

# U.S. ENVIRONMENTAL PROTECTION AGENCY

## FACT SHEET- Pathways Analysis Report

### OPERABLE UNIT 04

## ANNISTON PCB SITE

## ANNISTON, ALABAMA



U.S. EPA Region 4

February 2010

### *Site Background*

The Anniston PCB Site (the "Site") is located in Calhoun and Talladega Counties in the north-central part of Alabama. The Site consists of the entire geographic area in and around Anniston, Alabama where polychlorinated biphenyls (PCBs) have come to be located. The U.S. Environmental Protection Agency (EPA) believes that the vast majority of the PCBs in the Anniston area were released from the operations of the former Monsanto Corporation's PCB manufacturing plant. Today the former PCB plant property is owned by Solutia, Inc. (Solutia). Solutia currently produces polyphenyl compounds and phosphate ester-based hydraulic fluids at the Anniston plant.

Solutia is conducting a Remedial Investigation/ Feasibility Study (RI/FS) to determine what actions are needed to protect human health and the environment. To better manage the RI/FS, site management activities have been divided into three operable units (OUs), which were selected based on geographic location and complexity. OU-1 and OU-2, which were previously separated, have been combined into a single OU (i.e., OU-1/OU-2). OU-1/OU-2 generally consists of both residential and non-residential properties from, and around, the plant and downstream, following Snow Creek to Highway 78. OU-3 consists of the plant, the South Landfill, and the West End Landfill. OU-4 includes Snow Creek and its floodplain downstream of Highway 78 to the confluence of Snow and Choccolocco Creeks, and Choccolocco Creek from the backwater area upstream of Snow Creek to Lake Logan Martin. When the remedial investigation for all OU-4 is complete, EPA will consider whether additional downstream investigations are warranted.

This document concerns OU-4, Choccolocco Creek and its floodplains downstream of Highway 78 to the confluence of Snow and Choccolocco Creeks, and Choccolocco Creek from the backwater area upstream of Snow Creek to Lake Logan Martin in Talladega

County, and provides a summary of the Pathways Analysis Report (PAR) that was recently prepared for OU-4. The PAR was prepared to give the community an opportunity to provide input to the Human Health Risk Assessment (HHRA) for OU-4.

The OU-4 floodplain area was divided into 25 Characterization Areas (CAs) because of the size of the area (approximately 6,000 acres). The Characterization Areas were based on topographical and unique features of the Choccolocco Creek and its floodplain and were developed to assist with sampling and contamination characterization activities. Figure 1 shows the Characterization Areas for OU-4. A variety of land uses and potential for human exposure to contaminants can exist within a single CA. This makes it necessary to consider subdividing the CAs into smaller areas (i.e., Exposure Units) to facilitate a meaningful assessment of the potential risks to people who may be exposed to contaminants. The Exposure Units (EUs) will focus the HHRA to areas with high contamination levels. Floodplain contamination levels and site-specific land uses will assist in the development of the EUs.

