



UCI IRVINE

**BIOMONITORING
CALIFORNIA**
MEASURING CHEMICALS IN CALIFORNIANS

January 10, 2012

[Participant Name]
[Participant Street Address]
[Participant City, State Zip code]

Dear [Participant Name]:

Thank you very much for taking part in the Firefighter Occupational Exposures (FOX) Project in late 2010 to early 2011. As part of FOX, we are testing the levels of more than 75 chemicals that may be in you and 100 other Orange County Fire Authority firefighters.

Your participation in this important project is helping us learn more about the presence of chemicals in firefighters' bodies and possible environmental sources of these chemicals.

The first set of laboratory tests has been completed and your results are enclosed. This first mailing includes results for 16 chemicals we tested in your blood. You will receive your remaining blood and urine test results at a later date after laboratory analyses are completed.

This mailing includes:

Part 1: Metals in Blood – cadmium, lead, manganese and mercury. For each metal, you will find a summary of your results, a graph, and information about that metal.

Part 2: Perfluorochemicals (PFCs) in Blood – twelve PFCs were tested. This section includes a summary of your results, a list of the PFCs we tested, graphs, and information about these chemicals.

You can compare your results to:

- Results for other firefighters who participated in the FOX Project
- Results from a study of the general U.S. population
- The level of concern for the chemical where one has been set. For most chemicals, very little is known about what level may be a concern.

Your participation in this study will have an impact beyond this project by helping us lay the foundation to measure chemicals in people throughout California. Ultimately, this information may be used to learn how chemicals affect our health and to support efforts to prevent exposure to harmful chemicals.

If you have any questions, please feel free to call either of us.

Sincerely,

Leslie Israel, DO, MPH
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University of California, Irvine
Center for Occupational and Environmental Health
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Firefighter Occupational Exposures (FOX) Project

Your Chemical Lab Results

Set 1

Samples collected in 2010-2011

This is the first of two sets of results that you will receive.

To maintain confidentiality, your name is not printed on this packet. You may choose to write your name here:

Why are We Studying Firefighters?

Firefighters, by the nature of their profession, may be exposed to more toxic chemicals than the general population. During a fire or overhaul process, firefighters may inhale gases, vapors, or dust particles, and may ingest particles. Chemicals found in building structures and contents can be released and new chemicals can be formed during the combustion process. Firefighters may also be exposed to chemicals while responding to incidents involving spills or leaks.

Only a few studies have looked at chemicals in firefighters. The Firefighter Occupational Exposures (FOX) Project, which will measure more than 75 chemicals, will provide information on how the levels of these chemicals measured in firefighters compare to levels in the general population.

Your participation helps us learn about chemical exposures in the California population. Your results will become part of a larger anonymous database that will include findings from other Californians who may be exposed to chemicals in a variety of ways at home or work. FOX and similar studies will help the State assess the effectiveness of its current programs to decrease exposures to harmful environmental chemicals and inform policies to improve public health. We truly appreciate your contribution to this project.

What can Firefighters Learn from FOX?

- How chemical levels in OCFA firefighters compare with chemical levels in the general U.S. population
- Whether or not job categories and other factors affect chemical levels in OCFA firefighters

What are Some Ways for Firefighters to Protect Themselves from Chemical Exposures on the Job?

- Wear your personal protective equipment.
- Wash your hands regularly with soap and water, especially before preparing food or eating.

Your Lead Lab Results

Part 1: Metals in Blood

We tested your blood for lead. Lead is a metal found in nature and is used in many industries and products.

Your level of lead micrograms per deciliter ($\mu\text{g}/\text{dL}$)	Range of levels for firefighters in this study ($\mu\text{g}/\text{dL}$)	National levels ($\mu\text{g}/\text{dL}$)		Level of concern for men ($\mu\text{g}/\text{dL}$)
		Median	95 th percentile	
1.70	0.20 to 7.54	1.3	3.9	10 and above

Was there lead in my blood?

Yes. Your lead level was 1.70 $\mu\text{g}/\text{dL}$.

What can I compare my level to?

You can use the table above and the graph of your lead results to compare your lead level to:

- **Other firefighters in this study.** We found lead in all firefighters tested. The levels ranged from 0.20 to 7.54 $\mu\text{g}/\text{dL}$.

- **National levels**

- **Median** — Half the adults tested in the U.S. had a level above the median and half below.
- **95th percentile** — 95% of adults tested in the U.S. had a level below this number.

The national median and 95th percentile do not tell us anything about what level might be a health concern. They are just another way for you to compare your results with others.

- **Level of concern** — Your lead level was below the level of concern. A lead level of 10 $\mu\text{g}/\text{dL}$ or above may be a concern.

Frequently Asked Questions about Lead

Firefighters are most at risk for exposure on the job when lead is present in fumes, dust, or vapor.

Where is lead found?

