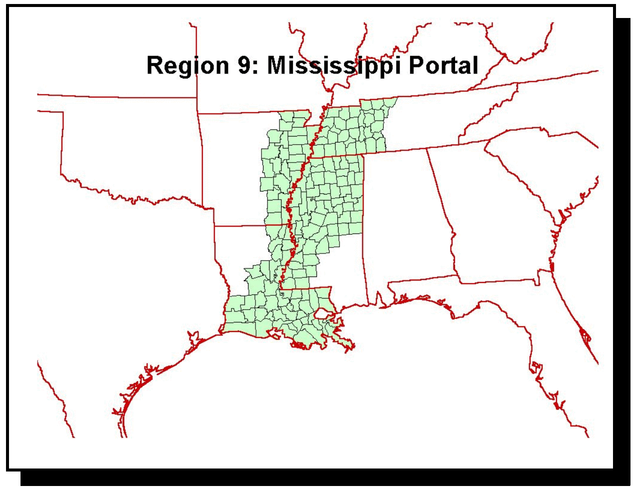
II. Regional Assessments

J. Region 9 - MS Portal Assessment

1. Executive Summary



This module of the Organophosphate (OP) cumulative risk assessment focuses on risks from OP uses in the MS Portal Region (area shown to right). Information is included in this module only if it is specific to the MS Portal, or is necessary for clarifying the results of the MS Portal assessment. A comprehensive description of the OP cumulative assessment comprises the body of the main document; background and other supporting information for this regional assessment can be found there.

This module focuses on the two components of the OP cumulative assessment which are likely to have the greatest regional variability: drinking water and residential exposures. Dietary food exposure are likely to have significantly less regional variability, and are assumed to be nationally uniform. An extensive discussion of food exposure is included in the main document. Pesticides and uses which were considered in the drinking water and residential assessments are summarized in Table II.J.1 below. The OP uses included in the drinking water assessment generally accounted for 95% or more of the total OPs applied in that selected area. Various uses that account for a relatively low percent of the total amount applied in that area were not included in the assessment.

Table II.J.1. Pesticides and Use Sites/Scenarios Considered in MS Portal Residential/Non-Occupational and Drinking Water Assessment

Pesticide	OP Residential Use Scenarios	OP Drinking Water Scenario Uses
Acephate	Golf Courses, Ornamental Gardens	Cotton
Bensulide	Golf Courses	None
Chlorpyrifos	None	Corn
DDVP	Indoor uses	None
Dicrotophos	None	Cotton

Pesticide	OP Residential Use Scenarios	OP Drinking Water Scenario Uses
Dimethoate	None	Corn, Cotton
Disulfoton	Ornamental Gardens	Cotton
Fenamiphos	Golf Courses	None
Fenthion	Public Health	None
Malathion	Lawn Applications, Golf Courses, Home Fruit & Vegetables, Ornamental Gardens, Public Health	Cotton
Methamidophos	None	Cotton
Methyl-parathion	None	Cotton, Soybean
Phorate	None	Cotton
Profenofos	None	Cotton
Terbufos	None	Corn
Trichlorfon	Golf Courses, Lawn applications	None
Tribuphos	None	Cotton
Tebupirimphos	None	Corn

This module will first address residential exposures. The residential section describes the reasons for selecting or excluding various use scenarios from the assessment, followed by a description of region-specific inputs. Detailed information regarding the selection of generic data inputs common to all the residential assessments (e.g., contact rates, transfer coefficients, and breathing rate distributions, etc.) are included in the main document. The only major sources of potential residential exposure not included in this assessment are from pet treatments. Risks for pet uses tend to be relatively high; mitigation is being considered as part of the aggregate assessment for individual pesticides.

Drinking water exposures are discussed next. This will include criteria for the selection of a sub-region within the MS Portal for modeling drinking water residues, followed by modeling results, and finally characterization of the available monitoring data which support use of the modeling results. This assessment accounted for all OP uses within the selected location that are anticipated to contribute significantly to drinking water exposure.

Finally a characterization of the overall risks for the MS Portal region is presented, focusing on aspects which are specific to this region.

In general, the risks estimated for the MS Portal show a similar pattern to those observed for other regions. Drinking water does not contribute to the risk picture in any significant way at the upper percentiles of exposure. At these higher percentiles of population exposure, residential exposures are the major source of risk - in particular inhalation exposure. For children at still higher percentiles, oral exposure through hand-to-mouth activity is predominant. These patterns occur for all population sub-groups, although potential risks appear to be higher for children than for adults regardless of the population percentile considered.

2. Development of Residential Exposure Aspects of MS Portal Region 9

In developing this aspect of the assessment, the residential exposure component of Calendex was used to evaluate predicted exposures from residential uses. Except for golf course uses, this assessment is limited to the home as are most current single chemical assessments. Additional work is needed to account for an individual's time spent in areas outside of the home (e.g., schools, workplace ,etc.). The residential component of the assessment incorporates dermal, inhalation, and non-dietary ingestion exposure routes which result from applications made to residential lawns (dermal and non-dietary ingestion), golf courses, ornamental gardens, home fruit and vegetable gardens, public health uses and indoor uses. These scenarios were selected because they are expected to be the most prominent contributors to exposure in this region. No pet uses were considered since these will be dealt with as part of the aggregate risk assessments for individual pesticides. Additional details regarding the selection of the scenario-pesticide pairs can be found in Part I of this document. OPP believes that the majority of exposures (and all significant exposures) in this region have been addressed by the scenarios selected.

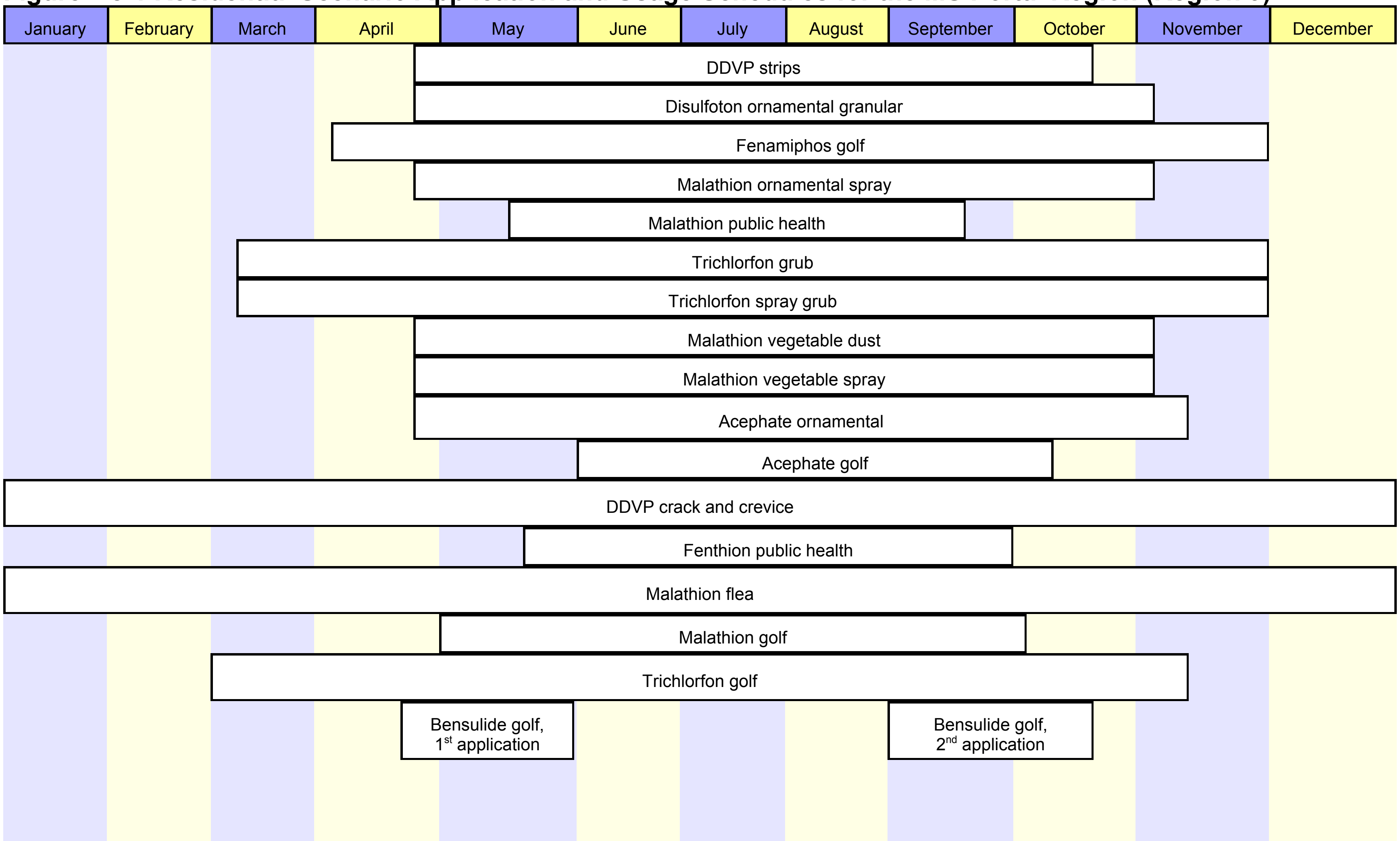
The data inputs to the residential exposure assessment come from a variety of sources including the published, peer reviewed literature and data submitted to the Agency to support registration and re-registration of pesticides. Generic scenario issues and data sources are discussed in Part I of this report. However, a variety of additional <u>region-specific</u> ancillary data was required for this assessment of the MS Portal. This information includes region-specific data on pesticide application rates and timing, pesticide use practices, and seasonal applications patterns, among others. The Gaant chart shown in Figure II.J.1 displays and summarizes the various region-specific residential applications and their timing (including repeated applications) over the course of a year which were used in this assessment. Specific information and further details regarding these scenarios, the Calendex input parameters, and the pesticides for which these scenarios were used is presented in Table II.J.2 which summarizes all relevant region-specific scenarios.