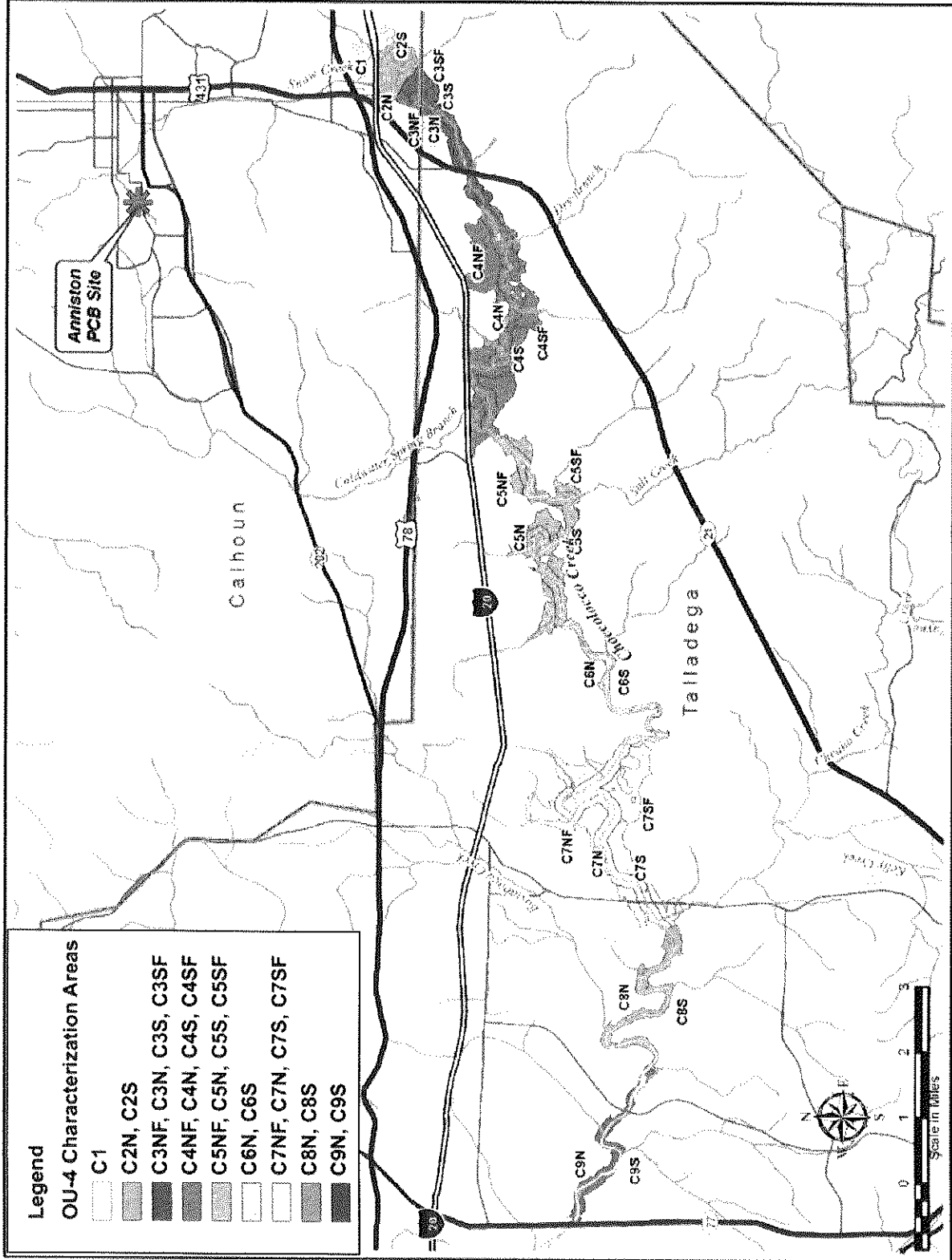
The ingestion of fish caught in the Choccolocco Creek is likely to be a major contributor of the potential risks associated with the contamination in OU-4. Fish fillet samples were collected from nine locations along the Choccolocco Creek to characterize the extent of the fish contamination. The fish sampling locations consisted of access points like bridge crossings. Three different fish species categories were collected from each location including bass (spotted bass and largemouth bass), catfish, and panfish (sunfish or crappie).

The OU-4 floodplain area includes numerous properties owned by private and public entities that are used for a variety of purposes. Agricultural and forested lands are the predominant land uses in OU-4. Table 1 presents the current land uses associated with the Characterization Areas.