Lead is widespread in the environment and is in many products. The most common sources of lead are:

- Chipped or peeling paint and dust in and around homes built before 1978 (when lead was banned in house paint).
 - Bare soil around homes built before 1978 and near roadways.
 - Worksites or hobby areas. Examples include construction and painting sites, shooting ranges, areas where lead solder is used, and battery and scrap metal recycling facilities.
-

Can lead harm people's health?

- Lead can affect brain development and contribute to learning problems in babies and young children.
 - Lead can increase blood pressure, decrease kidney and brain function, and cause reproductive problems in adults.
-

What can I do?

- Clean up and keep children away from peeling paint.
 - If you plan to permanently remove or seal lead-based paint, use a certified professional.
 - Cover bare soil with grass, bark, or gravel, especially around homes built before 1978.
 - If you do any house renovation or work with lead, even as a hobby, use proper protective equipment, such as a respirator and coveralls. Keep work dust contained. Shower after working and wash work clothes separately.
 - Wash your hands before eating or drinking.
 - Vacuum, wet mop, and use a damp cloth to clean regularly.
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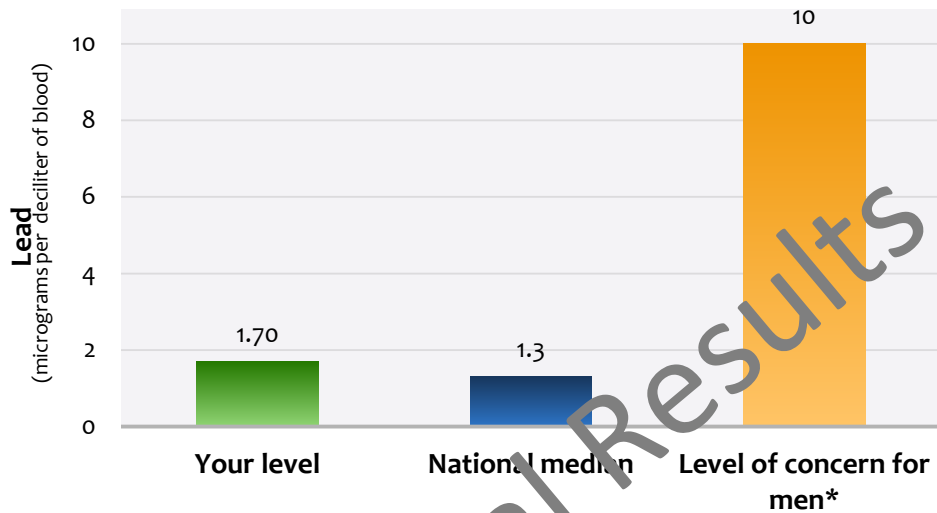
For more information:

- Orange County Lead Poisoning Prevention Program: call (714) 567-6220
- California's Childhood Lead Poisoning Prevention Program: call (510) 620-5600 or go to <http://www.cdph.ca.gov/programs/CLPPB/Pages/defaults.aspx>
- California's Occupational Lead Poisoning Prevention Program: call (510) 620-5740 or go to <http://www.cdph.ca.gov/programs/olpp/Pages/default.aspx>

Your Lead Results

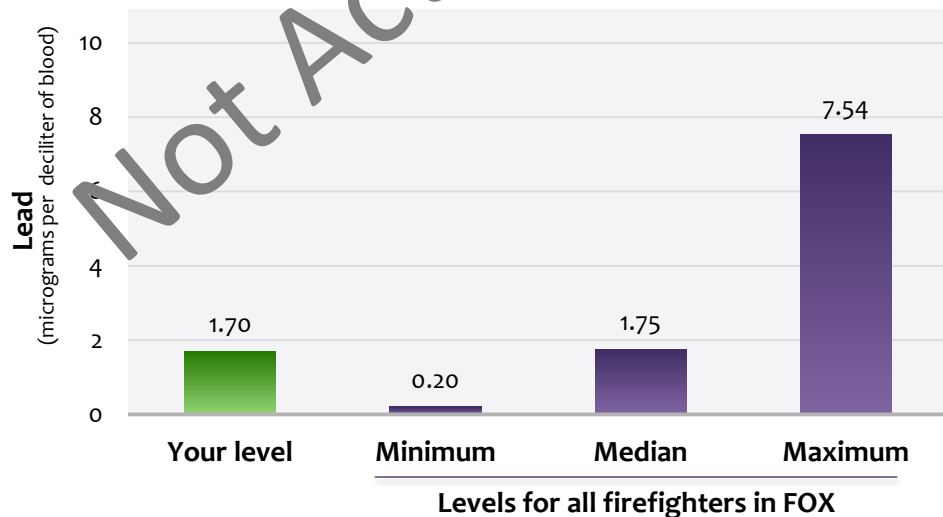
Part 1: Metals in Blood

Your lead level compared to the national median and level of concern



* The level of concern for women 18-49 years old is 5 micrograms per deciliter.

