

Health Consultation

Fish Testing

KIRBY MINE
COLUMBIA CITY, COLUMBIA COUNTY, FLORIDA

AUGUST 22, 2007

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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HEALTH CONSULTATION

Fish Testing

KIRBY MINE
COLUMBIA CITY, COLUMBIA COUNTY, FLORIDA

Prepared By:

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

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Foreword

This health consultation report evaluates the Florida Department of Environmental Protection's (DEP) fish testing results from July 2003, April 2005 and January 2006.

Evaluating exposure: Florida Department of Health (DOH) scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is on the site, and how people might be exposed to it. Usually, Florida DOH does not collect its own environmental sampling data. We rely on information provided by the Florida Department of Environmental Protection (DEP), the U.S. Environmental Protection Agency (USEPA), and other government agencies, businesses, and the public.

Evaluating health effects: If evidence is found that people are being exposed—or could be exposed—to hazardous substances, Florida DOH scientists will take steps to determine whether that exposure could be harmful to human health. Their assessment focuses on public health; that is, the health impact on the community as a whole, and is based on existing scientific information.

Developing recommendations: In an evaluation report—such as this health consultation report—Florida DOH outlines its conclusions regarding any potential health threat posed by a site, and offers recommendations for reducing or eliminating human exposure to contaminants. The role of Florida DOH in dealing with hazardous waste sites is primarily advisory. For that reason the evaluation report will typically recommend actions to be taken by other agencies—including the EPA and Florida DEP. If, however, the health threat is immediate, Florida DOH will issue a public health advisory warning people of the danger and will work to resolve the problem.

Soliciting community input: The evaluation process is interactive. Florida DOH starts by soliciting and evaluating information from various government agencies, the organizations or individuals responsible for cleaning up the site, and from community members who live near the site. Any conclusions are shared with the organizations and individuals who provided information. Once an evaluation report has been prepared, Florida DOH seeks feedback from the public. *If you have questions or comments about this exposure investigation report, we encourage you to contact us. Please write to:*

Please write to: Susan Skye / Health Assessment Team
Office of Environmental and Occupational Toxicology
Florida Department of Health
4052 Bald Cypress Way, Bin # A-08
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Or call us at: (850) 245-4299, or toll-free during business hours: (877) 798-2772

Summary and Statement of Issues

Florida Department of Environmental Protection (DEP) requested that Florida Department of Health (DOH) assess the public health threat from eating fish from ponds on the Kirby Mine site. This health consultation evaluates test results for fish Florida DEP collected from ponds on the Kirby Mine site July 2003, April 2005 and January 2006.

Florida DEP tested soil, surface water, and ground water at this site. After collecting fish, DEP asked Florida DOH to review fish data. They analyzed the fish for metals, pesticides, polychlorinated biphenyls (PCBs), and dioxins. Florida DEP wants to allow recreational fishing in the ponds.

Florida DOH finds that fish consumption from the ponds on the Kirby Mine site is a “public health hazard” for women of childbearing age and young children. Recent levels of mercury in the fish at the Kirby Mine site exceed Florida DOH’s current fish advisory policy for women of childbearing age and young children. Women of childbearing age and young children should only eat one 6 ounce meal of cooked fish per month from the pond and everyone else should only eat one meal per week. Catfish or other bottom-feeders were not available for analysis. Florida DEP collected too few fish in 2003 for DOH to evaluate polychlorinated biphenyls (PCBs) and pesticides. DOH did evaluate 2003, 2005 and 2006 mercury levels though. In 2005 and 2006, Florida DEP did not detect PCBs, dioxins, or pesticides. Therefore, these contaminants are no apparent public health hazard. Since fish from the Kirby Mine ponds were not tested prior to 2003, the public health threat from eating fish from these ponds prior to 2003 is unknown.

Florida DOH will post a mercury fish consumption advisory on its website (<http://www.doh.state.fl.us/environment/community/fishconsumptionadvisories/index.html>). Florida DOH will review future fish or environmental test data and make recommendations as necessary.

Background

Site Description and History

The Kirby Mine site is in rural Columbia County, Florida, on Kirby Pit Road approximately 2.5 miles southwest of the intersection of State Highway 47 and County Road 240. The site is centered at N 30° 02’ 31.95” latitude and W 82° 43’ 36.97” longitude in Sections 20 and 21, Township 5 South, Range 16 East (Figure 1). Mining operations at the Kirby Mine occupies 80 acres of a 302 acre parcel and is adjacent to the Columbia City Mine site (Figure 2). Both mines operated for decades as limestone quarries. Mining operations ceased at both sites when purchased by the State of Florida in 2000 and 2001. Florida purchased these properties to prevent impacts to nearby Ichetucknee Springs.

Kirby Mine has large water filled pits, spoil piles and various abandoned service facilities such as scale houses, loading areas and process areas. Due to mining activities, the site’s elevations are highly variable ranging from 35 to 75 feet above sea level (DEP 2003).

Kirby Mine Health Consultation

In 2000, the Florida Department of Environmental Protection (DEP) found petroleum-stained surface soils at the former heavy equipment maintenance area at nearby Columbia City Mine. Laboratory tests, however, found only arsenic above Florida DEP's soil cleanup target levels. Florida DEP concluded that the arsenic was of natural origin and within expected background concentrations.

In 2003, Florida DEP tested soil, surface water, and ground water at this site. They found levels of mercury, chromium, and lead in the soil; low levels of arsenic and barium in the surface water; and low levels of silver, mercury, and chromium in the ground water.

Demographics

Based on the 2000 census, approximately 589 people reside within one mile of the Kirby Mine site. Of this population, 90% are white, 7 % are black and 3% are Hispanic or from other racial/ethnic groups (Census 2000) (Figure 3).

Community Health Concerns

Neither Florida DOH nor Florida DEP have received health concerns from nearby residents.

