PUBLIC HEALTH ASSESSMENT

MONSANTO COMPANY/SOLUTIA INCORPORATED
[a/k/a ANNISTON PCB SITE (MONSANTO COMPANY)]

ANNISTON, CALHOUN COUNTY, ALABAMA

EPA FACILITY ID: ALD004019048

Prepared by:

Alabama Department of Public Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry
This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment 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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FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the Superfund law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements. The public health assessment program allows the scientists flexibility in the format or structure of their response to the public health issues at hazardous waste sites. For example, a public health assessment could be one document or it could be a compilation of several health consultations; the structure may vary from site to site. Nevertheless, the public health assessment process is not considered complete until the public health issues at the site are addressed.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists evaluate whether or not these contacts may result in harmful effects. ATSDR recognizes that children, because of their play activities and their growing bodies, may be more vulnerable to these effects. As a policy, unless data are available to suggest otherwise, ATSDR considers children to be more sensitive and vulnerable to hazardous substances. Thus, the health impact to the children is considered first when evaluating the health threat to a community. The health impacts to other high risk groups within the community (such as the elderly, chronically ill, and people engaging in high risk practices) also receive special attention during the evaluation.

ATSDR uses existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries, to determine the health effects that may result from exposures. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further public health actions are needed.
Conclusions: The report presents conclusions about the public health threat, if any, posed by a site. When health threats have been determined for high risk groups (such as children, elderly, chronically ill, and people engaging in high risk practices), they will be summarized in the conclusion section of the report. Ways to stop or reduce exposure will then be recommended in the public health action plan.

ATSDR is primarily an advisory agency, so usually these reports identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, fullscale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E56), Atlanta, GA 30333.
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Executive Summary

This public health assessment (PHA) was conducted to identify pathways of human exposure and to assess the public health implications of these exposures to polychlorinated biphenyls (PCBs) in selected environmental samples. The samples are limited to surface soil, subsurface soil, and sediment collected under Consent Order Number 96-054-CHW dated March 8, 1996. The Alabama Department of Public Health (ADPH), in coordination with the Agency for Toxic Substances & Disease Registry (ATSDR), prepared this PHA to document any potential health hazards.

Based upon this evaluation, ADPH concludes that:

• The levels of polychlorinated biphenyls (PCBs) found in surface soil at two residences that have not been cleaned up pose a public health hazard. Exposure to these PCB levels could result in an increased risk of adverse health effects for children.
• The levels of PCBs found in surface soil in several areas posed a public health hazard to children in the past.
• There is not enough information to know if there are PCBs in dust in the air of the two homes where the PCB-contaminated surface soils have not been cleaned up. For this reason, people at those homes may also be exposed by breathing PCB-contaminated dust.

The following activities are planned:

1. ATSDR, in conjunction with ADPH, will evaluate any additional environmental sampling data collected subsequent to the 1996 Consent Order.
2. ATSDR, in conjunction with ADPH, is currently evaluating biological data and environmental data provided by a local environmental group to determine the extent of contamination and if other pathways of exposure to PCBs may exist in the Anniston area.
3. ATSDR, in conjunction with ADPH, will continue to provide environmental health education for local public health officials, the local medical community, and local citizens to assist the community in assessing possible adverse health outcomes associated with exposures to PCBs.
4. ADPH, in conjunction with ATSDR, will share this public health assessment with ADEM and EPA so that those making site management decisions are aware of the public health issues identified herein.

The following activities are recommended:

1. Prevent further exposure to PCBs at the two residences that have not been cleaned up.
2. Conduct follow-up activities designed to fill data gaps that currently hinder the local medical community and local citizens from assessing and mitigating possible adverse health outcomes associated with exposures to PCBs.
3. Obtain additional input from the West Anniston community to ensure that follow-up activities designed to address site-related public health issues are conducted in a manner that is relevant and acceptable to the community.

For more current information, please refer to recent health consultations by ATSDR.
Purpose and Health Issues

The Alabama Department of Public Health (ADPH), through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia, evaluates the public health significance of hazardous waste sites in Alabama. This public health assessment was conducted to evaluate on-site and off-site surface soil, subsurface soil, and sediment samples collected at the Monsanto Company/Solutia Inc. (Solutia) site in Anniston, Alabama, under Consent Order Number 96-054-CHW dated March 8, 1996. The purpose of this public health assessment is to evaluate environmental samples taken under the 1996 Consent Order and identify human exposure scenarios that could potentially affect public health.

In conducting the public health assessment, ADPH reviewed environmental data and solicited community health concerns. The environmental data were reviewed to determine whether (and how) people could come into contact with PCB-contaminated surface soil, subsurface soil, and sediment. If human exposures could occur, ADPH determined whether the exposure was at levels which might cause harm. Community health concerns were collected to determine whether health concerns expressed by community members could be related to exposure to chemicals released from the site.

This public health assessment presents conclusions about whether exposures are occurring, have occurred in the past, and if exposure could occur in the future. Based on exposure pathways and contaminant concentrations, conclusions are made about whether a public health hazard is present. In some cases, it is possible to determine whether exposures occurred in the past; however, a lack of appropriate historical data often makes it difficult to quantify past exposures. If it is found that a threat to public health exists, recommendations are made to stop or reduce the threat to public health.

Background

Site Description and History

The Solutia site is located one mile west of downtown Anniston on State Highway 202 in Calhoun County, Alabama. The manufacturing portion of Solutia consists of approximately 70 acres and is bordered on the south by Highway 202, on the east by the Clydesdale Avenue extension, on the west by First Avenue, and on the north by the Norfolk Southern and Erie Railroads. The area north of Solutia contains residential, commercial, and industrial properties. Residential properties are also located east and west of the site [1, 2, 4].

In 1917, Southern Manganese Corporation began manufacturing ferro-manganese, ferro-silicon, ferro-phosphorous compounds, and phosphoric acid at the site. In the late 1920s, production of biphenyls was initiated. In 1930, Southern Manganese Corporation became Swann Chemical Company. Monsanto purchased Swann Chemical Company in 1935, and manufactured PCBs, parathion, phosphorous pentasulfide, para-nitrophenol, and polyphenyl compounds. In the early 1970s, Monsanto ceased production of PCBs, and in the mid-1980s production of parathion and phosphorous pentasulfide ceased. In 1997, Monsanto renamed its chemical business to Solutia,
Inc. Currently, para-nitrophenol and polyphenyl compounds are manufactured at Solutia’s Anniston facility [2, 3].

Throughout the facility’s history, hazardous and nonhazardous wastes were disposed of at two landfills located adjacent to Solutia’s manufacturing facility, the West End Landfill and the South Landfill. The West End Landfill is a six-acre plot located on the southwest side of the manufacturing facility, north of Highway 202. The unlined landfill was used for disposal of all refuse from the facility from the mid-1930s until 1961. In November 1961, Monsanto Company and the Alabama Power Company conducted a property exchange that included the West End Landfill and an adjacent property. With the closure of the West End Landfill, Solutia began disposing of wastes at the South Landfill [1, 2].

The South Landfill is located southeast of the manufacturing facility, south of Highway 202. The landfill contains ten individual unlined cells, two of which previously received hazardous wastes from the plant. The landfill is situated on the lower northeast slope of Coldwater Mountain and is surrounded to the east, south, and west by undeveloped land [2]. A portion of a drainage ditch, known as the East Drainage Ditch, is located on the western edge of South Landfill [1, 2]. Operations at the South Landfill ended in 1988.