Table II.J.2. Use Scenarios and Calendex Input Parameters for MS Portal Residential Exposure Assessment

Chemical	Use Scenario and Pest	Appln. Method	Amount Applied lb ai/A	Maximum Number and Frequency of Applns.	Seasonal Use	% use LCO	% use HO	% users	Active Exposure Period (days)	Exposure Routes
Acephate	Golf Courses	NA	5	1/yr	June-Oct.	100	--	1.22	10	dermal
	Ornamentals	hand pump sprayer	0.934-2	4/yr	April-Nov.	--	100	6	1	dermal, inhalation
Bensulide	Golf Courses	NA	12.5	2/yr	April-May Sept-Oct.	100	--	4.27	14	dermal
DDVP	Crack/Crevicee	spray can	0.72-2.5 mg	1/mth	Jan-Dec.	--	100	8	42	inhalation
	Pest Strips	strip	NA	3/yr	April-July July-Oct.	NA	100	2.5	90	inhalation
Disulfoton	Ornamentals	granular	8.7	3/yr	April-Nov.	--	100	2	1	dermal, inhalation
Fenamiphos	Golf Courses	NA	116	1/yr	April-Dec.	100	--	1	1	dermal
Fenthion	Public Health	aerial & ground	NA	9/yr	May-Oct.	10	--	8.39	2	dermal, oral
Malathion	Golf Courses	spray	NA	1/yr	May-Oct.	100	--	1.22	4	dermal
	Lawns	hose end spray	5 lb ai	1/yr	Jan-Dec.	19	81	1.54	4	dermal, oral inhalation
	Ornamentals	hand pump spray	0.94-2 lb/A	4/yr	April-Nov.	--	100	3.7	1	dermal, inhalation
	Public Health Mosquitoes	aerial & ground	NA	9/yr	May-Sept.	100	--	55.4	2	dermal, oral
	Vegetable Gardens	hand duster	1.5 lb/A	5/yr	April-Nov.	--	100	1.1	14 1	dermal, inhalation
		hand pump sprayer	1.5 lb/A	5/yr	April-Nov.	--	100	1.1	7 1	dermal inhalation
Trichlorfon	Golf Courses	NA	8 lb ai	1/yr	March-Nov.	100	--	1.22	1	dermal

Chemical	Use Scenario and Pest	Appln. Method	Amount Applied lb ai/A	Maximum Number and Frequency of Applns.	Seasonal Use	% use LCO	% use HO	% users	Active Exposure Period (days)	Exposure Routes
	Lawns Granular	rotary spreader	8 lb ai	1/yr	March-Dec.	8	92	1	1 2	inhalation dermal, oral
	Lawns Spray	hose end sprayer	8 lb ai	1/yr	March-Dec.	8	92	1	1 2	inhalation dermal, oral

Figure II.J.1 Residential Scenario Application and Usage Schedules for the MS Portal Region (Region 9)



a. Dissipation Data Sources and Assumptions

i. Acephate

A residue dissipation study was conducted on Bahia grass in Florida with multiple residue measurements collected for 10 days after treatment (Days 0, 1, 2, 3, 5, 7, and 10 days). A uniform distribution bounded by the high and low residue measurements of each day was used to represent these daily measurements. No half-life value or other degradation parameter was used, with the current assessment based instead on the time-series distribution of actual residue measurements. The uniform distribution reflects a range of spray and granular measurements

ii. Bensulide

A residue dissipation study was conducted with multiple residue measurements collected for up to 14 days after treatment. For each day following application, a residue value from a uniform distribution bounded by the low and high measurements was selected (the day zero distribution consisted of measurements collected immediately after application and 0.42 day after treatment). No half-life value or other degradation parameter was used, with the current assessment based instead on the time-series distribution of actual measurements. Residues measured at day 7 were assumed to be available and to persist to day 10 and day 10 measurements to persist to day 14.

iii. Malathion

A residue degradation study was based on a 3-day study conducted on a cool-season grass in Missouri, North Carolina, and Pennsylvania (application rate of 5 lb ai/acre). These measured residue values were entered into the Calendex software as a time series distribution of 4 values (Days 0, 1, 2, and 3). For use on home lawns for assessing non-dietary ingestion for children, these values were multiplied by a value selected from a uniform distribution bounded by 1.5 and 3 to account for wet hand transfer.

A residue dissipation study was conducted with multiple residue measurements collected up to 7 days after treatment in Pennsylvania. This was used for vegetable gardening in eastern regions 1,2,3,4,5,6,9, and 12. A value selected from a uniform distribution bounded by the low and high measurements was used for each day after the application. Since the study was conducted at a one pound ai per acre treatment rate, the residues were adjusted upwards by a 1.5 factor to account for the 1.5 pound ai per acre rate for vegetables.

iv. Fenamiphos

Snyder et al., 1999 collected residue dissipation data on the day of and day after application following the application of fenamiphos on a golf course. Only mean measurements were collected.

v. Trichlorfon

Residue values from a residue degradation study for the granular and sprayable formulations were collected for the “day of” and “day following” the application. A uniform distribution bounded by the low and high residue measurements was used, with these residue values adjusted upwards to simulate the higher active ingredient concentrations in use (i.e., adjusted to 0.5% and 1% for granular and sprayable formulations respectively). These distributions also reflect actual measurements including those based on directions to water in the product. For use on home lawns, these values were multiplied by a value selected from a uniform distribution bounded by 1.5 and 3 to account for wet hand transfer for assessing non-dietary ingestion for children.

3. Development of Water Exposure Aspects of Mississippi Portal Region

Because of the localized nature of drinking water exposure, the water exposure component of this assessment focused on a specific geographic area within the Mississippi Portal. The selection process considers OP usage, the locations and nature of the drinking water sources, and the vulnerability of those sources to pesticide contamination. An extensive discussion of the methods used to identify a specific location within the region is included in the main document. The following discussion provides the details specific to the Mississippi Portal regional assessment for drinking water exposure with respect to cumulative exposure to the OP pesticides. The discussion centers on four main aspects of the assessment: (1) the selection criteria for the specific location in northeastern Louisiana and west-central Mississippi (on either side of the Mississippi River) used for the drinking water assessment for the Mississippi Portal, (2) highlights of the results of the model outputs (predicted cumulative concentrations of OPs in surface water) for those OP-crop uses included in this regional assessment, (3) a summary and comparison of the predicted concentrations used in the Mississippi Portal assessment with actual surface water monitoring data for the region, and (4) a summary of water monitoring data used for site selection and evaluation of the estimated drinking water concentrations for the region.

a. Selection of Northeastern Louisiana for Drinking Water Assessment

Drinking water derived from surface water is more likely to be contaminated with OPs than ground water in the Mississippi Portal region. The majority of the surface water intakes for drinking water are located outside the major OP-use area in the region. The high-use region around northeastern Louisiana and west central Mississippi has few surface water intakes, but represents the most vulnerable area in the region in terms of OP usage and runoff vulnerability. Transport of pesticides in surface water is complicated by leveeing of the Mississippi River and a system of drainage canals. As noted in the discussion on drinking water sources and on monitoring, the ground-water aquifers used for drinking water in this region tend to be protected by relatively impermeable overlying materials. While a surface water assessment using the index reservoir may be less representative of actual drinking water sources in this region than in other regions, it is likely to be health-protective for the region. If the estimated drinking water concentrations are a significant driver in the regional cumulative assessment, refinements need to focus on drinking water facilities in the lower-use areas of the region and on facilities that use the Mississippi River as a source of drinking water.

Total OP usage is relatively high in the Mississippi Portal. In 1997, approximately 8.5 million pounds (ai) of OPs were applied in on agricultural crops in this region. Cotton is the dominant OP-use crop in the region, accounting for approximately 90 percent of the total use (Table II.J.3).

Table II.J.3. General Overview of OP Usage in the Mississippi Portal

Crops	Primary Production Areas	Total Pounds Applied	Percent of Total OP Use
Cotton	Either side of the Mississippi River, from northeastern LA northward	7,695,000	90
Rice	West side of Mississippi River, from eastern AR to southwest LA	273,000	3
Corn	Northeastern LA, western MS and north	161,000	2
Soybeans	Higher use on west side of Mississippi River	199,000	2
Sugarcane	Southern LA	99,000	1
		8,562,000	98

(1) Source: NCFAP, 1997.

Figure II.J.2 shows the highest OP-use areas are on either side of the Mississippi River, predominantly in western Mississippi and northeastern Louisiana. Because of the high OP use and vulnerability to runoff, OPP focused on this areas for its drinking water assessment.

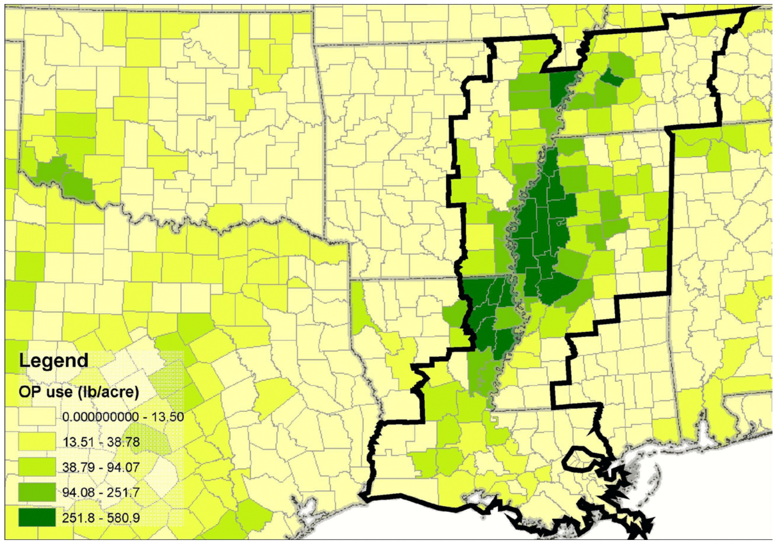


Figure II.J.2. Total OP usage (pounds per area) in the Mississippi Portal (source: NCFAP, 1997)

In the high-use counties in northeastern Louisiana and those counties directly across the Mississippi River in west-central Mississippi, OP use on cotton accounted for 95 percent of total agricultural use. The latest NASS usage data found that 15 OP-crop combinations accounted for 98 percent of OP usage in these counties (Table II.J.4). As discussed below, these uses were used to develop the drinking water assessment for this region.

