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DRINKING WATER EXPOSURE ASSESSMENT FOR LACTOFEN, UPDATED FOR PROSPECTIVE GROUND WATER (PGW) MONITORING STUDY

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The Agency recently reviewed the results of a second lactofen PGW study located in a Michigan soybean field (D263966). Neither lactofen nor acifluorfen were detected in ground water during this study, which featured highly vulnerable soils exposed to above average (but not worst-case) precipitation (irrigation was added to supplement precipitation during the study). The fact that lactofen was not detected is consistent with laboratory measurements of the pesticide's short persistence and low mobility. Acifluorfen had previously been detected in ground water in a sodium acifluorfen PGW study, but not in a retrospective sodium acifluorfen monitoring study (five sites). The results of this lactofen PGW study suggest that the application of lactofen is less likely to result in acifluorfen ground-water contamination than when acifluorfen is a degradate of the herbicide sodium acifluorfen. The registrant has also

completed an aerobic soil metabolism study (using soil from the PGW site) for lactofen (MRID # 457222-01). Lactofen degradates were desethyl lactofen and acifluorfen. Other possible degradates of acifluorfen, such as amino acifluorfen, were not identified in the lactofen proposed metabolic pathway in soil metabolism, and thus were not included in sample analysis in this PGW study. This additional information was considered in this update of the drinking water exposure assessment for the herbicide lactofen. Both acifluorfen and desethyl lactofen were considered by the Agency's Health Effects Division (HED)in the human health risk assessment for lactofen.

This document summarizes the updated drinking water assessment for the herbicide lactofen for FQPA assessments. A Tier 1 ground-water drinking water assessment for lactofen and a Tier 2 surface water estimate of drinking water concentrations for lactofen and a major degradate acifluorfen were conducted. Data are not available for two other important degradates, desethyl lactofen and amino acifluorfen and therefore these are not considered in the assessment. With the exception of two small-scale prospective ground-water monitoring studies, monitoring has not been conducted for lactofen (acifluorfen as a degradate was also included in these PGW studies). Both ground-water and surface-water data from other monitoring studies for acifluorfen were also considered in this assessment. With the exception of the sodium acifluorfen PGW study, the source of acifluorfen (e.g., lactofen or sodium acifluorfen use) detections in these other monitoring studies can not be determined.

The Tier 2 assessment for surface water uses the linked PRZM/EXAMS model simulations to represent the application of lactofen to cotton and soybeans in Mississippi. The exposure of drinking water from surface water sources includes the Index Reservoir (IR) and the percent crop area (PCA) concepts. The scenarios used to represent the vulnerable fields/watersheds have recently undergone QA/QC to make them as accurate as possible. The fate of sodium acifluorfen, acifluorfen, and amino acifluorfen are discussed in greater detail in the reregistration eligibility document (RED) of sodium acifluorfen (PC Code 114402) for uses on soybeans, peanuts and rice (DP Barcode D252561).

The estimates of surface and ground water concentration values for lactofen and acifluorfen derived from lactofen on cotton and soybeans are listed below in Table 1. The maximum lactofen label seasonal rate of 0.4 lb ai/acre was split between pre-emergence and post-emergence (both at 0.2 lb ai/acre) for each crop. The rates of formation and decline all lactofen degradates have not been well defined. However in the two lactofen aerobic soil metabolism (ASM) study, acifluorfen accounted for 52.3 and 64.1 percent of the applied radio-labeled lactofen on day 7. For this assessment, acifluorfen was simulated separately assuming acifluorfen was applied at 58.2 percent (average conversion) of the lactofen rate (0.116 lb ai/acre = 0.582 x 0.2 lb ai/acre) by ground application (4-cm incorporation CAM=1) seven days after the lactofen application, and where the spray drift contribution assumed to be zero. This represents the average maximum amount of acifluorfen observed from the degradation of lactofen in the two ASM studies.

The peak lactofen and the degradate acifluorfen concentrations simulated for the Index Reservoirs (IR) adjusted by the percent crop area (PCA) were 0.39 and 2.99 : g/L, respectively as applied to cotton in Mississippi (Table 1). The peak values presented represent approximately the 90% exceedence values. The concentrations predicted by the linked PRZM/EXAMS model were greater for cotton than soybeans, the PCA for soybeans (0.41) is greater than for cotton (0.20). The highest 1-in-10 year average lactofen and acifluorfen

concentrations simulated with PRZM and EXAMS were 0.008 and 0.53 :g/L for lactofen and the degradate acifluorfen from lactofen applied to cotton. The long-term average (30 years) for lactofen and acifluorfen simulated with linked PRZM/EXAMS were 0.007 and 0.24 :g/L from lactofen applied (degrades to acifluorfen) to soybeans. The highest surface water acifluorfen concentration reported in NAWQA is 2.2 :g/L.

Table 1. Estimated drinking water concentrations, :g/L (EDWC) for acute, chronic, and cancer exposure from lactofen and the acifluorfen derived from lactofen in :g/L for cotton and soybeans using linked PRZM/EXAMS[1] and Index Reservoir (IR) and Percent Crop Area (PCA) for surface water and estimates for ground water based on lactofen prospective ground study monitoring results.

Crop	Water Type	Chemical Species	1-in-10 Year Maximum Surface Water Concentration (acute EDWC)/1-in-10 yr Annual Mean(chronic EDWC)	Long term Average (avg. 30 yrs daily value)(cancer EDWC)
Cotton	Surface	Lactofen	0.39/0.008	0.005
Cotton	Surface	Acifluorfen	2.99/0.53	0.21
Soybean	Surface	Lactofen	0.18/0.008	0.007
Soybean	Surface	Acifluorfen	2.65/0.52	0.24
Cotton/Soybean	Ground	Lactofen[2]	0.006[3]	0.006[3]
Cotton/Soybean	Ground	Acifluorfen	0.035[4]	0.035[4]

[1] PRZM/EXAMS simulations utilized new meteorological files for the period 1961 to 1990. Cotton (Yazoo County; MLRA 134; Metfile: W03940.dvf (old: Met131.met) and Soybean (Yazoo County; MLRA 134; Metfile: W03940.dvf (old: Met131.met). Lactofen applications were split between pre- and post-emergence (0.2 lb ai/acre per application), the application interval was assumed to be 21 days for cotton and 14 days for soybeans. Acifluorfen was assumed to be applied 7 days after each lactofen application at a rate of 0.116 lb ai/acre per application (using average of the maximum conversion percent in the ASM studies).

[2] SCI-GROW estimate using 0.4 lb ai/acre, the maximum seasonal rate.

[3] 0.006 represents the lower limit of SCI-GROW estimate. Lactofen PGW method limit of detection (LOD = 0.05 :g/L or ppb).

[4] Estimates of acifluorfen ground water concentrations set using lactofen PGW LOD (method limit of detection for acifluorfen = 0.035 :g/L or ppb) .

The Tier 1 assessment uses the EFED's SCI-GROW model to estimate ground-water concentrations for lactofen which may be expected to occur from the maximum label application rate of lactofen at a vulnerable site. Due to the complexity of fate of acifluorfen, and limitations of SCI-GROW, SCI-GROW has not been used to estimate a drinking water concentration for acifluorfen in ground water. Ground-water monitoring data from both the lactofen and sodium acifluorfen small-scale prospective ground-water (PGW) monitoring studies were considered to estimate potential ground-water contamination from acifluorfen.

The small-scale prospective ground-water monitoring study for lactofen showed no lactofen leaching (study ground water lactofen limit of detection (LOD) in ground water = 0.050 ppb). The concentration shallow ground-water concentration estimated by the USEPA's SCI-GROW model is the lower limit (0.006 :g/L) of the algorithm used to calculate pesticide concentrations (Table 1). Based upon the known fate properties (high sorption and non-persistent), lactofen is not expected to leach.

Low level concentrations of acifluorfen (degradate) were detected during the lactofen PGW in soil-water at several depths (3- and 6-feet) (acifluorfen LOD in soil water = 0.035 ppb), but there were no detections in the ground water (acifluorfen LOD in ground water = 0.035 ppb). The leaching of acifluorfen is not unexpected based upon the fate data (low sorption and persistent). Leaching of acifluorfen below six feet is possible and also likely. Although literature has suggests that sorption may increase and mobility decrease with time. The concentrations of acifluorfen available are however much lower than in the Wisconsin PGW study.

The magnitude of the levels of acifluorfen in the lactofen PGW are much lower than those seen at the Wisconsin sodium acifluorfen PGW study. The first reason for the difference is due to the difference of the applied pesticide (source). The maximum amount of acifluorfen (maximum 64 percent of acifluorfen derived from lactofen) produced in the study from lactofen is only about 35 percent of that of derived from sodium acifluorfen (e.g., sodium acifluorfen PGW applied 0.75 lb ai/acre where as the lactofen study applied at maximum 0.26 lb -acifluorfen from 0.4 lb ai/acre lactofen). In addition, acifluorfen is not formed instantaneously from lactofen, and will not move through the soil matrix a single "pulse". Secondly, there are at least two degradation pathways: lactofen to desethyl lactofen then desethyl lactofen to acifluorfen and/or lactofen to acifluorfen. And thirdly, literature suggest that there is a kinetic (time dependant component) aspect to the sorption of acifluorfen (longer contact time the greater the sorption).

The acifluorfen concentration in ground-water from lactofen is difficult to quantify. The lactofen PGW demonstrated that acifluorfen did not meet or exceed the LOD (0.035 :g/L in ground water), but can not demonstrate that acifluorfen at levels less than the LOD is present. Few monitoring studies have included acifluorfen (non-targeted studies with the source not specified). When acifluorfen has been detected, the concentrations have been below (< 1 :g/L). The highest concentration detected in the USGS's National Water Quality Assessment Program (NAWQA) is 0.19 :g/L. Therefore, the LOD of 0.035 :g/L is suggested as the ground water estimate which is consistent with the available evidence.

Fate properties are primarily available for acifluorfen from the salt (sodium acifluorfen) or acid (H^+ acifluorfen) not as a degradate from lactofen, thus our fate assessments have to extrapolate between sources of information.