Previous Investigations

**South Landfill**

Investigations at the South Landfill began in 1980. During these investigations, organophosphorous pesticides were found to be present in groundwater and in catchment basins located adjacent to the landfill. In 1982, the catchment basins for the South Landfill were closed and interceptor wells were installed to capture affected groundwater. Additional interceptor wells, including two wells in the plant production area, were installed in 1987 when it was determined that the contaminated groundwater extended beyond the initial receptor wells. In 1989, Monsanto capped the two cells previously used for disposal of hazardous substances at the South Landfill [2, 3].

During precipitation events, the moderate-to-steep slopes, characteristic of Coldwater Mountain, contributed to significant quantities of surface-water flow across the South Landfill. Surface water flowed along the eastern and western sides of the Solutia site into various ditches, including the East Drainage Ditch that flowed through residential and commercial areas [1, 2]. In 1994, surface-water samples indicated the presence of PCBs in some of the outfalls from the South Landfill [2]. In 1997, Solutia began implementing measures to control the storm water runoff from the landfill. Solutia removed vegetation from the area, placed a low permeability cap over the western half of the landfill, and diverted storm water runoff to a retention and sedimentation pond [2]. In 1998, Solutia completed remediation activities at the South Landfill by diverting storm water run-on from unaffected areas upstream of the South Landfill, installing culverts for drainage, and closing the ditches with PCB contaminated sediment [2, 3].
West End Landfill

In April 1993, the Alabama Power Company detected PCBs in preliminary analysis of material found at the Anniston substation (formerly the West End Landfill). A thin protective covering of soil was placed over the toe of the landfill in late April. In December 1993, Solutia reacquired the property [2]. In 1996, Solutia completed construction of a multi-media cap on the West End Landfill and of a soil cover on the area immediately around the landfill [2, 3]. The cap included a minimum of six inches of compacted clay, a 60 millimeter thick high density polyethylene liner, a drainage fabric, 18 inches of cover soils, and a vegetative layer. Access has been restricted to the area with a fence. To control for storm water run-off from the West End Landfill, Solutia closed the drainage ditches in the area and installed hard piping to collect runoff from the area [3].

Off-Site Areas Sampled

On April 5, 1995, Solutia entered into a Consent Order with the Alabama Department of Environmental Management (ADEM) in which Solutia agreed to develop and implement a sampling plan to sample soils in the storm water drainage system in an area immediately east of the site (roughly bounded by Clydesdale Avenue, Eighth Street, Montrose Avenue and Highway 202) [2]. Solutia collected sediment samples throughout the reach of the drainage ditches and collected soil samples extending outward on both sides of the ditches. In addition, soil and sediment samples were also collected from Solutia’s property and from north of Eighth Street. PCBs were detected at varying concentrations in sediment samples collected from drainage ditches flowing from the South Landfill area and flowing from Solutia’s production area. PCBs were also detected at varying concentrations in soil samples collected near various drainage ditches in the area [2].

Based on the sampling data, Solutia began purchasing PCB-contaminated properties located immediately east and north of the main facility, including properties along the East Drainage Ditch and properties located south of Tenth Street, between Clydesdale Avenue and Montrose Avenue [2, 4]. By 1998, structures on the majority of the purchased properties were demolished and soil covers were constructed over areas with PCB contaminated soils [2, 3]. The covers consisted of a geotextile fabric over the existing ground surface and a minimum of 14 inches of cover soil which was then seeded [3]. In addition to cover construction, storm water flowing through the covered areas was isolated in pipelines and conveyed to a discharge structure constructed on Tenth Street [2, 3]. Solutia property ownership as of October 1999 is presented in Appendix B, Figure 1.

On March 8, 1996, Solutia entered into a second consent order (Consent Order Number 96-054-CHW) with ADEM. This Consent Order further expanded and defined the scope of Solutia’s ongoing investigation and remedial activities in areas in close proximity to the site. Under this Order, Solutia agreed to sample four additional areas for the presence of PCBs; to identify other areas potentially affected by PCBs and to propose and implement a sampling plan for such areas; to complete the upgrading of the cap on the West End Landfill in accordance with the earlier plan approved by ADEM; to submit a design and schedule for implementing storm water run-off
controls for the area immediately east of the facility; to undertake additional efforts to relocate residents in the original sampling area east of the facility and efforts to mitigate exposure potential for those residents who chose not to relocate; and to offer weekly cleaning services to two churches in the area immediately east of the facility [2, 5].

As agreed to in the 1996 Consent Order, Solutia collected soil and sediment samples at various areas identified as having the potential for PCB contamination [2]. (The areas sampled under the 1996 Consent Order are presented in Appendix B, Figure 2.) A total of 550 samples was collected from residential and commercial properties in the areas identified as having the potential for PCB contamination. At least two samples were collected from each residential or commercial property in the areas sampled. Samples were also collected from the drainage ditches in the selected areas. Samples were field screened at a minimum detection limit of 5 parts per million (ppm). (Samples collected from Solutia's landfill were field screened at 10 ppm, in accordance with the 1995 consent order.) If PCBs were detected at concentrations at or above the minimum detection limit, the samples were sent to a certified laboratory for further analysis [6, 7]. The following is a description of the areas sampled. A more complete description of the areas, extent of contamination, and progress of remedial activities is provided in the section titled Evaluation of Environmental Contamination, Pathways of Exposure, and Public Health Implications.

**Area A:** Area A is a residential area located northeast of Solutia between Tenth Street and Eleventh Street extending from Pine Grove Road to McDaniel Avenue.

**Area B:** Area B is a residential area located east of Solutia along Zinn Parkway, north of Highway 202 and south of Moses Street.

**Area BN:** Area BN is a commercial area east of Solutia located north of Seventh Street, south of Tenth Street between Clydesdale Road and Crawford Avenue in the Boynton Street area.

**Area C:** Area C is a residential area north of Solutia that extends from the railroad tracks north to West Ninth Street and from Parkwin Avenue to Bancroft Avenue.

**Area CP:** Area CP is a commercial property northeast of Solutia located north of West Tenth Street, between Clydesdale Road and Pine Grove Road.

**Area D:** Area D is a residential area located west of Solutia along First Avenue between Jefferson Street and Adams Street.

**Area E:** Area E is a residential/commercial area north of Solutia located south of West Tenth Street between Duncan Avenue and Parkwin Avenue.

**Area GASCO:** Area GASCO consists of seven small Alabama Gas Company right-of-ways located east of Solutia.
Area LF: Area LF is the Solutia landfill (South Landfill) located south of Highway 202.

Line A: Line A is the portion of the Northern Drainage Ditch located northeast of Solutia that flows between the railroad tracks and Eleventh Street, beginning at Clydesdale Road and continuing to Snow Creek.

Area MDN: Area MDN is the median located south of Solutia on Alabama Highway 202 between First Avenue and Third Avenue.

Area NP: Area NP is Solutia property located north of the railroad tracks, south of West Ninth Street, and west of Bancroft Avenue.

Area XE: Area XE is a commercial area northeast of Solutia located south of West Tenth Street between Parkwin Avenue and Ferron Avenue, and includes the southwest corner of West Tenth Street and Duncan Avenue.

In addition to completing the environmental sampling agreed to under the 1996 Consent Order, Solutia finished upgrading the cap on the West End Landfill; implemented storm water run-off controls for the area immediately east of the facility; made additional efforts to relocate residents in the original sampling area east of the facility and to mitigate exposure potential for those residents who chose not to relocate; and offered weekly cleaning services to the two churches in the area immediately east of the facility [2, 7].

To further define the extent of contamination, Solutia has conducted additional sampling in areas surrounding the facility. At the request of local environmental groups, EPA collected additional surface soil samples and air samples from various properties near the Solutia site. These data are being reviewed by ATSDR and will not be evaluated in this public health assessment.

Demographics and Land Use

ADPH examined information about population demographics to identify the presence of sensitive populations, such as young children and the elderly, in the vicinity of the site. Demographics also provide details on residential history in a particular area—information that helps ADPH assess time frames of potential human exposure to contaminants.

