AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

S. HRG. 112–818

PUBLIC HEALTH AND DRINKING WATER ISSUES

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

FEBRUARY 2, 2011

Printed for the use of the Committee on Environment and Public Works

Available via the World Wide Web: http://www.fdsys.gpo.gov

U.S. GOVERNMENT PRINTING OFFICE

85–223PDF WASHINGTON : 2014

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

ONE HUNDRED TWELFTH CONGRESS
FIRST SESSION

BARBARA BOXER, California, *Chairman*

MAX BAUCUS, Montana
THOMAS R. CARPER, Delaware
FRANK R. LAUTENBERG, New Jersey
BENJAMIN L. CARDIN, Maryland
BERNARD SANDERS, Vermont
SHELDON WHITEHOUSE, Rhode Island
TOM UDALL, New Mexico
JEFF MERKLEY, Oregon
KIRSTEN GILLIBRAND, New York

JAMES M. INHOFE, Oklahoma
DAVID VITTER, Louisiana
JOHN BARRASSO, Wyoming
JEFF SESSIONS, Alabama
MIKE CRAPO, Idaho
LAMAR ALEXANDER, Tennessee
MIKE JOHANNS, Nebraska
JOHN BOOZMAN, Arizona

BETTINA POIRIER, *Majority Staff Director and Chief Counsel*
RUTH VAN MARK, *Minority Staff Director*

C O N T E N T S

Page

FEBRUARY 2, 2011

OPENING STATEMENTS

Boxer, Hon. Barbara, U.S. Senator from the State of California 1
Inhofe, Hon. James M, U.S. Senator from the State of Oklahoma 3
Cardin, Hon. Benjamin L., U.S. Senator from the State of Maryland 7
Johanns, Hon. Mike, U.S. Senator from the State of Nebraska 8
Lautenberg, Hon. Frank R., U.S. Senator from the State of New Jersey 9
Barrasso, Hon. John, U.S. Senator from the State of Wyoming 11
Merkley, Hon. Jeff, U.S. Senator from the State of Oregon 13
Boozman, Hon. John, U.S. Senator from the State of Arkansas 13
Udall, Hon. Tom, U.S. Senator from the State of New Mexico 13

WITNESSES

Jackson, Hon. Lisa, Administrator, Environmental Protection Agency 14
Prepared statement 15
Responses to additional questions from:
Senator Boxer 19
Senator Inhofe 26
Senator Carper 42
Senator Lautenberg 45
Senator Whitehouse 47
Senator Boozman 48
EPA, Emergency Administrative Orders:
Region 6, Final Peer Review, Range Resources Corporation and Range Production Company 49
Region 8, Draft IRIS Toxicological Review, Murphy Exploration & Production Co., Pioneer Natural Resources USA, Inc., and Samson Hydrocarbons Co. 60
Birnbaum, Linda, D.A.B.T., A.T.S., director, National Institute of Environmental Health Sciences and National Toxicology Program 103
Prepared statement 105
Cook, Kenneth A., president, Environmental Working Group 126
Prepared statement 127
Study, Chromium-6 in U.S. Tap Water 133
Responses to additional questions from:
Senator Boxer 156
Senator Carper 157
Senator Lautenberg 157
VanDe Hei, Diane, executive director, Association of Metropolitan Water Agencies 158
Prepared statement of Carrie Lewis 159
Responses to additional questions from:
Senator Boxer 163
Senator Inhofe 164
Senator Lautenberg 167
Senator Carper 167
Murray, Charles, general manager, Fairfax Water 168
Prepared statement 170
Responses to additional questions from:
Senator Inhofe 172
Senator Carper 174

Page

Burke, Thomas A, Ph.D., MPH, professor and associate dean for Public Health Practice, Johns Hopkins Bloomberg School of Public Health, Director of the Johns Hopkins Risk Sciences and Public Policy Institute 174
Prepared statement 176

ADDITIONAL MATERIAL

Statement, Lewis, Steve, city manager, City of Norman, OK 187
Responses to additional questions from:
Senator Boxer 188
Senator Inhofe 188
Senator Lautenberg 190
Senator Carper 190

PUBLIC HEALTH AND DRINKING WATER ISSUES

WEDNESDAY, FEBRUARY 2, 2011

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The committee met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Office Building, Hon. Barbara Boxer (chairman of the committee) presiding.

Present: Senators Boxer, Inhofe, Lautenberg, Cardin, Whitehouse, Udall, Merkley, Barrasso, Johanns, and Boozman.

STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. Good morning, everybody. The Committee will come to order.

We have called this hearing today to focus on a public health issue that touches every family in every community across the country: the quality of our Nation's drinking water. Congress passed the Safe Drinking Water Act in 1974 to protect public health by creating consistent and strong safeguards for the Nation's public drinking water supply.

The words that President Ford spoke when he signed this legislation into law are as true today as they were then, so I am going to quote him. He said, "Nothing is more essential to the life of every single American than clean air, pure food and safe drinking water." He went on to say, there have been strong national programs to improve the quality of our air and the purity of our food. This bill, meaning the Water Bill, will provide us with the protection we need for drinking water.

So President Ford, I believe, had it right. I think we need to live up to the spirit of this law and the letter of this law.

Congress last amended significant portions of the Act in 1996, strengthening public health protections and expanding the public's right to know about the quality of the water that they drink. The House passed these amendments 392 to 30; the Senate passed them unanimously.

Both of the distinguished witnesses on our first panel, Administrator Jackson and Director Birnbaum, are leading efforts to use the best available science to protect the public health. Administrator Jackson, EPA's very mission, as you know, is to protect human health and the environment. You have told us that many times. A core principle of your agency is "to ensure that national

efforts to reduce environmental risks are based on the best available scientific information." That is what you have told us.

As I said last week when I participated at a town hall at EPA headquarters, the mission that you undertake every day, Administrator Jackson, is critically important to children and to families, the elderly in communities large and small all across our great country. Your mission matters. It is a mission created with bipartisan support and one that has made huge strides to improve our families' and our Nation's health.

The EPA is also charged with making the final decision on whether to develop safeguards for new threats to drinking water, such as chromium VI and perchlorate. We would like to applaud your announcement today, Administrator Jackson, that the EPA will move forward to establish a national drinking water standard for perchlorate. Perchlorate is a toxic chemical contained in rocket fuel. It does not belong in our drinking water. Yet, according to the Government Accountability Office, EPA data show that perchlorate has been found in 35 States and the District of Columbia, and is known to have contaminated 153 public water systems in 26 States.

The Bush administration never did set a drinking water standard for perchlorate, leaving millions of Americans in dozens of states at risk. But after reviewing the science, you reversed that decision, and I applaud you for that. I look forward to the agency moving quickly to put in place a strong national standard to protect public drinking water from this dangerous contaminant.

Chromium VI is another drinking water contaminant that I have urged the Federal Government to address. Chromium is used to make steel, metal plating and other materials. We all know the story of Erin Brockovich, who worked to help the people in Hinkley, California, who were drinking water contaminated by chromium VI. In 2008, the National Toxicology Program concluded that chromium VI in drinking water shows "clear evidence of carcinogenic activity in laboratory animal tests."

In 2009, my home State of California proposed a public health goal for chromium VI of 0.06 parts per billion. One year later, in 2010, my State strengthened its proposal to .02 parts per billion, based on the need to protect infants and children from danger-causing substances. We all know that infants, children and pregnant women are far more vulnerable to these toxins.

