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 50. Analyte recovery from Iowa runoff supernatant samples from the second and third natural rainfall event.

Event: Natural Rain #2 and 3
 Substrate: Supernatant
 Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s) IFT, 248, 328
			RPA201772	RPA202248	RPA203328	
02-16368-1575	NR-2	1	0.232	7.302	0.734	Aug30
02-16368-1576	NR-2	2	0.576	11.424	1.060	Aug30
02-16368-1577	NR-2	3	0.856	12.564	1.140	Aug30
02-16368-1578	NR-2	4	0.532	9.396	0.846	Aug30
02-16368-1579	NR-2	5	0.394	8.182	0.704	Aug30
02-16368-1580	NR-2	6	0.546	8.096	0.678	Aug30
02-16368-1581	NR-2	7	0.628	7.746	0.664	Aug30
02-16368-1582	NR-2	8	0.790	7.444	0.670	Aug30
02-16368-1583	NR-2	9	0.944	10.456	1.006	Aug30
02-16368-1584	NR-2	10	0.968	11.808	1.224	Aug30
02-16368-1585	NR-2	11	1.088	15.196	1.622	Aug30
02-16368-1586	NR-2	12	0.634	12.036	1.380	Aug30
02-16368-1587	NR-2	13	0.524	9.306	1.002	Aug30
02-16368-1588	NR-2	14	0.468	8.734	0.872	Aug30
02-16368-1589	NR-2	15	0.634	8.478	0.902	Aug30
02-16368-1590	NR-2	16	0.524	8.832	0.854	Aug30
02-16368-1591	NR-2	17	0.642	8.302	0.850	Aug30
02-16368-1592	NR-2	18	0.568	8.276	0.828	Aug30
02-16368-1593	NR-2	19	0.616	7.876	0.808	Aug30
02-16368-1594	NR-2	20	0.606	8.536	0.874	Aug30
02-16368-1595	NR-2	21	0.720	8.508	0.954	Aug30
02-16368-1596	NR-2	22	0.938	10.088	1.146	Aug30
02-16368-1597	NR-2	23	1.072	12.342	1.386	Aug30
02-16368-1598	NR-2	24	1.094	15.758	1.800	Aug30
02-16368-1599	NR-2	25	0.978	14.972	1.710	Aug30
02-16368-1600	NR-2	26	1.116	17.550	1.944	Aug30
02-16368-1601	NR-2	27	1.190	21.288	2.350	Aug30
02-16368-1602	NR-2	28	1.454	30.230	3.374	Aug30
02-16368-1605	NR-3	1	0.186	9.670	2.324	Aug30
02-16368-1606	NR-3	2	0.380	28.926	6.762	Aug30

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 51: Analyte recovery from Iowa runoff supernatant samples from the second rainfall simulation.

Event: Simulated Rain #2
 Substrate: Supernatant
 Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s) IFT, 248, 328
			RPA201772	RPA202248	RPA203328	
02-16368-1515	SR-2	1	0.043	7.751	3.547	Aug30
02-16368-1516	SR-2	2	0.049	7.334	2.611	Aug30
02-16368-1517	SR-2	3	0.078	9.900	3.771	Aug30, Oct7, Aug30
02-16368-1518	SR-2	4	0.094	10.900	4.134	Aug30, Oct7, Aug30
02-16368-1519	SR-2	5	0.105	9.600	3.592	Aug30, Oct7, Aug30
02-16368-1520	SR-2	6	0.087	9.400	3.518	Aug30, Oct7, Aug30
02-16368-1521	SR-2	7	0.095	9.100	3.288	Aug30, Oct7, Aug30
02-16368-1522	SR-2	8	0.088	9.506	3.317	Aug30
02-16368-1523	SR-2	9	0.084	9.251	3.159	Aug30
02-16368-1524	SR-2	10	0.093	8.843	3.063	Aug30
02-16368-1525	SR-2	11	0.087	8.427	3.038	Aug30
02-16368-1526	SR-2	12	0.088	8.266	2.894	Aug30
02-16368-1527	SR-2	13	0.089	8.031	2.857	Aug30
02-16368-1528	SR-2	14	0.084	7.715	2.810	Aug30
02-16368-1529	SR-2	15	0.107	7.611	2.788	Aug30
02-16368-1530	SR-2	16	0.092	7.291	2.793	Aug30
02-16368-1531	SR-2	17	0.087	7.096	2.632	Aug30
02-16368-1532	SR-2	18	0.092	6.935	2.664	Aug30
02-16368-1533	SR-2	19	0.080	6.825	2.572	Aug30
02-16368-1534	SR-2	20	0.083	6.739	2.597	Aug30
02-16368-1535	SR-2	21	0.088	6.659	2.567	Aug30
02-16368-1536	SR-2	22	0.092	6.336	2.447	Aug30
02-16368-1537	SR-2	23	0.088	6.579	2.449	Aug30
02-16368-1538	SR-2	24	0.088	6.428	2.484	Aug30
02-16368-1539	SR-2	25	0.077	6.223	2.451	Aug30
02-16368-1540	SR-2	26	0.081	6.111	2.420	Aug30
02-16368-1541	SR-2	27	0.078	6.163	2.403	Aug30
02-16368-1542	SR-2	28	0.088	6.170	2.417	Aug30
02-16368-1543	SR-2	29	0.083	5.928	2.337	Aug30
02-16368-1544	SR-2	30	0.092	6.418	2.601	Aug30