Calhoun County is predominantly rural, especially to the north and west. The county, which has a total population of 115,000, encompasses an area of 610 square miles. The City of Anniston is an industrial and agricultural area of approximately 26,000 residents. Approximately 5,926 people live within a 1-mile buffer of the site, including 415 children ages 5 and younger and 889 people ages 65 and older [1].

A geographic information system (GIS) was used to estimate the population within one mile of the site. This information is based on the 1990 Census data. However, Solutia has purchased more than 50 residential properties in close proximity to the main facility from 1995 to present, resulting in a significant change in the population surrounding the site. Because current
Research on Cancer has determined that PCBs are probably carcinogenic to humans. The EPA has proposed that PCBs are probable human carcinogens. A detailed review of the carcinogenic potential of PCBs by EPA demonstrates that some PCB mixtures in the environment (e.g., those typically found in fish or in soil) are likely to be more carcinogenic than others (e.g., those typically found in water or air) [14].

**Environmental Contamination and Exposure Pathways**

Substances released into the environment do not always result in human exposure. Human exposure to a hazardous substance can occur only if humans come in contact with the substance either by ingestion (eating or drinking a substance containing the chemical), inhalation (breathing air containing the chemical), or dermal absorption (skin contact with a substance containing the chemical). ADPH staff members try to determine whether people working or living near the Solutia site could have been (past scenario), are (current scenario), or will be (future scenario) exposed to PCBs in on-site or off-site soils and sediments. A glossary of terms used in this document is provided in Appendix A.

An exposure pathway consists of five elements: a source of contamination, transportation of environmental media, point of exposure, a route of human exposure, and a receptor population. Exposure pathways are categorized as either completed, potential, or eliminated pathways. For an exposure pathway to be completed, all elements of the pathway must be present. Potential pathways are those where there is not sufficient evidence to show that all the elements are present now, could be present in the future, or were present in the past. Eliminated pathways are those where exposure is not present now, was not present in the past, and will not be present in the future.

If exposure was or is possible, ADPH staff members then consider whether PCBs are present at levels that might affect public health. PCB concentrations are compared to ATSDR comparison values; comparison values are media specific concentrations of contaminants that are considered to be safe levels of exposure. Exceeding a given comparison value does not mean that adverse health effects are expected to occur. The comparison value used in this document to determine the potential for non-cancerous health effects is the cancer risk evaluation guide (CREG) for PCBs in soil. CREGs are non-enforceable health-based comparison values developed by ATSDR. CREGs are estimated contaminant concentrations expected to cause no more than one excess cancer in a million persons exposed over a lifetime (70 years). The CREG for PCBs is 1 ppm.

Generally, a contaminant is selected for further evaluation if it is detected at a concentration that exceeds its comparison value. Since the minimum detection limits were set above ATSDR's comparison value for PCBs in all the samples collected under the 1996 Consent Order, the potential for a public health hazard was evaluated for all the areas sampled. The results of the environmental sampling conducted under the 1996 Consent Order are presented below in Tables 1 through 3. Each table identifies the area sampled, the number of samples collected, the range of PCB levels detected, and the average concentration of PCBs detected in the area.
Table 1. PCB concentrations detected in surface soil (0-3" deep).

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Samples</th>
<th>Concentration Range (ppm)</th>
<th>Average concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A</td>
<td>38</td>
<td>&lt;5.0 - 12.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Area B</td>
<td>35</td>
<td>&lt;5.0 - 10.5</td>
<td>2.9</td>
</tr>
<tr>
<td>Area BN</td>
<td>18</td>
<td>&lt;5.0 - 9.9</td>
<td>3.7</td>
</tr>
<tr>
<td>Area C</td>
<td>29</td>
<td>&lt;5.0 - 33.8</td>
<td>6.7</td>
</tr>
<tr>
<td>Area CP</td>
<td>43</td>
<td>&lt;5.0 - 710</td>
<td>29.4</td>
</tr>
<tr>
<td>Area D</td>
<td>20</td>
<td>&lt;5.0 - 28.0</td>
<td>6.1</td>
</tr>
<tr>
<td>Area E (Residential)</td>
<td>35</td>
<td>&lt;5.0 - 112.5</td>
<td>12</td>
</tr>
<tr>
<td>Area E (Commercial)</td>
<td>32</td>
<td>&lt;5.0 - 384</td>
<td>51.5</td>
</tr>
<tr>
<td>Area GASCO</td>
<td>16</td>
<td>&lt;5.0 - 56.9</td>
<td>8.1</td>
</tr>
<tr>
<td>Area LF</td>
<td>69</td>
<td>&lt;10.0 - 41.0</td>
<td>6.2</td>
</tr>
<tr>
<td>Area MDN</td>
<td>4</td>
<td>&lt;5.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Area NP</td>
<td>60</td>
<td>&lt;5.0 - 1850</td>
<td>64</td>
</tr>
<tr>
<td>Area XE</td>
<td>61</td>
<td>&lt;5.0 - 2810</td>
<td>130.4</td>
</tr>
<tr>
<td>Line A</td>
<td>26</td>
<td>&lt;5.0 - 450</td>
<td>60.9</td>
</tr>
</tbody>
</table>

* To calculate averages, ADPH replaced those samples field screened at less than 5 ppm with the value of half the detection limit (2.5 ppm).

Table 2. Contaminant Concentrations in Sediment Samples (0-3" deep).

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Samples</th>
<th>Concentration Range (ppm)</th>
<th>Average concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A</td>
<td>3</td>
<td>&lt;5.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Area C</td>
<td>11</td>
<td>&lt;5.0 - 369</td>
<td>71.7</td>
</tr>
<tr>
<td>Area CP</td>
<td>38</td>
<td>3.7 - 1193</td>
<td>130.6</td>
</tr>
<tr>
<td>Area E (Commercial)</td>
<td>9</td>
<td>17.4 - 209</td>
<td>65.3</td>
</tr>
</tbody>
</table>

* To calculate averages, ADPH replaced those samples field screened at less than 5 ppm with the value of half the detection limit (2.5 ppm).

Table 3. Contaminant Concentrations in Subsurface Soil Samples.

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of Samples</th>
<th>Depth (inches)</th>
<th>Concentration Range (ppm)</th>
<th>Average concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A</td>
<td>2</td>
<td>12-15&quot;</td>
<td>&lt;5.0 - 3.4</td>
<td>3.0</td>
</tr>
<tr>
<td>Area BN</td>
<td>1</td>
<td>6-9&quot;</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>Line A</td>
<td>4</td>
<td>12-15&quot;</td>
<td>&lt;5.0 - 7.1</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>26-29&quot;</td>
<td>&lt;5.0</td>
<td>--</td>
</tr>
</tbody>
</table>

To calculate averages, ADPH replaced those samples field screened at less than 5 ppm with the value of half the detection limit (2.5 ppm).
Determining Public Health Implications

Health effects are related to a variety of characteristics, including age, sex, nutritional habits, health status, lifestyle, and family traits. All of these characteristics may influence how PCBs are absorbed (taken up by the body), metabolized (broken down by the body), and excreted (eliminated from the body). If completed or potential exposure pathways have been identified, and a contaminant has been detected at levels exceeding ATSDR comparison values, then ADPH staff members consider those physical and biological factors and evaluates the potential for adverse cancerous and non-cancerous health effects.

