

# ATSDR

EXPERT PANEL DISCUSSION:  
EXPLORING OPPORTUNITIES  
FOR PCB-RELATED HEALTH STUDIES  
IN ANNISTON, ALABAMA

JANUARY 14-15, 2002

ATLANTA, GEORGIA

PRESENTED BY:  
HEALTH INVESTIGATIONS BRANCH  
DIVISION OF HEALTH STUDIES

Dear Colleagues:

Polychlorinated biphenyls (PCBs) continue to be a great concern to communities living near toxic waste sites and other sources of exposure across the United States. The Agency for Toxic Substance and Disease Registry (ATSDR) increasingly is faced with communities exposed to varying levels of these toxins. Since the mid 1990s, ATSDR has been involved with issues surrounding the potential for PCB exposure in Anniston, Alabama. Previous and on-going sampling has indicated that high levels of PCBs are present in the local environment. In addition, serum PCB levels in excess of 100 parts per billion have been measured in a number of local residents.

Many of the concerns voiced by residents of this community include high rates of cancer, adverse birth outcomes, and learning and developmental disabilities. These residents look to ATSDR for assistance in determining whether elevated rates of adverse health outcomes are related to the potential for exposure to these chemicals. In order to provide guidance in addressing the environmental health concerns of the residents of Anniston, ATSDR convened a PCB Expert Panel session in Atlanta, Georgia, on January 14, 2002, to solicit input regarding the scientific basis for future epidemiologic investigations of PCB exposure in Anniston. Seven nationally recognized experts on PCBs and epidemiology were invited to participate. Information collected throughout the session is summarized in the enclosed document. The panel members, as well as Anniston citizens and state and federal health and environmental officials provided valuable insight into a number of issues concerned with PCB exposure in Anniston.

We are currently working with a number of communities that have documented levels of PCBs in their residential soil and whose citizens have documented levels of PCBs in their bodies. Information gathered during this workshop will help guide future public health research not only in Anniston, but in other communities across the United States.

Sincerely yours,

Henry Falk, M.D., M.P.H.  
Assistant Surgeon General  
Assistant Administrator

Enclosure

# Table of Contents

	<u>Page</u>
List of Expert Panel Members.....	1
Meeting Agenda.....	2
Meeting Summary.....	4
ATSDR Attendees.....	23
Meeting Attendees.....	25
ATSDR Summary of the Panel Meeting.....	26

## List of Expert Panel Members

Howard Frumkin, MD, DrPH  
Professor and Chair, Department of Environmental and Occupational Health  
Rollins School of Public Health  
Emory University

Mary Hovinga, PhD  
Associate Professor, Department of Epidemiology  
School of Public Health  
University of Alabama at Birmingham

Susan Korrick, MD, MPH  
Instructor, School of Medicine  
Lecturer, School of Public Health  
Harvard University

Larry W. Robertson, PhD, MPH  
Professor, Graduate Center for Toxicology  
University of Kentucky Medical Center

Susan Schantz, PhD  
Associate Professor  
College of Veterinary Medicine  
University of Illinois at Urbana-Champaign

Allen Silverstone, PhD  
Professor of Microbiology and Immunology  
SUNY Health Sciences Center at Syracuse

John Vena, PhD  
Professor and Associate Chair, Social and Preventive Medicine  
University of New York at Buffalo

## Meeting Agenda

### **MONDAY, JANUARY 14, 2002**

- 1:00 PM Welcome.....Henry Falk, MD, Assistant Administrator, ATSDR
- 1:15 PM Introductions.....Mary White, ATSDR
- 1:45 PM Logistics & Charge to Participants.....Mary White and Lucy Peipins, ATSDR
- 2:00 PM Human Health Studies in the Great Lakes - Investigating Potential Adverse Health Outcomes from Exposure to PCBs.....Heraline Hicks, ATSDR
- 2:15 PM Overview: Environmental Issues in Anniston.....Sherri Berger-Frank, ATSDR
- 2:30 PM Environmental Field Activities.....Steve Spurlin, EPA
- 2:50 PM Exploring Exposure Pathways.....Clem Welsh, ATSDR
- 3:10 PM BREAK
- 3:25 PM Discussion Topic One: Characterizing Exposure
- 4:40 PM Question and Answer Session with the Panelists
- 5:20 PM Overview of Day Two .....Mary White, ATSDR
- 5:30 PM ADJOURN

### **TUESDAY, JANUARY 15, 2002**

- 8:00 AM Welcome.....Mary White, ATSDR
- 8:30 AM Pediatric Environmental Health Speciality Unit Activity in Anniston, Alabama.....Howard Frumkin, MD, DrPH, Emory
- 9:00 AM Discussion Topic Two: Study Design and Measurement Issues
- 10:30 AM BREAK
- 10:45 AM Discussion Topic Two: Continued

12:15 PM LUNCH

1:30 PM Discussion Topic Three: Public Health Considerations

2:30 PM BREAK

2:45 PM Discussion Topic Four: Next Steps

3:45 PM Closing Comments.....Mary White, ATSDR

4:00 PM Question and Answer Session with the Panelists

4:30 PM ADJOURN

## Meeting Summary

The following summary was recorded by a representative of DESA, Inc., an independent contractor. The summary does not capture all aspects of the meeting; only main topics of discussion have been cited.

Throughout the discussion, audience members submitted questions on note cards to the expert panelists. The meeting facilitator read the questions out loud, and one or more of the panelists responded accordingly. Their responses do not necessarily reflect the official opinion or policy of ATSDR or the U.S. Department of Health and Human Services.

### **Welcome - Dr. Henry Falk, Assistant Administrator, ATSDR**

The meeting was called to order at 1:00 PM by Dr. Falk, who welcomed everyone and thanked the participants for attending. Dr. Falk said the Agency for Toxic Substances and Disease Registry (ATSDR) has been involved with the aftermath of the September 11 events. Personnel are involved with evaluating the potential exposure risks, from asbestos and other chemicals, to residents of the World Trade Center area, as well as responding to environmental concerns regarding anthrax exposure. ATSDR's primary work involves evaluating the more than 500 Superfund sites across the United States. The agency works with the Environmental Protection Agency (EPA), state and local agencies, as well as communities, to conduct these evaluations.

Polychlorinated Biphenyls (PCBs) are some of the most potent chemicals present in our environment, and they are a large part of the Superfund and Great Lakes efforts. ATSDR has been involved with the Anniston site since the mid 1990's, working with a number of groups including the Southeast Pediatric Environmental Health Specialty Unit (PESHU), EPA, the Alabama Department of Health (ADPH), the Alabama Department of Environmental Conservation (ADEM), the Calhoun County Health Department (CCHD), and a number of community-based organizations. The agencies involved are working with the Community Against Pollution (CAP), and other community leaders, to address the environmental and health concerns of the residents of Anniston. The panel meeting was convened to help ATSDR determine what health effects are likely to be seen from PCB exposure and what epidemiologic investigations may be appropriate for this community.

### **Introductions - Dr. Mary White, ATSDR**

Dr. White introduced herself and asked the panelists and audience to introduce themselves.

### **Charge to Participants - Dr. Lucy Peipins, ATSDR**

The purpose of the meeting is to explore opportunities for PCB-related research. The session was convened to gather input, not reach consensus. These discussions do not guarantee the implementation of a study, nor do they signify the availability of funding for such an activity.