Table II.J.4. OP Usage on Agricultural Crops in Northeast Louisiana and West-Central Mississippi

OP Usage/ Agricultural Crops				Cropland Acreage, Assessment Area	
Crop Group	**Crops**	**OP Usage**	**Percent of Total OP Use**	**Acres**	**Pct of total Cropland**
Cotton	Cotton	4,289,000	1	533,000	34
Corn	Corn, sweet corn	40,000	95	241,000	15
Soybeans	Soybeans	86,000	2	370,000	24
			98	1,144,000	73

Pesticide use based latest data collected by USDA National Agricultural Statistics Service (NASS). Acreage estimates based on LA Agricultural Statistics Service and reflect only the acreage in the eastern LA counties. Details on the sources of usage information are found in Appendix III.E.8.

Surface water sources of drinking water occur primarily in western Tennessee, in the northeast corner of the region, and in southern Louisiana, in the southern end of the region. The central portion of the region, on either side of the Mississippi River, is more vulnerable to runoff (Figure II.J.3). The largest concentration of people drinking from surface water is in southeastern Louisiana (including New Orleans), drawing from the Mississippi River. About one-third of the drainage of the Mississippi Embayment is to the Mississippi River. The remainder of the surface drainage is to the Gulf of Mexico through rivers and streams in southern Louisiana, Mississippi and Alabama.

The Atchafalaya River, which drains to the Gulf of Mexico, is the drinking water source for more than 60,000 people, through ox-bow lakes. The Red, Black and Ouachita Rivers all drain to the Atchafalaya at least indirectly. Another 70,000 or so in the Monroe area drink from reservoirs located in cotton areas. There are plans for a new treatment plant there with advanced treatment facilities.

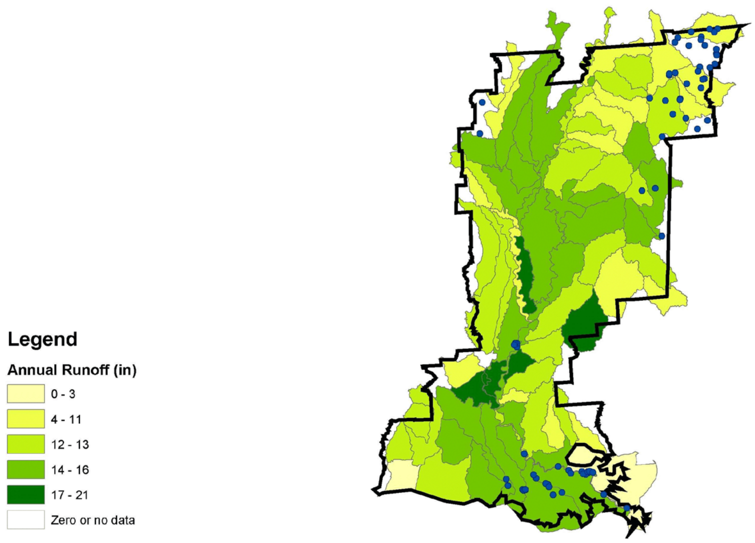


Figure II.J.3. Locations of surface water intakes of drinking water (shown as dots) in relation to average annual runoff (color gradation) in the Mississippi Portal Region

Ground water is the major source of drinking water for a significant area of the region, north of Baton Rouge, LA, and south of western Tennessee. Ground water is derived predominantly from confined or semi-confined aquifers which underlie the entire Mississippi Portal. Significant amounts of water are also drawn from younger alluvium which occurs at the surface or under 10 to 50 feet of relatively recently deposited silt and clay. Although the alluvial aquifer is mostly used for irrigation, there is some domestic use for drinking water. In general, while OP contamination is possible, ground-water contamination with pesticides is less likely in the Mississippi Portal than most of the rest of the nation.

The Mississippi Portal draws drinking water from three distinct aquifer systems which make up the Mississipi Embayment Aquifer system. The majority of drinking water north of Baton Rouge is drawn from Tertiary age aquifers which are both deep and confined throughout most of the region. This aquifer system, which includes multiple confining layers, is overlain in much of the region by the Mississippi River Valley Alluvial Aquifer. In central to southern Louisiana, the Vicksburg-Jackson confining layer separates the Mississippi Embayment Aquifer system from the coastal lowlands aquifer system defined by the USGS Regional Aquifer-System Analysis program.

The Mississippi Embayment aquifer system extends 160,000 square miles in parts of six states, including the entirety of the Mississippi Portal Farm Resource Region. This system includes six regional aquifers which constitute the most important source of ground water used for drinking water in the Mississippi Portal. The main recharge area for the five aquifers below the alluvial aquifer occurs at their eastern outcrops in Mississippi and western Tennessee, although ground-water pumping has reversed natural flow to draw water down from the Mississippi River alluvial aquifer.

Natural ground-water flow in the five aquifers is southwest and down from the recharge area, then up in the center of the basin. The five aquifers are hydraulically interconnected, although flow within individual aquifers is much quicker than that between aquifers, due to lower permeability in the confining layers that separate them.

The structure of the aquifer system, and the presence of multiple confining layers, reduces the likelihood of drinking-water contamination for large sections of the Mississippi Portal region. The middle Claiborne aquifer, for instance, accounts for 76% of pumpage from the Embayment aquifers. This aquifer is in hydrologic connection with the surface in outcrop areas in Mississippi and western Louisiana. However, OPs used in the center of the basin are much less likely to contaminate water drawn from that same aquifer, due to depth and the intervening confining layers. Given the amount of time needed to travel from the recharge area to the deeper center of the syncline, the water would likely have infiltrated the surface before OPs were in use.

The Tertiary aquifers are only in direct hydraulic connection with the overlying alluvial aquifer in a small portion of the Embayment. However, pumping has increased the possibility of contamination traveling from the alluvial aquifer to the underlying Embayment aquifers. Natural recharge was from the Embayment aquifers up to the alluvial aquifer. However, due to the influence of groundwater pumping for irrigation and public supply, water from the alluvial aquifer now recharges the Embayment aquifer in some areas.

USGS sampled from the Tertiary aquifers in the NAWQA program. Thirty sampling sites throughout the Mississippi Embayment were sampled one time in 1996. Only the shallowest of the wells, which ranged in depth from 208 to 1460 feet, had any detections of pesticides. Bromacil and de-ethyl atrazine were both detected at sub part-per-billion concentrations. OPs were not among the pesticides detected in domestic and public supply wells.

The Mississippi River Valley Alluvial aquifer system extends from northeastern Louisiana to the northernmost extent of the Mississippi Embayment in southeastern Missouri (http://capp.water.usgs.gov/gwa/ch_f/gif/F066.GIF). This sand and gravel aquifer, which ranges from 60 to 140 feet in thickness, overlies the less permeable aquifers and confining layers of the Tertiary-age Mississippi Embayment aquifer system. The Mississippi Valley Alluvial aquifer system is itself overlain over most of its extent by a 10 to 50-foot confining unit of silt, clay and fine-grained sand which is thicker to the south(USGS Professional Paper 1416-D).

Water from this alluvial aquifer "is used for public supply, usually with treatment, only where an adequate supply of water of better quality is not available from deeper aquifers" (Prof. Paper 1416-D). Domestic wells in the alluvial aquifer are at least 50 to 200 feet deep in Louisiana (Karen Irion, personal communication). Eighty percent of the water withdrawn from this aquifer (in 1988) was for rice irrigation, and another 10% for other crops. A significant portion of the remaining use is for aquaculture. Pesticides detected more often by NAWQA in alluvial wells than in the Tertiary supply wells. However, there were no detections of OPs in ground water.

The Coastal Lowlands aquifer system overlies both the Tertiary and Mississippi River Valley Alluvial aquifers from Texas through southern and central Louisiana into southern Mississippi (Water Atlas 730-F). Included in the Coastal Lowlands system are the Chicot aquifer of southwest Louisiana and the Southern Hills aquifer, which extends from southeastern Louisiana north of Baton Rouge up into southwestern Mississippi. These aquifers are "sole source" aquifers that are susceptible to contamination http://www.epa.gov/earth1r6/6wq/swp/ssa/gif/ssa.gif .

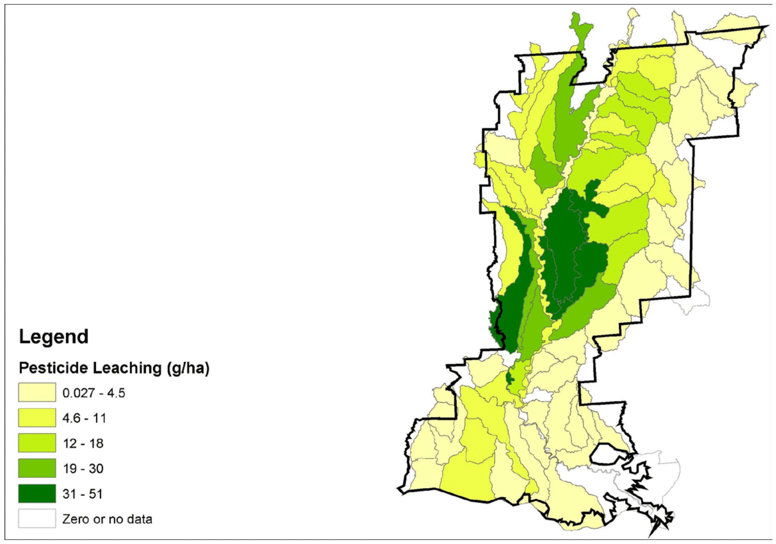


Figure II.J.4. Vulnerability of ground water resources to pesticide leaching in the Mississippi Portal, adapted from USDA (Kellogg, 1998)

Drinking water derived from surface water is more likely to be contaminated with OPs than ground water. OPs have been detected in surface water at low concentrations. Transport of pesticides in surface water is complicated by leveeing of the Mississippi River in Lousiana and the system of drainage canals in southern Louisiana. While agricultural areas around tributaries can potentially contribute to contamination of drinking water supplies, drainage from fields along leveed portions of the Mississippi River may follow the longer path through drainage canals to a potential drinking water supply.

b. Cumulative OP Concentration Distribution in Surface Water

The Agency estimated drinking water concentrations in the Mississippi Portal cumulative assessment using PRZM-EXAMS output with various input parameters that are specific, where possible, to northeast Louisiana or west-central Mississippi. Table II.J.5 presents pesticide use statistics for the OP-crop combinations which were modeled in this regional assessment. Chemical-, application- and site-specific inputs into the assessments are found in Appendices III.E.5-7. Sources of usage information can be found in Appendix III.E.8. Based on the latest available USDA National Agricultural Statistics Service (NASS) usage data, these uses represent roughly 98 percent of agricultural use of OP pesticides in the assessment area.

