FILES

Shaugh. No. 079401

EAB Log Out Date: 16JAN86

Init.:

To: Michael Slimak, Chief
Ecological Effects Branch
Hazard Evaluation Division (TS-769C)

From: Carolyn K. Offutt, Chief
Environmental Processes and Guidelines Section
Exposure Assessment Branch, HED (TS-769)

Attached, please find the estimated environmental concentration review of:

Reg./File No.:

Chemical: Endosulfan

Type Product: Insecticide/Seed Protectant

Product Name: Thiodan (and others)

Company Name: (Various)

Submission Purposes: Determine an estimated environmental concentration for use in cotton as an insecticide

Date In: 19 September 1985

Action Code:

Date Completed:

EFB#:

TAIS (Level II) Days

Deferrals To:

__X__ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

1

Endosulfan

I. Chemical

Common Name: Endosulfan
Chemical Name: hexachlorohexahydromethano-2,4,3-benzo-dioxathiepin 3-oxide
Trade Name: Thiodan W.P.

II. Test Materials

Active Ingredient

III. Study/Action Type

Determination of estimated environmental concentration calculation as a result of spray drift and runoff to nearby ponds and streams from application to cotton.

IV. Study Identification

Not applicable

V. Reviewed By

Robert W. Holst, Ph.D.
Plant Physiologist
Exposure Assessment Branch/HED/OPP

VI. Approval By

Carolyn K. Offutt, Chief
Environmental Process and Guidelines Section
Exposure Assessment Branch/HED/OPP

VII. Conclusions

In a modelled endosulfan assessment for spray drift, runoff, and water quality, the following quantities and concentrations may be attained in the various components. At 150 feet downwind, the quantities of endosulfan from an aerial application can reach 150 gm/ha for a 1-hectare pond 100 meters in width. The runoff from a field can reach over 463 gm/ha per event and over 1200 gm/ha for a short series of events. From this latter series, the concentrations of endosulfan can attain approximately 150 ppb in a pond's water column and 100 ppb in the stream. The sorbed quantites in the benthos can reach approximately 20 mg/kg.

VIII. Recommendations

None

IX. Background

On 17 September 1985, the Ecological Effects Branch requested that an estimated environmental concentration be calculated for endosulfan applications in aquatic systems in the proximity of cotton fields.

The use pattern of concern is the application of endosulfan to cotton to control various chewing insects. The maximum label rate is 1.5 lb.ai. per acre, numerous times per year. The pesticide may be applied at five to ten-day intervals as needed. EEB requested five applications per season. The season is sufficiently long enough (approximately 100 days from the first insect appearance to boll opening) to allow for 9 or 10 applications at 5 to 10-day intervals. There are no label restrictions as to the number of applications or quantity of material to be applied per season for most insect control situations. Therefore, nine applications were modelled which will address a worst-case situation.

X. Discussion

The estimated environmental concentrations of endosulfan in ponds and streams was calculated using the Simulator for Water Resources in Rural Basins model (SWRRB) and the Exposure Analysis Monitoring System model (EXAMS). Also spray drift concentrations downwind were determined using an elementary model based on algorithms taken from field evaluations of spray drift.

Spray Drift

The spray drift model used in this analysis is based on algorithms from various researchers in the field of pesticide application technology and developed by this reviewer.

When the pesticide is applied at 1.5 lb/acre at a height of 10 feet in a 10-mph crosswind, the quantities at 150 feet downwind can range from 50 to almost 300 g/ha depending upon the type of nozzle and the number of passes that were made across the field. At 600 feet downwind from the nearest pass, the quantities can range from 15 to 60 gm/ha. In the cases modelled here, there were ten passes across the field (swaths) and each pass was 50 feet upwind, and the area on which the pesticide fell was 100 meters wide beginning at 50 meters downwind which accounts for the deposition on a 1-hectare pond.

Only the 150-foot downwind quantities were used in this assessment and an average of 150 gm/ha was used as the quantity available to enter the pond during application.

Runoff

The SWRRB runoff determinations were performed employing the

data inputs as found in Tables 1 and 6. The Yazoo River Basin in northcentral Mississippi and an area near Tifton GA were used for the assessment where cotton is grown for a five-year period, 1971 to 1975 and 1970 to 1974, respectively. The dissipation rate of endosulfan was a strong factor in this assessment and, therefore, both long-term and short-term dissipation rates were modeled.

The pesticide runoff was highly variable and dependent upon the rainstorms (Tables 2, 4, 7, and 9). 1974 in the Yazoo River basin was found to be the worst year for the five years modelled in either basin (Tables 3, 5, 8, and 10). Total pesticide runoff per event ranged up to 463 gm/ha (4 July 72 in Yazoo River basin with long-term dissipation).

The period of 28 May 1974 (day 148) to 17 July (day 198), which corresponds to the time of the first six applications (day 148 to 191), was used in the calculation of pesticide load by runoff to the nearby ponds and streams for the Yazoo River Basin. Although the runoff quantity from a single event reached 463 gm/ha in 1972, the total quantity of material in all of the runoff periods over a short period of time (day 151 to day 169) attained over 1200 gm/ha of total runoff in 1974. The 1972 series of runoff events (day 166 - 186) totalled 900 gm/ha.

Water Quality

Using the water quality model, EXAMS (pulse mode 2), the Yazoo cotton watershed, with the long-term dissipation scenario, was modelled for 1974 for runoff entry into a nearby pond which fed a stream system. The pond and stream are part of a pond-stream-stream scenario (Figure 1) that was developed to assess the water quality of pesticides in a more complex aquatic system as a result of runoff from an agronomic situation. The environmental and physical parameters of the scenario are given in the Appendix. The water and sediment inflows to the pond and the streams are based on the water and sediment runoffs from the Watkinsville (GA) P1 and P2 watersheds as used in SWRRB. Though the environmental parameters (EXAMS global parameters) for this aquatic scenario are based on water runoff from Georgia agricultural fields, the environmental parameters are similar enough to those of Mississippi to allow use of this scenario in this EEC calculation. The constant non-point source flow of the pond and stream is equal to a constant seep which is taken to be 1/4 of the average hourly runoff from the fields into the pond and stream segments. Daily surges from the water runoff (added stream flow - NPSFL) and sediment (suspended sediment inflow - SUSED) are also entered as non-point source flushes into the pond and stream segments. These values are returned to base flow the day following the events.

The chemical parameters for EXAMS are given in Table 11. The input loadings for the pond scenario are given in Table 12.

The pesticide runoff values from the SWRRB model were multipled by 10 to account for a requirement for 10 acres (or hectares) of watershed to maintain a one-acre (or hectare) pond as determined from USDA manuals on pond development and maintenance.

Note: The increased distances of the aquatic system from the field will have an effect on the amount of material that reaches the streams and ponds by runoff, however, this was not assessed as part of this EEC analysis. Also, pesticide drift and runoff were modeled only where they would enter the pond not the streams. The drift to the streams is approximately 3 percent that of the pond (3 meters width versus 100 meters width). The initializing data and environmental and pesticide pulse parameters for the run are given in Table 13.

In the pond-stream-stream scenario at 150 feet downwind, the maximum dissolved concentrations were 152 ppb in the pond (day 166) and 108 ppb in the second stream segment (day 168) as a result of runoff events (Table 12, Figures 2, 3, and 4). The lesser concentrations in the waters of the stream are due to greater water quantities being available to dilute the pesticide. The sorbed concentrations of endosulfan will reach over 5 ppm in the pond (day 198) and almost 20 ppm in the second stream segment.

At greater distances downwind (600 feet), the largest input to the pond will still be through runoff. This overshadows the drift of pesticide spray to the pond. At 2400 feet downwind, the spray drift influence would be negligible.

For each of the inputs, regardless of quantity, the dissipation of dissolved endosulfan was moderate, on the order of ten days for the dissipation half-life in the pond. This is primarily due to movement of the waters through the pond and stream segments. If the system is repeatedly insulted on a daily basis, the concentrations of endosulfan will remain high as noted in this analysis.

Note: This EXAMS assessment and analysis has used a worst-case set of assumptions. Most series of runoff events within a period of time of application and crop growth will not attain the pesticide quantities in runoff modelled here and thereby yield much lower concentrations of endosulfan in the nearby waters.

The formation and degradation of any degradates in the water cannot be determined due to insufficient data.

Actual Runoff and Water Quality Study

In a series of actual field studies in Southern California's Imperial Valley, runoff (tailwaters) from furrow irrigated fields were measured for pesticide concentrations. The fields were irrigated at various times after application in order to maintain

desired water capacity for the various crops grown. No water was in the furrows during application. Endosulfan was one of the pesticides measured. The following concentrations were found in the waters:

Lettuce (1981) 10 to 24 days following three different applications:
2.2 to 30.0 ppb

Cotton (followed by cantalopes)(1981) 4 months after appl.:
0.2 to 0.7 ppb

Cantalopes (1981) 2 to 4 days following application:
33.0 to 104.0 ppb

The soils were silty clay loams and silty clays with percent organic carbon contents of 0.56 to 0.71 and pHs of 7.8 to 8.0.

XI. One-Liner

The attached EAB one-liner for endosulfan remains correct.

XII. CBI Information

Not applicable.

EXPOSURE ASSESSMENT BRANCH ONE LINER

EAB File No: 079401 Type Pesticide: Insecticide Acaricide Date:
(Shaughnessy)

TYPICAL USES: Orchard, Field/Veg., Greenhouse, Forestry, Aquatic Food, Dom. outdoor

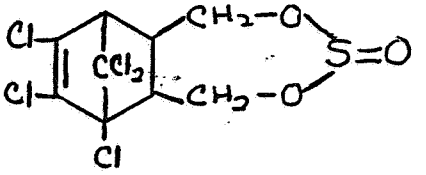
COMMON NAME: Endosulfan

CHEMICAL NAME: hexachlorohexahydromethano-2,4,3-benzo dioxathiepin 3-oxide

FORMULATION TYPES: D, WP, G, EC, pressurized liquids and impregnated materials

NAME(s) OF DEGRADATION PRODUCTS

Parent Structure



CHEMICAL AND PHYSICAL PROPERTIES

Molecular wt.	Aqueous Solubility	Vapor Pressure	Partition Coef. K_{ow}	Henry's (atm/mol/m^3)
	0.6 ppm (°) 25	(°)		

Soil Adsorption Coefficient

Soil Type	pH	% Soil O.M. or O.C. 0.8-2.58% OC	K_d	K_{om}	K_{oc} 3600	Soil Column Leaching Study	Soil TLC R_f	Mobility Class
Sand			29-72		2800			(1) Immobile
Sandy Loam			33		3300			(2) Low (3) Low to Mod.
								(4) Moderate
								(5) Mobile

Hydrolysis

pH	temp.	T 1/2
5	22	> 1 year
7	22	7-22 days
9	22	<1 day

Photolysis

	t 1/2	pH
Air:		
Soil:	>200 days	?
Water:		

Laboratory Degradation (half-life)

Soil Aerobic	t 1/2
Sand	>15 w
Silt Loam	<15 w
Sandy Loam	<15 w
Loamy Sand	<15 w
Clay Loam	<15 w
Aquatic Aerobic	t 1/2

Soil Anaerobic	t 1/2
Sand	>15 w
Silt Loam	>15 w
Sandy Loam	>15 w
Loamy Sand	>15 w
Clay Loam	>15 w
Aquatic Anaerobic	t 1/2

CHEMICAL: Field Degradation (Half-Life)

Terrestrial [Crop Site]	Other [Crop Site]
Sandy Loam (2EC) 6 lbs a.i./A t 1/2 60-800 days	
NY & MISS - (2EC) 20 lb a.i./A t 1/2 <120 days	

Aquatic [Crop Site]	Forestry [Crop Site]

Found In Ground Water? Y _____ N X

Site(s) and Levels:

Reentry Interval Established? California - 2 days (all crops)

Rotational Crop Restrictions: _____

Fish Bioaccumulation Factors

Species	Tissue		Whole Fish	Depuration (Half-life)
	Edible	Viscera		
Static Study: 7 pesticides	x	x	600 x	34 hours
Mussel (Mytilis edulis)	x	x	x	

FISH KILLS

HUMAN EXPOSURE ASSESSMENT:

DEGRADATION SUMMARY: Parents and Degradates

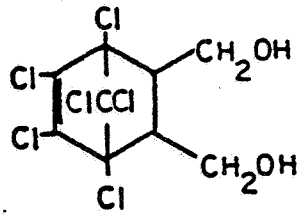
Fish Kills; Soil Persistence
Endosulfan severely inhibits soil microbes for 9-20 days after exposure. Atmospheric transport via volatilization and adsorption to airborne particulates.

Degradation Product Names or Structures:

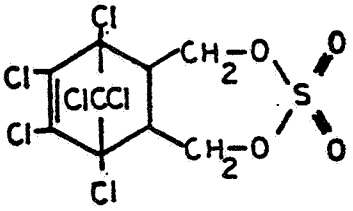
See attached sheet

REFERENCES: Reg. Std. and Registrant Response to the RS

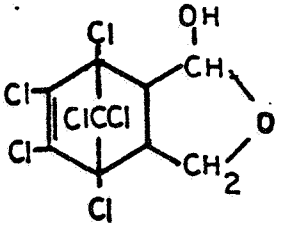
One-Liner Writer: Pat Ott



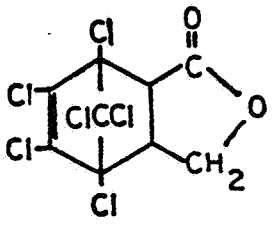
Endosulfan diol



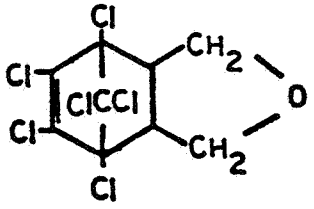
Endosulfan sulfate



Endosulfan α-hydroxyether



Endosulfan lactone



Endosulfan ether

Figure 1. Endosulfan metabolites

Table 1. SWRRB pesticide parameters for application of endosulfan to cotton in the Yazoo River Basin MS for long or short dissipation.

PESTICIDE TITLE = ENDOSULFAN YAZOO 1971-1975

ADSORPTION COEFFICIENT (KD)	30.0	
	(Long)	(Short)
FOLIAR HALF LIFE (DAYS)	20.0	10.0
SOIL DECAY CONSTANT (/DAYS)	0.00600	0.030
APPLICATION EFFICIENCY	0.70	
INITIAL PESTICIDE ON FOLIAGE (KG/HA)	0.0	
INITIAL PESTICIDE ON GROUND (KG/HA)	0.0	
ENRICHMENT RATIOS FOR PESTICIDE	1.50	

PESTICIDE APPLICATIONS

YEAR	MM	DD	JULI	KG/HA
1971				
	5	31	151	1.680
	6	5	156	1.680
	6	10	161	1.680
	6	21	172	1.680
	7	1	182	1.680
	7	10	191	1.680
	7	21	202	1.680
	7	31	212	1.680
	8	7	219	1.680
1972				
	6	1	152	1.680
	6	5	156	1.680
	6	10	161	1.680
	6	20	171	1.680
	7	2	183	1.680
	7	10	191	1.680
	7	20	201	1.680
	7	30	211	1.680
	8	9	221	1.680
1973				
	5	31	151	1.680
	6	6	157	1.680
	6	11	162	1.680
	6	20	171	1.680
	7	1	182	1.680
	7	8	189	1.680
	7	17	198	1.680
	7	31	212	1.680
	8	9	221	1.680
1974				
	5	28	148	1.680
	6	2	153	1.680
	6	11	162	1.680
	6	17	168	1.680
	6	26	177	1.680
	7	10	191	1.680
	7	20	201	1.680
	7	31	212	1.680
	8	9	221	1.680
1975				
	5	31	151	1.680
	6	7	158	1.680
	6	12	163	1.680
	6	20	171	1.680
	6	30	181	1.680
	7	11	192	1.680
	7	20	201	1.680
	7	30	211	1.680
	8	10	222	1.680

Table 2. SWRRB Daily Pesticide Values in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with long term dissipation.