## **Human Health Studies in the Great Lakes: Investigating Potential Adverse Health Effects from Exposure to PCBs - *Dr. Heraline Hicks, ATSDR***

Several organochlorine compounds, including PCBs, HCB, DDT and dioxins, heavy metals, Polycyclic Aromatic Hydrocarbons, and Benzo[a]pyrene were found in the Great Lakes region. In response to those findings the Great Lakes Critical Programs Act of 1990 was passed. That act created the ATSDR Great Lakes Research Program to investigate and characterize the association between consumption of contaminated Great Lakes fish and the potential for short- and long-term harmful health effects. A number of populations are being investigated under this initiative, these include pregnant females, nursing mothers, fetuses and nursing infants, infants and children, Native Americans (due to high fish consumption), sport anglers, urban poor, and the elderly. These populations could experience behavioral, reproductive, endocrine, developmental, neurologic, and/or immunologic effects as a result of exposure to the toxic substances identified in the area. Nine projects are being supported by ATSDR to study the health effects of these toxins on susceptible populations.

### *Discussion*

According to Dr. Hicks, this study is in its tenth year. Body burden levels of PCBs in the general population of Upper New York State were, on average, 5 parts per billion (ppb). In the Great Lakes populations, PCB levels have been reported as high as 30-40 ppb.

## **Environmental Issues in Anniston, Alabama - *Ms. Sherri Berger-Frank, ATSDR***

For more than 100 years, Anniston, Alabama has been home to the production and disposal of various toxic substances. Industries and military facilities have been involved in the production, or use, of PCBs, lead, mercury and other chemicals.

In the late 1920s, the Southern Manganese Company began production of biphenyls. In 1935, Monsanto purchased the company and began producing PCBs, parathion and other chemicals. PCBs were produced until the early 1970s. Solutia, Inc. now owns the facility. For more than 35 years, all aroclors (except 1016) were produced in Anniston. Both hazardous and non-hazardous wastes were disposed of at two adjacent landfills.

In 2000, the EPA conducted lead soil sampling in the area, and found 14 properties with lead soil contamination levels ranging from 1000 to 3080 ppm. In the Spring of 2001, ATSDR screened 410 children who attended Anniston schools or lived in the west Anniston area. Based on fingerstick samples (capillary), only four children had elevated lead levels of 10 or more micrograms per deciliter. Three of these children were re-tested and two remained elevated (the highest was 13 micrograms per deciliter).

The city of Anniston has recently been designated as a Brownfield site by the EPA, but no work has been done thus far.



In addition to industrial sites, Anniston is home to both Fort McClellan and the Anniston Army Depot. Ft. McClellan, which dates back to the Spanish-American War, was closed in 1999. It was a previous chemical warfare and chemical weapons decontamination training center. Ft. McClellan is not an NPL site, and there are no previous or on-going ATSDR activities there. The Anniston Army Depot, however, is an NPL site. ATSDR has been involved there since the early 1990s. The Depot has a TCE groundwater plume that is moving off-site, although comprehensive sampling for TCE has shown levels to be below those of health concern. The Anniston Depot holds some of the nation's stockpile of chemical weapons, such as mustard gas, GBX and VX. Burning of this stockpile is scheduled to begin in 2002. The community has concerns regarding emergency preparedness and education.

#### *Discussion*

The chemical weapons incinerator has been built, but has not gone on-line.

#### **Environmental Field Activities - Mr. Steve Spurlin, EPA**

The EPA has been involved with the Anniston site since early 1999. Third-party data (from attorneys representing local community members) has shown widespread PCB contamination in the soil, air, and water in the area. The EPA Community Relations Office was established by the agency. The EPA, Super Fund, ATSDR, the state environmental agency, and local, county, and state health departments are all involved with activities at the site.

Based on sampling results, the PCB contamination appears to be transported via drainage, where the affected area is prone to flooding. The flood plain feeds into Snow Creek, which eventually drains into a local lake. The Solutia facility is somewhat elevated.

From February 1999 to May 2001, soil, sediment, and air samples were taken in the area, with the primary focus being residential properties. Both field screen and fixed lab tests were used. To date, some 3,500 samples have been collected from more than 850 locations. PCBs and other contaminants were found in varying levels at various sites throughout the area. Grab samples, which are taken from the top three inches of soil, were taken from several different areas on each residential property. If PCBs were measured at 8 ppm, additional composite sampling was done. Levels measured at 10 ppm or greater (the EPA established level), warrants clean up of the property. Properties were sampled only when residents granted permission. At this time, twenty-one properties have PCB levels of 10 ppm or greater and are eligible for clean up. Although many properties have levels less than 10 ppm, these properties are still considered impacted by the contamination. The highest levels were 390 ppm in one residential yard, and 500 ppm in a storm water drainage ditch near a sewer. Affected residences are scattered throughout the area, but are all located within the main tributary area near Snow Creek. The EPA has approached the Solutia facility about entering into an abatement agreement, but it has not been finalized. The company is required to remediate the 21 properties that are contaminated. Solutia is continuing to sample in the Anniston/Oxford area using various sampling methods. In some instances, the EPA samples do not reflect Solutia's sampling results.

### *Discussion*

Mr. Spurlin was asked why 10 ppm was selected as the remediation level, and whether the measurement is the same for a children's playground as for an abandoned factory. He replied that the 10 ppm was a removal action number and not a "safe" number. It was considered to be a reasonable short-term protective number the program could use to address property contamination in an emergency situation. Mr. Spurlin was asked whether the cut-off level was chosen before or after clean-up costs were considered. He said before.

There was a short discussion regarding the potential for lead exposure. Ms. Katrina Jones from EPA stated that soil sampling showed contamination with lead as well as with PCBs. Of the 820 residences sampled, 134 had lead levels of more than 400 ppm, ranging from 400-2,800 ppm.

### **Exploring Exposure Pathways - *Dr. Clem Welsh, ATSDR***

Three investigations of serum PCBs were conducted in the Anniston area: the Alabama Department of Public Health (ADPH) Exposure Investigation in 1996; the ATSDR Health Consultation of 2000; and the ATSDR Exposure Investigation of 2000.

The ADPH investigation tested 103 people (with 26 being under 21 years of age) from 35 homes near the Solutia facility. PCB serum levels ranged from non-detect to 303 µg/L, with older adults having the highest levels.

The ATSDR Health Consultation was conducted in response to requests from the community and the EPA. A draft report was released in 2000. The final has not been released. Data, reviewed in the document, were collected by a local attorney from approximately 3,000 clients; levels ranged from non-detect to 792 µg/L. Seventeen percent of those tested exceeded 20 µg/L. Some adults may have occupational exposure as well as at-home environmental exposure. There are quality control (QC) and quality assurance (QA) questions concerning the data.

The ATSDR Exposure Investigation was conducted in response to community concerns about the possibility of on-going exposure to PCBs. Samples were collected in the spring of 2000 from 18 families living near the facility. Exposure levels in adults ranged from non-detect to 210 µg/L, with five adults over age 45 having serum levels of >10 µg/L. Exposure levels in children ranged from non-detect to 4.6 µg/L. Of 37 children tested, 27 had non-detectable levels of PCBs. Participation was limited because many people invited to participate refused on advice of their attorney.

