Health Consultation

(EXPOSURE INVESTIGATION)

LANDIA CHEMICAL COMPANY
(a/k/a FLORIDA FAVORITE FERTILIZER)

LAKELAND, POLK COUNTY, FLORIDA

CERCLIS NO. FLD04211084

MARCH 20, 2000

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared by:

Florida Department of Health
Bureau of Environmental Toxicology
Under a Cooperative Agreement with the
U.S. Agency for Toxic Substances and Disease Registry

Summary and Statement of Issues

This health consultation evaluates the public health threat from eating fish from a storm water pond southwest of the Landia Chemical/Florida Favorite Fertilizer hazardous waste site. The contaminants of concern include arsenic, dieldrin, chlordane, DDT/DDD/DDE, endosulfan (total), hexachlorocyclohexane and toxaphene. Nearby residents reportedly catch and eat fish from this pond that receives storm water runoff from the site. Financial support for this consultation is provided entirely by the U.S. Agency for Toxic Substances and Disease Registry (ATSDR). The conclusions and recommendations of this consultation are only applicable to people who eat fish from this storm water pond.

Background

Landia Chemical/Florida Favorite Fertilizer is a 12-acre hazardous waste site in Lakeland, Polk County, Florida (Figures 1 and 2). Until 1987, Landia Chemical Company operated a pesticide storage, blending, and manufacturing business on half of the site. Florida Favorite Fertilizer continues to operate a fertilizer storage, mixing, and distribution business on the other half. In 1983 nearby residents complained that pesticide odors from the ditch that receives storm water runoff from the site were causing nausea, headaches, dizziness, and eye/respiratory irritation. Because of a 1983 investigation by the Florida Department of Environmental Protection (FDEP), Landia removed contaminated sediment from the first 1000 feet of the storm water ditch draining the site.

In a draft 1999 Public Health Assessment (PHA) report, the Florida Department of Health (FDOH) concluded that testing of fish in down stream water bodies was inadequate. FDOH recommended collection of additional fish samples and analysis for site-related contaminants.

Storm water runoff from this site flows south then west through a series of ditches to a storm water pond about 1.5 miles west-southwest of the site. This two-acre storm water pond is on the north side of Highland Street between Jensen and Lebanon Roads (Figure 3). The ditches between the site and this storm water pond contain site-related pesticides. Organochlorine pesticides and arsenic are not easily degraded or metabolized and therefore, persist in the environment.[1] Since these compounds are either insoluble or have relatively low solubility in water but are quite lipid soluble, they may accumulate in the sediments and fish of downstream water bodies. Fish in this storm water pond may contain site-related pesticides. FDOH initiated this health consultation since nearby residents reportedly catch and eat fish from this storm water pond.

On November 10, 1999 the Florida Fish and Wildlife Conservation Commission (FFWCC) collected fish from the storm water pond at Jensen Road and Highland Street. They collected eight fish from this pond using a net. They netted three armored catfish also known as sailfin catfish or *Liposarcus multiradiatus*. These catfish occur naturally in the Orinoco River basin of

Venezuela. FFWCC also caught three nile perch (*Tilapia aurea*), and two bluegill (*Pomatodus saltatrix*). The lengths of the three catfish were 466, 410 and 371 millimeters. The bluegill and nile perch were approximately 13-15 centimeters long. FFWCC estimates the following ages for the three species of fish: Catfish - two to three years old; Nile perch - less than one year old; Bluegill - two to three years old.

FFWCC collected all eight fish using a net as this storm water pond was not deep enough to electrofish. FDOH shipped one nile perch, one bluegill and three pieces of the catfish with skin to Battelle Labs in Sequim, Washington. FDOH delivered the rest of the fish, including the remaining pieces of catfish, were hand delivered to STL Savannah Labs in Tallahassee.

A t-shaped pond exists northwest of the intersection of Wabash Avenue and Highland Street about one mile west-southwest of the site. It is near the ditch that drains from the site to the storm water pond on Highland Street between Lebanon and Jensen Roads. Aerial photographs indicated that this pond was excavated sometime before 1975. Before 1975, storm water runoff from the site may have drained into this area. Currently it appears that storm water runoff from the site does not drain into this pond.

