HEALTH CONSULTATION

CRYSTAL SPRINGS ROAD PARK POND

JACKSONVILLE, DUVAL COUNTY, FLORIDA

Prepared by:

Florida Department of Health
Bureau of Environmental Epidemiology
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Health Consultation

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JACKSONVILLE, DUVAL COUNTY, FLORIDA

SEPTEMBER 30, 2002

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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Summary and Statement of Issues

The Florida Department of Environmental Protection (DEP) requested the Florida Department of Health (DOH) evaluate the public health threat from eating dioxin- and furan-contaminated fish from a pond at the Crystal Springs Road Park in Jacksonville, Florida. Florida DOH finds no apparent health threat from the levels of dioxins and furans in the sampled fish at this park. 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 pond.

Site Description and History

Crystal Springs Road Park (a.k.a. Westside Park) is at the northeast corner of Crystal Springs Road and Blair Road in Jacksonville, Duval County, Florida (Figures 1 and 2). A portion of the park was built on a former city-operated dumpsite. The park is near a residential neighborhood.

Crystal Springs Road Park includes a 1.8–acre, 15-foot deep pond. The banks of the pond are covered with grass and are readily accessible. A wooden pedestrian bridge crosses over the center of the pond. The pond is covered with a dense growth of aquatic weed, especially *Najas* spp. (Southern naiad). A pump provides aeration in the southern end of the pond. The Florida Fish and Wildlife Conservation Commission (FWCC) stocks and manages fish in this pond. Only people accompanied by children and retirees are allowed to fish from this pond.

In February and April 2000, the Duval County Health Department (CHD) collected 20 surface soil samples from the site and had them analyzed for dioxins.

On January 19, 2001, the Duval CHD/City of Jacksonville closed Crystal Springs Road Park as a precautionary measure due to dioxins found in soil. The Duval CHD found elevated levels of chlorinated dibenzo-p-dioxin (CDD) and chlorinated dibenzofuran (CDF) congeners. The highest levels were found in the northeastern part of the park, east of the pond on-site. The source of dioxins in the park soil is unknown. Dioxins may have been in the fill originally used to build the park.

On February 12, 2001, the Duval CHD/City of Jacksonville held a public meeting to present the reasons for temporary closure of the park and the plan to fully assess the contamination. On April 19, 2001, the Duval CHD collected fish from the pond and had them analyzed for metals, mercury, pesticides and polychlorinated biphenyls (PCBs) but not for CDDs/CDFs. In May 2001, the Duval CHD/City of Jacksonville tested fish (tissue survey) in response to the comments from the Florida DEP regarding their Contamination Assessment Plan report.

In September 2001, the Duval CHD/City of Jacksonville reopened part of Crystal Springs Road Park after their contractors assessed contamination on the site and fenced off contaminated areas.

Discussion

Fish Sampling Methods, Species Selection and Sample Size

Fish species targeted for collection included one bottom feeder (bottom dweller) – channel catfish (*Ictalurus punctatus*), one game fish (water-column dweller) – largemouth bass (*Micropterus salmoides*) and one pan fish (water-column dweller) – bluegill (*Lepomis macrochirus*). Three individual (largest adult) fish per target species were sought, to yield a total of nine fish samples. Larger fish were sought because of the persistent nature of CDDs/CDFs, which tend to accumulate in tissues as fish grow. Therefore, the Florida DOH anticipated larger fish should contain higher concentrations of these chemicals.

Fish Collection and Shipment

In May 2001, the Florida FWCC collected three species of fish (largemouth bass, channel catfish and bluegill) from the pond using a boat for electro-fishing. The Florida DOH provided technical assistance (number of fish to collect, size, laboratory details, etc.). The Florida FWCC collected three largemouth bass (296-507 millimeters (mm) long), three channel catfish (439-524 mm long), and three bluegill (165-186 mm long). The largest bass, catfish and bluegill weighed 1872, 1280 and 90 grams respectively. 1872 grams is approximately 4 pounds. 507 mm is approximately 20 inches. The Florida FWCC sealed the fish in aluminum foil, packed them in a cooler with dry ice, and shipped them to the laboratory using chain-of-custody record/analysis forms.