Analyte LOD	0.001	0.001	0.003
Analyte LOQ	0.010	0.010	0.010

Table 52: Analyte recovery from Iowa runoff soil samples from the first rainfall simulation.

Event: Simulated Rain #1
Substrate: Soil
Study Number: EBA 079811

Sample ID:	Event No.:	Bucket No.:	Calculated Concentration (ppb)			Data Set(s)
			RPA201772	RPA202248	RPA203328	
02-16368-1485	SR-1	1	2.402	2.393	ND	July9
02-16368-1486	SR-1	2	6.292	5.304	ND	July9
02-16368-1487	SR-1	3	12.670	11.073	<LOD	July9
02-16368-1488	SR-1	4	18.845	15.962	<LOD	July9
02-16368-1489	SR-1	5	25.393	20.453	<LOD	July9
02-16368-1490	SR-1	6	62.903	45.587	<LOQ (0.783)	July9
02-16368-1491	SR-1	7	89.404	57.140	<LOQ (0.880)	July9
02-16368-1492	SR-1	8	94.891	63.483	<LOQ (0.899)	July9
02-16368-1493	SR-1	9	97.650	61.943	<LOQ (1.09)	July9
02-16368-1494	SR-1	10	98.082	63.057	<LOQ (0.976)	July9
02-16368-1495	SR-1	11	79.338	50.161	<LOQ (0.892)	July9
02-16368-1496	SR-1	12	87.999	53.900	<LOQ (1.040)	July9
02-16368-1497	SR-1	13	68.585	40.745	<LOQ (0.678)	July9
02-16368-1498	SR-1	14	67.882	38.449	<LOQ (0.764)	July9
02-16368-1499	SR-1	15	69.912	42.778	<LOQ (0.743)	July9
02-16368-1500	SR-1	16	66.587	38.562	<LOQ (0.699)	July9
02-16368-1501	SR-1	17	69.600	47.949	<LOQ (0.690)	July9
02-16368-1502	SR-1	18	61.650	42.325	<LOQ (0.619)	July9
02-16368-1503	SR-1	19	79.893	43.443	<LOQ (0.670)	July9
02-16368-1504	SR-1	20	74.399	39.900	<LOQ (0.636)	July9
02-16368-1505	SR-1	21	65.562	45.675	<LOQ (0.646)	July9
02-16368-1506	SR-1	22	63.059	44.160	<LOQ (0.567)	July9
02-16368-1507	SR-1	23	84.467	39.670	<LOQ (0.617)	July9
02-16368-1508	SR-1	24	69.222	34.784	<LOQ (0.457)	July9
02-16368-1509	SR-1	25	44.344	24.521	<LOQ (0.332)	July9
02-16368-1510	SR-1	26	102.619	57.621	<LOQ (0.773)	July9
02-16368-1511	SR-1	27	71.548	37.032	<LOQ (0.436)	July9
02-16368-1512	SR-1	28	66.705	35.293	<LOQ (0.444)	July9
02-16368-1513	SR-1	29	64.638	33.331	<LOQ (0.447)	July9
02-16368-1514	SR-1	30	69.808	44.139	<LOQ (0.537)	July9

