PC Code: 128888 (Lactofen)
DP BARCODE: D263996

MEMORANDUM

SUBJECT: Revised drinking water exposure assessment for lactofen.

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DATE: July 14, 2000

This memo summarizes the updated drinking water assessment for the herbicide lactofen. Tier 1 ground water and Tier 2 surface water estimates of drinking water concentration values for lactofen and its major degradate acifluorfen for FQPA assessments were determined. Data are not available for two other important degradates, desethyl lactofen and amino acifluorfen and therefore are not considered in the assessment. Both ground water and surface water monitoring for acifluorfen data were also incorporated into the assessment. With the exception of a small scale prospective ground water monitoring studies, monitoring has not been conducted for lactofen or the other degradates. Tier 1 uses the SCI-GROW model to estimate ground-water concentrations which may be expected to occur from the maximum label application rate of lactofen at a vulnerable site. The Tier 2 uses linked PRZM/EXAMS model simulations which represent the application of lactofen to cotton (Mississippi) and soybeans (Mississippi and Georgia). The reassessment of exposure from drinking water from surface water sources includes the Index Reservoir (IR) and the percent crop area (PCA) concepts. The previous assessment did not (DP Barcode: D239268, 6/1/98). The fate of sodium acifluorfen, acifluorfen, and amino acifluorfen are discussed in greater detail in the reregistration of sodium acifluorfen (PC Code 114402) for uses on soybeans, peanuts and rice (DP Barcode D252561).

There has been no additional fate information for lactofen submitted by the registrant since the previous assessment. Previous reviews and DERs were considered. The environmental fate data suggests that lactofen will degrade rapidly (to desethyl lactofen and acifluorfen) and has a high potential for binding. Lactofen has a low potential to leach to ground water as it will be bound to soil particles and organic matter. Therefore, lactofen will be transported on eroded sediment rather than in runoff water. Acifluorfen is highly persistent in an aerobic environment and is highly mobile, thus it remains in runoff water. Under anaerobic or reducing conditions acifluorfen is rapidly changed to amino acifluorfen which is less mobile than acifluorfen, but is also persistent. The registrant previously conducted a small-scale prospective ground water study for lactofen, which was determined by the Agency to be inconclusive, since the occurrence of leaching could not be demonstrated. Currently the registrant is conducting a second prospective study which may eliminate shortcomings of the earlier study.

The quantity of fate data for lactofen is very limited. Most of the fate values represent the results of a single study. The quality of the studies is also variable, but most provide useful information. The rate of decline of lactofen and the rates of formation and decline have not been established for lactofen or its degradates. More data are available for sodium acifluorfen. In addition to the registrant studies, a number of scientific journals have published articles on acifluorfen. Although all guideline data requirements for sodium acifluorfen have been fulfilled, the characterization of the environmental fate of acifluorfen and the other degradates may not be as straight forward as would be indicated by the basic fate properties (*e.g.*, half-life and K_{oc}). Thus, our ability to predict the fate or concentrations of acifluorfen in soil or water has considerable uncertainty. Additional studies are needed to better define the variability of the persistence and mobility of acifluorfen and amino acifluorfen and what site factors may be able to better predict behavior of the acifluorfen residues in the environment.

The estimated surface and ground water concentration values for lactofen and acifluorfen for cotton and soybeans grown in Mississippi are listed below in Table 1. Concentrations were determined using the maximum label rate (or amount applied) for each crop. As noted above the rates of formation and decline of lactofen degradates have not been well defined. However in the aerobic soil metabolism study, acifluorfen accounted for 52.3 percent of the applied radio-labeled lactofen on day 7. Thus, acifluorfen was simulated separately assuming acifluorfen was applied at 52.3 percent of the lactofen rate and the spray drift contribution assumed to be zero. The estimated drinking water concentrations EDCW concentrations tended to be lower in Georgia compared to Mississippi. Data are not sufficient to assess concentrations of desethyl lactofen and amino acifluorfen.

Table 1. Estimated drinking water concentrations (EDWC) for acute, chronic, and cancer exposure from lactofen and the lactofen degradate acifluorfen in µg/L for several different crops using linked PRZM/EXAMS and Index Reservoir (IR) and Percent Crop Area (PCA) for surface water and SCI-GROW estimates for ground water.

Crop (State)	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. 20 or 36 yrs daily value)(cancer EDWC)
Cotton	Surface	Lactofen	0.62/0.023	0.012
Cotton	Surface	Acifluorfen	5.76/1.15	0.40
Soybean (MS)	**Surface**	**Lactofen**	**1.13/0.041**	**0.023**
Soybean(MS)	**Surface**	**Acifluorfen**	**7.99/1.53**	**0.51**
Cotton	Ground	Lactofen	0.006	0.006
Cotton	Ground	Acifluorfen[1]	5.4	5.4

[1] SCI-GROW estimates of acifluorfen ground water concentrations considered the monitoring data observed in the prospective ground water study conducted for sodium acifluorfen in the Central Sands Region of Wisconsin.

The peak lactofen and the degradate acifluorfen concentrations simulated for the Index Reservoirs (IR) adjusted by the percent crop area (PCA) were 1.13 and 7.99 µg/L for lactofen and acifluorfen, respectively as applied to soybeans in Mississippi. 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, but the PCA for soybeans is greater than for cotton. Since only 20-years of data were available for Mississippi, the confidence is lower. The 1-in-10 year average lactofen and acifluorfen concentrations simulated with PRZM and EXAMS for the IRs with the PCAs were 0.041 and 1.53 µg/L for lactofen and the degradate acifluorfen from lactofen applied to cotton and soybeans in Mississippi, respectively. The long term average (multiple years) for lactofen and acifluorfen simulated with linked PRZM/EXAMS with the PCAs were 0.023 and 0.51 µg/L from lactofen applied (degrades to acifluorfen) to soybeans in Mississippi.

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, amino acifluorfen, and desethyl lactofen. Acifluorfen and amino acifluorfen are also primary degradates of the herbicide sodium acifluorfen. Both 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.

An interim drinking water exposure assessment was previously conducted for the herbicide lactofen (DP Barcode D239268, 6/1/98). This assessment was conducted for the Herbicide Branch of the Registration Division for lactofen use on cotton for the time-limited tolerance for cotton. Because lactofen and sodium acifluorfen are both used on soybeans, the drinking water exposure assessment included both the cotton and soybean use. OPP's then current interim approach for addressing drinking water exposure with respect to cotton use and only considered lactofen and acifluorfen (with sodium acifluorfen and acifluorfen being equivalent).