On November 10, 1999, the FFWCC and the FDOH tried to access this t-shaped pond from two different locations but were not successful. The pond was surrounded with dense vegetation and appeared to be covered with water hyacinths. The FDOH spoke with several residents who live near this pond. They report that in the past people caught and ate fish from this t-shaped pond. However, since the pond is now densely vegetated, it is not accessible for fishing.

Laboratory Methods and Analysis

Battelle Labs in Sequim, Washington analyzed four fish samples for inorganic arsenic. The first sample was composited using three individual catfish fillets. Since it was possible that residents who fish in the pond cook their catfish with the skins on, one of the catfish samples analyzed was composed of 50% skin and 50% fish tissue (second sample). The third and fourth samples were the nile perch and bluegill fish respectively. The laboratory used EPA Method 1632 Revision A in which hydride generation separates inorganic from organic arsenic.

STL Savannah Laboratories analyzed four fish samples for total arsenic and organochlorine pesticides. They used EPA Method 6010 for total arsenic analysis and EPA Method 8081 for organochlorine pesticides analysis. The first sample consisted of three composited catfish fillets. The second was the three composited catfish fillets with skins. The third sample was a composite of two nile perch. The fourth sample was one bluegill.

Discussion

Evaluation of Biological Data:

The recommended mean and 95th percentile fish consumption values for recreational freshwater

anglers are 8 grams/day and 25 grams/day, respectively. These were derived by averaging the values from a survey of three populations.[11] We assumed that nearby residents eat more fish from this pond than the average recreational fishermen. Thus, we used 32 grams of fish per day (about one ounce) for an adult and 16 grams of fish per day (about ½ ounce) for a child in our dose calculations. We assumed a child weighs 14.5 kg and an adult weighs 70 kg. We calculated doses in milligrams per kilogram per day (mg/kg/day). We then compared these doses to ATSDR's MRLs and EPA's Reference Doses (RfDs).[2] We calculated cancer risks using EPA's cancer slope factors.

Arsenic:

Our estimate of a child's and an adult's maximum exposure to inorganic arsenic from eating fish for long-term (≥ 365 days) exposure is 1000 times less than the Cancer Effect Levels (CELs) and the chronic MRL. We estimated exposure to inorganic arsenic because it is more toxic than organic arsenic. Therefore, we do not expect any illness from eating the fish in the pond with levels of inorganic arsenic as shown in Table I.

Dieldrin:

Our estimate of a child's and an adult's maximum exposure to dieldrin from eating fish is10 times less than the ATSDR chronic MRL for long-term (≥365 days) exposure. Therefore, we do not expect any illness from eating fish in the pond with levels of dieldrin as shown in Table II.

Chlordane:

Our estimate of a child's and an adult's maximum exposure to chlordane from eating fish for long-term (≥ 365 days) exposure is at least 100 times less than the ATSDR chronic MRL. Therefore we do not expect any illness from eating the fish in the pond with levels of chlordane as shown in Table II.

DDT/DDD/DDE:

Our estimate of a child's and an adult's maximum exposure to DDT/DDD/DDE from eating fish for long-term (≥ 365 days) exposure is 10000 times less than the ATSDR CELs. Therefore we do not expect any illness from eating the fish in the pond with levels of DDT/DDD/DDE as shown in Table II.

Endosulfan (total):

Our estimate of a child's and an adult's maximum exposure to endosulfan(total) from eating fish for long-term (≥ 365 days) exposure is 100 times less than the ATSDR chronic MRL. Furthermore, since the highest detection limit was used for the nile perch in the calculations, this calculated dose errs on the side of protecting public health. Therefore we do not expect any illness from eating the fish in the pond with levels of endosulfan as shown in Table II.

Hexachlorocyclohexane (HCH):

We estimated an ingestion exposure dose for a child and an adult using the maximum concentrations for alpha, beta and delta hexachlorocyclohexane (HCH) in the four fish samples (Table II). We calculated the dose for the gamma-isomer separately. Our exposure estimate for a total of alpha, beta and delta HCH is at least 1000 times less than the ATSDR chronic MRL for long-term (≥ 365 days) exposure. For Lindane (gamma-HCH), our exposure estimate is less than the ATSDR chronic MRL for long-term (≥ 365 days) exposure. Therefore we do not expect any illness from eating the fish in the pond with levels of HCH as shown in Table II.