In September 2010, EPA released a draft scientific assessment that found chromium VI in drinking water is "likely to be carcinogenic to humans." The agency had said it expects to finish this assessment in 2011.

The non-profit Environmental Working Group released a report that provided us with a snapshot in time on chromium VI levels in some drinking water systems. They found chromium VI in the drinking water in 31 cities across our country. I believe the Federal Government must act quickly to develop needed safeguards to reduce the threats in our Nation's drinking water. I look forward to hearing about the work that EPA is engaged in to address chromium VI and other emerging contaminants.

I do want to welcome our new members, Senator Johanns. We welcome you, sir, we are delighted you are with us. Also Senator

Sessions and Senator Boozman are also new members. I want to welcome them, even though they are not here. They will be strongly welcomed by all of us. Thank you.

Senator Inhofe.

STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. Thank you, Madam Chairman, for taking time to continue our discussions on the Federal drinking water program. I know that everyone in this room agrees that we all need safe, clean, drinking water.

To carry out this priority effectively, we need resources, but we also need sound policy based on the best available science. Madam Chairman, I counted in your opening statement, you said the same thing three times, best available science. I feel confident that the recent drinking water report by the Environmental Working Group, which we are working on today, does not fall into that category. Simply put, the report is biased, and therefore the conclusions are skewed to fit a particular viewpoint, or I should say agenda, perhaps.

What is more, the Environmental Working Group has rejected transparency, one of the fundamental practices of good science. When the city officials from Norman, OK requested the Environmental Working Group's testing methodology, they said no. Without transparency, without the ability of other scientists to replicate your work, you can't have good science.

Due to the snowstorm in Oklahoma, Steven Lewis, who was going to be one of our witnesses, and I appreciate your allowing him to come, however, he can't come, because he can't get here. He was unable to travel here. His testimony can help us put some context around the Environmental Working Group's flawed findings and help us understand the robust public health protections Norman has in place. That is Norman, OK.

He has agreed to answer the followup questions that the Committee might have, and I would respectfully request, of course, that his testimony be part of the record.

Senator BOXER. Yes, without objection, so ordered.

[The prepared statement of Mr. Lewis follows on page 187.]

Senator INHOFE. I also welcome the testimony of Charles Murray, city manager for Water from the city of Fairfax. Some of these guys are going to have to do double duty, since my witness couldn't show up today. Mr. Murray will no doubt provide some practical insights into how local water systems are dealing with chromium VI and other drinking water mandates.

I also want to make a special note and welcome the Administrator, Lisa Jackson. Administrator, it is good to see you, as always. I want to thank you for your willingness last year to work with me specifically and my staff on some of the real difficult issues. I also want to thank you for your help on passing several key pieces of legislation that were drafted in this Committee. With your help, we passed a bill to reduce lead in drinking water and a bill to provide grants to States to reduce diesel emissions.

I want you to know that I sent a spy into your office and they tell me that the picture of my 20 kids and grandkids are still there. So I appreciate that, too.

[Laughter.]

Senator INHOFE. As we look at the next 2 years, obviously there are many contentious issues ahead, many issues where we have fundamental disagreements. They include, and we have talked about, among the Republicans on this side of the aisle, and particularly the three new ones we are welcoming to this Committee. That is, regulating the greenhouse gases under the Clean Air Act. This is something that Congressman Upton and I have a joint—we were going to announce this today and apparently it got out last night instead, so we will be talking about that. The boiler MACT, the utility MACT, PM dust, that is regulating dust on farms. Those of us in western States understand that if you have cotton and you have dirt and you have wind, you are going to have dust. We need to talk about that. The ozone changes that are recommended. Then hydraulic fracturing, I may have some questions today on that.

So we disagree on this issues, yet we have in the past and let's keep an open line of communication. Administrator Jackson, I am sure we will, because there could be areas where we can reach agreement as we did before. The lead bill and the diesel bill are just two examples of what we can do. So I wish you all the best as we head into the new Congress.

Now, let me welcome our three new members. Senator Sessions is not here. He was on the Committee some time ago, then dropped off, and he is back now. Senator Boozman will be here. He has been a very good friend of mine for many years, from Arkansas. Senator Johanns will have a lot to offer. Having been the Secretary of Agriculture, he brings an abundance of knowledge to this Committee. So we welcome our new members here, and thank you, Madam Chairman.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Thank you, Madam Chairman, for taking the time today to continue our discussions about Federal drinking water programs. I know that everyone in this room agrees that clean, safe, affordable drinking water is essential, and should be a national priority.

To carry out this priority effectively, we need resources, but we also need sound policy, based on the best available science. I feel confident that the recent drinking water report by the Environmental Working Group, which we are focusing on today, does not fall in that category.

Put simply, the report is biased, and therefore the conclusions are skewed to fit a particular view point. What's more, the EWG has rejected transparency, one of the fundamental practices of good science. When city officials from Norman, Oklahoma requested EWG's testing methodology, EWG said no. Without transparency—without the ability of other scientists to replicate your work—you can't have good science.

We've seen this scenario before. An activist group publishes a study—in this case, on chromium-6—making a dramatic finding about some kind of harm to the environment or public health. Rarely, however, are the findings of such studies carefully scrutinized or rigorously analyzed in the media.

EPA already regulates chromium in all its valance forms, 0, 3 and 6, together in its total chromium MCL–G and MCL. While chromium-3 is an essential nutrient that we need to properly metabolize glucose, protein and fat, chromium-0 and chromium-6 are of concern to public health. As recently as March 2010, EPA had deter-

mined that the 100 ppb MCL for chromium is still protective of human health, based on the science available, but that they were examining the new science.

The new science that EPA is currently examining is from a 2007 National Toxicology Program study showing the potential carcinogenic properties of chromium-6. In the press release on the study's findings, the NTP noted that:

"rats and mice were given four different doses of [chromium-6] in their drinking water ranging from 14.3 milligrams/liter to 516 milligrams/liter for 2 years. The lowest doses given to the animals in the study were ten times higher than what humans could consume from the most highly contaminated water sources identified in California."[1]

As a result of this study, EPA is proposing to classify chromium-6 as "likely to be carcinogenic" to humans via ingestion. As of now, EPA plans to make a final determination about the carcinogenicity of chromium-6 in 2011. The agency has a lot of intensive scientific work to do. I would encourage EPA to ensure that it considers all of the best available science when making its final decision and not rush to conclusions.

Additionally, EPA needs to do a better job of communicating to the public the process they are going through. Good science sometimes seems frustratingly slow. However, when we are making decisions about how to spend limited resources and ensure we're focusing on the contaminants of highest public health concern, we have an obligation to get it right the first time.

Unfortunately, none of this helps Norman, or the 30 other communities singled out by the EWG. The residents are surely confused about the EWG's study. At first glance, the findings seem ominous, but upon closer inspection, one can see how the study, particularly how it was couched, is mainly hype.

Let's take Norman as an example. The EWG found that Norman's tap water had a 12.5 ppb concentration of chromium-6. Of course that concentration is significantly lower than the 100 ppb drinking water standard set by EPA. What's more, it's almost meaningless when compared to the 14,300–516,000 ppb concentration that caused cancer in rats in the NTP study.