The interim approach consisted of a Tier 2 assessment for surface water using 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 Soybean Scenarios with a farm pond, as these scenarios represent conditions favorable for high runoff.

A drinking water reassessment was 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 (although previous guidance was used for several fate properties) for input selection. Fate parameters for lactofen did not change, as no additional data were available. Current guidance and additional data resulted in longer estimated half-lives for acifluorfen which would result in higher concentrations. Data from the USGS National Water Quality Assessment Program (NAWQA) not available for the earlier assessment, which includes acifluorfen in both surface and ground water, has also been considered. The registrant of lactofen has provided little environmental fate information on the major degradates acifluorfen and desethyl lactofen. The majority of the information concerning acifluorfen is from active ingredient sodium acifluorfen (144402) and published literature.

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. Estimated concentrations were greater for the cotton use compared to the soybean without the consideration of the PCA. While the estimated acifluorfen and lactofen concentrations were greater for soybean uses when

factoring that about twice as many acres were planted in soybeans (0.41) compared to cotton (0.20).

Several acifluorfen degradates were identified in water, but their persistence is not known. Aquatic degradation information for lactofen is lacking. This increases the uncertainty of our understanding of the fate of these compounds in surface water. Lactofen is not mobile or persistent. It is unlikely to leach to ground 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 bound lactofen will degrade to acifluorfen is not known.

Environmental Fate:

Aerobic soil metabolism and hydrolysis are the major degradation routes for lactofen. The major degradates of lactofen are acifluorfen, desethyl lactofen, and amino acifluorfen. Chemical names and identification codes are in Appendix 1, Table 1. In the aerobic soil metabolism study the half-life was estimated to be between 1 and 3 days. The maximum acifluorfen concentration was 52.3 % of applied radioactivity seven days after application and the 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 nonextractable 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). Other sources report acifluorfen is persistent in soil with half-lives ranging between 100 and 200 days. Under anaerobic conditions acifluorfen is less persistent (half-life of about 30 days) and is reduced to amino acifluorfen which can be persistent.

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

Lactofen undergoes hydrolysis with an increasing rate with increasing pH (Table 2). 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 2 (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. Both acifluorfen and desethyl lactofen were considered in the human health risk assessment calculation.

Lactofen has a high affinity for binding as the K_{oc} values are reported between 6600 and 15000 mL/gC. Acifluorfen is highly mobile with K_{oc} values of about 50 to 200 mL/gC. Amino acifluorfen's mobility depends upon soil properties with K_{ads} ranging from 1.25 to 47 mL/g.

Lactofen will tend to bound to sediment because of the high binding potential rather than be in the runoff water. Lactofen that remains in solution in surface water is not expected to be persistent because of rapid soil metabolism and hydrolysis. It is assumed that in an aquatic environment lactofen will be degraded to acifluorfen. Lactofen is not expected to leach to ground water because of its high binding potential and rapid degradation. Acifluorfen will tend to remain in solution rather than being bound to sediment. Acifluorfen and desethyl lactofen appear relatively stable to photolysis and hydrolysis at least for the duration of the studies. Acifluorfen rapidly reduces to amino acifluorfen under anaerobic conditions.

TABLE 1. 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	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)	1-3	multiply max. value by 3	9 (7.70E-02/d)	EFED One-liner Acc. #s 071228; 073854
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 6)	18 d (1.6E-03/hr)	EFED One-liner
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

TABLE 1. LACTOFEN ENVIRONMENTAL FATE PROPERTIES AND MODEL INPUT VALUES USED IN PRZM/EXAMS.				
LACTOFEN PROPERTY	**FATE DATA**	**MODEL INPUT CALCULATIONS**	**MODEL INPUT VALUE**	**SOURCE**
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.

Table 2. 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 acifluorfen used in this reassessment were the same that were used in the earlier assessment (which followed Agency Guidance (4/22/97) at the time) for aerobic soil metabolism (121 d) and aqueous photolysis (3.8 d) half-lives, and sorption coefficients (K_{ads} = 1 mL/g) Table 3. Additional information has been considered. Following current Agency guidance (7/15/99) and incorporating the additional, the following values would be used for aerobic soil metabolism (158 d), aqueous photolysis (11.2 d), and sorption (2.22 mL/g).

Fate data for lactofen show that it has a high binding potential and that it rapidly is transformed to acifluorfen. It is not clear whether bound lactofen can be degraded and released as acifluorfen. The ultimate fate of the acifluorfen degradation products in soil and water cannot be determined. Other degradates were desethyl lactofen and amino acifluorfen.

TABLE 3. SELECTED 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		0.0075/hr	EFED One-liner **(MRID 43155201)**
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 not specifically used))**	upper 90%=mean + t90 x std/√n; single tail student t, á=0.1 and n = number of samples	121 (5.7E-03/d)	EFED One-liner **(MRID 00143572)**
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
Soil Water Partition (Kd)mL/g (Kads mL/g)	1 **0.148, 0.346, 1.51, 1.87, 3.1 not used**		1 (assume OC=1%) K_{oc} = 100 **(50.22 to 198.7)**	EFED One-liner (MRID 42703501)

[1] **Bold** –Additional information not considered in reassessment. Typically additional data would result in greater estimated concentrations.

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.

Monitoring: Other than the 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 µg/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 monitoring. The highest concentration observed in the prospective study was of 46 µg/L. The maximum was 0.19μg/L (0.04% of 2604 samples) in the NAWQA study and in the PGWDB it was 0.025 µg/L. The long term average acifluorfen concentration at the prospective study site was 7.33 µg/L.

LITERATURE CITATIONS

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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 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
Soybeans-Cotton	0.49 (0.31 soybeans, 0.18 cotton)	08020204	Missouri
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.

.

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	464[1] m	Hydraulic length
DRFT	0.01 ground 0.05 aerial	0.064 ground 0.16 aerial	Spray drift

[1] This value changed between versions Guidance document and modeling of data during the development of the Guidance document.

As noted above in Appendix 2, Table 2, the value for the variable HL changed between Guidance document versions and modeling. The HL (hydraulic length) value changed from 464 m to 600 m. A comparison was made to evaluate the effect of HL on estimated acifluorfen and lactofen concentration. For lactofen, the estimated peak lactofen concentration changed from 3.089 to 3.04 µg/L when the HL value increased from 484 m to 600 m, respectively. For acifluorfen on soybeans, when the HL was increased from 484 m to 600 m, the peak acifluorfen concentrations decreased from 21.358 µg/L to 21.355 µg/L, respectively. Thus, for the acifluorfen and lactofen the value selected for HL made very little difference in the scenarios selected.

