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SUBJECT: DEVELOPMENT OF FLUX PROFILES FOR NEW CHLOROPICRIN APPLICATION METHODS

Introduction

The Methyl Bromide Industry Panel recently submitted to the Department of Pesticide Regulation (DPR) a report entitled: "Monitoring of methyl bromide and chloropicrin field emissions from shank applications at shallow and deep injection depths (Ajwa, H. 2010)" (DPR registration data volume 123-0220). This report was recently reviewed and the data found to be acceptable for development of flux profiles. Although the report includes flux profiles for both chloropicrin and methyl bromide, the methods used to develop those flux profiles does not follow preferred DPR methods. This memorandum describes the development of the flux profiles for chloropicrin, lays out the procedure to develop methyl bromide flux profiles, and presents the results.

Data Description and Analysis

The study objective is: "…to generate comparative emissions data from five shank application methods for methyl bromide and chloropicrin at practical application rates for each method." The nominal application rate for all five applications was 360lb/ac of Tri-Con 50:50 (EPA Regulation Number 11220-10) (50% methyl bromide and 50% chloropicrin). All five fields were 1 acre. A "control field" was applied by shallow shank injection and covered with a standard HDPE tarp. All four remaining fields were tarped with EVOH resin barrier tarp. The application types were as follows: (1) broadcast EVOH tarp shallow shank (12 inches), (2) broadcast EVOH tarp shallow shank (12 inches) with potassium thiosulfate applied to the soil immediately before tarping, (3) broadcast EVOH tarp deep shank (18 inches), and (4) strip EVOH tarp deep shank (18 inches).

Air sampling interval duration was 6 hours for the first 2 days, changing to 12 hour intervals until tarp splitting when 6 hour intervals were resumed for several intervals before changing back to 12 hour intervals for the remainder of the study. The data CD accompanying the report include ISCST3 modeling results for each sampling interval matched with the measured air concentrations. We used the ISCST3 modeling results as presented.

One acre fields, low application rates and VIF tarps were used in this study. As a result, sampling intervals showing all ND air concentrations are common. Using the usual flux estimation methods for these sampling intervals is problematic. It is important to be able to scale up to fields larger than that used in the study. Flux estimates using usual flux estimation methods are not appropriate because it can not be assumed that a field size of, say, 20 acres would show all ND results for off-site air samplers if a field that size had been monitored. So, there is little information with which to mitigate off site exposure. In the registration review DPR staff recommended estimating the maximum flux that could have occurred and still produced nondetects for a 1 acre field. That flux estimate can then be used for larger fields. Flux profiles developed and reported in this memorandum follow that recommendation.

There are four alternatives to estimate the flux for each sampling interval: (1) air concentrations matched in space and time. This means that the air concentrations were paired according to location relative to the applied field, (2) sorting measured air concentrations and matching those concentrations with sorted modeled air concentrations. This means that within each sampling interval the location of the concentrations is not used in the regression. Thus, the air concentrations are matched in time but not in space, (3) for sampling intervals with measured air concentrations above the detection limit and nonsignificant regressions by both unsorted and sorted data, the flux is estimated as mean(measured)/mean(modeled) air concentrations, and (4) for sampling intervals with all measured air concentrations below the detection limit the flux was estimated by finding the maximum flux that could have occurred and still produced nondetects for the one acre field. This is accomplished by using the single highest modeled value together with the nondetect value for that sampler. The nondetect, which was reported as half the reporting limit on the data CD was multiplied by two to bring the value up to the reporting limit. The nominal flux for the modeling was 1 $ug/m^2/sec$ so the ratio of that reporting limit air concentration to the modeled value is estimated as the flux.

Fields #2 and #5 were used to arrive at the uniform method for developing flux profile from the data in this study. This uniform method is consistent with methods DPR has used in the past, with the only new approach being that used in the nondetect sampling periods. The DPR flux profiles were developed as follows. Any sampling interval with measured values that were all non-detects used the method for nondetects as described above. For the remainder of the sampling intervals the preference for flux estimation is as follows: (1) if the least square linear regression with pairs matched in space and time is significant at the 5% significance level then that flux estimate is used, (2) if linear regression on the sorted pairs matched only in time is significant at the 5% significance level then that flux estimate is used, (3) if neither regression is significant at the 5% significance level, then the flux is estimated as flux = Mean(measured)/Mean(modeled), or (4) if all measured data is missing the flux is estimated by interpolation between flux from sampling intervals before and after the interval with all missing data.

Results

Tables 1 through 4 show the regression results for each sampling interval for Field#2 and Field#5. Sampling intervals that had all nondetect measured values are indicated with an asterisk in the far right column. Tables 1 and 3 show the least square linear regression on air concentrations matched in space and time. Tables 2 and 4 show linear regression on air concentrations matched only in time (regression on sorted pairs).

For Field#2 sampling interval 25 had all measured values missing. This left 31 sampling intervals to analyze. Only 3 of 31 remaining sampling intervals showed statistically significant regressions for air concentrations matched in space and time (Table 1). This left 28 sampling intervals to analyze. Thirteen of the remaining 28 sampling intervals showed statistically significant regressions on air concentrations matched only in time (regression on sorted pairs) (Table 2). One of the remaining 28 sampling intervals (interval 23) showed statistically nonsignificant regressions for both regressions. The flux for interval 23 was estimated by the measured/modeled method. Fourteen sampling intervals showed all measured air concentrations below the detection limit.