Your lead level compared to the other OCFA firefighters in FOX



Lead was found in [number detected] of the 101 firefighters tested.

Your Mercury Lab Results

Part 1: Metals in Blood

We tested your blood for mercury. Mercury is a metal found in nature. Mercury that gets into the environment from coal burning, some industries, and past use in California gold mining can build up in certain types of fish.

Your level of mercury micrograms per liter (µg/L)	Range of levels for firefighters in this study (µg/L)	National levels (µg/L)		Level of concern for men (µg/L)
		Median	95 th percentile	
1.00	0.60 to 8.23	0.9	5.3	10 and above

Was there mercury in my blood?

Yes. Your mercury level was 1.00 µg/L.

What can I compare my level to?

You can use the table above and the graph of your mercury results to compare your mercury level to:

- **Other firefighters in this study.** We found mercury in all firefighters tested. The levels ranged from 0.60 to 8.23 µg/L.
- **National levels**
 - **Median** — Half the adults tested in the U.S. had a level above the median and half below.
 - **95th percentile** — 95% of adults tested in the U.S. had a level below this number.

People who live on the East or West coasts tend to eat more fish and have higher levels of mercury compared to those who live in the rest of the U.S. The national median and 95th percentile do not tell us anything about what level might be a health concern. They are just another way for you to compare your results with others.

- **Level of concern** — Your mercury level was below the level of concern. If an adult man has a mercury level of 10 µg/L or above, we notify him of his results early and provide advice on choosing lower-mercury fish. There are no proven health problems associated with this level of mercury. However, we provide advice as a precaution.

Frequently Asked Questions about Mercury

Where is mercury found?

- Certain types of fish and seafood – this is the most common source of exposure to mercury
- Some imported face creams used for skin lightening, anti-aging, or acne
- Silver-colored dental fillings
- Glass thermometers, and older barometers and blood pressure gauges
- Fluorescent light bulbs such as compact fluorescent light bulbs (CFL bulbs)

Can mercury harm people's health?

- Mercury can affect brain development and cause learning and behavior problems in children and in babies exposed in the womb.
- Mercury can harm the nervous system and kidneys in adults.
- Mercury may affect the heart.

What can I do?

- Choose fish that are lower in mercury. Examples include: salmon, tilapia, trout, canned light tuna, sardines, anchovies, and oysters.
- Avoid fish that are high in mercury. Examples include: shark, swordfish, orange roughy, and bluefin and bigeye tuna.
- Do not use imported creams for skin lightening, acne treatment, or anti-aging unless you are certain that they do not contain mercury.
- Properly clean up any mercury spills, such as from broken thermometers or CFL bulbs (<http://www.epa.gov/mercury/spills/>). Do not let children play with the silver liquid from these items.

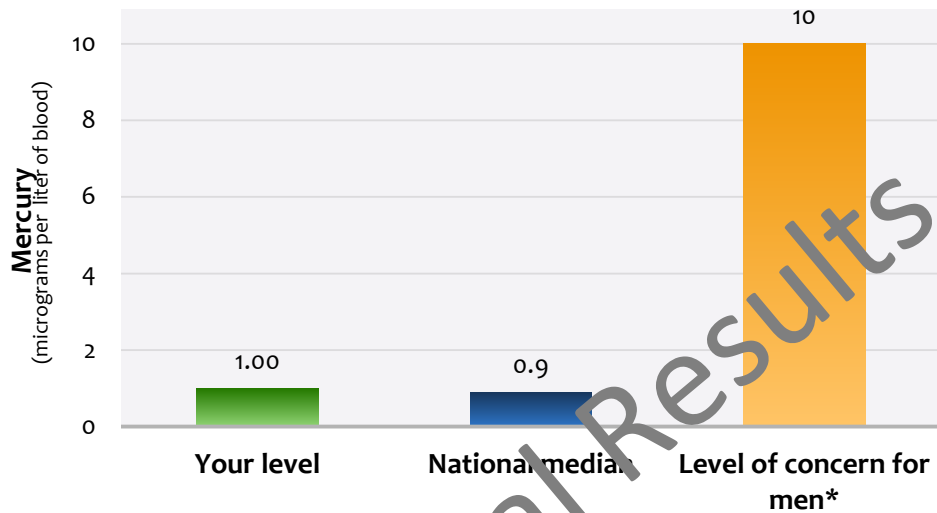
For more information:

- Choosing fish that are lower in mercury: http://www.oehha.ca.gov/fish/pdf/2011CommFishGuide_color.pdf
- Advice on mercury in fish that you catch: <http://www.oehha.ca.gov/fish.hg.index.html> or call (510) 622-3170
- Concerns about mercury exposure: call the California Poison Action Line, 1-800-222-1222, or go to <http://calpoison.org/home.html>