So what was EWG's reference point? EWG compared its samples to the draft California health goal of 0.06 ppb, which they argued was too high. California public health goals are not regulatory, but instead set to a standard under which no adverse health effects occur over a lifetime, or a one in a million chance of this contaminant contributing to cancer. Additionally, around the same time as this report the California Cancer Registry survey for Hinkley, CA, where the now famous Erin Brockovich case was settled, found that Hinkley did not have any statistical increase in cancer during the time when people drank water that exceeded 550 ppb.[2]

Furthermore, this was no random sample of 35 cities. EWG says in their report that, "Over the years, nearly all of the 35 cities tested by EWG regularly report finding chromium (in the form of total chromium) in their water despite using far less sensitive testing methods than those used by EWG."[3]

This is one of many oddities in the EWG study.

A basic tenet of good science is transparency—that is, sharing your data and assumptions so other scientists can replicate your work. In this case, the EWG has taken the opposite course. City officials in Norman pressed EWG for basic information on its study, such as where and when EWG sampled water. Thus far, EWG refused to answer, indicating to me at least that EWG either lacks confidence in its methods and conclusions or did not intend this report to be more than a scare tactic. Otherwise, what is EWG trying to hide?

It is clear that the EWG report was released to influence both California and EPA to take some action on chromium-6, which both have. California announced it was lowering its public health goal and EPA put out guidance for drinking water systems on how to test for chromium-6, though they gave no indication of how to report the potential health effects to consumers.

I hope that we can have rational discussions about how to properly regulate contaminants in drinking water. In this case, as in others, political tracts disguised as scientific studies are taken as fact, and the consequence is usually more regulation. That in turn can mean high costs for little or no benefit for local communities.

---

[1] "Hexavalent Chromium in Drinking Water Causes Cancer in Lab Animals," NIH Press Release May 16, 2007, *http://www.nih.gov/news/pr/may2007/niehs–16.htm*

[2] "Fewer cancers found in Hinkley than expected," Louis Sahagun, LA Times, December 13, 2010. *http://www.latimes.com/news/local/la-me-hinkley-cancer–20101213,0,7881571.story*

[3] Chromium-6—the Erin Brockovich Chemical—Is Widespread in U.S. Tap Water, Environmental Working Group, December 20, 2010 *http://static.ewg.org/reports/2010/chrome6/html/home.html*

In 1996, Congress successfully amended the Safe Drinking Water Act, and set up a system to ensure that we regulate substances in drinking water in a scientifically sound way. EPA is required to set standards if contaminants "have known health effects," and are "known to occur in public water systems with a frequency and at levels of public health concern," not simply because they catch media attention.

This committee has had success in dealing with drinking water issues in the past. In fact, just last Congress, Madam Chairman, you and I were able to co-sponsor and pass legislation clarifying the definition of "lead free" as it relates to drinking water—lowering the statutorily allowable limit from 8 percent to 0.25 percent.

I would also like to take the opportunity to remind the Committee that we need to improve our nation's drinking water facilities by reauthorizing the State Revolving Loan Fund programs, both for drinking water and waste water. We cannot expect our communities to continue to provide safe drinking water if they do not have the resources to meet their infrastructure needs. This committee has the responsibility to ensure clean, safe, and affordable water for our country by providing the necessary resources to our states and local governments.

EPA estimates that over the next 20 years, eligible drinking water systems will need over $300 billion in infrastructure investments, and that is not taking into account treatment costs for any of the chemicals we are discussing being added. I look forward to working with you and the Chair and Ranking Members of the Water Subcommittee on our next bill.

Due to the severe snow fall in Oklahoma, Steven Lewis, the City Manager from Norman was unable to travel to be with us today. Mr. Lewis's testimony can help put some context around the EWG's findings, and help us understand the robust public health protections Norman has in place. He has agreed to answer any follow-up questions that the committee may have. I would respectfully request that Mr. Lewis's testimony be included for the record. I also welcome the testimony of Charles Murray, General Manager for water for Fairfax County, across the river in Virginia. Mr. Murray will no doubt provide some practical insights into how a local water system is dealing with chromium-6 and other drinking water mandates.

I also want to make special note to welcome EPA Administrator Lisa Jackson. Administrator, it's good to see you. I want to thank you for your willingness last year to work with me and my staff on some very difficult issues. I also want to thank you for your help in passing several key pieces of legislation that were drafted in this committee. With your help, we passed a bill to reduce lead in drinking water and a bill to provide grants to states to reduce diesel emissions.

As we look to the next 2 years, obviously there are many contentious issues ahead—many issues where we have fundamental disagreements. They include:

- Regulating greenhouse gases under the Clean Air Act;
- The Boiler MACT;
- The Utility MACT;
- PM Dust;
- Ozone; and
- Hydraulic Fracturing

Yes, we disagree on these issues. Yet, as we have in the past, let's keep an open line of communication, because there could be areas where we can reach agreement. The lead bill and the diesel bill are just two examples of what can happen if we do that.

So Administrator Jackson, I wish you all the best as we head into a new Congress. Thank you for coming today, and I look forward to your testimony.

I would also like to extend a warm welcome to our new Republican members to our Committee this Congress. Welcome Senator Sessions, Senator Johanns and Senator Boozman. We are happy to have you on our committee and look forward to working with you this Congress. And a welcome back to all our returning committee members, Republican and Democrat.

Thank you again, Madam Chairman, for holding this important hearing, and I look forward to hearing from all of our witnesses.

Senator BOXER. Thank you so much. Senator.

I just want to go through the order of arrival on our side. It is Boxer, Cardin, Lautenberg, Merkley, Udall. On the Republican side, Inhofe, Johanns and Barrasso.

So we will now go to Senator Cardin.

STATEMENT OF HON. BENJAMIN L. CARDIN, U.S. SENATOR FROM THE STATE OF MARYLAND

Senator CARDIN. Thank you, Madam Chair, and thank you for calling this hearing on this extremely important subject. Welcome, Administrator Jackson and Dr. Birnbaum, to our Committee. We look forward to your continuing to work with us to make sure that all people in this country have clean and safe water.

I think for many years in the wake of seminal laws like the Clean Water Act and the Safe Drinking Water Act, many of us took for granted that our water would be safe. But when you hear the stories and accounts now that we are finding chromium VI in our water supplies, it raises serious questions as to whether we are doing everything we need to make sure our water supplies are safe. I add to that the fact that my constituents of Prince Georges County had to boil water because of water main breaks. That also raises questions as to the availability of clean, safe water to the people of this Nation.

That is why I am so glad we have the Environmental Protection Agency, whose job it is under the Safe Drinking Water Act to study chemicals and compounds in our drinking water and decide what is safe and what isn't, and set standards for treatment that protect that health. It is a job that agency did today when it reversed the Bush-era decision and announced that it will set standards for perchlorate, a chemical that we know impairs brain development in fetuses and young children. I congratulate the EPA for doing that, Administrator Jackson.

I feel better, and I think my constituents feel better, knowing that we can turn to Administrator Jackson, a fierce protector of public health and the environment, and ask, what does it mean when the Environmental Working Group found that chromium-6 is in tap water in Bethesda, MD, and what should we do about it. We know that not only is it her job to tell us, but she has, and her staff has, the scientific knowledge and skills to give us the answers or will work to find the answers to those issues.

But for 400,000 Marylanders and those in Prince Georges County that spent much of last week boiling their water, know that it is not just getting the dangerous chemicals, that is not enough to make the water supply safe. For high quality water, we need high quality water infrastructure.