For Field#5 sampling interval 1 did not have any measurements because the application occurred in the afternoon. Only 3 of 31 remaining sampling intervals showed statistically significant regressions for air concentrations matched in space and time (Table 3). Twelve of the remaining 31 sampling intervals showed statistically significant regressions on air concentrations matched only in time (regression on sorted pairs) (Table 4). Four of the remaining 31 sampling intervals showed statistically nonsignificant regressions for both regressions. Twelve sampling intervals showed all measured air concentrations below the detection limit.

Table 5 shows the DPR developed flux profiles and the cumulative percent of mass applied lost in each sampling interval. The flux profiles were constructed as detailed in the Data Description and Analysis section. Preference was given first to statistically significant least squares linear regression for air concentrations matched in space and time, next to statistically significant least squares linear regression for air concentrations matched in time only (regression on sorted pairs), next, Measured/Modeled and last, Interpolation. Below the Detection Limit method was used if all measured values were below the detection limit. The sampling intervals with flux estimated by either the Measured/Modeled method, the Below the Detection Limit method, or the Interpolation method are indicated.

Tables 6 through 8 and Figures 1-4 show a comparison between the DPR flux profiles and the MBIP flux profiles. For Field#2 the DPR flux total mass loss was 8.07% of the mass applied while the MBIP flux profiles showed a total mass loss as 12.68% of the mass applied (Table 6). For Field#5 the DPR flux total mass loss was 6.26% of the mass applied while the MBIP flux profiles showed a total mass loss as 9.37% of the mass applied (Table 7).

The peak flux estimates for the DPR and MBIP flux profiles for Field#2 occurred in the same sampling interval, Interval 1 (a daytime interval). But the DPR flux estimate was smaller, 15.80 ug/m^{2}sec versus 25.82 ug/m^{2}sec. The peak flux estimates for the DPR and MBIP profiles for Field#5 occurred in different sampling intervals. The DPR flux profile shows the peak flux estimate during the sampling interval when tarp cutting occurred, Interval 18 (a daytime interval), a flux of 5.93 ug/m^{2}sec. The MBIP peak flux occurred in Interval 7 (a nighttime interval), with a value of 6.31 ug/m^{2}sec. It should be noted that for Field#5 both the DPR and the MBIP flux profiles show Interval 8 with a flux estimate of 5.9 ug/m^{2}sec.

Tables 9 and 10 show the final flux profiles and the percent mass loss for all 5 fields, respectively.

Discussion

The MBIP mass loss and peak flux estimates tend to be higher than the DPR results partly because the MBIP choice of analysis method when least squares linear regression on air concentrations matched in both space and time is deemed unsuccessful tends to biases the flux estimates high. The alternate analysis methods are used by MBIP when either a non-significant regression is obtained or due the treatment of a significant regression intercept. As discussed in the introduction, the treatment of a significant regression intercept is particularly problematic because it is statistically invalid. A larger flux estimate should not be accepted if it is obtained using a statistically invalid procedure.

DPR staff recommends that, if these study results are used to develop mitigation measured, that the DPR developed flux profiles shown in Table 9 be used. However, the large number of sampling intervals with all nondetect values for measured air concentrations together with the majority of the remaining sampling intervals requiring alternate methods other than least squares regression on air concentrations matched in both time and space to estimate flux increases the uncertainty in these estimates considerably.

Table 1. Field #2 linear least squares regression on air concentrations matched in space and time.

Period	Emissions ($ug/m^2/sec$)	P	SE	R sq	below DL
1	8.38	0.191	5.689	26.60%	
2	5.02	0.014	1.456	66.40%	
3	0.0184	0.415	0.021	11.30%	
4	-0.0447	0.06	0.0193	47.20%	
5	-0.0413	0.159	0.0256	30.20%	
6	5.32	0.024	1.774	60.00%	
7	-1.12	0.235	0.847	22.50%	
8	0.0079	0.693	0.019	2.80%	
9	-0.0558	0.071	0.0255	44.40%	*
10	0.0048	0.762	0.0152	1.60%	*
11	0.247	0.016	0.0748	64.60%	
12	-0.00744	0.552	0.0115	9.50%	*
13	-0.0141	0.071	0.00645	44.40%	*
14	-0.0021	0.744	0.00615	1.90%	*
15	0.0001	0.994	0.0136	0.00%	*
16	-0.945	0.13	0.5382	33.90%	
17	1.00	0.476	1.31	8.80%	
18	1.46	0.072	0.6706	44.10%	
19	0.0222	0.402	0.02463	12.00%	
20	-0.0125	0.585	0.02144	6.40%	
21	0.0048	0.843	0.02317	0.90%	*
22	0.196	0.15	0.119	31.20%	
23	-0.674	0.515	0.9741	7.40%	
24	-0.0057	0.785	0.01993	1.30%	
25	Missing[1]				
26	0.002	0.899	0.01485	0.30%	*
27	0.0038	0.855	0.02015	0.60%	*
28	0.0131	0.435	0.0157	10.40%	*
29	0.0152	0.387	0.01631	12.70%	*
30	0.0354	0.131	0.02023	33.80%	*
31	-0.0209	0.506	0.02951	7.70%	*
32	-0.0169	0.66	0.02791	5.80%	*

[1]Missing = all measured data from this interval is missing. Flux was estimated using the Interpolation method.