Table II.J.5. OP-Crop Combinations Included in the Mississippi Portal Assessment, With Application Information Used in the Assessment

Chemical	Crop/ Use	Pct. Acres Treated	App. Rate, lb ai/A	App Meth/ Timing	Application Date(s)	Range in Dates (most active dates)
Chlorpyrifos	Corn	4	0.76	Ground; Planting	Mar 27	Mar 10-Apr28 (Mar 19- Apr 4)
Dimethoate	Corn	5	0.43	Aerial; Foliar	Jun 23	May15-Jul31
Tebupirimphos	Corn	8	0.08	Ground; Planting	Mar 27	Mar 10-Apr28 (Mar 19- Apr 4)
Terbufos	Corn	12	0.82	Ground; Planting	Mar 27	Mar10-Apr28 (Mar 19- Apr 4)
Acephate	Cotton	41	0.35	Ground; Planting-Foliar	May 6	Apr17-Aug31
				Air; Planting-Foliar	Jun 24	
Dicrotophos	Cotton	20	0.27	Ground; Foliar	May 1	May1-Aug 31
				Air; Foliar	Jul 1	
Dimethoate	Cotton	3	0.26	Ground; Foliar	Jun15	Jun15-Jul31
				Air; Foliar	Jul 8	
Malathion	Cotton	77	0.87	Ground; Foliar	May 1, May 20, Jun 8	May1-Oct20
				Air; Foliar	Jun 27, Jul 16, Aug 4, Aug 23, Sep 11, Sep 30	
Methamidophos	Cotton	4	0.38	Air; Foliar	Jul 1	May 1-Aug 31
Methyl parathion	Cotton	4	0.39	Ground; Foliar	Jun 15	Jun15-Aug31
				Air; Foliar	Jul 4, Jul 23, Aug 11	
Phorate	Cotton	3	0.61	Ground; Planting	May 6	Apr17-Jun15 (Apr 26-May 16)
Profenofos	Cotton	2	0.86	Ground; Foliar	Jun 15	Jun15-Aug31
Tribufos	Cotton	49	0.68	Air; Harvest	Sep. 2	Sep15-Nov13 (Sep 28 - Oct 20)
Disulfoton	Cotton	2	0.74	Ground; Foliar	May 23	May1-Jun15
Methyl parathion	Soybean	32	0.46	Air; Foliar	Aug. 31	Aug1-Sep30

Figure II.J.5 displays 20 years of predicted OP cumulative concentrations for the Mississippi Portal drinking water assessment. This chart depicts peaks occurring each year, with years 17 and 18 having OP cumulative concentration levels exceeding 4 ppb in methamidophos equivalents.

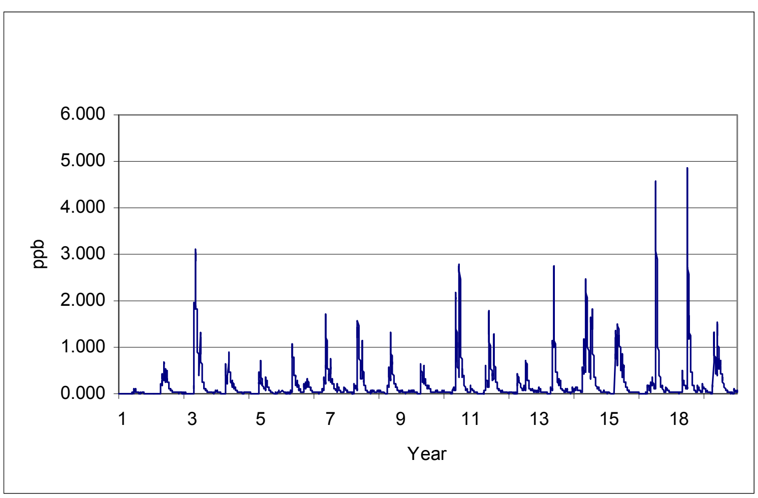


Figure II.J.5. Cumulative OP Distribution in Water in the Mississippi Portal (Methamidophos equivalents)

Figure II.J.6 overlays all 20 years of predicted values over the Julian calendar. Here, for example, each of the 20 yearly values associated with February 1st (i.e., Julian Day 32) are graphed such that the spread of concentration associated with February 1st (over all years) can readily be seen. This chart indicates that OP concentrations follow a recurring pattern each year, with a little peak occurring about day 100 (early April), a bigger peak occuring about day 120 (end of April), and a still bigger peak occurring at about day 170 (late June).

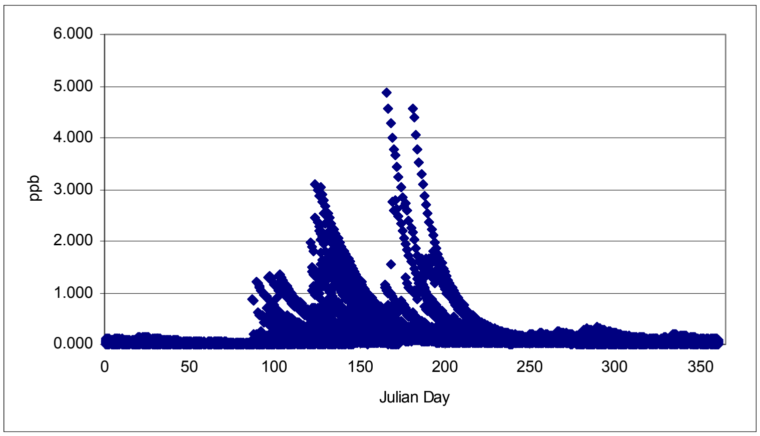


Figure II.J.6. Cumulative OP Distribution in Water (Methamidophos Equivalents) in the Mississippi Portal, summarized on daily basis over 20 years

Figure II.J.7 depicts the predicted OP cumulative concentration for uses that made significant contributions during Year 18, the year in which the highest modeled concentration occurred. Profenophos use on cotton was the primary contributor to that peak. Other uses (e.g., phosmet on corn) accounted for smaller peaks during the spring and late summer. It is important to note that these concentrations are converted to methamidophos equivalents based on relative potency factors. Thus, the relative contributions are the result of both individual chemical concentrations in water and the relative potency factor of each of the OP chemicals found in the water. In the case of profenofos, a surrogate relative potency factor that was roughly an order of magnitude greater than that of dicrotophos, another OP used on cotton, greatly impacted its relative contribution to the cumulative OP load.

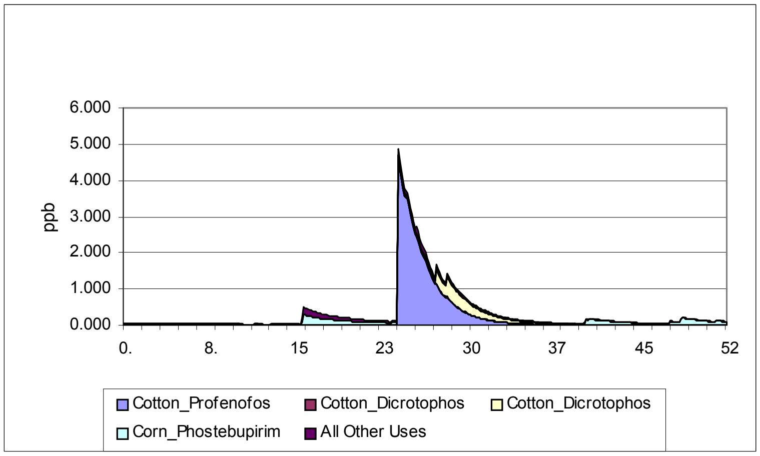


Figure II.J.7. Cumulative OP Distribution for an Example Year (Year 18) in the Mississippi Portal Region Showing Relative Contributions of the Individual OPs in Methamidophos Equivalents

c. A Comparison of Monitoring Data versus Modeling Results

The maximum detect from the USGS NAWQA study (summarized below and in Appendix III.E.1) for **chlorpyrifos** was an order of magnitude greater than the maximum estimated concentration (Table II.J.6). The estimated maximum concentration is roughly equivalent to the 90th percentile concentration in the monitoring data. The maximum detect for **methyl parathion** in NAWQA was four times greater than the maximum estimated concentration. The estimated peak concentration falls somewhere between the 95th and 99th percentile of monitoring data. The maximum detect for **disulfoton** in NAWQA was an order of magnitude greater than the estimated maximum concentration, which was less than the analytical limit of detection (LOD) for disulfoton in the USGS study. On the other side, the maximum estimated concentration for **malathion** was an order of magnitude greater than the highest NAWQA detection, which fell between the 95th and 99th percentile in the estimated distribution.