Environmental Fate Data

Even though all guideline data requirements have been fulfilled, the characterization of the environmental fate of acifluorfen and the other degradates may not be as straight forward as would be indicated by the basic fate properties (*e.g.*, half-life and K_{oc}). Thus, our ability to predict the fate or concentrations of acifluorfen in soil or water has considerable uncertainty. Additional studies are needed to better define the variability of the persistence and mobility of acifluorfen, amino acifluorfen, and desnitroacifluorfen and what site factors may be able to better predict behavior of the acifluorfen residues in the environment.
Fate

Lactofen is susceptible to hydrolysis, as the half-lives for pH 5, 7, and 9 were 10.7, 4.6, and <1.0 days (@40°C), respectively. Hydrolysis may proceed more slowly with lower temperatures that better reflect environmental temperatures. Lactofen's solubility (0.94 mg/L) is low and is not mobile (K_{oc} 6600 to 15000), but eroded soil with lactofen bound to soil particles may be transported to surface water.

Environmental fate properties suggest that once acifluorfen reaches ground water it is quite persistent. Monitoring data from a prospective ground-water study confirm its persistence in ground water. It also appears that acifluorfen will be persistent in surface water due to a long aerobic aquatic half-life and its stability to hydrolysis. Photolysis in water maybe one of the possible means of acifluorfen degradation in water as the aqueous photolysis half-lives range from 0.9 to 15 days. When light penetration is restricted the rate of photolysis would reduced. Photodegradation may be an important process in surface water, but in not ground water.

Because of rapid soil metabolism and hydrolysis, lactofen that enters surface water in solution is not expected to be persistent. It is assumed that, in an aquatic environment, lactofen will degrade to acifluorfen. Lactofen is not expected to leach to ground water because of its high binding potential and short half-life. The degradate amino acifluorfen appears to be persistent but less mobile than acifluorfen in some soils.

Chemical properties, environmental fate characteristics and available monitoring data indicate that acifluorfen has the potential to leach to ground water and to enter surface water via leaching and run-off. The water assessment includes monitoring data and modeling to estimate acifluorfen concentrations, from both the application of acifluorfen and lactofen, in both surface and ground water. Surface water bodies were simulated using PRZM and EXAMS to represent a small farm pond via standard farm pond for ecological exposure and the Index Reservoir (IR) with percent crop treated (PCA) for drinking water exposure assessment. The ground-screening model, SCI-GROW, was used for a Tier I ground water assessment. The models and scenarios are discussed briefly below. The selection of model input parameters generally followed EFED guidance for input selection. Scenarios had sodium acifluorfen being applied to soybeans in Georgia and Mississippi and lactofen applied to cotton and converted to acifluorfen (52% conversion).

The SCI-GROW estimates of ground-water concentrations of acifluorfen depend upon inputs of K_{oc}, the aerobic soil metabolism half-life selected, the assumptions used concerning the formation of acifluorfen and lactofen decline, and the application rate and number. The sorption of acifluorfen is influenced by clay content (type), organic carbon content, and pH. Therefore, this K_{oc} can be quite variable. Two values were considered, 10 and 100. The estimated acifluorfen concentrations ranged from 0.19 to 10.33 µg/L, depending upon half-life (84 and 121 days), K_{oc} value selected, the application rate and number, and for acifluorfen derived from lactofen, the conversion rate of lactofen to acifluorfen.

It is recommended that 5.4 µg/L be used for the drinking water assessment. This represents the highest SCI-GROW estimates for acifluorfen, correcting for the conversion of lactofen to acifluorfen, assuming the maximum possible acifluorfen application per season and a K_{oc} of 10 and a half-life of 121 days. This value is recommended because using the same fate properties (K_{oc}=10, $T_{½}$ = 84 and 121 days) and the application rate of acifluorfen (0.75 lb ai/ac) used in the Wisconsin prospective ground-water study, SCI-GROW's estimates of acifluorfen concentrations in ground water (8.00 and 15.5 µg/L with 84 and 121 day half-life, respectively) were similar to the measured concentrations (7.33 µg/L). The application rate in the Wisconsin study (0.75 lbs ai/A) is higher than the application rates used in this Drinking Water Assessment (0.4 lb ai/A lactofen and 0.5 lb ai/A acifluorfen on soybeans).

The Wisconsin prospective ground-water monitoring study was conducted in a highly vulnerable use area than does not typify the entire use area. However, the type of aquifer contaminated by acifluorfen in the prospective monitoring study is used for drinking water in Wisconsin. Thus, the potential exists for aquifers tapped by shallow drinking water wells to be contaminated by acifluorfen residues as high as 46 µg/L is possible.