Table 2. Field#2 linear regression on air concentrations matched only in time (regression on sorted pairs).

Period	Emissions (ug/m²/sec)	P	SE	R sq	below DL
1	15.8	0.000	1.573	94.40%	
2	-[1]	-	-	-	
3	0.043	0.022	0.014	61.30%	
4	0.058	0.003	0.012	79.50%	
5	0.0668	0.003	0.014	79.00%	
6	-	-	-	-	
7	2.07	0.004	0.463	76.90%	
8	2.57	0.000	0.1803	97.10%	
9	0.0756	0.002	0.0147	81.50%	*
10	0.0342	0.002	0.0062	83.50%	*
11	-	-	-	-	
12	0.0159	0.010	0.00334	85.00%	*
13	0.0175	0.012	0.0049	68.00%	*
14	0.0147	0.000	0.001679	92.70%	*
15	0.0307	0.001	0.005252	85.00%	*
16	1.51	0.001	0.2392	87.00%	
17	3.02	0.002	0.6011	80.80%	
18	1.78	0.015	0.5247	65.80%	
19	0.0602	0.001	0.009178	87.80%	
20	0.0411	0.021	0.01237	68.90%	
21	0.0432	0.021	0.01295	69.00%	*
22	0.266	0.030	0.09403	57.10%	
23	1.55	0.097	0.7892	39.20%	
24	0.0453	0.001	0.007756	85.10%	
25	Missing[2]				
26	0.0327	0.002	0.006548	80.60%	*
27	0.0437	0.004	0.009474	78.00%	*
28	0.034	0.010	0.009076	70.10%	*
29	0.0349	0.013	0.01006	66.80%	*
30	0.0603	0.000	0.003424	98.10%	*
31	0.049	0.081	0.02333	42.30%	*
32	0.0578	0.012	0.01641	67.40%	*

[1]Sampling periods with no sorted regression results indicates that the regression matched in space and time (Table 1) was statistically significant.
[2]Missing = all measured data from this interval is missing. Flux was estimated using the Interpolation method.

Table 3. Field #5 linear least squares regression on air concentrations matched in space and time.

Period	Emissions (ug/m²/sec)	P	SE	R sq	Non-detect
1	-[1]	-	-	-	
2	0.0143	0.77	0.047	1.50%	
3	0.236	0.32	0.216	16.50%	
4	-0.0001	0.996	0.0207	0.00%	
5	-0.025	0.95	0.365	0.10%	
6	0.583	0.21	0.42	24.60%	
7	-0.956	0.25	0.76	20.90%	
8	0.903	0.31	0.81	17.10%	
9	0.0147	0.56	0.02	5.90%	*
10	-0.0187	0.28	0.016	18.80%	*
11	0.0111	0.22	0.008	23.60%	*
12	0.0022	0.84	0.01	0.80%	*
13	0.0115	0.58	0.02	5.40%	*
14	0.019	0.91	0.17	0.20%	
15	0.0191	0.335	0.018	15.50%	*
16	-0.0022	0.85	0.011	0.60%	*
17	0.92	0.485	1.182	9.20%	
18	0.997	0.71	2.532	3.00%	
19	1.265	0.31	1.142	17.00%	
20	0.793	0.22	0.58	236.00%	
21	2.46	0	0.36	88.90%	
22	1.6165	0.001	0.26	86.90%	
23	0.572	0.04	0.222	52.50%	
24	1.2585	0.002	0.241	82.00%	
25	0.0085	0.538	0.0129	6.6	
26	0.439	0.167	0.2793	29.20%	
27	-0.0018	0.922	0.017	20.00%	*
28	-0.0129	0.516	0.019	7.30%	*
29	0.0117	0.57	0.02	5.60%	*
30	-0.004	0.812	0.0162	1.00%	*
31	0.032	0.177	0.021	28.10%	*
32	0.057	0.657	0.122	3.50%	

[1]The Field#5 application was made starting in sampling interval 2.

Table 4. Field #5 linear least squares regression on air concentrations matched time only (regression on sorted pairs).

Period	Emissions ($ug/m^2/sec$)	P	SE	R sq	Non-detect
1	-[1]	-	-	-	
2	0.0907	0.020	0.03	61.00%	
3	0.462	0.020	0.143	63.50%	
4	0.0504	0.000	0.003	98.40%	
5	0.802	0.003	0.162	80.30%	
6	1.08	0.001	0.0194	83.7	
7	1.54	0.040	0.58	54.10%	
8	1.37	0.097	0.69	39.20%	
9	0.0581	0.000	0.007	92.10%	*
10	0.0384	0.003	0.008	79.20%	*
11	0.0197	0.006	0.005	74.2	*
12	0.0236	0.000	0.003	90.90%	*
13	0.0354	0.005	0.014	51.20%	*
14	0.332	0.015	0.098	65.40%	
15	0.0442	0.002	0.008	82.30%	*
16	0.0277	0.000	0.002	97.00%	*
17	2.05	0.070	0.91	45.60%	
18	6.23	0.084	2.9	48.00%	
19	1.67	0.163	1.051	29.60%	
20	1.39	0.007	0.35	72.80%	
21	2.6	0.000	0.11	99.00%	
22	-[2]	-	-	-	
23	-	-	-	-	
24	-	-	-	-	
25	0.0294	0.003	0.006	80.1	
26	0.79	0.000	0.0778	94.50%	
27	0.0357	0.008	0.0092	71.50%	*
28	0.0472	0.000	0.0003	97.80%	*
29	0.0382	0.026	0.013	58.90%	*
30	0.0375	0.001	0.0056	88.10%	*
31	0.04	0.074	0.0185	43.70%	*
32	0.247	0.015	0.073	65.80%	