YR	MM	DD	DAY	RAIN (CM)	RUNOFF (CM)	SEDIMT (KG/HA)	PESTLCH (GM/HA)	PESTRNF (GM/HA)	DISPEST (GM/HA)	SORBPES (GM/HA)
1971										
71	6	6	157	6.579	3.074	759.502	57.887	147.593	137.408	10.185
71	6	8	159	2.642	2.542	277.506	8.332	106.914	103.524	3.390
71	6	20	171	2.235	0.321	102.444	74.110	20.579	18.783	1.796
71	7	16	197	3.785	0.740	124.366	134.802	67.904	64.645	3.260
71	7	20	201	1.270	0.009	0.853	83.260	0.764	0.743	0.021
71	7	24	205	1.600	0.020	2.603	110.906	1.717	1.651	0.066
71	7	25	206	2.032	0.210	131.174	92.480	22.708	19.125	3.583
71	7	26	207	1.930	0.650	107.036	50.712	59.606	56.801	2.804
71	7	28	209	1.473	0.307	101.384	46.037	29.457	26.803	2.653
71	7	29	210	1.168	0.507	240.077	50.837	50.728	44.420	6.309
71	8	2	214	1.575	0.065	2.016	72.037	5.401	5.351	0.050
71	8	3	215	1.321	0.141	8.895	65.569	12.109	11.884	0.225
71	8	5	217	4.496	2.032	74.635	46.632	178.464	176.519	1.945
71	9	19	262	4.216	0.988	202.266	85.316	67.487	63.582	3.906
71	9	20	263	1.219	0.960	349.129	46.588	67.881	61.202	6.679
71	11	18	322	2.184	0.122	2.677	52.868	5.407	5.371	0.036
71	11	28	332	1.473	0.015	0.942	44.073	0.626	0.614	0.012
71	12	5	339	2.819	0.434	53.088	37.705	18.159	17.516	0.643
71	12	6	340	3.632	3.093	532.388	16.435	127.154	120.911	6.243
71	12	12	346	1.626	0.272	40.375	4.366	10.374	9.931	0.442
71	12	14	348	2.972	2.236	390.452	3.990	83.435	79.282	4.153
71	12	15	349	0.356	0.166	15.744	3.767	5.800	5.640	0.160
71	12	16	350	3.785	3.496	869.234	3.722	125.340	116.640	8.700
71	12	17	351	2.108	1.831	396.104	3.409	60.510	56.823	3.687
71	12	30	364	1.194	0.019	0.884	22.829	0.531	0.524	0.008
1972										
72	1	1	1	5.283	2.832	261.240	5.474	79.277	77.143	2.135
72	1	2	2	0.127	0.018	0.546	2.901	0.463	0.459	0.004
72	1	3	3	8.687	8.389	1424.566	2.779	216.256	205.774	10.483
72	1	4	4	3.912	3.623	1077.310	2.288	85.257	78.274	6.984
72	1	9	9	0.457	0.218	58.293	2.035	4.757	4.404	0.353
72	1	10	10	3.810	3.575	940.856	2.009	74.831	69.356	5.475
72	1	28	28	1.321	0.071	4.726	14.201	1.241	1.217	0.024
72	1	29	29	2.921	1.593	169.217	1.802	27.576	26.724	0.852
72	1	30	30	0.203	0.057	4.715	1.659	0.959	0.935	0.023
72	2	7	38	2.235	0.635	215.627	6.608	11.440	10.383	1.057
72	2	12	43	0.813	0.044	2.607	3.828	0.684	0.672	0.012
72	2	17	48	1.651	0.282	46.811	8.078	4.499	4.286	0.214
72	2	29	60	1.448	0.102	38.700	12.239	1.681	1.508	0.172
72	3	1	61	2.057	0.946	290.768	1.943	14.994	13.729	1.265
72	3	2	62	2.718	2.435	178.032	1.401	33.610	32.888	0.721
72	3	7	67	6.909	4.649	1347.271	4.496	63.663	58.570	5.092
72	3	8	68	1.981	1.706	239.366	1.163	20.196	19.380	0.816
72	3	15	75	3.048	1.633	96.343	1.320	17.552	17.247	0.305

Table 2 (Con't)

72	3	25	85	0.610	0.012	1.682	0.461	0.124	0.119	0.005
72	3	26	86	0.533	0.021	0.403	0.839	0.210	0.209	0.001
72	3	27	87	1.397	0.485	15.569	2.206	4.804	4.758	0.046
72	3	28	88	3.302	2.953	821.855	0.994	31.355	28.938	2.416
72	4	3	94	2.134	0.594	212.444	4.933	5.986	5.406	0.580
72	4	15	106	1.372	0.113	27.695	5.757	1.012	0.942	0.070
72	4	21	112	3.912	1.811	848.480	4.962	16.711	14.651	2.060
72	4	29	120	3.708	2.084	854.966	2.094	17.187	15.303	1.884
72	5	1	122	0.356	0.049	14.300	1.483	0.372	0.342	0.030
72	5	2	123	0.457	0.127	43.944	1.267	0.972	0.881	0.091
72	5	6	127	1.753	0.869	102.642	1.899	5.783	5.585	0.198
72	5	7	128	3.277	2.990	764.797	1.456	20.113	18.680	1.433
72	5	12	133	4.445	3.401	232.355	1.499	18.793	18.416	0.377
72	5	17	138	1.143	0.512	121.509	1.389	2.789	2.603	0.185
72	6	7	159	1.067	0.067	21.678	41.746	3.780	3.447	0.333
72	6	14	166	2.464	0.934	761.679	28.271	86.751	69.703	17.049
72	6	15	167	2.515	2.234	763.256	19.427	166.763	151.257	15.506
72	6	20	172	2.388	1.180	870.275	27.447	127.906	104.731	23.175
72	6	25	177	1.397	0.273	220.372	27.215	27.914	22.464	5.450
72	6	30	182	1.092	0.046	29.088	45.832	4.138	3.474	0.663
72	7	3	185	3.988	1.299	129.768	73.607	109.785	106.590	3.195
72	7	4	186	4.775	4.483	3118.042	65.871	463.054	383.119	79.935
72	8	24	237	1.676	0.058	2.452	75.420	3.642	3.596	0.046
72	9	4	248	1.930	0.067	6.651	76.634	4.098	3.979	0.119
72	9	17	261	1.727	0.036	6.746	68.196	2.092	1.980	0.112
72	10	22	296	3.505	0.787	35.996	49.140	33.343	32.892	0.451
72	10	26	300	1.753	0.401	38.057	10.403	16.603	16.144	0.460
72	10	27	301	0.610	0.384	49.289	10.362	15.877	15.288	0.588
72	10	30	304	0.508	0.033	2.423	11.341	1.285	1.257	0.028
72	11	1	306	2.159	0.813	121.504	8.746	31.994	30.621	1.373
72	11	2	307	2.718	2.435	286.606	7.312	91.237	88.125	3.112
72	11	3	308	0.152	0.067	1.658	5.947	2.342	2.325	0.017
72	11	7	312	2.616	0.636	123.558	4.681	23.093	21.821	1.272
72	11	13	318	6.248	3.447	493.863	4.120	113.725	109.038	4.686
72	11	18	323	2.311	2.076	248.112	3.533	62.720	60.549	2.171
72	11	28	333	3.480	1.199	168.160	6.279	33.656	32.297	1.359
72	11	29	334	1.397	1.133	76.060	3.467	29.911	29.321	0.591
72	12	4	339	1.194	0.306	30.252	2.785	7.929	7.700	0.228
72	12	6	341	0.178	0.004	0.154	2.715	0.088	0.087	0.001
72	12	8	343	1.829	0.655	112.449	2.646	16.996	16.164	0.832
72	12	9	344	0.432	0.229	33.384	2.583	5.785	5.542	0.243
72	12	10	345	5.232	4.940	883.789	2.544	120.246	114.121	6.126
72	12	12	347	1.270	1.072	63.705	2.240	22.900	22.499	0.401
72	12	14	349	4.775	3.530	459.404	2.138	73.357	70.601	2.756
72	12	15	350	0.203	0.057	2.042	1.965	1.089	1.077	0.012
72	12	19	354	0.889	0.259	42.214	1.904	5.120	4.881	0.239
72	12	20	355	2.946	2.904	426.151	1.883	55.262	52.932	2.330
72	12	21	356	2.769	2.059	103.108	1.751	35.289	34.767	0.522
72	12	30	365	1.067	0.050	8.058	10.104	0.849	0.810	0.039
1973										
73	1	2	2	0.483	0.000	0.002	1.407	0.003	0.003	0.000
73	1	3	3	1.499	0.524	43.776	2.715	8.452	8.245	0.207
73	1	5	5	2.210	1.816	393.272	1.571	30.134	28.296	1.838

Table 2 (Con't)

73	1	7	7	2.946	2.102	751.886	1.494	35.056	31.659	3.397
73	1	21	21	4.801	2.212	957.136	12.379	34.144	30.222	3.923
73	1	25	25	0.711	0.477	37.196	1.270	6.110	5.971	0.140
73	1	26	26	0.305	0.260	37.973	1.255	3.393	3.250	0.143
73	1	27	27	0.356	0.073	8.004	1.243	0.926	0.897	0.030
73	2	1	32	7.722	5.549	975.038	4.445	67.299	63.930	3.370
73	2	13	44	4.470	2.596	358.618	4.157	27.158	26.077	1.081
73	3	2	61	1.600	0.276	39.447	6.661	2.648	2.539	0.109
73	3	4	63	0.559	0.045	3.866	0.767	0.423	0.412	0.011
73	3	6	65	2.057	0.899	139.801	1.581	8.444	8.067	0.377
73	3	8	67	0.203	0.005	0.276	0.013	0.047	0.046	0.001
73	3	10	69	3.785	2.251	150.794	2.311	19.302	18.921	0.380
73	3	14	73	1.270	0.407	57.016	0.936	3.457	3.318	0.139
73	3	15	74	7.620	7.397	858.838	0.579	57.497	55.561	1.935
73	3	16	75	2.642	1.912	51.696	0.688	12.736	12.633	0.103
73	3	24	83	3.658	1.588	73.273	5.046	9.810	9.676	0.134
73	3	28	87	0.381	0.006	0.241	0.031	0.035	0.034	0.000
73	4	7	97	5.740	3.360	1156.379	4.366	20.936	18.977	1.959
73	4	9	99	0.838	0.595	147.434	0.523	3.372	3.139	0.233
73	4	15	105	1.270	0.316	59.629	1.527	1.672	1.582	0.090
73	4	16	106	2.794	2.330	535.064	0.497	12.172	11.388	0.785
73	4	17	107	1.930	1.403	280.760	0.466	6.882	6.493	0.390
73	4	18	108	1.422	0.877	158.459	0.263	4.134	3.921	0.213
73	4	24	114	6.553	4.304	1405.888	2.728	19.513	17.772	1.742
73	4	26	116	0.889	0.643	98.639	0.378	2.527	2.416	0.111
73	5	2	122	2.997	1.768	308.999	1.468	6.557	6.230	0.327
73	5	6	126	0.330	0.055	14.223	0.583	0.202	0.188	0.014
73	5	7	127	2.692	2.295	1502.492	0.685	9.426	7.878	1.548
73	5	12	132	1.448	0.730	94.322	1.078	2.240	2.156	0.084
73	5	20	140	0.381	0.032	6.215	0.650	0.095	0.090	0.005
73	5	23	143	1.321	0.608	208.984	0.902	1.845	1.673	0.173
73	5	25	145	0.660	0.342	31.270	0.520	0.909	0.884	0.024
73	5	27	147	2.362	1.844	283.272	0.642	4.825	4.613	0.213
73	6	1	152	0.914	0.285	25.926	8.950	7.567	7.366	0.201
73	6	5	156	0.508	0.062	30.756	7.194	1.858	1.616	0.242
73	6	10	161	0.635	0.064	36.081	19.385	3.724	3.186	0.538
73	6	12	163	1.194	0.421	225.409	23.788	35.615	30.687	4.928
73	6	13	164	0.356	0.168	47.983	12.659	12.694	11.691	1.002
73	6	29	180	1.473	0.068	28.921	92.090	6.398	5.671	0.727
73	6	30	181	2.667	0.956	471.245	47.677	89.930	78.348	11.582
73	7	4	185	4.013	1.915	167.008	45.231	170.961	166.603	4.358
73	7	5	186	0.102	0.009	1.653	42.100	0.764	0.721	0.042
73	7	6	187	0.305	0.127	49.001	42.291	12.191	10.926	1.265
73	7	7	188	2.489	1.537	735.080	43.267	149.841	131.040	18.802
73	7	29	210	3.200	0.466	105.112	107.954	39.638	37.125	2.514
73	7	30	211	0.483	0.025	5.836	69.525	2.067	1.929	0.137
73	8	14	226	1.651	0.024	0.762	97.394	1.845	1.827	0.017
73	8	18	230	1.143	0.002	0.009	76.766	0.167	0.166	0.000
73	9	2	245	2.057	0.155	81.085	76.694	13.158	11.372	1.786
73	9	3	246	1.295	0.202	0.451	56.243	13.765	13.756	0.009
73	9	4	247	0.660	0.083	60.729	47.969	7.429	6.095	1.335
73	9	5	248	0.711	0.078	42.691	31.521	6.485	5.572	0.913
73	9	28	271	1.346	0.002	0.034	64.877	0.083	0.083	0.001

Table 2 (Con't)