Cotton - Lactofen

```
*** PRZM 3.1 Input data File, cotlact.inr***
*** INDEX RESERVOIR VERSION  March 6, 2000
*** Standard Scenario Draft Final April 10, 1998 ***
*** Location: Yazoo County, Mississippi; MLRA: O-134 ***
*** Weather: MET131.MET Jackson, MS ***
*** Manning's N: Assume fallow surface with residues not more than 1 ton/acre ***
*** See MSCOTTN1.wpd for scenario description and metadata ***
*** Modeler must input chemical specific information where all "X's" appear ***
Chemical: Lactofen
Location: Mississippi; Crop: cotton;  MLRA: O-134
    0.76    0.15       0   17.00       1       1
       4
    0.49    0.40    0.75   172.8    5.80       4    6.00   464.0
       3
       1    0.20  125.00   98.00       3  99  93  92                0.00  120.00
       2    0.20  125.00   98.00       3  94  84  83                0.00  120.00
       3    0.20  125.00   98.00       3  99  83  83                0.00  120.00
       1       3
0101 2109 2209
0.63 0.16 0.18
0.02 0.02 0.02
       2       3
0105 0709 2209
0.16 0.13 0.13
0.02 0.02 0.02
       3       3
0105 0709 2209
0.16 0.13 0.09
0.02 0.02 0.02
      20
  01 564  07 964  220964       1
  01 565  07 965  220965       2
  01 566  07 966  220966       3
  01 567  07 967  220967       1
  01 568  07 968  220968       2
  01 569  07 969  220969       3
  01 570  07 970  220970       1
  01 571  07 971  220971       2
  01 572  07 972  220972       3
  01 573  07 973  220973       1
  01 574  07 974  220974       2
  01 575  07 975  220975       3
  01 576  07 976  220976       1
  01 577  07 977  220977       2
  01 578  07 978  220978       3
  01 579  07 979  220979       1
  01 580  07 980  220980       2
  01 581  07 981  220981       3
  01 582  07 982  220982       1
  01 583  07 983  220983       2
Application schedule:  1 (ground spray) apps @ 00.45 kg/ha @ 95% eff w/ 0.064 drift
      20       1       0       0
lactofen Koc=10800; AESM t1/2 =  9 days
  14 564  0 2 0.00  0.45 0.950.064
  14 565  0 2 0.00  0.45 0.950.064
  14 566  0 2 0.00  0.45 0.950.064
```

```
  14 567  0 2 0.00  0.45 0.950.064
  14 568  0 2 0.00  0.45 0.950.064
  14 569  0 2 0.00  0.45 0.950.064
  14 570  0 2 0.00  0.45 0.950.064
  14 571  0 2 0.00  0.45 0.950.064
  14 572  0 2 0.00  0.45 0.950.064
  14 573  0 2 0.00  0.45 0.950.064
  14 574  0 2 0.00  0.45 0.950.064
  14 575  0 2 0.00  0.45 0.950.064
  14 576  0 2 0.00  0.45 0.950.064
  14 577  0 2 0.00  0.45 0.950.064
  14 578  0 2 0.00  0.45 0.950.064
  14 579  0 2 0.00  0.45 0.950.064
  14 580  0 2 0.00  0.45 0.950.064
  14 581  0 2 0.00  0.45 0.950.064
  14 582  0 2 0.00  0.45 0.950.064
  14 583  0 2 0.00  0.45 0.950.064
    0.00       1    0.00
    0.00    0.00    0.50
Soil Series: Loring silt loam; Hydrogic Group C
  155.00    0.00   0   0   0   0   0   0   0   0   0
    0.00    0.00   0.000
       6
       1   13.00   1.400   0.385   0.000   0.000   0.000
          0.0770  0.0770   0.000
           0.100   0.385   0.151   2.180   235.4
       2   23.00   1.400   0.370   0.000   0.000   0.000
          0.0770  0.0770   0.000
           1.000   0.370   0.146   0.490   52.92
       3   33.00   1.400   0.370   0.000   0.000   0.000
          0.0770  0.0770   0.000
           1.000   0.370   0.146   0.160   17.28
       4   30.00   1.450   0.340   0.000   0.000   0.000
          0.0770  0.0770   0.000
           1.000   0.340   0.125   0.124   13.39
       5   23.00   1.490   0.335   0.000   0.000   0.000
          0.0125  0.0125   0.000
           1.000   0.335   0.137   0.070   7.560
       6   33.00   1.510   0.343   0.000   0.000   0.000
          0.0125  0.0125   0.000
           1.000   0.343   0.147   0.060   6.480
       0
    WATR    YEAR      10    PEST    YEAR      10    CONC    YEAR      10   1
       1
       1  -----
       7    DAY
    PRCP    TSER   0   0
    RUNF    TSER   0   0
    INFL    TSER   1   1
    ESLS    TSER   0   0   1.E3
    RFLX    TSER   0   0   1.E5
    EFLX    TSER   0   0   1.E5
    RZFX    TSER   0   0   1.E5
```

Cotton Acifluorfen

```
*** PRZM 3.1 Input data File, cotacif.inr***
*** INDEX RESERVOIR March 6, 2000
```

```
*** Standard Scenario Draft Final April 10, 1998 ***
*** Location: Yazoo County, Mississippi; MLRA: O-134 ***
*** Weather: MET131.MET Jackson, MS ***
*** Manning's N: Assume fallow surface with residues not more than 1 ton/acre ***
*** See MSCOTTN1.wpd for scenario description and metadata ***
*** Modeler must input chemical specific information where all "X's" appear ***
Chemical: Aciflurfen - degradate of lactofen assumme 52.3% lactofen goes to aciflurfen
(3 days later)
Location: Mississippi; Crop: cotton;  MLRA: O-134
    0.76    0.15       0   17.00       1       1
       4
    0.49    0.40    0.75  172.80    5.80       4    6.00   464.0
       3
       1    0.20  125.00   98.00       3  99  93  92                0.00  120.00
       2    0.20  125.00   98.00       3  94  84  83                0.00  120.00
       3    0.20  125.00   98.00       3  99  83  83                0.00  120.00
       1       3
0101 2109 2209
0.63 0.16 0.18
0.02 0.02 0.02
       2       3
0105 0709 2209
0.16 0.13 0.13
0.02 0.02 0.02
       3       3
0105 0709 2209
0.16 0.13 0.09
0.02 0.02 0.02
      20
  01 564  07 964  220964       1
  01 565  07 965  220965       2
  01 566  07 966  220966       3
  01 567  07 967  220967       1
  01 568  07 968  220968       2
  01 569  07 969  220969       3
  01 570  07 970  220970       1
  01 571  07 971  220971       2
  01 572  07 972  220972       3
  01 573  07 973  220973       1
  01 574  07 974  220974       2
  01 575  07 975  220975       3
  01 576  07 976  220976       1
  01 577  07 977  220977       2
  01 578  07 978  220978       3
  01 579  07 979  220979       1
  01 580  07 980  220980       2
  01 581  07 981  220981       3
  01 582  07 982  220982       1
  01 583  07 983  220983       2
Application schedule:  1 (soil) apps .4*1.12*0.523= 0.234 kgai/ha 0% drift
      20       1       0       0
acifluorfen Kd =1; AESM t1/2 =  121 days anaesm t1/2= 84 days
  17 564  0 5 1.00 0.234 0.95 0.00
  17 565  0 5 1.00 0.234 0.95 0.00
  17 566  0 5 1.00 0.234 0.95 0.00
  17 567  0 5 1.00 0.234 0.95 0.00
  17 568  0 5 1.00 0.234 0.95 0.00
  17 569  0 5 1.00 0.234 0.95 0.00
  17 570  0 5 1.00 0.234 0.95 0.00
```

```
  17 571  0 5 1.00 0.234 0.95 0.00
  17 572  0 5 1.00 0.234 0.95 0.00
  17 573  0 5 1.00 0.234 0.95 0.00
  17 574  0 5 1.00 0.234 0.95 0.00
  17 575  0 5 1.00 0.234 0.95 0.00
  17 576  0 5 1.00 0.234 0.95 0.00
  17 577  0 5 1.00 0.234 0.95 0.00
  17 578  0 5 1.00 0.234 0.95 0.00
  17 579  0 5 1.00 0.234 0.95 0.00
  17 580  0 5 1.00 0.234 0.95 0.00
  17 581  0 5 1.00 0.234 0.95 0.00
  17 582  0 5 1.00 0.234 0.95 0.00
  17 583  0 5 1.00 0.234 0.95 0.00
    0.00       1    0.00
*** 0.00       0    0.00
Soil Series: Loring silt loam; Hydrogic Group C
  155.00    0.00   0   0   0   0   0   0   0   0   0
    0.00    0.00   0.000
       6
       1   13.00   1.400   0.385   0.000   0.000   0.000
          0.0057  0.0057   0.000
           0.100   0.385   0.151   2.180    1.00
       2   23.00   1.400   0.370   0.000   0.000   0.000
          0.0057  0.0057   0.000
           1.000   0.370   0.146   0.490    1.00
       3   33.00   1.400   0.370   0.000   0.000   0.000
          0.0057  0.0057   0.000
           1.000   0.370   0.146   0.160    1.00
       4   30.00   1.450   0.340   0.000   0.000   0.000
          0.0057  0.0057   0.000
           1.000   0.340   0.125   0.124    1.00
       5   23.00   1.490   0.335   0.000   0.000   0.000
          0.0083  0.0083   0.000
           1.000   0.335   0.137   0.070    1.00
       6   33.00   1.510   0.343   0.000   0.000   0.000
          0.0083  0.0083   0.000
           1.000   0.343   0.147   0.060    1.00
       0
    WATR    YEAR      10    PEST    YEAR      10    CONC    YEAR      10   1
       1
       1  -----
       7    DAY
    PRCP    TSER   0   0
    RUNF    TSER   0   0
    INFL    TSER   1   1
    ESLS    TSER   0   0   1.E3
    RFLX    TSER   0   0   1.E5
    EFLX    TSER   0   0   1.E5
    RZFX    TSER   0   0   1.E5
```