To evaluate the possible cancer risk associated with the exposures that occurred to people working or living in the areas sampled under the 1996 Consent Order, ADPH calculated the theoretical upper bound cancer risk using the U.S. Environmental Protection Agency (EPA) cancer slope factor for PCBs. A cancer slope factor is an estimate of a chemical's potential for causing cancer. If adequate information about the level, frequency, and length of exposure to a particular carcinogen is available, an estimate of excess cancer risk associated with the exposure can be calculated using the cancer slope factor for that carcinogen. These upper bound calculations are only used as a guide and must be used in combination with the evaluation of the mechanism of toxicity of the carcinogen and the strength and weight of evidence of the laboratory and epidemiologic studies. The true risk could be as low as zero; however, ADPH and ATSDR have taken a “weight of evidence” approach to the assessment of hazards associated with the PCBs in the Anniston area.

Cancer risk calculations attempt to estimate exposures to a “reasonably highly exposed individual” for the particular exposure pathways being considered. Most individuals in the exposure pathway would have estimated risks below this estimate. For example, we do not expect that exposures occurred continuously over 30 years in all individuals. Furthermore, our cancer risk calculations make “protectively conservative” assumptions about how toxic PCBs are, and generally do not assume that our bodies can avoid cancer through natural immunity. Also, cancer risk calculations generally do not assume humans are less sensitive to carcinogens than test animals. Some researchers have argued that exposure to carcinogens at levels similar to that which occurred at this site may not necessarily result in cancer.

Because cancer risk is a conservatively protective estimate of the likelihood, or chance, of getting cancer, ADPH uses this to support decisions about whether and where to take action. Our cancer risk estimate is a “worst case” estimate. Our estimate of cancer risk is not intended to suggest that cancer will occur, nor should it be interpreted as a statement that a certain cancer rate has occurred or will occur. The general public has a "background risk" of about one in two or three chances of getting cancer, and a one in four or five chances of dying of cancer [15]. In other words, in a million people, it is expected that about 400,000 would get cancer from a variety of causes at some time in their lifetime, and about 250,000 would die from cancer. If we say there is a "one-in-a-million" excess cancer risk from a given exposure to a contaminant, we mean that if one million people are exposed as highly as a "reasonably highly exposed" individual for this site, then our worst case estimate is that one cancer above the background chance, or the
400,001st cancer, may appear over the lifetimes of those million persons from that particular exposure.

Chemical exposure may result in adverse health effects other than cancer. Such effects may be acute (resulting from a short-term exposure of less than 14 days), intermediate (resulting from an exposure of more than 14 but less than 365 days), or chronic (resulting from a long-term exposure, at least a year's duration). For each area sampled, we calculated estimated exposure doses for adults, children, and/or workers to evaluate the potential for adverse health effects from short-term, intermediate, and/or long-term exposure to PCBs. The maximum concentration of PCBs detected in an area and/or property was used to calculate the estimated exposure dose for short-term exposures. The average concentration of PCBs detected in an area and/or property was used to calculate the estimated exposure dose for intermediate and long-term exposures (ADPH replaced those samples field screened at less than 5 ppm with the value of half the detection limit [2.5 ppm] to calculate average concentrations for each area). These estimated exposure doses were compared to the documented findings from animals studies and from studies of people exposed to PCBs in the workplace. Appendix D provides the exposure frequencies and ingestion rates used to calculate estimated exposure doses.

Evaluation of Environmental Contamination, Pathways of Exposure, and Public Health Implications

Summary: As a result of site visits and a review of the available data, ADPH concluded that PCBs in surface soils and sediments in various areas surrounding the Solutia site presents a public health hazard. In the past, local residents and employees of businesses in the area may have been exposed to contaminated surface soils located in their yards or near their place of business that could have resulted in an increased risk of adverse health effects. Solutia has completed remediation activities at many of the areas with contaminated surface soils; however, some residents have not provided access to Solutia to conduct remedial activities. In the absence of remediation, trespassers, adults, and children could remain exposed to PCBs in surface soils via incidental ingestion of soil through normal hand-to-mouth contact. In addition, there is insufficient information from the sampling conducted under the 1996 Consent Order to determine whether dust containing PCBs is present in the air of buildings in the areas containing contaminated surface soils. Consequently, a potential exposure pathway may exist via inhalation of PCB-contaminated dust. Furthermore, air exposures due to volatilization of PCBs (i.e., PCB vapor caused by evaporation of PCBs) have not been evaluated in this PHA, nor have exposures to PCBs from ingestion of fish, game, and local produce. These pathways will be evaluated in future health consultations, as sufficient data become available.

The following sections summarize ADPH's analyses of exposure pathways and the public health implications of exposure for each area sampled under the 1996 Consent Order. The areas of contamination are divided into on-site and off-site areas. Off-site areas are further divided into residential and commercial areas.
layer of soil, soil samples were collected from the bottom of the excavation and screened for PCBs. Excavation of soil layers continued until analytical results verified that PCBs did not exceed the detection limit of 5 ppm. The excavated area was backfilled with clean clay material and covered with topsoil and sod.

**Past, Present, and Potential Future Exposures (Area A)**

No pathway of exposure exists to PCB-contaminated subsurface soil. While PCBs were detected in subsurface soil samples in the area, it is unlikely that adults, children, or workers would have come into contact with subsurface soil. Exposure to contaminants in soil and sediment usually occurs in the top several inches (0-3 "). Even if adults or children were exposed to PCB-contaminated subsurface soil in Area A, no adverse health effects would be expected from exposure to the levels detected.

ADPH determined that current and potential future exposures to PCB-contaminated surface soil and subsurface soil are not likely since Solutia has completed remediation actions and restricted access to the area with a fence. A potential pathway of exposure existed in the past for neighboring adults and children to contaminated surface soil at Area A. However, the potential for past exposure to contaminated surface soil at Area A is believed to be minimal. The area where PCBs were detected is set away from the church and is adjacent to a main road (Tenth Street). It is unlikely that adults or children frequented this area. Such exposure, if any, would not be expected to result in adverse health effects.

**Area B**

Area B is a residential area located east of Solutia along Zinn Parkway, north of Highway 202 and south of Moses Street. Surface-soil samples were collected from 14 residential properties in the area. PCBs were detected above the screening assay detection limit at two properties, at maximum concentrations of 10.5 ppm in one property and 9.0 ppm in the other property [6].

In October 1998, Solutia completed remediation activities in Area B at the property with the detected PCB concentration of 10.5 ppm. Solutia excavated the contaminated soil from the property. Excavation of contaminated soil occurred in layers. After removal of a layer of soil, soil samples were collected from the bottom of the excavation and screened for PCBs. Excavation of soil layers continued until analytical results verified that PCBs did not exceed the detection limit of 5 ppm. The excavated property was backfilled with clean clay material and covered with topsoil and sod [3]. Solutia was not allowed access to the second property to conduct remedial actions. The maximum concentration of PCBs detected in surface soil at this property is 9.0 ppm [6].

**Past, Present, and Potential Future Exposures (Area B)**

ADPH determined that no pathway of exposure exists to PCB-contaminated surface soils at the property where Solutia completed remediation activities. However, a potential pathway of exposure existed in the past for adults and children to contaminated surface soils at the property.
In addition, a current completed pathway of exposure exists for adults and children to PCB-contaminated surface soil in the yard of the property owner who has not had their property remediated. The most likely route of exposure to PCBs at either property would have been through incidental ingestion of surface soil. Exposure to the concentrations of PCBs detected at either property would not be expected to result in adverse health effects for adults.

If children deliberately ingested surface soil (pica behavior) in the past from the property that has been remediated, they could have experienced an increased risk of adverse health effects. Studies of animals who ingested similar doses of PCBs experienced changes in behavior, deficits in memory and learning function, and hyperactivity [9].

There is insufficient information to determine whether dust containing PCBs is present on floors or in the air of the home in Area B where the PCB-contaminated surface soils have not been remediated. Consequently, potential exposure pathways may also exist via inhalation or ingestion of PCB-contaminated dust.