Discussion

This investigation was initiated because the Florida DEP found metals in soils on the site near the mining pits and asked the Florida DOH to review the fish data. Florida DEP's Office of Greenway and Trails wants to allow recreational fishing in the ponds. Ingestion is the exposure pathway of concern.

On July 11, 2007 an inspector with the Columbia County Health Department (CHD) drove past the site to provide an update on accessibility to the site and to see if people were fishing there. The main gate leading into the driveway for both former mines was open. There are numerous "No Trespassing", "Private Property" and "Danger" signs, all around, throughout the area leading down to the mines. Both former mines are fenced. The gates at both mines were closed and locked but access to the ponds could be accessible if someone climbs the fence or gate. The inspector did not see anyone fishing between 8:15 A.M. and 9:00 A.M. on Tuesday July 11, 2007. There were no people entering or leaving the property, nor was any one milling around, loitering or working, at that time. There was quite a bit of visual evidence, on the main driveway leading to both mines, that people had entered the area and loitered and/or dumped their trash. The CHD inspector could not say if people regularly fish the ponds but the area seems accessible, quiet and secluded. There are no homes, within a quarter of a mile of the mines' gates; however, there were several homes within a quarter of a mile of the gate accessing the driveway down to the mines. The inspector did not investigate the outer edges of, and surrounding, the mines; therefore, we are unsure how many homes are within 1/4 of a mile surrounding the mines.

Although there is a statewide fish consumption advisory for mercury (<http://www.doh.state.fl.us/environment/community/fishconsumptionadvisories/index.html>), there are currently no fish advisories specific for the Kirby Mine site.

Fish Collection

In July 2003, the Florida DEP collected five largemouth bass from the on-site pond (Figure 4). DEP wrapped each fish individually and shipped them to the Florida DEP laboratory. The laboratory analyzed fillets for pesticides, metals, and polychlorinated biphenyls (PCBs).

Florida DOH notified Florida DEP that five fish were too few to evaluate the public health threat. Although mercury levels were higher than the Florida DOH's 2003 guideline of 0.5 parts per million (ppm), an existing statewide mercury advisory applied to fish in all water bodies. The Florida DOH recommended Florida DEP collect and analyze bottom feeders (i.e., catfish) in addition to more largemouth bass from this pond. They recommended DEP collect a minimum of 12 fish for a representative composite sample.

In April 2005, Florida DEP collected 14 largemouth bass composite sample and one individual sample over a three day period (Table I). In June 2005, the Florida DEP was unable to collect catfish using hook and line. In January 2006, the Florida Fish and Wildlife Conservation Commission (FFWCC) collected bluegill, redear sunfish (shellcracker) and largemouth bass from the two largest pits (Pit 1 and Pit 4) using electroshock. However, they did not find any catfish or other bottom feeders.

For all sampling events, DEP kept the fish on ice throughout the fish collection and recorded the weights and lengths of fish. In the field, they rinsed the fish samples with deionized water, wrapped in aluminum foil and placed into plastic bags and stored on ice. Chain of custody forms were filled out in the field transported with the fish. They transported the fish to Florida DEP's lab in Tallahassee and filleted. DEP transported the fillets in certified clean glass containers on ice to the FFWCC lab in Eustis for compositing (species specific) using the on-site stainless steel blender. DEP returned the composited fillets back to the Florida DEP laboratory in Tallahassee for analysis.

Laboratory Analyses

In 2003, the Florida DEP laboratory composited and homogenized (blended) the fillets with skins on from five largemouth bass. They analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury and zinc) and organochlorine pesticides including 17 dioxin-like polychlorinated biphenyls (PCBs) (EPA Method 8081 modified). The lab used EPA method 245.6 for testing mercury, EPA method 6010B for zinc and EPA method 6020 for arsenic, cadmium, chromium, copper and lead.

In 2005 the Florida DEP laboratory composited and homogenized the fish fillets with the skin on. The Florida DEP Central Lab in Tallahassee analyzed for mercury (DEP SOP HG-006-3: EPA method 245.6), PCBs, and pesticides (EPA method 8081/8082). Enriver Laboratory analyzed for dioxins (EPA Method 8290).

Table II in Appendix A summarizes the laboratory analytical results. The highest mercury level found in largemouth bass was 0.92 parts per million (ppm). The most recent mercury level found in largemouth bass in 2006 was 0.52 ppm. In 2005 and 2006, the levels of polychlorinated biphenyls (PCBs), dioxins and pesticides were all below detection limits.

Eating Fish/Mercury in Fish

Eating fish is an important part of a healthy diet. Rich in vitamins and low in fat, fish contains protein we need for strong bodies. It is also an excellent source of nutrition for proper growth and development. In fact, the American Heart Association recommends that you eat two meals of fish or seafood every week (FDOH, 2006).

However, most Florida seafood (freshwater and marine) has low to medium levels of mercury. Depending on the age of the fish, the type of fish and the condition of the water the fish lives in, the levels of mercury found in fish are different (FDOH, 2006).

To lower the risk of harm from mercury found in fish caught in Florida, guidelines based on tests of various freshwater, marine and estuarine water bodies are found on the Florida DOH's website

(<http://www.doh.state.fl.us/environment/community/fishconsumptionadvisories/index.html>).

Methylmercury builds up in the tissues of fish. Larger and older fish tend to have the highest levels of mercury (ATSDR, 1999). For people who have eaten fish in the past with mercury levels above these guidelines, they can ask their physician for a mercury blood test. There are no definitive symptoms of low level mercury poisoning. Consuming fish has many health benefits, including a reduced risk of heart disease; that must be considered when deciding whether fish should be consumed. Don't avoid fish; avoid mercury.

For most people, the risk of eating fish exposed to mercury is not a health concern. However, developing fetuses and young children are more sensitive to the harmful effects mercury has on the brain than other people. As a result, women of childbearing age and young children should eat less fish than all others to avoid the higher health risks (FDOH, 2006).