Your Mercury Results

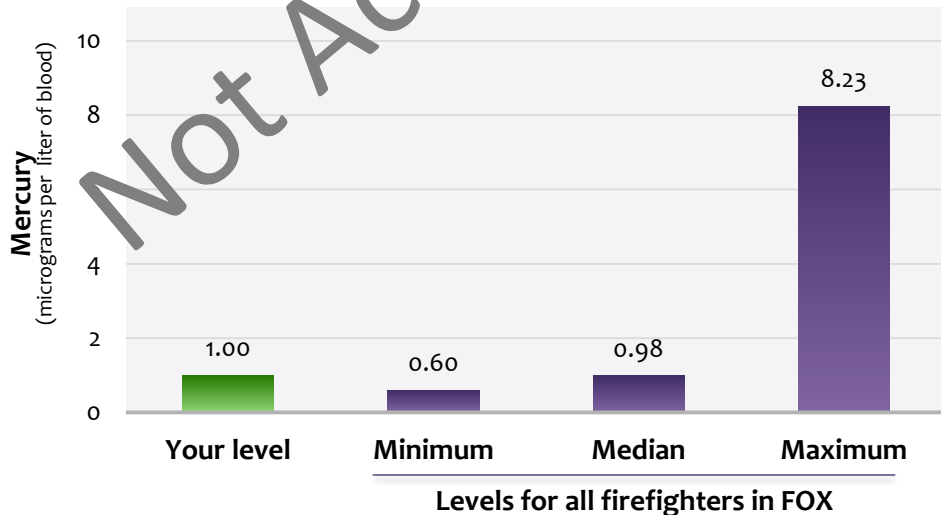
Part 1: Metals in Blood

Your mercury level compared to the national median and level of concern



* The level of concern for women 18-49 years old is 5.8 micrograms per liter.

Your mercury level compared to the other OCFA firefighters in FOX



Mercury was found in [number detected] of the 101 firefighters tested.

Your Cadmium Lab Results

Part 1: Metals in Blood

We tested your blood for cadmium. Cadmium is a metal that is found in nature and is used in many industries and products.

Your level of cadmium micrograms per liter (µg/L)	Range of levels for firefighters in this study (µg/L)	National levels (µg/L)		Level of concern (µg/L)
		Median	95 th percentile	
0.40	0.14 to 2.41	0.3	1.7	5 and above

Was there cadmium in my blood?

Yes. Your cadmium level was 0.40 µg/L.

What can I compare my level to?

You can use the table above and the graph of your cadmium results to compare your cadmium level to:

- **Other firefighters in this study.** We found cadmium in most firefighters tested. The levels ranged from 0.14 to 2.41 µg/L.
- **National levels**
 - **Median** — Half the adults tested in the U.S. had a level above the median and half below.
 - **95th percentile** — 95% of adults tested in the U.S. had a level below this number.

The national median and 95th percentile do not tell us anything about what level might be a health concern. They are just another way for you to compare your results with others.

- **Level of concern** — Your cadmium level was below the level of concern. A cadmium level of 5 µg/L or above may be a concern.

Frequently Asked Questions about Cadmium

Where is cadmium found?

- Cigarette and other tobacco smoke
- Some cheap metal jewelry or charms
- Rechargeable batteries labeled NiCd or NiCad
- Metal plating and soldering
- Some red, yellow, and orange decorative paints, which may be used on glassware and pottery

Can cadmium harm people's health?

- Cadmium can damage the lungs and kidneys.
- Cadmium can cause lung cancer.
- Cadmium can weaken bones.
- Cadmium can affect brain development in young children.

What can I do?

- Do not smoke or let children breathe cigarette or other tobacco smoke.
- Do not let children wear or play with cheap metal jewelry or charms.
- Do not let children handle rechargeable batteries labeled NiCd or NiCad. Properly recycle batteries.
- If you do any welding or metal working, be sure the area is well-ventilated and use proper protective equipment. Keep children away from welding fumes and other metal vapors and dusts.

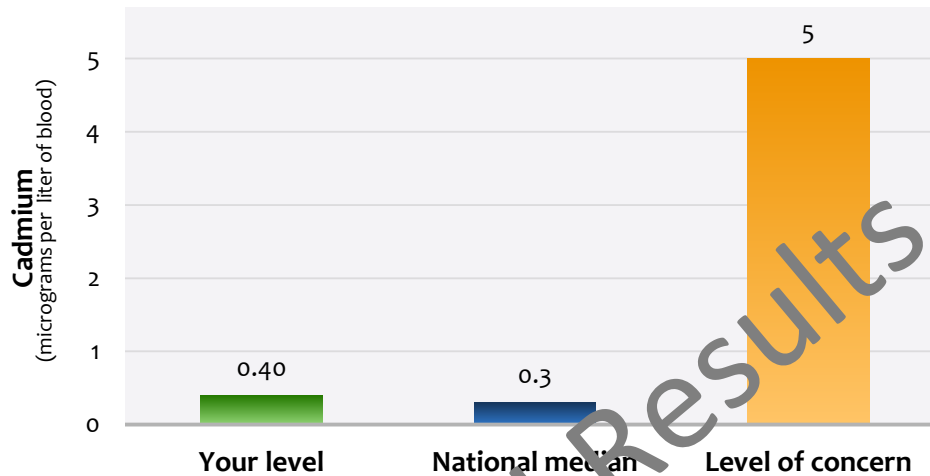
For more information:

- Cadmium fact sheets:
 - http://www.oehha.ca.gov/public_info/facts/cd_facts.html
 - <http://www.atsdr.cdc.gov/tfacts5.pdf>
- Battery recycling information: call 1-(800) CLEANUP (253-2687) or go to <http://earth911.com/>
- Cadmium in consumer products: call the Consumer Product Safety hotline, 1-800-638-2772

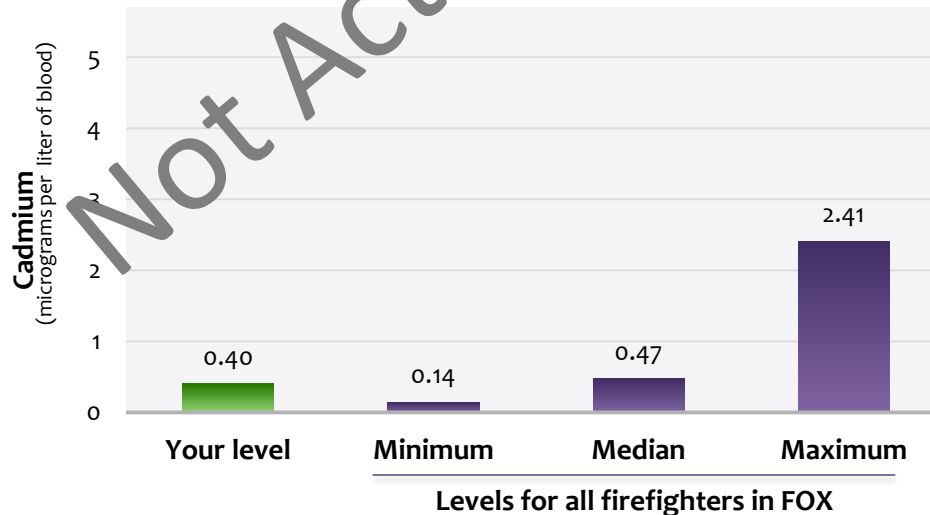
Your Cadmium Results

Part 1: Metals in Blood

Your cadmium level compared to the national median and level of concern



Your cadmium level compared to the other OCFA firefighters in FOX



Cadmium was found in [number detected] of the 101 firefighters tested.

Your Manganese Lab Results

Part 1: Metals in Blood

We tested your blood for manganese, an essential nutrient. It is normal and healthy to have some manganese in your blood. Manganese is also a metal that can be toxic at higher levels. The most common way to be exposed to excess manganese is through jobs that involve working with metals, such as welding.

Your level of manganese micrograms per liter (µg/L)	Range of levels for firefighters in this study (µg/L)	Usual range for U.S. population* (µg/L)
9.22	6.21 to 16.02	about 4-15

Was there manganese in my blood?

Yes. Your manganese level was 9.22 µg/L.

What can I compare my level to?

You can use the table above and the graph of your manganese results to compare your manganese level to:

- **Other firefighters in this study.** We found manganese in all firefighters tested. The levels ranged from 6.21 to 16.02 µg/L.
- **Usual range for U.S. population.** The usual range for the general U.S. population is about 4-15 µg/L.

The national median and 95th percentile are not yet known.

No state or federal agency has established a level of health concern for manganese.

* This usual range was cited by the Agency for Toxic Substances and Disease Registry, a federal government agency.

Frequently Asked Questions about Manganese

Manganese is an essential nutrient that we get mainly from food. It is also a metal used in many industries and products. The most common way to be exposed to excess manganese is through jobs that involve working with metals, such as welding.

Where is manganese found?

- Certain foods such as nuts, grains, beans, and leafy green vegetables
- Some drinking water sources
- Certain metal alloys, such as steel
- Some welding rods
- Certain chemicals used in agriculture to kill fungus

Does my body need manganese?

- Some manganese is needed to support many vital processes in the body, such as building bones and healing wounds.

Can too much manganese harm people's health?

- Too much manganese can harm memory, thinking, mood, and balance, and cause slow, clumsy movement in adults.
- Too much manganese can cause learning and behavior problems in babies exposed in the womb and in children.

How can I maintain a healthy level of manganese?

- Eat a well-balanced diet with enough iron.
- If you do any welding or metal working, be sure the area is well ventilated and use proper protective equipment. Keep children away from welding fumes and other metal vapors and dusts.