Analyte LOD	0.11	0.04	0.29
Analyte LOQ	0.4	0.4	2.0

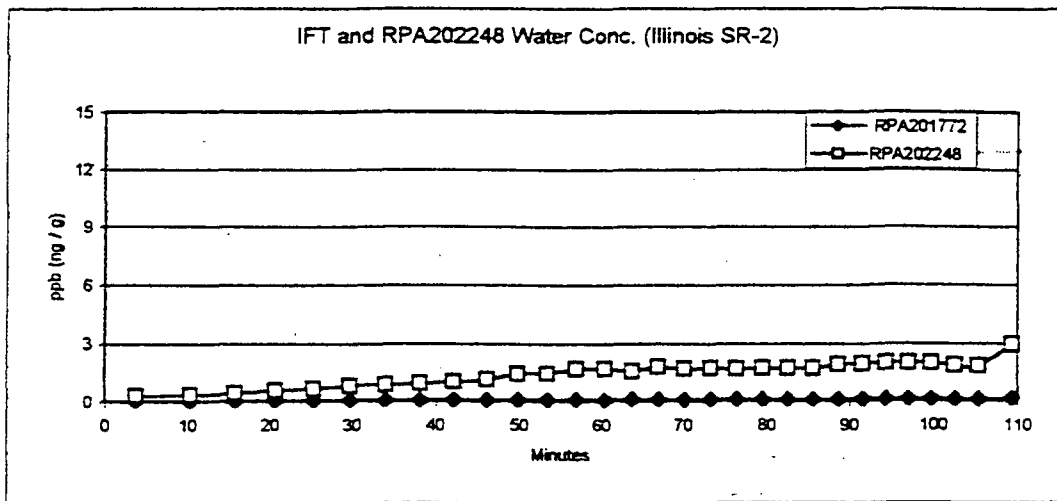
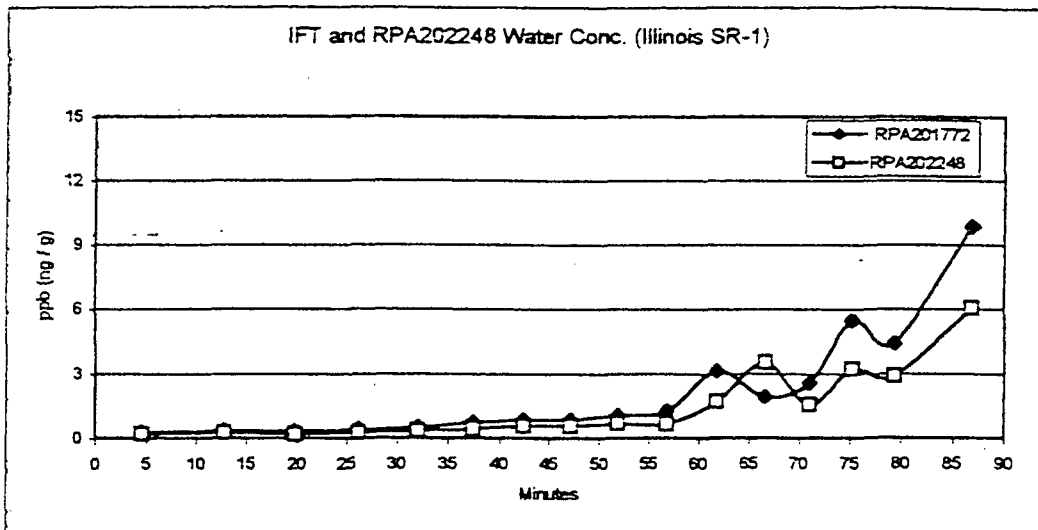


FIGURE 43. ILLINOIS IFT AND RPA202248 CONCENTRATION OVER TIME FOR ILLINOIS SIMULATED RAINFALL I (SR-1) AND SIMULATED RAINFALL 2 (SR-2).