Toxaphene:

Due to the small size of nile perch collected, the reporting limit for toxaphene in the nile perch was elevated. However, the laboratory did not detect anything for toxaphene in any of the fish. To err on the side of protecting public health, we assumed toxaphene was in the fish at a concentration equal to the reporting limit in the nile perch. Based on this assumption, our estimate of a child's and an adult's exposure to toxaphene by ingestion is 10 times less than the ATSDR chronic MRL for long-term (≥ 365 days) exposure. So, we do not expect any illness from eating the fish in the pond with levels of toxaphene as shown in Table II.

Other Pesticides:

We also estimated exposure doses for several other organochlorine pesticides (heptachlor/heptachlor epoxide, endrin/endrin aldehyde/endrin ketone and methoxychlor) included in the laboratory results by STL Savannah Labs. We do not expect any illness from eating the fish in the pond with the reported levels of heptachlor/heptachlor epoxide, endrin/endrin aldehyde and methoxychlor.

Other Health-Based Standards:

The Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed by the Food and Drug Administration (FDA) supports our conclusions.[9] The levels of organochlorine pesticides found in the fish in this storm water pond are much less than the FDA Action Levels. There is no FDA Action Level for inorganic arsenic. FDA Action Levels apply to commercially sold fish and include economic considerations.

Children's Health Conclusions

Based on the arsenic and organochlorine pesticide analytical results from the collected fish samples, there is currently no public health hazard for children eating armored catfish, bluegill or nile perch from this storm water pond. However, we do not know what exposures occurred in the past.

Conclusions

Based on the arsenic and organochlorine pesticide analytical results from the collected fish samples, there is currently no public health hazard for adults or children eating armored catfish, bluegill or nile perch from the storm water pond located 1.5 miles southwest of Landia Chemical/Florida Favorite Fertilizer. However, we do not know what exposures occurred in the past.

Recommendations

At this time, FDOH does not offer any recommendations for this site.

Definitions

Cancer Effect Level (CEL) - The lowest dose of chemical in a study, or group of studies, that produces significant increases in the incidence of cancer (or tumors) between the exposed population and its appropriate control.

Method Detection Limit (MDL) - the minimum concentration of a substance that can be measured in reagent water and reported with a given confidence that the analyte concentration is greater than zero.

Minimal Risk Level (MRL) - an estimate of daily exposure of a human being to a chemical (in mg/kg/day) that is likely to be without an appreciable risk of deleterious effects (noncarcinogenic) over a specified duration of exposure. MRLs are based on human and animal studies and are reported for acute ($\leq$ 14 days), intermediate (15-364 days), and chronic ($\geq$365 days). MRLs are published in ATSDR Toxicological Profiles for specific chemicals.[10]

Parts Per Million (ppm) - a common basis of reporting water analysis. One part per million (ppm) equals 1 pound per million pounds of water; 14.3 equals one grain per Imperial gallon.[10]

Reporting Limit (RL) - the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions and are determined to be the lowest concentration standard or the sample equivalent of the lowest concentration standard in the initial calibration.

References

(1) United States Environmental Protection Agency. 1999. Draft Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume I, Fish Sampling and Analysis, Third Edition. Washington, D.C.: Office of Science and Technology, Office of Water

(2) United States Environmental Protection Agency. 1997. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume II, Risk Assessment and Fish Consumption Limits, Second Edition. Washington, D.C.: Office of Science and Technology, Office of Water

(3) Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological Profile for Aldrin/Dieldrin. Atlanta: U.S. Department of Health and Human Services, Public Health Services

(4) Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological Profile for alpha-, beta-, gamma- and delta-Hexachlorocyclohexane. Atlanta: U.S. Department of Health and Human Services, Public Health Services

(5) Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological Profile for Chlordane. Atlanta: U.S. Department of Health and Human Services, Public Health Services

(6) Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological Profile for 4,4'-DDT, 4,4'-DUE, 4-4'-DDD. Atlanta: U.S. Department of Health and Human Services, Public Health Services

(7) Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Draft Toxicological Profile for Endosulfan. Atlanta: U.S. Department of Health and Human Services, Public Health Services

(8) Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Toxicological Profile for Toxaphene. Atlanta: U.S. Department of Health and Human Services, Public Health Services

(9) Department of Health and Human Services. 1998. Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed. Washington, D.C.: Public Health Service, Food and Drug Administration

(10) Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Public Health Assessment Guidance Manual. Lewis Publishers.