Routes of exposure include ingestion, inhalation, and dermal. Twenty-one sampled properties contained PCB levels of >10 ppm. Ingestion can occur through clay eating, consumption of local produce, and consumption of local fish. Inhalation is a possibility, since the airborne range is from 5.4 to 30.8 µg/m<sup>3</sup>. For comparison, levels in Baltimore, Maryland (1996) ranged from 0.38 to 3.36 µg/m<sup>3</sup>, and in New Brunswick, New Jersey (1977) ranged from 0.92 to 3.2 µg/m<sup>3</sup>. Some

of the testing of fish was conducted by Solutia. The state of Alabama split some samples, and found levels to be one-third higher than those reported by Solutia.

### *Discussion*

Until the past two years, local people raised animals for food, milk or eggs. Few people in the area now do so. Ingestion of these food products, along with vegetables raised in contaminated soil and pica eating, could contribute to the total body burden of PCBs and to on-going exposure of local residents. Another possible source of on-going contamination is ambient airborne exposure.

### **Audience Questions:**

1) *How many properties, and what percentage of the total properties were not sampled due to refusal of access by owner?*

When a lead survey was conducted earlier by ADPH on homes with elevated soil lead levels (>400 ppm), 70% refused to allow blood to be drawn. The refusal rate for the ATSDR exposure investigation was similar, with only 18 of close to 100 households visited agreeing to participate.

*During this portion of the discussion, audience members submitted questions on note cards to the expert panelists. The meeting facilitator read the questions out loud, and one or more of the panelists or audience members responded accordingly. Their responses do not necessarily reflect the official opinion or policy of ATSDR or the U.S. Department of Health and Human Services.*

2) *Do lead levels follow PCB levels by location or are they independent?*

According to EPA, sampling has discovered only five properties with high levels of both lead and PCBs.

### **Discussion Topic One: Characterizing Exposure**

The panelists were asked whether adequate information is available regarding exposure. They replied that since exposures go back for many years, serum blood levels are not adequate to determine total body burden. Serum levels indicate the amount in blood at any one point, but do not indicate what has accumulated over the years, and what amount of toxins are stored in body fat. To gain a more complete estimate of exposure, occupational and residential exposure information over time would be needed. This, too, presents problems in that different congeners break down at different rates, and rates could have been much higher earlier in production history. A questionnaire could provide some information on route of exposure, but is subject to recall bias.

It was suggested that information on current and on-going exposures is needed so that residents can protect themselves now. Panelists suggested the collection of survey data to better understand the habits (such as gardening, fishing, etc.) of community members. Other panelists pointed out that people who no longer lived in the area may be unaware of their health risks due to having previously lived in the Anniston area. Many former residents actually may be at greater risk due to higher contamination levels at the time they resided in the area. A registry of current and former residents was suggested so the occurrence of particular health outcomes, related to PCB exposure, could be documented. Exposure and lifestyle surveys would provide information on local food consumption, recreational activities (such as swimming in affected creeks), and other information to help identify sources of contamination.

If data were to be collected from the community, the following issues were highlighted by panel members:

- the timing of exposures;
- local fish consumption;
- house dust exposure;
- soil contamination;
- schools attended and for how long;
- gardening habits;
- locally raised animals and crops;
- specific congeners to which people were/are exposed;
- breast feeding habits of residents; and
- the ways water is used around the community.

Information on multiple pathways of exposures for the same individuals may help target clean-up efforts.

An ATSDR staff person who has investigated the possibility of enumerating the community indicated that the greatest challenge with locating data on previous and current residences is that property records for Calhoun County are not computerized; therefore, determining who lived where and where they moved to, is tedious. A community member pointed out that family and friends of many of those who have moved still reside in the area, and one or two phone calls could locate many people. Also, the attorneys have information on former residents.

The EPA expressed concern about whether current exposure is still taking place, because it affects the clean-up process. Panelists agreed that on the basis of sampling results (such as air), contamination was still occurring. However, just measuring air and sediment are not enough. Additional data, such as food and activities, are needed as well. In fact, exposure information from all potential sources would be needed to have a more complete picture. Panelists recommended that more air studies to determine the source of the contamination be done. One possible source discussed was the local landfills. A state agency monitored air around the landfills in 1999 and 2000 and found that the highest levels of contamination occurred on rainy

days. Historically, there has been an effort to reduce the size of landfills and debris has been distributed all around the county. In fact, contaminated soil may have been used as fill dirt, distributed for commercial use (such as at the mall on Quintard) and to residents for their personal property. The location of all of the contaminated soil is unknown.

One panelist stated that a method to measure past contamination is to take core samples from soil and underground water supplies, and look at measures of the contaminants over time.

Another panelist thought the PCB levels were elevated, but not very high, and that an alarming response was not necessary. Lengthy discussion followed. Other panelists strongly disagreed, saying 10 ppm may even be a cut-off point too high for clean up. One cited study (the Dutch study) used 7 ppm as the highest acceptable level. It was pointed out that in the Great Lakes and Oswego studies the levels were lower than those in Anniston, yet they were considered clean-up sites; that particular health outcomes of these population are currently being monitored.

Different congeners act in different ways in different organs. There is a whole spectrum of effects from endocrine disruption of reproductive outcomes to neurologic disorders. Some questions that need to be explored in the short term include why exposures are so high, what the exposure routes are, and which congeners are present in Anniston. Combined exposures (different chemicals in the environment) are important as well. The interactions of lead, mercury, and PCBs may be more toxic than any one contaminant alone. These interactions may mean that lower levels of a single contaminant, when combined with low levels of other contaminants, may have a different impact than previously recognized. For example, mercury has neurologic endpoints and one animal study suggests that mercury may act synergistically with PCBs to reduce dopamine levels.

### **Audience Questions:**

1) *What factors might be associated with excessively high levels of PCBs? How would you explain the wide range in a given location?*

Exposures vary due to eating patterns, for example, whether contaminated fish or vegetables were consumed, and the different kinds of PCBs to which people were exposed. Some PCBs are estrogenic, some are neurotoxic, some are toxic to the liver—these effects can depend on the congener. The types of fish consumed can make a difference in the amount and types of PCBs ingested by humans, e.g., some fish are bottom dwellers and stay in one place, while other fish move all around the lake. The amounts of PCBs ingested by the fish would depend on their eating habits and where the highest concentrations of PCBs were concentrated in the water. The age of the person and how long he/she has lived in the area may also make a difference in the amount of PCBs present. The half-life of PCBs also has an effect. Some PCBs deteriorate faster than others, meaning that their ability to be detected in the body can vary.

2) *If serum PCB levels do not necessarily reflect past exposures accurately, is there some way of measuring this, such as the measure of tooth lead?*

Comparing a fat sample with a blood sample is a good measure, although what is stored in the fat depends on the individual's metabolism. Breast milk is a good measure. The number of years a woman breast feeds affects her levels, and the longer she breast feeds the less PCBs will be present in the mother's body, but the more she passes on to her child(ren).

3) *How are you able to capture the population to make the data relevant and significant?*

The community should be involved in the process through what is referred to as participatory research. A panel of citizen representatives may be established as part of the team. It also is necessary to make sure the community understands what can and cannot be done scientifically and financially. An example of community involvement in research is the Children's Environmental Health Centers (EPA/NIH). These are community-based research centers that have been very effective. The centers create community advisory boards and hire community residents to conduct the assessments.

4) *If you had a 70% access refusal rate, how representative of the community is the data gathered?*

Without more information about why the 70% chose not to participate, or how these people differ from those who did decide to participate, it cannot be said whether or not the data is representative.