	73	10	15	288	1.219	0.000	0.001	52.233	0.004	0.004	0.000
	73	10	16	289	3.048	0.671	88.095	42.837	35.363	34.022	1.341
	73	10	31	304	1.930	0.132	17.913	49.031	6.164	5.923	0.241
	73	11	4	308	4.597	1.563	220.148	26.048	69.150	66.347	2.803
	73	11	7	311	0.914	0.424	32.182	6.055	17.577	17.185	0.391
	73	11	20	324	2.997	0.667	44.543	21.739	25.612	25.109	0.503
	73	11	22	326	0.178	0.005	0.179	5.616	0.172	0.170	0.002
	73	11	23	327	0.559	0.073	3.655	4.390	2.737	2.696	0.040
	73	11	24	328	2.108	1.432	250.177	4.199	55.237	52.487	2.751
	73	11	25	329	0.432	0.229	13.712	4.020	8.195	8.050	0.145
	73	11	26	330	3.531	3.397	444.156	3.969	120.939	116.374	4.565
	73	11	27	331	6.401	5.643	856.082	3.645	183.314	175.334	7.980
	73	12	4	338	1.321	0.136	17.089	4.636	3.965	3.821	0.144
	73	12	19	353	2.007	0.173	17.235	28.802	4.683	4.548	0.136
	73	12	24	358	6.198	3.479	1159.195	9.649	97.433	88.578	8.855
	73	12	25	359	0.991	0.740	52.555	2.685	17.506	17.141	0.365
	73	12	26	360	0.914	0.667	134.595	2.415	16.395	15.459	0.935
1974											
	74	1	2	2	0.610	0.121	22.544	2.259	2.871	2.719	0.152
	74	1	3	3	3.150	2.767	463.246	2.236	63.174	60.153	3.021
	74	1	4	4	0.102	0.009	0.811	2.094	0.181	0.176	0.005
	74	1	6	6	1.880	0.932	227.794	2.068	20.755	19.336	1.419
	74	1	8	8	0.203	0.108	9.374	2.017	2.218	2.162	0.056
	74	1	9	9	1.854	1.236	189.509	2.000	25.568	24.443	1.124
	74	1	10	10	1.422	1.157	266.828	1.940	23.999	22.447	1.553
	74	1	11	11	0.102	0.009	1.227	1.886	0.166	0.160	0.007
	74	1	14	14	1.270	0.395	94.970	2.088	7.955	7.419	0.536
	74	1	20	20	0.356	0.000	0.000	1.594	0.001	0.001	0.000
	74	1	22	22	0.737	0.068	6.258	2.859	1.259	1.225	0.034
	74	1	23	23	4.597	3.844	724.975	1.804	70.880	67.084	3.796
	74	1	24	24	3.429	3.142	499.492	1.647	52.679	50.281	2.398
	74	1	25	25	0.229	0.073	8.612	1.533	1.156	1.117	0.039
	74	1	26	26	0.940	0.691	17.988	1.526	10.373	10.293	0.080
	74	1	28	28	1.219	0.567	104.461	1.492	8.921	8.453	0.467
	74	2	2	33	1.092	0.140	15.104	5.573	2.077	2.012	0.065
	74	2	6	37	0.737	0.042	24.142	3.694	0.732	0.624	0.109
	74	2	15	46	4.547	1.976	1173.591	13.877	32.697	27.752	4.944
	74	2	16	47	0.076	0.002	0.066	1.324	0.029	0.029	0.000
	74	2	18	49	1.041	0.788	552.934	1.286	12.982	10.726	2.257
	74	2	21	52	1.168	0.341	169.237	1.401	5.079	4.421	0.658
	74	3	20	79	2.134	0.389	45.067	12.235	4.462	4.312	0.150
	74	3	21	80	0.660	0.222	25.819	1.155	2.529	2.443	0.085
	74	3	28	87	1.194	0.103	11.429	5.598	1.122	1.086	0.036
	74	4	11	101	3.124	0.891	164.094	11.502	9.176	8.696	0.480
	74	4	12	102	4.775	4.483	1555.614	1.030	47.033	42.599	4.434
	74	4	22	112	4.369	2.218	510.376	5.941	19.037	17.807	1.230
	74	5	1	121	0.711	0.054	12.823	0.352	0.435	0.406	0.029
	74	5	3	123	0.813	0.115	21.271	3.688	0.888	0.841	0.047
	74	5	4	124	1.930	1.211	633.052	1.653	10.421	9.008	1.413
	74	5	8	128	0.229	0.005	0.514	1.098	0.037	0.036	0.001
	74	5	11	131	1.321	0.601	191.317	2.165	4.405	4.021	0.384
	74	5	14	134	2.616	1.876	367.511	1.905	12.402	11.713	0.689
	74	5	15	135	10.770	10.471	5246.324	1.119	69.342	60.281	9.061

Table 2 (Con't)

74	5	21	141	3.480	2.476	942.735	1.196	12.071	10.834	1.238
74	5	22	142	4.394	4.103	972.830	0.766	17.367	16.214	1.153
74	5	25	145	0.406	0.207	119.550	0.600	0.921	0.785	0.136
74	5	26	146	1.295	1.034	342.032	0.652	4.090	3.720	0.369
74	5	31	151	8.509	7.322	936.588	8.896	189.203	182.211	6.992
74	6	1	152	1.321	1.058	414.763	5.779	27.293	24.422	2.871
74	6	4	155	6.655	6.359	3184.769	9.007	326.820	284.132	42.688
74	6	5	156	0.305	0.127	15.665	6.446	4.978	4.800	0.178
74	6	7	158	1.930	1.636	348.962	7.520	64.255	60.391	3.864
74	6	8	159	1.168	1.042	1176.702	7.133	54.230	40.508	13.722
74	6	9	160	0.838	0.477	106.429	7.548	17.372	16.282	1.090
74	6	10	161	0.076	0.010	2.680	6.070	0.358	0.331	0.027
74	6	12	163	2.108	1.211	451.639	15.259	76.870	69.137	7.733
74	6	15	166	5.842	5.157	919.087	14.330	275.154	261.190	13.964
74	6	18	169	2.769	1.991	1031.718	19.689	163.626	141.606	22.020
74	6	23	174	0.686	0.071	28.644	24.988	5.114	4.558	0.556
74	7	9	190	5.969	2.055	1071.856	103.583	177.562	153.542	24.021
74	7	11	192	0.533	0.237	14.798	38.519	16.943	16.631	0.312
74	7	16	197	1.499	0.021	3.979	78.274	1.500	1.418	0.082
74	7	26	207	4.801	1.313	374.435	104.489	108.649	100.089	8.560
74	7	30	211	1.016	0.019	1.901	37.235	1.377	1.337	0.040
74	8	15	227	1.270	0.002	0.006	75.758	0.109	0.109	0.000
74	8	16	228	1.575	0.088	3.377	67.928	6.556	6.481	0.074
74	8	29	241	3.404	0.554	44.312	93.016	38.796	37.886	0.910
74	8	30	242	5.359	4.352	468.693	64.062	306.468	296.876	9.591
74	8	31	243	1.930	1.558	17.383	47.322	97.861	97.534	0.327
74	9	1	244	3.734	2.609	159.553	30.165	160.690	157.795	2.895
74	9	2	245	1.549	1.281	321.770	24.971	81.443	75.738	5.706
74	9	13	256	1.803	0.060	1.785	63.721	3.055	3.028	0.027
74	9	21	264	3.937	0.811	170.808	62.559	40.562	38.153	2.410
74	10	28	301	3.429	0.564	46.488	45.788	20.384	19.891	0.492
74	10	29	302	0.533	0.161	7.288	27.850	5.612	5.537	0.075
74	11	4	308	1.676	0.077	5.472	20.717	2.579	2.525	0.054
74	11	10	314	3.048	0.503	70.975	28.591	16.437	15.769	0.668
74	11	16	320	1.372	0.039	2.255	17.857	1.178	1.158	0.020
74	11	19	323	3.277	0.957	105.968	9.521	28.690	27.768	0.922
74	11	24	328	0.864	0.057	6.352	3.194	1.651	1.598	0.054
74	12	11	345	1.270	0.029	3.238	19.152	0.802	0.776	0.026
74	12	14	348	1.549	0.167	10.786	8.101	4.396	4.312	0.084
74	12	15	349	0.432	0.133	9.158	3.240	3.485	3.415	0.071
74	12	24	358	4.369	1.637	182.955	17.614	40.997	39.668	1.330
74	12	25	359	0.127	0.018	1.572	3.532	0.428	0.417	0.011
74	12	26	360	0.813	0.572	151.095	2.551	14.837	13.746	1.090
74	12	27	361	1.168	0.911	67.079	2.454	21.386	20.924	0.462
74	12	28	362	0.381	0.187	36.574	2.385	4.547	4.295	0.253
74	12	29	363	1.118	0.862	48.760	2.353	19.498	19.172	0.326
74	12	30	364	0.254	0.090	16.005	2.292	2.124	2.016	0.107
74	12	31	365	0.254	0.090	15.498	2.269	2.108	2.005	0.103
1975										
75	1	1	1	0.127	0.018	0.858	2.248	0.388	0.382	0.006
75	1	2	2	0.686	0.454	54.459	2.230	10.237	9.881	0.356
75	1	3	3	0.508	0.294	55.216	2.192	6.748	6.388	0.360
75	1	10	10	4.597	2.311	320.136	10.671	48.932	46.979	1.953

Table 2 (Con't)

75	1	12	12	0.254	0.090	9.287	1.977	1.827	1.772	0.055
75	1	18	18	0.762	0.064	15.702	2.329	1.345	1.252	0.093
75	1	19	19	1.270	0.721	61.512	1.935	14.062	13.711	0.351
75	1	31	31	1.270	0.076	14.889	14.454	1.488	1.405	0.082
75	2	1	32	0.965	0.240	53.246	2.018	4.692	4.399	0.293
75	2	2	33	0.965	0.837	211.768	1.810	16.372	15.217	1.155
75	2	3	34	0.838	0.364	157.827	1.765	7.494	6.632	0.863
75	2	4	35	1.143	0.933	264.498	1.745	17.815	16.419	1.396
75	2	5	36	0.686	0.308	39.195	1.700	5.405	5.206	0.199
75	2	15	46	2.057	0.393	181.790	14.215	7.480	6.567	0.912
75	2	16	47	1.829	1.612	233.691	1.638	26.542	25.436	1.107
75	2	18	49	0.279	0.000	0.001	0.039	0.001	0.001	0.000
75	2	22	53	2.388	0.726	227.522	9.041	12.099	11.060	1.040
75	2	23	54	1.549	1.281	488.654	1.494	21.456	19.254	2.203
75	2	26	57	0.305	0.000	0.005	0.039	0.002	0.002	0.000
75	3	9	68	1.016	0.020	0.915	6.422	0.279	0.276	0.004
75	3	10	69	2.642	1.141	67.482	7.735	15.213	14.947	0.265
75	3	12	71	5.258	4.699	1246.793	1.305	64.430	59.680	4.751
75	3	13	72	3.150	2.998	530.077	1.013	35.991	34.178	1.813
75	3	18	77	1.118	0.146	6.071	4.285	1.551	1.532	0.019
75	3	28	87	3.480	1.347	301.869	8.660	14.406	13.499	0.907
75	3	29	88	1.016	0.764	160.192	0.997	7.936	7.467	0.470
75	4	8	98	0.660	0.003	0.311	1.674	0.030	0.029	0.001
75	4	9	99	2.896	1.208	363.604	4.860	12.004	11.010	0.994
75	4	13	103	1.067	0.200	28.424	1.961	1.798	1.724	0.074
75	4	14	104	0.330	0.026	0.706	0.019	0.223	0.222	0.002
75	4	25	115	0.813	0.019	0.614	1.795	0.154	0.152	0.002
75	4	28	118	2.438	0.788	517.343	5.231	7.803	6.519	1.283
75	4	29	119	0.432	0.242	46.979	0.011	1.982	1.873	0.109
75	4	30	120	2.591	1.650	176.475	0.855	12.648	12.255	0.393
75	5	1	121	0.076	0.002	0.023	0.004	0.013	0.013	0.000
75	5	3	123	3.302	1.981	363.914	2.616	14.745	13.975	0.770
75	5	7	127	1.270	0.815	146.667	1.477	5.680	5.389	0.291
75	5	11	131	0.508	0.081	12.477	1.537	0.533	0.509	0.024
75	5	14	134	1.676	0.886	197.583	2.095	5.810	5.446	0.364
75	5	15	135	1.067	0.813	69.391	1.043	4.891	4.769	0.122
75	5	16	136	1.118	0.862	317.675	1.022	5.672	5.107	0.565
75	5	26	146	1.295	0.378	101.547	2.608	2.176	2.014	0.163
75	5	29	149	3.353	2.376	1396.465	1.652	14.623	12.431	2.192
75	6	6	157	4.039	2.872	358.347	7.752	78.817	75.973	2.844
75	6	9	160	1.321	1.058	161.130	9.543	53.124	50.804	2.320
75	6	10	161	0.864	0.619	75.688	9.053	29.819	28.764	1.055
75	6	11	162	0.635	0.407	142.143	8.692	21.060	19.064	1.997
75	6	15	166	1.372	0.564	81.867	17.734	39.027	37.399	1.629
75	6	19	170	2.286	1.243	378.986	20.055	86.541	79.288	7.252
75	6	22	173	1.372	0.745	612.955	23.085	82.087	65.831	16.256
75	7	10	191	2.083	0.101	26.761	116.707	9.238	8.558	0.680
75	7	19	200	2.413	0.183	97.262	110.809	18.368	15.845	2.523
75	7	24	205	2.057	0.118	29.365	102.633	10.860	10.107	0.753
75	8	3	215	2.743	0.333	27.539	102.772	29.338	28.628	0.710
75	8	4	216	0.406	0.002	0.009	71.780	0.193	0.192	0.000
75	8	17	229	9.169	4.487	147.513	138.273	435.330	431.079	4.252
75	8	18	230	0.102	0.009	0.608	85.715	0.785	0.768	0.017
75	9	5	248	2.184	0.122	15.076	100.255	9.799	9.448	0.351

Table 2 (Con't)

75	9	12	255	4.140	0.917	405.960	96.222	76.628	67.642	8.987
75	9	16	259	2.438	0.479	169.233	39.124	35.935	32.491	3.444
75	9	20	263	1.448	0.106	23.330	30.996	7.115	6.675	0.441
75	10	16	289	1.473	0.008	0.231	65.340	0.404	0.401	0.004
75	10	25	298	3.937	0.822	99.946	61.420	41.321	39.867	1.454
75	10	26	299	0.254	0.090	0.890	37.733	4.225	4.212	0.013
75	11	3	307	5.309	2.022	155.422	27.389	89.105	87.096	2.009
75	11	4	308	2.946	2.662	369.941	17.281	114.075	109.510	4.566
75	11	5	309	0.127	0.018	0.158	11.188	0.686	0.684	0.002
75	11	6	310	5.588	5.294	757.150	7.868	207.161	198.639	8.522
75	11	20	324	1.016	0.002	0.012	18.654	0.054	0.054	0.000
75	11	26	330	3.327	0.797	54.846	21.904	25.372	24.859	0.513
75	11	30	334	4.343	2.402	302.352	3.452	74.220	71.519	2.700
75	12	6	340	2.388	1.090	177.407	3.074	32.115	30.620	1.495
75	12	15	349	0.991	0.032	0.414	9.894	0.842	0.839	0.003
75	12	25	359	3.150	0.931	30.428	17.895	23.513	23.285	0.228
75	12	29	363	0.356	0.027	0.949	2.552	0.664	0.657	0.007

Table 3a. SWRRB water balance in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with long dissipation.

YEAR	RAIN (CM)	MEAS RNF (CM)	PRED RNF (CM)	EVAP (CM)	PERC (CM)	SEDIMENT (KG/HA)
1971	105.105	39.360	39.360	73.752	0.383	6585.562
1972	164.363	88.979	88.979	72.100	0.560	20199.520
1973	157.581	77.975	77.975	79.175	0.500	16697.344
1974	181.635	97.340	97.340	83.686	0.454	27795.215
1975	147.065	64.724	64.724	82.332	0.471	13147.668
TOTAL	755.748	368.378	368.378	391.045	2.367	84425.250

Table 3b. SWRRB pesticide balance in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with long dissipation.

YEAR	APPLIED (GM/HA)	DECAYED (GM/HA)	LEACHED (GM/HA)	TOT RUNOFF (GM/HA)	DIS.RUNOFF (GM/HA)	SORB.RNF (GM/HA)
1971	15120.250	5887.922	2037.360	1276.645	1205.689	70.955
1972	15120.250	6899.031	1701.658	2585.753	2364.971	220.782
1973	15120.250	6459.504	2150.103	1664.996	1558.177	106.819
1974	15120.250	5302.289	2301.535	2999.459	2779.000	220.458
1975	15120.250	5838.406	2545.751	2072.789	1967.764	105.025
TOTAL	75601.250	30387.152	10736.402	10599.633	9875.598	724.039

Table 4. SWRRB Daily Pesticide Values in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with short term dissipation.

