

# Blood PFC Testing and Health Information Summary

Morgan, Lawrence and Limestone Counties, Alabama

## What are Perfluorochemicals (PFCs)?

Perfluorochemicals (PFCs) are a class of man-made chemicals. In most cases, PFCs are not regulated by the U.S. Environmental Protection Agency (EPA). PFCs have been used for many years to make products that resist heat, stains, grease and water. Because of their widespread use, most people in the United States have some PFCs in their body. Once the PFCs are in a person's body, it takes about two to four years before those PFC levels go down by half, even if no more is taken in.

Some products that may have used PFCs when they were made or that might contain PFCs include:

- Furniture and carpets treated for stain resistance
- Treated clothing that is stain resistant or waterproof
- Foams used to fight fires
- Fast food or packaged food containers, such as french fry boxes, pizza boxes, hamburger wrappers, and microwave popcorn bags
- Makeup and personal care products, such as dental floss, pressed powders, nail polish and shaving cream with ingredients that have 'perfluoro' in the name
- Floor care products
- Cleaning products

## Why did ATSDR become involved in the investigation of PFCs in this region?

In May 2007, a PFC manufacturer in Decatur, Alabama, notified the EPA that it had unknowingly discharged large amounts of perfluorocarboxylic acids (PFCA), a class of compounds that include perfluorooctanoic acid (PFOA) and other PFCs, into the Decatur Utilities' Dry Creek Wastewater Treatment Plant. From 1996 to 2008, treated sewage sludge (biosolids) from Decatur Utilities were used as a soil amendment on about 5000 acres of privately owned agricultural fields in Lawrence, Morgan and Limestone Counties, Alabama.

Decatur Utilities Dry Creek Waste Water Treatment Plant (Decatur Utilities) in Decatur, Alabama receives wastewater from domestic and industrial sources, including PFC manufacturing and use facilities in the area. To date, the U.S. Environmental Protection Agency (EPA), the Alabama Department of Environmental Management (ADEM), and Decatur Utilities have identified several direct sources of PFCs to Decatur Utilities.

As with all waste water treatment plants, solids and many chemicals are removed from the water. The solids are called "biosolids." They are rich in nutrients and can be used as fertilizer. Biosolid content is tested regularly and must meet regulatory requirements. However, PFCs in water and biosolids are generally not regulated by EPA, so testing of biosolids for these chemicals is typically not required. EPA has not established an action level for PFOA or perfluorooctane sulfonate (PFOS) in soil, sewage sludge, biosolids, groundwater, surface water, or air.

In September 2007, EPA tested the farm fields for PFCs. EPA collected biosolids and soil from a small number of the farm fields that received biosolids from Decatur Utilities. The results showed raised levels of PFCs compared with background levels. In February and March of 2009, EPA followed up with more sample collection of surface water, groundwater, drinking water, and soils in areas near the treated fields. EPA found PFCs in the soils from the farm fields on which the biosolids were spread, and in surface water, groundwater, and drinking water.

In January 2009, EPA set up a drinking water Provisional Health Advisory level for PFOA and PFOS—two of the PFC compounds about which we have the most toxicological data. EPA set the Provisional Health Advisory level at 0.4 parts per billion (ppb) for PFOA and 0.2 ppb for PFOS. In February 2009, EPA tested for PFCs in six private drinking

water wells near the farm fields. Two private drinking water wells had PFOA concentrations above the EPA Provisional Health Advisory levels. EPA supplied other drinking water to residents who used those wells and then arranged for the residences' connection to the public water supply system. After EPA's February–March 2009 sampling and at EPA's request, a local industries group did a complete private drinking water well survey and did sampling in the areas near the farm lands where the biosolids were spread. From August 2009 through August 2010, the local-industries group sampled 12 private drinking water wells. One of the 12 wells had levels of PFOS above EPA's Provisional Health Advisory values. Residents who used this well were supplied other drinking water, and their home was linked to the local public water supply system.

In addition, EPA sampled five local public drinking water systems. No PFCs were detected in four of the five public water supply systems. PFOA and PFOS were detected in the West Morgan/East Lawrence public water supply but at concentrations below EPA's Provisional Health Advisory levels. The West Morgan/East Lawrence public water supply system draws its water from the Tennessee River approximately 13 miles downstream from an industrial center where several PFC manufacturers and users are located. A study funded by one of the local industries detected PFOA and PFOS in samples collected in 2000 from the Tennessee River. The agricultural fields that received the Decatur Utilities' biosolids are not suspected to be the source of PFCs in the West Morgan/East Lawrence public water supply system.