Interpretation of Fish Testing Results

Florida DEP collected too few largemouth bass (five) in 2003 for DOH to evaluate polychlorinated biphenyls (PCBs) and pesticides. DOH did evaluate 2003, 2005 and 2006 mercury levels in fish. Also, in 2006 DEP collected too few panfish (five) for DOH to evaluate for PCBs and pesticides. Largemouth bass were the only fish evaluated for mercury.

In 2005 and 2006 the laboratory did not detect PCBs, dioxins or pesticides in the largemouth bass. Therefore these contaminants are no apparent public health hazard. Catfish or other bottom-feeders were unavailable for analysis.

For mercury, the USFDA action level is 1 ppm methyl mercury in the edible portion of fish (DHHS 2000).

Based on the most recent levels of mercury detected in the fish and the Florida DOH current fish advisory policy, women of childbearing age and young children should only eat one 6 ounce meal of cooked fish per month from the pond and everyone else should only eat one meal per week.

Florida DOH will post this fish consumption advisory (<http://www.doh.state.fl.us/environment/community/fishconsumptionadvisories/index.html>).

Eating fish from the Kirby Mine ponds is a “public health hazard” for women of childbearing age and young children.

Child Health Considerations

Pregnant women and children are more sensitive to the effects of mercury than are adults. Children drink more fluids, eat more food, and breathe more air per kilogram of body weight than do adults. Children have a larger skin surface in proportion to their body volume. A child's diet—that often differs from that of an adult's—and a child's behavior and lifestyle can also influence exposure. Children, especially small children, are closer to the ground than are adults. They crawl on the floor, put things in their mouths, and might ingest inappropriate items such as dirt or paint chips. Children also spend more time outdoors than do adults. Finally and perhaps most importantly, children do not have the judgment of adults for avoiding hazards (ATSDR 1999). Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

Based on the recent levels of mercury detected in the fish, women of childbearing age and young children should only eat one 6 ounce meal of cooked fish per month.

Conclusions

Fish consumption from the ponds on the Kirby Mine site is a “public health hazard” for women of childbearing age and young children.

1. Recent levels of mercury in the fish at the Kirby Mine site exceed Florida DOH's current fish advisory policy for women of childbearing age and young children.
2. In 2005 and 2006 Florida DEP did not detect polychlorinated biphenyls (PCBs), dioxins, or pesticides in the largemouth bass. Therefore these contaminants are no apparent public health hazard. Catfish or other bottom-feeders were unavailable for analysis.
3. Since fish from the Kirby Mine ponds were not tested prior to 2003, the public health threat from eating fish from these ponds prior to 2003 is unknown.

Recommendations

1. Women of childbearing age and young children should only eat one 6 ounce meal of cooked fish per month from the pond and everyone else should only eat one meal per week.
2. DEP should collect at least 12 fish of the same size (within 75%) per water body to represent an adequate composite sample. While in the field, DEP should call DOH to verify the size and number of fish collected.
3. DEP should collect catfish or other bottom feeder fish during the summer months when they are most likely available.

Public Health Action Plan

Florida DOH will post a mercury fish consumption advisory on its website:

(<http://www.doh.state.fl.us/environment/community/fishconsumptionadvisories/index.html>).

Florida DOH will review future fish or environmental test data and make recommendations as necessary.

Florida DOH is considering issuing a press release or news article in one of the local newspapers to notify nearby residents of the mercury fish consumption advisory.

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References

[ATSDR] Agency for Toxic Substances and Disease Registry. 1999. ATDSR Toxicological Profile for Mercury.

[Census] U.S. Census Bureau. 2000. Landview 5 on DVD. U.S. Department of Commerce Economics and Statistics Administration. U.S. Census Bureau, Washington, D.C.

[DHHS] Department of Health and Human Services. 2000. Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed. U.S. Food and Drug Administration, Washington, D.C.

[FDOH] Florida Department of Health. Your Guide to Eating Fish Caught in Florida. Tallahassee, Florida, September 2006.

<http://www.doh.state.fl.us/environment/community/fishconsumptionadvisories/index.html>

APPENDIX A
FIGURES AND TABLES

TABLE I
April 2005 Bass Lengths/Weights

	Length (inches)	Weight (lbs)
Bass 1	15.5	1.69
Bass 2	14.4	1.25
Bass 3	15.2	1.37
Bass 4	14.5	1.37
Bass 5	15.8	1.69
Bass 6	14.8	1.51
Bass 7	15.8	1.56
Bass 8	14.8	1.51
Bass 9	17.0	2.75
Bass 10	14.8	1.94
Bass 11	14.4	1.31
Bass 12	14.4	1.19
Bass 13	14.5	1.25
Bass 14	14.5	1.56
Bass 15	15.5	1.06

Note: Bass 9 was tested separately for mercury, PCBs, dioxins and pesticides; all other bass were composited and tested for mercury, PCBs, dioxins and pesticides

TABLE II. Contaminant Concentrations in Kirby Mine Fish

	Individual Bass	Composited Bass
Mercury		
2003	0.92 ppm*	N/A
2005	0.64 ppm*	0.57 ppm**
2006	0.52 ppm*	0.44 ppm**
Dioxins		
2003	N/A	N/A
2005	***	ND
2006	N/A	N/A
PCBs		
2003	**	N/A
2005	***	ND
2006	***	ND
Pesticides		
2003	***	N/A
2005	***	ND
2006	***	ND

ppm = parts per million

ND = not detected in the samples

N/A = chemical not tested

* 5, 15 and 6 individual bass tested for mercury in 2003, 2005 and 2006 respectively

** 15 bass composited in 2005 and 9 bass composited in 2006

*** Even though DEP analyzed individual fish for these chemicals, the results are non-applicable. DOH does accept mercury results from individual fish. However, PCB, dioxins and pesticide results must be from composited samples of 12 fish or more not from individual fish.