(11) Environmental Protection Agency (EPA). 1997. Exposure Factors Handbook Volume II. Washington, D.C.: Office of Research and Development, National Center for Environmental Assessment

APPENDIX A - FIGURES

Figure 1: Site Location County Map
Figure 2. City Map
Figure 3. Drainage Map of Ponds and Site

APPENDIX B - TABLES

Table I: Summary of Inorganic Arsenic and Total Arsenic Laboratory Results
Table II: Summary of Organochlorine Pesticide Laboratory Results
Table III: FDA Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed

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CERTIFICATION

The Landia Chemical/Florida Favorite Fertilizer Health Consultation was prepared by the Florida Department of Health, Bureau of Environmental Toxicology, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

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The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.

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APPENDIX A: FIGURES

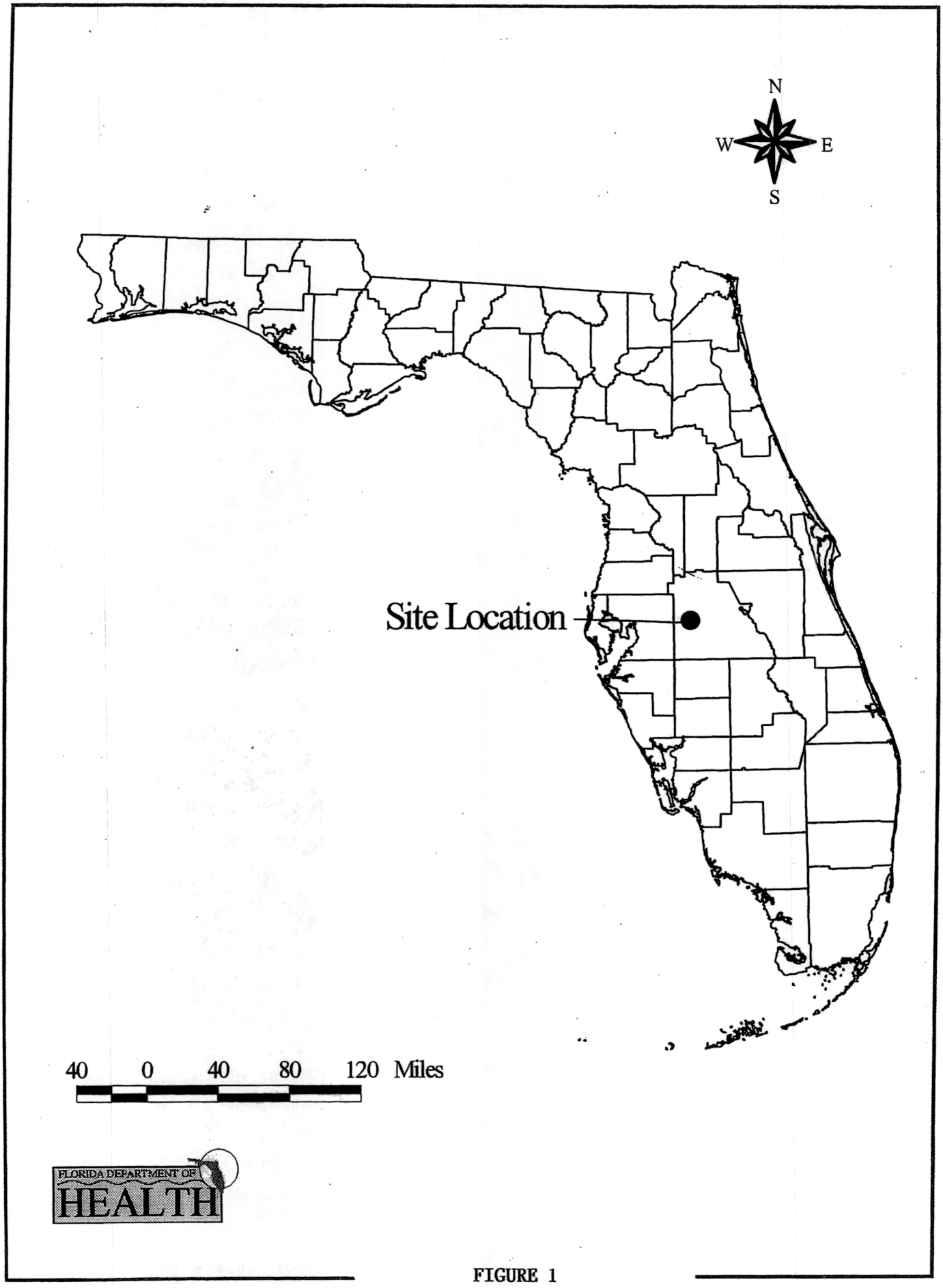

FIGURE 1

Site Location County Map

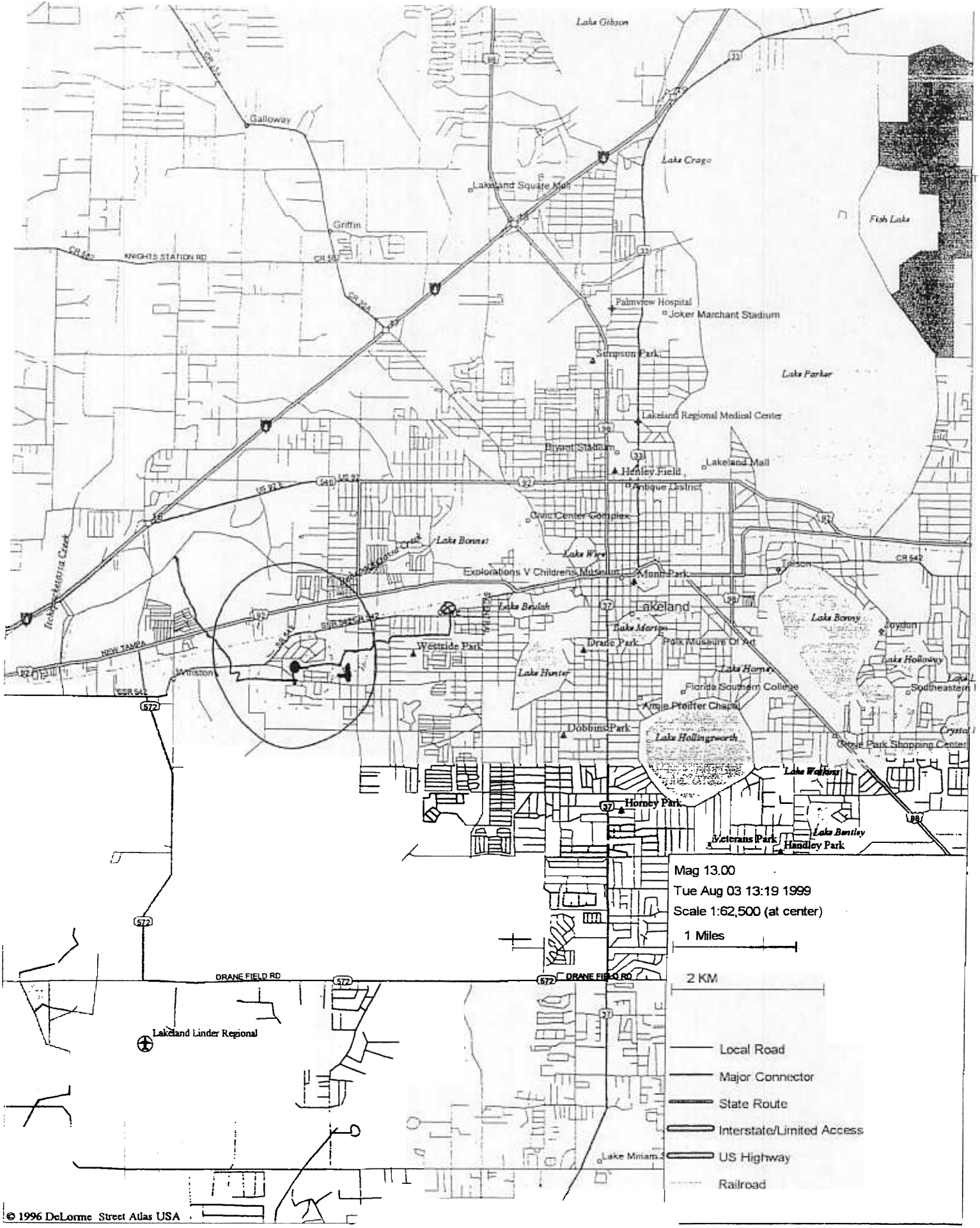

FIGURE 2

City Map

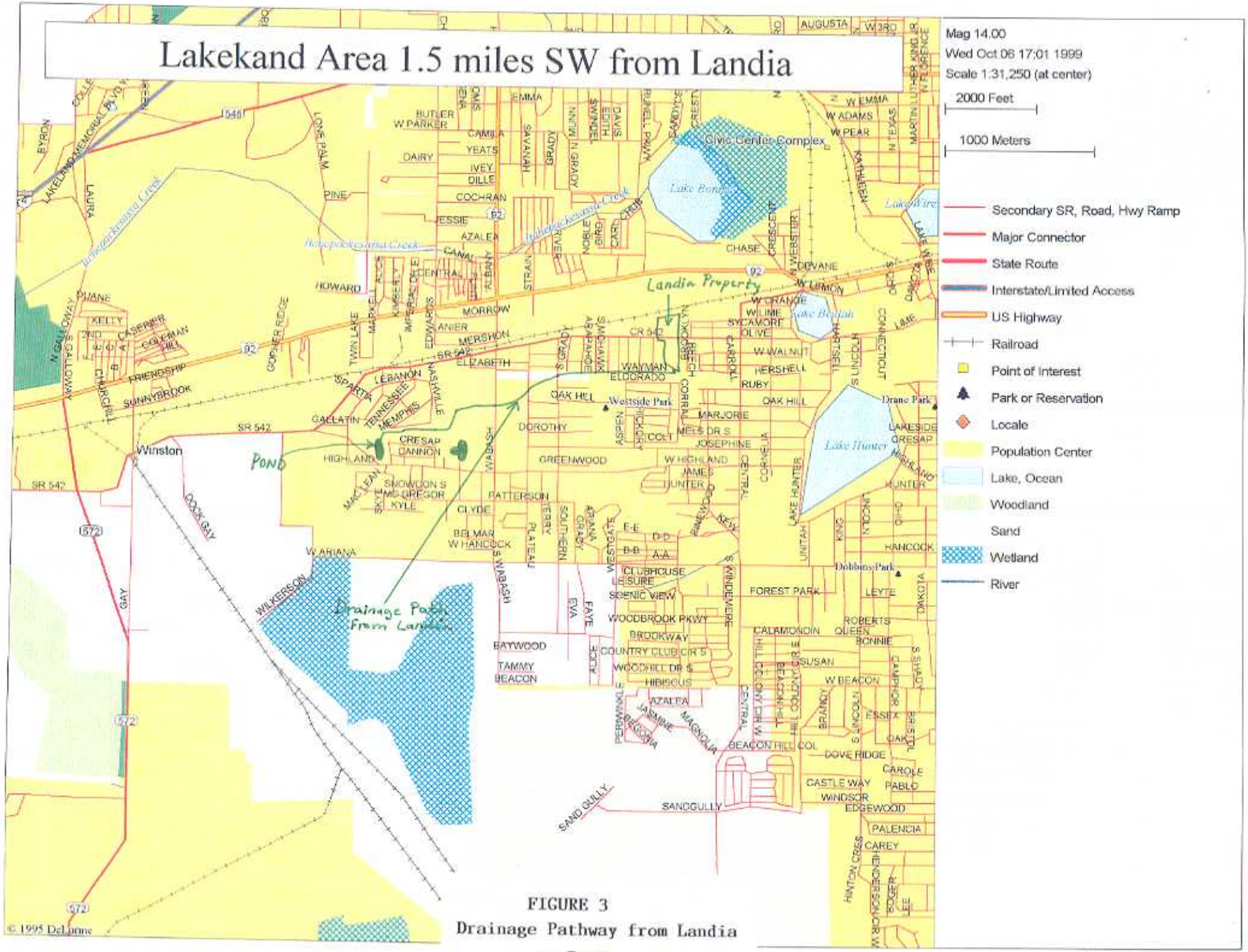

FIGURE 3
Drainage Pathway from Landia
to Pond

APPENDIX B: TABLES

TABLE I
SUMMARY OF INORGANIC ARSENIC AND TOTAL ARSENIC IN FISH FROM POND SOUTHWEST OF LANDIA CHEMICAL/ FLORIDA FAVORITE FERTILIZER