In October 2009 EPA released residential soil screening guidance values for PFOA and PFOS that are protective of children's health (which are also protective of adult health). These soil screening values are 16,000 ppb [micrograms / kilogram] for PFOA and 6,000 ppb for PFOS. All soil and water sampling data collected can be obtained from the following website: <http://www.epa.gov/region4/water/PFCindex.html>

In 2009 EPA contacted ATSDR to request that an exposure investigation be conducted.

## Why was blood testing done for PFCs?

It was not known how much PFCs might be in a person's body from contact with contaminated soil, water or other exposure pathways. The Agency for Toxic Substances and Disease Registry (ATSDR), a federal public health agency, tested people's blood for PFCs to find out how much of this chemical may be entering a person's body.

## Who was eligible for testing?

People who were 12 and older and who

- Lived on or near fields that received biosolids from Decatur Utilities; and
- Had private drinking water wells located near these biosolids application sites; or
- Drank water from the West Morgan / East Lawrence public water system.

A total of 155 persons—63 males and 92 females—volunteered for blood testing. Of these, 147 were adults and 8 were children.

## Why was the PFC blood testing not offered to children under age 12?

At this time, PFC comparison values for the U.S. population are limited to children 12 years of age and older. If children under 12 were tested, we would not be able to tell them how their PFC level compared with the levels seen in the general U.S. population.

## How many PFCs were tested in the blood of participants?

Eight PFCs were tested in the blood of participants. These PFCs are listed below:

<b>Abbreviation</b>	<b>Complete Chemical Name</b>
• PFOA	Perfluorooctanoic acid
• PFOS	Perfluorooctane sulfonate
• PFHxS	Perfluorohexane sulfonate
• PFOSA	Perfluorooctane sulfonamide
• PFNA	Perfluorononanoate
• PFDeA	Perfluorodecanoate
• Et-PFOSA-AcOH	2-(N-ethyl-perfluorooctane sulfonamido) acetate
• Me-PFOSA-AcOH	2-(N-methyl-perfluorooctane sulfonamido) acetate

Scientists know the most about PFOA and PFOS. Less is known about the other PFCs. This information sheet is mostly about PFOA and PFOS.

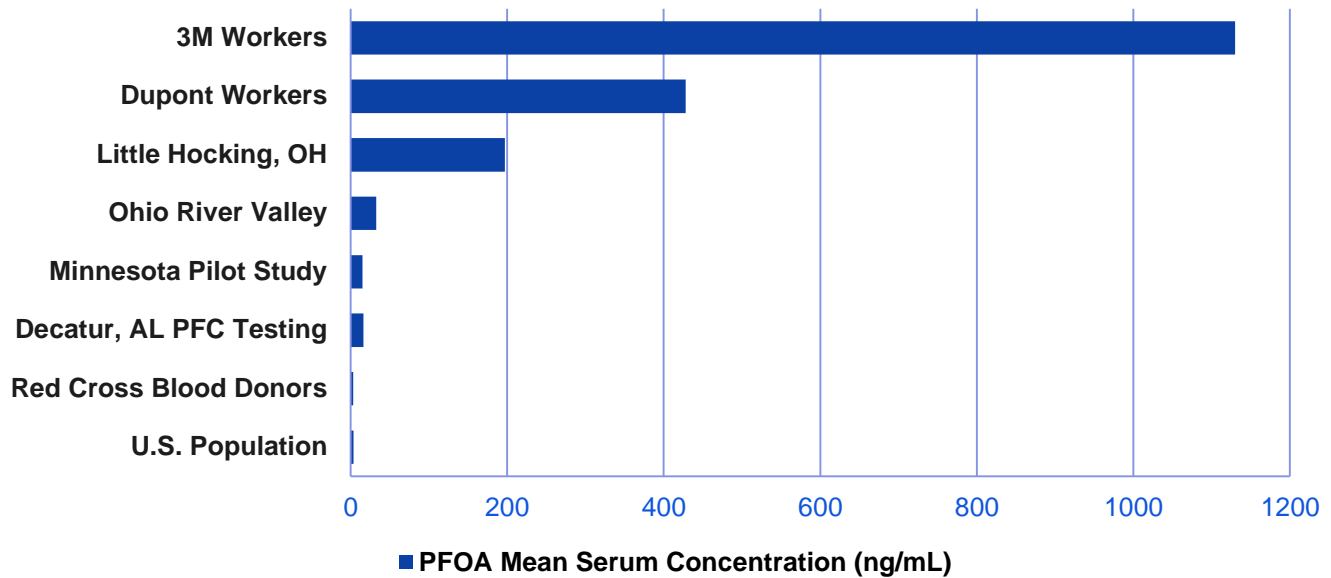
## What were the PFC blood test results?