Fish Laboratory Methods and Analyses

Severn Trent Laboratories (STL) in Sacramento, California analyzed the fish samples. They filleted the bass and catfish leaving the belly flaps but removed scales and skin. The lab cleansed the bluegill carcasses removing the scales but leaving the skin intact. For each species, they analyzed both edible fillets and whole fish for dioxins and furans using EPA Method 8290. STL also analyzed each sample for percent (%) lipids. CDDs/CDFs are lipophilic (fat loving) and found in the fatty portions of the fish.

Evaluation of Fish Results and Interpretation

The levels of dioxins in the fish collected from the pond at the Crystal Springs Road Park do not appear to be a health risk. Low levels of dioxins/furans or none at all were detected in the fish samples (Table 1). In a September 2001 letter to the Florida DEP, the Florida DOH stated low levels of dioxin were found in all the fish sampled. Actually, some fish had levels below detection limits.

For the eighteen fish samples analyzed, most of the laboratory analysis showed non-detect for most dioxin/furan congeners. For each species of fish (largemouth bass, channel catfish and bluegill), the Florida DOH used Toxicity Equivalents (TEQs) to calculate ingestion doses for a child and an adult. A TEQ is the mean concentration of the total dioxin/furan toxic equivalents.

The Florida DOH assumed an adult eats 30 grams of fish per day and a child eats 15 grams per day. The amount of fish per day errs on the conservative side for protecting human health.

For dioxins and furans, each of these calculated doses for each type of fish tested were less than the Agency for Toxic Substances and Disease Registry (ATSDR's) Minimum Risk Level (MRL) for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD). A MRL is an estimate of daily human exposure to a dose of a chemical that is likely to be without an appreciable risk of adverse noncancerous effect over a specified duration of exposure. The Florida DOH used the MRL for 2, 3, 7, 8-TCDD as this congener is the most toxic of all the dioxins and furans. Our estimate of a child's and an adult's maximum acute (1-14 days) exposure to 2,3,7,8-TCDD from the Crystal Springs Park Pond is least 10,000 times less than the ATSDR's MRL. Our estimate of a child's and an adult's maximum intermediate (15-364 days) exposure to 2, 3,7,8-TCDD from eating fish from the pond is 1,000 times less than the ATSDR's MRL. Our estimate of a child's and an adult's maximum long-term (≥ 365 days) exposure to 2, 3,7,8-TCDD from eating fish from the pond is 100 times less than the ATSDR's MRL. Therefore, we do not expect any illness from eating the levels of dioxins in largemouth bass, channel catfish or bluegill from the Crystal Springs Road Park pond.

See Appendix A for general information concerning chlorinated dibenzo-p-dioxins, chlorinated dibenzofurans, chlorinated dibenzodioxins and chlorinated dibenzofurans, and accumulation of chlorinated dibenzodioxins and chlorinated dibenzofurans in foods.

Other Health Based Standards

Currently, the Food and Drug Administration (FDA) does not have action levels for dioxins or furans in human food and animal feed (Department of Health and Human Services 1998).

Consideration of Biological Testing

The Florida DOH also considered biological testing (urine, hair and/or blood) for people eating the fish. However, the levels of dioxin found in the fish do not warrant a biological investigation.

Child Health Initiative

Because this health consultation addresses children who eat fish from the Crystal Springs Road Park Pond, children are a main concern. Pregnant women, nursing mothers and children can be affected by dioxins in fish. Children are not small adults; a child's exposure to hazardous substances can differ from an adult's exposure in many ways. Children drink more fluids, eat more food, and breathe more air per kilogram of body weight than do adults. They also have a larger skin surface in proportion to their body volume. A child's diet often differs from that of an adult's. A child's behavior and lifestyle also influence exposure. Children—especially very young children—crawl on the floor, put things in their mouths and can ingest inappropriate objects such as dirt or paint chips. Children also spend more time outdoors than do adults. But perhaps most importantly, children do not have the judgment of adults insofar as avoiding hazards is concerned. Even though sensitive populations such as pregnant women, nursing mothers and children are a concern, the dioxins and furans found in the largemouth bass, bluegill and channel catfish collected from the Crystal Springs Road Park pond are not likely to cause illness.