**Area C**

Area C is a former residential area north of Solutia that extends from the railroad tracks north to West Ninth Street and from Parkwin Avenue to Bancroft Avenue. Twenty-nine surface-soil samples were collected from 16 private residences in the area. PCBs were detected in surface soil at concentrations ranging from less than 5.0 ppm to 33.8 ppm at eight properties. PCBs were not detected above the screening assay detection limit of 5.0 ppm in surface soil-samples collected at the remaining properties. In addition, 11 sediment samples were collected from the portion of the Northern Drainage Ditch located in Area C. Concentrations of PCBs ranged from less than 5.0 ppm to 369 ppm in sediment [6].

In November 1998, Solutia completed remediation activities at all but one property in Area C. Remedial activities included purchasing the properties, removing all structures, covering the contaminated soils with a geosynthetic liner, and restricting access to the purchased properties with a fence. In addition, Solutia closed the drainage ditch in the area and installed piping to capture storm water [3].

The one property at which Solutia was denied access for remedial purposes had a PCB concentration of 19.4 in surface soil. The owner has not restricted public access to the site or conducted any remedial actions. No one currently lives on the property or in the remaining portion of Area C.

**Past, Present, and Potential Future Exposures (Area C)**

ADPH determined that a potential pathway of exposure currently exists for trespassers to PCB-contaminated surface soil located at the property in the area where access has been denied to conduct remedial activities. Exposure by trespassers would likely be brief and infrequent. The most likely route of exposure is through incidental ingestion of PCB-contaminated surface soil.
from normal hand-to-mouth behavior. Such exposure would not be expected to result in adverse health effects.

However, adults and children could have come in contact with PCB-contaminated surface soil in the past at Area C. Again, the most likely route of exposure would have been through incidental ingestion of contaminated surface soil. It is unlikely that such exposure would have resulted in adverse non-cancerous or cancerous health effects for adults. However, pre-school children could have experienced an increased risk of adverse health effects after exposure to PCB-contaminated surface soil in the area. Dermal effects and immunological effects have been observed in animal studies [9].

If children deliberately ingested surface soil (pica behavior) from Area C, they could have experienced an increased risk of adverse health effects. Studies of animals who ingested similar doses of PCBs experienced changes in behavior, deficits in memory and learning function, and hyperactivity. Other effects observed in animals exposed to similar doses of PCBs include: skin irritation, swelling and/or reddening of the eyelids, reduced resistance to infection, and alterations in the liver and thyroid function[9].

Past exposure, if any, to PCB-contaminated sediment in the portion of the Northern Drainage Ditch located in the area was likely to have been brief and infrequent. The most likely route of exposure would have been through incidental ingestion of contaminated sediment through normal hand-to-mouth contact. Such exposure would not be expected to result in adverse health effects for adults or children.

**Area D**

Area D is a residential area located west of Solutia along First Avenue between Jefferson Street and Adams Street. Twenty surface soil-samples were collected from four homes in Area D. PCBs were detected at concentrations ranging from less than 5.0 ppm to 28 ppm [6]. All the samples with concentrations of PCBs above the detection limit were detected on one property in the area. Solutia has not been allowed access to this property to conduct remedial activities. PCBs were not detected above the screening assay detection limit of 5.0 ppm in surface-soil samples collected at the remaining three properties.

**Past, Present, and Potential Future Exposures (Area D)**

A completed exposure pathway exists for adults and children to contaminated surface soil at Area D. PCBs were detected in one residential yard in the area. The most likely route of exposure is through incidental ingestion of PCB-contaminated surface soil from normal hand-to-mouth behavior.

ADPH determined that it is unlikely that incidental ingestion of PCB-contaminated surface soil in Area D would result in an increased risk of adverse health effects for adults. However, pre-school children could experience an increased risk of adverse health effects after exposure to
PCB-contaminated surface soil at Area D. Dermal and immunological effects have been observed in animal studies [9].

If children deliberately ingest soil (pica behavior) from Area D, they could experience an increased risk of adverse health effects after exposure of less than a year. Studies of animals who ingested similar doses of PCBs experienced changes in behavior, deficits in memory and learning function, and hyperactivity. Other effects observed in animals exposed to similar doses of PCBs include: skin irritation, reduced resistance to infection, and alterations in the liver and thyroid function. These effects are supported by animal studies [9].

There is insufficient information to determine whether dust containing PCBs is present in the air of the home in Area D where the PCB-contaminated surface soils have not been remediated. Consequently, a potential exposure pathway may also exist via inhalation of PCB-contaminated dust.

**Area E - Residential**

Area E is a former residential/commercial area north of Solutia located south of West Tenth Street between Duncan Avenue and Parkwin Avenue. A total of 76 environmental samples was collected from the area. PCBs were detected at concentrations ranging from less than 5.0 ppm to 112.5 ppm at in the residential portion of Area E [6].

In November 1998, Solutia completed remediation activities in the residential portion of Area E. Solutia purchased all the properties in the area, removed the structures, and restricted access to the area with a fence. The contaminated soils were covered with a geosynthetic liner, a layer of soil (a minimum of 18" deep), and seeded to prevent migration and future exposures. In addition, Solutia closed the drainage ditch in the area and installed piping to capture storm water [3].

**Past, Present, and Potential Future Exposures (Area E - Residential)**

ADPH determined that since Solutia has completed remediation actions and no one currently lives in the area, current and potential future exposures to PCB-contaminated surface soil in residential Area E are not likely. However, a completed exposure pathway did exist in the past for adults and children to contaminated surface soil in residential yards in the area.

ADPH determined that it is unlikely that incidental ingestion of PCB-contaminated surface soil in residential Area E would have resulted in an increased risk of adverse health effects for adults. However, pre-school children could have experienced an increased risk of adverse health effects after exposure to PCB-contaminated surface soil at residential Area E. The most likely route of exposure would have been through incidental ingestion of surface soil through normal hand-to-mouth contact. Dermal effects and immunological effects have been observed in animal studies [9].
their wells tested, can be confident that their water meets the stringent standards of the Safe Drinking Water Act. This act requires public water suppliers (such as those for Calhoun County) to test their water regularly for harmful contaminants and specifies that concentrations of these contaminants must not exceed their respective Maximum Contaminant Levels (MCLs). The MCLs are enforceable drinking water regulations that are protective of public health. Should a contaminant, such as PCBs, be detected above its MCL, the supplier is required to switch to an alternative drinking water source or to purify the contaminated water. Anniston public water supplies are tested and they meet safe drinking water standards. Concerned residents of Anniston who have not had their private drinking water wells tested can call the ADPH for help in identifying laboratories that test drinking water.

**ATSDR Child Health Initiative**

ATSDR recognizes that infants and children may be more sensitive to environmental exposure than adults in communities faced with contamination of their water, soil, air, or food. This sensitivity is a result of the following factors: 1) children are more likely to be exposed to certain media (e.g., soil or surface water) because they play and eat outdoors; 2) children are shorter than adults, which means that they can breathe dust, soil, and vapors close to the ground; and, 3) children are smaller; therefore, childhood exposure results in higher doses of chemical exposure per body weight. Children can sustain permanent damage if these factors lead to exposure during critical growth stages. ADPH is committed to evaluating their special interests at sites such as Solutia, as part of the ATSDR Child Health Initiative.

ADPH evaluated the likelihood that children living near the Solutia site may have been or may be exposed to contaminants at levels of health concern. ADPH identified several exposure pathways in which children may be or may have been exposed to PCBs at levels that could result in an increased risk of adverse health effects. See the section titled Environmental Contamination, Pathways of Exposure, and Public Health Implications for the complete discussion of exposure pathways and the potential for adverse health effects.