Acifluorfen from sodium acifluorfen may have greater potential for ground-water contamination than acifluorfen derived from lactofen. Sodium acifluorfen conversion to acifluorfen is much closer to "instantaneous", thus a much larger quantity of acifluorfen present to leach as a detectable "pulse". Acifluorfen was detected in ground-water at levels up to 46 :g/L at a sodium acifluorfen PGW site in Wisconsin. The average acifluorfen concentration on the days with detections was 7.33 :g/L (D239268). Several factors may be involved the source of such significant results. First, high levels of sodium acifluorfen that were applied (0.75 lb ai/acre) exceed current label rates. Secondly, sodium acifluorfen is a salt, thus, it dissociates "instantaneously" to acifluorfen (ionic and acquiring a negative charge). This would suggest

limited or no sorption to soils dominated by permanent charged surface. However, the sorption of acifluorfen is dependant upon a number of factors (pH, mineralogy, type and amount of organic carbon). The acifluorfen degradate amino acifluorfen is less mobile than acifluorfen in some soils (non-sands), but was not detected during the Wisconsin PGW study. The amount, distribution, and intensity of precipitation and/irrigation may have been a factor. Further discussion on this topic is given in an earlier document (D280710). It is also possible that the Wisconsin PGW site is more vulnerable than the site used for the lactofen PGW. The lower detections in the ground-water monitoring studies indicate that the potential for ground water contamination from acifluorfen may not be equal everywhere.

The Agency (EFED) is not expecting that this reassessment of lactofen and acifluorfen derived from lactofen will result in significant changes in the drinking water previously conducted for sodium acifluorfen. Additional information has been requested from the registrant of sodium acifluorfen, to try to better understand (acifluorfen sorption interaction with different soils).

BACKGROUND:

The water assessment for lactofen is complicated by the fact that lactofen has several degradates in common with the herbicide sodium acifluorfen (114402). The major degradates of lactofen include acifluorfen, desethyl lactofen, and amino acifluorfen. Acifluorfen and amino acifluorfen are also primary degradates of the herbicide sodium acifluorfen. Lactofen and sodium acifluorfen also have some common uses (e.g., soybeans). Valent, the registrant of lactofen, has provided only limited data on the degradates, acifluorfen and desethyl lactofen. The majority of the data concerning acifluorfen and amino acifluorfen have been submitted for sodium acifluorfen. Both compounds have a number of additional residues that have not been identified which are typically less than 10 percent (but frequently less than a few percent) of applied radioactivity.

Drinking water exposure assessments were previously conducted for the herbicide lactofen (DP Barcode D239268, 6/1/98; D263996, 7/14/00). These assessment were conducted for the Herbicide Branch of the Registration Division for lactofen use on cotton for the time-limited tolerance for cotton and for Reregistration actions for the Special Review and Registration Branch. Because lactofen and sodium acifluorfen are both used on soybeans, the drinking water exposure assessment included both the cotton and soybean use.

The Tier 2 assessment for surface water used the linked PRZM/EXAMS models and a Tier 1 ground-water assessment was conducted using the EFED screening model SCI-GROW and monitoring data. The surface water scenarios utilized were the EFED standard Mississippi Cotton and Mississippi Soybean scenarios with an Index Reservoir and PCA, as these scenarios represent conditions favorable for high runoff.

A drinking water reassessment was also conducted as part of the reregistration eligibility process for sodium acifluorfen and incorporated into the Reregistration Eligibility Document (RED). This reassessment estimated acifluorfen concentrations in vulnerable drinking water sources from the use of sodium acifluorfen and lactofen. The reassessment of exposure from drinking water from surface water sources included the Index Reservoir (IR) and the percent crop area (PCA) concept. The ecological assessment continued to use the standard farm pond.

The selection of environmental fate values for model input parameters generally followed EFED guidance for input selection and are slightly different than the previous assessment (D263996). Fate parameters for lactofen were changed to incorporate the recently available aerobic soil metabolism rate data. Current guidance and additional data resulted in a slightly longer estimated half-life for acifluorfen, which resulted in higher concentrations. Data from the USGS National Water Quality Assessment Program (NAWQA), which includes acifluorfen in both surface and ground water, has also been considered.

Based on the chemical and fate properties, existing monitoring data, and computer modeled simulated estimates of lactofen and acifluorfen contamination of drinking water supplies resulting from normal agricultural practices have been determined.

Environmental Fate Assessment:

Lactofen is not persistent in the environment, has a high affinity for binding (high K_{oc} values), and low solubility (Table 2). Lactofen is not expected to leach to ground water because of its high binding potential and short half-life. The lactofen PGW study confirms this. Lactofen will tend to bound to sediment because of the high binding potential rather than be in the runoff water. Lactofen which remains in solution in surface water is not expected to be persistent because of rapid soil metabolism and hydrolysis (Table 3). It is assumed that, in an aquatic environment, lactofen will degrade to acifluorfen. Lactofen degradates to desethyl lactofen and acifluorfen; desethyl lactofen will also degrade to acifluorfen. Desethyl lactofen appears relatively stable to photolysis and hydrolysis at least for the duration of the available studies.

Acifluorfen can be quite persistent, is highly soluble, and is highly mobile with K_{ads} values typically of about 0.148 to 3.1 mL/g (Table 4) suggesting a potential to leach to ground water. This is confirmed by monitoring data. Environmental fate properties suggest that once acifluorfen reaches ground water it is quite persistent. Monitoring data from a prospective ground-water study confirms the persistence of acifluorfen in ground water. There is also evidence in that sorption of acifluorfen to different soils can be highly variable depending upon specific soil properties. This variability may explain the difference in leaching seen at different locations .

Acifluorfen will tend to remain in solution rather than being bound to sediment, therefore, acifluorfen in runoff will remain in solution. Acifluorfen and desethyl lactofen appear relatively stable to photolysis and hydrolysis at least for the duration of the available studies. Acifluorfen reduces to amino acifluorfen under anaerobic conditions. The degradate amino acifluorfen appears to be persistent but less mobile than acifluorfen in non-sandy soils. Photolysis in water may be one of the possible ways for acifluorfen to degrade in surface water as the aqueous photolysis half-lives range from 0.9 to 15 days. However, when light penetration is restricted the rate of photolysis would reduced.

Environmental Fate Data:

Aerobic soil metabolism and hydrolysis are the major degradation routes for lactofen. The major degradates of lactofen are acifluorfen and desethyl lactofen; desethyl lactofen also degrades to acifluorfen. Other degradates include amino acifluorfen. Chemical names and identification codes are in Appendix 1, Table 1. The aerobic soil metabolism (ASM) half-life was

estimated from two studies (Table 2). Both studies had “half-lives between 1 and 3 days. Study one reported a half-life of 2.2 days (linear interpolation when 50 percent occurs), the Agency calculated DT_{50} is 2.41 days. Study two reported registrant calculated half-life of 1.35 days (actually a DT_{50}), the Agency calculated DT_{50} is 1.496 days. Other fate properties are summarized in Tables 2 and 3 for lactofen and Table 4 sodium acifluorfen.

In the first ASM study, the maximum acifluorfen concentration was 52.3 % of applied radioactivity seven days after application and a maximum desethyl lactofen was 16.2 % of applied radioactivity one day after application. A maximum of 4.1 % of unknown extractable radioactivity occurred on day 14 after the application. The percentage of non-extractable residues increased as the study progress, reaching the maximum of 44.8% on day 90 (last sampling). Forty-two percent of the applied radioactivity remained as acifluorfen at the end of the study (day 90). In the second ASM study, the maximum acifluorfen concentration (as % radio active lactofen equivalents) was 64 percent. About 10 percent remained at the end of the study (120 days).

The aerobic soil metabolism half-life of acifluorfen ranges between 40 and 200 days (Table 4). Under anaerobic conditions, acifluorfen is less persistent (half-life of about 30 days) and is reduced to amino acifluorfen which may also be persistent (Table 4).

Aquatic degradation information for lactofen is lacking. This increases the uncertainty of our understanding of the fate of these compounds in surface water. Lactofen's fate in an aquatic system (surface water) is less clear, but it is not persistent in soil and would have an affinity to bind to sediment rather than remain in solution. Whether soil-bound lactofen will degrade to acifluorfen is not known.

Four degradates were found (but not identified), during the photolysis study. As lactofen (% radioactivity) declined with time the percent of degradates generally increased (32% max) with time as did the percent non-extractable residues (35% max).

Lactofen undergoes hydrolysis with an increasing rate with increasing pH (Table 3). As the pH increases the percent and persistence of acifluorfen and desethyl lactofen increases. The final percentages of ^{14}C lactofen and degrades acifluorfen (PPG-847) and desethyl lactofen (PPG-947) at the three pH values used in the study are given in Table 3 (Acc. No. 73854, BRC 23655). It should be noted that this study was determined to be invalid because lactofen residues bound to the container walls. Although this study was flawed, it indicates that lactofen can degrade via hydrolysis resulting in persistent degradates at concentrations similar to parent lactofen. The study was not long enough to understand the long term persistence of these degradates. The current scenario only considers a water with a neutral pH (pH=7), thus, only the hydrolysis rate at pH 7 is used.