Table II.J.6. Percentile Concentrations of Individual OP Pesticides and of the Cumulative OP Distribution, 20 Years of Weather

Chemical	Crop/Use	Concentration, ug/L (ppb)						
		Max	99th	95th	90th	80th	75th	50th
Acephate	Cotton	4.6e+00	7.4e-01	1.1e-01	2.8e-02	1.6e-03	2.2e-04	3.9e-07
Chlorpyrifos	Corn	3.7e-02	1.6e-02	7.0e-03	3.9e-03	1.8e-03	1.3e-03	5.3e-04
Dicrotophos	Cotton	1.5e+00	6.3e-01	2.9e-01	1.4e-01	4.7e-02	2.7e-02	9.7e-04
Dimethoate	Corn, Cotton	2.1e-01	6.1e-02	1.3e-02	6.3e-03	1.3e-03	4.6e-04	1.0e-05
Disulfoton	Cotton	1.3e-02	1.1e-02	6.4e-03	4.9e-03	3.1e-03	2.7e-03	1.3e-03
Malathion	Cotton	1.4e+01	1.8e+00	4.2e-01	2.5e-01	8.5e-02	5.0e-02	1.5e-03
Methamidophos	Cotton	7.2e-01	8.1e-02	7.7e-03	1.0e-03	1.2e-05	6.8e-07	8.4e-09
Methyl Parathion	Cotton, Soybeans	1.5e-01	8.1e-02	4.4e-02	2.3e-02	1.0e-02	6.7e-03	1.7e-04
Phorate	Cotton	5.6e-01	8.7e-02	4.2e-03	1.1e-04	8.9e-08	1.5e-09	3.6e-15
Profenofos	Cotton	1.8e-01	2.7e-02	3.8e-03	9.7e-04	9.1e-05	3.0e-05	3.3e-07
Phostebupirim	Corn	3.6e-02	1.5e-02	7.3e-03	4.5e-03	2.5e-03	2.1e-03	9.5e-04
Terbufos	Corn	1.0e+00	3.5e-01	1.2e-01	6.8e-02	2.1e-02	1.2e-02	4.9e-04
Tribufos	Cotton	3.3e-01	2.2e-01	1.7e-01	1.2e-01	7.6e-02	6.6e-02	4.4e-02
OP Cumulative Concentration (in ppb methamidophos equivalents)		4.9e+01	2.0e+01	1.0e+01	5.8e-01	2.6e-01	1.8e-01	5.3e-02

In evaluating these comparisons, it is important to realize that the estimated cumulative OP concentrations used in the exposure assessment represent concentrations that would occur in a reservoir, and not in the streams and rivers represented by the NAWQA sampling. The sampling frequency of the NAWQA study (sample intervals of 1 to 2 weeks apart or less frequent) was not designed to capture peak concentrations, so it is unlikely that the monitoring data will include true peak concentrations. As noted earlier, the surface-water hydrology in this region is complicated by levees along the Mississippi River and by a system of drainage canals. The main document provides a characterization of what the water exposure estimates represent and includes an analysis of the factors that most influence these estimated concentrations.

d. Summary of Available Monitoring Data for the Mississippi Portal

The **Mississippi Embayment NAWQA** study unit extends from northeast Louisiana along the Mississippi River as it forms the borders of Mississippi, Arkansas, Tennessee and Missouri. According to USGS, 62% of the area is used for agriculture, up to 90% in areas of intensive row-crop agriculture. About 94% of drinking water supplies in this study unit were derived from ground water in 1995 (USGS Circular 1208).

As mentioned above, none of the nine active OPs included as analytes were detected in ground water studies in this study unit. Thirty public-supply wells screened in the deep Tertiary aquifers, which represent the most important drinking water source in the study unit, were sampled once each in 1996. Fifty-four irrigation wells in surficial sedimentary aquifers were also sampled a single time. Another 32 wells screened in the shallow, unconfined

Memphis aquifer, but this is not an area of significant OP use.

Surface-water sampling resulted in the detection of multiple OPs. Sampling programs included three agricultural streams, one mixed use stream, and one urban stream sampled at least biweekly for two years. In addition, 38 sites from “streams that drained all major crop types grown in the Study Unit” were sampled once each (USGS Circular 1208).

Diazinon and chlorpyrifos were detected in 96% and 100% of urban stream samples, respectively. They were detected in 4% and 6% of agricultural stream samples. Malathion was detected in 56% of urban, 36% of mixed use, and 11% of agricultural samples, with a maximum concentration of 0.616 ug/l (agricultural).

Other OPs were detected in surface water as well. Methyl-parathion was detected in 10% of samples, with a maximum concentration of 0.422 ug/l. Azinphos-methyl was detected in 5 samples, with a maximum detected concentration of 1.0 ug/l. Disulfoton was detected in three samples, with a maximum detection of 0.213 ug/l. Phorate was detected once at 0.2, ethoprop once at 0.206 ug/l, and terbufos twice, with a maximum concentration of 0.173 ug/l.

The U.S. Geological Survey (USGS) Organic Geochemistry Research Group (OGRG) designed a cotton pesticide monitoring study, the results of which are published as the May 1998 USGS Fact Sheet 022-98, “Occurrence of Cotton Pesticides in Surface Water of the Mississippi Embayment.” The OGRG collected weekly samples at 8 fixed sites, and collected single samples at another 56 sites in 1996.

Seven different OPs were detected in this study above a detection limit of 0.01 ug/l (http://ks.water.usgs.gov/Kansas/pubs/fact-sheets/fs.022-98.fig.8.gif). Dicrotophos was detected in 35% of samples, methyl parathion in 18%, and profenofos and malathion in 12%. Sulprofos, chlorpyrifos and azinphos-methyl were also detected. The 90th percentile concentration detected for all OPs was 0.3 ug/l or less.

The high rate of detection in this study correlates to high use of these OPs on cotton. Methyl parathion, profenofos and dicrotophos are applied extensively to cotton. The OGRG reported that although profenofos was used three times as much as dicrotophos, dicrotophos was much more frequently detected. This is consistent with the shorter persistence of profenofos.

Two sampling stations in the Mississippi Portal region are included in the NASQAN program. The results of sampling from 1996 to 1999 can be found at http://water.usgs.gov/nasqan/data/statsum/atchafalaya.html for the Lower Atchafalaya River at Melville, Louisiana site, and at http://water.usgs.gov/nasqan/data/statsum/st.francis.html for the Mississippi River at St. Francisville, Louisiana site.

Diazinon, chlorpyrifos and malathion were the most frequently detected OPs at these sites, which is consistent with surface-water data in most monitoring studies. Diazinon was detected in 57% and 48% of the 68 and 65 samples from the Mississippi River and Atchafalaya River, respectively, with a maximum concentration of 0.024 ug/l at both sites. Malathion was detected in 10% and 12% of samples, with a maximum concentration of 0.036 ug/l (Atchafalaya River). Chlorpyrifos was detected in 3% and 9% of samples, respectively, with a maximum concentration of 0.018 ug/l (Mississippi River). The concentrations detected were not high, but the detection of these OPs at any concentration in these large rivers is significant, given their volume.

Methyl parathion was the only other OP detected in this set of samples. It was detected in 1 sample in the Mississippi River, and 3 in the Atchafalaya, with detections at the 0.006 ug/l level of detection. Ethoprop, phorate, terbufos, disulfoton and azinphos-methyl were not detected in these samples.

Little monitoring data which included OPs is available from the states in the Mississippi Portal Farm Resource Region.

4. Results of Cumulative Assessment

Analyses and interpretation of the outputs of a cumulative distribution rely heavily upon examination of the results for changing patterns of exposure. To this end, graphical presentation of the data provides a useful method of examining the outputs for patterns and was selected here to be the most appropriate means of presenting the results of this cumulative assessment. Briefly, the cumulative assessment generates multiple potential exposures for each hypothetical individual in the assessment for each of the 365 days in a year. Because multiple calculations for each individual in the CSFII population panel are conducted for each day of the year, a distribution of **daily** exposures (i.e., a distribution of exposures for *each* of the 365 days of the year) is available for each route and source of exposure throughout the entire year. Each of these generated exposures is internally consistent – that is, each generated exposure appropriately considers temporal, spatial, and demographic factors such that "mismatching" (such as combining a winter drinking water exposure with an exposure that would occur through a spring lawn application) is precluded. In addition, a simultaneous calculation of MOEs for the combined risk from all routes is performed, permitting the estimation of distributions of the various percentiles of total risk across the year. As demonstrated in the graphical presentations of analytical outputs for this section, results are displayed as MOEs with the various pathways, routes, and the total exposures arrayed across the year as a time series (or time profile). Any given percentile of these (daily) exposures can be selected and plotted as a function of time. That is, for example, a 365-day series of 95th percentile values can be plotted, with 95th percentile exposures for each day of the year (January 1, January 2, etc) shown. The result can be regarded as a “time-based exposure profile plot” in which periods of higher exposures (evidenced by low ‘Margins of Exposure’) and lower exposures (evidenced by high ‘Margins of Exposure’) can be discerned. Patterns can be observed and interpreted and exposures by different routes and pathways (e.g., dermal route through lawn application) seen and compared. Abrupt changes in the slope or levels of such a profile may indicate some combination of exposure conditions resulting in an altered risk profile due to a variety of factors. Factors may include increased pest pressure and subsequent home pesticide use, or increased use in an agricultural setting that may result in increased concentrations in water. Alternatively, a relatively stable exposure profile indicates that exposure from a given source or combination of sources is stable across time and the sources of risk may be less obvious. Different percentiles can be compared to ascertain which routes or pathways tend to be more significant contributors to total exposure for different subgroups of the Mississippi Portal population (e.g, those at the 95th percentile vs. 99th percentiles of exposure).

Figures III.R.2-1 through III. R.2-5 in Appendix R present the results of this cumulative risk analysis for Children, 1-2 years for a variety of percentiles of the Mississippi population (95th, 97.5 th , 99th, 99.5th, and 99.9th). Figures III.R.2-6 through III.R.2-10, Figures III.R.2-11 through III.R.2-15, and Figures III. R..2-16 through III.R.2-20 present these same figures for Children 3-5, Adults 20-49, and Adults 50+, respectively. The following paragraphs describe, in additional detail, the exposure profiles for each of these population age groups for these percentiles (i.e., 95th, 97.5th, 99th, 99.5th, and 99.9th). Briefly, these figures present a series of time courses of exposure (expressed as MOEs) for various age groups at various percentiles of exposure for the population comprising that age group. For example, for the 95th percentile graphs for children 1-2 years old, the 95 th percentile (total) exposure for children 1-2 is estimated for each of the 365 days of the year, with each of these (total) exposures – expressed in terms of MOE’s – plotted as a function of time. The result is a “time course” (or “profile”) of exposures representing that portion of the Mississippi population at the 95th percentile exposures throughout the year. Each “component” of this 95th percentile total exposure for children 1-2 (i.e., the dermal, inhalation, non-dietary oral, food, and water, etc. “component” exposures which, together, make up the total exposure) can also be seen – each as its own individual time profile plot. This discussion represents the unmitigated exposures (i.e., exposures which have not been attempted to be reduced by discontinuing specific uses of pesticides) and no attempt is made in this assessment to evaluate potential mitigation options. The following paragraphs describe the findings and conclusions from each of the assessments performed.