YR	MM	DD	DAY	RAIN (CM)	RUNOFF (CM)	SEDIMT (KG/HA)	PESTLCH (GM/HA)	PESTRNF (GM/HA)	DISPEST (GM/HA)	SORBPES (GM/HA)
1971										
71	6	6	157	6.579	3.074	759.502	52.032	132.664	123.510	9.155
71	6	8	159	2.642	2.542	277.506	7.127	91.457	88.557	2.900
71	6	20	171	2.235	0.321	102.444	50.209	13.942	12.725	1.217
71	7	16	197	3.785	0.740	124.366	62.500	31.484	29.972	1.511
71	7	20	201	1.270	0.009	0.853	34.900	0.320	0.312	0.009
71	7	24	205	1.600	0.020	2.603	44.858	0.695	0.668	0.027
71	7	25	206	2.032	0.210	131.174	38.059	9.345	7.871	1.475
71	7	26	207	1.930	0.650	107.036	20.901	24.567	23.411	1.156
71	7	28	209	1.473	0.307	101.384	18.243	11.673	10.621	1.051
71	7	29	210	1.168	0.507	240.077	19.787	19.745	17.290	2.456
71	8	2	214	1.575	0.065	2.016	27.485	2.061	2.042	0.019
71	8	3	215	1.321	0.141	8.895	25.285	4.670	4.583	0.087
71	8	5	217	4.496	2.032	74.635	18.536	70.939	70.165	0.773
71	9	19	262	4.216	0.988	202.266	12.138	9.602	9.046	0.556
71	9	20	263	1.219	0.960	349.129	6.496	9.465	8.534	0.931
71	11	18	322	2.184	0.122	2.677	2.759	0.282	0.280	0.002
71	11	28	332	1.473	0.015	0.942	2.061	0.029	0.029	0.001
71	12	5	339	2.819	0.434	53.088	1.646	0.793	0.765	0.028
71	12	6	340	3.632	3.093	532.388	0.711	5.497	5.227	0.270
71	12	12	346	1.626	0.272	40.375	0.179	0.425	0.407	0.018
71	12	14	348	2.972	2.236	390.452	0.161	3.361	3.194	0.167
71	12	15	349	0.356	0.166	15.744	0.151	0.232	0.225	0.006
71	12	16	350	3.785	3.496	869.234	0.148	4.966	4.621	0.345
71	12	17	351	2.108	1.831	396.104	0.134	2.378	2.233	0.145
71	12	30	364	1.194	0.019	0.884	0.813	0.019	0.019	0.000
1972										
72	1	1	1	5.283	2.832	261.240	0.192	2.783	2.708	0.075
72	1	2	2	0.127	0.018	0.546	0.101	0.016	0.016	0.000
72	1	3	3	8.687	8.389	1424.566	0.096	7.487	7.124	0.363
72	1	4	4	3.912	3.623	1077.310	0.079	2.931	2.691	0.240
72	1	9	9	0.457	0.218	58.293	0.068	0.158	0.146	0.012
72	1	10	10	3.810	3.575	940.856	0.066	2.471	2.290	0.181
72	1	28	28	1.321	0.071	4.726	0.416	0.036	0.036	0.001
72	1	29	29	2.921	1.593	169.217	0.052	0.802	0.777	0.025
72	1	30	30	0.203	0.057	4.715	0.048	0.028	0.027	0.001
72	2	7	38	2.235	0.635	215.627	0.180	0.312	0.283	0.029
72	2	12	43	0.813	0.044	2.607	0.101	0.018	0.018	0.000
72	2	17	48	1.651	0.282	46.811	0.204	0.114	0.108	0.005
72	2	29	60	1.448	0.102	38.700	0.278	0.038	0.034	0.004
72	3	1	61	2.057	0.946	290.768	0.044	0.338	0.309	0.029
72	3	2	62	2.718	2.435	178.032	0.031	0.750	0.734	0.016
72	3	7	67	6.909	4.649	1347.271	0.096	1.352	1.244	0.108
72	3	8	68	1.981	1.706	239.366	0.024	0.425	0.407	0.017
72	3	15	75	3.048	1.633	96.343	0.026	0.342	0.336	0.006

Table 4 (Con't)

72	3	25	85	0.610	0.012	1.682	0.008	0.002	0.002	0.000
72	3	26	86	0.533	0.021	0.403	0.014	0.004	0.004	0.000
72	3	27	87	1.397	0.485	15.569	0.037	0.081	0.080	0.001
72	3	28	88	3.302	2.953	821.855	0.017	0.519	0.479	0.040
72	4	3	94	2.134	0.594	212.444	0.075	0.091	0.082	0.009
72	4	15	106	1.372	0.113	27.695	0.073	0.013	0.012	0.001
72	4	21	112	3.912	1.811	848.480	0.057	0.191	0.167	0.024
72	4	29	120	3.708	2.084	854.966	0.021	0.169	0.151	0.019
72	5	1	122	0.356	0.049	14.300	0.014	0.004	0.003	0.000
72	5	2	123	0.457	0.127	43.944	0.012	0.009	0.008	0.001
72	5	6	127	1.753	0.869	102.642	0.016	0.050	0.048	0.002
72	5	7	128	3.277	2.990	764.797	0.012	0.169	0.157	0.012
72	5	12	133	4.445	3.401	232.355	0.011	0.142	0.140	0.003
72	5	17	138	1.143	0.512	121.509	0.009	0.019	0.018	0.001
72	6	7	159	1.067	0.067	21.678	33.036	2.991	2.728	0.264
72	6	14	166	2.464	0.934	761.679	20.557	63.079	50.682	12.396
72	6	15	167	2.515	2.234	763.256	13.768	118.188	107.198	10.990
72	6	20	172	2.388	1.180	870.275	19.577	91.231	74.701	16.530
72	6	25	177	1.397	0.273	220.372	17.021	17.457	14.049	3.408
72	6	30	182	1.092	0.046	29.088	25.090	2.265	1.902	0.363
72	7	3	185	3.988	1.299	129.768	42.803	63.841	61.983	1.858
72	7	4	186	4.775	4.483	3118.042	38.023	267.289	221.149	46.141
72	8	24	237	1.676	0.058	2.452	15.585	0.753	0.743	0.010
72	9	4	248	1.930	0.067	6.651	12.464	0.667	0.647	0.019
72	9	17	261	1.727	0.036	6.746	8.312	0.255	0.241	0.014
72	10	22	296	3.505	0.787	35.996	3.089	2.096	2.067	0.028
72	10	26	300	1.753	0.401	38.057	0.614	0.980	0.953	0.027
72	10	27	301	0.610	0.384	49.289	0.602	0.923	0.889	0.034
72	10	30	304	0.508	0.033	2.423	0.631	0.072	0.070	0.002
72	11	1	306	2.159	0.813	121.504	0.472	1.728	1.654	0.074
72	11	2	307	2.718	2.435	286.606	0.389	4.857	4.691	0.166
72	11	3	308	0.152	0.067	1.658	0.312	0.123	0.122	0.001
72	11	7	312	2.616	0.636	123.558	0.233	1.148	1.085	0.063
72	11	13	318	6.248	3.447	493.863	0.190	5.233	5.017	0.216
72	11	18	323	2.311	2.076	248.112	0.153	2.719	2.625	0.094
72	11	28	333	3.480	1.199	168.160	0.244	1.309	1.257	0.053
72	11	29	334	1.397	1.133	76.060	0.134	1.152	1.129	0.023
72	12	4	339	1.194	0.306	30.252	0.102	0.291	0.283	0.008
72	12	6	341	0.178	0.004	0.154	0.098	0.003	0.003	0.000
72	12	8	343	1.829	0.655	112.449	0.094	0.601	0.572	0.029
72	12	9	344	0.432	0.229	33.384	0.091	0.203	0.194	0.009
72	12	10	345	5.232	4.940	883.789	0.088	4.180	3.967	0.213
72	12	12	347	1.270	1.072	63.705	0.077	0.783	0.769	0.014
72	12	14	349	4.775	3.530	459.404	0.072	2.465	2.372	0.093
72	12	15	350	0.203	0.057	2.042	0.066	0.036	0.036	0.000
72	12	19	354	0.889	0.259	42.214	0.061	0.165	0.158	0.008
72	12	20	355	2.946	2.904	426.151	0.060	1.770	1.695	0.075
72	12	21	356	2.769	2.059	103.108	0.056	1.122	1.105	0.017
72	12	30	365	1.067	0.050	8.058	0.301	0.025	0.024	0.001
1973										
73	1	3	3	1.499	0.524	43.776	0.079	0.245	0.239	0.006
73	1	5	5	2.210	1.816	393.272	0.045	0.860	0.807	0.053
73	1	7	7	2.946	2.102	751.886	0.042	0.987	0.891	0.096

Table 4 (Con't)

73	1	21	21	4.801	2.212	957.136	0.317	0.875	0.775	0.101
73	1	25	25	0.711	0.477	37.196	0.032	0.153	0.149	0.004
73	1	26	26	0.305	0.260	37.973	0.031	0.084	0.081	0.004
73	1	27	27	0.356	0.073	8.004	0.031	0.023	0.022	0.001
73	2	1	32	7.722	5.549	975.038	0.106	1.601	1.521	0.080
73	2	13	44	4.470	2.596	358.618	0.091	0.592	0.568	0.024
73	3	2	61	1.600	0.276	39.447	0.125	0.050	0.048	0.002
73	3	4	63	0.559	0.045	3.866	0.014	0.008	0.008	0.000
73	3	6	65	2.057	0.899	139.801	0.029	0.153	0.146	0.007
73	3	8	67	0.203	0.005	0.276	0.000	0.001	0.001	0.000
73	3	10	69	3.785	2.251	150.794	0.040	0.335	0.329	0.007
73	3	14	73	1.270	0.407	57.016	0.016	0.058	0.055	0.002
73	3	15	74	7.620	7.397	858.838	0.010	0.946	0.914	0.032
73	3	16	75	2.642	1.912	51.696	0.011	0.207	0.206	0.002
73	3	24	83	3.658	1.588	73.273	0.075	0.145	0.143	0.002
73	4	7	97	5.740	3.360	1156.379	0.053	0.255	0.231	0.024
73	4	9	99	0.838	0.595	147.434	0.006	0.040	0.037	0.003
73	4	15	105	1.270	0.316	59.629	0.016	0.018	0.017	0.001
73	4	16	106	2.794	2.330	535.064	0.005	0.129	0.120	0.008
73	4	17	107	1.930	1.403	280.760	0.005	0.072	0.067	0.004
73	4	18	108	1.422	0.877	158.459	0.003	0.042	0.040	0.002
73	4	24	114	6.553	4.304	1405.888	0.025	0.179	0.163	0.016
73	4	26	116	0.889	0.643	98.639	0.003	0.022	0.021	0.001
73	5	2	122	2.997	1.768	308.999	0.012	0.052	0.049	0.003
73	5	6	126	0.330	0.055	14.223	0.004	0.002	0.001	0.000
73	5	7	127	2.692	2.295	1502.492	0.005	0.068	0.057	0.011
73	5	12	132	1.448	0.730	94.322	0.007	0.015	0.014	0.001
73	5	23	143	1.321	0.608	208.984	0.005	0.009	0.009	0.001
73	5	25	145	0.660	0.342	31.270	0.003	0.004	0.004	0.000
73	5	27	147	2.362	1.844	283.272	0.003	0.022	0.021	0.001
73	6	1	152	0.914	0.285	25.926	7.772	6.571	6.396	0.175
73	6	5	156	0.508	0.062	30.756	5.670	1.464	1.274	0.191
73	6	10	161	0.635	0.064	36.081	15.277	2.935	2.511	0.424
73	6	12	163	1.194	0.421	225.409	19.445	29.113	25.085	4.028
73	6	13	164	0.356	0.168	47.983	10.090	10.117	9.318	0.799
73	6	29	180	1.473	0.068	28.921	54.364	3.777	3.348	0.429
73	6	30	181	2.667	0.956	471.245	27.404	51.690	45.033	6.657
73	7	4	185	4.013	1.915	167.008	26.450	99.977	97.428	2.549
73	7	5	186	0.102	0.009	1.653	23.965	0.435	0.411	0.024
73	7	6	187	0.305	0.127	49.001	23.453	6.760	6.059	0.701
73	7	7	188	2.489	1.537	735.080	23.499	81.381	71.169	10.211
73	7	29	210	3.200	0.466	105.112	38.147	14.007	13.118	0.888
73	7	30	211	0.483	0.025	5.836	24.003	0.714	0.666	0.047
73	8	14	226	1.651	0.024	0.762	27.278	0.517	0.512	0.005
73	8	18	230	1.143	0.002	0.009	20.294	0.044	0.044	0.000
73	9	2	245	2.057	0.155	81.085	14.667	2.516	2.175	0.342
73	9	3	246	1.295	0.202	0.451	10.611	2.597	2.595	0.002
73	9	4	247	0.660	0.083	60.729	8.874	1.374	1.128	0.247
73	9	5	248	0.711	0.078	42.691	5.717	1.176	1.011	0.166
73	9	28	271	1.346	0.002	0.034	7.077	0.009	0.009	0.000
73	10	16	289	3.048	0.671	88.095	3.332	2.751	2.646	0.104
73	10	31	304	1.930	0.132	17.913	3.002	0.377	0.363	0.015
73	11	4	308	4.597	1.563	220.148	1.506	3.998	3.835	0.162

Table 4 (Con't)

73	11	7	311	0.914	0.424	32.182	0.336	0.975	0.953	0.022
73	11	20	324	2.997	0.667	44.543	1.026	1.209	1.186	0.024
73	11	22	326	0.178	0.005	0.179	0.259	0.008	0.008	0.000
73	11	23	327	0.559	0.073	3.655	0.200	0.125	0.123	0.002
73	11	24	328	2.108	1.432	250.177	0.190	2.494	2.370	0.124
73	11	25	329	0.432	0.229	13.712	0.180	0.366	0.360	0.007
73	11	26	330	3.531	3.397	444.156	0.175	5.345	5.144	0.202
73	11	27	331	6.401	5.643	856.082	0.159	8.016	7.668	0.349
73	12	4	338	1.321	0.136	17.089	0.189	0.162	0.156	0.006
73	12	19	353	2.007	0.173	17.235	1.032	0.168	0.163	0.005
73	12	24	358	6.198	3.479	1159.195	0.333	3.359	3.054	0.305
73	12	25	359	0.991	0.740	52.555	0.092	0.599	0.587	0.013
73	12	26	360	0.914	0.667	134.595	0.082	0.557	0.525	0.032
1974										
74	1	2	2	0.610	0.121	22.544	0.073	0.093	0.088	0.005
74	1	3	3	3.150	2.767	463.246	0.072	2.027	1.930	0.097
74	1	4	4	0.102	0.009	0.811	0.067	0.006	0.006	0.000
74	1	6	6	1.880	0.932	227.794	0.065	0.652	0.608	0.045
74	1	8	8	0.203	0.108	9.374	0.063	0.069	0.067	0.002
74	1	9	9	1.854	1.236	189.509	0.062	0.788	0.753	0.035
74	1	10	10	1.422	1.157	266.828	0.059	0.734	0.687	0.048
74	1	11	11	0.102	0.009	1.227	0.057	0.005	0.005	0.000
74	1	14	14	1.270	0.395	94.970	0.062	0.237	0.221	0.016
74	1	22	22	0.737	0.068	6.258	0.081	0.036	0.035	0.001
74	1	23	23	4.597	3.844	724.975	0.051	1.989	1.882	0.107
74	1	24	24	3.429	3.142	499.492	0.046	1.468	1.401	0.067
74	1	25	25	0.229	0.073	8.612	0.042	0.032	0.031	0.001
74	1	26	26	0.940	0.691	17.988	0.042	0.285	0.283	0.002
74	1	28	28	1.219	0.567	104.461	0.041	0.242	0.229	0.013
74	2	2	33	1.092	0.140	15.104	0.146	0.054	0.053	0.002
74	2	6	37	0.737	0.042	24.142	0.094	0.019	0.016	0.003
74	2	15	46	4.547	1.976	1173.591	0.330	0.778	0.660	0.118
74	2	16	47	0.076	0.002	0.066	0.031	0.001	0.001	0.000
74	2	18	49	1.041	0.788	552.934	0.030	0.301	0.249	0.052
74	2	21	52	1.168	0.341	169.237	0.032	0.115	0.100	0.015
74	3	20	79	2.134	0.389	45.067	0.211	0.077	0.074	0.003
74	3	21	80	0.660	0.222	25.819	0.020	0.043	0.042	0.002
74	3	28	87	1.194	0.103	11.429	0.087	0.018	0.017	0.001
74	4	11	101	3.124	0.891	164.094	0.146	0.117	0.110	0.006
74	4	12	102	4.775	4.483	1555.614	0.013	0.588	0.532	0.055
74	4	22	112	4.369	2.218	510.376	0.063	0.201	0.188	0.013
74	5	1	121	0.711	0.054	12.823	0.003	0.004	0.004	0.000
74	5	3	123	0.813	0.115	21.271	0.032	0.008	0.007	0.000
74	5	4	124	1.930	1.211	633.052	0.014	0.088	0.076	0.012
74	5	11	131	1.321	0.601	191.317	0.016	0.032	0.029	0.003
74	5	14	134	2.616	1.876	367.511	0.013	0.085	0.081	0.005
74	5	15	135	10.770	10.471	5246.324	0.008	0.466	0.405	0.061
74	5	21	141	3.480	2.476	942.735	0.007	0.071	0.064	0.007
74	5	22	142	4.394	4.103	972.830	0.004	0.100	0.093	0.007
74	5	25	145	0.406	0.207	119.550	0.003	0.005	0.004	0.001
74	5	26	146	1.295	1.034	342.032	0.003	0.022	0.020	0.002
74	5	31	151	8.509	7.322	936.588	7.100	150.992	145.412	5.580
74	6	1	152	1.321	1.058	414.763	4.503	21.266	19.029	2.237