	CATFISH (FILLET ONLY)	CATFISH (FILLET W/ SKIN)	NILE PERCH (FILLET)	BLUEGILL (FILLET W/ SKIN)
TOTAL INORGANIC ARSENIC***	0.00365	0.00889	0.00526	0.00127
TOTAL ARSENIC***	<1.0	0.63*	0.80*	<1.0

* Represents estimated values
** Note: results given in milligrams per kilogram (mg/kg)
*** Note: inorganic arsenic analyzed at Battelle Labs in Sequim, WA., total arsenic analyzed at STL Savannah Labs in Tallahassee, Fl.

TABLE II
SUMMARY OF ORGANOCHLORINE PESTICIDES IN THREE SPECIES OF FISH IN THE STORMWATER POND SOUTHWEST OF LANDIA CHEMICAL/FLORIDA FAVORITE FERTILIZER

PESTICIDE	*COMPOSITED CATFISH (FILLETS)*	*COMPOSITED CATFISH (FILLETS W/SKIN)*	*COMPOSITED NILE PERCH (WHOLE FISH)*	*BLUEGILL (WHOLE FISH)*
Aldrin	<0.0017	<0.0017	<0.010	<0.0017
alpha-BHC	0.00020*	0.00028*	0.00063	0.00033*
beta-BHC	<0.0017	<0.0017	<0.010	0.00015*
gamma-BHC	0.00020*	0.00059*	0.00066*	0.000046*
delta-BHC	<0.0017	<0.0017	<0.010	0.000047*
alpha-Chlordane	0.00037*	0.0010*	0.00094*	0.00086*
gamma-Chlordane	<0.0017	<0.0017	<0.010	<0.0017
4,4'-DDD	<0.0033	<0.0033	<0.020	0.00077*
4,4'-DDE	0.00053*	0.0017*	<0.020	0.0041
4,4'-DDT	0.00012*	0.000075*	0.00092*	0.00052*
Dieldrin	0.000086*	0.00021*	<0.020	0.00025*
Endosulfan I	<0.0017	<0.0017	<0.010	<0.0017
Endosulfan II	<0.0033	<0.0033	<0.020	<0.0033
Endosulfan sulfate	<0.0033	<0.0033	<0.020	0.00053*
Endrin	<0.0033	<0.0033	<0.020	0.00014*
Endrin Aldehyde	<0.0033	<0.0033	<0.020	0.00023*
Endrin Ketone	<0.0033	<0.0033	<0.020	<0.0033
Heptachlor	<0.0017	<0.0017	<0.010	<0.00014*
Heptachlor Epoxide	<0.0017	0.00033*	0.00034*	0.000083*
Methoxychlor	<0.017	<0.017	<0.100	<0.017
Toxaphene	<0.170	<0.170	<1.0	<0.170

* Represents estimated values
**Note: All results are given in mg/kg (ppm)
***All results given as < are reporting limits unless an estimated or known value is given

TABLE III
FOOD AND DRUG ADMINISTRATION (FDA) ACTION LEVELS FOR POISONOUS OR DELETERIOUS SUBSTANCES IN HUMAN FOOD AND ANIMAL FEED[9]

PESTICIDE OR METAL	*FDA ACTION LEVEL (mg/kg)*	*REFERENCE*
Inorganic Arsenic	None given	None given
Aldrin/Dieldrin	0.30 (edible portion)	CPG 575.100
Chlordane	0.30 (edible portion)	CPG 575.100
DDT/DDE/DDD	5.0 (edible portion)	CPG 575.100
Endosulfan	None given	None given
Lindane (gamma-HCH)	None given	None given
Toxaphene	None given	None given

Note: CPG = Compliance Policy Guides