5) *What are the suspected sources of lead in the community?*

According to EPA, there are multiple sources in the Anniston area, including 30 industries and smaller businesses operating over the past 100 years. Lead paint in homes is considered a large risk factor as well. Also, according to the audience, waste was removed in lead-lined containers, and then dumped in local landfills.

6) *It was stated that 450 lead tests were done in Calhoun County [yearly]. Where did you get that figure?*

According to ADPH, blood lead screening data collected by pediatricians are reported to the state. A community member said the numbers of lead screens are not being reported properly to the state health department—expressing concern about the state's data.

7) *Are there demographic differences between east and west Anniston?*

It was clear from the discussion that east versus west Anniston may be defined differently. For some, the two parts are divided by a particular road or railroad track. For others, the distinction

between the two is determined by “near Solutia” versus further away. However, everyone seemed to agree that the west side of Anniston is the affected area.

8) *Of the 209 PCB congeners, which ones should be included in exposure studies?*

All of them. Since there are many different mechanisms for toxicity, the more complete the data, the more long-lasting its usefulness. Any good lab should be able to give a congener breakdown. All congeners will not be present in all samples. Testing precision can depend on the amount of blood tested. In addition, specific congeners may be linked with specific effects. Twelve PCB congeners, for example, have the ability to bind to thyroxin.

9) *It was stated that ethyl mercury augments the effects of PCBs on dopamine. Will dopamine become a valid biomarker for correlation of PCB effects?*

No. You cannot measure dopamine function in humans, because you cannot get a sample from the brain.

10) *Elaborate on multiple types of PCBs and congeners.*

PCBs are characterized by the molecular position of the chlorine atoms. Coplanar PCBs bind with certain receptors (the Ah receptor, which also binds TCDD) while those in the ortho form bind with other receptors. There are 209 combinations. Humans cannot de-chlorinate PCBs, but, the addition of a hydrogen creates oxygen hydroxylated chlorines that can be more easily excreted. However, these hydroxylated chlorines may be more harmful before excretion than non-hydroxylated ones. Receptors are found in every tissue, but we do not fully understand how they affect the body. From animal studies, we know there are gender differences in the effects of PCBs. For example, only aroclor mixtures of the highest concentrations caused cancer in male rats, but all four concentrations caused cancer in females, so the spectrum of effects in males is not the same as in females.

11) *What is the basis for the belief that PCBs are becoming more toxic in the environment?*

It depends on what the congener is and how it breaks down. Some congeners are more easily excreted, but may be more toxic before excretion. PCBs change in four ways: photolytic - they change according to their exposure to light, with some becoming more toxic and others less; aerobic/anaerobic - in absence of air a congener may be less toxic, but more volatile; mixture - PCBs may be leaving environments and moving to new ones and the mixture may be more toxic; biodegradation - what was there 10 years ago is different than what is there now, and though the levels may be decreasing, the PCBs may be more dangerous in lower concentrations in a different mixture.

12) *Chemically, how do PCBs interfere with metabolism?*

In all ways. If the doses are right, they are excellent inducers of phase 1 and 2 metabolism, and they will increase degradation in the liver of foreign compounds. In response to some of the PCB congeners, the liver enlarges and the enzymes gear up to attack the toxins. So the liver remains in an agitated state trying to break down the PCBs. Since the carbon bonds are stable and hard to break, the liver never rests. This causes enhanced drug metabolism. Hydroxylation can inhibit that activity and toxins from being excreted. Some PCBs increase metabolism and some inhibit it.

13) *How do PCBs affect CNS metabolism?*

It is unknown.

**Pediatric Environmental Health Speciality Unit Activity in Anniston, Alabama - *Dr. Howard Frumkin, Emory University***

The Southeast Pediatric Environmental Health Speciality Unit (PEHSU) Network is funded by EPA and ATSDR, and is located within Emory University's School of Public Health. There is one PEHSU in each health region of the U.S. The units provide clinical assessments and referrals. In Anniston, the PEHSU worked closely with the local medical community and citizens' groups to determine local health concerns. Based on these conversations, the health of children in the affected area emerged as a major concern. The community felt that more children in the area than ever before are experiencing significant learning and cognitive difficulties.

Anniston was founded in 1872 as a company town for an iron company. By the 1920s, there were 173 foundries making ferro-manganese, doing metal working, and producing biphenyls. Monsanto produced PCBs, parathion, and other chemicals there. In the early 1970s, PCB manufacture stopped, and in the 1980s, pesticide manufacture stopped. Solutia continues to produce chemicals.

Two large landfills were created, and aroclors were used locally for termites and treated wood. There was runoff from the plant into the local waterways. The *U.S. News and World Report* article, "Kids at Risk" (2000), called Anniston as the most challenging mixture of environmental exposures in the country.

Johnny Cochran came to the area and got involved with litigation for a large group of community members.

The community is divided into four main community groups, and there is much fragmentation. Some groups are more successful and active than others, and there are different lawsuits representing different groups. Overall, Anniston has an extensive history of great leadership in a civil rights context. The city is half black and half white, with the county being mostly white.



There has been tension between the two governments, but the situation is improving. Economically, the area is changing from being heavily dependent on the military and steel industries—which are declining—to establishing a more diverse economy. However, the many lawsuits make it difficult to attract new industries and businesses. Many people cannot, or will not talk because of on-going litigation. Collecting the information needed to assess situations and provide help is difficult. The medical community is wary, but establishing the PEHSU has ignited an interest, particularly in the pediatric community.

In the 1970s and 1980s, PCBs were detected in downstream fish, and some clean-up occurred. In the 1990s, a fish advisory was issued, and in the mid-1990s, lawsuits began. As broader contamination was recognized, more community groups became involved and more lawsuits began. Superfund status is still being considered for the community.

In 1995, ADPH measured contamination exposure levels in a small group of people. In 1999, attorneys obtained exposure levels for a much larger number of people. Considerable PCB levels were detected in some of these samples.

In addition to the industrial sites, the Army Depot poses exposure concerns due to planned chemical demilitarization activities. ATSDR has not found an excessive number of elevated lead levels in blood tests it conducted for residents of the area. Additionally, the *Anniston Star* has reported mercury contamination in the area; however, additional information is not available.

It is obvious that the community at large has many concerns regarding children's health, which has prompted a great desire for service delivery and research. Originally, community groups wanted research for use in on-going litigation. Community members were then asked what they would want as a result of the lawsuits. These discussions led to a productive dialogue on helping children and delivering services to improve learning in the community. There are 24,000 people in Anniston, and 100,000 in Calhoun County. The birthrate in the area appears high enough to develop and follow a cohort. The population is relatively old. The population peaks during the 30s and 40s. There are 3,200 school children in the city, 10,000 in Calhoun County, 3,100 in Oxford, and 1,700 in Jacksonville (north of Anniston and unlikely to be contaminated). This experience is an opportunity to learn about exposures and what they do to people. What is learned here can help others. The community wants to help others, but also wants health-related services for their community.

Litigation is, understandably, a contentious issue. The local medical community did not want to be involved in the litigation processes. When medical professionals learned that the PEHSU was not legally involved, they became more willing to work together. However, it has been difficult to balance the needs of the many community groups and entities.

PEHSU, with a goal of establishing a world-class program for detecting developmental and learning disabilities in children, continued to meet with stakeholders in 2001. The program will also determine whether children in Anniston are different from those in other towns. There are

many at-risk children who need help. Last fall, there was a community meeting to discuss services for local children during which college and school systems administrators and community leaders were able to reach consensus.