TABLE 2. LACTOFEN ENVIRONMENTAL FATE PROPERTIES AND MODEL INPUT VALUES USED IN PRZM/EXAMS.				
LACTOFEN PROPERTY	FATE DATA	MODEL INPUT CALCULATIONS	MODEL INPUT VALUE	SOURCE
Solubility (ppm)	0.945 0.10		0.945	E. Tamichi, Valent EFED One-liner
Molecular Weight	461.77		461.77	EFED One-liner
Hydrolysis (days) Half-life	pH 5: 10.7 @ 40° C pH 7: 4.6 @ 40° C pH 9 < 1.0 @ 40° C	all values multiple by 5 to reflect 20° C, 2.5 by slower for each 10° C[1]	53.5[1] @ 20 °C 23.0[1] @ 20 °C 5.0[1] @ 20 °C 23.0 days used	EFED One-liner
Henry's Constant (atm. m^3/Mol)	2.43E-08 (calculated)		2.43E-08	EFED One-liner
Photolysis half-life (days)	water: 2.75 soil: 23	converted to rate in hours	0.0105/hr	E. TAMICHI, Valent EFED One-liner
Aerobic Soil Metabolism half-life (days)[2]	**1:** 2.41 (DT_{50}) **2:** 1.496 (DT_{50})	90th percent upper bound of mean = 2.82	2.82 (0.2458/d)	1:EFED One-liner Acc. #s 071228; 073854 2: MRID # 45722201 (D284417)
Anaerobic Soil Metabolism half-life	est. 18.5	multiply max. value by 3	55.5 (1.25E-02/d)	EFED One-liner
Aerobic Aquatic Half-life	no data	estimated - multiply aerobic soil input half-life value by 2 (multiply max aerobic soil value by 2)	5.64 d (5.12E-03/hr)	Est. from Aerobic soil metabolism

TABLE 2. LACTOFEN ENVIRONMENTAL FATE PROPERTIES AND MODEL INPUT VALUES USED IN PRZM/EXAMS.				
LACTOFEN PROPERTY	FATE DATA	MODEL INPUT CALCULATIONS	MODEL INPUT VALUE	SOURCE
Anaerobic Aquatic Half-life	no data	estimated - multiply anaerobic soil input half-life value by 2 (multiply max anaerobic soil value by 6)	111 d(2.6E-04/hr)	EFED One-liner
Soil Water Partition (Koc) mL/g	6600 15000	mean value	10800	E. TAMICHI, Valent DP Barcode D242256

[1] J.C. Harris. 1981. Rate of Hydrolysis. Pages 7-1 to 7-48. *in* Lyman, W.J. *et al.*, Research and Development of Methods for Estimating Physiochemical Properties of Organic Compounds of Environmental Concern. US Army Medical Research Development Command, Frederick, MD The hydrolysis rate decrease (longer half-life) as temperature decreases. Harris suggest that the rate is 2.5 slower for each 10°C decrease. Thus, hydrolysis at 20°C would be five times slower than at 40°C. The rate constants in hours are for acid, neutral, and basic hydrolysis, KAH, KNH, and KBH, are -6.71/hr, 1.21 E-03/hr, and 4.57 E+02/hr, respectively.

[2] The decline pattern of lactofen did not follow first order kinetics. Non-linear estimate of first order equation fit the data better. Lactofen decline was very rapid.

Table 3. Final ^{14}C-lactofen and degradates acifluorfen and desethyl lactofen remaining in hydrolysis study at three pH values.				
pH	Time of Final Sample Interval (hr)	Lactofen	Acifluorfen PPG-847	Desethyl Lactofen PPG-947
		% of recovered		
5	944	81.5	1.3	17.3
7	720	11.9	9.6	76.8
9	48	2.5	27.9	65.6

The environmental fate parameters for sodium acifluorfen used in this reassessment are listed in Table 4. The fate of sodium acifluorfen, acifluorfen, and amino acifluorfen are discussed in greater detail in the reregistration eligibility document (RED) of sodium acifluorfen (PC Code 114402) for uses on soybeans, peanuts and rice (DP Barcodes: D252561, D278403).

TABLE 4. SELECTED (SODIUM) ACIFLUORFEN ENVIRONMENTAL FATE PROPERTIES AND MODEL INPUTS VALUES USED IN PRZM/EXAMS				
ACIFLUORFEN PROPERTY	FATE DATA	MODEL INPUT CALCULATIONS	MODEL INPUT VALUE	SOURCE
Solubility (ppm)	2.50E+05		2.50E+05	EFED One-liner
Molecular Weight	383.70		383.70	EFED One-liner
Hydrolysis (days)	stable at pH 5,7,9		considered stable	EFED One-liner
Henry's Constant ($atm.m^3/mol$)	1.51E-13 (calculated)		1.51E-13	EFED One-liner
Photolysis half-life (days)	Water: **3.8** **(0.9 to 14.7)**[1] Soil: 57 @pH4	 upper 90%=mean + t90 x std/ / n; single tail student t, "=0.1 and n = number of samples	previous 0.0075/hr (3.8 days) 13.31 days	EFED One-liner **MRID 41891208** **D232775**
Aerobic Soil Metabolism half-life (days)	30, 60 - 180, 170, 59, 6 (60 and 180 were used to cover the range 60 - 180) **(100,108,193,200 used)** **40**	- upper 90%=mean + t90 x std/ / n; single tail student t, "=0.1 and n = number of samples	previous 121 (5.7E-03/d) **172.84 days**	EFED One-liner **(MRID 00143572)** **MRID 45722201**
Anaerobic Soil Metabolism half-life (days)	<28 days	multiply value by 3	84 (8.3E-04/d)	EFED One-liner
Aerobic Aquatic half-life (days)	98%-day 0, 82%-day 35: half-life estimated to be 117 days	multiple value by 3	351 (8.23E-05/hr)	EFED One-liner
Anaerobic Aquatic half-life (days)	no data	estimate by multiplying anaerobic soil half-life by 6 (28 x 3 x 2)	168 (1.72E-04/hr)	EFED One-liner

ACIFLUORFEN PROPERTY	FATE DATA	MODEL INPUT CALCULATIONS	MODEL INPUT VALUE	SOURCE
Soil Water Partition (Kd)mL/g (Kads mL/g)	1 **0.148, 0.346, 1.51, 1.87, 3.1 used**	 upper 90%=mean + t90 x std/ / n; single tail student t, "=0.1 and n = number of samples	previous 1 (assume OC=1%); K_{oc} = 100 (50.22 to 198.7**)** **K_{ads} = 2.22**	EFED One-liner (MRID 42703501)

[1] **Bold** -Additional information was considered in reassessment.

The K_{ads} values for the degradate acifluorfen amine (amino acifluorfen) were 47.01, 19.34, 12.11, and 1.25 for loamy sand, loam, clay, and sand soils, respectively (1/n values ranged from 0.802 to 0.936) (DP D253561). K_{oc} values were 7368, 741, 652, and 431 for loamy sand, loam, clay, and sand soils, respectively. Using the relative mobility classification of McCall et al (1980)., acifluorfen amine has a mobility classification of “immobile” in loamy sand, “low mobility” in loam and clay, and “medium mobility” in sand.

Several acifluorfen degradates were identified in water, but their persistence is not known.

Monitoring: Other than the two lactofen prospective ground-water monitoring studies, lactofen has not included in monitoring studies.

For acifluorfen, there were a limited number of detections in (0.12% of 3408 samples from 1058 sites) surface water monitoring data, the maximum value reported in NAWQA is 2.2 :g/L. The estimated values from PRZM/EXAMS correspond reasonably well with the maximum concentration seen in NAWQA monitoring data. Because of the high mobility and long persistence of acifluorfen in water, potentially "high" concentrations of acifluorfen may exist in surface water bodies. Without specifically targeted monitoring data it is not possible to determine peak environmental concentration. The monitoring data demonstrates the potential for acifluorfen to contaminate ground water. Considerable variability was seen in the acifluorfen concentrations observed by ground-water monitoring. The highest concentration observed in the Wisconsin sodium-acifluorfen prospective ground-water monitoring study was of 46 :g/L, where, a single 0.75 lb ai/acre application of sodium acifluorfen was applied to soybeans. The long term average acifluorfen concentration at the prospective study site was 7.33 :g/L. The maximum was 0.19 µg/L (0.04% of 2604 samples) in the NAWQA study.

LITERATURE CITATIONS

Jones, R. David Jones and Sidney Abel. 1997. Use of a Crop Area Factor in Estimating Surface-Water-Source Drinking Water Exposure. Presentation to the FIFRA Science Advisory Panel, December, 1997.

McCall, P.J., R.L. Swann, D.A. Laskowksi, S.M. Unger, S.A. Vrona, and H.J. Dishburger. Estimation of Chemical Mobility in Soil from Liquid Chromatographic Retention times. Bulletin of Environ. Contamin. and Toxicol. 24:190-195.

U.S. Environmental Protection Agency. 2000. *Draft* Guidance for Use of the Index Reservoir and Percent Crop Area Factor in Drinking Water Exposure Assessments. (3/21/2000).

DP Barcode: D280710 (Sub-bean for D278403) EFED Response to BASF's "60-day" comments posted to the Public Docket OPP-34241 on the draft RED on Sodium Acifluorfen.

DP Barcode D253561 "Draft" Chapter Environmental Fate- Reregistration of sodium acifluorfen (PC Code 114402) for uses on soybeans, peanuts and rice.

Studies

MRID #	Study Title
421522-00	Hiscock, A. M. 1991. A Small Scale Retrospective Groundwater Monitoring Study and Limited Prospective Groundwater Monitoring Study with Acifluorfen-Sodium, the Active Ingredient of Tackle™ Brand Herbicide and Blazer™ Brand Herbicide. BASF Reg. Doc # 91/5031.
421522-01	Hiscock, A. and S. C Cooper. 1991. A Small Scale Retrospective and Limited Prospective Groundwater Monitoring Study with Acifluorfen-Sodium, the Active Ingredient of Tackle™ Herbicide and Blazer™ Herbicide. BASF Reg. Doc # 91/5206.
41833201	Blundell, K. A Small Scale Retrospective and Limited Prospective Groundwater Monitoring Study with Acifluorfen-Sodium, the Active Ingredient of Tackle™ Herbicide and Blazer™ Herbicide: Interim Report. BASF Reg. Doc # 91/5048.
	USEPA. 1993. Review of Small Scale Retrospective Groundwater Monitoring Studies. EFGWB# 92-0428 (D173298) dated Jan 26, 1993, USEPA, Washington, DC.
	USEPA. 1996. Review of photodegradation in water, aerobic aquatic and Adsorption/Desorption studies EFGWB#s 92-0968, 92-1014, 93-0807 (D192233, D179053, D178920) dated Sept. 17, 1996. Sent with a letter, dated Oct. 8, 1996, from Lois A. Rossi to Karen R. Blundell. USEPA, Washington, DC.
42152201	Hiscock, A. M. and S. C. Cooper. A small-scale retrospective and limited prospective groundwater monitoring study with acifluorfen-sodium, the active ingredient of Tackle® and Blazer®: Final Report BASF Registration Document No. 91/5206. EFGWB No. 92-0428
41160001	Norris, F. A small-scale retrospective and limited prospective groundwater monitoring study with acifluorfen-sodium, the active ingredient of Tackle® Brand Herbicide and Blazer® Brand Herbicide: Progress Report Rhone-Poulenc Ag. Company and BASF Corporation. EPA review EFGWB No. 90-002.

Asc 224133 Jones, R. L. and F.A. Norris. A small-scale retrospective monitoring study with Acifluorfen-sodium, the active ingredient of Tackle Brand herbicide and Blazer Brand herbicide: Study Protocol. EPA review EFGWB No. 80-822.

Appendix 1. Table 1. Common name, code and chemical name of lactofen and lactofen degradates.