Note 1: In 2005, the laboratory detected 0.31 picograms/gram OctoChloroDibenzoDioxin in both the composited bass and in the blank. Therefore, we considered OctoChloroDibenzoDioxin “non-detected.”

Note 2: All mercury levels are the highest levels found in all individual fish collected for that sampling event.

TABLE III
Summary of Florida Mercury Health Guidelines for the Consumption of Fish and Shellfish

Frequency of Consumption	Women of Childbearing Age & Young Children	All Other Individuals
Two 6 ounce meals per week of fish*	With <0.1 ppm total mercury in flesh**	With <0.43 ppm total mercury in flesh**
One 6 ounce meal per week of fish*	With <0.2 ppm total mercury in flesh**	With <0.86 ppm total mercury in flesh**
One 6 ounce meal per month of fish*	With <0.85 ppm total mercury in flesh**	With <1.5 ppm total mercury in flesh**
Do not eat fish*	With \geq 0.85 ppm total mercury in flesh**	With \geq 1.5 ppm total mercury in flesh**
On meal per month of Largemouth Bass, Bowfin, or Gar	For water bodies not listed in the DOH advisories	NA
One meal per week of Largemouth Bass, Bowfin, or Gar	N/A	For water bodies not listed in the DOH advisories
Do not eat ***	Shark, Swordfish, King Mackerel, or Tilefish from unknown or untested waters:	Shark > 43 inches, King Mackerel > 31 inches
Commonly eaten fish low in mercury include Shrimp, canned light Tuna, Salmon, Pollock, & Catfish	limit consumption to 12 ounces of fish and shellfish per week	NA
For recreationally caught fish from unknown or untested waters.	Limit to 6 ounces per week***	NA
Limit to 6 ounces per week***	Albacore Tuna and a second meal of fish low in mercury	NA

* 6 ounces of fish after cooked

** Concentration values were furnished by Dr. Joe Sekerke, Toxicologist, Bureau of Community Environmental Health, The Florida Department of Health, Tallahassee, Florida.

***From Florida Health, The Florida Department of Health, Fish Consumption Advisory, Eat Healthy, Eat Smart, Your Guide to Eating Fish Caught in Florida, September, 2006 (<http://www.doh.state.fl.us/Environment/community/fishconsumptionadvisories/index.html>).