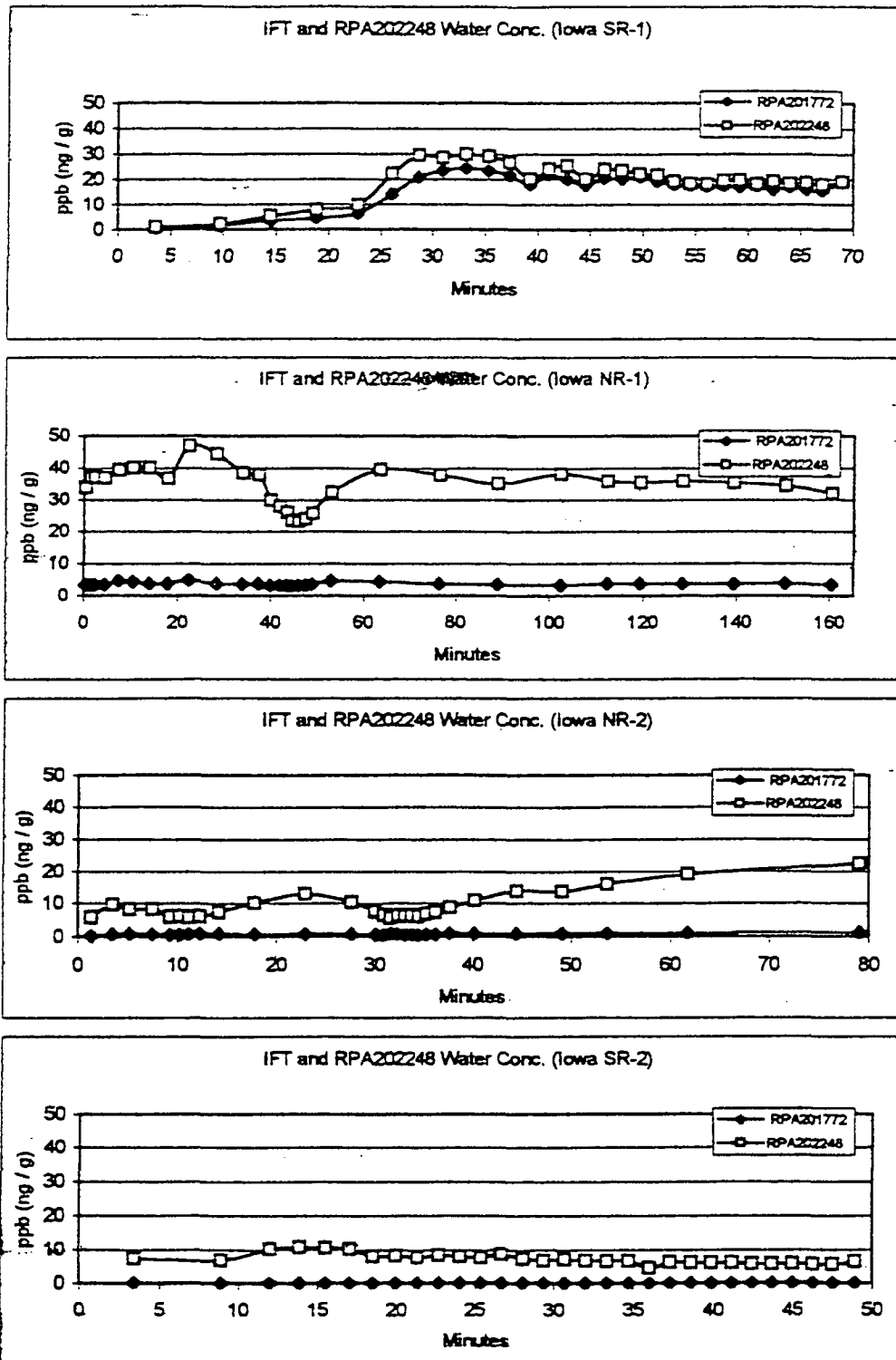


FIGURE 48. IOWA IFT AND RPA202248 CONCENTRATION OVER TIME TIME FOR IOWA SIMULATED RAINFALL I (SR-1), SIMULATED RAINFALL 2 (SR-2), NATURAL RAINFALL 1 (NR-1) AND NATURAL RAINFALL 2 (NR-2).