Conclusions

Because the dioxin levels found in the sampled fish were less than ATSDR's MRLs and less than the TEQ for dioxins and furans for all but one single fish sample, the Crystal Springs Road Park is categorized as **no apparent public health hazard**.

Recommendations/Public Health Action Plan

At this time, the Florida DOH does not offer any recommendations for this site.

The Florida DOH will make copies of this consult available to the Crystal Springs Road Park community.

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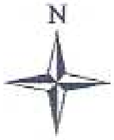
Crystal Springs Road Park - Jacksonville, FL
Street Map
Figure 1



Prepared by FDOH
8/20/02

Legend
- All Streets
- Highways
- Water Bodies
- County Boundaries

Crystal Springs Road Park and Pond
Jacksonville, Florida
Figure 2

Crystal Springs Park

- Park
- Soil Samples
- Dioxin Samples
- Hot Spots
- Structures
- Sidewalk
- Lake

0 100 Feet

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DCHD

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Table I

Crystal Springs Road Park

Summary of Fish Samples Dioxins/Furans Detected and Calculated TEQs

From May 2001 Fish Collection

	Fish Sample and Type					
Chemical Detected	**LMB-1 (Fillet)**	**LMB-1 (Whole Fish)**	**CC-1 (Fillet)**	**CC-3 (Fillet)**	**BG-1 (Fillet)**	**BG-3 (Filet)**
OCDD	6.3	5.5	6.7	ND	ND	9.1 J
2,3,7,8-TCDF	1.6	1.9	ND	ND	0.76 J	ND
1,2,3,4,6,7,8-HpCDD	ND	ND	2.8J	ND	ND	ND
Total HpCDD	ND	ND	2.8	ND	ND	ND
Total TCDF	1.6	ND	0.61	0.53	1.6	ND
% Lipids	7.70%	10%	7.50%	9.50%	11%	8.40%
TEQ	0.16	0.19	0.03	0.05	0.08	0.001

LMB=largemouth bass; CC=channel catfish; BG=bluegill

All results are in parts per trillion (ppt)

J=estimated value;result is less than the reporting limit

ND=not detected

OCDD=octa-chlorinated dioxin

TCDF=tetra-chlorodibenzofuran

HpCDD=hepta-chlorodibenzofuran

TEQ=Sum of the products of the Toxic Equivalency Factors (TEFs) for each congener and its concentration in the mixture;TEQs represent 2,3,7,8-tetra-chlorinated dibenzo-p-dioxins toxic equivalents for mixtures of CDDs, CDFs and/or dioxin-like PCBs.

APPENDIX A

Chlorinated Dibenzo-p-Dioxins: General Information

Chlorinated dibenzo-p-dioxins (CDDs) are a family of 75 different compounds with varying harmful effects. CDDs are divided into eight groups of chemicals based on the number of chlorine atoms in the compound. A few examples are: di-chlorinated dioxin (DCDD), tri-chlorinated dioxin (TrCDD) and tetra-chlorinated dioxin (TCDD). 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin (2, 3, 7, 8-TCDD) has four chlorine atoms, one each in the 2, 3, 7, and 8 positions. 2, 3, 7, 8-TCDD is odorless. The odors of the other CDDs are not known. CDDs are known to occur naturally, and are also produced by human activities. They are naturally produced from the incomplete combustion of organic material by forest fires or volcanic activity. CDDs are not intentionally manufactured by industry, except in small amounts for research purposes. They are unintentionally produced by industrial, municipal, and domestic incineration and combustion processes (ATSDR 1998).

If a person is exposed to CDDs, many factors determine whether they will be harmed. These factors include the dose (how much), the duration (how long) and how you come in contact with the chemicals. Other factors include other chemicals the person is exposed to, their age, sex, diet, family traits, lifestyle and state of health (ATSDR 1998).