[1]The Field#5 application was made starting in sampling interval 2.

[2]With the exception of Period 1, sampling periods showing no sorted regression results indicate that the regression matched in space and time (Table 3) was statistically significant.

Table 5. DPR Flux (ug/m^2/sec) profiles and percent of applied mass lost for Field #2 and Field#5.

Period	Date/Time	Field #2 - Shank 12" TIF Tarp	Field #2 - Shank 12" TIF Tarp	Field #5 - Shank 18" TIF	Field #5 - Shank 18" TIF
1	6/2/2009 11:00	15.8	1.24%	-[4]	-
2	6/2/2009 16:00	5.02	1.83%	0.0907	0.01%
3	6/2/2009 21:30	0.043	1.83%	0.462	0.06%
4	6/3/2009 3:30	0.058	1.84%	0.0504	0.06%
5	6/3/2009 9:30	0.0668	1.85%	0.802	0.15%
6	6/3/2009 15:30	5.32	2.47%	1.08	0.26%
7	6/3/2009 21:30	2.07	2.72%	1.54	0.42%
8	6/4/2009 3:30	2.57	3.02%	5.9[1]	1.04%
9	6/4/2009 12:30	1.61[2]	3.40%	1.43[2]	1.34%
10	6/5/2009 0:30	1.23[2]	3.69%	1.11[2]	1.58%
11	6/5/2009 12:30	0.247	3.75%	0.806[2]	1.74%
12	6/6/2009 0:30	0.95[2]	3.97%	0.538[2]	1.86%
13	6/6/2009 12:30	0.95[2]	4.19%	0.899[2]	2.05%
14	6/7/2009 0:30	0.664[2]	4.35%	0.332	2.12%
15	6/7/2009 12:30	1.05[2]	4.60%	0.939[2]	2.31%
16	6/8/2009 0:30	1.51	4.95%	0.544[2]	2.43%
17	6/8/2009 9:30	3.02	5.31%	2.25[1]	2.67%
18	6/8/2009 15:30	1.78	5.52%	5.93[1]	3.29%
19	6/8/2009 21:30	0.0602	5.52%	3.47[1]	3.65%
20	6/9/2009 3:30	0.0411	5.53%	1.39	3.80%
21	6/9/2009 12:30	0.877[2]	5.73%	2.6	4.35%
22	6/10/2009 0:30	0.266	5.80%	1.6191	4.69%
23	6/10/2009 12:30	3.08[1]	6.52%	0.674	4.83%
24	6/11/2009 0:30	0.0453	6.53%	1.2632	5.09%
25	6/11/2009 12:30	0.303[3]	6.60%	0.0294	5.10%
26	6/12/2009 0:30	0.56[2]	6.73%	0.79	5.27%
27	6/12/2009 12:30	1.14[2]	7.00%	1.055[2]	5.49%
28	6/13/2009 0:30	0.63[2]	7.15%	0.587[2]	5.61%
29	6/13/2009 12:30	1.25[2]	7.44%	1.142[2]	5.85%
30	6/14/2009 0:30	0.83[2]	7.64%	0.699[2]	6.00%
31	6/14/2009 12:30	1.046[2]	7.89%	0.993[2]	6.21%
32	6/15/2009 0:30	0.803[2]	8.07%	0.247	6.26%

[1]Flux estimated using Measured/Modeled Method – see text for details.
[2]Flux estimated using Below the Detection Limit Method – see text for details.
[3]Flux estimated using Interpolation Method – see text for details.
[4]The Field#5 application was made starting in sampling interval 2.

Table 6. Field #2 DPR flux (ug/m^2/sec) profile and cumulative percent mass loss compared to MBIP flux profile.