On Monday of last week, a major water main break in Prince Georges County not only destroyed cars and caused serious damage to a local business park, it shut down a portion of the Capital Beltway, it disrupted regular work of the Census Bureau headquarters and Andrews Air Force Base, it shut down local businesses and schools and required 400,000 residents to boil their water to ensure its safety. That task I am sure was made much more difficult during the snow storm when power was cutoff to many of those residents.

We had another dramatic break in Maryland in recent years when we saw River Road in Bethesda turn literally into a river, requiring motorists to be rescued by helicopters and boats. In October 2009, a thousand basements in Dundalk, MD, were underwater. In March 2010, thousands more homes and businesses along major thoroughfares in Baltimore County were left without water.

Madam Chair, this story could be told in just about every community in our country. The major water main breaks that have become near epidemic in our region and elsewhere tell us that major parts of the system are too old and too frail to hold together too much longer. The breaks are more than an inconvenience, they can endanger the health and safety of our citizens, as well as disrupt economic activity and our national security.

That is one of the reasons why our water infrastructure has been given a rating of D minus by our national engineers. The Environmental Protection Agency estimates that more than $340 billion will be needed over the next 20 years to meet the Nation's drinking water infrastructure needs.

For these reasons, I have asked the President to include water in his 6-year plan for infrastructure investment. While water mains are less visible than roads and bridges, they are just as important to our economy and in equally desperate need of repair. That is why as Chairman of the Water and Wildlife Subcommittee, I will have no higher priority than reauthorization the Water Infrastructure Financing Act. I look forward to working with Administrator Jackson, Chairman Boxer, Senator Inhofe and the members of our Committee to report out again, I hope, a Water Infrastructure Financing Act, and hopefully to get it enacted.

Thank you, Madam Chair, and I thank you once again for holding this hearing.

Senator BOXER. Thank you very much.

Senator Boozman, we welcomed you, both sides, and we are very happy to see you here today.

Senator BOOZMAN. Thank you, Madam Chair.

Senator BOXER. So, Senator Johanns.

STATEMENT OF HON. MIKE JOHANNS, U.S. SENATOR FROM THE STATE OF NEBRASKA

Senator JOHANNS. Thank you very much, Madam Chair.

As you pointed out, this is my first meeting, so it is kind of my maiden voyage on this Committee. I won't speak long.

I just wanted to offer a thought or two if I could to maybe frame how I am thinking about this and what I will be interested in as you testify and we ask questions. In another life, some years ago, I had the privilege to serve the city of Lincoln as their mayor for two terms. The city of Lincoln, NE, has a strong mayor form of government, so the mayor is not only the mayor in terms of the ceremonial duties, but is also the city manager, a separate city manager is not hired.

During that period of time, under my jurisdiction was the Lincoln water system, which today does an excellent job, did an excellent job then. I think it one of the most forward-leaning, forward-looking water systems really in the country.

The perspective I would offer is this. There is nobody out there employed by any water system that wants to provide a dangerous product to their customers. Their customers rely upon that source of water, they want to know that it is safe to drink, not only for them but for their children and their babies.

The thing that we were always struggling with, though, is how do deal with the requirements in a way that not only provided that

safety but allowed us to be able to go to customers and say, this additional expenditure of money that we are going to do is justified by good science and a thoughtful approach. Typically that would come from the Federal Government. That is important. We have to make the case. It is one thing for us to sit here in Washington and issue rules and regulations, which I have done also as a former Secretary of Agriculture. It is quite another thing for the people on the ground delivering the service to make the case to that customer clientele that in fact this is the right course of action and it is justified.

So when I press on issues like this, and hopefully ask good, thoughtful, tough questions, it is because somewhere out there, someone is trying to make the case that the requirements are in fact justified.

Final thing I am going to mention, it is interesting how quickly word spreads of new committee assignments, because I already got a letter from one of our water systems in Nebraska, I will make that a part of the record at the appropriate time, raising these same basic issues. Just making the case that, look, we want to provide a safe product, we also want to assure our clientele that the investment that we will be making is justified under the science that is available.

Madam Chair, I thank you very much.

Senator BOXER. Thank you so much.

Senator Lautenberg.

STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. Thank you, Madam Chairman. I welcome our distinguished testifiers here, Lisa Jackson and Dr. Birnbaum. They come with a lot of experience and a lot of concerns about what we might be able to do to protect our health and well-being better.

Clean, safe drinking water is essential in our health and especially for the well-being of our children. Under the Safe Drinking Water, we have made big strides in cleaning our country's water supply. But too many people are still drinking water that is contaminated with dangerous pollutants. Too often, public water supplies are found to be in violation of EPA standards. But the public health is at risk, even when water doesn't violate the law, because EPA has either failed to set limits on pollution at law, but much of that is because of restrictions that prevent them from doing so, or because the limits are too weak.

Since 2004, more than 62 million Americans have been exposed to drinking water that meets EPA standards but actually contains potentially harmful contaminants, including some that are toxic. In fact, research shows that there are more than 140 chemicals in our drinking water that EPA does not regulate. In some parts of our country, these chemicals include gasoline additives and pesticides. In other States, drinking water contains the so-called fracking chemicals, which are used to produce natural gas. In some communities near drilling rigs, you can turn on the tap and literally light the water.

As if that isn't disturbing enough, last year, chromium VI, a carcinogen linked to leukemia, stomach cancer and other cancers, was found in the water supplies of 31 America cities. These cities include some of the Nation's largest, like New York, Los Angeles, Boston, Phoenix and Washington, DC. Chromium pollution is also a major problem in our State of New Jersey. So this is an issue that hits close to home for me, as well as EPA Administrator Lisa Jackson, who previously led the State's Department of Environmental Protection. We miss you there, but we would rather see you here. The reach for the health and well-being of kids is much better with your post here.

Make no mistake, when Administrator Jackson arrived at EPA, she had plenty of work cut out for her. Under President Bush, the EPA was required on several occasions to consider setting limits on contaminants found in drinking water. But each and every time that EPA was given an opportunity to improve water safety during those years, the agency sat on its hands and decided not to regulate. Fortunately, under Administrator Jackson's leadership, the EPA is moving in the right direction, and working on the public's behalf.

As we are going to hear today, Ms. Jackson is taking steps to set new limits on chemicals in our drinking water and doing more to determine the impact of natural gas drilling on our country's water supply. Administrator Jackson is making good use of the tools she has under the Safe Drinking Water Act, but the bill itself limits the EPA's ability to protect the public's right to know.

Now, 25 years ago, I authored the Right to Know Law on toxic chemical releases, to make sure that people knew about potentially hazardous substances in their communities. The public also has a right to know what's in their water. That is why I will soon introduce the Drinking Water Right to Know Act. The Safe Drinking Water only allows EPA to require temporary monitoring of small groups of unregulated contaminants. So the public has no idea that they might be drinking water laden with unregulated contaminants like chromium VI and gasoline additives and other toxins.

My bill would fix this problem by allowing EPA to require a targeted increase in monitoring for unregulated pollutants that could be hazardous. In addition, my bill would require EPA to make information on contaminants in drinking water more readily available online and in simple English. More information on contaminants will empower citizens and help Government to make better decisions on pollutants in the water supply.

So I look forward, Madam Chairman, to hearing from our witnesses about how we can all work together to meet this challenge. My friend and colleague mentioned his grandchildren, and the beauty of the grandchildren. Their beauty will be considerably enhanced for your grandchildren and my grandchildren. Smiles will get better if the water isn't attacking their well-being.