**Conclusions**

1. The concentrations of PCBs detected in surface-soil samples at the one property at Area D that has not been remediated and at the one property at Area B that has not been remediated pose a public health hazard because exposure to such concentrations could result in an increased risk of adverse health effects for children. Children could be exposed to PCBs through incidental ingestion of the contaminated surface soils or through deliberate ingestion of the soil (pica behavior).

2. The concentrations of PCBs detected in surface-soil samples in Area NP, B, C, and residential Area E posed a public health hazard to children in the past. Children could have been exposed to PCBs through incidental ingestion of the contaminated surface soils or through deliberate ingestion of the soil (pica behavior). Such exposure could have resulted in an increased risk of adverse health effects for children.
3. There is insufficient information from the data collected under the 1996 Consent Order to
determine whether dust containing PCBs is present on floor surfaces or in the air of the home
in Area B or of the home in Area D where the PCB-contaminated surface soils have not been
remediated. Consequently, potential exposure pathways may also exist via inhalation or
ingestion of PCB-contaminated indoor dust. (For more updated information, please refer to
recent health consultations from ATSDR.)

4. Additional data have been collected since the 1996 Consent Order, including additional
environmental and biological data. These data may provide further insight into other routes of
exposure and the potential for an increased risk of adverse health effects.

Public Health Action Plan

The purpose of the public health action plan (PHAP) is to ensure that this public health
assessment goes beyond presenting ADPH's conclusions and recommendations about public
health issues at the Monsanto Company/Solutia Inc. Site. The PHAP describes actions that are
designed to prevent exposure to hazardous substances at the site and reduce any harmful health
effects.

Numerous PHAP activities occurred during the course of ADPH's investigation of the site. For
instance, ADPH collected blood samples from adults and children living near the site in
November 1995. In addition, ADPH and ATSDR have conducted educational activities during
several public meetings and public availability sessions to educate people about the hazards of
PCBs, about the remedial activities, and the results of several environmental sampling events and
the blood testing. ADPH has also been involved in reviewing activities conducted by Monsanto
Company/Solutia Inc. at the site to ensure that remedial activity is timely and protective of public
health.

Actions Planned

1. ATSDR, in conjunction with ADPH, will evaluate any additional environmental sampling
data collected since the 1996 Consent Order.

2. ATSDR, in conjunction with ADPH, is currently evaluating biological data and
environmental data provided by a local environmental group to determine the extent of
contamination and if other pathways of exposure to PCBs may exist in the Anniston area.
ATSDR has asked for public comment on a health consultation concerning this data.

3. ATSDR, in conjunction with ADPH, will continue to provide environmental health
education for local public health officials, the local medical community, and local citizens
to assist the community in assessing possible adverse health outcomes associated with
exposures to PCBs.
4. ADPH, in conjunction with ATSDR, will share this public health assessment with ADEM and EPA so that those making site management decisions are aware of the public health issues identified herein.

**Actions Recommended**

1. Prevent further exposure to PCBs by restricting access to the PCB-contaminated surface soils, by conducting remedial actions according to EPA regulations at the remaining contaminated properties in Areas B and D, and by ensuring that the remedies already in place are maintained.

2. ADPH and ATSDR should conduct follow-up activities designed to fill data gaps that currently hinder the local medical community and local citizens from assessing and mitigating possible adverse health outcomes associated with exposures to PCBs.

3. ADPH and ATSDR should obtain additional input from the West Anniston community to ensure that follow-up activities designed to address site-related public health issues are conducted in a manner that is relevant and acceptable to the community.

**Preparer of Report**

Yvonne Barnett  
Epidemiologist II  
Alabama Department of Public Health
References


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CERTIFICATION

This Solutia Inc./Monsanto Company Public Health Assessment was prepared by the Alabama Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was begun.

Alan W. Farbrough
Technical Project Officer
State Programs Section
Superfund Site Assessment Branch (SSAB)
Division of Health Assessment and Consultation (DHAC)
ATSDR

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

Richard Gillig
Chief, State Programs Section, SSAB, DHAC, ATSDR
Appendix A: Glossary

Cancer Risk Evaluation Guides (CREGs)
Estimated contaminant concentrations that would be expected to cause no more than one excess cancer in a million \((10^{-6})\) persons exposed over a 70-year life span. ATSDR’s CREGs are calculated from EPA’s cancer potency factors.

CERCLA
The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, also known as Superfund. This is the legislation that created ATSDR.

Comparison Values
Estimated contaminant concentrations in specific media that are not likely to cause adverse health effects, given a standard daily ingestion rate and standard body weight. The comparison values are calculated from the scientific literature available on exposure and health effects. The conclusion that a contaminant exceeds the comparison value does not mean that it will cause adverse health effects. Comparison values represent media-specific contaminant concentrations that are used to select contaminants for further evaluation to determine the possibility of adverse public health effects.

Concentration
The amount of one substance dissolved or contained in a given amount of another. For example, sea water contains a higher concentration of salt than fresh water.

Contaminant
Any substance or material that enters a system where it is not normally found, or that is found in greater concentrations than background levels.

Environmental Contamination
The presence of hazardous substances in the environment. From the public health perspective, environmental contamination is addressed when it potentially affects the health and quality of life of people living and working near the contamination.

Exposure
Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). Exposure may be short term (acute) or long term (chronic).

Hazard
A source of risk that does not necessarily imply potential for occurrence. A hazard produces risk only if an exposure pathway exists, and if exposures create the possibility of adverse consequences.

Media
Soil, water, air, plants, animals, or any other parts of the environment that can contain contaminants.
## Appendix B: Assumptions Used in Calculating Exposure Dose Estimates

<table>
<thead>
<tr>
<th>Location</th>
<th>Media</th>
<th>Potentially Exposed Population</th>
<th>Estimated Frequency of Exposure</th>
<th>Ingestion Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A</td>
<td>Subsurface soil</td>
<td>Adults</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Children</td>
<td>none</td>
</tr>
<tr>
<td></td>
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<td>Adults</td>
<td>1 day a week</td>
<td>50 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Children</td>
<td>200 mg/day</td>
</tr>
<tr>
<td>Area B</td>
<td>Surface soil</td>
<td>Adults</td>
<td>7 days a week</td>
<td>50 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Children</td>
<td>200 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Children with pica behavior</td>
<td>3 days a week</td>
<td>8000 mg/day</td>
</tr>
<tr>
<td>Area BN</td>
<td>Subsurface soil</td>
<td>Workers</td>
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<td>none</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Workers</td>
<td>none</td>
</tr>
<tr>
<td></td>
<td>Surface soil</td>
<td>Workers</td>
<td>5 days a week</td>
<td>50 mg/day</td>
</tr>
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<td>Area C</td>
<td>Surface soil</td>
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<td>50 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Children</td>
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</tr>
<tr>
<td></td>
<td>Sediment</td>
<td>Adults</td>
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<td>50 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Children</td>
<td>200 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Children with pica behavior</td>
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</tr>
<tr>
<td>Area CP</td>
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<td>50 mg/day</td>
</tr>
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<td></td>
<td>Sediment</td>
<td>Workers</td>
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<td>50 mg/day</td>
</tr>
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<td>Surface soil</td>
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<td>7 days a week</td>
<td>50 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Children</td>
<td>200 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Children with pica behavior</td>
<td>3 days a week</td>
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<tr>
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<td>(Residential)</td>
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</tr>
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<td>Sediment</td>
<td>Adults</td>
<td>1 day (intermittent exposure)</td>
<td>50 mg/day</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Children</td>
<td>1 day (intermittent exposure)</td>
<td>200 mg/day</td>
</tr>
</tbody>
</table>
Appendix C: Public Comments

Public health assessments are released in draft form to the public for comment. For this public health assessment, the required 30 day public comment period was doubled, allowing the public 60 days to submit comments. This appendix contains public comments in the order they were received and responses from ADPH/ATSDR.