Table 4 (Con't)

	74	6	4	155	6.655	6.359	3184.769	7.496	271.988	236.463	35.526
	74	6	5	156	0.305	0.127	15.665	5.235	4.043	3.898	0.144
	74	6	7	158	1.930	1.636	348.962	5.813	49.676	46.688	2.987
	74	6	8	159	1.168	1.042	1176.702	5.379	40.898	30.550	10.349
	74	6	9	160	0.838	0.477	106.429	5.553	12.779	11.977	0.802
	74	6	10	161	0.076	0.010	2.680	4.355	0.257	0.237	0.020
	74	6	12	163	2.108	1.211	451.639	12.135	61.130	54.981	6.150
	74	6	15	166	5.842	5.157	919.087	10.562	202.796	192.505	10.292
	74	6	18	169	2.769	1.991	1031.718	15.221	126.490	109.468	17.022
	74	6	23	174	0.686	0.071	28.644	16.956	3.470	3.093	0.377
	74	7	9	190	5.969	2.055	1071.856	52.319	89.685	77.553	12.133
	74	7	11	192	0.533	0.237	14.798	19.448	8.554	8.397	0.157
	74	7	16	197	1.499	0.021	3.979	35.346	0.678	0.640	0.037
	74	7	26	207	4.801	1.313	374.435	43.444	45.174	41.615	3.559
	74	7	30	211	1.016	0.019	1.901	14.011	0.518	0.503	0.015
	74	8	15	227	1.270	0.002	0.006	24.400	0.035	0.035	0.000
	74	8	16	228	1.575	0.088	3.377	22.324	2.155	2.130	0.025
	74	8	29	241	3.404	0.554	44.312	22.764	9.495	9.272	0.223
	74	8	30	242	5.359	4.352	468.693	15.777	75.474	73.112	2.362
	74	8	31	243	1.930	1.558	17.383	11.429	23.635	23.556	0.079
	74	9	1	244	3.734	2.609	159.553	7.163	38.157	37.470	0.687
	74	9	2	245	1.549	1.281	321.770	5.798	18.911	17.586	1.325
	74	9	13	256	1.803	0.060	1.785	11.437	0.548	0.544	0.005
	74	9	21	264	3.937	0.811	170.808	9.414	6.104	5.742	0.363
	74	10	28	301	3.429	0.564	46.488	3.490	1.554	1.516	0.038
	74	10	29	302	0.533	0.161	7.288	2.091	0.421	0.416	0.006
	74	11	4	308	1.676	0.077	5.472	1.426	0.178	0.174	0.004
	74	11	10	314	3.048	0.503	70.975	1.815	1.044	1.001	0.042
	74	11	16	320	1.372	0.039	2.255	1.052	0.069	0.068	0.001
	74	11	19	323	3.277	0.957	105.968	0.541	1.631	1.579	0.052
	74	11	24	328	0.864	0.057	6.352	0.172	0.089	0.086	0.003
	74	12	11	345	1.270	0.029	3.238	0.874	0.037	0.035	0.001
	74	12	14	348	1.549	0.167	10.786	0.360	0.195	0.192	0.004
	74	12	15	349	0.432	0.133	9.158	0.143	0.154	0.151	0.003
	74	12	24	358	4.369	1.637	182.955	0.723	1.684	1.629	0.055
	74	12	25	359	0.127	0.018	1.572	0.144	0.018	0.017	0.001
	74	12	26	360	0.813	0.572	151.095	0.103	0.600	0.556	0.044
	74	12	27	361	1.168	0.911	67.079	0.099	0.859	0.840	0.019
	74	12	28	362	0.381	0.187	36.574	0.095	0.181	0.171	0.010
	74	12	29	363	1.118	0.862	48.760	0.093	0.772	0.759	0.013
	74	12	30	364	0.254	0.090	16.005	0.090	0.084	0.079	0.004
	74	12	31	365	0.254	0.090	15.498	0.089	0.082	0.078	0.004
1975											
	75	1	1	1	0.127	0.018	0.858	0.087	0.015	0.015	0.000
	75	1	2	2	0.686	0.454	54.459	0.086	0.394	0.380	0.014
	75	1	3	3	0.508	0.294	55.216	0.084	0.258	0.244	0.014
	75	1	10	10	4.597	2.311	320.136	0.389	1.783	1.712	0.071
	75	1	12	12	0.254	0.090	9.287	0.071	0.066	0.064	0.002
	75	1	18	18	0.762	0.064	15.702	0.081	0.047	0.043	0.003
	75	1	19	19	1.270	0.721	61.512	0.066	0.483	0.471	0.012
	75	1	31	31	1.270	0.076	14.889	0.458	0.047	0.045	0.003
	75	2	1	32	0.965	0.240	53.246	0.063	0.148	0.138	0.009
	75	2	2	33	0.965	0.837	211.768	0.057	0.511	0.475	0.036

Table 4 (Con't)

75	2	3	34	0.838	0.364	157.827	0.055	0.232	0.206	0.027
75	2	4	35	1.143	0.933	264.498	0.054	0.548	0.505	0.043
75	2	5	36	0.686	0.308	39.195	0.052	0.165	0.159	0.006
75	2	15	46	2.057	0.393	181.790	0.403	0.212	0.186	0.026
75	2	16	47	1.829	1.612	233.691	0.046	0.746	0.715	0.031
75	2	22	53	2.388	0.726	227.522	0.242	0.324	0.296	0.028
75	2	23	54	1.549	1.281	488.654	0.040	0.569	0.510	0.058
75	3	9	68	1.016	0.020	0.915	0.149	0.007	0.006	0.000
75	3	10	69	2.642	1.141	67.482	0.178	0.349	0.343	0.006
75	3	12	71	5.258	4.699	1246.793	0.029	1.448	1.341	0.107
75	3	13	72	3.150	2.998	530.077	0.023	0.800	0.760	0.040
75	3	18	77	1.118	0.146	6.071	0.090	0.033	0.032	0.000
75	3	28	87	3.480	1.347	301.869	0.161	0.267	0.250	0.017
75	3	29	88	1.016	0.764	160.192	0.018	0.145	0.137	0.009
75	4	9	99	2.896	1.208	363.604	0.076	0.187	0.172	0.016
75	4	13	103	1.067	0.200	28.424	0.029	0.026	0.025	0.001
75	4	14	104	0.330	0.026	0.706	0.000	0.003	0.003	0.000
75	4	25	115	0.813	0.019	0.614	0.021	0.002	0.002	0.000
75	4	28	118	2.438	0.788	517.343	0.059	0.088	0.074	0.015
75	4	29	119	0.432	0.242	46.979	0.000	0.022	0.021	0.001
75	4	30	120	2.591	1.650	176.475	0.009	0.138	0.133	0.004
75	5	3	123	3.302	1.981	363.914	0.027	0.151	0.143	0.008
75	5	7	127	1.270	0.815	146.667	0.014	0.054	0.051	0.003
75	5	11	131	0.508	0.081	12.477	0.013	0.005	0.004	0.000
75	5	14	134	1.676	0.886	197.583	0.017	0.048	0.045	0.003
75	5	15	135	1.067	0.813	69.391	0.008	0.039	0.038	0.001
75	5	16	136	1.118	0.862	317.675	0.008	0.045	0.040	0.004
75	5	26	146	1.295	0.378	101.547	0.016	0.014	0.013	0.001
75	5	29	149	3.353	2.376	1396.465	0.010	0.085	0.073	0.013
75	6	6	157	4.039	2.872	358.347	5.484	55.752	53.740	2.012
75	6	9	160	1.321	1.058	161.130	7.523	41.876	40.047	1.829
75	6	10	161	0.864	0.619	75.688	6.960	22.925	22.114	0.811
75	6	11	162	0.635	0.407	142.143	6.517	15.790	14.293	1.497
75	6	15	166	1.372	0.564	81.867	13.402	29.493	28.262	1.231
75	6	19	170	2.286	1.243	378.986	13.671	58.993	54.049	4.944
75	6	22	173	1.372	0.745	612.955	16.450	58.496	46.911	11.584
75	7	10	191	2.083	0.101	26.761	57.510	4.552	4.217	0.335
75	7	19	200	2.413	0.183	97.262	45.743	7.583	6.541	1.042
75	7	24	205	2.057	0.118	29.365	40.541	4.290	3.992	0.297
75	8	3	215	2.743	0.333	27.539	36.460	10.408	10.156	0.252
75	8	4	216	0.406	0.002	0.009	25.036	0.067	0.067	0.000
75	8	17	229	9.169	4.487	147.513	48.374	152.296	150.809	1.487
75	8	18	230	0.102	0.009	0.608	29.220	0.268	0.262	0.006
75	9	5	248	2.184	0.122	15.076	21.856	2.136	2.060	0.077
75	9	12	255	4.140	0.917	405.960	17.833	14.202	12.536	1.666
75	9	16	259	2.438	0.479	169.233	6.627	6.087	5.503	0.583
75	9	20	263	1.448	0.106	23.330	4.809	1.104	1.035	0.068
75	10	16	289	1.473	0.008	0.231	6.103	0.038	0.037	0.000
75	10	25	298	3.937	0.822	99.946	4.946	3.327	3.210	0.117
75	10	26	299	0.254	0.090	0.890	2.992	0.335	0.334	0.001
75	11	3	307	5.309	2.022	155.422	1.929	6.275	6.133	0.142
75	11	4	308	2.946	2.662	369.941	1.200	7.921	7.604	0.317
75	11	5	309	0.127	0.018	0.158	0.766	0.047	0.047	0.000

Table 4 (Con't)

75	11	6	310	5.588	5.294	757.150	0.532	13.993	13.418	0.576
75	11	20	324	1.016	0.002	0.012	1.058	0.003	0.003	0.000
75	11	26	330	3.327	0.797	54.846	1.163	1.348	1.320	0.027
75	11	30	334	4.343	2.402	302.352	0.176	3.784	3.646	0.138
75	12	6	340	2.388	1.090	177.407	0.148	1.546	1.474	0.072
75	12	15	349	0.991	0.032	0.414	0.440	0.038	0.037	0.000
75	12	25	359	3.150	0.931	30.428	0.736	0.967	0.958	0.009
75	12	29	363	0.356	0.027	0.949	0.102	0.027	0.026	0.000

Table 5a. SWRRB water balance in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with short term dissipation.

YEAR	RAIN (CM)	MEAS RNF (CM)	PRED RNF (CM)	EVAP (CM)	PERC (CM)	SEDIMENT (KG/HA)
1971	105.105	39.360	39.360	73.752	0.383	6585.562
1972	164.363	88.979	88.979	72.100	0.560	20199.520
1973	157.581	77.975	77.975	79.175	0.500	16697.344
1974	181.635	97.340	97.340	83.686	0.454	27795.215
1975	147.065	64.724	64.724	82.332	0.471	13147.668
TOTAL	755.748	368.378	368.378	391.045	2.367	84425.250

Table 5b. SWRRB pesticide balance in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with short dissipation.

YEAR	APPLIED (GM/HA)	DECAYED (GM/HA)	LEACHED (GM/HA)	TOT RUNOFF (GM/HA)	DIS.RUNOFF (GM/HA)	SORB.RNF (GM/HA)
1971	15120.250	9391.969	692.225	450.606	426.302	24.304
1972	15120.250	9410.586	515.018	683.857	589.396	94.461
1973	15120.250	9547.871	667.181	355.930	326.181	29.750
1974	15120.250	8554.539	736.621	1286.407	1172.846	113.560
1975	15120.250	9285.480	756.330	536.461	504.709	31.751
TOTAL	75601.250	46190.445	3367.375	3313.262	3019.434	293.825

Table 6. SWRRB pesticide parameters for application of endosulfan to cotton in the Tifton GA watershed for long or short dissipation.

PESTICIDE TITLE = ENDOSULFAN TIFTON 1971-1975

ADSORPTION COEFFICIENT (KD)	30.0	
	(Short)	(Long)
FOLIAR HALF LIFE (DAYS)	10.0	20.0
SOIL DECAY CONSTANT (/DAYS)	0.03000	0.006
APPLICATION EFFICIENCY	0.70	
INITIAL PESTICIDE ON FOLIAGE (KG/HA)	0.0	
INITIAL PESTICIDE ON GROUND (KG/HA)	0.0	
ENRICHMENT RATIOS FOR PESTICIDE	1.50	

PESTICIDE APPLICATIONS

YEAR	MM	DD	JULI	KG/HA
1970				
	5	25	145	1.680
	6	2	153	1.680
	6	12	163	1.680
	6	17	168	1.680
	6	22	173	1.680
	7	2	183	1.680
	7	10	191	1.680
	7	20	201	1.680
	7	30	211	1.680
1971				
	5	25	145	1.680
	6	3	154	1.680
	6	12	163	1.680
	6	23	174	1.680
	6	28	179	1.680
	7	7	188	1.680
	7	12	193	1.680
	7	21	202	1.680
	7	31	212	1.680
1972				
	5	25	145	1.680
	6	4	155	1.680
	6	14	165	1.680
	6	22	173	1.680
	6	29	180	1.680
	7	5	186	1.680
	7	13	194	1.680
	7	22	203	1.680
	7	31	212	1.680
1973				
	5	24	144	1.680
	5	31	151	1.680
	6	7	158	1.680
	6	14	165	1.680
	6	21	172	1.680
	6	27	178	1.680
	7	7	188	1.680
	7	17	198	1.680
	7	28	209	1.680
1974				
	5	24	144	1.680
	6	3	154	1.680
	6	9	160	1.680
	6	15	166	1.680
	6	24	175	1.680
	7	3	184	1.680
	7	11	192	1.680
	7	19	200	1.680
	7	26	207	1.680

Table 7. SWRRB daily pesticide values in the field when endosulfan is applied to cotton in the Tifton GA watershed with long term dissipation.