**Table 1**

| <b>Characterization Area</b> | <b>Area (acres)</b> | <b>Description</b>  |
|------------------------------|---------------------|---|
| C1                           | 71                  | Includes the area of the Snow Creek floodplain downstream of Highway 78 to Interstate 20. This area, which includes most of Oxford Lake Park, was sampled extensively and remediated in 2001 and 2002 as part of an interim corrective measure. |
| C2                           |                     | Includes the Choccolocco Creek backwater area north of the main Choccolocco Creek channel (the southern branch) from approximately one mile upstream of the Snow Creek confluence downstream to Friendship Road.                                |
| C2N                          | 159                 | Area that is mostly forested. A small portion of C2N includes the Anniston WWTP and adjacent soil piles that were remediated.   |
| C2S                          | 76                  | Area that is predominantly forested. It abuts some residential lots to the south and includes a portion of agricultural land on the west side of Friendship Road (connected via culvert to the east side of the road).                          |
| C3                           |                     | Includes the area from Friendship Road downstream to mile marker 33.5, where there is a constriction in the floodplain.   |
| C3N                          | 125                 | Consists of a mixture of agricultural and forested land.  |
| C3NF                         | 47                  | Predominantly agricultural land.  |
| C3S                          | 151                 | Predominantly agricultural land with some forest and scrub land.  |
| C3SF                         | 106                 | Mixture of agricultural and residential land.   |
| C4                           |                     | Includes area from mile marker 33.5 to just downstream of the Coldwater Creek confluence.   |
| C4N                          | 274                 | Mainly scrub land upstream transitioning to mainly forested land downstream.  |
| C4NF                         | 435                 | A large portion of the land is associated with the airport and forested in other areas.   |
| C4S                          | 285                 | Mixture of scrub, agricultural, and forest land   |
| C4SF                         | 323                 | Mainly agricultural land with some forest.  |
| C5                           |                     | Includes the area just downstream of the Coldwater Creek confluence to mile marker 23.5 where a small tributary enters the Choccolocco Creek.   |
| C5N                          | 230                 | Mainly forested land in upstream portion that transitions to mainly agricultural heading downstream.  |
| C5NF                         | 216                 | Predominantly agricultural.   |
| C5S                          | 230                 | Mixture of agricultural and forested land.  |
| C5SF                         | 126                 | Mixture of agricultural and forested land.  |
| C6                           |                     | Includes the area from mile marker 23.5 to mile marker 19.5.  |
| C6N                          | 95                  | Terrain rises sharply from the Creek, resulting in a narrow floodplain. Land use is primarily forest.   |
| C6S                          | 101                 | Terrain rises sharply from the Creek, resulting in a narrow floodplain. Land use is primarily forest with limited areas of agricultural and a few residential lots.   |
| C7                           |                     | Includes area from mile marker 19.5 to just downstream of the Cheaha Creek confluence.  |
| C7N                          | 263                 | Mainly agricultural land with a small portion of residential use.   |
| C7NF                         | 447                 | Mainly agricultural land with some forest.  |
| C7S                          | 285                 | Mainly agricultural land with some forest.  |
| C7SF                         | 473                 | Predominantly agricultural.   |
| C8                           |                     | Includes area from just downstream of the Cheaha Creek confluence to Jackson Shoals.  |
| C8N                          | 150                 | Mainly agricultural land with some forest.  |
| C8S                          | 145                 | Mainly forested land with some agricultural.  |
| C9                           |                     | Includes the area from downstream of Jackson Shoals to Highway 77.  |
| C9N                          | 111                 | Mixture of forested and agricultural land.  |
| C9S                          | 108                 | Mixture of forested and agricultural land.  |

**Figure 1** depicts the 25 downstream characterization areas for OU-4. Each named area is identified with a "C," for characterization area, and a number. Each area includes an "S" or "N" indicating a location North or South of the Creek. An "F" indicates that the CA is further than 500 feet from the creek.



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## *Pathways Analysis*

A critical step in characterizing health risks at hazardous wastes sites, such as the Anniston PCB site, is estimating how much of each site-related chemical might be taken into the body by people living, working or recreating/trespassing on or near the site. In this step of the risk assessment process, known as exposure assessment, the risk assessor begins with a "**pathways analysis**." People can be exposed to chemicals through what are termed "**exposure pathways**." The pathways analysis considers exposure pathways that are most important for the Site.

Part of the pathways analysis also considers how often people contact contamination in the environment, for how long (number of years) people continue this contact, and how much chemical is taken into the body at each contact. Estimates for these considerations are termed "**exposure parameters**." The risk assessor chooses exposure parameters that are estimated for each exposure pathway. The exposure parameters are chosen based on the current exposure and the anticipated exposure that could occur in the future.

Exposure pathways and scenarios, and exposure parameters are each discussed below.

### *Exposure Pathways*

Exposure pathways describe ways that people can come into contact with chemicals. Exposure pathways typically consist of four parts:

1. A source of chemicals -- for instance, an industry that produces wastes that it needs to get rid of in some way.
2. A way that chemicals enter the environment (a release mechanism) -- for instance, industrial wastes at the PCB plant were placed in landfills.
3. A way that chemicals move through the environment to places where people live, work or recreate/trespass -- for instance, chemicals in wastes placed in a landfill may be carried off-site during rain events and subsequent runoff and impact a surface water body such as the Choccolocco Creek.
4. A way that chemicals can enter the body -- for instance, people that eat fish from contaminated bodies of water could take chemicals into their bodies.