Soybeans Lactofen

```
*** PRZM 3.1 Input data File, Mssoylan.inr***
*** INDEX RESERVOIR March 6, 2000
*** Standard Scenario Draft Final April 10, 1998 ***
```

```
*** Location: Yazoo County, Mississippi; MLRA: O-134 ***
*** Weather: MET131.MET Jackson, MS ***
*** Manning's N: Assume fallow surface with residues not more than 1 ton/acre ***
*** See MSCOTTN1.wpd for scenario description and metadata ***
*** Modeler must input chemical specific information where all "X's" appear ***
Chemical: Lactofen
Location: Mississippi; Crop: soybean  MLRA: O-134
    0.76    0.15       0   17.00       1       1
       4
    0.49    0.40    0.75  172.80    5.80       4    6.00   464.0
       3
       1    0.20  125.00   98.00       3  99  93  92                0.00  120.00
       2    0.20  125.00   98.00       3  94  84  83                0.00  120.00
       3    0.20  125.00   98.00       3  99  83  83                0.00  120.00
       1       3
0101 2109 2209
0.63 0.16 0.18
0.02 0.02 0.02
       2       3
0105 0709 2209
0.16 0.13 0.13
0.02 0.02 0.02
       3       3
0105 0709 2209
0.16 0.13 0.09
0.02 0.02 0.02
      20
  01 564  07 964  220964       1
  01 565  07 965  220965       2
  01 566  07 966  220966       3
  01 567  07 967  220967       1
  01 568  07 968  220968       2
  01 569  07 969  220969       3
  01 570  07 970  220970       1
  01 571  07 971  220971       2
  01 572  07 972  220972       3
  01 573  07 973  220973       1
  01 574  07 974  220974       2
  01 575  07 975  220975       3
  01 576  07 976  220976       1
  01 577  07 977  220977       2
  01 578  07 978  220978       3
  01 579  07 979  220979       1
  01 580  07 980  220980       2
  01 581  07 981  220981       3
  01 582  07 982  220982       1
  01 583  07 983  220983       2
Application schedule:  1 (ground spray) apps @ 00.40kg/ha @ 95% eff w/ 0.064 drift
      20       1       0       0
lactofen Koc=10800; AESM t1/2 =  9 days
  14 564  0 2 0.00  0.40 0.950.064
  14 565  0 2 0.00  0.40 0.950.064
  14 566  0 2 0.00  0.40 0.950.064
  14 567  0 2 0.00  0.40 0.950.064
  14 568  0 2 0.00  0.40 0.950.064
  14 569  0 2 0.00  0.40 0.950.064
  14 570  0 2 0.00  0.40 0.950.064
  14 571  0 2 0.00  0.40 0.950.064
  14 572  0 2 0.00  0.40 0.950.064
```

```
  14 573  0 2 0.00  0.40 0.950.064
  14 574  0 2 0.00  0.40 0.950.064
  14 575  0 2 0.00  0.40 0.950.064
  14 576  0 2 0.00  0.40 0.950.064
  14 577  0 2 0.00  0.40 0.950.064
  14 578  0 2 0.00  0.40 0.950.064
  14 579  0 2 0.00  0.40 0.950.064
  14 580  0 2 0.00  0.40 0.950.064
  14 581  0 2 0.00  0.40 0.950.064
  14 582  0 2 0.00  0.40 0.950.064
  14 583  0 2 0.00  0.40 0.950.064
    0.00       1    0.00
    0.00    0.00    0.50
Soil Series: Loring silt loam; Hydrogic Group C
  155.00    0.00   0   0   0   0   0   0   0   0   0
    0.00    0.00   0.000
       6
       1   13.00   1.400   0.385   0.000   0.000   0.000
          0.0770  0.0770   0.000
           0.100   0.385   0.151   2.180   235.4
       2   23.00   1.400   0.370   0.000   0.000   0.000
          0.0770  0.0770   0.000
           1.000   0.370   0.146   0.490   52.92
       3   33.00   1.400   0.370   0.000   0.000   0.000
          0.0770  0.0770   0.000
           1.000   0.370   0.146   0.160   17.28
       4   30.00   1.450   0.340   0.000   0.000   0.000
          0.0770  0.0770   0.000
           1.000   0.340   0.125   0.124   13.39
       5   23.00   1.490   0.335   0.000   0.000   0.000
          0.0125  0.0125   0.000
           1.000   0.335   0.137   0.070   7.560
       6   33.00   1.510   0.343   0.000   0.000   0.000
          0.0125  0.0125   0.000
           1.000   0.343   0.147   0.060   6.480
       0
    WATR    YEAR      10    PEST    YEAR      10    CONC    YEAR      10   1
       1
       1  -----
       7    DAY
    PRCP    TSER   0   0
    RUNF    TSER   0   0
    INFL    TSER   1   1
    ESLS    TSER   0   0   1.E3
    RFLX    TSER   0   0   1.E5
    EFLX    TSER   0   0   1.E5
    RZFX    TSER   0   0   1.E5
```