This proposed project will not cite blame nor support litigation needs, but rather will involve all stakeholders in addressing community health problems and provide support to those citizens who need help. The project will establish and maintain a birth registry for all children born in Anniston and Calhoun County. From neonatal through adolescence, children will be routinely screened for cognitive development so that, if needed, help can be provided early. Rapid referral will occur as appropriate. The program will be integrated with existing services. School services will be reinforced and private agencies will be involved to create a seamless system. There is a need for a great deal of external funding for this project.

There also is the need to design a data management system that is suitable for epidemiologic research, while maintaining privacy and confidentiality. As PCB levels are determined for each child, confounding information can be gathered as well.

The first priority is an effective service program, then research. Potentially, a wide range of research could be conducted. Scientific and ethical evaluations of potential future research ideas are needed by both the scientific community and the community at large.

#### *Discussion*

Although PEHSU has no data on the level of developmental disabilities for the Anniston area, the state Special Education enrollment data indicates that Anniston is comparable to with the rest of the state. However, the state enrollment data relates to mild retardation conditions only.

The panelists provided suggestions to Drs. Frumkin and Rubin (Emory University - Southeast Pediatric Environmental Health Speciality Unit) on issues that should be addressed regarding the research component of the project.

#### **Discussion Topic Two: Study Design and Measurement Issues**

The panel was asked what are appropriate epidemiologic study designs for the Anniston area, and how health outcomes are to be measured. The panel replied it is reasonable for the population to be concerned about the children in the area, but the health of the older population might be at greater risk based on serum PCB levels reported by the attorney. One panelist suggested that a registry could be

*Prior to the start of this discussion, ATSDR announced that the 1999 Health Consultation, available to the panelists for review prior to the meeting, was still in draft format. Since the release of the report, data inconsistencies pertaining to serum PCB levels have been discovered. For example, a review of the data showed some of individuals originally classified as children, were not actually children. In addition, one child had not lived in the area, but merely visited the area. ATSDR is working to resolve these issues and to update the draft report.*

developed to follow all people at risk in the area. The registry would be tied to complete exposure assessments and interventions to reduce exposure effects.

The panel thought looking at children would be reasonable because the community had expressed an interest in children's health and there is evidence of health effects in children from PCB exposure.

Health effects to consider when designing an epidemiologic investigation include neurobehavioral and developmental problems, immunologic and reproductive outcomes, mortality rates, cancer rates and types, heart disease, low birth weight, and infant mortality.

It was recommended that basic descriptive epidemiologic data could be gathered from existing sources, without contacting the public. Panelists agreed that data at the county level is helpful, but more specifics are need for the city of Anniston, such as a review of cancer statistics for the city versus the entire county. This type of data is collected by the state health department. Other information to better characterize the community could be collected, such as the percentage of uninsured residents. Two reports on the health status of people of Calhoun County have already been conducted by the Calhoun County Community Foundation; the information is available for review.

To study health outcomes in children, the Dutch study could be used as a model. This study measured antibody titres after measles immunization in exposed children and found they were less responsive to immunization. Dioxin and some PCBs suppress the immune response, and others create auto or hyper immunity. Children living downstream of contamination were found to have abnormal immunity, thyroid function, hyper allergies, and asthma. These outcomes can be measured in children and may indicate other problems. In the Dutch study the more highly exposed children had more frequent infections, especially otitis media. In Taiwan, the thickness of the middle ear was a good indicator of the number of ear infections children had experienced. Children with high exposures have less allergy and asthma in the 6-10 year range, unless they over-react to allergens. Another suggestion was to use phenotyping of the kinds of white blood cells people have.

Additional issues/conditions to consider:

- autoimmune - allergy, asthma, lupus, diabetes, thyroid, immune suppression, hyper immunity;
- neurologic - behavioral, developmental, hearing loss;
- reproductive - delayed pregnancy, fetal mortality, low birth weight, infant mortality;
- response to vaccines;
- numbers of ear and other infections.

More specifically:

Asthma - Air pollution exacerbates asthma, but does not appear to be the sole cause. A comparison of East and West Germany showed poorer air quality in the East, but lower asthma

rates. Children in the East, as compared with those in the West, had many childhood infections and fewer immunizations. However, there are many confounders in the home (such as smoking) and genetic predisposition that should be evaluated when studying asthma.

Thyroid - Hashimoto's Disease and Graves' Disease are two autoimmune thyroid illnesses that may result from toxic exposures, as indicated in animal studies.

Hearing Loss - One neurologic effect from animal studies is hearing loss related to developmental changes in the cochlea. Photoacoustic emissions can measure vibrations in the cochlea to determine damage to hair cells.

There was discussion regarding the creation of a registry for Anniston residents who may have been exposed. This would consist of developing a "cohort" of potentially exposed individuals and following them forward in time to document the development of specific health outcomes related to PCB exposure. The cohort would be assembled based on characteristics such as length of residence in Anniston, years of residence, etc. Data to be collected could include: proximity to site; length of time near site; lifestyle issues (food, gardening, water use); mother's age at birth of child; specific health outcomes related to PCB exposure; pigmentation at birth; age at menarche; delayed pregnancy; and neurologic development.

There was also discussion regarding the opportunity to provide medical care to the residents of Anniston.

Types of studies:

The panelists discussed the danger of conducting too many studies, which might result in declining participation rates. One possible solution would be to create a review body that would serve as a clearinghouse for all studies. This group could review the scientific merit and ethical considerations of each study, determine what needs to be done, what may be a duplication, and what information is already available to answer the questions raised. Information could be gathered in one place, so that people would not have to be enrolled in every study. Retrospective data would be available to answer many questions without involving residents in additional studies.

Specific study designs were discussed:

- A cross-sectional review of pediatric records from ages 1-5 to look for a doctor's diagnosis of otitis media, prospectively staggered by age, taking into account the half-life of toxins.
- A case-control study and/or a cohort study of autoimmune disease, comparing exposed to unexposed residents.
- A prospective cohort, or Framingham-type study, following people who still live in the area and those who have moved away.

Other issues/comments:

- The mother's age can impact the opportunity for prenatal exposure. Research shows that in utero measures are more sensitive predictors.
- All PCBs are not extractable, some bind more to proteins, some to DNA. Selenium status may play an important role in PCB detoxification.
- A blood and tissue bank could be established in Anniston, as part of a registry or prospective cohort, so additional studies can be conducted.
- Medical care for residents and former residents was discussed. An estimated twenty percent of the people in Anniston have no health insurance. Medicaid/Medicare does not cover exposure assessments.
- Privacy and confidentiality need to be assured for all future work in Anniston.
- Although the community wants children to be the focus of study, the older population should not be left out. Many of the "signs of aging" may, in fact, be the result of toxic exposures. People 40 years of age and older have very high exposure levels in blood, over 100 ppb, which may be affecting aging, memory loss, and motor function. As the population ages, these problems will become greater and more money will be spent on treatment for this group. Children are more complicated and the effects are longer term, but a study of older adults can provide a powerful and informative study base.

**Audience Questions:**

1) *Are there any reports on genetic susceptibility to PCBs, which may explain the variability in blood levels?*

One study on breast cancer and PCBs showed there were differences in PCB levels and cancers in groups that metabolized PCBs differently. The data is clearer in animals than in humans, but this is an important issue that could be studied. If an appropriate tissue bank is established, the question can be addressed.