FIGURE 1

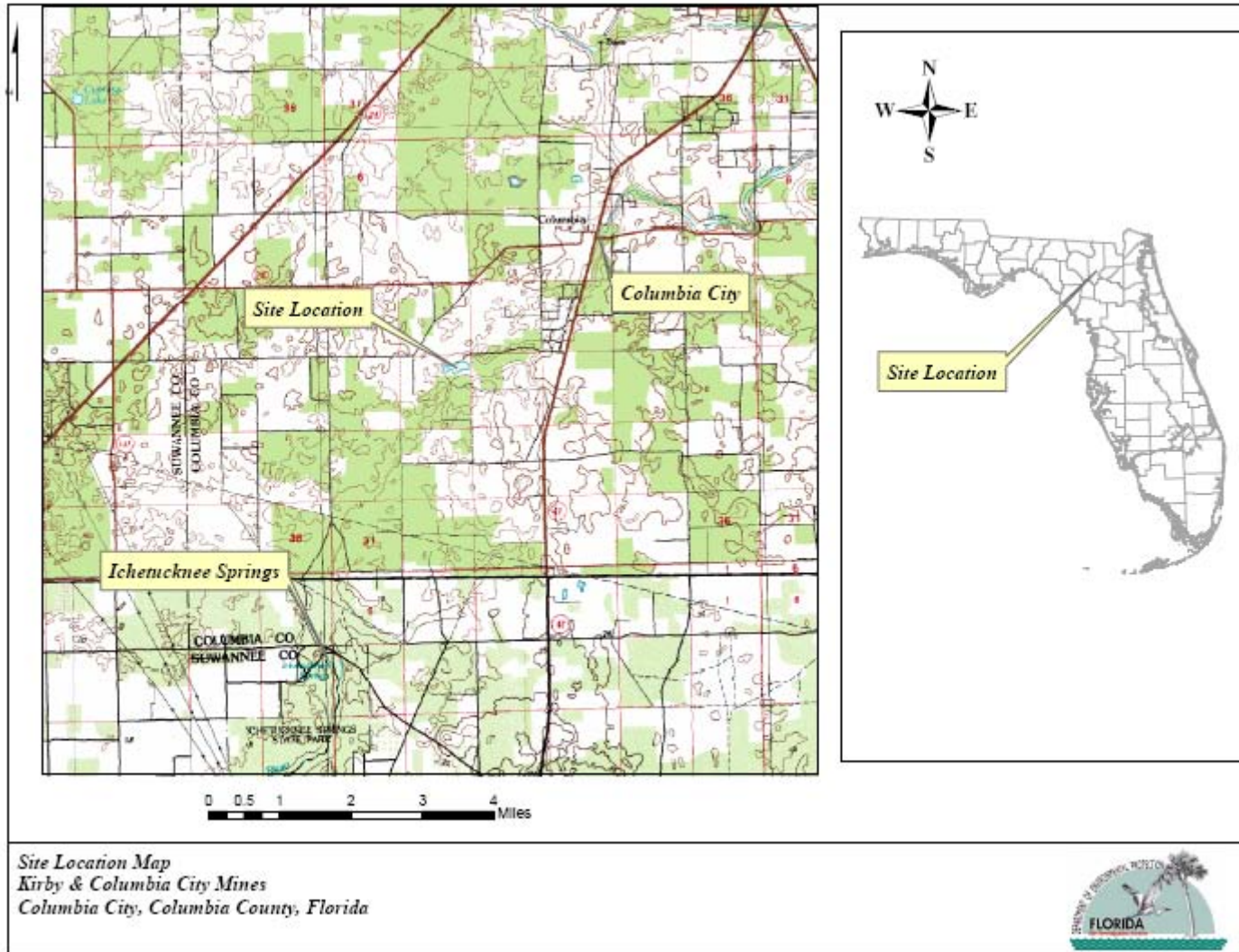


FIGURE 2



FIGURE 3

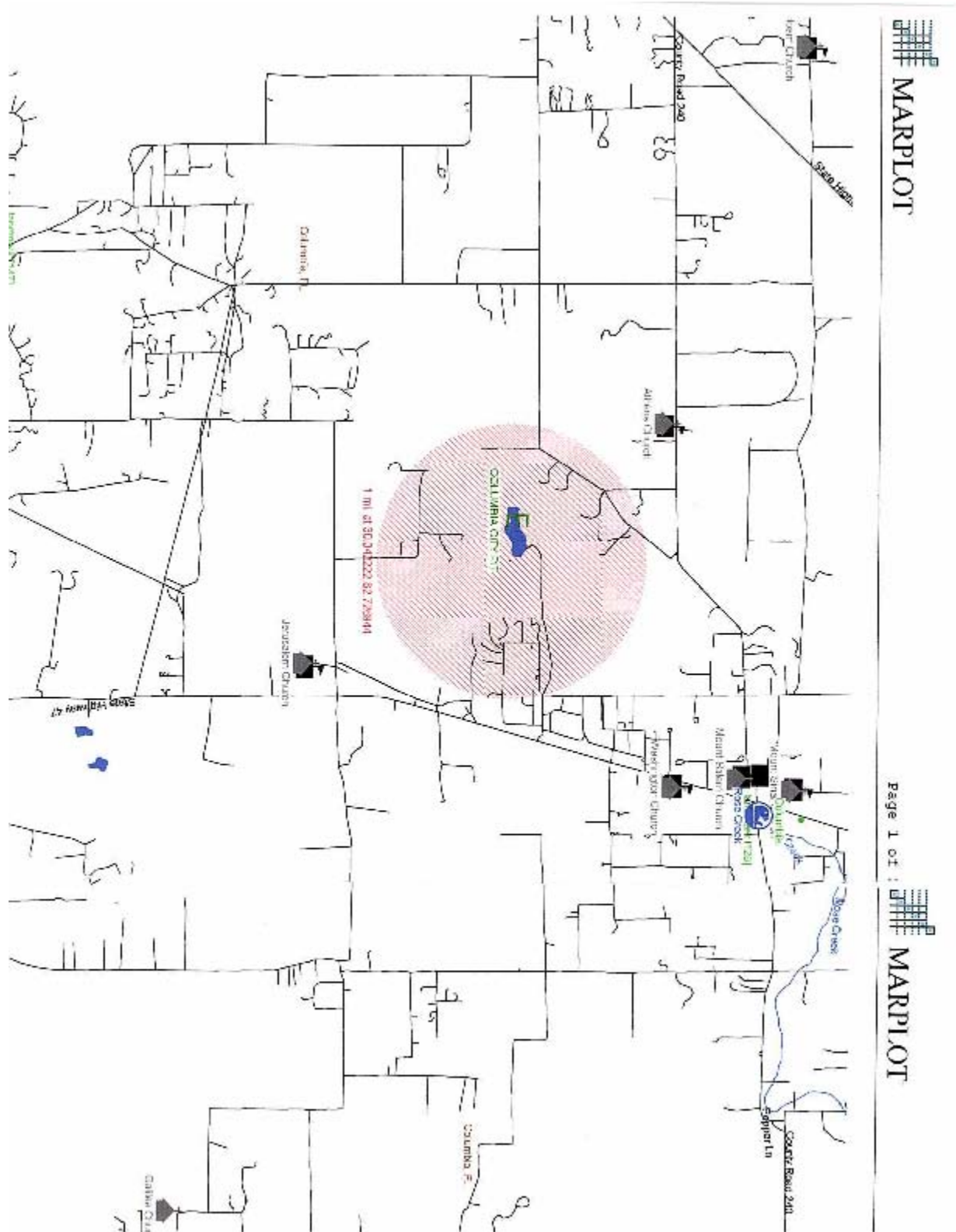
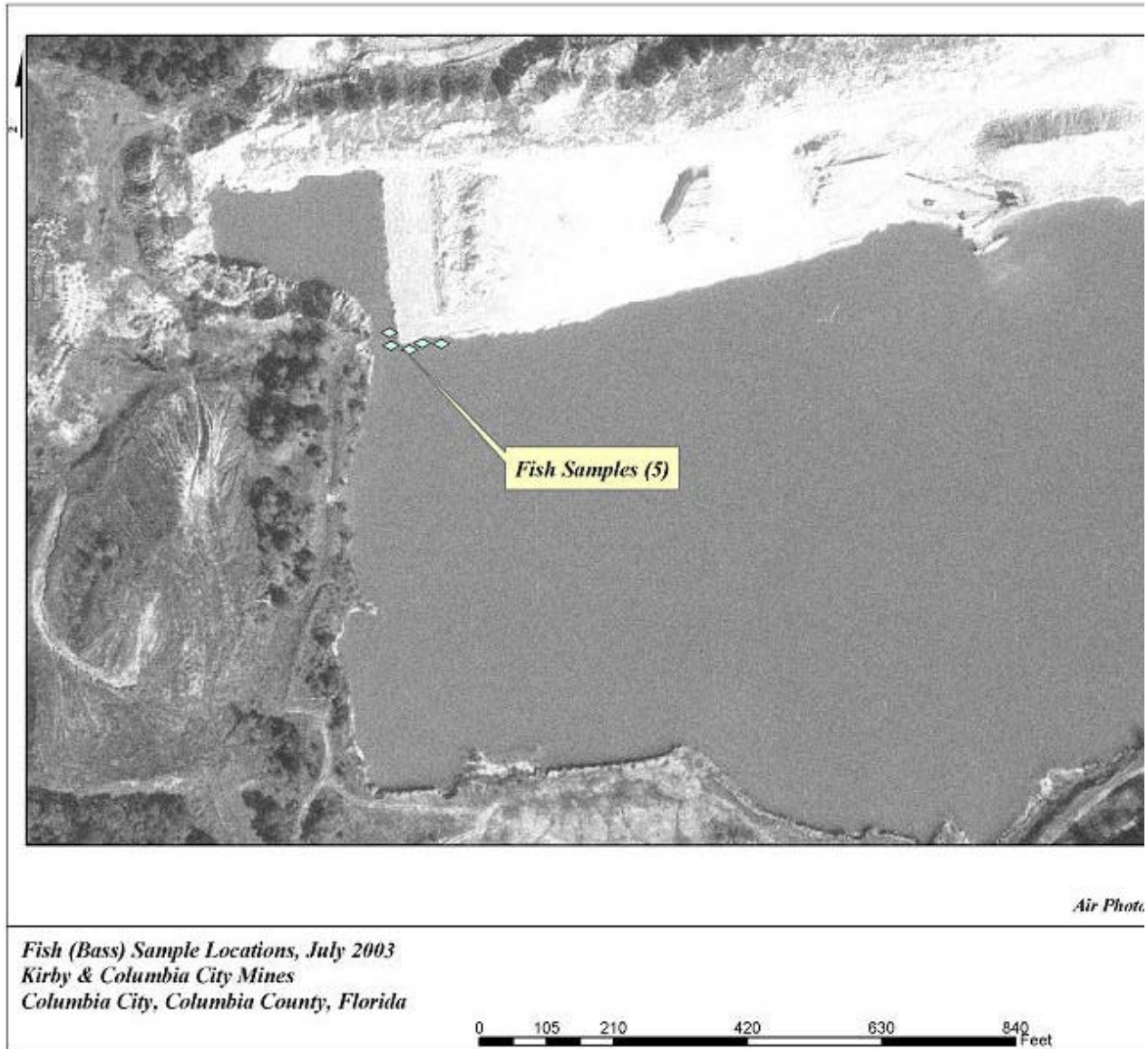