Soybeans acifluorfen

```
*** Przm 3.12 input file mssoyacN.inr   index reservoir
***       ******** INDEX RESERVOIR *****************
*** spray drift = 0
*** old PRZM 3.1 Input data File, mssoyacf.inp***
*** Standard Scenario Draft Final MAR 01, 2000 ***
*** Location: Yazoo County, Mississippi; MLRA: O-134 ***
*** Weather: MET131.MET Jackson, MS ***
*** Manning's N: Assume fallow surface with residues not more than 1 ton/acre ***
*** See MSCOTTN1.wpd for scenario description and metadata ***
```

```
*** Modeler must input chemical specific information where all "X's" appear ***
Chemical: Aciflurfen - from 1 appl of lactofen on soybeans
***  0.4 lb ai/a * 1.12 * 0.523 = 0.234 kg ai/ha acifluorfen
Location: Mississippi; Crop: soybean; MLRA: O-134
    0.76    0.15       0   17.00       1       1
       4
    0.49    0.40    0.75  172.80    5.80       4    6.00   464.0
       3
       1    0.20  125.00   98.00       3  99  93  92                0.00  120.00
       2    0.20  125.00   98.00       3  94  84  83                0.00  120.00
       3    0.20  125.00   98.00       3  99  83  83                0.00  120.00
       1       3
0101 2109 2209
0.63 0.16 0.18
0.02 0.02 0.02
       2       3
0105 0709 2209
0.16 0.13 0.13
0.02 0.02 0.02
       3       3
0105 0709 2209
0.16 0.13 0.09
0.02 0.02 0.02
      20
  01 564  07 964  220964       1
  01 565  07 965  220965       2
  01 566  07 966  220966       3
  01 567  07 967  220967       1
  01 568  07 968  220968       2
  01 569  07 969  220969       3
  01 570  07 970  220970       1
  01 571  07 971  220971       2
  01 572  07 972  220972       3
  01 573  07 973  220973       1
  01 574  07 974  220974       2
  01 575  07 975  220975       3
  01 576  07 976  220976       1
  01 577  07 977  220977       2
  01 578  07 978  220978       3
  01 579  07 979  220979       1
  01 580  07 980  220980       2
  01 581  07 981  220981       3
  01 582  07 982  220982       1
  01 583  07 983  220983       2
Application schedule:  1 (soil) apps @  0.448 * 0.523 kg/ha @ 95% eff w/ 5% drift
      20       1       0       0
acifluorfen Kd =1; AESM t1/2 =  121 days anaesm t1/2= 84 days
  18 564  0 2 0.00 0.2340.950 0.00
  18 565  0 2 0.00 0.2340.950 0.00
  18 566  0 2 0.00 0.2340.950 0.00
  18 567  0 2 0.00 0.2340.950 0.00
  18 568  0 2 0.00 0.2340.950 0.00
  18 569  0 2 0.00 0.2340.950 0.00
  18 570  0 2 0.00 0.2340.950 0.00
  18 571  0 2 0.00 0.2340.950 0.00
  18 572  0 2 0.00 0.2340.950 0.00
  18 573  0 2 0.00 0.2340.950 0.00
  18 574  0 2 0.00 0.2340.950 0.00
  18 575  0 2 0.00 0.2340.950 0.00
  18 576  0 2 0.00 0.2340.950 0.00
  18 577  0 2 0.00 0.2340.950 0.00
  18 578  0 2 0.00 0.2340.950 0.00
  18 579  0 2 0.00 0.2340.950 0.00
  18 580  0 2 0.00 0.2340.950 0.00
  18 581  0 2 0.00 0.2340.950 0.00
  18 582  0 2 0.00 0.2340.950 0.00
  18 583  0 2 0.00 0.2340.950 0.00
    0.00       1    0.00
   0.000     0.0    0.50
```

```
Soil Series: Loring silt loam; Hydrogic Group C
  155.00    0.00   0   0   0   0   0   0   0   0   0
    0.00    0.00   0.000
       6
       1   13.00   1.400   0.385   0.000   0.000   0.000
          0.0057  0.0057   0.000
           0.100   0.385   0.151   2.180    1.00
       2   23.00   1.400   0.370   0.000   0.000   0.000
          0.0057  0.0057   0.000
           1.000   0.370   0.146   0.490    1.00
       3   33.00   1.400   0.370   0.000   0.000   0.000
          0.0057  0.0057   0.000
           1.000   0.370   0.146   0.160    1.00
       4   30.00   1.450   0.340   0.000   0.000   0.000
          0.0057  0.0057   0.000
           1.000   0.340   0.125   0.124   13.39
       5   23.00   1.490   0.335   0.000   0.000   0.000
          0.0083  0.0083   0.000
           1.000   0.335   0.137   0.070    1.00
       6   33.00   1.510   0.343   0.000   0.000   0.000
          0.0083  0.0083   0.000
           1.000   0.343   0.147   0.060    1.00
       0
    WATR    YEAR      10    PEST    YEAR      10    CONC    YEAR      10   1
       1
       1  -----
       7    DAY
    PRCP    TSER   0   0
    RUNF    TSER   0   0
    INFL    TSER   1   1
    ESLS    TSER   0   0   1.E3
    RFLX    TSER   0   0   1.E5
    EFLX    TSER   0   0   1.E5
    RZFX    TSER   0   0   1.E5
```

Mississippi Index Reservoir (File IRMSCOTN.EXV

```
Index reservoir for Yazoo Co, MS cotton
    2
LB
 39.12     90.05     54.90
1.4400E+05 2630.
5.2609E+045.2609E+04
 2.740    5.0000E-02
0.0000    0.0000
 640.0     640.0
 82.20     82.20
    2
    1    2
    0    1
 1.000     1.000
    1
    1
    2
1.0000E+04
 1.395
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
```

```
0.0000
 2.000
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 1.090     1.090
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
```

```
 2.000
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 6.260     6.260
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 13.21     13.21
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
```

```
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 18.61     18.61
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 23.73     23.73
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
```

```
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 26.09     26.09
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 25.04     25.04
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
 1.190    0.0000
```

```
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 20.91     20.91
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 14.50     14.50
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
 1.190    0.0000
0.0000    0.0000
```

```
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
 7.040     7.040
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
3.0000E-05
 1.000     1.000
 71.64    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000    0.0000
0.0000
0.0000
0.3000
0.0000
 2.000
R
 1.190    0.0000
0.0000    0.0000
 30.00    0.0000
 1.850     1.850
 137.0     137.0
4.0000E-024.0000E-02
0.0000    0.0000
0.0000    0.0000
0.9900    0.9900
 7.000     7.000
 7.000     7.000
0.0000
 1.000    0.0000
 37.00     37.00
0.4000    0.0000
0.0000    6.0000E-03
 8.000    0.0000
 5.000     5.000
5.0000E-030.0000
 5.000    0.0000
0.0000    0.0000
```