Common Name/(Code)	Chemical Name
lactofen/(PPG-844)	1-(carboethoxy) ethyl 5-[2-chloro-4-(trifluoromethyl) phenoxy)]2-nitrobenzoate).
acifluorfen/(PPG-847)	(5-[2-chloro-4-(trifluoromethyl)phenoxy)-2-nitrobenzoic acid)
desethyl lactofen/(PPG-947)	(1-(carboxy) ethyl 5-[2-chloro-4-(trifluoromethyl) phenoxy]-2-nitrobenzoate)
amino acifluorfen/(PPG-2053)	(5-[2-chloro-4-(trifluoromethyl) phenoxy]-2-aminobenzoic) acid).
/(PPG-3219)	phenoxy-2-nitrobenzoate ????
amino lactofen/(PPG-1576)	1-(Carboethoxy)ethyl 5-[2-chloro-4-(trifluoromethyl) phenoxy]-2-aminobenzoate

Appendix 2. Index Reservoir
Drinking Water Assessment with Index Reservoir and Percent Crop Area

The estimated drinking water concentrations (EDWCs) were reevaluated using the methodology outlined in EPA-OPP *draft* Guidance for Use of the Index Reservoir and Percent Crop Area Factor in Drinking Water Exposure Assessments (USEPA, 2000).

The purpose the Index Reservoir (IR) scenario and the Percent Crop Area (PCA) for use in estimating the exposure in drinking water derived from vulnerable surface water supplies. Since the passage of the Food Quality Protection Act (FQPA) in 1997, the Agency has been using the standard farm pond as an interim scenario for drinking water exposure and has been assuming that 100% of this small watershed is planted in a single crop. The Agency is now implementing the index reservoir to represent a watershed prone to generating high pesticide concentrations that is capable of supporting a drinking water facility in conjunction with the percent cropped area (PCA) which accounts for the fact that a watershed large enough to support a drinking water facility will not usually be planted completely to a single crop. These two steps are intended to improve the quality and accuracy of OPP's modeling of drinking water exposure for pesticides.

The Index Reservoir (IR): IR is intended as a drop-in replacement for the standard pond for use in drinking water exposure assessment. It is used in a manner similar to the standard pond, except that flow rates have been modified to reflect local weather conditions. The EXAMS parameters for the standard index reservoir are in Appendix 3. This guidance results from a July, 1998 presentation to the FIFRA Science Advisory Panel. The materials for that presentation are at: http://www.epa.gov/scipoly/sap/1998/index.htm

Percent Crop Area (PCA): PCA is a generic watershed-based adjustment factor that will be applied to pesticide concentrations estimated for the surface water component of the drinking water exposure assessment using PRZM/EXAMS with the index reservoir scenario. The output generated by the linked PRZM/EXAMS models is multiplied by the maximum percent of crop area (PCA) in any watershed (expressed as a decimal) generated for the crop or crops of interest. Currently, OPP will apply PCA adjustments for four major crops – corn, soybeans, wheat, and cotton. Two are appropriate for lactofen, cotton and soybeans.

The concept of a factor to adjust the concentrations reported from modeling to account for land use was first proposed in a presentation to the SAP in December 1997 (Jones and Abel, 1997). This guidance results from a May 1999 presentation to the FIFRA Scientific Advisory Panel (SAP), *Proposed Methods For Determining Watershed-derived Percent Crop Areas And Considerations For Applying Crop Area Adjustments to Surface Water Screening Models*, and the response and recommendations from the panel. A more thorough discussion of this method and comparisons of monitoring and modeling results for selected pesticide/crop/site combinations is located at:
http://www.epa.gov/scipoly/sap/1999/may/pca_sap.pdf.

The Agency will continue to develop PCAs for other major crops in the same manner as was described in the May 1999 SAP presentation. However, the Agency expects that it will use smaller watersheds for these calculations in the near future. For minor-use crops, the SAP found that the use of PCAs produced less than satisfactory results and advised OPP to further investigate possible sources of error. Thus, for the near term, OPP will not be using PCAs in a

crop-specific manner for both major crops that do not yet have PCAs and minor-use crops. Instead it will use a default PCA that reflects the total agricultural land in an 8-digit Hydrologic Unit Code (HUC). The PCA values used in this assessment are listed in Appendix 2, Table 1.

The OPP guidance document provides information on when and how to apply the PCA to model estimates, describes the methods used to derive the PCA, discusses some of the assumptions and limitations with the process, and spells out the next steps in expanding the PCA implementation beyond the initial crops. Instructions for using the index reservoir and PCA are provided below. Discussion on some of the assumptions and limitations for both the PCA and Index Reservoir are included in the Reporting section.

Appendix 2, Table 1. Summary of Maximum Percent Crop Areas (without Land Use coverage)

CROP	MAXIMUM PERCENT CROP AREA (as a decimal)	HYDROLOGIC UNIT CODE (8-DIGIT HUC)	STATE
Soybeans	0.41	08020201	Missouri
Cotton	0.20	08030207	Mississippi
All Agricultural Land	0.87	10230002	Iowa

Note that there is an entry for 'All Agricultural Land' in Appendix 2, Table 1. This is a default value to use for crops for which no specific PCA is available. It represents the largest amount of land in agricultural production in any 8-digit hydrologic unit code (HUC) watershed in the continental United States.

The unadjusted EDWC (PRZM/EXAMS output) is multiplied by the appropriate PCA for that crop to obtain the final estimated drinking water concentration (EDWC). Note that if Tier 2 modeling is done for an area other than the standard scenario, the PCA would still be applied, since it represents the maximum percent crop area for that particular crop. (As regional modeling efforts are expanded, regional PCAs could be developed in the future.) As an example, for a pesticide used only on cotton, the PRZM/EXAMS estimated environmental concentrations would be multiplied by 0.20. This factor would be applied to the standard PRZM/EXAMS scenario for cotton or any non-standard cotton scenario until such time as regional PCAs are developed.

When multiple crops occur in the watershed, the co-occurrence of these crops needs to be considered. The PCA approach assumes that the adjustment factor represents the maximum potential percentage of the watershed that could be planted to a crop. If, for example, a pesticide is only used on cotton, then the assumption that no more than 20% of the watershed (at the current HUC scale used) would be planted to the crop is likely to hold true. However, if the pesticide is used on both cotton and soybeans, then this assumption no longer holds true, since watersheds often contain both crops, with a combined percentage of up to 61% (Table 1). In this case, the model estimates should be re-adjusted to reflect the combined PCA.

Cotton and soybeans were considered because they represent significant uses, maximum application rates, and are grown in vulnerable regions of the United States. For the PRZM, the input files for each IR scenario are essentially the same as its farm pond scenario. Three parameters, AFIELD, HL, and DRFT require modification. These changes are shown in Appendix 2, Table 2.

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Appendix 2, Table 2. PRZM input parameters where modifications were necessary for the Index Reservoir (IR) Scenario			
PRZM variable	Farm Pond Value	IR Scenario	Definition
AFIELD	10 ha	172.8 ha	area of plot or field
HL	374 m	600 m	Hydraulic length
DRFT	0.01 ground 0.05 aerial	0.064 ground 0.16 aerial	Spray drift

Clarification concerning several points of uncertainty associated with the linked PRZM/EXAMS simulations.

Please note that the Environmental Fate and Effects Division (EFED) is in the process of revising the "EFED Shell" for PRZM/EXAMS used in this exposure assessment. These revisions are largely the result of modifications made by ORD to models the shell runs. The revised EFED Shell may result in different estimated environmental concentrations (EEC) than those presented in earlier exposure assessments. The current version of the EFED Shell "PE3.PL" (version 1.2 dated October 15, 2002) was approved on November 6, 2002. The revisions to the shell address the issues summarized below.

- Peak concentrations estimated using the EFED Shell (version 1.2 dated October 15, 2002) represent a one day average concentration instead of the instantaneous peak concentration historically used by EFED. This resulted from a revision to EXAMS (VERSION 2.98.04). The appropriateness of using a one day average peak concentration instead of the instantaneous peak has not undergone thorough review by EFED. Therefore, EFED will revise the EFED Shell to reincorporate the instantaneous peak concentration. Preliminary analysis suggests that for non-persistent pesticides using the one-day average instead of the instantaneous peak could result in a peak EEC which is up to 15% lower .

- The EFED Shell (version 1.2 dated October 15, 2002) is not taking full advantage of the new meteorological files used by EXAMS 2.98.04. The current version of the EFED Shell uses default temperature and wind speed, however EFED intends to utilize the site specific temperature and wind speed data within the new meteorological files. Using site-specific meteorological data can affect both the chronic and acute estimates for non-persistent pesticides. Preliminary analysis suggests that chronic EEC may be reduced in lower latitude scenarios and that the chronic EEC may be higher in higher latitude scenarios.

- EXAMS 2.98.04 initiates a new surface water hydrology program when the new meteorological data are read. This results in the initiation of flow through the standard pond used in ecological exposure assessments. This can result in additional dissipation and reduced EECs in the ecological exposure assessment. It is current EFED policy to assume no flow through the pond. EFED will revise the EFED Shell (version 1.2 dated October 15, 2002) to restore the static pond scenario.

Because of known issues with "PE3.PL" (version 1.2 dated October 15, 2002), model predictions should be considered in light of known toxicity endpoints. Model predictions within 20% of known toxicity endpoints should be reevaluated.

APPENDIX 3 Modeling files for PRZM, EXAMS, and PE4 files for Drinking Water Exposure Assessment for Lactofen, Updated for Prospective Ground Water (PGW) Monitoring Study dated January 21, 2003. The key surface water modeling files are provided in this appendix.