Thank you very much.

Senator BOXER. Thank you, Senator Lautenberg.

Senator Barrasso.

STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM THE STATE OF WYOMING

Senator BARRASSO. Thank you, Madam Chairman.

I would like to add to the comments from Senator Johanns, and I would also like to thank the witnesses for testifying today on such an important matter.

Madam Chairman, there has been an onslaught of job-crushing regulations emerging from the Environmental Protection Agency over the last 2 years. Employment in this country is 9.4 percent. Regulations coming out of the EPA are devastating to the American economy.

Despite the fact that the American people rejected cap and trade, the EPA continues to press forward. Charles Krauthammer wrote in the Washington Post an editorial entitled "Who Makes the Laws, Anyway?" In it he says, "Administrators administer the law, they don't change it. That's the legislators' job."

I don't see that the Environmental Protection Agency has learned that constitutional lesson. The EPA has continued to move forward with job-crushing Clean Air Act regulations for greenhouse gases. Washington Times reporter Richard Rahn stated in a piece entitled "Obama's Regulatory Reform Test" that "Well-qualified independent economists have estimated this will cost the United States in lost foreign investment roughly $100 billion a year and many thousands, thousands of jobs." He bluntly stated the Environmental Protection Agency's climate policies amounted to "national economic suicide."

As the Wall Street Journal pointed out on January 24th, despite the President's executive order to have the EPA do a simple cost estimate of its regulations, the EPA issued a statement saying that it was "confident" that it wouldn't need to change a single rule. Respectfully, Madam Administrator, that sounds arrogant.

I will tell you the Environmental Protection Agency went further and stated that its rules consistently yield billions in cost savings that make them among the cost-effective in the Government.

The most recent example of EPA abuse fits well within today's hearing's subject matter. It is the EPA's abuse of power to use the Clean Water Act to consider climate change in approving TMDLs, or the total maximum daily loads for communities. A TMDL is a plan to reduce overall loading of a particular substance to a body of water. The economic impact of an overly restrictive TMDL can be devastating to communities. It would stop expansion of a sewer system to put in a new housing development or a small business or a factory. It could increased the sewer rates on existing customers, which could limit any new land use activity that could impact the loading. This includes activities such as forestry and farming.

Now the EPA wants to consider the potential, potential effects of climate change on water bodies. No one can predict what the effect would be of a changing climate on a body of water years into the future. Not even the oracles at the Environmental Protection Agency can do that. In fact, in the EPA's most recent and rigorous review of the impacts of climate change on water, it mentions the "uncertainty," the uncertainty of climate change effects, 47 times in the 72 pages report. Yet the EPA wants to potential open up all

43,658 approved TMDLs across all 50 States and territories and now, factor in climate change. This would eliminate any certainty in existing and future investment in new factories and small business across the country.

The only thing that is certain is Congress didn't approve this sweeping, job-crushing idea. Anti-job activists did, and they did it behind closed doors at the Environmental Protection Agency.

We need to send a message to the EPA that the days of legislating without Congress are over. The consent of the governed is re-established. That is why I have introduced Senate Bill 228, the Defending America's Affordable Energy and Jobs Act. I have done it with 10 of my fellow Senators. This bill establishes that Congress shall set the Nation's energy and climate and policy, and eliminate these job-crushing regulations.

I thank the Chairman and look forward to the testimony.

Senator BOXER. Thank you.

As chair of this Committee, I want to put in the record with unanimous consent the Supreme Court decision that said the following: "Because greenhouses gases fit well within the Clean Air Act's definition of air pollutant, we hold that EPA has the statutory authority to regulate the emission of such gases."

This is a hearing about clean water. Senator, you had every right to say whatever you want. But it is not consistent with the topic before us.

But I wanted to put this into the record, because I thought you might go in this direction. I think it is important to note that if the EPA failed to regulate carbon pollution, they would be going against the Clean Air Act and against the Supreme Court decision. We are a country of laws, not people, no matter how strongly we feel. I think those people who want to repeal the Clean Air Act, should go ahead and do it. You want to repeal it, you have every right.

But the fact is, to attack an agency that is carrying out the law is totally inappropriate. That is just how I feel about it.

[The referenced document was not received at time of print.]

Senator BOXER. Senator Inhofe, you can have a minute to respond.

Senator INHOFE. Well, let me respond. It is my understanding of the Court that they gave the authority to the EPA to do that but not a mandate to do it. So that discretion was made by the EPA. I think that needs to be part of this UC.

Senator LAUTENBERG. Madam Chairman——

Senator BOXER. Well, just a moment. We could go back and forth. The EPA had the responsibility to make an endangerment finding. That was under the law. If they found via the science that there is a danger to the people from carbon pollution, they had to pass this finding, which they did.

But I am really going to cut this off now, because we really will have lots of opportunity as we look at your law and the kinds of things we want to do on our side. But we are just going to move forward.

Senator INHOFE. Well, let me just respond to the comment on the endangerment finding.

Senator BOXER. Well, this could go on all day.

Senator INHOFE. I know——

Senator BOXER. Who has the last word?

Senator LAUTENBERG. Well, if we are going to go on, I want to go on also.

[Laughter.]

Senator INHOFE. Madam Chairman, I will address my part during my questions.

Senator BOXER. Thank you. If everyone can address their part during the question time. I think we see the divide here very clearly. It is healthy, it is not unhealthy that we have this divide. It is the fact. We will deal with it. We all want a Highway Bill.

[Laughter.]

Senator BOXER. But we also, I think, all want clean air. So we will be taking these things up.

All right, getting back. We now will hear from Senator Merkley, followed by Senator Boozman, followed by Senator Udall, and then we will get to our witnesses.

Senator Merkley.

STATEMENT OF HON. JEFF MERKLEY, U.S. SENATOR FROM THE STATE OF OREGON

Senator MERKLEY. Thank you, Administrator Jackson and Dr. Birnbaum, for coming, and for your work to ensure safe drinking water for all Americans.

I appreciate the work of the EPA on helping to establish an appropriate testing regime for cryptosporidium in the Bull Run and also for your hard work on the tailoring rule to put biomass into the proper life cycle context. So I look forward to your testimony today and thank you.

Senator BOXER. That was amazingly brief.

[Laughter.]

Senator BOXER. You caught me by surprise.

Senator Boozman.

STATEMENT OF HON. JOHN BOOZMAN, U.S. SENATOR FROM THE STATE OF ARKANSAS

Senator BOOZMAN. Thank you. I will follow in the Senator's footsteps. It sounds like we need to move on and that the question period is going to be interesting.

I was the Ranking Member on Water Resources, and had the opportunity of working with both of the witnesses over there, and look forward to working with them in the future. These are very serious problems. I think the key is, as we move forward, we have to have sound science, we have to have sound methodology to back things up.

Thank you very much.

Senator BOXER. Thank you so much, Senator.

Senator Udall.

STATEMENT OF HON. TOM UDALL, U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator UDALL. Madam Chair, there maybe a stampede here. I am going to put my opening statement into the record, so we can get directly to the witnesses.

Thank you.

Senator BOXER. Thank you, that is very kind.

Administrator Jackson, we welcome you and please, go ahead.

STATEMENT OF HON. LISA JACKSON, ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY

Ms. JACKSON. Good morning, Chairman Boxer, Ranking Member Inhofe and members of the Committee. I will ask permission for my opening statement to also be put into the record, and I will just give a few remarks here in the interest of time.