Lactofen - Mississippi cotton

lactcot.inr 1 app .4 lb

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1964	1.034	0.872	0.584	0.324	0.225	0.058
1965	1.034	0.872	0.470	0.192	0.128	0.031
1966	2.575	2.275	1.371	0.606	0.407	0.110
1967	2.103	1.780	1.182	0.559	0.377	0.101
1968	1.034	0.928	0.668	0.294	0.198	0.049

1969	1.034	0.872	0.471	0.193	0.129	0.031
1970	1.034	0.872	0.489	0.219	0.147	0.035
1971	1.034	0.872	0.470	0.197	0.133	0.031
1972	1.075	0.906	0.489	0.200	0.134	0.031
1973	1.034	0.872	0.639	0.282	0.189	0.047
1974	1.034	0.872	0.473	0.230	0.155	0.037
1975	1.343	1.150	0.654	0.285	0.193	0.049
1976	3.146	2.656	1.634	0.731	0.493	0.114
1977	1.034	0.872	0.470	0.206	0.140	0.032
1978	1.572	1.327	0.819	0.347	0.233	0.063
1979	1.034	0.872	0.490	0.300	0.210	0.051
1980	2.281	1.928	1.157	0.489	0.328	0.083
1981	1.887	1.680	1.058	0.482	0.326	0.089
1982	1.034	0.872	0.471	0.259	0.181	0.043
1983	3.320	2.986	1.993	0.868	0.584	0.152

SORTED FOR PLOTTING

PROB	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
0.048	3.320	2.986	1.993	0.868	0.584	0.152
0.095	3.146	2.656	1.634	0.731	0.493	0.114
0.143	2.575	2.275	1.371	0.606	0.407	0.110
0.190	2.281	1.928	1.182	0.559	0.377	0.101
0.238	2.103	1.780	1.157	0.489	0.328	0.089
0.286	1.887	1.680	1.058	0.482	0.326	0.083
0.333	1.572	1.327	0.819	0.347	0.233	0.063
0.381	1.343	1.150	0.668	0.324	0.225	0.058
0.429	1.075	0.928	0.654	0.300	0.210	0.051
0.476	1.034	0.906	0.639	0.294	0.198	0.049
0.524	1.034	0.872	0.584	0.285	0.193	0.049
0.571	1.034	0.872	0.490	0.282	0.189	0.047
0.619	1.034	0.872	0.489	0.259	0.181	0.043
0.667	1.034	0.872	0.489	0.230	0.155	0.037
0.714	1.034	0.872	0.473	0.219	0.147	0.035
0.762	1.034	0.872	0.471	0.206	0.140	0.032
0.810	1.034	0.872	0.471	0.200	0.134	0.031
0.857	1.034	0.872	0.470	0.197	0.133	0.031
0.905	1.034	0.872	0.470	0.193	0.129	0.031
0.952	1.034	0.872	0.470	0.192	0.128	0.031
1/10	3.089	2.618	1.608	0.719	0.485	0.114

MEAN OF ANNUAL VALUES = 0.062
STANDARD DEVIATION OF ANNUAL VALUES = 0.035
UPPER 90% CONFIDENCE LIMIT ON MEAN = 0.073

Acifluorfen from lactofen applied to cotton Mississippi

COTACIF.INR

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1964	6.815	6.620	5.908	4.805	4.062	1.438
1965	0.360	0.352	0.317	0.254	0.215	0.089
1966	11.960	11.690	10.640	8.236	6.860	2.284
1967	35.710	34.840	32.090	25.510	21.390	7.453
1968	5.571	5.415	4.807	3.981	3.356	1.366
1969	0.459	0.446	0.395	0.345	0.302	0.148
1970	7.503	7.285	6.505	5.241	4.416	1.486
1971	0.632	0.613	0.548	0.434	0.363	0.194
1972	0.981	0.952	0.843	0.651	0.545	0.182

1973	13.760	13.370	12.380	9.696	8.115	2.726
1974	1.354	1.314	1.164	0.896	0.746	0.360
1975	0.519	0.509	0.460	0.358	0.308	0.124
1976	29.960	29.090	26.760	21.140	17.680	6.003
1977	2.870	2.787	2.467	2.102	1.815	0.871
1978	10.860	10.550	9.533	7.476	6.244	2.082
1979	14.350	13.930	12.360	9.972	8.429	3.078
1980	2.194	2.133	1.894	1.503	1.267	0.560
1981	18.100	17.590	16.020	12.480	10.400	3.447
1982	17.250	16.740	15.230	11.870	9.923	3.618
1983	13.320	12.990	11.640	8.989	7.498	2.665

SORTED FOR PLOTTING

PROB	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
0.048	35.710	34.840	32.090	25.510	21.390	7.453
0.095	29.960	29.090	26.760	21.140	17.680	6.003
0.143	18.100	17.590	16.020	12.480	10.400	3.618
0.190	17.250	16.740	15.230	11.870	9.923	3.447
0.238	14.350	13.930	12.380	9.972	8.429	3.078
0.286	13.760	13.370	12.360	9.696	8.115	2.726
0.333	13.320	12.990	11.640	8.989	7.498	2.665
0.381	11.960	11.690	10.640	8.236	6.860	2.284
0.429	10.860	10.550	9.533	7.476	6.244	2.082
0.476	7.503	7.285	6.505	5.241	4.416	1.486
0.524	6.815	6.620	5.908	4.805	4.062	1.438
0.571	5.571	5.415	4.807	3.981	3.356	1.366
0.619	2.870	2.787	2.467	2.102	1.815	0.871
0.667	2.194	2.133	1.894	1.503	1.267	0.560
0.714	1.354	1.314	1.164	0.896	0.746	0.360
0.762	0.981	0.952	0.843	0.651	0.545	0.194
0.810	0.632	0.613	0.548	0.434	0.363	0.182
0.857	0.519	0.509	0.460	0.358	0.308	0.148
0.905	0.459	0.446	0.395	0.345	0.302	0.124
0.952	0.360	0.352	0.317	0.254	0.215	0.089
1/10	28.774	27.940	25.686	20.274	16.952	5.764

MEAN OF ANNUAL VALUES = 2.009

STANDARD DEVIATION OF ANNUAL VALUES = 2.011

UPPER 90% CONFIDENCE LIMIT ON MEAN = 2.682

Lactofen Mississippi soybean
mssoylan.inr (july 6,2000)