Period	Date/Time	DPR Field #2 - Shank 12" TIF Tarp	MBIP Field #2 - Shank 12" TIF Tarp	DPR Field #2 - Shank 12" TIF Tarp Percent Loss	MBIP Field #2 - Shank 12" TIF Tarp Percent Loss
1	6/2/2009 11:00	15.8	25.82	1.24%	2.02%
2	6/2/2009 16:00	5.02	6.97	1.83%	2.84%
3	6/2/2009 21:30	0.043	2.08	1.83%	3.09%
4	6/3/2009 3:30	0.058	0.89	1.84%	3.19%
5	6/3/2009 9:30	0.0668	1.19	1.85%	3.33%
6	6/3/2009 15:30	5.32	5.32	2.47%	3.96%
7	6/3/2009 21:30	2.07	8.53	2.72%	4.96%
8	6/4/2009 3:30	2.57	1.97	3.02%	5.19%
9	6/4/2009 12:30	1.61	1.26	3.40%	5.49%
10	6/5/2009 0:30	1.23	1.74	3.69%	5.90%
11	6/5/2009 12:30	0.247	0.25	3.75%	5.96%
12	6/6/2009 0:30	0.95	1.36	3.97%	6.28%
13	6/6/2009 12:30	0.95	1.64	4.19%	6.66%
14	6/7/2009 0:30	0.664	0.77	4.35%	6.84%
15	6/7/2009 12:30	1.05	1.43	4.60%	7.18%
16	6/8/2009 0:30	1.51	1.66	4.95%	7.57%
17	6/8/2009 9:30	3.02	3.86	5.31%	8.02%
18	6/8/2009 15:30	1.78	2.82	5.52%	8.36%
19	6/8/2009 21:30	0.0602	1.31	5.52%	8.51%
20	6/9/2009 3:30	0.0411	1.53	5.53%	8.69%
21	6/9/2009 12:30	0.877	1.57	5.73%	9.06%
22	6/10/2009 0:30	0.266	1.52	5.80%	9.42%
23	6/10/2009 12:30	3.08	3.08	6.52%	10.14%
24	6/11/2009 0:30	0.0453	0.93	6.53%	10.36%
25	6/11/2009 12:30	0.303	0.88	6.60%	10.57%
26	6/12/2009 0:30	0.56	0.83	6.73%	10.76%
27	6/12/2009 12:30	1.14	1.64	7.00%	11.15%
28	6/13/2009 0:30	0.63	1.36	7.15%	11.47%
29	6/13/2009 12:30	1.25	1.69	7.44%	11.86%
30	6/14/2009 0:30	0.83	1.05	7.64%	12.11%
31	6/14/2009 12:30	1.046	1.61	7.89%	12.49%
32	6/15/2009 0:30	0.803	0.79	8.07%	12.68%

Table 7. Field #5 DPR flux (ug/m^2/sec) profile and cumulative percent mass loss compared to MBIP flux profile.

Period	Date/Time	DPR Field #5 - Shank 18" TIF Tarp	MBIP Field #5 - Shank 18" TIF Tarp	DPR Field #5 - Shank 18" TIF Tarp Percent Loss	MBIP Field #5 - Shank 18" TIF Tarp Percent Loss
1	6/2/2009 11:00	-[1]	-	-	-
2	6/2/2009 16:00	0.0907	1.78	0.01%	0.16%
3	6/2/2009 21:30	0.462	2.1	0.06%	0.38%
4	6/3/2009 3:30	0.0504	0.91	0.06%	0.47%
5	6/3/2009 9:30	0.802	4.04	0.15%	0.90%
6	6/3/2009 15:30	1.08	5.47	0.26%	1.47%
7	6/3/2009 21:30	1.54	6.31	0.42%	2.14%
8	6/4/2009 3:30	5.9	5.9	1.04%	2.76%
9	6/4/2009 12:30	1.43	1.15	1.34%	3.00%
10	6/5/2009 0:30	1.11	1.58	1.58%	3.33%
11	6/5/2009 12:30	0.806	1.24	1.74%	3.59%
12	6/6/2009 0:30	0.538	0.88	1.86%	3.77%
13	6/6/2009 12:30	0.899	1.4	2.05%	4.07%
14	6/7/2009 0:30	0.332	0.58	2.12%	4.19%
15	6/7/2009 12:30	0.939	1.24	2.31%	4.45%
16	6/8/2009 0:30	0.544	0.62	2.43%	4.58%
17	6/8/2009 9:30	2.25	2.25	2.67%	4.82%
18	6/8/2009 15:30	5.93	5.93	3.29%	5.44%
19	6/8/2009 21:30	3.47	3.47	3.65%	5.81%
20	6/9/2009 3:30	1.39	2.65	3.80%	6.08%
21	6/9/2009 12:30	2.6	2.46	4.35%	6.60%
22	6/10/2009 0:30	1.6191	1.62	4.69%	6.94%
23	6/10/2009 12:30	0.674	0.57	4.83%	7.06%
24	6/11/2009 0:30	1.2632	1.26	5.09%	7.33%
25	6/11/2009 12:30	0.0294	1.45	5.10%	7.63%
26	6/12/2009 0:30	0.79	1.01	5.27%	7.84%
27	6/12/2009 12:30	1.055	1.38	5.49%	8.13%
28	6/13/2009 0:30	0.587	1.37	5.61%	8.42%
29	6/13/2009 12:30	1.142	1.49	5.85%	8.74%
30	6/14/2009 0:30	0.699	0.95	6.00%	8.94%
31	6/14/2009 12:30	0.993	1.42	6.21%	9.23%
32	6/15/2009 0:30	0.247	0.66	6.26%	9.37%

[1]The Field#5 application was made starting in sampling interval 2.

Table 8. Comparison of maximum flux between DPR and MBIP flux profiles.