FIGURE 4



APPENDIX B

Photo 1: Typical site topography looking west across both properties (Courtesy of DEP)



APPENDIX C

ATSDR Glossary of Environmental Health Terms

This glossary defines words used by the Agency for Toxic Substances and Disease Registry (ATSDR) in communications with the public. It is not a complete dictionary of environmental health terms. If you have questions or comments, call ATSDR's toll-free telephone number, 1-888-422-8737.

Absorption

The process of taking in. For a person or an animal, absorption is the process of a substance getting into the body through the eyes, skin, stomach, intestines, or lungs.

Acute

Occurring over a short time [compare with chronic].

Acute exposure

Contact with a substance that occurs once or for only a short time (up to 14 days) [compare with intermediate duration exposure and chronic exposure].

Additive effect

A biologic response to exposure to multiple substances that equals the sum of responses of all the individual substances added together [compare with antagonistic effect and synergistic effect].

Adverse health effect

A change in body function or cell structure that might lead to disease or health problems

Aerobic

Requiring oxygen [compare with anaerobic].

The Agency for Toxic Substances and Disease Registry (ATSDR)

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency with headquarters in Atlanta, Georgia, and 10 regional offices in the United States. ATSDR's mission is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances.

Ambient

Surrounding (for example, *ambient* air).

Anaerobic

Requiring the absence of oxygen [compare with aerobic].

Analyte

A substance measured in the laboratory. A chemical for which a sample (such as water, air, or blood) is tested in a laboratory. For example, if the analyte is mercury, the laboratory test will determine the amount of mercury in the sample.

Analytic epidemiologic study

A study that evaluates the association between exposure to hazardous substances and disease by testing scientific hypotheses.

Antagonistic effect

A biologic response to exposure to multiple substances that is **less** than would be expected if

the known effects of the individual substances were added together [compare with additive effect and synergistic effect].

Background level

An average or expected amount of a substance or radioactive material in a specific environment, or typical amounts of substances that occur naturally in an environment.

Biodegradation

Decomposition or breakdown of a substance through the action of microorganisms (such as bacteria or fungi) or other natural physical processes (such as sunlight).

Biologic indicators of exposure study

A study that uses (a) biomedical testing or (b) the measurement of a substance [an analyte], its metabolite, or another marker of exposure in human body fluids or tissues to confirm human exposure to a hazardous substance [also see exposure investigation].

Biologic monitoring

Measuring hazardous substances in biologic materials (such as blood, hair, urine, or breath) to determine whether exposure has occurred. A blood test for lead is an example of biologic monitoring.

Biologic uptake

The transfer of substances from the environment to plants, animals, and humans.

Biota

Plants and animals in an environment. Some of these plants and animals might be sources of food, clothing, or medicines for people.

CAP [see Community Assistance Panel.]

Cancer

Any one of a group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.

Cancer risk

A theoretical risk for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

Carcinogen

A substance that causes cancer.

Case study

A medical or epidemiologic evaluation of one person or a small group of people to gather information about specific health conditions and past exposures.

Case-control study

A study that compares exposures of people who have a disease or condition (cases) with people who do not have the disease or condition (controls). Exposures that are more common among the cases may be considered as possible risk factors for the disease.

Central nervous system

The part of the nervous system that consists of the brain and the spinal cord.

CERCLA [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980]

Chronic

Occurring over a long time [compare with acute].