YR	MM	DD	DAY	RAIN (CM)	RUNOFF (CM)	SEDIMT (KG/HA)	PESTLCH (GM/HA)	PESTRNF (GM/HA)	DISPEST (GM/HA)	SORBPES (GM/HA)
1970										
70	5	29	149	2.718	0.193	319.247	57.621	6.625	4.428	2.197
70	5	30	150	1.727	0.348	257.104	39.152	8.756	7.167	1.589
70	6	1	152	1.473	0.221	155.654	10.922	5.380	4.442	0.939
70	6	13	164	2.464	0.064	17.484	119.827	4.478	4.136	0.342
70	7	3	184	0.000	0.234	208.254	0.000	35.671	28.146	7.525
70	7	11	192	0.864	0.191	260.773	0.000	31.790	22.536	9.255
70	7	26	207	0.000	0.211	283.265	0.000	33.833	24.113	9.720
70	8	6	218	0.000	0.005	0.293	0.000	0.490	0.481	0.008
70	8	7	219	1.397	0.869	140.976	45.010	88.465	84.358	4.107
70	8	10	222	0.102	0.025	3.559	6.420	2.518	2.417	0.102
70	8	12	224	0.787	0.236	19.553	40.171	21.808	21.279	0.528
70	8	23	235	0.000	0.688	242.485	0.000	59.985	54.252	5.734
70	8	24	236	2.794	0.005	0.586	188.334	0.369	0.356	0.012
70	8	25	237	1.346	1.151	242.595	7.480	87.277	82.085	5.192
70	8	26	238	2.489	2.154	625.645	17.274	161.121	148.206	12.915
70	9	10	253	0.000	0.094	270.628	0.000	11.137	5.975	5.162
70	10	19	292	4.826	0.023	4.495	151.028	0.860	0.812	0.048
1971										
71	2	7	38	3.556	0.023	25.843	50.798	0.542	0.404	0.137
71	2	8	39	2.286	0.058	99.849	29.056	1.568	1.037	0.532
71	4	30	120	5.080	0.902	431.633	22.943	7.572	6.621	0.951
71	5	8	128	3.302	0.185	227.642	19.341	1.727	1.262	0.465
71	5	12	132	2.540	0.539	317.987	11.242	3.820	3.245	0.575
71	5	14	134	0.000	0.338	205.162	0.000	2.394	2.025	0.369
71	6	17	168	4.318	1.798	3512.326	164.120	212.293	133.860	78.433
71	6	18	169	2.032	0.508	219.329	83.849	34.548	30.587	3.962
71	6	19	170	2.032	0.696	1185.968	70.515	66.932	44.290	22.642
71	7	2	183	4.318	1.118	1773.764	263.355	154.091	104.388	49.703
71	7	3	184	1.270	0.048	58.370	87.665	5.744	4.215	1.529
71	7	4	185	4.572	1.054	2131.598	223.608	143.698	89.439	54.259
71	7	29	210	3.048	0.607	1049.380	178.426	80.841	53.234	27.607
71	8	1	213	2.794	0.777	1025.361	163.748	101.453	72.686	28.767
71	8	6	218	0.762	0.025	11.407	55.247	2.459	2.167	0.292
71	8	21	233	4.064	1.138	758.213	206.046	104.485	87.078	17.407
71	8	22	234	1.270	0.246	52.295	65.495	18.553	17.442	1.111
71	8	29	241	2.286	0.015	2.214	136.620	1.012	0.969	0.042
71	11	2	306	3.556	0.008	0.644	120.528	0.293	0.286	0.007
71	12	20	354	6.350	0.018	5.515	97.230	0.464	0.425	0.040
1972										
72	1	2	2	1.524	0.005	2.679	25.388	0.135	0.117	0.019
72	1	5	5	1.524	0.005	3.371	24.205	0.137	0.115	0.023
72	1	10	10	2.032	0.036	20.994	32.712	0.887	0.753	0.133
72	1	13	13	5.334	0.899	314.981	54.956	18.405	16.654	1.750
72	2	3	34	3.810	0.488	496.862	40.883	9.629	7.375	2.254
72	4	22	113	2.032	0.008	2.492	11.502	0.072	0.065	0.006

Table 7 (Con't)

	72	6	25	177	4.826	0.259	349.026	260.567	29.705	21.155	8.550
	72	6	27	179	2.032	0.224	71.877	124.075	17.180	15.668	1.512
	72	7	16	198	5.334	1.166	844.425	378.639	137.806	113.207	24.599
	72	7	24	206	4.318	0.165	245.398	374.762	24.597	17.011	7.586
	72	8	25	238	5.080	1.430	478.551	268.236	119.120	108.252	10.868
	72	8	26	239	1.016	0.018	2.411	64.361	1.329	1.277	0.052
	72	9	28	272	2.540	0.041	90.840	132.270	4.398	2.633	1.765
	72	10	27	301	4.826	1.090	693.885	139.052	54.585	45.830	8.755
	72	11	13	318	2.032	0.036	4.529	56.609	1.305	1.257	0.048
	72	12	6	341	5.588	1.245	1366.521	115.294	50.243	37.794	12.449
	72	12	21	356	4.826	0.211	23.215	97.044	5.047	4.886	0.161
1973											
	73	1	19	19	1.778	0.015	1.432	25.040	0.282	0.275	0.008
	73	2	1	32	2.286	0.808	852.318	17.036	18.637	14.156	4.481
	73	2	9	40	4.826	0.196	407.865	40.269	4.652	2.862	1.790
	73	3	31	90	2.794	0.020	6.862	23.837	0.191	0.174	0.018
	73	4	1	91	2.794	0.267	167.218	19.247	2.650	2.230	0.420
	73	4	3	93	6.350	2.030	2527.816	22.387	22.120	16.103	6.017
	73	4	4	94	0.508	0.442	507.897	1.386	4.511	3.354	1.156
	73	4	7	97	3.556	0.610	678.418	14.608	5.581	4.184	1.397
	73	4	25	115	6.096	0.180	47.165	20.933	0.993	0.921	0.072
	73	4	26	116	5.080	1.252	771.258	14.632	7.298	6.160	1.138
	73	6	28	179	1.524	0.216	70.523	136.592	28.117	25.607	2.509
	73	7	13	194	3.048	0.127	141.281	296.484	19.717	14.783	4.934
	73	7	18	199	4.572	0.719	1102.004	409.624	128.103	87.746	40.357
	73	7	27	208	3.810	0.125	285.177	349.225	23.929	14.181	9.748
	73	8	16	228	3.048	0.043	9.268	249.173	3.961	3.721	0.240
1974											
	74	1	11	11	2.794	0.361	308.039	65.379	15.344	12.214	3.129
	74	1	20	20	1.524	0.142	142.007	30.676	6.038	4.646	1.392
	74	1	29	29	0.762	0.033	26.980	0.000	1.284	1.032	0.253
	74	2	7	38	6.096	0.475	196.816	68.860	12.710	11.304	1.405
	74	2	8	39	3.556	0.932	2512.508	59.921	43.470	24.035	19.435
	74	4	2	92	3.302	0.051	23.780	35.869	0.806	0.707	0.099
	74	4	4	94	3.810	0.246	57.160	37.081	3.297	3.082	0.215
	74	4	5	95	2.032	0.041	15.519	17.402	0.562	0.504	0.058
	74	5	11	131	4.318	0.183	81.661	35.976	1.888	1.665	0.223
	74	7	18	199	4.064	0.330	437.468	360.114	50.567	36.185	14.382
	74	7	20	201	1.270	0.099	154.403	104.772	16.825	11.464	5.361
	74	7	25	206	1.778	0.345	483.545	134.919	55.348	38.979	16.369
	74	7	30	211	5.080	1.212	2715.706	398.706	247.124	147.763	99.361
	74	8	27	239	5.334	0.178	59.237	317.208	14.543	13.222	1.322
	74	9	6	249	6.858	0.292	135.290	185.788	19.843	17.422	2.421
	74	9	8	251	1.270	0.282	783.689	101.792	32.746	17.856	14.890

Table 8a. SWRRB water balance in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with long term dissipation.

YEAR	RAIN (CM)	MEAS RNF (CM)	PRED RNF (CM)	EVAP (CM)	PERC (CM)	SEDIMENT (KG/HA)
1970	131.978	8.672	8.672	93.304	5.736	3770.375
1971	133.502	10.102	10.102	96.665	4.871	13094.496
1972	126.238	7.323	7.323	93.693	4.475	5012.055
1973	122.174	7.048	7.048	83.041	7.238	7576.496
1974	127.254	5.202	5.202	97.494	4.866	8133.801
TOTAL	641.144	38.346	38.346	464.195	27.186	37587.223

Table 8b. SWRRB pesticide balance in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with long term dissipation.

YEAR	APPLIED (GM/HA)	DECAYED (GM/HA)	LEACHED (GM/HA)	TOT RUNOFF (GM/HA)	DIS.RUNOFF (GM/HA)	SORB.RNF (GM/HA)
1970	15120.250	4965.461	4117.703	560.562	495.188	65.373
1971	15120.250	5637.352	3928.894	944.484	655.657	288.826
1972	15120.250	5273.953	4853.625	474.577	394.048	80.529
1973	15120.250	5935.973	3752.992	270.740	196.456	74.284
1974	15120.250	5668.781	4883.223	522.393	342.080	180.313
TOTAL	75601.250	27481.520	21536.430	2772.756	2083.429	689.326

Table 9. SWRRB daily pesticide values in the field when endosulfan is applied to cotton in the Tifton GA watershed with short term dissipation.

YR	MM	DD	DAY	RAIN (CM)	RUNOFF (CM)	SEDIMT (KG/HA)	PESTLCH (GM/HA)	PESTRNF (GM/HA)	DISPEST (GM/HA)	SORBPES (GM/HA)
1970										
70	5	29	149	2.718	0.193	319.247	51.075	5.873	3.925	1.947
70	5	30	150	1.727	0.348	257.104	33.866	7.574	6.200	1.374
70	6	1	152	1.473	0.221	155.654	8.995	4.431	3.658	0.773
70	6	13	164	2.464	0.064	17.484	94.150	3.518	3.250	0.268
70	7	3	184	0.000	0.234	208.254	0.000	21.287	16.796	4.491
70	7	11	192	0.864	0.191	260.773	0.000	16.614	11.777	4.837
70	7	26	207	0.000	0.211	283.265	0.000	13.061	9.308	3.752
70	8	6	218	0.000	0.005	0.293	0.000	0.151	0.149	0.003
70	8	7	219	1.397	0.869	140.976	14.099	27.711	26.425	1.287
70	8	10	222	0.102	0.025	3.559	2.023	0.793	0.761	0.032
70	8	12	224	0.787	0.236	19.553	12.339	6.699	6.536	0.162
70	8	23	235	0.000	0.688	242.485	0.000	14.126	12.776	1.350
70	8	24	236	2.794	0.005	0.586	43.376	0.085	0.082	0.003
70	8	25	237	1.346	1.151	242.595	1.681	19.619	18.451	1.167
70	8	26	238	2.489	2.154	625.645	3.792	35.372	32.536	2.835
70	9	10	253	0.000	0.094	270.628	0.000	1.696	0.910	0.786
70	10	19	292	4.826	0.023	4.495	9.972	0.057	0.054	0.003
1971										
71	2	7	38	3.556	0.023	25.843	0.747	0.008	0.006	0.002
71	2	8	39	2.286	0.058	99.849	0.422	0.023	0.015	0.008
71	4	30	120	5.080	0.902	431.633	0.092	0.031	0.027	0.004
71	5	8	128	3.302	0.185	227.642	0.066	0.006	0.004	0.002
71	5	12	132	2.540	0.539	317.987	0.035	0.012	0.010	0.002
71	5	14	134	0.000	0.338	205.162	0.000	0.007	0.006	0.001
71	6	17	168	4.318	1.798	3512.326	109.471	141.604	89.287	52.316
71	6	18	169	2.032	0.508	219.329	54.496	22.454	19.879	2.575
71	6	19	170	2.032	0.696	1185.968	44.652	42.383	28.045	14.337
71	7	2	183	4.318	1.118	1773.764	163.605	95.726	64.849	30.877
71	7	3	184	1.270	0.048	58.370	53.125	3.481	2.554	0.927
71	7	4	185	4.572	1.054	2131.598	132.658	85.250	53.061	32.190
71	7	29	210	3.048	0.607	1049.380	69.435	31.459	20.716	10.743
71	8	1	213	2.794	0.777	1025.361	69.638	43.145	30.912	12.234
71	8	6	218	0.762	0.025	11.407	21.613	0.962	0.848	0.114
71	8	21	233	4.064	1.138	758.213	55.961	28.378	23.650	4.728
71	8	22	234	1.270	0.246	52.295	17.383	4.924	4.629	0.295
71	8	29	241	2.286	0.015	2.214	30.451	0.226	0.216	0.009
71	11	2	306	3.556	0.008	0.644	6.750	0.016	0.016	0.000
71	12	20	354	6.350	0.018	5.515	2.740	0.013	0.012	0.001
1972										
72	1	2	2	1.524	0.005	2.679	0.614	0.003	0.003	0.000
72	1	5	5	1.524	0.005	3.371	0.565	0.003	0.003	0.001
72	1	10	10	2.032	0.036	20.994	0.722	0.020	0.017	0.003
72	1	13	13	5.334	0.899	314.981	1.172	0.393	0.355	0.037
72	2	3	34	3.810	0.488	496.862	0.687	0.162	0.124	0.038
72	6	25	177	4.826	0.259	349.026	163.892	18.684	13.306	5.378

Table 9 (Con't)

	72	6	27	179	2.032	0.224	71.877	74.062	10.255	9.353	0.902
	72	7	16	198	5.334	1.166	844.425	189.317	68.902	56.603	12.299
	72	7	24	206	4.318	0.165	245.398	171.891	11.282	7.803	3.479
	72	8	25	238	5.080	1.430	478.551	66.976	29.743	27.030	2.714
	72	8	26	239	1.016	0.018	2.411	15.668	0.324	0.311	0.013
	72	9	28	272	2.540	0.041	90.840	14.833	0.493	0.295	0.198
	72	10	27	301	4.826	1.090	693.885	8.831	3.466	2.910	0.556
	72	11	13	318	2.032	0.036	4.529	2.713	0.063	0.060	0.002
	72	12	6	341	5.588	1.245	1366.521	3.983	1.736	1.306	0.430
	72	12	21	356	4.826	0.211	23.215	2.778	0.145	0.140	0.005
1973											
	73	1	19	19	1.778	0.015	1.432	0.514	0.006	0.006	0.000
	73	2	1	32	2.286	0.808	852.318	0.301	0.330	0.250	0.079
	73	2	9	40	4.826	0.196	407.865	0.648	0.075	0.046	0.029
	73	3	31	90	2.794	0.020	6.862	0.189	0.002	0.001	0.000
	73	4	1	91	2.794	0.267	167.218	0.150	0.021	0.017	0.003
	73	4	3	93	6.350	2.030	2527.816	0.169	0.167	0.122	0.045
	73	4	4	94	0.508	0.442	507.897	0.010	0.034	0.025	0.009
	73	4	7	97	3.556	0.610	678.418	0.103	0.039	0.029	0.010
	73	4	25	115	6.096	0.180	47.165	0.105	0.005	0.005	0.000
	73	4	26	116	5.080	1.252	771.258	0.072	0.036	0.030	0.006
	73	6	28	179	1.524	0.216	70.523	88.749	18.269	16.638	1.630
	73	7	13	194	3.048	0.127	141.281	141.329	9.399	7.047	2.352
	73	7	18	199	4.572	0.719	1102.004	195.068	61.004	41.786	19.218
	73	7	27	208	3.810	0.125	285.177	134.149	9.192	5.447	3.745
	73	8	16	228	3.048	0.043	9.268	62.141	0.988	0.928	0.060
1974											
	74	1	11	11	2.794	0.361	308.039	1.152	0.270	0.215	0.055
	74	1	20	20	1.524	0.142	142.007	0.488	0.096	0.074	0.022
	74	1	29	29	0.762	0.033	26.980	0.000	0.019	0.015	0.004
	74	2	7	38	6.096	0.475	196.816	0.891	0.164	0.146	0.018
	74	2	8	39	3.556	0.932	2512.508	0.766	0.556	0.307	0.249
	74	4	2	92	3.302	0.051	23.780	0.216	0.005	0.004	0.001
	74	4	4	94	3.810	0.246	57.160	0.216	0.019	0.018	0.001
	74	4	5	95	2.032	0.041	15.519	0.100	0.003	0.003	0.000
	74	5	11	131	4.318	0.183	81.661	0.100	0.005	0.005	0.001
	74	7	18	199	4.064	0.330	437.468	151.460	21.268	15.219	6.049
	74	7	20	201	1.270	0.099	154.403	44.625	7.166	4.883	2.283
	74	7	25	206	1.778	0.345	483.545	54.316	22.282	15.692	6.590
	74	7	30	211	5.080	1.212	2715.706	165.940	102.853	61.499	41.354
	74	8	27	239	5.334	0.178	59.237	65.507	3.003	2.730	0.273
	74	9	6	249	6.858	0.292	135.290	29.995	3.204	2.813	0.391
	74	9	8	251	1.270	0.282	783.689	15.660	5.038	2.747	2.291

Table 10a. SWRRB water balance in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with short term dissipation.