Ms. Barnett once again did a super job in preparing this report and Ms. Browder was all too valuable! Ms. Barnett will be greatly missed. I would like to make my medical records available to the ATSDR as “so far” I have and still suffer from health effects.

Response: Thank you for the compliments. Thank you also for offering medical records. On those occasions when ADPH and ATSDR reviewed medical records, we appreciate people who are willing to participate.

What about the people and property on Montrose Avenue? What are you going to do? Now!

Response: The people and property on Montrose Avenue were tested during an exposure investigation in 1995-1996. Because the exposure investigation showed that people were exposed to PCBs, ADPH recommended that those people relocate and/or allow cleanup to prevent further exposure. Unfortunately, a few people did not agree to allow their property to be remediated. They continue to be at risk for exposure. ADPH and ATSDR continue to recommend that steps be taken to stop exposure.

Will I need testing?

Response: ADPH is concerned about the many people who have not been tested for PCBs, and we all want more information about how PCB exposure might affect health. The tests are very expensive and ADPH has requested assistance to fund more work.

It’s a little confusing to read and understand all the facts.

Response: Unfortunately, that comment is correct. Thank you for your honesty. There were different kinds of property sampled: residential, business, municipal, and utility. For each property, ADPH identified people who might go to the area and how they might come into contact with contaminated soil. ADPH regrets the confusion caused by our efforts to describe each location.

Probably no clear answers but it is not clear what health effects really are. Also, newer information regarding extensive testing. Would have liked a clearer map.

Response: The comment is correct, there are few clear answers on human health effects of PCB exposure. ATSDR has prepared a health consultation on the newer information. They have received comments on that report and are responding to the comments. ADPH regrets that details on the maps are not very clear, making them difficult to read.
chemicals had been manufactured by Swann for several years at the time of the purchase, and, more correctly, Monsanto continued the manufacturing of those chemicals.

Response: Comment noted.

Page 2, first full sentence: The draft PHA mischaracterizes the relationship between Monsanto and Solutia Inc. (not Solutia, Incorporated as denoted in the document). On September 1, 1997, Monsanto spun off its former chemical businesses as Solutia Inc., which is a totally separate business entity.

Response: Comment noted.

Page 2, first full paragraph: Solutia believes the West End Landfill was used only until 1960, not 1961 as denoted in the document. Solutia suggests replacing "exchanged to" to "exchanged with" in the next-to-last line.

Response: The sentence addressing the property exchange has been rewritten.

Page 2, second full paragraph: In this paragraph and elsewhere, the PHA refers to the drainage ditch which ran through the area east of the Solutia facility as the "Eastern Drainage Ditch" and, alternatively, as the "East Drainage Ditch." Solutia suggests that a consistent name be used and that "East Drainage Ditch" is more consistent with previous documents submitted to the Alabama Department of Environmental Management (ADEM) and the Alabama Department of Public Health (ADPH).

Response: The wording has been changed to "East Drainage Ditch."

Previous Investigations, South Landfill

Page 2, last paragraph: The wording of the last sentence, "closing the ditches with PCB contaminated sediment," is subject to misinterpretation. Solutia suggests that a more complete description of the remediation process would be appropriate. The East Drainage Ditch was lined with a geotextile liner and then covered with up to 6 feet of clean soil and an impermeable geomembrane liner. Tributary ditches were also lined with a geotextile liner and were filled with clean soil. All areas, including the ditches, were then covered with a minimum of 14 inches of clean soil and were seeded.

Response: Comment noted.

West End Landfill

Page 3, first paragraph: In this paragraph and elsewhere, the PHA refers to "storm water," "storm-water," and "stormwater." Solutia suggests consistent terminology ("storm water") be used.

Response: The wording has been changed to storm water. 

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Response: The paragraph has been rewritten to clarify activities conducted by the University of Alabama at Birmingham, Occupational and Environmental Medicine Clinic.

Page 8, first paragraph: The reference cited at the end of the paragraph, "[6]," does not appear to be correct. The correct reference may be number 4 on Page 28.

Response: The reference has been changed to 4.

Page 8, second paragraph: This paragraph somewhat mischaracterizes the timing and nature of Monsanto Company's Property Purchase Program. The Property Purchase Program was instituted in October of 1995 to acquire residential properties in the area east of the Anniston facility in order to facilitate management and control of the PCB impacted soils and sediments in the area. This Program was instituted prior to the ADPH health consultations. The area to which the Program applied was generally defined by the presence of PCBs in soils and sediments above the screening level of the immunoassay tests being used to determine the extent of PCB-impacted soils. Subsequent to the signing of Consent Order No. 96-054-CHW between Monsanto and ADEM, Monsanto extended the Property Purchase Program to Montrose Avenue, which is east of and upgradient of the original area. Many of the property owners on Montrose Avenue agreed to participate in the Program. None of the properties purchased was "in the immediate vicinity of Snow Creek."

Response: The paragraph has been rewritten to reflect the expanded area.

Discussion, Polychlorinated Biphenyls (PCBs)

Page 8, first paragraph of this section: Although natural sources of PCBs are probably minor, there are literature reports of naturally-occurring PCBs.

Response: Comment noted.

Page 8, third paragraph of this section, continuing to Page 9: Solutia believes this paragraph mischaracterizes the amount and nature of the scientific and medical literature concerning PCBs. It is not correct that the information available on the human health implications of exposure to PCBs is "very limited." That literature is voluminous, and several excellent reviews have also been published, for example, "Polychlorinated Biphenyl Exposure and Human Disease," James, R. C., et al., J. Occup. Med., 1993, 35(2):136-148. Much of the literature has also been summarized in ATSDR's Toxicological Profile for Polychlorinated Biphenyls, which is cited as reference 9 on Page 29 of the draft PHA. Although the draft PHA properly notes some of the limitations of the various publications describing the potential human health effects of PCBs, it does not give appropriate weight to the strengths of those same studies, including the fact that the subjects of most of those studies were occupationally exposed persons whose exposures were significantly higher than those of most environmentally exposed persons. As Dr. James observed in the abstract of the paper cited above, "... [T]he weight of evidence suggests the only adverse health effects attributable to high, occupational PCB exposures are dermal... [T]he collective occupational experience with PCB fluids provides no evidence for adverse PCB effects on any other organ systems."
Response: ADPH’s balanced public health assessment of the carcinogenicity of PCBs is based on a weight of evidence approach; it is not based on limited studies. The public health assessment text further states that PCBs have been designated as probable carcinogens or reasonably anticipated to be carcinogens by the Department of Health and Human Services, the International Agency for Research on Cancer, and EPA. No changes are necessary.

Environmental Contamination and Exposure Pathways

Page 10, third paragraph: It is unclear why ADPH/ATSDR has chosen ATSDR’s Cancer Risk Evaluation Guide (CREG) as the comparison value for non-cancerous health effects. The use of this conservative CREG in conjunction with other conservative assumptions used to evaluate some of the areas addressed by this document results in overly restrictive evaluations.

Response: A comparison value is used as a screening tool. Conservative screening tools are desired and needed in order to be protective of public health. We disagree that the evaluations contained in this PHA are overly restrictive.

Page 10, fourth paragraph: While Solutia understands the need to deal appropriately with the large number of soil PCB concentrations that were below the screening level of 5 ppm, the uniform application of one-half of the detection limit (2.5 ppm) to those values almost certainly exaggerated the exposure estimates in many of the areas evaluated, especially those where most of the samples had no PCBs detected above the screening level. Solutia recommends recalculating the values using zero ppm (0 ppm) as the surrogate value and reporting both results in the PHA. This calculation would provide a range of average PCB values and would allow more appropriate ranges of estimated doses. Solutia also questions the use of average PCB soil levels to estimate "exposure doses" in the evaluated areas without some analysis of distribution of soil level results. It is not possible to determine by examining the data as presented in the PHA whether the average value is a fair representation of the distribution of results or whether one or two relatively high values biased the average.