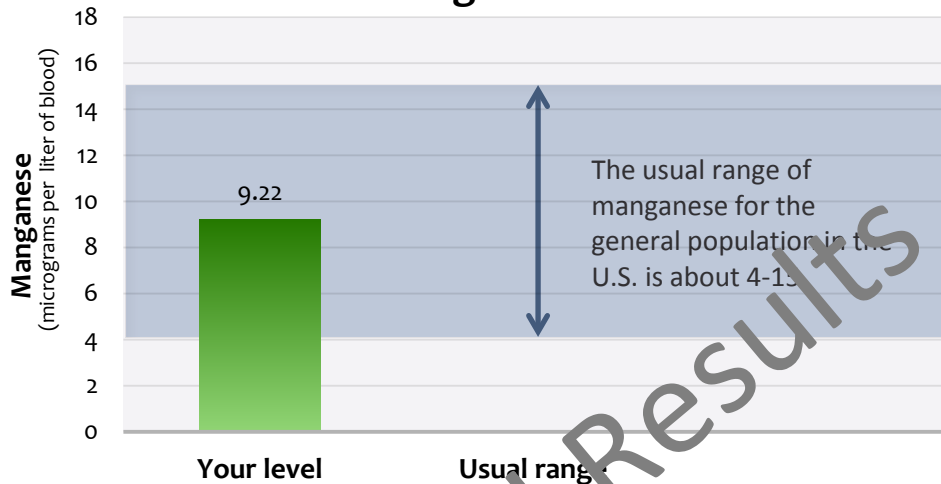
For more information:

- Manganese fact sheet: <http://www.atsdr.cds.cgov/tfacts151.pdf>

Your Manganese Results

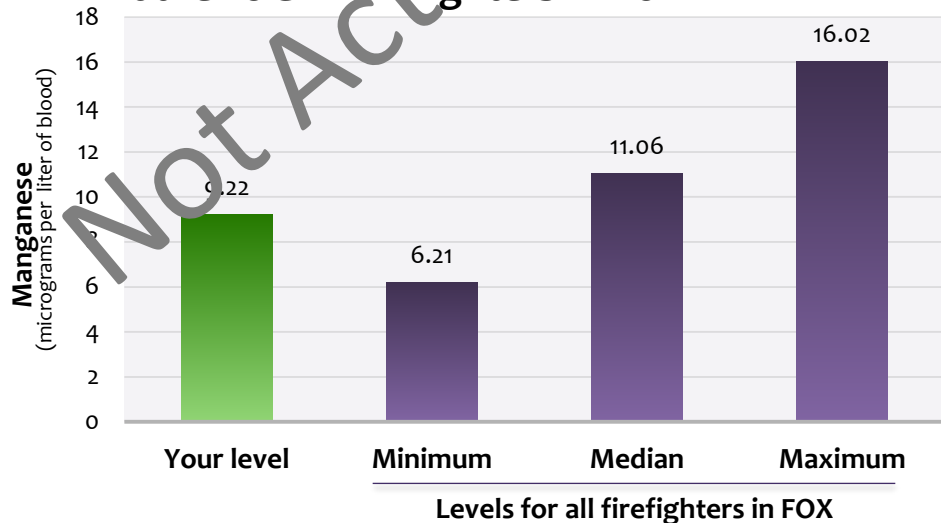
Part 1: Metals in Blood

Your manganese level compared to the national usual range



A level of concern for manganese has not been established by a state or federal agency.

Your manganese level compared to the other OCFA firefighters in FOX



Manganese was found in [number detected] of the 101 firefighters tested.

Your PFC (Perfluorochemical) Lab Results

Part 2: PFCs in Blood

We tested your blood for 12 perfluorochemicals (PFCs). Perfluorochemicals are used to make various products resistant to oil, stains, grease, and water.

Were there PFCs in my blood?

Yes. We found ten PFCs in your blood.

What can I compare my levels to?

You can use the table on the next page to compare your PFC levels to:

- **Other firefighters in the study.** We found PFCs in most firefighters tested.
- **National levels**
 - **Median** — Half the adults tested in the U.S. had a level above the median and half below.
 - **95th percentile** — 95% of adults tested in the U.S. had a level below this number.

The national median and 95th percentile do not tell us anything about what level might be a health concern. They are just another way for you to compare your results with others.

No state or federal agency has established a level of concern for these chemicals.