PC Code: 128888 (Lactofen)

1 **MS Cotton Aciflourfen from lactofen PRZM Input File**

```
MS Cotton; 8/13/2001
"Yazoo County; MLRA 134; Metfile: W03940.dvf (old: Met131.met),"
*** Record 3:
    0.74    0.15       0      17       1       1
*** Record 6 -- ERFLAG
       4
*** Record 7:
    0.49     0.4    0.75   172.8               4       6     600
*** Record 8
       3
*** Record 9
       1     0.2     125      98       3  99  93  92       0     120
       2     0.2     125      98       3  94  84  83       0     120
       3     0.2     125      98       3  99  83  83       0     120
*** Record 9a-d
       1      25
0101 1601 0102 1602 0103 1603 0104 1604 2504 0105 1605 0106 1606 0107 1607 0108
500 .517 .532 .549 .567 .591 .617 .667 .705 .718 .699 .620 .496 .354 .303 .305
014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
1608 0109 1609 0110 1610 0111 1611 0112 1612
289 .343 .359 .223 .327 .376 .425 .465 .494
014 .014 .014 .014 .014 .014 .014 .014 .014
       2      25
0101 1601 0102 1602 0103 1603 0104 1604 2504 0105 1605 0106 1606 0107 1607 0108
500 .517 .532 .549 .567 .591 .617 .667 .705 .718 .699 .620 .496 .354 .303 .305
014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
1608 0109 1609 0110 1610 0111 1611 0112 1612
289 .343 .359 .223 .327 .376 .425 .465 .494
014 .014 .014 .014 .014 .014 .014 .014 .014
       3      25
0101 1601 0102 1602 0103 1603 0104 1604 2504 0105 1605 0106 1606 0107 1607 0108
500 .517 .532 .549 .567 .591 .617 .667 .705 .718 .699 .620 .496 .354 .303 .305
014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
1608 0109 1609 0110 1610 0111 1611 0112 1612
289 .343 .359 .223 .327 .376 .425 .465 .494
014 .014 .014 .014 .014 .014 .014 .014 .014
*** Record 10 -- NCPDS, the number of cropping periods
      30
*** Record 11
  010561  070961  220961       1
  010562  070962  220962       2
  010563  070963  220963       2
  010564  070964  220964       1
  010565  070965  220965       2
  010566  070966  220966       2
  010567  070967  220967       1
  010568  070968  220968       2
  010569  070969  220969       2
  010570  070970  220970       1
  010571  070971  220971       2
  010572  070972  220972       2
```

```
  010573  070973  220973       1
  010574  070974  220974       2
  010575  070975  220975       2
  010576  070976  220976       1
  010577  070977  220977       2
  010578  070978  220978       2
  010579  070979  220979       1
  010580  070980  220980       2
  010581  070981  220981       2
  010582  070982  220982       1
  010583  070983  220983       2
  010584  070984  220984       2
  010585  070985  220985       1
  010586  070986  220986       2
  010587  070987  220987       2
  010588  070988  220988       1
  010589  070989  220989       2
  010590  070990  220990       2
*** Record 12 -- PTITLE
Sodium acifluorfen - 2 applications @ 0.130 kg/ha
*** Record 13
      60       1       0       0
*** Record 15 -- PSTNAM
Sodium acifluorfen
*** Record 16
  280461  0 1  4.0  0.13    1    0
  190561  0 1  4.0  0.13    1    0
  280462  0 1  4.0  0.13    1    0
  190562  0 1  4.0  0.13    1    0
  280463  0 1  4.0  0.13    1    0
  190563  0 1  4.0  0.13    1    0
  280464  0 1  4.0  0.13    1    0
  190564  0 1  4.0  0.13    1    0
  280465  0 1  4.0  0.13    1    0
  190565  0 1  4.0  0.13    1    0
  280466  0 1  4.0  0.13    1    0
  190566  0 1  4.0  0.13    1    0
  280467  0 1  4.0  0.13    1    0
  190567  0 1  4.0  0.13    1    0
  280468  0 1  4.0  0.13    1    0
  190568  0 1  4.0  0.13    1    0
  280469  0 1  4.0  0.13    1    0
  190569  0 1  4.0  0.13    1    0
  280470  0 1  4.0  0.13    1    0
  190570  0 1  4.0  0.13    1    0
  280471  0 1  4.0  0.13    1    0
  190571  0 1  4.0  0.13    1    0
  280472  0 1  4.0  0.13    1    0
  190572  0 1  4.0  0.13    1    0
  280473  0 1  4.0  0.13    1    0
  190573  0 1  4.0  0.13    1    0
  280474  0 1  4.0  0.13    1    0
  190574  0 1  4.0  0.13    1    0
  280475  0 1  4.0  0.13    1    0
  190575  0 1  4.0  0.13    1    0
  280476  0 1  4.0  0.13    1    0
  190576  0 1  4.0  0.13    1    0
  280477  0 1  4.0  0.13    1    0
  190577  0 1  4.0  0.13    1    0
```

```
  280478  0 1  4.0  0.13    1    0
  190578  0 1  4.0  0.13    1    0
  280479  0 1  4.0  0.13    1    0
  190579  0 1  4.0  0.13    1    0
  280480  0 1  4.0  0.13    1    0
  190580  0 1  4.0  0.13    1    0
  280481  0 1  4.0  0.13    1    0
  190581  0 1  4.0  0.13    1    0
  280482  0 1  4.0  0.13    1    0
  190582  0 1  4.0  0.13    1    0
  280483  0 1  4.0  0.13    1    0
  190583  0 1  4.0  0.13    1    0
  280484  0 1  4.0  0.13    1    0
  190584  0 1  4.0  0.13    1    0
  280485  0 1  4.0  0.13    1    0
  190585  0 1  4.0  0.13    1    0
  280486  0 1  4.0  0.13    1    0
  190586  0 1  4.0  0.13    1    0
  280487  0 1  4.0  0.13    1    0
  190587  0 1  4.0  0.13    1    0
  280488  0 1  4.0  0.13    1    0
  190588  0 1  4.0  0.13    1    0
  280489  0 1  4.0  0.13    1    0
  190589  0 1  4.0  0.13    1    0
  280490  0 1  4.0  0.13    1    0
  190590  0 1  4.0  0.13    1    0
*** Record 17
       0       1       0
*** Record 19 -- STITLE
Loring Silt Loam; HYDG: C
*** Record 20
     155           0   0   0   0   0   0   0   0   0
*** Record 26
       0       0       0
*** Record 33
       6
       1      13     1.4   0.385       0       0       0
        0.0040110.004011       0
             0.1   0.385   0.151    2.18    2.22
       2      23     1.4    0.37       0       0       0
        0.0040110.004011       0
               1    0.37   0.146    0.49    2.22
       3      33     1.4    0.37       0       0       0
        0.0040110.004011       0
               3    0.37   0.146    0.16    2.22
       4      30    1.45    0.34       0       0       0
        0.0040110.004011       0
               5    0.34   0.125   0.124    2.22
       5      23    1.49   0.335       0       0       0
        0.0040110.004011       0
               1   0.335   0.137    0.07    2.22
       6      33    1.51   0.343       0       0       0
        0.0040110.004011       0
               3   0.343   0.147    0.06    2.22
***Record 40
       0
            YEAR      10            YEAR      10            YEAR      10   1
       1
       1  -----
       7    YEAR
```

```
PRCP    TCUM   0   0
RUNF    TCUM   0   0
INFL    TCUM   1   1
ESLS    TCUM   0   0  1.0E3
RFLX    TCUM   0   0  1.0E5
EFLX    TCUM   0   0  1.0E5
RZFX    TCUM   0   0  1.0E5
```

2 MS Cotton Aciflourfen from lactofen PE4 output file
stored as MSaciC23.out
Chemical: Sodium acifluorfen
PRZM environment: MScottonC.txt modified Satday, 12 October 2002 at 17:06:56
EXAMS environment: INDEXRES.EXV modified Thuday, 7 March 2002 at 15:01:54
Metfile: w03940.dvf modified Wedday, 3 July 2002 at 09:05:46
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day		60 Day		90 Day	Yearly
1961	5.768	5.535	4.791	4.349	3.925	1.379		
1962	0.5498	0.5328	0.4694	0.3523	0.3163	0.1316		
1963	3.246	3.112	2.621	2.16	1.776	0.5852		
1964	4.523	4.34	3.705	3.252	2.741	0.8865		
1965	0.1244	0.1204	0.1054	0.07987		0.06609	0.03558	
1966	12.89	12.53	11.06	7.891	6.267	1.84		
1967	22.72	21.87	19.38	15.09	12.89	4.198		
1968	5.721	5.499	4.959	4.409	3.666	1.174		
1969	0.4284	0.4112	0.3477	0.3189	0.2858	0.1171		
1970	5.587	5.372	4.604	3.796	3.39	1.137		
1971	5.961	5.729	5.272	4.035	3.28	1.035		
1972	1.723	1.655	1.56	1.238	1.05	0.3333		
1973	8.429	8.229	7.364	5.552	4.651	1.476		
1974	1.709	1.64	1.384	0.9753	0.7798	0.261		
1975	2.365	2.272	2.039	1.668	1.407	0.464		
1976	15.52	14.89	13.49	9.944	8.425	2.727		
1977	1.69	1.622	1.369	1.261	1.096	0.3802		
1978	2.464	2.378	2.149	1.804	1.515	0.4904		
1979	15.2	14.58	12.36	10.51	9.716	3.261		
1980	2.963	2.847	2.424	1.865	1.604	0.5414		
1981	3.304	3.171	2.804	2.261	1.857	0.5641		
1982	11.74	11.26	9.978	7.487	6.035	1.965		
1983	12.75	12.31	10.55	7.506	6.043	1.817		
1984	2.694	2.588	2.313	2.015	1.705	0.5517		
1985	3.274	3.139	2.771	2.417	2.063	0.6819		
1986	4.687	4.5	3.98	2.892	2.308	0.7261		
1987	4.505	4.322	3.779	2.679	2.125	0.7419		
1988	4.337	4.158	3.547	3.105	2.723	0.888		
1989	4.401	4.283	3.784	3.277	2.745	0.9036		
1990	3.219	3.09	2.839	2.384	1.94	0.5938		

Sorted results

Prob.	Peak	96 hr	21 Day		60 Day		90 Day	Yearly
0.032258064516129	22.72	21.87	19.38	15.09	12.89	4.198		
0.0645161290322581	15.52	14.89	13.49	10.51	9.716	3.261		
0.0967741935483871	15.2	14.58	12.36	9.944	8.425	2.727		