YEAR	RAIN (CM)	MEAS RNF (CM)	PRED RNF (CM)	EVAP (CM)	PERC (CM)	SEDIMENT (KG/HA)
1970	131.978	8.672	8.672	93.304	5.736	3770.375
1971	133.502	10.102	10.102	96.665	4.871	13094.496
1972	126.238	7.323	7.323	93.693	4.475	5012.055
1973	122.174	7.048	7.048	83.041	7.238	7576.496
1974	127.254	5.202	5.202	97.494	4.866	8133.801
TOTAL	641.144	38.346	38.346	464.195	27.186	37587.223

Table 10b. SWRRB pesticide balance in the field when endosulfan is applied to cotton in the Yazoo River Basin (MS) with short term dissipation.

YEAR	APPLIED (GM/HA)	DECAYED (GM/HA)	LEACHED (GM/HA)	TOT RUNOFF (GM/HA)	DIS.RUNOFF (GM/HA)	SORB.RNF (GM/HA)
1970	15120.250	8838.656	1544.984	178.665	153.594	25.070
1971	15120.250	8631.418	1448.392	500.105	338.741	161.365
1972	15120.250	8626.801	1810.918	145.671	119.617	26.054
1973	15120.250	9045.215	1431.863	99.564	72.378	27.186
1974	15120.250	8912.852	1512.509	165.951	106.370	59.581
TOTAL	75601.250	44054.941	7748.660	1089.957	790.700	299.256

FIGURE 1. Pond-Stream-Stream Scenario for the Exposure Analysis Monitoring System (EXAMS).

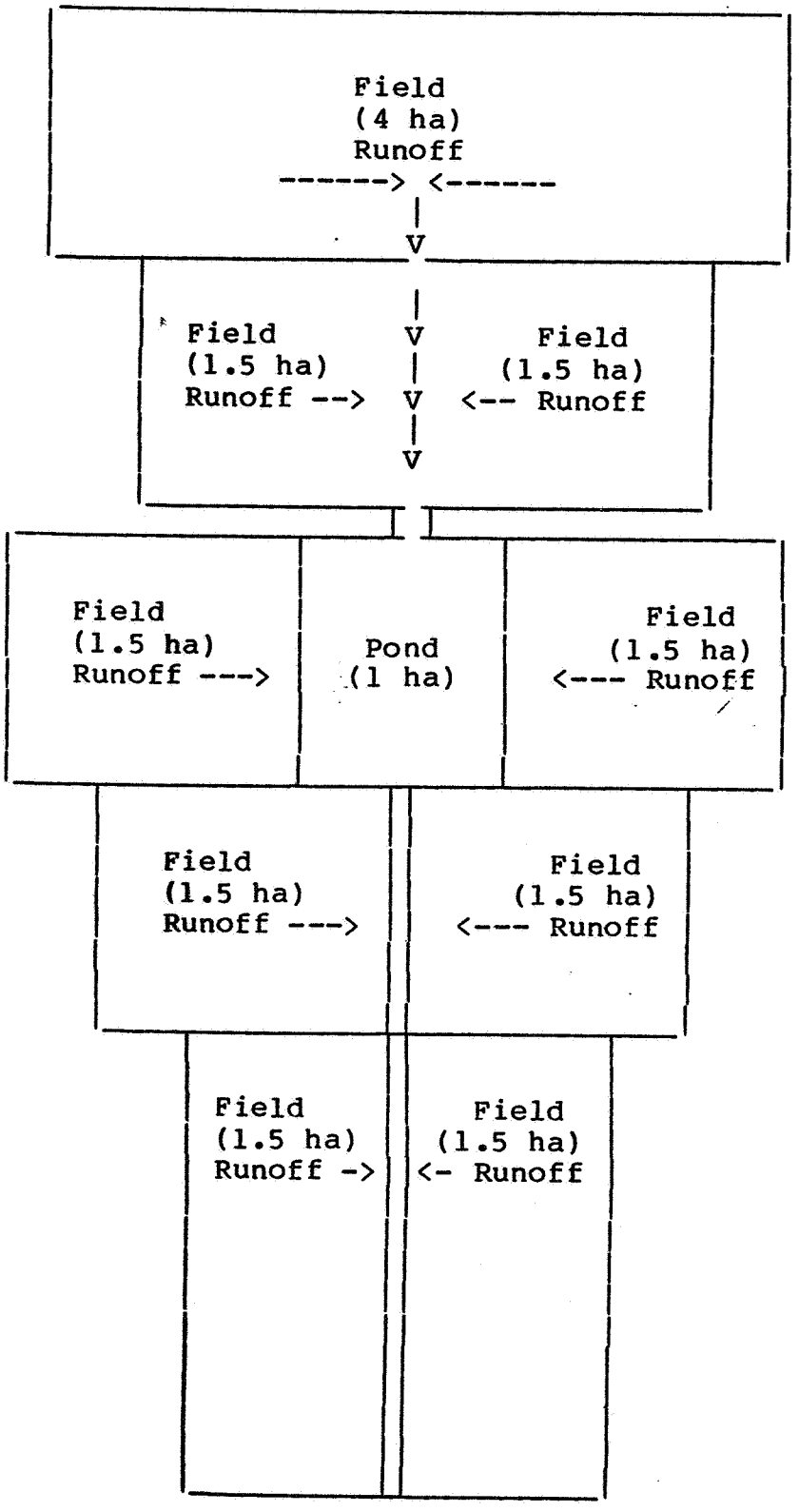


Table 11. EXAMS chemical input data for endosulfan.

Chemical: 1) Endosulfan / Cotton / 1974 / Yazoo MS

Chemical input data for neutral molecule (Sp.#1).

```
*** Chemical-specific data: SET via "entry( 1)"
MWT:    4.07E+02 VAPR:  1.00E-05 HENRY:           KOW:    3.80E+03
KVO:             EVPR:           EHEN:            KOC:    3.20E+03
*** Ion-specific data: "entry(1, 1)"
SOL:    6.00E-01 KPB:            KPS:    3.50E+01
ESOL:            KPDOC:
*** Reactivity of dissolved species: SET via "entry(1, 1, 1)"
KAH:             EAH:            KNH:    1.40E-03 ENH:
KBH:             EBH:            KRED:            ERED:
KBACW:           QTBAW:          KBACS: 1.85E-10  QTBAS:
*** Reactivity of solids-sorbed species:     "entry(2, 1, 1)"
KAH:             EAH:            KNH:             ENH:
KBH:             EBH:            KRED:            ERED:
KBACW:           QTBAW:          KBACS: 1.85E-10  QTBAS:
*** Reactivity of "DOC"-complexed species:   "entry(3, 1, 1)"
KAH:             EAH:            KNH:             ENH:
KBH:             EBH:            KRED:            ERED:
KBACW:           QTBAW:          KBACS: 1.85E-10  QTBAS:
*** Reactivity of biosorbed species:         "entry(4, 1, 1)"
KBACW:           QTBAW:          KBACS: 1.85E-10  QTBAS:
*** Photochemical process data;  Ion-specific data: "entry(1, 1)"
KDP(1, 1):          RFLAT(1, 1):          LAMAX(1, 1):
*** Reactivity of dissolved species: SET via "entry(1, 1, 1)"
K1O2:            EK1O2:          KOX:             EOX:
*** Reactivity of solids-sorbed species:     "entry(2, 1, 1)"
K1O2:            EK1O2:          KOX:             EOX:
*** Reactivity of "DOC"-complexed species:   "entry(3, 1, 1)"
K1O2:            EK1O2:          KOX:             EOX:
 QUA(1,1, 1)          QUA(2,1, 1)          QUA(3,1, 1)
```

Table 12. EXAMS daily values for the reaches of pond-stream-stream scenario where endosulfan ran off into the pond from a cotton field in upper Yazoo River Basin MS.

Day	Pond		Stream		Stream	
	Dissolved in Water Column	Sorbed in Benthos	Dissolved in Water Column	Sorbed in Benthos	Dissolved in Water Column	Sorbed in Benthos
	(mg/l)	(mg/kg)	(mg/l)	(mg/kg)	(mg/l)	(mg/kg)
Spray drift input = 0.150 kg						
148	4.5727E-03	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
149	4.1646E-03	9.9765E-03	1.0428E-03	4.4753E-02	1.7570E-04	6.0489E-03
150	3.7955E-03	1.8909E-02	1.0466E-03	9.1056E-02	2.0215E-04	1.4600E-02
151	3.4616E-03	2.6899E-02	1.0413E-03	0.1297	2.2534E-04	2.2978E-02
Runoff input = 1.890 kg						
151	6.1078E-02	2.6899E-02	1.0413E-03	0.1297	2.2534E-04	2.2978E-02
152	3.9051E-02	0.1390	2.6798E-02	1.779	3.7781E-02	2.117
Runoff input = 0.273 kg						
152	4.7373E-02	0.1390	2.6798E-02	1.779	3.7781E-02	2.117
153	4.1455E-02	0.2381	2.2291E-02	2.691	1.6419E-02	2.711
Spray drift input = 0.150 kg						
153	4.6028E-02	0.2381	2.2291E-02	2.691	1.6419E-02	2.711
154	4.1482E-02	0.3343	1.8872E-02	3.257	1.2614E-02	2.925
155	3.7415E-02	0.4191	1.8087E-02	3.674	1.2863E-02	3.090
Runoff input = 3.268 kg						
155	0.1370	0.4191	1.8087E-02	3.674	1.2863E-02	3.090
156	8.1608E-02	0.6568	5.7066E-02	6.790	8.7759E-02	7.715
Runoff input = 0.050 kg						
156	8.3132E-02	0.6568	5.7066E-02	6.790	8.7759E-02	7.715
157	7.4979E-02	0.8270	3.6797E-02	7.734	3.1986E-02	8.421
158	6.7687E-02	0.9769	3.5145E-02	8.319	3.2203E-02	8.665
Runoff input = 0.642 kg						
158	8.7258E-02	0.9769	3.5145E-02	8.319	3.2203E-02	8.665
159	7.5089E-02	1.147	4.6600E-02	9.430	4.7148E-02	9.535
Runoff input = 0.542 kg						
159	9.1612E-02	1.147	4.6600E-02	9.430	4.7148E-02	9.535
160	8.0393E-02	1.325	4.8175E-02	10.45	4.6204E-02	10.30
Runoff input = 0.173 kg						
160	8.5667E-02	1.325	4.8175E-02	10.45	4.6204E-02	10.30
161	7.7433E-02	1.490	4.2349E-02	11.00	3.9372E-02	10.65
Runoff input = 0.003 kg						
161	7.7524E-02	1.490	4.2349E-02	11.00	3.9372E-02	10.65
162	7.0993E-02	1.637	3.7188E-02	11.18	3.6454E-02	10.77
Spray drift input = 0.150 kg						
162	7.5566E-02	1.637	3.7188E-02	11.18	3.6454E-02	10.77
163	6.9247E-02	1.776	3.6956E-02	11.28	3.6663E-02	10.86
Runoff input = 0.768 kg						
163	9.2660E-02	1.776	3.6956E-02	11.28	3.6663E-02	10.86
164	8.0790E-02	1.946	5.0762E-02	12.10	5.2135E-02	11.61

Table 12. (Con't)

165	7.4086E-02	2.093	3.9993E-02	12.30	3.9867E-02	11.81
166	6.8019E-02	2.222	3.8588E-02	12.31	3.9872E-02	11.90
Runoff input = 2.751 kg						
166	0.1519	2.222	3.8588E-02	12.31	3.9872E-02	11.90
167	0.1084	2.482	7.5301E-02	14.75	0.1080	15.63
168	9.5885E-02	2.676	5.9815E-02	15.59	6.5655E-02	16.65
Spray drift input = 0.150 kg						
168	0.1005	2.676	5.9815E-02	15.59	6.5655E-02	16.65
169	9.2188E-02	2.854	5.0585E-02	15.75	5.5760E-02	16.81
Runoff input = 1.636 kg						
169	0.1421	2.854	5.0585E-02	15.75	5.5760E-02	16.81
170	0.1192	3.107	7.8238E-02	17.38	9.1517E-02	18.53
171	0.1094	3.319	5.8295E-02	17.74	6.2840E-02	18.87
172	0.1005	3.507	5.6275E-02	17.79	6.2745E-02	18.96
Spray drift input = 0.150 kg						
172	0.1051	3.507	5.6275E-02	17.79	6.2745E-02	18.96
173	9.6616E-02	3.682	5.5346E-02	17.78	6.2817E-02	19.04
174	8.8951E-02	3.837	5.3384E-02	17.68	6.2690E-02	19.10
Runoff input = 0.051 kg						
174	9.0506E-02	3.837	5.3384E-02	17.68	6.2690E-02	19.10
175	8.3427E-02	3.975	5.1786E-02	17.51	6.2573E-02	19.14
176	7.7016E-02	4.096	4.9858E-02	17.27	6.2360E-02	19.17
177	7.1209E-02	4.201	4.7958E-02	16.97	6.2103E-02	19.18
Spray drift input = 0.150 kg						
177	7.5781E-02	4.201	4.7958E-02	16.97	6.2103E-02	19.18
178	7.0112E-02	4.302	4.7139E-02	16.67	6.1982E-02	19.19
179	6.4974E-02	4.389	4.5324E-02	16.33	6.1675E-02	19.18
180	6.0318E-02	4.463	4.3549E-02	15.95	6.1330E-02	19.15
181	5.6096E-02	4.526	4.1821E-02	15.55	6.0953E-02	19.11
182	5.2268E-02	4.579	4.0144E-02	15.12	6.0545E-02	19.06
183	4.8795E-02	4.622	3.8521E-02	14.68	6.0109E-02	18.99
184	4.5644E-02	4.658	3.6953E-02	14.23	5.9647E-02	18.92
185	4.2783E-02	4.686	3.5442E-02	13.77	5.9162E-02	18.83
186	4.0185E-02	4.707	3.3989E-02	13.32	5.8656E-02	18.73
187	3.7824E-02	4.722	3.2594E-02	12.86	5.8130E-02	18.62
188	3.5678E-02	4.732	3.1256E-02	12.41	5.7587E-02	18.50
189	3.3726E-02	4.737	2.9975E-02	11.96	5.7029E-02	18.38
190	3.1949E-02	4.738	2.8750E-02	11.52	5.6457E-02	18.24
Runoff input = 1.775 kg						
190	8.6060E-02	4.738	2.8750E-02	11.52	5.6457E-02	18.24
191	7.2814E-02	4.845	4.8820E-02	12.25	7.2239E-02	18.85
Spray drift input = 0.150 kg						
191	7.7387E-02	4.845	4.8820E-02	12.25	7.2239E-02	18.85
192	7.1741E-02	4.939	3.9579E-02	12.39	6.0005E-02	18.90
193	6.6624E-02	5.020	3.8340E-02	12.37	5.9613E-02	18.83
194	6.1985E-02	5.088	3.7126E-02	12.29	5.9215E-02	18.76
195	5.7778E-02	5.145	3.5919E-02	12.17	5.8793E-02	18.67
196	5.3961E-02	5.192	3.4726E-02	12.00	5.8350E-02	18.58
197	5.0497E-02	5.230	3.3553E-02	11.80	5.7888E-02	18.48
198	4.7351E-02	5.259	3.2404E-02	11.57	5.7407E-02	18.38