Table of Your PFC (Perfluorochemical) Lab Results

Part 2: PFCs in Blood

PFC tested	Your level (µg/L)	Range of levels for firefighters in FOX (µg/L)	Number of FOX firefighters with this chemical found in their blood	National levels (µg/L)	
				Median	95 th percentile
PFDeA Perfluorodecanoic acid	0.75	0.10 – 0.90	[# detected] of 101	0.3	0.9
PFOA Perfluorooctanoic acid	4.82	0.20 – 9.90	[# detected] of 101	4.3	9.8
PFOS Perfluorooctane sulfonic acid	34.21	1.51 – 49.68	[# detected] of 101	14.1	42.8
PFHpA Perfluoroheptanoic acid	0.42	0.10 – 0.60	[# detected] of 101	*	0.5
PFNA Perfluorononanoic acid	1.62	0.10 – 3.40	[# detected] of 101	1.5	4.1
PFUA Perfluoroundecanoic acid	0.11	0.10 – 0.60	[# detected] of 101	*	0.6
PFDoA Perfluorododecanoic acid	Not found	0.10-0.14	[# detected] of 101	*	**
PFBuS Perfluorobutane sulfonic acid	Not found	0.10 – 0.14	[# detected] of 101	*	**
PFHxS Perfluorohexane sulfonic acid	6.02	0.10 – 7.60	[# detected] of 101	2.0	9.0
PFOSA Perfluorooctane sulfonamide	0.15	0.10 – 0.30	[# detected] of 101	*	**
Me-PFOSA-AcOH 2-(N-Methyl-perfluorooctane sulfonamido) acetic acid	0.67	0.10 – 1.20	[# detected] of 101	0.3	1.4
Et-PFOSA-AcOH 2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid	0.23	0.10 – 0.30	[# detected] of 101	*	**

* The national median cannot be calculated because this chemical was not found in enough people.

** The national 95th percentile cannot be calculated because this chemical was not found in enough people.

Frequently Asked Questions about Perfluorochemicals (PFCs)

Where are perfluorochemicals (PFCs) found?

- Some foods: Examples include some red meat and potato chips. Not much is known about which foods might regularly contain PFCs.
- Certain grease-repellent paper food containers, such as some microwave popcorn bags, take-out boxes, or fast-food wrappers
- Stain-resistant carpets and some carpet cleaning solutions
- Stain-, water-, and wrinkle-resistant fabrics and some stain- and water- repellent sprays
- Most non-stick cookware
- Certain Class B aqueous film-forming foams used in firefighting

Can PFCs harm people's health?

Scientists are still studying how PFCs might affect people's health. There is concern that some PFCs:

- May affect the developing fetus and child, including possible changes in growth, learning, and behavior;
- May decrease fertility and affect hormone balance;
- May contribute to cancer.

What can I do?

Scientists are not sure how best to reduce exposure to PFCs. However, you can:

- Limit how often you eat foods from grease-repellent paper containers;
- Avoid buying stain-resistant carpets;
- Avoid buying products labeled stain-resistant, water-resistant, or wrinkle-free, such as some fabrics, furniture, or clothes;
- Avoid using sprays and carpet cleaning solutions that contain PFCs.

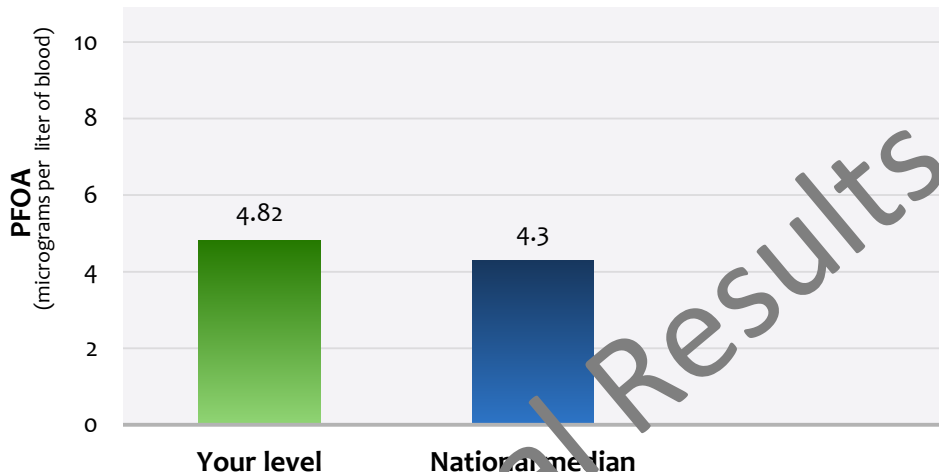
For more information:

- PFC fact sheet: http://www.cdc.gov/exposurereport/PFCs_FactSheet.html

Your PFOA Results

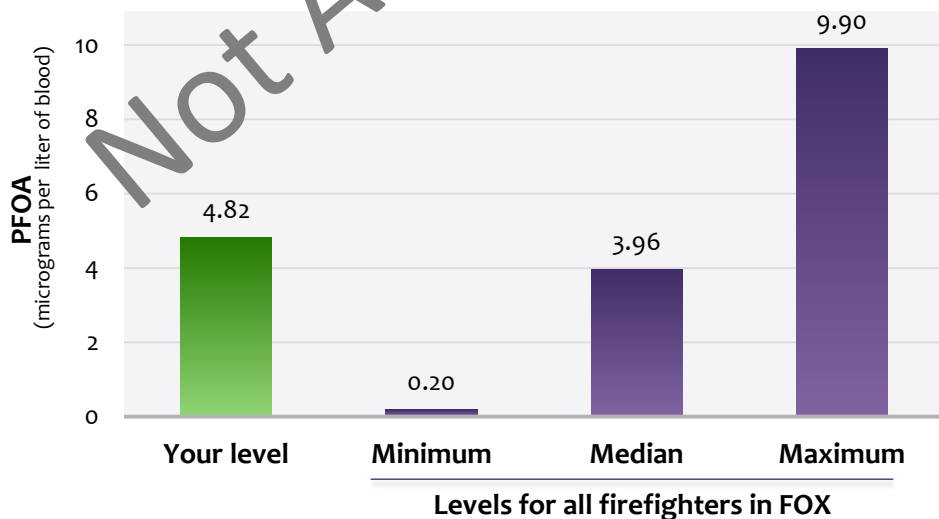
We are highlighting PFOA in graphic form because it is commonly found in both FOX participants and the general U.S. population.

Your PFOA level compared to the national median



A level of concern for PFOA has not been established by a state or federal agency.

Your PFOA level compared to the other OCFA firefighters in FOX

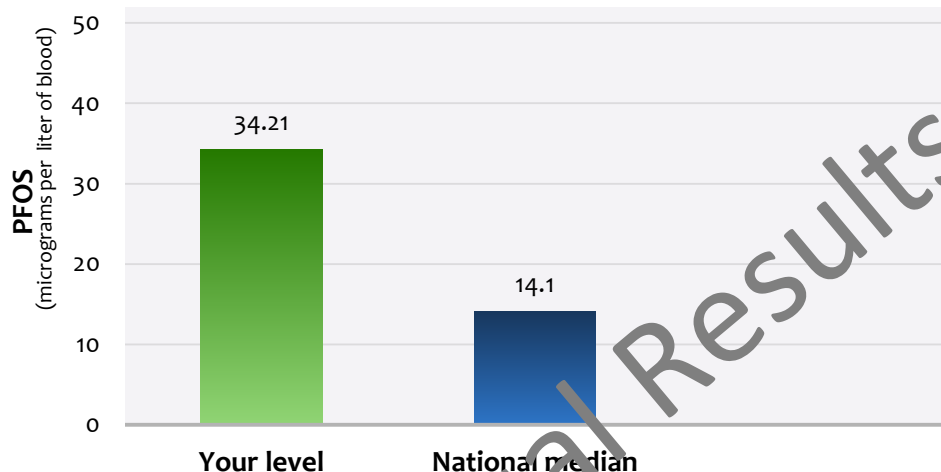


PFOA was found in [number detected] of the 101 firefighters tested.

Your PFOS Results

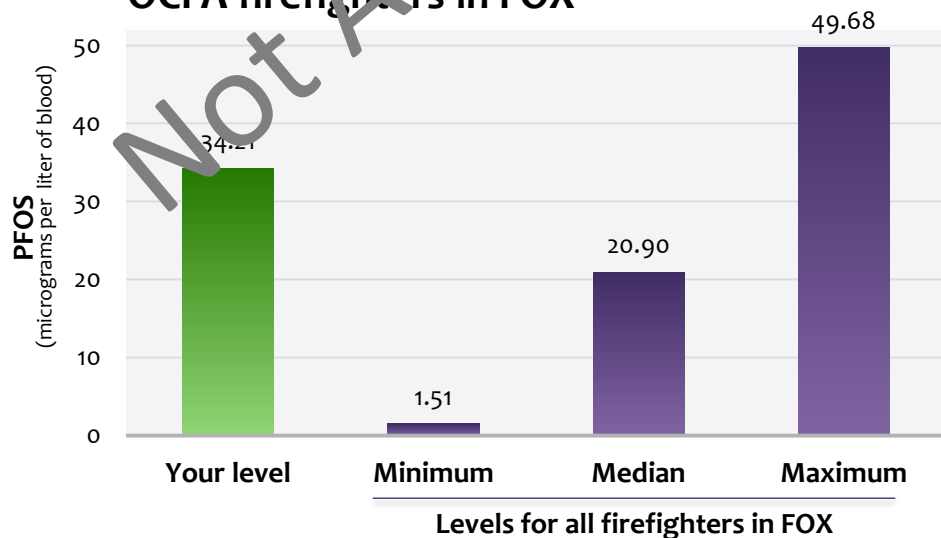
We are highlighting PFOS in graphic form because it is commonly found in both FOX participants and the general U.S. population.

Your PFOS level compared to the national median



A level of concern for PFOS has not been established by a state or federal agency.

Your PFOS level compared to the other OCFA firefighters in FOX



PFOS was found in [number detected] of the 101 firefighters tested.