a. Children 1- 2 years old

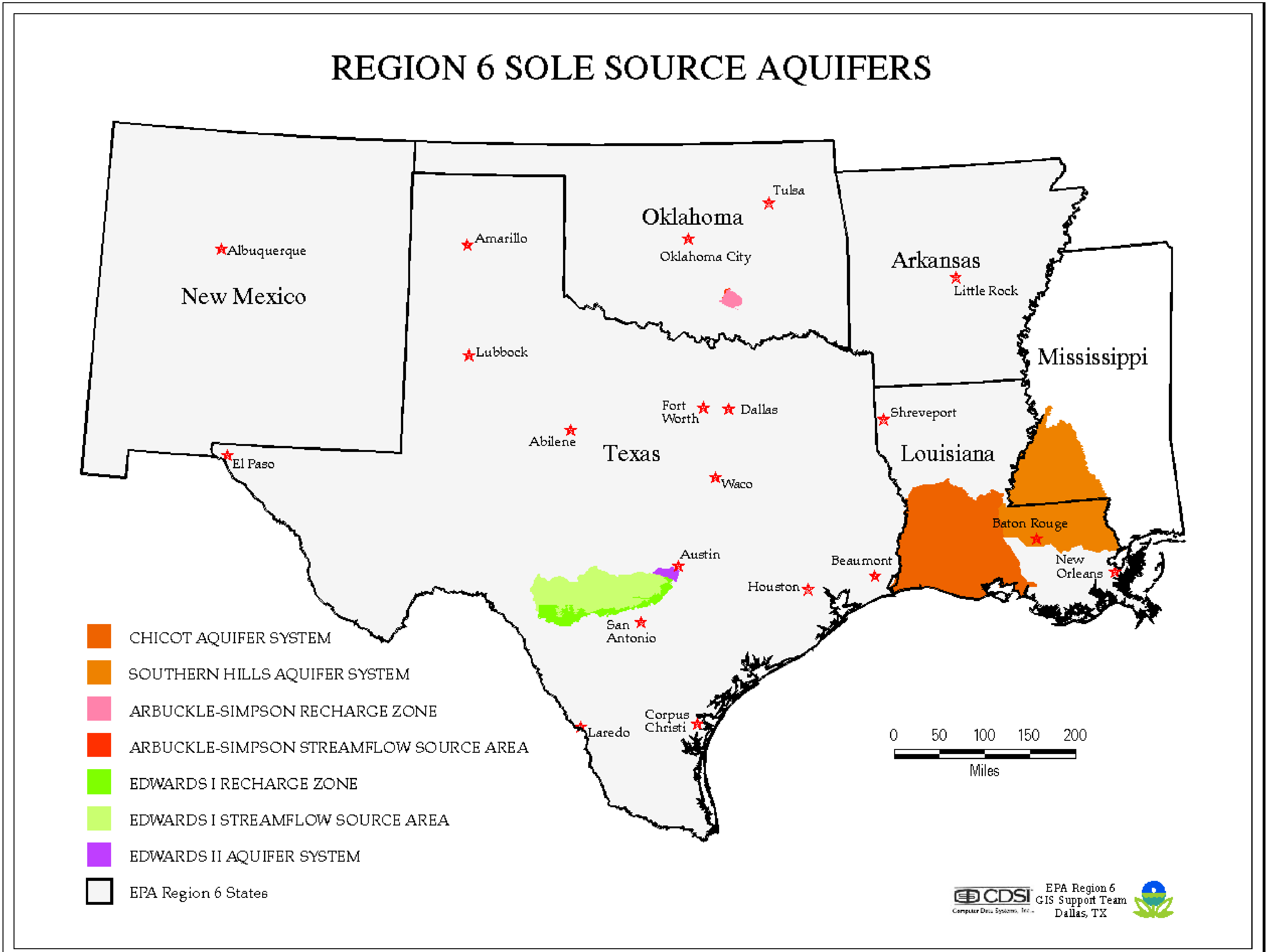
(Figures III.R.2-1 through III.R.2-5): At the 95th percentile, exposures from the residential applications of OP pesticides do not contribute to substantial exposure to the pesticides in this region, with exposures through this route representing less than approximately 1% of total exposures. . We note that there are increases in drinking water concentrations beginning at approximately Julian day 90 and lasting through Julian day 210 which corresponds to applications of various OP pesticides to corn (e.g. terbufos) and cotton (e.g., profenophos). Exposure from drinking water at this percentile does not contribute to substantial exposure. At the higher percentiles, the exposure profile and relative contributions begin to change. The residential exposures (via inhalation and oral hand-to-mouth activity) become an increasingly dominant portion of the total exposure profile. This corresponds to use of DDVP (pest strips/crack and crevice treatments), trichlorfon for grub treatment and/or malathion/fenthion public health uses. By the 99th percentile, residential exposures via the oral hand-to-mouth pathway from the use of trichlorfon grub and/or malathion/fenthion public health uses are by far the most significant contributors to the overall risk picture during Julian day 160 to Julian day 290. Drinking water exposures continue to remain very low and do not contribute in any significant manner to the overall risk picture. This is also true for residential exposures by the dermal route which also continue to be a small fraction (< ca. 0.1 to 1%) of total exposure.

b. Children 3-5 years old

Figures III.R.2-6 through III.R.2-10 As with children 1-2, residential applications of OP's pesticides do not contribute to substantial exposure to the pesticides in this region at the 95th percentile. . We note that there are increases in drinking water concentrations beginning at ca. Julian day 90 and lasting through Julian day 210 which corresponds to applications of various OP pesticides to corn (e.g., terbufos) and cotton (e.g., profenophos) in the region. However, exposure from drinking water at this percentile does not contribute to substantial exposure. At the higher percentiles, the exposure profile and relative contributions begin to change. The residential exposures (via inhalation and oral hand-to-mouth activity) become an increasingly dominant portion of the total exposure profile. This corresponds to use of DDVP (pest strips/crack and crevice), trichlorfon grub treatment and/or malathion/fenthion public health uses. By the 99th percentile, residential exposures via the oral hand-to-mouth pathway from the use of trichlorfon grub and/or malathion/fenthion public health uses are by far the most significant contributors to the overall risk picture during Julian day 160 to Julian day 290. Drinking water exposures continue to remain very low and do not contribute in any significant manner to the overall risk picture. This is also true for residential exposures by the dermal route which also continue to be a small fraction (< ca. 0.1 to 1%) of total exposure.

c. Adults, 20-49 and Adults 50+ years old

(Figures III.S.2-11 through III.S.2-15 and III.S.2.16 through III.S.2-20) At the 95th percentile, exposures from the residential applications of OP pesticides do not contribute to substantial exposure, with exposures through this route representing less than approximately 1% of total exposures. Exposure from drinking water at this percentile also does not contribute to substantial exposure. There are increases in drinking water concentrations beginning at ca. Julian day 90 and lasting through Julian day 210 which corresponds to applications of various OP pesticides to corn (e.g., terbufos) and cotton (e.g., profenophos)). At the higher percentiles, the exposure profile and relative contributions begin to change. The residential exposures (via inhalation) become an increasingly dominant portion of the total exposure profile. This corresponds to use of DDVP pest strips or crack and crevice treatments. By the 99.5th percentile, residential exposures by the inhalation pathway are consistently the most significant contributors to the overall risk picture throughout the year. Drinking water exposures continue to remain very low and do not contribute in any significant manner to the overall risk picture. This is also true for residential exposures by the dermal route which also continue to be a small fraction (< ca. 0.1 to 1%) of total exposure.


REGION 6 SOLE SOURCE AQUIFERS
New Mexico
Albuquerque
El Paso
Oklahoma
Tulsa
Oklahoma City
Arkansas
Little Rock
Mississippi
Louisiana
Shreveport
Baton Rouge
New Orleans
Texas
Amarillo
Lubbock
Abilene
Fort Worth
Dallas
Waco
Austin
San Antonio
Houston
Beaumont
Laredo
Corpus Christi
CHICOT AQUIFER SYSTEM
SOUTHERN HILLS AQUIFER SYSTEM
ARBUCKLE-SIMPSON RECHARGE ZONE
ARBUCKLE-SIMPSON STREAMFLOW SOURCE AREA
EDWARDS I RECHARGE ZONE
EDWARDS I STREAMFLOW SOURCE AREA
EDWARDS II AQUIFER SYSTEM
EPA Region 6 States
0
50
100
150
200
Miles
CDSI
EPA Region 6
GIS Support Team
Dallas, TX

National Stream Water Quality Network (NASQAN)

Summary Statistics for NASQAN Data--Mississippi Basin 1996-1999

Mississippi River at St. Francisville, Louisiana (07373420)

Field Parameters and Suspended Sediment

Units in milligrams per liter, except where noted

Parameter	N	Min	5th	25th	Median	75th	95th	Max
00010 Temperature (C)	71	2.0	6.5	12.0	19.8	26.5	30.5	34.0
00076 Turbidity (NTU)	71	1.0	16.0	26.0	47.0	68.0	106.0	290.0
00095 Conductance (uS/cm)	71	256.0	310.0	337.0	387.0	461.0	522.0	550.0
00300 Dissolved oxygen	71	5.9	6.1	7.0	8.4	10.0	11.5	12.4
00400 pH	71	7.2	7.3	7.7	7.9	8.0	8.2	8.3
00452 CO3 (filtered)	50	0.0	0.0	0.0	0.0	0.0	0.0	4.0
00453 HCO3 (filtered)	52	85.0	96.0	116.0	127.0	142.0	170.0	176.0
39086 Alk (filtered, as CaCO3)	52	70.0	78.0	95.0	104.0	116.5	140.0	146.0
70331 % fines	65	55.0	60.0	75.0	88.5	96.2	98.9	100.0
80154 Suspended sediment	65	37.0	64.0	110.0	183.0	230.0	354.0	484.0

Nutrients

Units in milligrams per liter

Note: because of differences in MRLs, all data in this summary are normalized to highest MRL