CDDs are found everywhere in the environment, and most people are exposed to very small background levels of CDDs when they breath air, consume food or milk, or have skin contact with materials contaminated with CDDs (ATSDR 1998). CDDs are found at very low levels in the environment. CDDs enter the environment as mixtures containing a variety of individual components and impurities. In the environment they tend to be associated with ash, soil, or any surface with a high organic content, such as plant leaves. CDDs strongly adhere to soils and sediments. Estimates of the half-life of 2, 3, 7, 8-TCDD on the soil surface range from 9 to 15 years, whereas the half-life in subsurface soil may range from 25 to 100 years (Paustenback et al. 1992). Sunlight and atmospheric chemicals will break down a very small portion of the CDDs, but most CDDs will be deposited on land or water.

2, 3, 7, 8-TCDD has been detected at 91 of the 126 waste sites on the EPA National Priorities List that contain CDDs (ATSDR 1998). People living around these sites may be exposed to above-background levels of 2, 3, 7, 8-TCDD and other CDDs. CDDs can enter your body when you breathe contaminated air, eat contaminated food, or have skin contact with contaminated soil or other materials. The most common way CDDs can enter your body is by eating food contaminated with CDDs.

Chlorinated Dibenzofurans: General Information

Chlorinated dibenzofurans (CDFs) are a family of chemicals that contain one to eight chlorine atoms attached to the carbon atoms of the parent chemical, dibenzofuran. The CDF family contains 135 individual compounds (known as congeners) with varying harmful health and environmental effects. Of these 135 compounds, those that contain chlorine atoms at the 2, 3, 7, 8-positions are especially harmful. Other than for research and development purposes, these chemicals are not deliberately produced by industry. Most CDFs are produced in very small amounts as unwanted impurities of certain products and processes utilizing chlorinated compounds. Only a few of the 135 CDF compounds have been produced in large enough quantities so that their properties, such as color, smell, taste, and toxicity could be studied. The few CDF compounds that have been produced in those quantities are colorless solids. They do not dissolve in water very easily. There is no known use for these chemicals (ATSDR 1994).

Most commonly, CDFs enter a person's body when you eat food contaminated with CDFs, in particular fish and fish products, meat and meat products, and milk and milk products containing CDFs. Exposure from drinking water is less than that from food. For people living around waste sites and for people who work with or around other chemicals that produce CDFs when heated, skin contact with contaminated soil or breathing CDF vapors are the most likely ways CDFs will enter the body. Once CDFs are in a person's body, some break down into metabolites. We do not know whether these metabolites are harmful. CDFs and some metabolites may leave a person's body in the feces and in the urine in a few days, but some CDFs may be stored in body fat for years (ATSDR 1994).

Like the CDDs, if a person is exposed to CDFs, many factors determine whether they will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with the chemicals. Other factors include other chemicals the person is exposed to, their age, sex, diet, family traits, lifestyle and state of health (ATSDR 1994).

Chlorinated Dibenzodioxins and Chlorinated Dibenzofurans

Chlorinated dibenzodioxins (CDDs) are found in the environment together with structurally related chlorinated dibenzofurans (CDFs). 2,3,7,8-TCDD is one of the most toxic and extensively studied of the CDDs and serves as a prototype for the toxicologically relevant or "dioxin-like" CDDs and CDFs. Based on results from animal studies, scientists have learned that they can express the toxicity of dioxin-like CDDs and CDFs as a fraction of the toxicity attributed to 2,3,7,8-TCDD. For example, the toxicity of dioxin-like CDDs and CDFs can be half or one tenth or any fraction of that of 2,3,7,8-TCDD. Scientists call that fraction a Toxic Equivalent Factor (TEF). CDD and CDF exposures are usually reported in Toxic Equivalency Factors (TEFs) (ATSDR 1998).

CDDs and CDFs are highly persistent compounds and have been detected in air, water, soil, sediments, animals and foods. CDDs and CDFs are structurally similar and elicit a number of similar toxicological and biochemical responses in animals. CDDs and CDFs are released to the environment during combustion processes (i.e. municipal solid waste, medical waste and industrial hazardous waste incineration, and fossil fuel and wood combustion); during the production of bleached pulp by pulp and paper mills; and during the production and recycling of several metals (Buser et. al 1985; Czuczwa and Hites 1986a, 1986b; Oehme eta al. 1987, 1989; Zook and Rappe 1994).