Thank you for inviting me to discuss the safety of our Nation's water. As we sit here every day across the country, Americans, rural areas and urban areas, rich, poor, red States and blue States, turn on their taps with one expectation, that the water that comes out will be safe for them and for their families to drink. The EPA, along with the States, who implement our Nation's drinking water laws, are responsible for ensuring that our water is safe, which means addressing not only infrastructure, but new and emerging contaminants as they present themselves to us, and if they affect the public health, especially the health of our children.

Today I am pleased to announce that EPA has begun the process of controlling toxic contamination of the chemical commonly known as perchlorate in our drinking water. Perchlorate is a toxic component of rocket fuel. It is not naturally occurring; it can cause thyroid problems and may disrupt the normal growth and development of children in the womb.

This decision has been years in the making, but it is essentially about two things. First and foremost, it is about protecting the health of the between 5 million and 17 million Americans that have perchlorate in the water that they drink. Second, this decision is about following the science. Perchlorate has been studied and reviewed for years. The science has led to this decision. It has been peer-reviewed by independent scientists, by public health experts and many others.

The next step for us is to update our laws in a way that is sensible and practical for protecting the health of the American people. So when we do that, as we look at our regulations for perchlorate, we will look at the feasibility and affordability of treatment systems, the costs and the benefits of potential standards, and of course, we will make sure our approach continues to be based on sound, up to date science.

We will also continue to make sure that we act as quickly as possible to protect our health from emerging threats in our drinking water, including one we also heard about this morning, hexavalent chromium, also called chromium VI, a toxic chemical and contaminant that is already a well-known human carcinogen when it is inhaled. The issue now is that recent animal testing, publicly available, has demonstrated carcinogenicity that is associated with ingesting chromium VI in drinking water. That discovery, along with the recent report by the Environmental Working Group that found elevated levels of chromium VI at the tap in 20 public water systems, has heightened public concern about chromium VI.

Now, this report was a snapshot in time. But it is consistent with other studies that we have seen that have detected chromium VI

in public water systems. As with perchlorate, science will guide all of our actions on chromium VI. We are working to finalize our human health assessment for the chemical. There will be an independent and external scientific peer review this spring. We expect to finalize our health assessment by the end of the year.

Based on the current draft assessment, it is likely that we will tighten our drinking water standards for this chemical. However, let me be clear: we will wait for our human health assessment on chromium VI to be finalized and to have gone through full peer review.

In the meantime, we have taken a series of steps to better understand the threat and protect the health of the American people. We are working with State and local officials in monitoring to find out how widespread and prevalent this contaminant might be in our Nation's drinking water.

Second, we have provided voluntarily guidance to all water systems nationwide on how to test for chromium VI. Finally, EPA is offering technical expertise and assistance to those communities that have the highest levels of chromium VI.

Finally, I would like to give a very brief update on a larger picture, and that is where we are with our drinking water strategy at EPA. I announced it about a year ago. The strategy is actually designed to transform the agency, so that we can use our existing Safe Drinking Water laws to achieve greater health and protection more quickly, more cost-effectively and transparently. We have made a great deal of progress.

One key component is the idea of addressing contaminants as groups of contaminants that act the same way in our bodies. As the agency has traditionally looked at each contaminant alone. I am pleased to announce that EPA has selected out first group to look at, it is the group of volatile organic compounds that are carcinogenic, and includes things like industrial solvents that may cause cancer.

Another component of the strategy is to work with universities to move the science along, to let our entrepreneurs and engineers help us address our problems. Two weeks ago, I was in Cincinnati in our engineering lab with the Small Business Administration, with Proctor and Gamble, with GE, with small businesses who are excited about the business opportunities associated with solving our Nation's water challenges.

In closing, Madam Chairman, clean and safe drinking water is the foundation of healthy communities, healthy families, and yes, healthy economies. Clean and safe water is not a luxury, it is not a privilege, it is the right of every single American. I look forward to working with this Committee to that end, and in answering any questions you may have. Thank you.

[The prepared statement of Ms. Jackson follows:]

STATEMENT OF HON. LISA P. JACKSON, ADMINISTRATOR, U.S. ENVIRONMENTAL PROTECTION AGENCY

Chairman Boxer, Ranking Member Inhofe, and Members of the Committee, thank you for inviting me to discuss the safety of our Nation's drinking water. Every day, Americans drink water from the taps in our homes, in our work places, and at our family's day care and schools. Having safe drinking water is essential to our health, our children's health and our economy.

EPA affirms the goal of the Safe Drinking Water Act (SDWA) to protect American's health by ensuring that the Nation's drinking water supply is safe. We have made significant progress since Congress wrote and passed SDWA 35 years ago, but we still face challenges. While we've put in place standards to address more than 90 drinking water contaminants, there are many more contaminants of emerging concern, which science has only recently allowed us to detect at very low levels. We need to keep pace with the increasing knowledge and potential public health implications from the growing number of chemicals that may be present in our products, our water, and our bodies. EPA understands our responsibility under the law to respond to new challenges, both to protect the public's health and to sustain Americans' confidence in the safety of their drinking water for themselves and their children.

SDWA defines a rigorous process to keep drinking water standards up to date to respond to improving science and emerging concerns. Two contaminants that have received a great deal of public attention recently, perchlorate and hexavalent chromium (chromium-6), provide examples of EPA activities to protect public health. EPA is evaluating the opportunity for health risk reductions from unregulated contaminants such as perchlorate, and reviewing existing standards, such as chromium, to determine if public health protections can be improved. I would like to highlight actions we are taking right now to focus our efforts on these contaminants in light of evolving science indicating the potential for greater public health concerns that prompts the need for an effective response.

PERCHLORATE

When I became the EPA Administrator, I committed to re-evaluate EPA's 2008 preliminary determination not to regulate perchlorate. In August 2009, EPA asked for public comment on our re-evaluation of the science supporting the perchlorate regulatory determination. We have received almost 39,000 comments on this and previous perchlorate notices and we continue to evaluate the evolving science. I remain committed to completing a regulatory determination for perchlorate and expect to announce the results of our evaluation soon.

HEXAVALENT CHROMIUM (CHROMIUM-6)

EPA also has the responsibility to reevaluate our existing regulations to ensure they stay current with science advancements including health assessments, improvements in technology, or other factors that may provide important opportunities to maintain or improve public health protections. An example is our regulation of total chromium and the evolving science on hexavalent chromium (referred to as chromium-6). Our total chromium drinking water standard applies to all forms of chromium and was established in 1991 based on the best available science at that time. This standard was designed to prevent the health effects from the more toxic form of chromium, which is chromium-6.

However, the science behind chromium-6 is evolving. For example, recent animal testing data by the National Toxicology Program[1] have found evidence of carcinogenicity that was not previously associated with ingesting chromium-6. EPA is already on a path toward identifying and addressing potential health threats from long-term exposure to chromium-6 with a new draft health assessment released this past fall.

This assessment still needs to be reviewed by independent scientists before a determination of whether or not to revise the drinking water standard for total chromium or set a specific standard for chromium-6. A recent report by the Environmental Working Group (EWG) has increased awareness and public concern about the presence of chromium-6 in drinking water. While this report was a "snapshot in time," it is consistent with other studies that have also detected chromium-6 in public water systems.