*During this portion of the discussion, audience members submitted questions on note cards to the expert panelists. The meeting facilitator read the questions out loud, and one or more of the panelists responded accordingly. Their responses do not necessarily reflect the official opinion or policy of ATSDR or the U.S. Department of Health and Human Services.*

2) *How important is the association (measurement) of specific PCB congeners in health outcome studies?*

We do not have a good answer for this because it is difficult to examine in humans. All congeners are highly correlated with each other and with total PCBs, but few individual congeners have been studied. It is unclear whether the ones most dangerous to humans are the ones that have been studied.

3) *Any design must include how to address false positives. How much over-testing will occur when trying to relate the appearance of a syndrome in the absence of detectable levels of PCBs?*

Non-detectable means non-detectable at this time. A person could have been highly exposed, but still be in the non-detectable range at the time the sample is taken. If there is a tissue/sample bank, then you do not have to continue to go back to individuals.

### **Discussion Topic 3: Public Health Considerations**

The panel was asked whether the focus of ATSDR's work in Anniston should be research, public health, or both? The panel replied ATSDR had indicated it was focusing on both. The panel was then asked what else could be done for this community? The panel replied that both research and services are necessary. Services should include the early identification of, and intervention for children with learning difficulties. Although every community needs better medical care, those communities at greatest risk are especially in need. Now that Dr. Satcher is with Morehouse College, his group may be interested in looking at the medical need of the Anniston community. It was pointed out that, although the PEHSU project was for children, the older members of the community were the ones with the highest contamination levels, and therefore, may be at greatest risk for adverse health outcomes. Surveillance and monitoring may ensure this population receives necessary medical care. One panelist explained that follow-up studies were requested at Love Canal, but were not provided. Even those who lived in Anniston in the past, but not currently, should be located, evaluated, and cared for.

Interventions are needed that advise people on how to minimize future exposure, and modify lifestyles, such as not eating local fish, not swimming in the creeks and lake, not growing food in contaminated soil, or irrigating crops with contaminated water. If food sources are lost to those who cannot afford to replace them, food stamps, or other programs, could provide adequate food replacements.

### **Topic Four: Next Steps**

Panelists were asked what communication issues should be addressed in Anniston, and what other additional steps need to be taken. Their replies follow:

- risk communication for the community and physicians concerning breast feeding, the health effects of PCBs, PCB serum tests, and exposure risks are important;
- continuing medical education for area doctors;
- identifying and explaining on-going exposure risks;
- building both public health and research infrastructure in the area;

- encouraging individuals to contact their physicians, or some central counseling facility to discuss the implications of their exposure tests;
- continuing to work with the community by convening meetings;
- interviewing people about what they are eating and other lifestyle issues to better understand potential exposure routes;
- looking at the mixture of toxic substances present in the area, such as mercury, PCBs, etc.;
- evaluating existing data —do not duplicate efforts.
- The EPA should focus on stopping the potential for exposure from this point on. Some panelists doubted whether soil was the biggest source of on-going contamination; air was considered to be a significant source.

### **Audience Questions:**

1) *How soon must blood determinations be made after air exposure to be able to correlate blood PCB congener profiles to inhalation exposure?*

To attempt to correlate the two, a baseline blood level would be needed prior to exposure. However, other contaminants in the air also affect the measurement.

2) *Given what is known about the population today, for how many years can individuals be entered into a study and still be considered part of the same cohort?*

A cohort would be based on exposure. Researchers would choose an appropriate time period, based on the potential for exposure within the community. The study design, hypothesis, and health outcomes will also affect the decision. In the case of the PEHSU's project, the cohort would be all children born in Anniston from now forward.

3) *Could there be a variability in individual metabolism that determines blood levels and the consequences of exposure?*

Yes.

4) *Is Head Start in Anniston? If so, are they included, and how?*

Head Start and WIC were included in the discussions and are part of the on-going activities, but we hope to have Head Start play a greater role with the PEHSU project.

5) *An ATSDR staff member spoke with ADPH about the opportunity to gather newborn screening data (TSH, T4) for the Anniston area. Is this a worthwhile endeavor?*

This would be a crude test, but a valuable one. However, the timing of the thyroid assessment is an issue. Thyroid function is seen better at three months than in newborns. The type of data available will impact the final decision.

6) *Dr. Frumkin's proposal is for a service component, followed by data management system development that would allow research studies with children. Should studies of exposed adults begin sooner?*

It is hard to say which should come first.

7) *Could each of the panelists present a synopsis of his/her research as it relates to the proposed intent to look at the children in Anniston/Calhoun County?*

Dr. Susan Korrick: Dr. Korrick is the Project Director/Principal Investigator of a longitudinal study of the impact of low-level intrauterine exposure to PCBs, pesticides, and lead on infant and child development. Over 780 families residing adjacent to a PCB-contaminated harbor (and Superfund site) have participated in this ongoing research. This work has entailed the development of appropriate and sensitive biomarkers of intrauterine PCB and pesticide exposures in population-based samples. In related work, she is investigating (1) the role of hormones as modifying factors in the expression of PCB and pesticide associated developmental differences; (2) the association of environmental dioxin exposure with male pubertal development; and (3) the association of PCBs and pesticides with adverse reproductive health outcomes (e.g., infertility and spontaneous abortion).

Dr. Susan Schantz: She has researched the neurobehavioral effects of PCBs in the rhesus monkey. She also worked on a study evaluating neuropsychological function in children born to women who consumed PCB-contaminated Great Lakes fish. In addition, she looked at similar outcomes in children who lived on Michigan farms with PCB-contaminated silos. At the University of Illinois Dr. Schantz has established an active research program funded by NIEHS, USEPA and ATSDR, which includes epidemiological studies of PCB-exposed human populations and parallel laboratory animal studies. The research focuses on exposures during development and aging, two periods when the nervous system is particularly vulnerable to toxic insult. One aspect of the laboratory animal studies is mechanistically based, focusing on understanding the specific neurobehavioral domains that are altered or impaired by PCB exposure and the biological mechanisms underlying those impairments. Another aspect is risk based, modeling actual human exposure to complex mixtures of PCBs and other chemicals such as dioxins, methyl mercury and DDE. The goal of these studies is to determine the relative importance of PCBs vs other chemical components in the mixtures in mediating the neuropsychological effects that have been observed in PCB-exposed human populations.

Dr. Larry Robertson: Animal models are helpful in identifying biomarkers, methods of toxicity, and analytes. Animal studies may also be helpful in identifying interventions, e.g., dietary interventions, that may ameliorate the signs or symptoms arising from toxic exposure. Dr. Robertson's laboratory has been carrying out studies to investigate the mechanisms of toxification for various classes of PCBs. These studies may be grouped into studies of the metabolic activation of PCBs, especially lower chlorinated PCBs, to electrophiles that interact with cellular targets, especially protein and DNA. Metabolites of PCBs may also, during their oxidation, be a



source of reactive oxygen species (ROS) and these may also react with critical targets. Other studies investigate the role of PCBs and metabolites in interactions with cellular receptors initiating changes in the cell that also lead to increased production of ROS. During the cellular response to these changes, antioxidants/antioxidant enzymes, vitamins, and nutrient metabolism are also altered. Investigating these mechanisms of toxicity, and recording these changes, give insights into possible biomarkers of exposure and toxicity in human populations, and suggest possible interventions, for example dietary interventions, that may ameliorate the signs or symptoms arising from toxic exposure.