Higher levels may be found in foods from areas contaminated with chemicals, such as pesticides or herbicides, containing CDDs as impurities. CDDs have been measured in human milk, cow's milk, and infant formula.

Accumulation of Chlorinated Dibenzo Dioxins and Chlorinated Dibenzo Furans in Food

The concentration of chlorinated dibenzo dioxins (CDDs) is often reported as parts per trillion, in samples of air, water, or soil. One part per trillion (ppt) is one part CDD per trillion parts of air, water, or soil. For the general population, more than 90% of the daily intake of CDDs, Chlorinated dibenzofurans (CDFs), and other dioxin-like compounds comes from food, primarily meat, dairy products, and fish. CDDs may be present at much lower levels in fruits and vegetables. The actual intake of CDDs from food for any one person will depend on the amount and type of food consumed and the level of contamination.

CDDs remain in the environment for a long time. Some of the CDDs deposited on or near the water surface will be broken down by sunlight. A very small portion of the total CDDs in water will evaporate to air. Because CDDs do not dissolve easily in water, most of the CDDs in water will attach strongly to small particles of soil or organic matter and eventually settle to the bottom. CDDs may also attach to microscopic plants and animals (plankton), which are eaten by larger animals that are in turn eaten by even larger animals. This is called a food chain. Concentrations of chemicals such as the most toxic, 2, 3, 7, 8-chlorine substituted CDDs, which are difficult for the animals to break down, usually increase at each step in the food chain. This process, called biomagnification, is the reason why undetectable levels of CDDs in water can result in measurable concentrations in aquatic animals. The food chain is the main route by which CDD concentrations build up in larger fish, although some fish may accumulate CDDs by eating particles containing CDDs directly off the bottom (ATSDR 1998). Concentrations of dioxins in aquatic organisms may be hundreds to thousands of times higher than the concentrations found in the surrounding waters or sediments (EPA 1999). Bioaccumulation factors vary among the congeners and generally increase with chlorine content up through the tetra congeners and then generally decrease with higher chlorine content (EPA 1999).

CDDs are bioconcentrated in aquatic organisms, plants, and terrestrial animals. Shellfish (including crustaceans and bivalve mollusks) appear to accumulate CDDs nonselectively to relatively high concentrations in their tissues (Bopp et al. 1991; Brown et al. 1994; Cai et al. 1994; Conacher et al 1993; Hauge et al. 1994; Rappe et al. 1991). In contrast, finfish appear to selectively accumulate primarily 2, 2, 7, 8-TCDD and other 2, 3, 7, 8-substituted isomers in their tissues (Rappe et al. 1991).

Elevated levels of CDDs have been reported in fish, shellfish, birds, and mammals collected in areas surrounding various chemical production facilities, various hazardous waste sites, and pulp and paper mills using the chlorine bleaching process. Sometimes these findings have resulted in closure of these areas for the purpose of fishing. People who eat contaminated food from these contaminated areas are at risk of increased exposure to CDDs (ATSDR 1998)

CDFs are also found in food and the environment. Meat and meat products, fish and fish products, and milk and milk products contribute equally to intake of CDFs from food, while intake from vegetable products contributes much less. Eating large amounts of fatty fish from water containing CDFs may increase your daily intake of CDFs from food. If you touch soil-containing CDFs, which might occur at a hazardous waste site, some of the CDFs will pass through your skin into the bloodstream, but we do not know how fast this occurs.

Individuals who may be exposed to higher than average levels of dioxins include those who ingest food containing higher concentrations of dioxins than are found in the commercial food supply. These groups are recreational and subsistence fishers who routinely consume large amount of locally caught fish (EPA 1999).

Lipophilic (fat loving) chemicals, such as dioxins, accumulate mainly in fatty tissues of fish (belly, flap, lateral line, subcutaneous and dorsal fat, dark muscle, gills, eye, brain and internal organs). Therefore, removal of internal organs and skin and trimming the fat before cooking fish will decrease exposure.

CERTIFICATION

The Crystal Springs Road Park Health Consultation was prepared by the Florida Department of Health, Bureau of Environmental Epidemiology, 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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