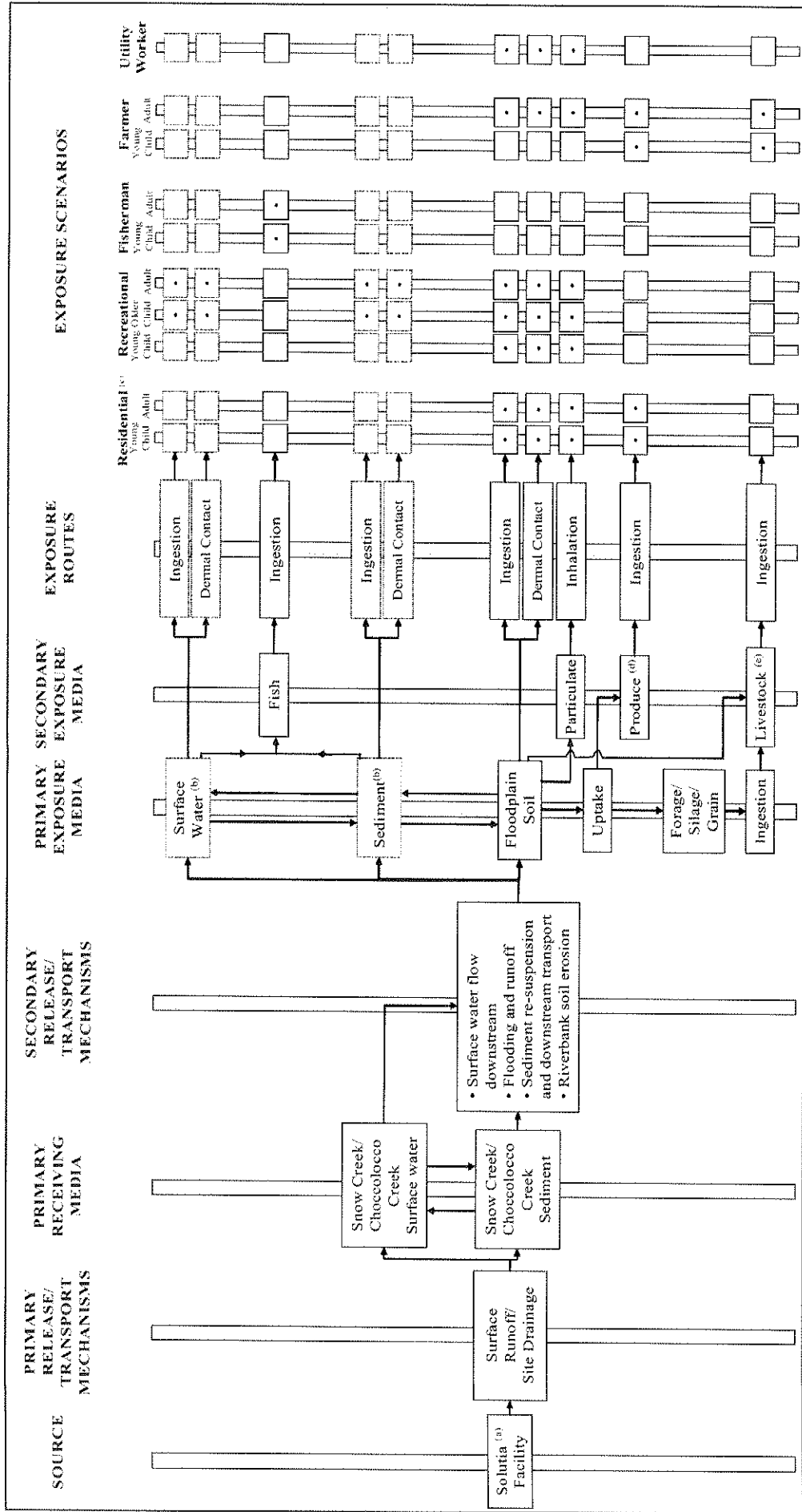
The risk assessor usually names exposure pathways according to the final part of the pathway -- the way that chemicals enter into the body. In the example above, the pathway from source to people would be termed the "fish ingestion pathway." The fish would be the location of chemicals in the environment when people come into contact with them, and ingestion (eating) would be the way that people actually take chemicals into the body.