0.129032258064516	12.89	12.53	11.06	7.891	6.267	1.965
0.161290322580645	12.75	12.31	10.55	7.506	6.043	1.84
0.193548387096774	11.74	11.26	9.978	7.487	6.035	1.817
0.225806451612903	8.429	8.229	7.364	5.552	4.651	1.476
0.258064516129032	5.961	5.729	5.272	4.409	3.925	1.379
0.290322580645161	5.768	5.535	4.959	4.349	3.666	1.174
0.32258064516129	5.721	5.499	4.791	4.035	3.39	1.137
0.354838709677419	5.587	5.372	4.604	3.796	3.28	1.035
0.387096774193548	4.687	4.5	3.98	3.277	2.745	0.9036
0.419354838709677	4.523	4.34	3.784	3.252	2.741	0.888
0.451612903225806	4.505	4.322	3.779	3.105	2.723	0.8865
0.483870967741936	4.401	4.283	3.705	2.892	2.308	0.7419
0.516129032258065	4.337	4.158	3.547	2.679	2.125	0.7261
0.548387096774194	3.304	3.171	2.839	2.417	2.063	0.6819
0.580645161290323	3.274	3.139	2.804	2.384	1.94	0.5938
0.612903225806452	3.246	3.112	2.771	2.261	1.857	0.5852
0.645161290322581	3.219	3.09	2.621	2.16	1.776	0.5641
0.67741935483871	2.963	2.847	2.424	2.015	1.705	0.5517
0.709677419354839	2.694	2.588	2.313	1.865	1.604	0.5414
0.741935483870968	2.464	2.378	2.149	1.804	1.515	0.4904
0.774193548387097	2.365	2.272	2.039	1.668	1.407	0.464
0.806451612903226	1.723	1.655	1.56	1.261	1.096	0.3802
0.838709677419355	1.709	1.64	1.384	1.238	1.05	0.3333
0.870967741935484	1.69	1.622	1.369	0.9753	0.7798	0.261
0.903225806451613	0.5498	0.5328	0.4694	0.3523	0.3163	0.1316
0.935483870967742	0.4284	0.4112	0.3477	0.3189	0.2858	0.1171
0.967741935483871	0.1244	0.1204	0.1054	0.07987	0.06609	0.03558

0.1	14.969	14.375	12.23	9.7387	8.2092	2.6508

Average of yearly averages: 1.06287933333333

Inputs generaged by pe3.pl 1.2 - 15-October-2002

3 MS Cotton Aciflourfen from lactofen PE4.PL PZR file

Metfile: w03940.dvf
PRZM scenario: MScottonC.txt
EXAMS environment file: INDEXRES.EXV
Chemical Name: Sodium acifluorfen

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	383.70	g/mol	
Henry's Law Const.	henry	1.51e-13	atm-m^3/mol	
Vapor Pressure	vapr		torr	
Solubility	sol	2.50e+05	mg/L	
Kd	Kd	2.22	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	13.31	days	Half-life
Aerobic Aquatic Metabolism	kbacw	351	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	168	days	Halfife
Aerobic Soil Metabolism	asm	172.8	days	Halfife
Hydrolysis: pH 7	0	days	Half-life	
Method:	CAM	1	integer	See PRZM manual
Incorporation Depth:	DEPI	4	cm	
Application Rate:	TAPP	0.130	kg/ha	
Application Efficiency:	APPEFF	1.00	fraction	
Spray Drift	DRFT	0	fraction of application rate applied to pond	
Application Date	Date	28-4	dd/mm or dd/mmm or dd-mm or dd-mmm	
Interval 1	interval	21	days	Set to 0 or delete line for single app.
Record 17:	FILTRA			
	IPSCND	1		
	UPTKF			
Record 18:	PLVKRT			
	PLDKRT			
	FEXTRC	0.5		
Flag for Index Res. Run	IR	IR		
Flag for runoff calc.	RUNOFF	total	none, monthly or total(average of entire run)	

```
*** Options
PRZM                ON
VADOFT               OFF
MONTE CARLO           OFF
TRANSPORT            OFF
*** Zone records
PRZM ZONES            1
ENDRUN
*** input file records
 METEOROLOGY      1   C:\models\INPUTS\metfiles\w03940.dvf
 PRZM INPUT       1   przm3.inp
*** output file records
 PATH             C:\models\
 TIME SERIES      1   MSaciC23.zts
 PRZM OUTPUT      1   MSaciC23.zpm
*** scratch file records
 PATH             C:\models\
 PRZM RESTART         RESTART.PRZ
ENDFILES
*** global records
 START DATE          010161
 END DATE           311290
NUMBER OF CHEMICALS    1
ENDDATA
*** display records
ECHO                8
TRACE                ON
```

5 MS Soybean acifluorfen from lactofen PRZM Input file

```
MS soybean; 8/9/01
"Yazoo Co. MLRA 134; Metfile: W13893.dvf (old: Met134.met),"
*** Record 3:
   0.75    0.25       0      17       1       3
*** Record 6 -- ERFLAG
       4
*** Record 7:
   0.42  0.0151       1   172.8              3       2     600
*** Record 8
       1
*** Record 9
       1     0.2      30     100       3  87  84  86       0      76
*** Record 9a-d
       1      27
0101 1601 0102 1602 0103 1603 0104 1604 2004 0105 0505 1605 0106 1606 0107 1607
.245 .276 .306 .337 .373 .418 .468 .498 .575 .627 .654 .620 .484 .361 .220 .094
.014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
0108 1608 0109 1609 0110 1510 1610 0111 1611 0112 1612
.109 .110 .046 .053 .040 .203 .239 .316 .394 .464 .524
.014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
*** Record 10 -- NCPDS, the number of cropping periods
      30
*** Record 11
  150461  010961  101061       1
  150462  010962  101062       1
  150463  010963  101063       1
  150464  010964  101064       1
  150465  010965  101065       1
  150466  010966  101066       1
  150467  010967  101067       1
  150468  010968  101068       1
  150469  010969  101069       1
  150470  010970  101070       1
  150471  010971  101071       1
  150472  010972  101072       1
  150473  010973  101073       1
  150474  010974  101074       1
  150475  010975  101075       1
```

```
 150476  010976  101076      1
 150477  010977  101077      1
 150478  010978  101078      1
 150479  010979  101079      1
 150480  010980  101080      1
 150481  010981  101081      1
 150482  010982  101082      1
 150483  010983  101083      1
 150484  010984  101084      1
 150485  010985  101085      1
 150486  010986  101086      1
 150487  010987  101087      1
 150488  010988  101088      1
 150489  010989  101089      1
 150490  010990  101090      1
*** Record 12 -- PTITLE
Sodium acifluorfen - 2 applications @ 0.130 kg/ha
*** Record 13
    60      1      0      0
*** Record 15 -- PSTNAM
Sodium acifluorfen
*** Record 16
 140561  0 1  4.0  0.13   1   0
 280561  0 1  4.0  0.13   1   0
 140562  0 1  4.0  0.13   1   0
 280562  0 1  4.0  0.13   1   0
 140563  0 1  4.0  0.13   1   0
 280563  0 1  4.0  0.13   1   0
 140564  0 1  4.0  0.13   1   0
 280564  0 1  4.0  0.13   1   0
 140565  0 1  4.0  0.13   1   0
 280565  0 1  4.0  0.13   1   0
 140566  0 1  4.0  0.13   1   0
 280566  0 1  4.0  0.13   1   0
 140567  0 1  4.0  0.13   1   0
 280567  0 1  4.0  0.13   1   0
 140568  0 1  4.0  0.13   1   0
 280568  0 1  4.0  0.13   1   0
 140569  0 1  4.0  0.13   1   0
 280569  0 1  4.0  0.13   1   0
 140570  0 1  4.0  0.13   1   0
 280570  0 1  4.0  0.13   1   0
 140571  0 1  4.0  0.13   1   0
 280571  0 1  4.0  0.13   1   0
 140572  0 1  4.0  0.13   1   0
```

```
 280572  0 1  4.0  0.13    1    0
 140573  0 1  4.0  0.13    1    0
 280573  0 1  4.0  0.13    1    0
 140574  0 1  4.0  0.13    1    0
 280574  0 1  4.0  0.13    1    0
 140575  0 1  4.0  0.13    1    0
 280575  0 1  4.0  0.13    1    0
 140576  0 1  4.0  0.13    1    0
 280576  0 1  4.0  0.13    1    0
 140577  0 1  4.0  0.13    1    0
 280577  0 1  4.0  0.13    1    0
 140578  0 1  4.0  0.13    1    0
 280578  0 1  4.0  0.13    1    0
 140579  0 1  4.0  0.13    1    0
 280579  0 1  4.0  0.13    1    0
 140580  0 1  4.0  0.13    1    0
 280580  0 1  4.0  0.13    1    0
 140581  0 1  4.0  0.13    1    0
 280581  0 1  4.0  0.13    1    0
 140582  0 1  4.0  0.13    1    0
 280582  0 1  4.0  0.13    1    0
 140583  0 1  4.0  0.13    1    0
 280583  0 1  4.0  0.13    1    0
 140584  0 1  4.0  0.13    1    0
 280584  0 1  4.0  0.13    1    0
 140585  0 1  4.0  0.13    1    0
 280585  0 1  4.0  0.13    1    0
 140586  0 1  4.0  0.13    1    0
 280586  0 1  4.0  0.13    1    0
 140587  0 1  4.0  0.13    1    0
 280587  0 1  4.0  0.13    1    0
 140588  0 1  4.0  0.13    1    0
 280588  0 1  4.0  0.13    1    0
 140589  0 1  4.0  0.13    1    0
 280589  0 1  4.0  0.13    1    0
 140590  0 1  4.0  0.13    1    0
 280590  0 1  4.0  0.13    1    0
*** Record 17
     0       1       0
*** Record 19 -- STITLE
"The Loring, silt loam, HYDG C"
*** Record 20
    155          0   0   0   0   0   0   0   0   0   0
*** Record 26
     0       0       0
```

```
*** Record 33
     6
     1     13    1.4   0.385      0      0      0
      0.0040110.004011      0
          0.1   0.385   0.151    2.18    2.22
     2     23    1.4    0.37      0      0      0
      0.0040110.004011      0
           1    0.37   0.146    0.49    2.22
     3     33    1.4    0.37      0      0      0
      0.0040110.004011      0
           3    0.37   0.146    0.16    2.22
     4     30   1.45    0.34      0      0      0
      0.0040110.004011      0
           5    0.34   0.125   0.124    2.22
     5     23   1.49   0.335      0      0      0
      0.0040110.004011      0
           1   0.335   0.137    0.07    2.22
     6     33   1.51   0.343      0      0      0
      0.0040110.004011      0
           3   0.343   0.147    0.06    2.22
***Record 40
     0
        YEAR     10          YEAR     10          YEAR     10   1
     1
     1  -----
     7   YEAR
   PRCP    TCUM   0   0
   RUNF    TCUM   0   0
   INFL    TCUM   1   1
   ESLS    TCUM   0   0  1.0E3
   RFLX    TCUM   0   0  1.0E5
   EFLX    TCUM   0   0  1.0E5
   RZFX    TCUM   0   0  1.0E5
```