	Sampling Period	Date/Time	Duration (hours)	Night/Day	Flux (ug/m^2sec)
DPR Field#1	2	6/2/2009 16:00	6hrs	Day	31.03
MBIP Field#1	2	6/2/2009 16:00	6hrs	Day	31.03
DPR Field#2	1	6/2/2009 11:00	6hrs	Day	15.80
MBIP Field#2	1	6/2/2009 11:00	6hrs	Day	25.82
DPR Field#3	1	6/2/2009 11:00	6hrs	Day	63.8
MBIP Field#3	1	6/2/2009 11:00	6hrs	Day	30.97
DPR Field#4	19	6/8/2009 21:30	6hrs	Night	4.6
MBIP Field#4	6	6/3/2009 15:30	6hrs	Day	6.33
DPR Field#5[1]	18	6/8/2009 15:30	6hrs	Day	5.93
MBIP Field#5	7	6/3/2009 21:30	6hrs	Night	6.31

[1]Tarp cutting

Table 9. Final flux (ug/m^2/sec) profiles for all 5 fields.

Period	Date/Time	Field #1 - Shank 12" PE Tarp	Field #2 - Shank 12" TIF Tarp	Field #3 - Shank 12" TIF plus KTS	Field #4 - 18" 180 lb/acre STRIP TIF	Field #5 - Shank 18" TIF
1	6/2/2009 11:00	17.41	15.8	63.8	-	-
2	6/2/2009 16:00	31.03	5.02	4.21	2.81	0.0907
3	6/2/2009 21:30	15.54	0.043	1.03	0.9	0.462
4	6/3/2009 3:30	5.25	0.058	1.22	1.213	0.0504
5	6/3/2009 9:30	16.2	0.0668	1.68	1.17	0.802
6	6/3/2009 15:30	23.97	5.32	1.91	2.82	1.08
7	6/3/2009 21:30	6.65	2.07	2.16	0.668	1.54
8	6/4/2009 3:30	1.3	2.57	0.77	1.47	5.9
9	6/4/2009 12:30	4.22	1.61	1.53	2.87	1.43
10	6/5/2009 0:30	1.14	1.23	1.18	1.3	1.11
11	6/5/2009 12:30	0.94	0.247	0.828	0.827	0.806
12	6/6/2009 0:30	0.59	0.95	0.565	0.566	0.538
13	6/6/2009 12:30	0.93	0.95	0.922	0.948	0.899
14	6/7/2009 0:30	0.41	0.664	0.617	1.35	0.332
15	6/7/2009 12:30	0.68	1.05	1.02	0.965	0.939
16	6/8/2009 0:30	0.531	1.51	1.433	0.594	0.544
17	6/8/2009 9:30	0.05	3.02	1.12	1.147	2.25
18	6/8/2009 15:30	0.0714	1.78	1.813	2.56	5.93
19	6/8/2009 21:30	0.1	0.0602	2.028	4.6	3.47
20	6/9/2009 3:30	0.834	0.0411	0.921	0.87	1.39
21	6/9/2009 12:30	0.78	0.877	0.868	0.797	2.6
22	6/10/2009 0:30	0.62	0.266	0.614	0.85	1.6191
23	6/10/2009 12:30	1.166	3.08	1.137	1.218	0.674
24	6/11/2009 0:30	1.85	0.0453	0.763	0.683	1.2632
25	6/11/2009 12:30	1.23	0.303	0.71	1.34	0.0294
26	6/12/2009 0:30	0.607	0.56	0.65	0.559	0.79
27	6/12/2009 12:30	1.102	1.14	1.151	1.086	1.055
28	6/13/2009 0:30	0.583	0.63	0.58	0.484	0.587
29	6/13/2009 12:30	1.16	1.25	1.187	1.603	1.142
30	6/14/2009 0:30	0.725	0.83	0.744	0.88	0.699
31	6/14/2009 12:30	1	1.046	1.01	1.152	0.993
32	6/15/2009 0:30	0.82	0.803	0.851	0.788	0.247

Table 10. Cumulative percent mass loss as calculated using the final flux profiles (Table 9) for all 5 fields.