- Five PFCs in the blood were at levels similar to or lower than the average levels in a person in the United States.
- Three PFCs (PFOA, PFOS and PFHx) in the blood were two to four times higher than average levels in the United States. These levels were similar to or lower than levels found in other U.S. communities with PFCs in their drinking water.
- This investigation found that drinking well or public water with detectable levels of PFCs may contribute to an increase in blood PFC levels. The investigation did not show that living on or near a biosolids application field, eating local cattle, fish or vegetables or gardening are associated with blood PFC levels in participants. However the investigation could not exclude these possible sources of exposure.
- Older people and men tended to have higher blood PFC levels than others tested.

## How do results of this testing compare to other studies?

The chart below shows the average blood levels of PFOA found in the U.S. population, in this investigation (PFC testing in the Decatur, Alabama area), other community studies, and in PFC manufacturing workers. The results are listed as nanograms per milliliter (ng/mL) – the same as parts per billion (ppb). Concentration is the measure of how much of a given substance, such as a chemical, is mixed with another substance (blood, for example). Just as one percent means one part out of a hundred, one ppb means one part out of a billion.

## PFOA Studies: Comparison of Average Blood Levels



### What do these results mean for your health?

As a result of this investigation the community has learned that there has been an exposure to PFCs. The participants have received their individual test results. At this time we do not have enough information to say what level of PFC's in the blood might result in a health problem. This investigation will not tell a person if the PFC levels in their blood will make them sick now or later in life, or if their current health problems are related to the PFC levels found in their body. However, there are recent studies that show a possible link to health effects from PFCs although more research needs to be done by scientists who work in this field.

#### Animal Studies

Animal studies have found that PFCs may affect animals' health. Animals exposed to PFCs at much higher levels than the levels found in this investigation can result in changes in the function of the liver, thyroid, pancreas and hormone levels. Animals may be more sensitive to the effects of PFCs than humans.

#### Human Studies

In humans, research has not clearly shown that PFCs are related to specific illnesses. Recent studies have found possible links to some PFC-related health problems. Science experts who work in this field need to do more research.

#### Worker Studies

Much of the research on humans has been done with people who were exposed to PFCs on the job. Workers involved in the manufacture or use of PFCs as part of their job duties usually have higher blood PFC levels than the general population.

Studies on PFC workers have looked for effects on cholesterol levels, male hormones, heart disease, liver changes and other effects. So far, these studies have not consistently shown that PFC exposure is linked to health problems.

## General Population Studies

Currently, a large study of 70,000 people is being done in the Ohio River Valley. The drinking water was contaminated and people were exposed to PFOA. So far, testing in this large group of people has found that the average PFOA levels in blood were higher when compared to the national average and about twice as high as what was found in the Decatur area, but lower than levels found in workers involved in the manufacture or use of PFCs as part of their job duties. This study will look to see if PFOA exposure is linked with heart disease, immune system function, liver function, hormone disorders, cancer, diabetes, and birth outcomes. In the most recent updates from December 2011, April 2012, July 2012 and October 2012, the C8 Scientific Panel (C8 is a shorthand name for PFOA), a panel that was formed to look at whether there is a probable link between C8 exposure and any human disease, released C8 Probable Link Reports which focused on several different health outcomes.

These reports noted a probable link between exposure to PFOA (C8) and pregnancy-induced hypertension, thyroid disease, ulcerative colitis, testicular cancer, kidney cancer and high cholesterol. The reports found no link between PFOA and other forms of cancer reviewed in the study. These reports also noted that there is not a probable link between exposure to PFOA (C8) and birth defects, miscarriage or stillbirth, and preterm birth or low birth weight. They also did not find a link between Type II diabetes, stroke, asthma or chronic obstructive airways disease (COPD), neurodevelopmental disorders in children (such as attention deficit disorders and learning disabilities), common infections or autoimmune disorders other than ulcerative colitis (to include rheumatoid arthritis, lupus, Type I diabetes, Crohn's disease or multiple sclerosis), Parkinson's disease, osteoarthritis, liver disease, chronic kidney disease, hypertension or coronary artery disease. Results from this large study will continue to be shared over the next few years and should add to our knowledge about health effects associated with PFCs.

For more information see: <http://www.c8sciencepanel.org>

## Do PFCs cause cancer?

The C8 study noted above has recently reported a probable link to testicular and kidney cancer. Additional studies are needed to better evaluate this link. Studies of workers involved in the manufacture or use of PFCs as part of their job duties who were exposed to PFCs have looked at whether PFCs are linked with prostate, bladder, and liver cancer. None of these existing studies have found a link between exposures to PFCs and cancer. However, additional health studies are underway.