EPA recently committed to a series of actions to address chromium-6 in our drinking water. First, EPA is working with State and local officials to better determine how widespread and prevalent this contaminant is in our Nation's drinking water. Second, we provided guidance to all water systems nationwide on how to sample and test drinking water for chromium-6. This guidance, released on January 11, 2011, provides recommendations on where systems should collect samples, how fre-

[1] Citation in IRIS Toxicological Review: NTP. (2008) NTP technical report on the toxicology and carcinogenesis studies of sodium dichromate dihydrate (CAS No. 7789–12–0) in F344/N rats and B6C3F1 mice (drinking water studies). Washington, DC: National Toxicology Program; NTP TR 546. Available online at http://ntp.niehs.nih.gov/files/546__web__FINAL.pdf (accessed January 29, 2008).

quently samples should be collected, and analytical methods for laboratory testing. We believe that systems that perform the enhanced monitoring recommended in EPA's guidance will be able to better inform their consumers about any presence of chromium-6 in their drinking water, evaluate the degree to which other forms of chromium are transformed into chromium-6, and assess the extent to which existing treatment affects the levels of chromium-6 in drinking water. Third, EPA is also offering technical expertise and assistance to communities cited in the EWG report as having the highest levels of chromium-6 in drinking water.

Strong science and the law will continue to be the foundation of our decision-making at EPA. EPA takes its obligation to ensure the safety of the water supply very seriously and will continue to do all that we can, using sound science and the law, to protect people's health.

DRINKING WATER STRATEGY

EPA national drinking water standards for contaminants such as chromium are essential to the protection of our water quality, but these individual regulations cannot keep pace with the thousands of chemicals that have been identified as being in commerce via the Toxic Substance Control Act (TSCA) and those that may be introduced in the future. In March 2010, I outlined a vision seeking to use existing authorities where appropriate to achieve greater health protection more quickly, cost-effectively, and transparently. I am pleased to say that in the last year we have made a great deal of progress on this approach.

One key component of the new drinking water strategy is to address contaminants as groups rather than individually. The traditional framework for drinking water regulation focuses on detailed assessment of each individual contaminant of concern and can take many years. Throughout 2010, EPA engaged stakeholders in a national conversation about how we might streamline this process by addressing multiple contaminants at once, which may provide protections more quickly and also allow utilities to implement them more efficiently. We have examined a number of contaminant groups that have a common health endpoint of concern, a common treatment approach, and/or common measurement methods.

I am pleased to announce that EPA has selected the first contaminant group and will be working toward developing one regulation to address up to 16 Volatile Organic Compounds (VOCs), which are chemicals such as industrial solvents. This group will include trichloroethylene (TCE) and tetrachloroethylene (PCE), which I announced last March we'd be revising, as well as up to 14 other VOCs that may cause cancer, some that are currently regulated and some that have not previously been regulated. EPA will also evaluate whether to regulate nitrosamines as a group. We have found these disinfection byproducts in a number of water systems and will assess whether or not this group of contaminants should be regulated as part of our next round of regulatory determinations.

The second component of the drinking water strategy is to foster development of new drinking water technologies to address health risks more comprehensively and cost-effectively. On January 18, I announced, in partnership with the U.S. Small Business Administration, the formation of a regional water technology innovation cluster in the Greater Cincinnati, Dayton, Northern Kentucky and Indiana region. The cluster involves businesses, universities and governments working together to promote economic growth and technology innovation. The cluster will not only assist in developing technology safeguards for drinking water and the protection of public health, but it will also encourage economic development and create jobs.

A third component of our new drinking water approach is to utilize provisions of multiple laws, where appropriate, to better protect drinking water. EPA offices have identified contaminants of mutual concern under drinking water, pesticide and toxic laws. By sharing information collected and analyses we can make sure that the best science is available to further public health protection goals. For example, occurrence data collected for SDWA reviews can inform decisions made to protect water resources under pesticide and toxics laws, while health effects information from pesticides and toxics laws can be used to provide advisory benchmark information to States and water systems that may find these chemicals in their water supplies.

Finally, because Americans have a right to know and to be assured that their drinking water is safe, the fourth component of the strategy is to provide easy access to drinking water compliance monitoring data. Taking a step toward this goal, in November 2010, EPA partnered with the Environmental Council of the States, the Association of State and Territorial Health Officials, and the Association of State Drinking Water Administrators to establish a data sharing memorandum of understanding (MOU). Under this MOU, EPA and the States will collaborate on developing the advanced information technology necessary to facilitate sharing and

analysis of the large amount of data. This will help us better understand national trends in occurrence of drinking water contaminants and will enable consumers to easily obtain information about the quality of their drinking water.

Clean and safe water is the foundation of healthy communities, healthy families, and healthy economies. I want to emphasize that EPA is committed to working with our State partners to build the Nation's confidence that these resources are safe and to provide Americans with clean and safe drinking water every day.

I greatly appreciate the leadership of this Committee on the Safe Drinking Water Act and we look forward to coordinating with Chairman Boxer, Ranking Member Inhofe and Members of the Committee as we work to achieve these important goals.

[RESPONSES BY LISA JACKSON TO ADDITIONAL QUESTIONS FOLLOW.]

Senate Committee on Environment and Public Works
"Oversight Hearing on Public Health and Drinking Water Issues"
Questions for the Record
EPA Administrator Jackson
February 2, 2011

Senator Barbara Boxer

1. **Please describe the importance of the Agency using the best available science to develop drinking water safeguards for perchlorate?**

RESPONSE: The EPA believes the use of best available peer reviewed science, adherence to the law, and transparency are critical foundations for developing effective drinking water regulations that are protective of public health. The agency is committed to using the best available science and peer reviewed data in developing a National Primary Drinking Water Regulation for perchlorate. The agency will consult with our Science Advisory Board and with the National Drinking Water Advisory Council in developing the perchlorate drinking water standard. In addition, the EPA will provide an opportunity for public comment on the proposed regulation, and will carefully evaluate and consider any new studies and data submitted by public commenters in developing a final regulation.

2. **Could you explain the role that stakeholders will have in developing drinking water safeguards to address perchlorate contamination?**

RESPONSE: Stakeholder participation is a key to developing a high quality and effective drinking water regulation. When the EPA publishes the proposed regulation and supporting analyses for perchlorate, there will be an opportunity for public review and comment from drinking water stakeholders and the public generally. The EPA will review and consider the public comments in promulgating a final regulation for perchlorate. In addition, on March 3, 2011, the EPA hosted a public meeting to engage stakeholders on environmental justice considerations for drinking water regulatory efforts, including perchlorate. If the EPA determines that the regulation may have a significant economic impact on a substantial number of small entities, the EPA will also conduct targeted small entity outreach consistent with the requirements of the Regulatory Flexibility Act as amended by the Small Business Regulatory Enforcement Fairness Act.