Chronic exposure

Contact with a substance that occurs over a long time (more than 1 year) [compare with acute exposure and intermediate duration exposure]

Cluster investigation

A review of an unusual number, real or perceived, of health events (for example, reports of cancer) grouped together in time and location. Cluster investigations are designed to confirm case reports; determine whether they represent an unusual disease occurrence; and, if possible, explore possible causes and contributing environmental factors.

Community Assistance Panel (CAP)

A group of people from a community and from health and environmental agencies who work with ATSDR to resolve issues and problems related to hazardous substances in the community. CAP members work with ATSDR to gather and review community health concerns, provide information on how people might have been or might now be exposed to hazardous substances, and inform ATSDR on ways to involve the community in its activities.

Comparison value (CV)

Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

Completed exposure pathway [see exposure pathway].

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

CERCLA, also known as Superfund, is the federal law that concerns the removal or cleanup of hazardous substances in the environment and at hazardous waste sites. ATSDR, which was created by CERCLA, is responsible for assessing health issues and supporting public health activities related to hazardous waste sites or other environmental releases of hazardous substances. This law was later amended by the Superfund Amendments and Reauthorization Act (SARA).

Concentration

The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

Contaminant

A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.

Delayed health effect

A disease or an injury that happens as a result of exposures that might have occurred in the past.

Dermal

Referring to the skin. For example, dermal absorption means passing through the skin.

Dermal contact

Contact with (touching) the skin [see route of exposure].

Descriptive epidemiology

The study of the amount and distribution of a disease in a specified population by person, place, and time.

Detection limit

The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

Dose (for chemicals that are not radioactive)

The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An “exposure dose” is how much of a substance is encountered in the environment. An “absorbed dose” is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.

Dose (for radioactive chemicals)

The radiation dose is the amount of energy from radiation that is actually absorbed by the body. This is not the same as measurements of the amount of radiation in the environment.

Dose-response relationship

The relationship between the amount of exposure [dose] to a substance and the resulting changes in body function or health (response).

Environmental media

Soil, water, air, biota (plants and animals), or any other parts of the environment that can contain contaminants.

Environmental media and transport mechanism

Environmental media include water, air, soil, and biota (plants and animals). Transport mechanisms move contaminants from the source to points where human exposure can occur. The environmental media and transport mechanism is the second part of an exposure pathway.

EPA

United States Environmental Protection Agency.

Epidemiologic surveillance [see Public health surveillance].

Epidemiology

The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

Exposure

Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [acute exposure], of intermediate duration, or long-term [chronic exposure].

Exposure assessment

The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with.

Exposure-dose reconstruction

A method of estimating the amount of people’s past exposure to hazardous substances. Computer and approximation methods are used when past information is limited, not available, or missing.

Exposure investigation

The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances.

Exposure pathway

The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has

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five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating, drinking, breathing, or touching), and a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

Exposure registry

A system of ongoing follow up of people who have had documented environmental exposures.

Feasibility study

A study by EPA to determine the best way to clean up environmental contamination. A number of factors are considered, including health risk, costs, and what methods will work well.

Groundwater

Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with surface water].

Hazard

A source of potential harm from past, current, or future exposures.

Hazardous Substance Release and Health Effects Database (HazDat)

The scientific and administrative database system developed by ATSDR to manage data collection, retrieval, and analysis of site-specific information on hazardous substances, community health concerns, and public health activities.

Hazardous waste

Potentially harmful substances that have been released or discarded into the environment.

Health investigation

The collection and evaluation of information about the health of community residents. This information is used to describe or count the occurrence of a disease, symptom, or clinical measure and to evaluate the possible association between the occurrence and exposure to hazardous substances.

Indeterminate public health hazard

The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.

Incidence

The number of new cases of disease in a defined population over a specific time period [contrast with prevalence].

Ingestion

The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see route of exposure].

Inhalation

The act of breathing. A hazardous substance can enter the body this way [see route of exposure].

Intermediate duration exposure

Contact with a substance that occurs for more than 14 days and less than a year [compare with acute exposure and chronic exposure].

In vitro

In an artificial environment outside a living organism or body. For example, some toxicity

testing is done on cell cultures or slices of tissue grown in the laboratory, rather than on a living animal [compare with in vivo].

In vivo

Within a living organism or body. For example, some toxicity testing is done on whole animals, such as rats or mice [compare with in vitro].

Lowest-observed-adverse-effect level (LOAEL)

The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.

Medical monitoring

A set of medical tests and physical exams specifically designed to evaluate whether an individual's exposure could negatively affect that person's health.

Metabolism

The conversion or breakdown of a substance from one form to another by a living organism.

Metabolite

Any product of metabolism.

mg/kg

Milligram per kilogram.

mg/cm²

Milligram per square centimeter (of a surface).

mg/m³

Milligram per cubic meter; a measure of the concentration of a chemical in a known volume (a cubic meter) of air, soil, or water.

Migration

Moving from one location to another.

Minimal risk level (MRL)

An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see reference dose].

National Priorities List for Uncontrolled Hazardous Waste Sites (National Priorities List or NPL)

EPA's list of the most serious uncontrolled or abandoned hazardous waste sites in the United States. The NPL is updated on a regular basis.

National Toxicology Program (NTP)

Part of the Department of Health and Human Services. NTP develops and carries out tests to predict whether a chemical will cause harm to humans.

No apparent public health hazard

A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.

No-observed-adverse-effect level (NOAEL)

The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.

No public health hazard

A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances.

NPL [see National Priorities List for Uncontrolled Hazardous Waste Sites]

Plume

A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.

Point of exposure

The place where someone can come into contact with a substance present in the environment [see exposure pathway].

Population

A group or number of people living within a specified area or sharing similar characteristics (such as occupation or age).

Potentially responsible party (PRP)

A company, government, or person legally responsible for cleaning up the pollution at a hazardous waste site under Superfund. There may be more than one PRP for a particular site.

ppb

Parts per billion.

ppm

Parts per million.