Another example of an exposure pathway is the "soil dermal contact pathway." For this pathway, soil would be the location of chemicals in the environment when people come into contact with them, and dermal contact (soil sticking to skin and absorbing through their skin and into their body) would be the way that people actually take chemicals in.

The length of the Choccolocco Creek within OU-4, and the size and multiple uses of the floodplain pose a significant challenge to effectively assessing risk from exposures to contamination for both current and potential future uses of the area. Children and adults may be exposed to soil while engaging in a variety of activities around their homes or recreational activities at other locations. Adults may be exposed to soil while working in agricultural, landscaping, utility maintenance, and other occupations. Fishermen, farmers, and their families may be exposed to contaminants from eating fish caught from the Creek and eating crops and other agricultural products raised in the floodplain. Hunting appears to be a popular activity in the area. The potential exposure associated with eating game (e.g., deer and turkey) taken from the floodplain is expected to be negligible given the home ranges of the game and the limited time that contact with the contamination is likely to occur.

There are numerous residential properties within the floodplain area. Children and adults contact the soil in the areas immediately around the location of the residence on a regular basis. Similar to OU-1/OU-2, the areas around the residences will be delineated and evaluated by comparing the PCB concentrations (95% UCL) to 1 mg/kg, the residential remedial level used in OU-1/OU-2. If any of the levels are greater than 1 mg/kg, the area will be evaluated further.

Exposure pathways that have been identified for Anniston PCB Site OU-4 are presented in Figure 2. Estimates of the amount of chemicals taken in by



**Figure 2  
Conceptual Site Model**

(a) = Complete exposure pathway  
 (b) = Incomplete exposure pathway  
 (c) = Not evaluated quantitatively.

(d) = Includes all facility-related sources.  
 (e) = Contaminant concentrations in surface water and sediment will be qualitatively evaluated by comparing to risk-based concentrations.  
 (f) = PCB concentrations (95% LCLs) at residentially used areas will be compared to the 1 mg/kg remedial level. Areas with concentrations greater than 1 mg/kg will be evaluated further in future remedial decisions.  
 (g) = Includes aboveground and belowground produce.  
 (h) = Includes beef (current and future) and dairy products, chickens, and eggs (future only).

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people living, working or recreating/trespassing on or near OU-4 will be used in the risk assessment to characterize risk associated with chemicals released to the environment.

### ***Exposure Parameters***

Exposure parameters help the risk assessor estimate how much of a chemical might be taken into the body given the current exposure associated at an area and the likely future exposure. Exposure parameters are identified for each exposure pathway and include:

- The number of days in a year people might eat chemicals in soil, fish, agricultural products, or get contaminated soil on their skin (exposure frequency).
- The number of years people continue to take chemicals into their bodies (exposure duration).
- The amount of soil, fish, or other food items gathered from a contaminated area that is taken in each time a person contacts contamination (contact rate). For soil, it is the amount eaten accidentally during outdoor work or play or the amount of soil that sticks to the skin. For

ingestion of contaminated food items such as fish and agricultural items, it is the amount of chemical found in the food item and how much such an item is consumed.

Other parameters are also used in the calculations. These parameters are important for making exposure estimates comparable, but are not important for understanding the basic idea of estimating exposure. These exposure parameters include body weights for children, teenagers and adults; the area of skin for children, teenagers and adults; and averaging time, which helps the risk assessor express all their calculations in terms of the amount of chemical taken in each day. The important exposure parameters planned to be used in the risk assessment for OU-4 are listed in Table 2. Table 2 includes **reasonable maximum exposure (RME)** parameters and **central tendency exposure (CTE)** parameters. In general, RME is an estimate of the individual risk for those persons at the upper end of the risk distribution, while risks based on CTE are intended to reflect risks more typical for the exposed population.



View of Choccolocco Creek during late spring, 2009.