## Should other members of my family get tested for PFCs?

ATSDR does not advise that everyone get their PFC levels tested. The test may be very costly and cannot predict health effects or be linked to current health problems. There is also no way to remove PFCs from the body other than the body's normal elimination processes.

## What are the next steps?

- Continue efforts to reduce the level of PFCs present in the Tennessee River which is used as source water for the WM/EL public water supply system.
- Continue monitoring for PFCs in the WM/EL public water supply and other potentially impacted public water supplies downstream of Decatur, Alabama. The WM/EL public water system has already taken steps to improve

water treatment which is expected to reduce PFC levels in finished drinking water. If PFOA and/or PFOS concentrations in the finished drinking water of the WM/EL public water system increase and remain above the EPA's Provisional Health Advisory levels, we recommend that the public water system evaluate modifications to their treatment processes to reduce contaminant levels.

- Conduct routine periodic monitoring of other local area public water supplies for potential contamination with PFCs. Although these water supplies are considered to be at a lower risk for PFC contamination because of their location and have no detectable PFCs to date, it is good public health practice to conduct routine periodic monitoring.
- Owners of private drinking water wells located on or near biosolids application fields not previously tested should consider conducting periodic monitoring for PFCs. If levels are consistently above EPA's Provisional Health Advisory levels, residents should use alternate drinking water sources. Some private drinking water wells in the area were sampled quarterly for a year and those that exceeded EPA's provisional health advisory levels for PFOA/PFOS were placed on public water. All other sampled wells did not exceed the public health advisory levels.
- The community's exposure to PFCs is expected to decline because of the actions taken to remove or decrease PFCs in the environment. Follow-up serum PFC testing in this community should be considered to verify that serum PFC concentrations are declining and to identify whether additional public health actions may be needed.
- Continue providing the community with any new science about health effects of PFC exposure as new information is documented.

## What can people do to avoid PFC exposure?

### Consumer Products

PFCs are found in the blood of people and animals all over the world. How people get PFCs into their bodies from products with PFCs in them is not clear. It is also not clear whether a person can avoid getting PFCs into their body by limiting the use of products that were made using PFCs. Because there is so little information about how people are exposed to PFCs from products, ATSDR is not able to recommend ways to reduce a person's exposure to PFCs from using products that contain PFCs.

### Water

#### Private well

People with private wells that contain PFCs above the current guidelines have been provided an alternate drinking water source. If you have questions about your private well, contact the U.S. Environmental Protection Agency, Region 4, Lee Thomas at 404-562-9786.

#### Public water

PFCs were not detected in the Decatur and Moulton public drinking water systems. PFCs levels were below EPA's current Provisional Health Advisory level in the West Morgan/East Lawrence public drinking water system. These levels have remained below EPA's Provisional Health Advisory levels.

However, if you are worried about PFC chemicals in your drinking water, a study by the Minnesota Department of Health and other studies in recent scientific journals found that some water filtration devices (point of use devices that are put in at a single tap, faucet, or outlet) may remove some of these compounds from water. You should contact the company that makes the water filtration device to find out how well the device works in removing PFC chemicals. Also ask about how often you should change the filters.

## Fish Consumption

PFCs, including both PFOA and PFOS, were detected in fish tissue samples taken from catfish and large-mouth bass in the Tennessee River near Decatur. The PFOA analytical results averaged 0.74 ppb and the PFOS analytical results averaged 806.06 ppb. Based on the PFOS results, the Alabama Department of Public Health has issued a '**no consumption**' fish advisory for all species of fish in the Baker's Creek embayment of Wheeler Reservoir. Future testing will determine if this advisory needs to be expanded. The entire advisory can be found at <http://adph.org/news/assets/120831.pdf>. ATSDR recommends that people follow this fish consumption advisory to reduce potential exposure to PFCs.

## More Information

**Because this investigation was designed to select individuals with the greatest likelihood of PFC exposure, these results cannot be generalized nor inferred to represent others living in the area or to other locations / populations.**

### Questions about PFC blood testing:

ATSDR: 1-888-529-1906 (toll-free) or 404-639-3311

ATSDR website: <http://www.atsdr.cdc.gov/>

### PFC environmental information from EPA:

EPA website: <http://www.epa.gov/region4/water/PFCindex.html>

EPA, Region 4 – Atlanta: Lee Thomas: 404-562-9786 or [Thomas.lee@epa.gov](mailto:Thomas.lee@epa.gov)

*Note: Some of the material in this information sheet was adapted from the East Metro Perfluorochemical Biomonitoring Pilot Project, Minnesota Department of Health, July 21, 2009.*

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