Public availability session

An informal, drop-by meeting at which community members can meet one-on-one with ATSDR staff members to discuss health and site-related concerns.

Public comment period

An opportunity for the public to comment on agency findings or proposed activities contained in draft reports or documents. The public comment period is a limited time period during which comments will be accepted.

Public health action

A list of steps to protect public health.

Public health advisory

A statement made by ATSDR to EPA or a state regulatory agency that a release of hazardous substances poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

Public health assessment (PHA)

An ATSDR document that examines hazardous substances, health outcomes, and community concerns at a hazardous waste site to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health.

Public health hazard

A category used in ATSDR's public health assessments for sites that pose a public health hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or radionuclides that could result in harmful health effects.

Public health hazard categories

Public health hazard categories are statements about whether people could be harmed by

conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. The five public health hazard categories are no public health hazard, no apparent public health hazard, indeterminate public health hazard, public health hazard, and urgent public health hazard.

Public health statement

The first chapter of an ATSDR toxicological profile. The public health statement is a summary written in words that are easy to understand. The public health statement explains how people might be exposed to a specific substance and describes the known health effects of that substance.

Public health surveillance

The ongoing, systematic collection, analysis, and interpretation of health data. This activity also involves timely dissemination of the data and use for public health programs.

Receptor population

People who could come into contact with hazardous substances [see exposure pathway].

Reference dose (RfD)

An EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans.

Remedial investigation

The CERCLA process of determining the type and extent of hazardous material contamination at a site.

RfD [see reference dose]

Risk

The probability that something will cause injury or harm.

Risk reduction

Actions that can decrease the likelihood that individuals, groups, or communities will experience disease or other health conditions.

Risk communication

The exchange of information to increase understanding of health risks.

Route of exposure

The way people come into contact with a hazardous substance. Three routes of exposure are breathing [inhalation], eating or drinking [ingestion], or contact with the skin [dermal contact].

Safety factor [see uncertainty factor]

SARA [see Superfund Amendments and Reauthorization Act]

Sample

A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger population [see population]. An environmental sample (for example, a small amount of soil or water) might be collected to measure contamination in the environment at a specific location.

Sample size

The number of units chosen from a population or an environment.

Source of contamination

The place where a hazardous substance comes from, such as a landfill, waste pond, incinerator, storage tank, or drum. A source of contamination is the first part of an exposure pathway.

Special populations

People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Statistics

A branch of mathematics that deals with collecting, reviewing, summarizing, and interpreting data or information. Statistics are used to determine whether differences between study groups are meaningful.

Substance

A chemical.

Superfund [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Superfund Amendments and Reauthorization Act (SARA)]

Superfund Amendments and Reauthorization Act (SARA)

In 1986, SARA amended the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from substance exposures at hazardous waste sites and to perform activities including health education, health studies, surveillance, health consultations, and toxicological profiles.

Surface water

Water on the surface of the earth, such as in lakes, rivers, streams, ponds, and springs [compare with groundwater].

Surveillance [see public health surveillance]

Survey

A systematic collection of information or data. A survey can be conducted to collect information from a group of people or from the environment. Surveys of a group of people can be conducted by telephone, by mail, or in person. Some surveys are done by interviewing a group of people [see prevalence survey].

Synergistic effect

A biologic response to multiple substances where one substance worsens the effect of another substance. The combined effect of the substances acting together is greater than the sum of the effects of the substances acting by themselves [see additive effect and antagonistic effect].

Teratogen

A substance that causes defects in development between conception and birth. A teratogen is a substance that causes a structural or functional birth defect.

Toxic agent

Chemical or physical (for example, radiation, heat, cold, microwaves) agents that, under certain circumstances of exposure, can cause harmful effects to living organisms.

Toxicological profile

An ATSDR document that examines, summarizes, and interprets information about a hazardous substance to determine harmful levels of exposure and associated health effects. A toxicological profile also identifies significant gaps in knowledge on the substance and describes areas where further research is needed.

Toxicology

The study of the harmful effects of substances on humans or animals.

Tumor

An abnormal mass of tissue that results from excessive cell division that is uncontrolled and progressive. Tumors perform no useful body function. Tumors can be either benign (not cancer) or malignant (cancer).

Uncertainty factor

Mathematical adjustments for reasons of safety when knowledge is incomplete. For example, factors used in the calculation of doses that are not harmful (adverse) to people. These factors are applied to the lowest-observed-adverse-effect-level (LOAEL) or the no-observed-adverse-effect-level (NOAEL) to derive a minimal risk level (MRL). Uncertainty factors are used to account for variations in people's sensitivity, for differences between animals and humans, and for differences between a LOAEL and a NOAEL. Scientists use uncertainty factors when they have some, but not all, the information from animal or human studies to decide whether an exposure will cause harm to people [also sometimes called a safety factor].

Urgent public health hazard

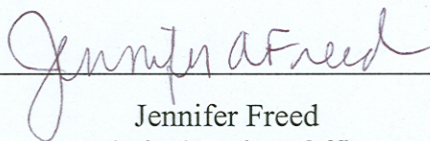
A category used in ATSDR's public health assessments for sites where short-term exposures (less than 1 year) to hazardous substances or conditions could result in harmful health effects that require rapid intervention.

Volatile organic compounds (VOCs)

Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, and methylene chloride.

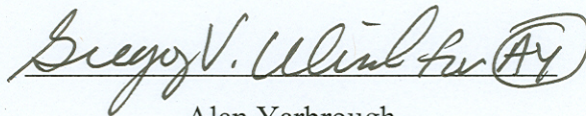
CERTIFICATION

The Florida Department of Health, Office of Environmental and Occupational Toxicology prepared this Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It followed approved methodology and procedures existing at the time it began. The Cooperative Agreement Partner completed editorial review.



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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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