Dr. Mary Hovinga: She has worked extensively with the Alabama Department of Education in creating a surveillance dataset of special education enrollment and has investigated the referral, evaluation and placement of children in special education. Additionally, Dr. Hovinga has received grant support from the Centers for Disease Control to compare mental retardation enrollment criteria and prevalence rates across states in the United States, and grant support from the National Institute of Environmental Health Sciences to examine the correlation of mental retardation prevalence rates and indicators of environmental pollution across counties in Alabama.

Dr. Allen Silverstone: Dr. Silverstone has done animal studies since 1988 on the effects of estrogens and dioxin on the immune system. He would like to do some studies with the Anniston population. He believes the animal study data suggests that a significant study could be done of whether and how much this PCB exposure has caused or will cause both increases in risk of infection and, more seriously, an increased risk of autoimmune diseases.

Dr. John Vena: Dr. Vena conducted a cohort study of sportsmen and their families who eat fish from Lake Ontario, with a sub-study of children, gender behavior, handedness, and fish eating. Although major learning problems were seen, no correlation with fish eating was discovered, but the eating behavior of children mirrored that of their parents. Subtle reproductive effects, such as delayed pregnancy also were discovered. A prospective baseline study looked at PCBs, heavy metals, number of prenatal visits, and pregnancy loss. Blood samples were taken at birth, breast milk samples were taken, and children were followed. At ages one and two years, the moms did not favor taking blood samples from the children. Although some late fetal loss assessment was done, it appeared to be non-related. One hundred women participated. Non-eaters of fish had PCB levels below 1 ppb, and eaters of fish had levels of between 3-5 ppb. This is a low level, but these were young women in their 20s. Therefore, people with levels of 20-30 ppb are seen as causes of concern.

Dr. Howard Frumkin: Dr. Frumkin has conducted community-based environmental epidemiologic studies of arsenic, hazardous waste, and mercury in New Brunswick and worked with multiple stakeholders in planning and risk communication. He has been involved with work in the Anniston community for the past year.

Dr. White thanked everyone for attending.

## ATSDR Attendees

Sherri Berger-Frank, MSPH  
Deputy Chief, Health Investigations Branch  
Division of Health Studies  
Agency for Toxic Substances and Disease Registry

Steve Dearwent, MPH  
Epidemiologist, Exposure Investigation Section  
Division of Health Assessment and Consultation  
Agency for Toxic Substances and Disease Registry

Henry Falk, MD, MPH  
Assistant Administrator  
Agency for Toxic Substances and Disease Registry

Heraline E. Hicks, PhD  
Senior Environmental Health Scientist, Research Implementation Branch  
Division of Toxicology  
Agency for Toxic Substances and Disease Registry

Ed Kilbourne, MD  
Associate Administrator for Toxic Substances and Public Health  
Office of the Assistant Administrator  
Agency for Toxic Substances and Disease Registry

Susan Moore  
Chief, Consultations Section  
Division of Health Assessment and Consultation  
Agency for Toxic Substances and Disease Registry

Curtis Noonan, PhD  
Epidemiologist, Health Investigations Branch  
Division of Health Studies  
Agency for Toxic Substances and Disease Registry

Lucy Peipins, PhD  
Epidemiologist, Health Investigations Branch  
Division of Health Studies  
Agency for Toxic Substances and Disease Registry

Mohammed Uddin, MD  
Medical Officer, Health Investigations Branch  
Division of Health Studies  
Agency for Toxic Substances and Disease Registry

Reuben Warren, DDS, DrPH  
Associate Administrator for Urban Affairs  
Office of the Assistant Administrator  
Agency for Toxic Substances and Disease Registry

Clement Welsh, PhD, MPH  
Environmental Health Scientist, Consultations Section  
Division of Health Assessment and Consultation  
Agency for Toxic Substances and Disease Registry

John Wheeler, PhD, DABT  
Toxicologist, Consultations Section  
Division of Health Assessment and Consultation  
Agency for Toxic Substances and Disease Registry

Mary C. White, ScD  
Chief, Health Investigations Branch  
Division of Health Studies  
Agency for Toxic Substances and Disease Registry  
\*Meeting Facilitator

G. David Williamson, PhD  
Director, Division of Health Studies  
Agency for Toxic Substances and Disease Registry

## Meeting Attendees

Elmer Aiken, US Environmental Protection Agency, Region IV

Elizabeth Bluemink, Anniston Star

Elaine Emory, Community Against Pollution

Brian Holtzclaw, US Environmental Protection Agency, Region IV

Katrina Jones, US Environmental Protection Agency, Region IV

Robert Kaley, Solutia Inc.

Robert Roden, Shelby and Cartee Attorneys at Law

Leslie Rubin, Emory University

Neil Sass, Alabama Department of Public Health

Steve Spurlin, US Environmental Protection Agency Region IV

Scott Story, Alabama Department of Environmental Management

Shirley Williams-Baker, Community Against Pollution

## ATSDR Summary of the Panel Meeting

Throughout the discussions, panelists contributed both thoughtful and constructive comments about the opportunity for epidemiologic research. Their knowledge and experience in both epidemiology and PCBs will provide guidance in formulating plans for future Anniston activities. The following summary addresses the major topics discussed throughout the panel meeting. The discussion points below are meant to help ATSDR further explore the feasibility of these issues and ideas; they will serve as basis for continued work in the community of Anniston, Alabama.

### ***Topic One: Exposure Assessment***

**Issue:** Many gaps exist regarding levels of PCBs in the environment, as well as lack of clear understanding of individual exposure levels and how local residents may have been exposed.

**Discussion:** Two separate issues regarding exposure assessment exist: (1) environmental characterization, and (2) biological data.

*Environmental Characterization* - The Environmental Protection Agency (EPA) Region IV has been the primary federal agency characterizing the extent of exposure in Anniston, Alabama. Other organizations, including ATSDR, the Alabama Department of Environmental Management (ADEM) and Solutia, Inc., have collected environmental samples as well. Over the past several years, ATSDR has been asked to evaluate the public health implications of this data. Information summarized by ATSDR is available in a number of health consultations.

Staff from EPA, ADEM, and ATSDR were present during the two-day meeting and had an opportunity to hear the panelists' suggestions regarding the need for better characterization of exposure (such as additional air sampling) and a more urgent need to determine if on-going exposure is a public health issue and, if so, how it can be mitigated. ATSDR agrees that work in this area should be a top priority and will make appropriate recommendations to EPA to focus future efforts on better characterization of exposure in this community. ATSDR will also continue to commit resources to this very important issue through continued evaluation of exposure data as it becomes available.

*Biological Data* - The majority of available serum PCB data was collected by a local attorney. Adequate information about how the samples were collected, QA/QC procedures during specimen analysis and reporting, and who the samples represent has been largely unavailable to ATSDR. Despite these limitations, ATSDR has used these data to guide its own activities, including an exposure investigation conducted during the summer of 2000. Additional serum PCB data from a representative group of residents could be used to better understand individual exposure levels among both current and past Anniston residents. As plans for future epidemiologic investigations are considered, the feasibility of collecting serum PCB levels from a large number of individuals within the community will be evaluated.