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## *Community Involvement Opportunity*

**Community input on the assumptions presented in the Pathway Analysis Report for OU-4 will be accepted until March 31, 2010. Please mail your input about the report to the EPA Project Office, 902 Noble Street, Anniston, AL 36201, email [annistonprojectoffice@hotmail.com](mailto:annistonprojectoffice@hotmail.com), or call (256) 236-2599.**

The PAR is available for review at the information repositories identified in the glossary below, at the EPA Project Office, and online at EPA's website (<http://www.epa.gov/region4/waste/npl/nplal/annpcbald.htm>). If members of the community are interested in attending a meeting to explain the information presented in this Fact Sheet or the document, please contact the project office before March 15, 2010, so that a meeting can be scheduled during the community input period.

### *For More Information*

For more information about the open house, ongoing investigations, or any other aspects of the Anniston PCB Site, please contact:

**Belenda Randall**

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## GLOSSARY

**Administrative Record:** Documents and data used in selecting cleanup remedies at NPL sites. The record is placed in the **information repository** to allow public access.

**Chemical of Potential Concern:** A substance detected at a hazardous waste site that has the potential to affect receptors adversely due to its concentration, distribution, and mode of toxicity.

**Exposure Parameter:** Estimates for how often people contact contamination in the environment, for how long (number of years) people continue this contact, and how much chemical is taken in into the body at each contact.

**Exposure Pathway:** The pathway a contaminant may take to reach humans or other living organisms.

**Exposure Point Concentration:** The amount (concentration) of a chemical at the absorptive surfaces of an organism.

**Human Health Risk Assessment:** A complex process by which scientists determine the harm that a substance, activity, lifestyle, or natural phenomenon can inflict on human health.

**Information Repository:** A file containing current information, technical reports, and reference documents on a site cleanup. The information repository is usually located in a public building that is convenient for local residents, such as a library, city hall or public school. For the Anniston PCB Site, two information repositories are located at the **Public Library of Anniston-Calhoun County:**

**Carver Branch**  
**722 West 14th Street**  
**Anniston, Alabama**

and

**Main Branch**  
**108 East 10th Street**  
**Anniston, Alabama.**

Table 2  
Reasonable Maximum Exposure (RME) and Central Tendency Exposure (CTE) Parameters for Current and Future Uses  
Anniston PCB Site  
OU-4