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1964	0.919	0.775	0.519	0.288	0.200	0.051
1965	0.919	0.775	0.418	0.171	0.114	0.028
1966	2.289	2.022	1.219	0.539	0.362	0.098
1967	1.869	1.582	1.050	0.496	0.335	0.089
1968	0.919	0.825	0.594	0.262	0.176	0.043
1969	0.919	0.775	0.419	0.171	0.115	0.028
1970	0.919	0.775	0.435	0.195	0.131	0.031
1971	0.919	0.775	0.418	0.175	0.118	0.028
1972	0.956	0.806	0.435	0.178	0.119	0.027
1973	0.919	0.775	0.568	0.250	0.168	0.042
1974	0.919	0.775	0.421	0.205	0.138	0.033
1975	1.194	1.022	0.581	0.254	0.172	0.043
1976	2.797	2.361	1.452	0.650	0.438	0.102
1977	0.919	0.775	0.418	0.184	0.124	0.028

1978	1.397	1.180	0.728	0.308	0.207	0.056
1979	0.919	0.775	0.436	0.266	0.186	0.045
1980	2.027	1.713	1.029	0.434	0.292	0.074
1981	1.676	1.493	0.940	0.429	0.290	0.079
1982	0.919	0.775	0.419	0.230	0.161	0.038
1983	2.950	2.654	1.772	0.772	0.519	0.135

SORTED FOR PLOTTING

PROB	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
0.048	2.950	2.654	1.772	0.772	0.519	0.135
0.095	2.797	2.361	1.452	0.650	0.438	0.102
0.143	2.289	2.022	1.219	0.539	0.362	0.098
0.190	2.027	1.713	1.050	0.496	0.335	0.089
0.238	1.869	1.582	1.029	0.434	0.292	0.079
0.286	1.676	1.493	0.940	0.429	0.290	0.074
0.333	1.397	1.180	0.728	0.308	0.207	0.056
0.381	1.194	1.022	0.594	0.288	0.200	0.051
0.429	0.956	0.825	0.581	0.266	0.186	0.045
0.476	0.919	0.806	0.568	0.262	0.176	0.043
0.524	0.919	0.775	0.519	0.254	0.172	0.043
0.571	0.919	0.775	0.436	0.250	0.168	0.042
0.619	0.919	0.775	0.435	0.230	0.161	0.038
0.667	0.919	0.775	0.435	0.205	0.138	0.033
0.714	0.919	0.775	0.421	0.195	0.131	0.031
0.762	0.919	0.775	0.419	0.184	0.124	0.028
0.810	0.919	0.775	0.419	0.178	0.119	0.028
0.857	0.919	0.775	0.418	0.175	0.118	0.028
0.905	0.919	0.775	0.418	0.171	0.115	0.028
0.952	0.919	0.775	0.418	0.171	0.114	0.027
1/10	2.746	2.327	1.429	0.639	0.431	0.101

MEAN OF ANNUAL VALUES = 0.055

STANDARD DEVIATION OF ANNUAL VALUES = 0.031

UPPER 90% CONFIDENCE LIMIT ON MEAN = 0.065

Acifluorfen from lactofen applied to soybeans in Mississippi
mssoyacn.inr IR 1 .4 lbai/a lactofen convert to 0.234 kgai/h

WATER COLUMN DISSOLVED CONCENTRATION (PPB)

YEAR	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
1964	4.674	4.533	4.018	3.266	2.746	0.959
1965	0.223	0.218	0.196	0.156	0.133	0.057
1966	8.408	8.212	7.438	5.683	4.690	1.507
1967	24.240	23.610	21.610	16.940	14.080	4.765
1968	3.232	3.138	2.765	2.102	1.735	0.704
1969	0.366	0.355	0.312	0.279	0.246	0.107
1970	4.975	4.822	4.278	3.412	2.856	0.942
1971	0.458	0.444	0.395	0.311	0.259	0.127
1972	0.635	0.615	0.540	0.413	0.343	0.111
1973	9.186	8.918	8.230	6.356	5.273	1.714
1974	1.106	1.072	0.942	0.714	0.589	0.255
1975	0.380	0.373	0.341	0.263	0.223	0.087
1976	20.290	19.670	18.050	14.050	11.650	3.869
1977	1.965	1.905	1.674	1.422	1.222	0.556
1978	0.880	0.854	0.751	0.583	0.493	0.181
1979	10.180	9.864	8.691	6.961	5.843	2.024
1980	1.988	1.930	1.705	1.354	1.138	0.457
1981	12.300	11.940	10.830	8.332	6.885	2.224

1982	12.070	11.700	10.580	8.134	6.746	2.387
1983	9.476	9.227	8.227	6.270	5.183	1.795

SORTED FOR PLOTTING

PROB	PEAK	96 HOUR	21 DAY	60 DAY	90 DAY	YEARLY
0.048	24.240	23.610	21.610	16.940	14.080	4.765
0.095	20.290	19.670	18.050	14.050	11.650	3.869
0.143	12.300	11.940	10.830	8.332	6.885	2.387
0.190	12.070	11.700	10.580	8.134	6.746	2.224
0.238	10.180	9.864	8.691	6.961	5.843	2.024
0.286	9.476	9.227	8.230	6.356	5.273	1.795
0.333	9.186	8.918	8.227	6.270	5.183	1.714
0.381	8.408	8.212	7.438	5.683	4.690	1.507
0.429	4.975	4.822	4.278	3.412	2.856	0.959
0.476	4.674	4.533	4.018	3.266	2.746	0.942
0.524	3.232	3.138	2.765	2.102	1.735	0.704
0.571	1.988	1.930	1.705	1.422	1.222	0.556
0.619	1.965	1.905	1.674	1.354	1.138	0.457
0.667	1.106	1.072	0.942	0.714	0.589	0.255
0.714	0.880	0.854	0.751	0.583	0.493	0.181
0.762	0.635	0.615	0.540	0.413	0.343	0.127
0.810	0.458	0.444	0.395	0.311	0.259	0.111
0.857	0.380	0.373	0.341	0.279	0.246	0.107
0.905	0.366	0.355	0.312	0.263	0.223	0.087
0.952	0.223	0.218	0.196	0.156	0.133	0.057
1/10	19.491	18.897	17.328	13.478	11.174	3.721

MEAN OF ANNUAL VALUES = 1.241

STANDARD DEVIATION OF ANNUAL VALUES = 1.318

UPPER 90% CONFIDENCE LIMIT ON MEAN = 1.683