Parameter	MRL	N	Percent Detections	Min	5th	25th	Median	75th	95th	Max
00608 NH3-N	.015	70	54	< 0.015	< 0.015	< 0.015	0.020	0.030	0.067	0.090
00613 NO2-N	.010	70	47	< 0.010	< 0.010	< 0.010	< 0.010	0.020	0.032	0.114
00623 Org+NH3-N (filtered)	.200	66	89	< 0.200	< 0.200	0.211	0.259	0.300	0.346	0.400
00625 Org+NH3-N (whole-water)	.200	69	100	0.229	0.330	0.400	0.567	0.662	0.845	1.145
00631 NO2+NO3-N	.050	70	99	< 0.050	0.664	1.065	1.300	1.755	2.644	2.901
00665 Total P (whole-water)	.010	70	99	0.025	0.070	0.138	0.176	0.232	0.351	0.420
00666 Total P (filtered)	.010	69	99	< 0.010	0.030	0.050	0.060	0.076	0.110	0.123
00671 PO4-P	.010	64	100	0.029	0.038	0.051	0.060	0.080	0.107	0.114
00681 DOC	.100	65	100	2.200	3.100	3.400	3.700	4.000	5.500	10.00
00689 SOC	.100	65	100	0.400	0.500	1.100	1.615	2.700	5.000	7.400

Major Ions

Units in milligrams per liter, except where noted

Parameter	MRL	N	Percent Detections	Min	5th	25th	Median	75th	95th	Max
00915 Calcium	.020	67	100	27.35	30.00	34.97	38.07	43.00	47.50	50.00
00925 Magnesium	.010	69	100	7.214	8.473	10.25	11.78	14.54	16.58	18.09
00930 Sodium	.200	69	100	9.371	10.00	14.93	18.69	25.12	34.00	41.32
00935 Potassium	.010	69	100	2.400	2.500	2.930	3.250	3.610	4.000	4.050
00940 Chloride	.010	69	100	10.40	12.00	16.31	20.19	24.00	30.55	37.13
00945 Sulfate	.010	69	100	26.83	31.33	37.00	45.81	58.61	84.37	92.39

00950 Fluoride	.100	69	97	< 0.100	0.105	0.162	0.193	0.213	0.300	0.320
00955 Silica	.010	69	100	2.600	5.019	5.817	6.310	7.030	8.190	9.120

Trace Elements, filtered at 0.45 microns

Units in micrograms per liter

Parameter	MRL	N	Percent Detections	Min	5th	25th	Median	75th	95th	Max
01000 Arsenic	1.0	66	68	< 1.0	< 1.0	1.0	1.0	1.7	2.0	3.0
01005 Barium	1.0	50	100	41.8	43.0	49.3	57.0	64.0	75.2	78.0
01010 Beryllium	1.0	48	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
01020 Boron	16.0	66	100	21.6	25.5	33.2	40.0	48.4	72.9	77.7
01025 Cadmium	1.0	48	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
01030 Chromium	1.0	48	50	< 1.0	< 1.0	< 1.0	< 1.0	1.5	2.2	9.6
01035 Cobalt	1.0	50	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.5
01040 Copper	1.0	47	100	1.1	1.5	1.7	2.0	2.1	2.8	6.5
01046 Iron	3.0	67	36	< 3.0	< 3.0	4.0	5.0	5.6	19.0	33.0
01049 Lead	1.0	48	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.9
01056 Manganese	1.0	50	56	< 1.0	< 1.0	< 1.0	1.0	2.5	6.0	9.8
01060 Molybdenum	1.0	50	88	< 1.0	< 1.0	1.2	1.7	2.2	3.5	5.0
01065 Nickel	1.0	49	98	< 1.0	1.0	1.5	1.7	2.0	3.0	3.0
01075 Silver	1.0	50	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
01080 Strontium	0.5	68	100	107.6	128.2	150.0	171.9	204.6	251.0	283.8
01085 Vanadium	6.0	69	4	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	9.0
01090 Zinc	1.0	46	85	< 1.0	< 1.0	1.2	2.0	2.9	6.1	7.0
01106 Aluminum	1.0	48	98	1.4	1.6	3.0	4.0	5.0	8.0	21.0
01130 Lithium	4.0	68	85	< 4.0	< 4.0	4.5	6.1	9.6	15.4	17.0

01145 Selenium	1.0	68	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.2	1.7
22703 Uranium	1.0	48	52	< 1.0	< 1.0	< 1.0	1.0	1.5	2.0	2.1

Dissolved Pesticides

Units in micrograms per liter, except where noted

Note: concentrations sometimes are estimated below the MRL; in this summary, all concentrations are normalized to MRL; the percent detections described in the table include estimated concentrations, when appropriate

Parameter	MRL	N	Percent Detections	Min	5th	25th	Median	75th	95th	Max
04024 Propachlor	.007	68	0	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
04028 Butylate	.002	68	6	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	0.002
04035 Simazine	.005	69	97	0.011	0.014	0.020	0.030	0.086	0.250	0.408
04037 Prometon	.018	69	93	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	0.025
04040 Desethyl atrazine	.002	69	97	0.010	0.012	0.024	0.040	0.089	0.223	0.445
04041 Cyanazine	.004	69	90	< 0.004	0.005	0.014	0.029	0.100	0.850	0.915
04095 Fonofos	.003	68	0	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
34253 alpha-HCH	.002	68	0	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
34653 p,p DDE	.006	68	6	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
38933 Chlorpyrifos	.004	68	3	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	0.018
39341 gamma-HCH	.004	68	0	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
39381 Dieldrin	.001	68	9	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.004	0.007
39415 Metolachlor	.002	69	100	0.030	0.034	0.053	0.139	0.550	1.360	2.430
39532 Malathion	.005	68	10	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.007	0.019
39542 Parathion	.004	68	0	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
39572 Diazinon	.002	68	57	< 0.002	< 0.002	< 0.002	0.003	0.005	0.012	0.024
39632 Atrazine	.001	69	100	0.060	0.072	0.120				