Table 13. EXAMS input information for input of data using the batch mode.

```
 1    rec chem 25
 2    rec env 12
 3    set mode to 2
 4    set tinit to 148
 5    set tend to 151
 6    set tcode to 2
 7    set cint to 1
 8    set iseg(1) to 1
 9    set ichem(1) to 1
10    set imass(1) to .150
11    set npsed(1,13) = 10.
12    set npsed(3,13) = 3.
13    set npsed(5,13) = 3.
14    set npsfl(1,13) = 10.
15    set npsfl(3,13) = 3.
16    set npsfl(5,13) = 3.
17    run
18    set imass(1) to 1.890
19    set npsed(1,13) = 390.
20    set npsfl(1,13) = 305.
21    continu
22    152
23    set imass(1) to .273
24    set npsfl(1,13) = 44.
25    set npsed(1,13) = 175.
26    continu
27    153
28    set imass(1) to .150
29    set npsfl(1,13) = 20.
30    set npsed(1,13) = 32.
31    continu
32    155
33    set imass(1) to 3.268
34    set npsfl(1,13) = 365.
35    set npsed(1,13) = 1320.
36    continu
37    156
38    set imass(1) to .050
39    set npsfl(1,13) = 20.
40    set npsed(1,13) = 10.
41    continu
42    158
43    set imass(1) to .642
44    set npsfl(1,13) = 60.
45    set npsed(1,13) = 145.
46    continu
47    159
48    set imass(1) to .542
49    set npsfl(1,13) = 44.
50    set npsed(1,13) = 490.
```

Figure 2. EXAMS calculation of dissolved endosulfan concentrations in the pond segment water column of a pond-stream-stream scenario as a result of runoff and spray drift (at 150' downwind) from a cotton field in the Yazoo River basin (MS) in 1974.
[B = Dissolved in Water Column (mg/l)]

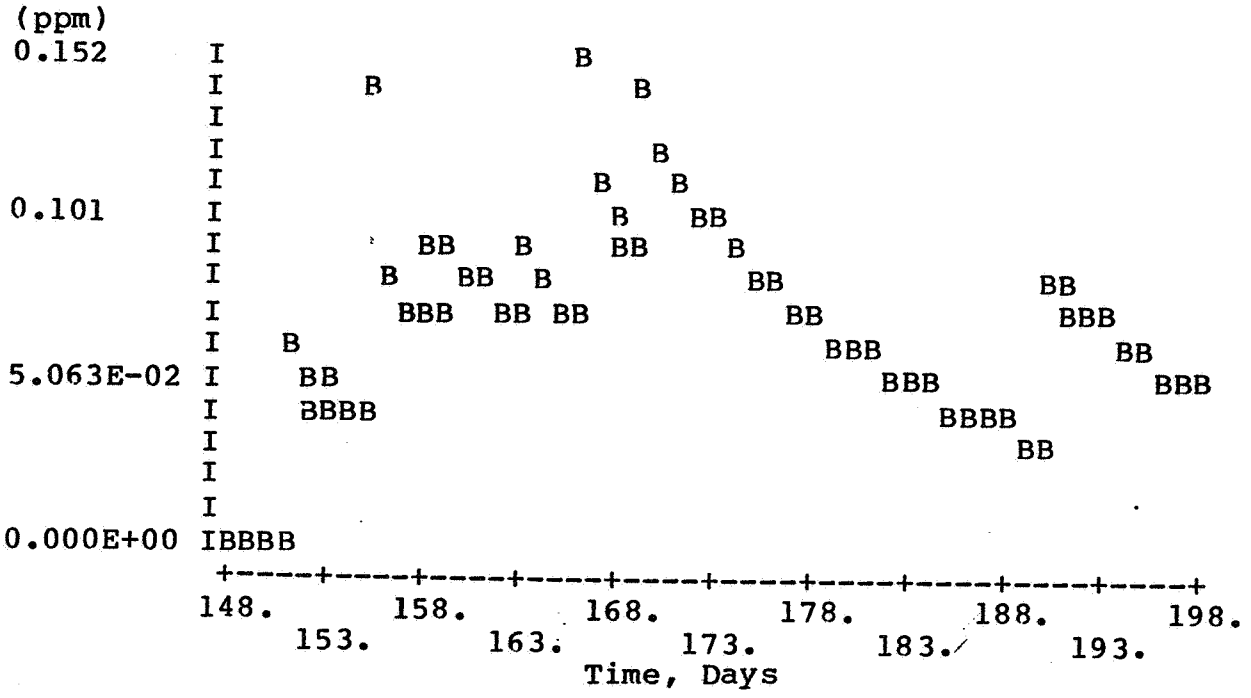


Figure 3. EXAMS calculation of dissolved endosulfan concentrations in all water column segments of a pond-stream-stream scenario as a result of runoff and spray drift (at 150' downwind) from a cotton field in the Yazoo River basin (MS) in 1974.
[B = Dissolved in Water Column (mg/l) Pond Segment;
C = Dissolved in Water Column (mg/l) 1st Stream Segment;
D = Dissolved in Water Column (mg/l) 2nd Stream Segment]

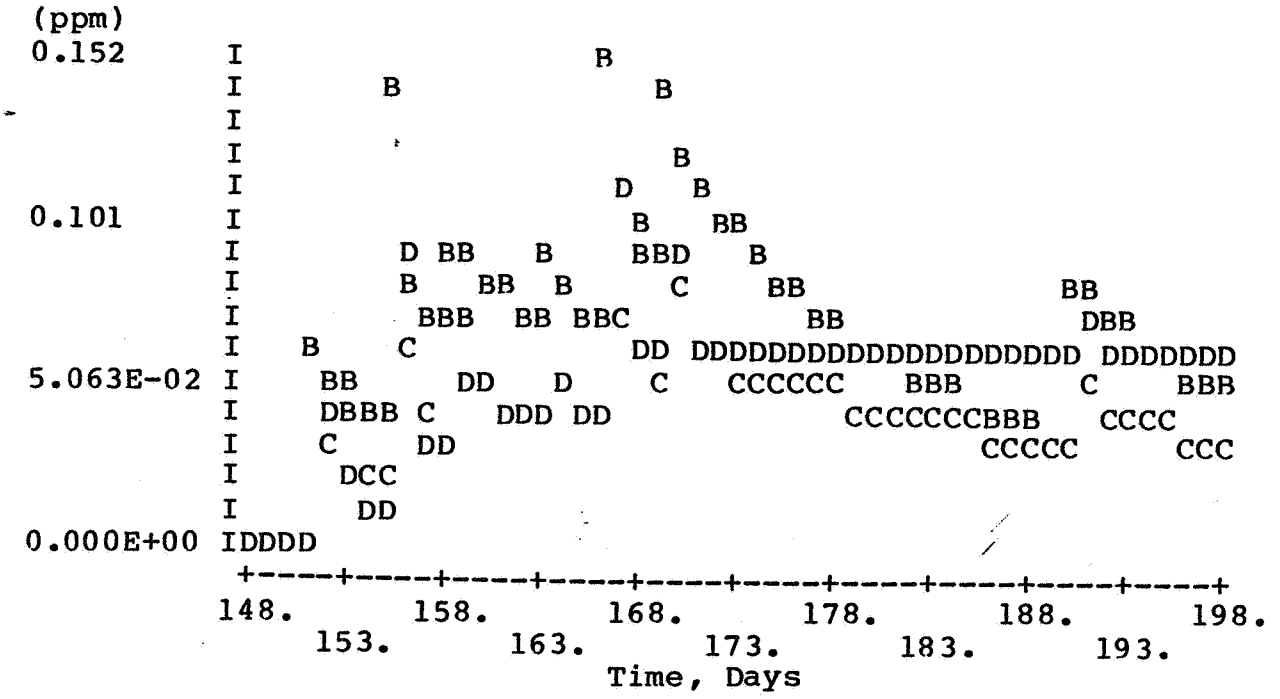
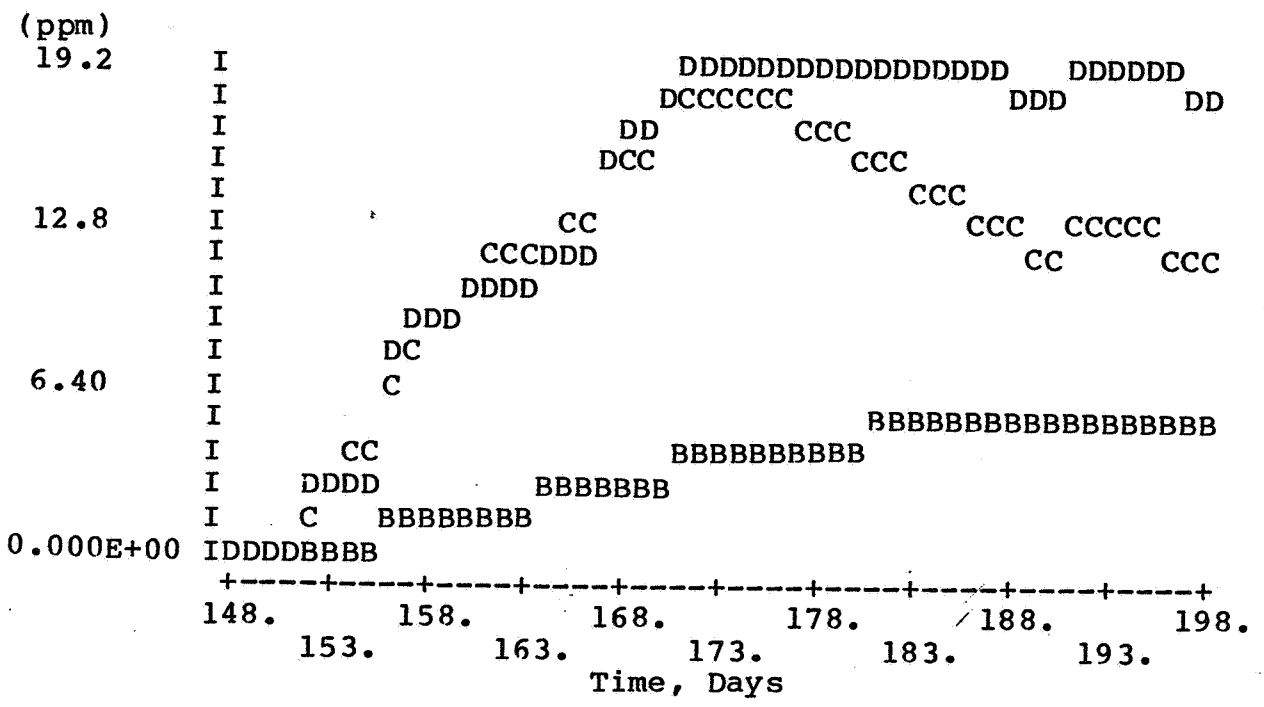


Figure 4. EXAMS calculation of sorbed endosulfan concentrations in all benthic segments of a pond-stream-stream scenario as a result of runoff and spray drift (at 150' downwind) from a cotton field in the Yazoo River basin (MS) in 1974.
[B = Sorbed in Benthos (mg/kg) Pond Benthos;
C = Sorbed in Benthos (mg/kg) 1st Stream Benthos;
D = Sorbed in Benthos (mg/kg) 2nd Stream Benthos]



Appendix

The following tables give the various environmental and physical parameters of the Exposure Analysis Modeling System ecosystem - Georgia Pond-Stream-Stream developed by R.W. Holst.

Table 5. Mean environmental data: hydrologic parameters.**

Seg #	T* y	STFLO m3/hr	STSED kg/hr	NPSFL m3/hr	NPSED kg/hr	SEEPS m3/hr	EVAP mm/mon
1	L	1.43	9.03	6.10E-01	3.87		1.03E+02
2	B						
3	L			6.10E-01	3.87		1.03E+02
4	B						
5	L			6.10E-01	3.87		1.03E+02
6	B						

* Segment types: Littoral, Epilimnetic, Hypolimnetic, Benthic.
** Average of 12 monthly mean values.

Table 6. Mean environmental inputs: sediment properties.**

Seg #	T* y	SUSED mg/L	BULKD g/cm3	PCTWA %	FROC	CEC meq/100g	AEC (dry)
1	L	2.00E+03			1.00E-01	2.50E+01	2.50E+01
2	B		1.85	1.37E+02	5.40E-02	2.50E+01	2.50E+01
3	L	3.95E+03			1.00E-01	2.50E+01	2.50E+01
4	B		1.85	1.37E+02	1.00E-01	2.50E+01	2.50E+01
5	L	3.95E+03			1.00E-02	2.50E+01	2.50E+01
6	B		1.85	1.37E+02	9.80E-02	2.50E+01	2.50E+01

* Segment types: Littoral, Epilimnetic, Hypolimnetic, Benthic.
** Average of 12 monthly mean values.

Table 7. Environmental input data: physical geometry.

Seg #	T* y	VOLume m3	AREA m2	DEPTH m	XSA m2	LENGth m	WIDTH m
1	L	2.00E+04	1.00E+04	2.00		1.00E+02	1.00E+02
2	B	5.00E+02	1.00E+04	5.00E-02		1.00E+02	1.00E+02
3	L	1.50E+02	3.00E+02	5.00E-01		1.00E+02	3.00
4	B	1.50E+01	3.00E+02	5.00E-02		1.00E+02	3.00
5	L	6.00E+02	1.20E+03	5.00E-01		4.00E+02	3.00
6	B	6.00E+01	1.20E+03	5.00E-02		4.00E+02	3.00

* Segment types: Littoral, Epilimnetic, Hypolimnetic, Benthic.

Table 8. Mean miscellaneous environmental input data.**

Seg #	T* y	DFAC m/m	DISO2 mg/L	KO2 cm/hr@20	WIND m/s@10cm	DOC mg/L	CHL pgmt mg/L
1	L	1.19	3.20	8.00	2.00	5.00E-01	2.00E-03
2	B						
3	L	1.19	3.20	8.00	2.00	1.00	2.00E-03
4	B						
5	L	1.19	8.00	1.20E+01	2.00	4.20	2.00E-03
6	B						

* Segment types: Littoral, Epilimnetic, Hypolimnetic, Benthic.
** Average of 12 monthly mean values.

Table 9. Input specifications -- advective transport field.

J_FR_AD	1	3	5
I_TO_AD	3	5	0
ADV_PR	1.00	1.00	1.00

Table 10. Mean dispersive transport field.

J_TURB	1	3	5
I_TURB	2	4	6
XS_TUR m2	1.000E+04	300.	1.200E+03
CHARL m	1.00	1.00	0.255
DSP m2/hr*	2.847E-05	1.000E-04	1.000E-04

* Average of 12 monthly mean values.

Table 11. Mean environmental data: global parameters.

OXRAD (M)	1.00E-09	RAIN(mm/mo)	97.3	CLOUD	3.00	LAT 34.0
OZONE(cm)	0.315	ATURB(km)	2.00	RHUM(%)	50.0	LONG 83.0

ELEV (m): 200.0 Air mass type: R

WLAM, P/cm2/s/N_nm:	1.741E-07	1.577E-03	4.06	4.163E+03	
1.277E+06	8.911E+07	2.279E+09	2.491E+10	1.369E+11	6.079E+11
2.070E+12	4.774E+12	8.740E+12	1.351E+13	1.883E+13	2.397E+13
2.877E+13	5.526E+13	2.232E+14	2.518E+14	2.937E+14	3.132E+14
3.855E+14	3.805E+14	3.666E+14	5.317E+14	7.069E+14	7.339E+14
7.123E+14	8.484E+14	9.607E+14	9.764E+14	1.018E+15	1.048E+15
9.977E+14	1.025E+15	1.086E+15	1.136E+15	1.150E+15	1.171E+15
1.187E+15	1.203E+15	1.209E+15	1.206E+15	1.160E+15	1.111E+15