Period	Date/Time	Field #1 - Shank 12" PE Tarp	Field #2 - Shank 12" TIF Tarp	Field #3 - Shank 12" TIF plus KTS	Field #4 - 18" 180 lb/acre STRIP TIF	Field #5 - Shank 18" TIF
1	6/2/2009 11:00	1.21%	1.24%	2.33%	-	-
2	6/2/2009 16:00	4.46%	1.83%	2.80%	0.46%	0.01%
3	6/2/2009 21:30	6.09%	1.83%	2.91%	0.63%	0.06%
4	6/3/2009 3:30	6.64%	1.84%	3.04%	0.87%	0.06%
5	6/3/2009 9:30	8.33%	1.85%	3.23%	1.10%	0.15%
6	6/3/2009 15:30	10.84%	2.47%	3.44%	1.65%	0.26%
7	6/3/2009 21:30	11.54%	2.72%	3.67%	1.78%	0.42%
8	6/4/2009 3:30	11.67%	3.02%	3.76%	2.07%	1.04%
9	6/4/2009 12:30	12.55%	3.40%	4.09%	3.19%	1.34%
10	6/5/2009 0:30	12.79%	3.69%	4.35%	3.70%	1.58%
11	6/5/2009 12:30	12.99%	3.75%	4.54%	4.02%	1.74%
12	6/6/2009 0:30	13.11%	3.97%	4.66%	4.24%	1.86%
13	6/6/2009 12:30	13.31%	4.19%	4.86%	4.61%	2.05%
14	6/7/2009 0:30	13.39%	4.35%	5.00%	5.14%	2.12%
15	6/7/2009 12:30	13.54%	4.60%	5.22%	5.51%	2.31%
16	6/8/2009 0:30	13.65%	4.95%	5.54%	5.75%	2.43%
17	6/8/2009 9:30	13.65%	5.31%	5.66%	5.97%	2.67%
18	6/8/2009 15:30	13.66%	5.52%	5.86%	6.47%	3.29%
19	6/8/2009 21:30	13.67%	5.52%	6.08%	7.37%	3.65%
20	6/9/2009 3:30	13.76%	5.53%	6.18%	7.54%	3.80%
21	6/9/2009 12:30	13.92%	5.73%	6.37%	7.85%	4.35%
22	6/10/2009 0:30	14.05%	5.80%	6.51%	8.18%	4.69%
23	6/10/2009 12:30	14.29%	6.52%	6.76%	8.66%	4.83%
24	6/11/2009 0:30	14.68%	6.53%	6.92%	8.92%	5.09%
25	6/11/2009 12:30	14.94%	6.60%	7.08%	9.45%	5.10%
26	6/12/2009 0:30	15.07%	6.73%	7.22%	9.67%	5.27%
27	6/12/2009 12:30	15.30%	7.00%	7.47%	10.09%	5.49%
28	6/13/2009 0:30	15.42%	7.15%	7.60%	10.28%	5.61%
29	6/13/2009 12:30	15.66%	7.44%	7.86%	10.91%	5.85%
30	6/14/2009 0:30	15.81%	7.64%	8.03%	11.25%	6.00%
31	6/14/2009 12:30	16.02%	7.89%	8.25%	11.70%	6.21%
32	6/15/2009 0:30	16.19%	8.07%	8.43%	12.01%	6.26%

Figure 1. Field#2. DPR versus MBIP flux profiles.

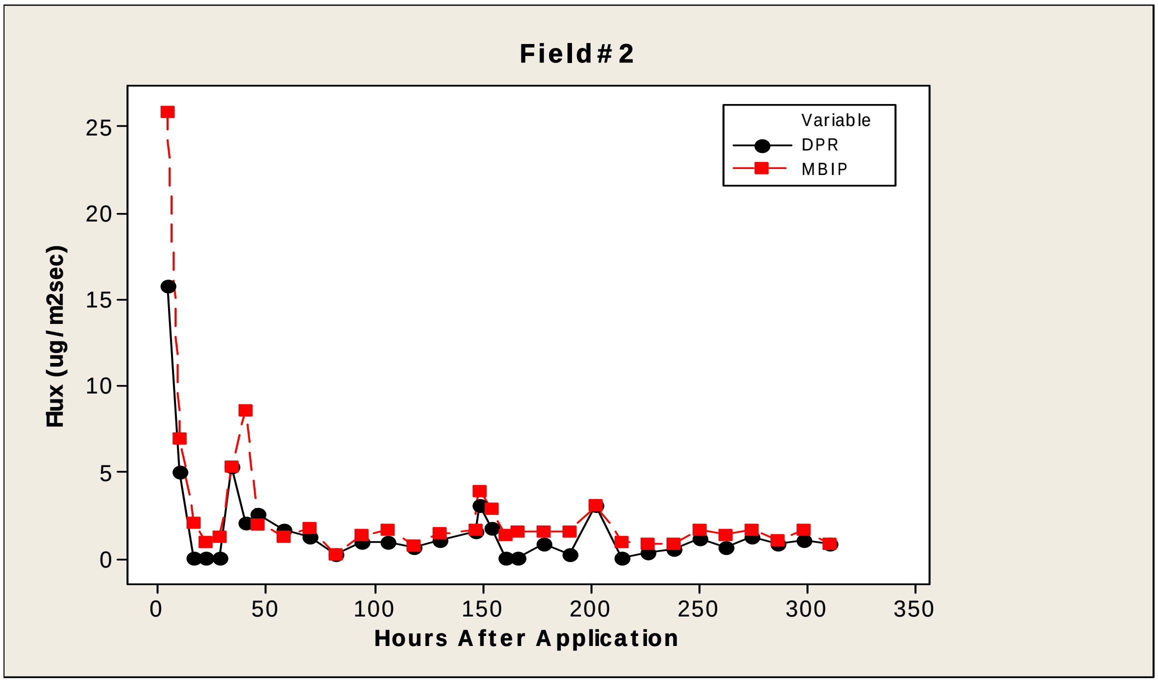

Figure 2. Field#2. DPR versus MBIP cumulative percent mass loss.