								0.342	1.110	3.650	4.710
46342	Alachlor	.002	69	83	< 0.002	< 0.002	0.004	0.008	0.034	0.113	0.170
49260	Acetochlor	.002	68	94	< 0.002	< 0.002	0.009	0.018	0.153	0.370	0.558
82630	Metribuzin	.004	69	46	< 0.004	< 0.004	< 0.004	0.005	0.019	0.047	0.080
82660	Diethylanaline	.003	68	0	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
82661	Trifluralin	.002	68	38	< 0.002	< 0.002	< 0.002	< 0.002	0.003	0.006	0.008
82663	Ethalfluralin	.004	68	0	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
82664	Phorate	.002	68	0	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
82665	Terbacil	.007	68	1	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.007
82666	Linuron	.002	68	4	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.008
82667	Methyl parathion	.006	68	1	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	0.006
82668	EPTC	.002	68	10	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	0.005
82669	Pebulate	.004	68	0	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
82670	Tebuthiuron	.010	68	87	< 0.010	< 0.010	< 0.010	< 0.010	0.011	0.016	0.019
82671	Molinate	.004	68	22	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	0.038	0.129
82672	Ethoprop	.003	68	0	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
82673	Benfluralin	.002	68	0	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
82674	Carbofuran	.003	68	24	< 0.003	< 0.003	< 0.003	< 0.003	0.003	0.015	0.024
82675	Terbufos	.013	68	0	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013	< 0.013
82676	Pronamide	.003	68	0	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
82677	Disulfoton	.017	68	0	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017	< 0.017
82678	Triallate	.001	68	1	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.003
82679	Propanil	.004	68	0	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
82680	Carbaryl	.003	68	3	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	0.012
82681	Thiobencarb	.002	68	6	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	0.007
82682	Dachthal (DCPA)	.002	66	3	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002
82683	Pendimethalin	.004	68	15	< 0.004	< 0.004	< 0.004	<			

```
0.004  < 0.004    0.010    0.012
82684 Napropamide             .003  68        0      < 0.003  < 0.003  < 0.003  <
0.003  < 0.003  < 0.003  < 0.003
82685 Propargite              .013  68        0      < 0.013  < 0.013  < 0.013  <
0.013  < 0.013  < 0.013  < 0.013
82686 Azinphos methyl         .001  68        0      < 0.001  < 0.001  < 0.001  <
0.001  < 0.001  < 0.001    0.010
82687 Permethrin              .005  68        0      < 0.005  < 0.005  < 0.005  <
0.005  < 0.005  < 0.005  < 0.005
91063 Diazinon-d10 (%)        .100  68      100        66.64    75.62    92.61
99.73    105.1    117.0    218.0
91064 Terbuthylazin (%)       .100  52      100        96.20    99.03    106.0
114.1    119.5    129.7    249.0
91065 HCH alpha-D6 (%)        .100  68      100        70.80    81.76    90.91
98.63    102.8    111.2    217.0
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Last modified on: September 6, 2000

National Stream Water Quality Network (NASQAN)

Summary Statistics for NASQAN Data--Mississippi Basin 1996-1999

Lower Atchafalaya River at Melville, Louisiana (07381495)

Field Parameters and Suspended Sediment

Units in milligrams per liter, except where noted

Parameter	N	Min	5th	25th	Median	75th	95th	Max
00010 Temperature (C)	69	3.5	7.5	13.0	19.5	27.5	30.0	32.5
00076 Turbidity (NTU)	70	5.8	9.0	29.0	50.0	65.0	120.0	260.0
00095 Conductance (uS/cm)	68	176.0	248.0	316.0	373.5	457.0	553.0	669.0
00300 Dissolved oxygen	69	5.7	6.1	7.0	7.8	9.7	11.5	13.0
00400 pH	70	7.2	7.2	7.6	7.8	8.0	8.2	8.3
00452 CO3 (filtered)	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0
00453 HCO3 (filtered)	52	48.0	67.0	88.0	109.0	132.5	168.0	174.0
39086 Alk (filtered, as CaCO3)	54	40.0	55.0	73.0	90.0	109.0	138.0	143.0
70331 % fines	66	35.8	45.0	70.0	93.5	96.7	99.0	99.8
80154 Suspended sediment	66	18.0	26.0	83.0	161.0	269.0	381.0	420.0

Nutrients

Units in milligrams per liter

Note: because of differences in MRLs, all data in this summary are normalized to highest MRL

Parameter	MRL	N	Percent Detections	Min	5th	25th	Median	75th	95th	Max
00608 NH3-N	.015	68	60	< 0.015	< 0.015	< 0.015	0.022	0.034	0.065	0.370
00613 NO2-N	.010	68	51	< 0.010	< 0.010	< 0.010	0.010	0.019	0.028	0.030
00623 Org+NH3-N (filtered)	.200	66	89	< 0.200	< 0.200	0.243	0.292	0.316	0.400	0.487
00625 Org+NH3-N (whole-water)	.200	67	99	< 0.200	0.299	0.460	0.562	0.686	0.806	0.895
00631 NO2+NO3-N	.050	68	99	< 0.050	0.577	0.751	1.100	1.500	2.237	2.623
00665 Total P (whole-water)	.010	67	100	0.058	0.080	0.132	0.169	0.240	0.300	0.326
00666 Total P (filtered)	.010	67	99	< 0.010	0.023	0.044	0.060	0.071	0.106	0.122
00671 PO4-P	.010	64	100	< 0.010	0.032	0.041	0.056	0.075	0.100	0.113
00681 DOC	.100	64	100	2.200	3.400	3.950	4.400	5.100	6.993	8.813
00689 SOC	.100	67	100	0.300	0.600	1.100	1.800	2.400	4.400	6.200

Major Ions

Units in milligrams per liter, except where noted

Parameter	MRL	N	Percent Detections	Min	5th	25th	Median	75th	95th	Max
00915 Calcium	.020	67	100	14.61	21.58	27.73	35.42	40.21	46.30	49.19
00925 Magnesium	.010	66	100	4.392	6.499	7.980	10.88	13.00	16.01	17.71
00930 Sodium	.200	67	100	11.00	12.00	15.21	19.56	27.00	36.83	44.28
00935 Potassium	.010	67	100	2.170	2.410	2.740	3.190	3.590	3.820	4.160
00940 Chloride	.010	65	100	12.42	14.00	17.81	22.58	30.00	38.53	49.87
00945 Sulfate	.010	65	100	19.68	24.79	34.29	42.99	57.23	77.00	94.17

00950 Fluoride	.100	65	91	< 0.100	< 0.100	0.127	0.168	0.200	0.241	0.300
00955 Silica	.010	67	100	1.263	4.955	5.717	6.200	6.787	7.805	8.787

Trace Elements, filtered at 0.45 microns

Units in micrograms per liter

Parameter	MRL	N	Percent Detections	Min	5th	25th	Median	75th	95th	Max
01000 Arsenic	1.0	68	65	< 1.0	< 1.0	< 1.0	1.0	1.8	2.0	2.9
01005 Barium	1.0	49	98	< 1.0	43.8	51.5	58.3	67.2	77.0	83.7
01010 Beryllium	1.0	50	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0
01020 Boron	16.0	66	100	20.6	25.8	31.9	40.0	50.0	71.6	118.8
01025 Cadmium	1.0	50	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
01030 Chromium	1.0	48	42	< 1.0	< 1.0	< 1.0	< 1.0	1.4	2.8	3.8
01035 Cobalt	1.0	49	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.5
01040 Copper	1.0	50	96	< 1.0	1.2	1.6	1.8	2.0	3.0	5.0
01046 Iron	3.0	67	66	< 3.0	< 3.0	5.0	9.9	29.0	58.5	124.2
01049 Lead	1.0	50	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
01056 Manganese	1.0	48	65	< 1.0	< 1.0	< 1.0	1.4	5.7	18.8	76.0
01060 Molybdenum	1.0	49	71	< 1.0	< 1.0	< 1.0	1.4	2.0	3.1	5.0
01065 Nickel	1.0	50	96	< 1.0	1.0	1.5	1.6	2.0	3.0	4.0
01075 Silver	1.0	49	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
01080 Strontium	0.5	67	100	98.4	122.8	145.5	173.5	220.0	278.3	292.2
01085 Vanadium	6.0	68	3	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	6.2
01090 Zinc	1.0	50	74	< 1.0	< 1.0	1.0	1.7	3.8	10.6	13.0
01106 Aluminum	1.0	48	98	< 1.0	2.0	3.0	4.0	6.1	20.0	42.7
01130 Lithium	4.0	67	84	< 4.0	< 4.0	4.4	5.4	8.1	13.7	17.0

01145 Selenium	1.0	68	9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.2	1.9
22703 Uranium	1.0	48	48	< 1.0	< 1.0	< 1.0	< 1.0	1.2	2.0	2.0

Dissolved Pesticides

Units in micrograms per liter, except where noted

Note: concentrations sometimes are estimated below the MRL; in this summary, all concentrations are normalized to MRL; the percent detections described in the table include estimated concentrations, when appropriate

Parameter	MRL	N	Percent Detections	Min	5th	25th	Median	75th	95th	Max
04024 Propachlor	.007	65	2	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.025
04028 Butylate	.002	65	5	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.002	0.025
04035 Simazine	.005	66	98	0.005	0.012	0.015	0.026	0.057	0.191	0.248
04037 Prometon	.018	66	77	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	< 0.018	0.025
04040 Desethyl atrazine	.002	66	98	0.007	0.011	0.018	0.035	0.066	0.185	0.425
04041 Cyanazine	.004	66	94	0.005	0.008	0.016	0.044	0.107	0.462	0.940
04095 Fonofos	.003	65	0	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
34253 alpha-HCH	.002	65	0	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
34653 p,p DDE	.006	65	5	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006
38933 Chlorpyrifos	.004	65	9	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	0.008	0.010
39341 gamma-HCH	.004	65	0	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
39381 Dieldrin	.001	65	5	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.010
39415 Metolachlor	.002	66	98	0.018	0.027	0.042	0.157	0.436	1.200	1.950
39532 Malathion	.005	65	12	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.009	0.036
39542 Parathion	.004	65	0	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
39572 Diazinon	.002	65	48	< 0.002	< 0.002	< 0.002	< 0.002	0.005	0.008	0.024
39632 Atrazine	.001	66	100	0.032	0.058	0.117				

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0.329    0.955    2.130    4.100
46342 Alachlor                  .002  66        70      < 0.002  < 0.002  < 0.002
0.009    0.025    0.052    0.104
49260 Acetochlor                .002  65        68      < 0.002  < 0.002  < 0.002
0.015    0.059    0.317    0.500
82630 Metribuzin                .004  66        42      < 0.004  < 0.004  < 0.004  <
0.004    0.016    0.045    0.073
82660 Diethylanaline            .003  65         0      < 0.003  < 0.003  < 0.003  <
0.003  < 0.003  < 0.003  < 0.003
82661 Trifluralin               .002  65        32      < 0.002  < 0.002  < 0.002  <
0.002    0.002    0.005    0.014
82663 Ethalfluralin             .004  65         0      < 0.004  < 0.004  < 0.004  <
0.004  < 0.004  < 0.004  < 0.004
82664 Phorate                   .002  65         0      < 0.002  < 0.002  < 0.002  <
0.002  < 0.002  < 0.002  < 0.002
82665 Terbacil                  .007  65         0      < 0.007  < 0.007  < 0.007  <
0.007  < 0.007  < 0.007  < 0.007
82666 Linuron                   .002  65         3      < 0.002  < 0.002  < 0.002  <
0.002  < 0.002  < 0.002    0.005
82667 Methyl parathion          .006  65         5      < 0.006  < 0.006  < 0.006  <
0.006  < 0.006  < 0.006    0.006
82668 EPTC                      .002  65         5      < 0.002  < 0.002  < 0.002  <
0.002  < 0.002  < 0.002    0.006
82669 Pebulate                  .004  65         0      < 0.004  < 0.004  < 0.004  <
0.004  < 0.004  < 0.004  < 0.004
82670 Tebuthiuron               .010  65        83      < 0.010  < 0.010  < 0.010
0.010    0.012    0.017    0.018
82671 Molinate                  .004  65        28      < 0.004  < 0.004  < 0.004  <
0.004  < 0.004    0.054    0.109
82672 Ethoprop                  .003  65         0      < 0.003  < 0.003  < 0.003  <
0.003  < 0.003  < 0.003  < 0.003
82673 Benfluralin               .002  65         2      < 0.002  < 0.002  < 0.002  <
0.002  < 0.002  < 0.002    0.004
82674 Carbofuran                .003  65        38      < 0.003  < 0.003  < 0.003  <
0.003    0.010    0.036    0.055
82675 Terbufos                  .013  65         0      < 0.013  < 0.013  < 0.013  <
0.013  < 0.013  < 0.013  < 0.013
82676 Pronamide                 .003  65         0      < 0.003  < 0.003  < 0.003  <
0.003  < 0.003  < 0.003  < 0.003
82677 Disulfoton                .017  65         0      < 0.017  < 0.017  < 0.017  <
0.017  < 0.017  < 0.017  < 0.017
82678 Triallate                 .001  65         0      < 0.001  < 0.001  < 0.001  <
0.001  < 0.001  < 0.001  < 0.001
82679 Propanil                  .004  65         3      < 0.004  < 0.004  < 0.004  <
0.004  < 0.004  < 0.004    0.009
82680 Carbaryl                  .003  65         8      < 0.003  < 0.003  < 0.003  <
0.003  < 0.003    0.005    0.049
82681 Thiobencarb               .002  65         5      < 0.002  < 0.002  < 0.002  <
0.002  < 0.002  < 0.002    0.008
82682 Dachthal (DCPA)           .002  64         2      < 0.002  < 0.002  < 0.002  <
0.002  < 0.002  < 0.002  < 0.002
82683 Pendimethalin             .004  65        11      < 0.004  < 0.004  < 0.004  <
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0.004  < 0.004    0.008    0.011
82684 Napropamide            .003  65        0      < 0.003  < 0.003  < 0.003  <
0.003  < 0.003  < 0.003  < 0.003
82685 Propargite             .013  65        0      < 0.013  < 0.013  < 0.013  <
0.013  < 0.013  < 0.013  < 0.013
82686 Azinphos methyl        .001  65        0      < 0.001  < 0.001  < 0.001  <
0.001  < 0.001  < 0.001  < 0.001
82687 Permethrin             .005  65        0      < 0.005  < 0.005  < 0.005  <
0.005  < 0.005  < 0.005  < 0.005
91063 Diazinon-d10 (%)       .100  65      100        71.50    80.19    90.50
100.8    107.0    116.0    120.0
91064 Terbuthylazin (%)      .100  51      100        91.90    94.19    104.3
108.8    117.2    129.6    140.0
91065 HCH alpha-D6 (%)       .100  65      100        70.20    82.52    91.23
96.64    100.9    112.0    119.1
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Last modified on: September 6, 2000