| Exposure Value                           | Unit      | Recreational <sup>a</sup> |                        |                        | Utility Worker <sup>b</sup> | Farmer <sup>c</sup> | Farmer <sup>d</sup>  |                      | Recreational Fisherman <sup>e</sup> |                         |
|--|-----------|---------------------------|------------------------|------------------------|-----------------------------|---------------------|----------------------|----------------------|-------------------------------------|-------------------------|
|  |           | Young Child (1-6 yr)      | Adolescent (7-16 yr)   | Adult                  |                             |                     | Young Child (1-6 yr) | Adult                | Young Child (1-6 yr)                | Adult                   |
| <b>Parameters used for RME and CTE</b>   |           |                           |                        |                        |                             |                     |                      |                      |                                     |                         |
| Exposure Duration                        | years     | 6                         | 10                     | 30                     | 1                           | 40                  | 6                    | 40                   | 6                                   | 30                      |
| <b>Parameters used for RME</b>           |           |                           |                        |                        |                             |                     |                      |                      |                                     |                         |
| Ingestion Rate Soil                      | g/week    | 1.4 <sup>f,g</sup>        | 0.7 <sup>f,s</sup>     | 0.7 <sup>f,g</sup>     | 2.3 <sup>h</sup>            | 1.4 <sup>i</sup>    | NA                   | NA                   | NA                                  | NA                      |
| Ingestion Rate Fish                      | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | NA                   | NA                   | 0.1 to 0.2 <sup>k</sup>             | 0.2 to 0.5 <sup>j</sup> |
| Ingestion Rate – tomatoes, peppers, etc. | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.4 <sup>f,i</sup>   | 1.1 <sup>f,i</sup>   | NA                                  | NA                      |
| Ingestion Rate –potatoes, carrots, etc.  | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.2 <sup>f,i</sup>   | 0.4 <sup>f,i</sup>   | NA                                  | NA                      |
| Ingestion Rate Beef                      | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.5 <sup>f,i</sup>   | 1 <sup>f,i</sup>     | NA                                  | NA                      |
| Ingestion Rate – milk, butter, etc.      | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 3.3 <sup>f,i</sup>   | 2.2 <sup>f,i</sup>   | NA                                  | NA                      |
| Ingestion Rate Chickens                  | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.3 <sup>f,i</sup>   | 0.5 <sup>f,i</sup>   | NA                                  | NA                      |
| Ingestion Rate Eggs                      | eggs/week | NA                        | NA                     | NA                     | NA                          | NA                  | 2 <sup>f,i</sup>     | 3 <sup>f,i</sup>     | NA                                  | NA                      |
| Exposure Frequency                       | days/year | 52 to 104 <sup>m</sup>    | 52 to 104 <sup>m</sup> | 52 to 104 <sup>m</sup> | 10                          | 10                  | 350                  | 350                  | 350                                 | 350                     |
| <b>Parameters used for CTE</b>           |           |                           |                        |                        |                             |                     |                      |                      |                                     |                         |
| Ingestion Rate Soil                      | g/week    | 0.7 <sup>f,s</sup>        | 0.4 <sup>f,s</sup>     | 0.4 <sup>f,g</sup>     | 0.7 <sup>h</sup>            | 0.7 <sup>i</sup>    | NA                   | NA                   | NA                                  | NA                      |
| Ingestion Rate Fish                      | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | NA                   | NA                   | TBD                                 | TBD                     |
| Ingestion Rate – tomatoes, peppers, etc. | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.013 <sup>f,i</sup> | 0.094 <sup>f,i</sup> | NA                                  | NA                      |
| Ingestion Rate –potatoes, carrots, etc.  | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.014 <sup>f,i</sup> | 0.031 <sup>f,i</sup> | NA                                  | NA                      |
| Ingestion Rate Beef                      | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.004 <sup>f,i</sup> | 0.012 <sup>f,i</sup> | NA                                  | NA                      |
| Ingestion Rate – milk, butter, etc.      | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.035 <sup>f,i</sup> | 0.015 <sup>f,i</sup> | NA                                  | NA                      |
| Ingestion Rate Chickens                  | lb/week   | NA                        | NA                     | NA                     | NA                          | NA                  | 0.002 <sup>f,i</sup> | 0.003 <sup>f,i</sup> | NA                                  | NA                      |
| Ingestion Rate Eggs                      | eggs/year | NA                        | NA                     | NA                     | NA                          | NA                  | <1 <sup>f,i</sup>    | <1 <sup>f,i</sup>    | NA                                  | NA                      |
| Exposure Frequency                       | days/year | 26 to 52 <sup>m</sup>     | 26 to 52 <sup>m</sup>  | 26 to 52 <sup>m</sup>  | 5                           | 5                   | 350                  | 350                  | 350                                 | 350                     |

Notes:

<sup>a</sup> Recreational – young children, adolescents, and adults at various locations in the floodplain.

<sup>b</sup> Utility Worker – intrusive workers with short-term, high intensity exposure.

<sup>c</sup> Farmer – adult engaged in high intensity exposure to floodplain soil during typical farming activities such as planting and harvesting.

<sup>d</sup> Farmer – child and adult consuming home-grown agricultural products raised in the floodplain.

<sup>e</sup> Recreational Fishermen – child and adult consuming fish caught from the Choctolocco Creek.

<sup>f</sup> EPA (1997) Exposure Factors Handbook.

<sup>g</sup> EPA (1991) RAGS, Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Assumptions.

<sup>h</sup> EPA (2002) Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

<sup>i</sup> Adjusted from 330 mg/day.

<sup>j</sup> ADEM (1993) Estimation of Daily Per Capita Freshwater Fish Consumption of Alabama Anglers.

<sup>k</sup> One-half of the adult value.

<sup>l</sup> EPA (2003) CSFII Analysis of Food Intake Distributions.

<sup>m</sup> Depends on accessibility.

Abbreviations:

ADEM – Alabama Department of Environmental Management

CSFII – Continuing Survey of Food Intakes by Individuals

EPA – Environmental Protection Agency

g – gram

lb – pound

NA – not applicable

PCB – Polychlorinated biphenyls

RAGS – Risk Assessment Guide for Superfund

RCRA – Resource Conservation and Recovery Act

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# FACT SHEET

## ANNISTON PCB SITE

### Pathway Analysis Report Operable Unit 4



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