Response: Any sample result that is reported to be below the 5.0 ppm detection limit represents an unknown quantity that could actually be any concentration between 0.0 ppm and 4.9 ppm. By assigning these samples a value of 2.5 ppm, the average concentration can be calculated with the least potential for either underestimating or overestimating the unknown. No changes are necessary.

Page 11, Tables 1, 2, and 3: There appear to be errors in at least some of the average concentrations reported on these tables. In Table 3, for example, the average concentration for Area A and Line A are the same as the highest value reported for the concentration range, which cannot be the case. Solutia suggests confirming the calculations of averages using 2.5 ppm for the "non-detects," repeating and reporting the average concentrations using 0 ppm for the "non-detects," and providing some information about the distribution of the values in the concentration ranges.
**Area NP**

Page 14, second paragraph of this section: Solutia suggests changing "To reduce . . ." to "To eliminate . . ."

Response: The description of actions taken does not support the suggested word substitution.

**Past, Present, and Potential Future Exposures (Area NP)**

Page 14, second paragraph of section, continuing to Page 15: The discussion of the potential for adverse non-cancerous health effects for preschool children mischaracterizes the animal and human scientific literature on these potential effects, even if one assumes the validity of the studies. There are several issues which need to be considered before ADPH and ATSDR suggest, as they do in this document, that neurobehavioral effects could have resulted from exposure to PCBs in this area or in areas B, C, D, and E below, for which the same characterization is presented. Reviews of the studies of potential neurobehavioral effects in humans associated with exposure to PCBs and other chemicals by Dr. Susan Schantz (Schantz, S. L., *Neurotoxicol. Teratol.*, 1996, 18(3):217-227) and Dr. Richard Seegal (Seegal, R. F., *Crit. Rev. Toxicol.*, 1996, 26(6):709-737) discussed in great detail the various criticisms of those studies, noted the small magnitude of the changes noted, and concluded that the studies, taken as a whole, are inconclusive. Further, even if one assumes that the various studies reviewed by Schantz and Seegal do have some validity, the subtle effects were reported to be associated with prenatal exposure to the chemicals, not to postnatal exposures, such as incidental ingestion of surface soil. Finally, many of the animal studies on which the agencies seem to rely for the description of potential non-cancerous effects were carried out at dosage levels much higher than those associated with potential incidental ingestion of surface soils. Solutia believes the suggestion that neurobehavioral effects could have resulted from exposures to soil in Area NP and other areas is not supported by the scientific literature.

Response: The reports cited in the comment point out the uncertainty and somewhat confusing nature of our understanding of the health effects associated with PCB exposures. Part of the difficulty of obtaining definitive evidence is related to the low dose exposures encountered in environmental scenarios, and variations in individual responses to PCB exposures. These factors hinder the ability to produce a definitive assessment for health effects an individual may experience related to PCB exposures.

Despite this confusion, numerous, more recent reports of laboratory and epidemiological investigations have added to the weight of evidence indicating that concerns over environmental exposures to PCBs are warranted (for general reviews see: J. P. Giesy and K. Kannan. 1998 Critical. Rev. Toxicol. 28:511-569; L. J. Fischer, R. Seegal, P. Ganey, I. Pessah, and P. Kodavanti. 1998. Toxicol. Sci. 41:49-61). It must be noted that although some investigators conclude that the published reports describe subtle effects of questionable consequence, others consider the results "adverse" responses. Some investigators conclude that the evidence from animal experiments leads to strong suspicions that similar effects may occur in humans. Included in these documented and
Response: The public health assessment correctly identifies a completed exposure pathway. Subsequent to identifying pathways of exposure, PCB concentrations and frequency of contact are evaluated to calculate dose. No change is necessary.

Page 16, second paragraph of this section, continuing to Page 17: Please see comment for Past, Present, and Potential Future Exposures (Area NP), Page 14.

Response: The reports cited in the comment point out the uncertainty and somewhat confusing nature of our understanding of the health effects associated with PCB exposures. Part of the difficulty of obtaining definitive evidence is related to the low dose exposures encountered in environmental scenarios, and variations in individual responses to PCB exposures. These factors hinder the ability to produce a definitive assessment for health effects an individual may experience related to PCB exposures.


Based on a limited review of the newer evidence, ADPH and ATSDR believe that it is reasonable to suspect that exposures to PCBs can induce a variety of responses in both animals and humans, and that some of those responses may occur as a result of exposures to environmental PCBs.

Area C

Page 17, second paragraph of this section, second sentence: This sentence should be modified to note that as part of the remediation process Solutia placed a minimum of 14 inches of clean soil on top of the geosynthetic liner and seeded the property.

Response: The sentence was based on the author’s personal communication with Solutia’s Manager of Remedial Projects rather than on a document which can be researched to verify the information. The author has left ADPH and the information
Response: One word of the sentence was changed.

Past, Present, and Potential Future Exposures (Area D)

Page 18, second paragraph of this section and Page 19, first paragraph: Please see comment for Past, Present, and Potential Future Exposures (Area NP), Page 14. Also, the scientific literature does not support the statement that "...immunological effects have been observed in human studies..."

Response: The reports cited in the comment point out the uncertainty and somewhat confusing nature of our understanding of the health effects associated with PCB exposures. Part of the difficulty of obtaining definitive evidence is related to the low dose exposures encountered in environmental scenarios, and variations in individual responses to PCB exposures. These factors hinder the ability to produce a definitive assessment for health effects an individual may experience related to PCB exposures.


Based on a limited review of the newer evidence, ADPH and ATSDR believe that it is reasonable to suspect that exposures to PCBs can induce a variety of responses in both animals and humans, and that some of those responses may occur as a result of exposures to environmental PCBs.

Area E - Residential

Page 19, second paragraph of this section, second sentence: The wording of this sentence is somewhat misleading. It is clearer to say, "Solutia purchased the properties in this area and removed all of the structures. Solutia restricted access to the area with a fence."

Response: The sentence has been clarified.
Area CP

Page 21, second paragraph of this section, first sentence: It is not correct that Solutia has "... removed all structures in the area..." Although Solutia did remove the structures on the eastern end of the area, a warehouse still stands on the western end of the property (the Miller property). It is correct to say, "By November 1999, Solutia had purchased the property and removed all but one of the structures,..."

Response: The sentence has been clarified.

Area XE

Page 24, first full paragraph: This paragraph is out of date. It would be better to replace "To-date" with "As of November 1999".

Response: The sentence was changed as noted.

Conclusions

Page 26, Conclusion 1 and Conclusion 2: Solutia disagrees that the concentrations of PCBs in the soils in the areas denoted in the conclusions could result in adverse noncancerous health effects for children. These conclusions are not supported by the scientific literature which discusses the human health effects of PCBs. The bases for Solutia's disagreement have been discussed in earlier comments. Solutia is confident that the levels of PCBs in the soils in the near-site areas to which children had or have access do NOT pose a public health hazard.

Response: This public health assessment was conducted by professionals trained in environmental health. Their weight of evidence evaluation of relevant data concludes that a public health hazard exists for designated populations. However, the word "noncancerous" has been removed from Conclusions 1 and 2.

Public Health Action Plan

Page 27, first paragraph of this section, line three and second paragraph of this section, line six: "Monsanto" should be replaced with "Solutia."

Response: The name has been changed to Monsanto Company/Solutia Inc. to remain consistent with the title of the public health assessment.