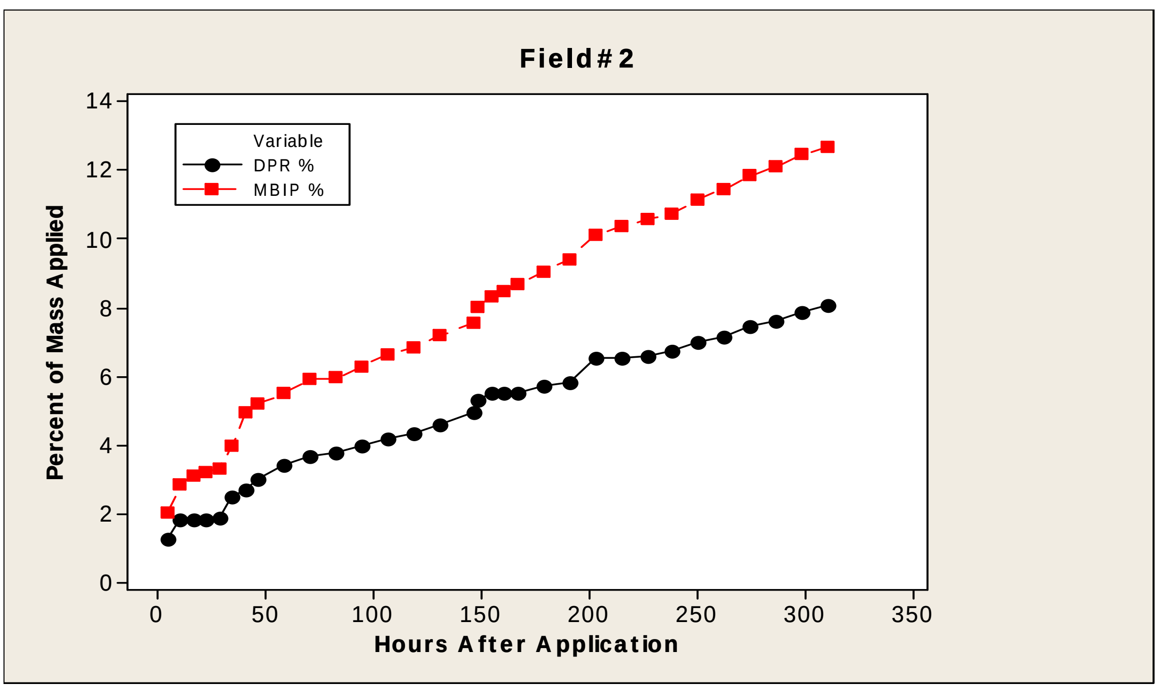

Figure 3. Field#5. DPR versus MBIP flux profiles.

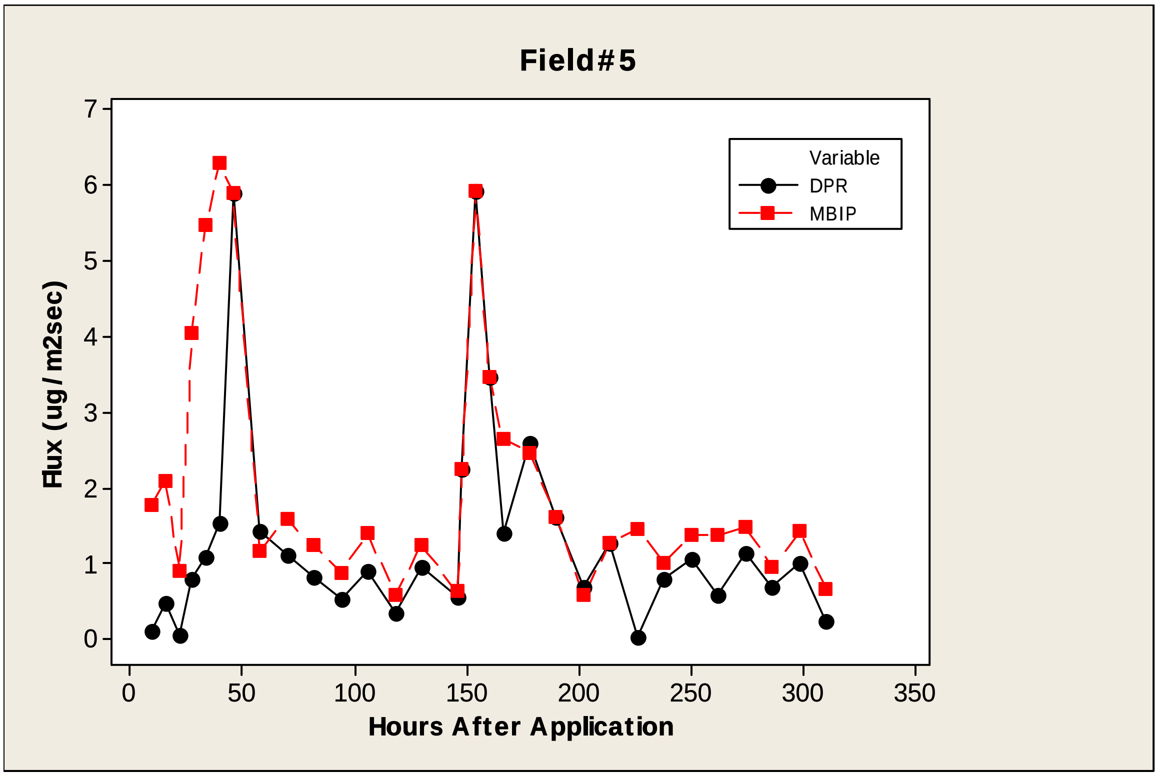

Figure 4. Field#5. DPR versus MBIP cumulative percent mass loss.