## ***Topic Two: A Community Profile***

**Issue:** Information exists regarding health outcomes at the county level, but Anniston-specific data has not been summarized.

**Discussion:** Defining the “affected” community is critical when considering the opportunity for epidemiologic investigations. Further exposure characterization will provide information to help researchers define the population at risk. If, for example, it is determined that fish eating was a major source of exposure among residents, then researchers could attempt to re-create a cohort of individuals who ate fish from a particular body of water during the time when exposure levels were high. However, all potential pathways of exposure may never be fully understood in this community. When exposure data is lacking, proximity to the exposure source may be used to define the exposed population.

The health of the community was discussed and a number of existing sources for health-related data were presented. The Alabama Department of Public Health (ADPH) collects data on cancer diagnoses and deaths throughout the state, as well as information on other health conditions and mortality. Alabama’s cancer registry was established in 1996. The Calhoun County Community Foundation recently contracted with the University of Alabama to conduct a community health assessment in order to better characterize the health needs and concerns of the community; a report was printed in 2001. The U.S. Department of Health Resources and Services Administration (HRSA) conducts community profiles for every county across the nation. These profiles highlight the major causes of death, as well as basic demographic information for each county. In addition, community-based organizations have conducted surveys within the community, collecting self-reported information regarding health, lifestyle, and environmental concerns. Each of these data sources has its own advantages and limitations.

Although some data is available for Calhoun County, Anniston-specific data has not been analyzed. Potential data sources to better understand the health of the Anniston community include: Medicare/Medicaid records, hospital discharge data, birth certificates, and death certificates. Typically, cancer statistics are analyzed by the state or local health department. With cancer, for example, the number of observed cases of a particular type of cancer may be compared to the number of expected cases, on the basis of state or national rates. Results may show that one or more types of cancer are elevated for an area, but will not provide information about the potential cause(s). These cancer statistics reviews are often used as hypothesis generating activities; they can be conducted only if data are available at an appropriate geographic level and the community has been informed about the limitations of these types of analyses. Under an existing agreement with ATSDR, ADPH may be able to explore the feasibility of analyzing available health outcome data (i.e., cancer incidence and/or mortality data) at the city level.

During the meeting, one panelist proposed conducting a cross-sectional survey in the Anniston community. If conducted, this activity would provide a snapshot of information - exposure status

(if individual PCB levels were available) and health outcome status at one point in time. A cross-sectional survey would miss those who moved out of the community and would count recent arrivals who may not share the exposure history of the larger community. Cross-sectional surveys depend on self-reported, versus verified, health information. In addition, another population would need to be surveyed for comparison.

Typically, ATSDR has relied on environmental monitoring information and existing health data to help clarify questions that could be addressed through research. Health studies (“epidemiologic investigations”) that require active participation of community residents are generally limited to studies that focus on specific questions that are both scientifically valid and responsive to local needs. Depending on the question to be studied, other types of epidemiologic study designs may be more efficient and appropriate than a cross-sectional survey.

### ***Topic Three: Behavioral and Developmental Effects Among Children Exposed to PCBs***

**Issue:** These effects have been seen in other populations, what can be done to assist the children of Anniston?

**Discussion:** Over the past year, the Southeast Pediatric Environmental Health Specialty Unit (PEHSU), under a grant with ATSDR and EPA, has been working closely with the Anniston community and has learned that the health of Anniston’s children is a major concern of residents. The PEHSU is working with a group of Anniston residents, schools, and local elected officials to develop a program which would screen children born in Anniston for behavioral and developmental disabilities. Through the use of existing programs, services would be offered to children who are in need of special education. This program is in an early stage of development and focuses on establishing solutions for the Anniston community. Two representatives from the PEHSU were available during the expert panel meeting to take note of suggestions made for possible research components to this proposed program. ATSDR is in support of these health service activities and is currently serving on the program’s Steering Committee, facilitated by the Mayor of Anniston and the PEHSU.

### ***Topic Four: Community Involvement and Health Education***

**Issue:** The Anniston community should be involved with future health-related activities and a more comprehensive approach to community education, including risk communication, should be considered.

**Discussion:** Over the past few years, ATSDR has worked with several members of the Anniston community. Most recently, ATSDR collaborated with Community Against Pollution (CAP) on a blood lead screening project. ATSDR recognizes and values the importance of collaborating with community groups and local elected officials throughout the community.

ATSDR’s Division of Health Education and Promotion has developed a number of educational

materials over the past year. However, ATSDR recognizes that the distribution of this information can be expanded both in terms of the number of people reached and the type of information being conveyed. As suggested, health education specialists within ATSDR will consider putting together a more comprehensive approach to PCB education for community members and to update and inform community members about ATSDR exposure characterization activities. This could include:(1) the development of health education materials and activities to inform community members of the results from ATSDR health assessments and other agency activities, and (2) the development and implementation of health education activities for local healthcare providers to inform them about possible health effects from PCBs in the area.

### ***Topic Five: Medical Care***

**Issue:** As a result of past exposure, the residents of Anniston should be offered comprehensive health care services.

**Discussion:** The issue of access to health care is important to this community, but beyond the scope of ATSDR. ATSDR is in contact with other federal agencies who may be in a better position to address these concerns, including the Health Resources and Services Administration (HRSA) and the Regional Office of the Department of Health and Human Services (HHS). These groups can, in turn, work with local and state health agencies to better characterize issues surrounding health care services in the Anniston community.

### ***Topic Six: Coordination of Research Activities***

**Issue:** The purpose of the expert panel meeting was to discuss the opportunity for epidemiologic investigations in the Anniston community. During the meeting one panelist suggested that ATSDR could facilitate a “Gateway to Anniston for Research,” or a committee to review and approve all research proposals for the community.

**Discussion:** There is clear benefit to establishing a working group of individuals, with varied backgrounds (including representation from the community, academia, and local, state, and federal government), to “review” research proposals for the Anniston community. The scope of authority for a group of this type should be fully explored. This group may have an opportunity to assist with the identification of existing data sources and oversee a data bank of both biologic specimens and individual data. It would, however, better suit the community if a committee or working group of this type was initiated at the local, not federal, level. ATSDR understands and supports a coordinated effort to conducting research in this community, however, without secure funding and/or research proposals, it may be premature to initiate a working group of this type.

Throughout the meeting, a wide variety of input was given related to possible epidemiologic activity in Anniston. Information received from the panelists ranged from the conduct of descriptive epidemiologic activities, such as cross-sectional surveys, to analytic approaches such



as case-control or cohort studies. Most frequently, the opportunity for a prospective cohort study (or “registry”) was discussed. Panelists discussed that the establishment of a cohort of exposed individuals to follow in time would allow for a more comprehensive approach to addressing the concerns of the community, while offering an opportunity for epidemiologic research. As with all epidemiologic investigations, the design and implementation of a prospective cohort study is based on a number of factors related to scientific merit, feasibility, and support from the affected community. Among the many issues to be considered, examples include funding sources, defining an exposed population, interest and participation on behalf of the community, and the choice of an appropriate health outcome to study. To be conducted properly, the establishment of a listing of exposed persons to be followed over time can be quite expensive and very lengthy; depending on the health outcome under investigation, the accumulation of data for analysis and interpretation can take decades. Currently, ATSDR lacks the resources to conduct a health study in Anniston, Alabama. However, ATSDR will continue to pursue funding opportunities for such activities, as well as discussions with the community and other interested parties about their ideas regarding health study activity.