6 MS Soybean acifluorfen from lactofen PE4 output file

stored as MSaciS23.out
Chemical: Sodium acifluorfen
PRZM environment: MSsoybeanC.txt modified Satday, 12 October 2002 at 17:07:44
EXAMS environment: INDEXRES.EXV modified Thuday, 7 March 2002 at 15:01:54
Metfile: w13893.met modified Satday, 10 August 2002 at 22:23:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day		60 Day	90 Day	Yearly
1961	0.3518	0.34	0.2988	0.2313	0.1916	0.06007	
1962	1.128	1.091	0.9943	0.7968	0.6855	0.2319	
1963	4.512	4.376	3.902	3.116	2.732	0.9408	
1964	1.123	1.087	0.9495	0.7127	0.6023	0.2347	
1965	3.193	3.091	2.712	2.059	1.762	0.6107	
1966	2.292	2.219	2.054	1.575	1.444	0.5825	
1967	2.519	2.437	2.124	1.819	1.558	0.5508	
1968	5.133	4.965	4.457	3.38	2.779	0.922	
1969	0.6878	0.67	0.5939	0.4499	0.3724	0.1678	
1970	1.591	1.541	1.38	1.218	1.03	0.3457	
1971	1.059	1.025	0.8932	0.676	0.5712	0.2078	
1972	3.36	3.258	2.956	2.253	1.854	0.6369	
1973	1.796	1.736	1.51	1.239	1.048	0.4573	
1974	9.897	9.588	8.758	6.627	5.436	1.864	
1975	2.286	2.213	1.93	1.49	1.234	0.464	
1976	6.324	6.122	5.442	4.22	3.48	1.099	
1977	1.513	1.464	1.278	1.026	0.8694	0.3177	
1978	2.441	2.361	2.057	1.589	1.331	0.4373	
1979	5.632	5.447	4.746	3.601	2.956	0.9299	
1980	6.474	6.261	5.45	4.338	3.615	1.298	
1981	3.501	3.386	2.989	2.392	2.013	0.7348	
1982	1.92	1.857	1.644	1.47	1.273	0.4362	
1983	6.768	6.553	5.998	4.754	4	1.306	
1984	1.196	1.159	1.03	0.8202	0.7202	0.3225	
1985	1.15	1.112	1.012	0.8053	0.6865	0.2614	
1986	2.679	2.594	2.273	1.704	1.442	0.4917	
1987	2.28	2.205	1.969	1.479	1.223	0.4131	
1988	2.498	2.415	2.228	1.734	1.431	0.4913	
1989	2.11	2.055	1.81	1.471	1.222	0.4379	
1990	2.191	2.12	1.859	1.582	1.483	0.5361	

Sorted results

Prob.	Peak	96 hr	21 Day		60 Day	90 Day	Yearly
0.032258064516129	9.897	9.588	8.758	6.627	5.436	1.864	
0.0645161290322581	6.768	6.553	5.998	4.754	4	1.306	

0.0967741935483871	6.474	6.261	5.45	4.338	3.615	1.298
0.129032258064516	6.324	6.122	5.442	4.22	3.48	1.099
0.161290322580645	5.632	5.447	4.746	3.601	2.956	0.9408
0.193548387096774	5.133	4.965	4.457	3.38	2.779	0.9299
0.225806451612903	4.512	4.376	3.902	3.116	2.732	0.922
0.258064516129032	3.501	3.386	2.989	2.392	2.013	0.7348
0.290322580645161	3.36	3.258	2.956	2.253	1.854	0.6369
0.32258064516129	3.193	3.091	2.712	2.059	1.762	0.6107
0.354838709677419	2.679	2.594	2.273	1.819	1.558	0.5825
0.387096774193548	2.519	2.437	2.228	1.734	1.483	0.5508
0.419354838709677	2.498	2.415	2.124	1.704	1.444	0.5361
0.451612903225806	2.441	2.361	2.057	1.589	1.442	0.4917
0.483870967741936	2.292	2.219	2.054	1.582	1.431	0.4913
0.516129032258065	2.286	2.213	1.969	1.575	1.331	0.464
0.548387096774194	2.28	2.205	1.93	1.49	1.273	0.4573
0.580645161290323	2.191	2.12	1.859	1.479	1.234	0.4379
0.612903225806452	2.11	2.055	1.81	1.471	1.223	0.4373
0.645161290322581	1.92	1.857	1.644	1.47	1.222	0.4362
0.67741935483871	1.796	1.736	1.51	1.239	1.048	0.4131
0.709677419354839	1.591	1.541	1.38	1.218	1.03	0.3457
0.741935483870968	1.513	1.464	1.278	1.026	0.8694	0.3225
0.774193548387097	1.196	1.159	1.03	0.8202	0.7202	0.3177
0.806451612903226	1.15	1.112	1.012	0.8053	0.6865	0.2614
0.838709677419355	1.128	1.091	0.9943	0.7968	0.6855	0.2347
0.870967741935484	1.123	1.087	0.9495	0.7127	0.6023	0.2319
0.903225806451613	1.059	1.025	0.8932	0.676	0.5712	0.2078
0.935483870967742	0.6878	0.67	0.5939	0.4499	0.3724	0.1678
0.967741935483871	0.3518	0.34	0.2988	0.2313	0.1916	0.06007

0.1	6.459	6.2471	5.4492	4.3262	3.6015	1.2781

Average of yearly averages: 0.592995666666667

Inputs generaged by pe3.pl 1.2 - 15-October-2002

7 MS soybean acifluorfen to lactofen PZR file

Metfile: w13893.met
PRZM scenario: MSsoybeanC.txt
EXAMS environment file: INDEXRES.EXV
Chemical Name: Sodium acifluorfen

Description	Variable Name		Value	Units	Comments
Molecular weight	mwt	383.70	g/mol		
Henry's Law Const.	henry	1.51e-13	atm-m^3/mol		
Vapor Pressure	vapr		torr		
Solubility	sol	2.50e+05	mg/L		
Kd	Kd	2.22	mg/L		
Koc	Koc		mg/L		
Photolysis half-life	kdp	13.31	days	Half-life	
Aerobic Aquatic Metabolism	kbacw	351	days	Halfife	
Anaerobic Aquatic Metabolism	kbacs	84	days	Halfife	
Aerobic Soil Metabolism	asm	172.8	days	Halfife	
Hydrolysis: pH 7	0	days	Half-life		
Method:	CAM	1	integer	See PRZM manual	
Incorporation Depth:	DEPI	4	cm		
Application Rate:	TAPP	0.130	kg/ha		
Application Efficiency:	APPEFF	1.00	fraction		
Spray Drift	DRFT	0.00	fraction of application rate applied to pond		
Application Date	Date	14-5	dd/mm or dd/mmm or dd-mm or dd-mmm		
Interval 1	interval	14	days	Set to 0 or delete line for single app.	
Record 17:	FILTRA				
	IPSCND	1			
	UPTKF				
Record 18:	PLVKRT				
	PLDKRT				
	FEXTRC	0.5			
Flag for Index Res. Run	IR	IR			
Flag for runoff calc.	RUNOFF	total	none, monthly or total(average of entire run)		

MS Cotton Lactofen PRZM Input file

```
MS Cotton; 8/13/2001
"Yazoo County; MLRA 134; Metfile: W03940.dvf (old: Met131.met),"
*** Record 3:
  0.74   0.15      0     17      1      1
*** Record 6 -- ERFLAG
     4
*** Record 7:
  0.49    0.4   0.75  172.8            4      6    600
*** Record 8
     3
*** Record 9
     1    0.2    125     98      3  99  93  92      0    120
     2    0.2    125     98      3  94  84  83      0    120
     3    0.2    125     98      3  99  83  83      0    120
*** Record 9a-d
     1     25
0101 1601 0102 1602 0103 1603 0104 1604 2504 0105 1605 0106 1606 0107 1607 0108
500 .517 .532 .549 .567 .591 .617 .667 .705 .718 .699 .620 .496 .354 .303 .305
014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
1608 0109 1609 0110 1610 0111 1611 0112 1612
289 .343 .359 .223 .327 .376 .425 .465 .494
014 .014 .014 .014 .014 .014 .014 .014 .014
     2     25
0101 1601 0102 1602 0103 1603 0104 1604 2504 0105 1605 0106 1606 0107 1607 0108
500 .517 .532 .549 .567 .591 .617 .667 .705 .718 .699 .620 .496 .354 .303 .305
014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
1608 0109 1609 0110 1610 0111 1611 0112 1612
289 .343 .359 .223 .327 .376 .425 .465 .494
014 .014 .014 .014 .014 .014 .014 .014 .014
     3     25
0101 1601 0102 1602 0103 1603 0104 1604 2504 0105 1605 0106 1606 0107 1607 0108
500 .517 .532 .549 .567 .591 .617 .667 .705 .718 .699 .620 .496 .354 .303 .305
014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014 .014
1608 0109 1609 0110 1610 0111 1611 0112 1612
289 .343 .359 .223 .327 .376 .425 .465 .494
014 .014 .014 .014 .014 .014 .014 .014 .014
*** Record 10 -- NCPDS, the number of cropping periods
    30
*** Record 11
 010561  070961  220961      1
 010562  070962  220962      2
 010563  070963  220963      2
 010564  070964  220964      1
```

```
 010565  070965  220965      2
 010566  070966  220966      2
 010567  070967  220967      1
 010568  070968  220968      2
 010569  070969  220969      2
 010570  070970  220970      1
 010571  070971  220971      2
 010572  070972  220972      2
 010573  070973  220973      1
 010574  070974  220974      2
 010575  070975  220975      2
 010576  070976  220976      1
 010577  070977  220977      2
 010578  070978  220978      2
 010579  070979  220979      1
 010580  070980  220980      2
 010581  070981  220981      2
 010582  070982  220982      1
 010583  070983  220983      2
 010584  070984  220984      2
 010585  070985  220985      1
 010586  070986  220986      2
 010587  070987  220987      2
 010588  070988  220988      1
 010589  070989  220989      2
 010590  070990  220990      2
*** Record 12 -- PTITLE
Lactofen - 2 applications @ 0.224 kg/ha
*** Record 13
    60      1      0      0
*** Record 15 -- PSTNAM
Lactofen
*** Record 16
 210461  0 2  0.0 0.224 0.950.064
 120561  0 2  0.0 0.224 0.950.064
 210462  0 2  0.0 0.224 0.950.064
 120562  0 2  0.0 0.224 0.950.064
 210463  0 2  0.0 0.224 0.950.064
 120563  0 2  0.0 0.224 0.950.064
 210464  0 2  0.0 0.224 0.950.064
 120564  0 2  0.0 0.224 0.950.064
 210465  0 2  0.0 0.224 0.950.064
 120565  0 2  0.0 0.224 0.950.064
 210466  0 2  0.0 0.224 0.950.064
 120566  0 2  0.0 0.224 0.950.064
```

210467 0 2 0.0 0.224 0.950.064
120567 0 2 0.0 0.224 0.950.064
210468 0 2 0.0 0.224 0.950.064
120568 0 2 0.0 0.224 0.950.064
210469 0 2 0.0 0.224 0.950.064
120569 0 2 0.0 0.224 0.950.064
210470 0 2 0.0 0.224 0.950.064
120570 0 2 0.0 0.224 0.950.064
210471 0 2 0.0 0.224 0.950.064
120571 0 2 0.0 0.224 0.950.064
210472 0 2 0.0 0.224 0.950.064
120572 0 2 0.0 0.224 0.950.064
210473 0 2 0.0 0.224 0.950.064
120573 0 2 0.0 0.224 0.950.064
210474 0 2 0.0 0.224 0.950.064
120574 0 2 0.0 0.224 0.950.064
210475 0 2 0.0 0.224 0.950.064
120575 0 2 0.0 0.224 0.950.064
210476 0 2 0.0 0.224 0.950.064
120576 0 2 0.0 0.224 0.950.064
210477 0 2 0.0 0.224 0.950.064
120577 0 2 0.0 0.224 0.950.064
210478 0 2 0.0 0.224 0.950.064
120578 0 2 0.0 0.224 0.950.064
210479 0 2 0.0 0.224 0.950.064
120579 0 2 0.0 0.224 0.950.064
210480 0 2 0.0 0.224 0.950.064
120580 0 2 0.0 0.224 0.950.064
210481 0 2 0.0 0.224 0.950.064
120581 0 2 0.0 0.224 0.950.064
210482 0 2 0.0 0.224 0.950.064
120582 0 2 0.0 0.224 0.950.064
210483 0 2 0.0 0.224 0.950.064
120583 0 2 0.0 0.224 0.950.064
210484 0 2 0.0 0.224 0.950.064
120584 0 2 0.0 0.224 0.950.064
210485 0 2 0.0 0.224 0.950.064
120585 0 2 0.0 0.224 0.950.064
210486 0 2 0.0 0.224 0.950.064
120586 0 2 0.0 0.224 0.950.064
210487 0 2 0.0 0.224 0.950.064
120587 0 2 0.0 0.224 0.950.064
210488 0 2 0.0 0.224 0.950.064
120588 0 2 0.0 0.224 0.950.064
210489 0 2 0.0 0.224 0.950.064

```
 120589  0 2  0.0 0.224 0.950.064
 210490  0 2  0.0 0.224 0.950.064
 120590  0 2  0.0 0.224 0.950.064
*** Record 17
     0       1       0
*** Record 18
     0       0     0.5
*** Record 19 -- STITLE
Loring Silt Loam; HYDG: C
*** Record 20
   155          0   0   1   0   0   0   0   0   0
*** Record 26
     0       0       0
*** Record 30
     4   10800
*** Record 33
     6
     1      13     1.4   0.385       0       0       0
      0.2457970.245797       0
          0.1   0.385   0.151    2.18       0
     2      23     1.4    0.37       0       0       0
      0.2457970.245797       0
            1    0.37   0.146    0.49       0
     3      33     1.4    0.37       0       0       0
      0.2457970.245797       0
            3    0.37   0.146    0.16       0
     4      30    1.45    0.34       0       0       0
      0.2457970.245797       0
            5    0.34   0.125   0.124       0
     5      23    1.49   0.335       0       0       0
      0.2457970.245797       0
            1   0.335   0.137    0.07       0
     6      33    1.51   0.343       0       0       0
      0.2457970.245797       0
            3   0.343   0.147    0.06       0
***Record 40
     0
        YEAR      10          YEAR      10          YEAR      10   1
     1
     1  -----
     7   YEAR
   PRCP    TCUM   0   0
   RUNF    TCUM   0   0
   INFL    TCUM   1   1
   ESLS    TCUM   0   0  1.0E3
```

```
RFLX    TCUM   0   0  1.0E5
EFLX    TCUM   0   0  1.0E5
RZFX    TCUM   0   0  1.0E5
```

MS Soybean Lactofen PE4 output file

stored as MSlacS23.out
Chemical: Lactofen
PRZM environment: MSsoybeanC.txt modified Satday, 12 October 2002 at 17:07:44
EXAMS environment: INDEXRES.EXV modified Thuday, 7 March 2002 at 15:01:54
Metfile: w13893.met modified Satday, 10 August 2002 at 22:23:22
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	0.5592	0.3845	0.2191	0.09091	0.06071	0.01667
1962	0.5502	0.3782	0.2142	0.08952	0.05978	0.01576
1963	0.5551	0.3817	0.2223	0.09336	0.06234	0.01732
1964	0.6117	0.4185	0.2495	0.1077	0.07195	0.02189
1965	0.5498	0.3779	0.2135	0.08846	0.05907	0.01511
1966	0.5498	0.3791	0.2158	0.09182	0.06132	0.01776
1967	0.5501	0.3781	0.2147	0.09011	0.06017	0.01696
1968	0.5508	0.3787	0.2146	0.0889	0.05936	0.01663
1969	0.5725	0.3943	0.2448	0.1004	0.06703	0.01809
1970	0.6297	0.4328	0.23	0.09993	0.06674	0.01778
1971	0.5498	0.3779	0.216	0.09047	0.06041	0.0168
1972	0.5498	0.3779	0.2135	0.08961	0.05984	0.01501
1973	0.9336	0.6423	0.2909	0.1295	0.08654	0.02649
1974	0.5546	0.4112	0.2344	0.1009	0.06739	0.01974
1975	0.5513	0.379	0.2159	0.09011	0.06017	0.01663
1976	0.5499	0.378	0.2142	0.08924	0.05959	0.01563
1977	0.5622	0.3864	0.2194	0.09241	0.06171	0.016
1978	0.5502	0.3782	0.2141	0.08949	0.05976	0.01624
1979	0.5684	0.3932	0.2408	0.1026	0.0685	0.02003
1980	0.5712	0.3933	0.2423	0.09949	0.06643	0.01972
1981	0.5509	0.3787	0.2169	0.0904	0.06036	0.01646
1982	0.5915	0.4066	0.2228	0.09273	0.06192	0.01644
1983	0.6056	0.4164	0.242	0.1002	0.0669	0.01996
1984	0.5499	0.378	0.2136	0.09102	0.06079	0.01615
1985	0.5498	0.3779	0.2351	0.1059	0.07071	0.01904
1986	0.6427	0.4399	0.2451	0.1002	0.06689	0.01852
1987	0.5671	0.3902	0.2262	0.09346	0.06241	0.0158
1988	0.551	0.3788	0.2141	0.08866	0.0592	0.015
1989	0.5499	0.3779	0.2135	0.08838	0.05902	0.01515
1990	0.5516	0.3896	0.2205	0.09344	0.06239	0.01975

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129	0.9336	0.6423	0.2909	0.1295	0.08654	0.02649
0.0645161290322581	0.6427	0.4399	0.2495	0.1077	0.07195	0.02189

0.0967741935483871 0.6297 0.4328 0.2451 0.1059 0.07071 0.02003
0.129032258064516 0.6117 0.4185 0.2448 0.1026 0.0685 0.01996
0.161290322580645 0.6056 0.4164 0.2423 0.1009 0.06739 0.01975
0.193548387096774 0.5915 0.4112 0.242 0.1004 0.06703 0.01974
0.225806451612903 0.5725 0.4066 0.2408 0.1002 0.0669 0.01972
0.258064516129032 0.5712 0.3943 0.2351 0.1002 0.06689 0.01904
0.290322580645161 0.5684 0.3933 0.2344 0.09993 0.06674 0.01852
0.32258064516129 0.5671 0.3932 0.23 0.09949 0.06643 0.01809
0.354838709677419 0.5622 0.3902 0.2262 0.09346 0.06241 0.01778
0.387096774193548 0.5592 0.3896 0.2228 0.09344 0.06239 0.01776
0.419354838709677 0.5551 0.3864 0.2223 0.09336 0.06234 0.01732
0.451612903225806 0.5546 0.3845 0.2205 0.09273 0.06192 0.01696
0.483870967741936 0.5516 0.3817 0.2194 0.09241 0.06171 0.0168
0.516129032258065 0.5513 0.3791 0.2191 0.09182 0.06132 0.01667
0.548387096774194 0.551 0.379 0.2169 0.09102 0.06079 0.01663
0.580645161290323 0.5509 0.3788 0.216 0.09091 0.06071 0.01663
0.612903225806452 0.5508 0.3787 0.2159 0.09047 0.06041 0.01646
0.645161290322581 0.5502 0.3787 0.2158 0.0904 0.06036 0.01644
0.67741935483871 0.5502 0.3782 0.2147 0.09011 0.06017 0.01624
0.709677419354839 0.5501 0.3782 0.2146 0.09011 0.06017 0.01615
0.741935483870968 0.5499 0.3781 0.2142 0.08961 0.05984 0.016
0.774193548387097 0.5499 0.378 0.2142 0.08952 0.05978 0.0158
0.806451612903226 0.5499 0.378 0.2141 0.08949 0.05976 0.01576
0.838709677419355 0.5498 0.3779 0.2141 0.08924 0.05959 0.01563
0.870967741935484 0.5498 0.3779 0.2136 0.0889 0.05936 0.01515
0.903225806451613 0.5498 0.3779 0.2135 0.08866 0.0592 0.01511
0.935483870967742 0.5498 0.3779 0.2135 0.08846 0.05907 0.01501
0.967741935483871 0.5498 0.3779 0.2135 0.08838 0.05902 0.015

0.1 0.6279 0.43137 0.24507 0.10557 0.070489 0.020023

Average of yearly averages: 0.0176176666666667

Inputs generaged by pe3.pl 1.2 - 15-October-2002