3. **Chromium-6 is a heavy metal that has been linked to a variety of health effects, including cancer. Could you please describe the main health threats that the Agency is studying related to chromium-6 in drinking water, including any potential threats to the health of pregnant women, infants and children?**

RESPONSE: The agency's Integrated Risk Information System (IRIS) Program has prepared a draft Toxicological Review of Hexavalent Chromium (2010) which is currently undergoing public comment and external peer review by an independent panel of scientific experts. This draft Toxicological Review is a re-assessment of noncancer health effects and a new assessment of cancer health effects of hexavalent chromium following oral exposure to this substance (e.g., ingestion of drinking water containing hexavalent chromium) based on a review of the peer-reviewed published scientific literature. The National Toxicology Program (NTP, 2008) recently concluded that there is "clear evidence of carcinogenic effects" in rats and mice based on results from lifetime studies in which animals were exposed to hexavalent chromium in drinking water at doses above 5 ppm. These studies showed an

increased incidence of oral tumors in rats and an increased incidence of tumors of the small intestine in mice. In addition, effects in humans have been reported in populations exposed unintentionally to elevated levels of hexavalent chromium over an extended period of time. In one study, data from a Chinese population exposed to chromium-contaminated soils and drinking water provide some evidence of an excess risk of mortality from stomach cancer[1,2]. These Chinese villagers had been exposed to levels of hexavalent chromium up to 20 milligrams per liter. In laboratory animals, the most sensitive noncancer effects have been adverse changes to tissues of the small intestine, liver, and lymph nodes of both rats and mice[3]. At higher doses, reproductive and developmental effects have been found in animals. For example, when exposed to hexavalent chromium in drinking water, rodents (both rats and mice) display decreased fertility, increased incidences of fetal loss, and external and skeletal abnormalities[4]. Adverse effects on fertility are observed in both male and female rats and mice at concentrations of 250 ppm and higher. The draft toxicity reference values (i.e., reference dose and oral cancer slope factor) derived in the draft Toxicological Review are based on the health effects described above. These values take into account the increased susceptibility of sensitive populations such as pregnant women, infants, and children, which includes recommending the use of age-dependent adjustment factors to evaluate cancer risks in children. The draft Toxicological Review has been peer reviewed by an independent expert peer review panel. The EPA recently received the final comments from the external peer review committee, whose report can be found at: http://cfpub.epa.gov/ncea/iris_drafts/recordisplay.cfm?deid=221433.

4. **EPA currently has a draft IRIS Risk Assessment for chromium-6. Please describe how the agency will use the assessment in determining whether to develop drinking water safeguards to address chromium-6 contamination.**

RESPONSE: The draft IRIS Toxicological Review for hexavalent chromium, released in September 2010, is an assessment of the health effects of hexavalent chromium following oral exposure based on a review of the peer-reviewed published scientific literature. The external peer review panel met in May 2011, and the final peer review report was posted on the EPA's website on July 21, 2011. The EPA is reviewing the external peer review report and is evaluating the peer review and public comments and incorporating them into the assessment. Finalizing our health assessment is a critical step to assure a sound scientific and transparent basis for decision making. When finalized, the EPA will carefully review the assessment and other relevant information to determine if a revised standard to address hexavalent chromium in drinking water is needed.

5. **On January 11, 2011, EPA issued guidance to drinking water utilities on how they can voluntarily test for chromium-6 in drinking water. Could you please explain why the Agency issued this guidance and the process that EPA used to develop the document?**

RESPONSE: The EPA issued the monitoring guidance to provide information to public water systems (PWSs) about how they can obtain better information about how to measure the levels of chromium-6 in

---

[1] Zhang, J; Li, X. (1987) Chromium pollution of soil and water in Jinzhou. J of Chinese Preventive Med 21:262-264.
[2] Beaumont et al. (2008) Cancer mortality in a Chinese population exposed to hexavalent chromium in drinking water. Epidemiology 19(1):12-23.
[3] NTP. (2008) NTP technical report on the toxicology and carcinogenesis studies of sodium dichromate dihydrate (CAS No. 7789-12-0) in F344/N rats and B6C3F1 mice (drinking water studies). Washington, DC: National Toxicology Program; NTP TR 546. Available online at http://ntp.niehs.nih.gov/files/546_web_FINAL.pdf
[4] Elbetieha A, Al-Hamood MH. 1997. Long-term exposure of male and female mice to trivalent and hexavalent chromium compounds: Effects of fertility. Toxicology 116:39-47.

their drinking water, determine the levels of hexavalent chromium in the distribution systems, and assess the degree to which existing treatment is affecting the levels of hexavalent chromium. EPA developed this guidance through discussion with numerous stakeholders including state drinking water administrators, representatives from commercial laboratories with experience evaluating chromium 6 in drinking water, and laboratory equipment manufacturers. Care was taken to provide the public water system community with accurate and complete information to allow them to consider monitoring for chromium-6 in their water. The EPA continues to work with state and local drinking water officials to develop frequently asked questions (FAQs) to address technical aspects of sampling and the analytical method as well as recommended responses to consumer's questions about hexavalent chromium in drinking water.

6. **Chromium-6 is one of the toxic metals that can leach into surface and ground waters from coal ash. Has EPA investigated the extent that coal ash impoundments and other disposal sites may be a source of chromium-6 contamination in groundwater and surface waters? Does the Agency intend to take into account the potential of coal ash to leach chromium-6 as the Agency determines how to regulate the disposal of coal ash?**

RESPONSE: Yes. The EPA is aware that coal ash impoundments and other disposal sites may be a source of hexavalent chromium contamination to ground and surface waters because hexavalent chromium is more soluble than chromium-3 and leaches out of coal ash under certain conditions at higher levels than does chromium-3. The EPA is considering information from its damage cases and other data and information provided during the public comment period associated with its coal combustion residual (CCR) rulemaking as the agency determines how best to regulate CCRs.

7. **Please provide me with an update on the status of EPA's study on the potential impacts of hydraulic fracturing on groundwater and surface waters.**

RESPONSE: The draft plan was reviewed by a special panel of the Science Advisory Board (SAB) on March 7-8, 2011. The SAB Panel released an initial draft report on its findings on April 28, and subsequently discussed the report at public teleconference calls on May 19 and 25. Upon receipt of the final report, the EPA will consider the Panel's recommendations along with comments that the SAB received from stakeholders. The agency will provide a response to the SAB, revise the study plan accordingly, and undertake research consistent with the final study plan. Initial findings will be released in late 2012.

8. **The following questions concern the content of the Agency's study on the potential impacts of hydraulic fracturing:**

   A. **Will the Agency include an assessment of the extent to which Section 322 of the Energy Policy Act of 2005 which contained some exemptions related to hydraulic fracturing under the Safe Drinking Water Act's Underground Injection Control Program, had an impact on the ability of EPA to fully investigate reported instances of drinking water contamination or other impacts from hydraulic fracturing?**

RESPONSE: No. The EPA is committed to study the potential impacts of hydraulic fracturing on drinking water resources. The EPA study will not evaluate alternative policy options, but will evaluate the impacts of hydraulic fracturing as it is currently practiced.

B. Please describe whether EPA will also include an assessment of the extent to which non-disclosure agreements signed by persons who settled claims against companies that allegedly contaminated their water supplies from hydraulic fracturing may have had an impact on the ability of EPA to fully investigate reported instances of drinking water contamination or other impacts from hydraulic fracturing?

RESPONSE: The EPA is not assessing non-disclosure agreements. The EPA is considering what additional information, if any, would provide useful data for our assessment of the potential impacts of hydraulic fracturing on drinking water resources.

9. [NO QUESTION 9]

10. EPA's draft hydraulic fracturing study proposes to look at how large volume water withdrawals from ground and surface waters to conduct hydraulic fracturing might impact drinking water availability and quality. Is EPA committed to examining these impacts and including its assessment and findings in the final study?

RESPONSE: The EPA will make a final determination regarding this issue taking into consideration input from the Science Advisory Board.

11. Does EPA have a plan to investigate the potential adverse human health effects of releases of toxic air pollutants from gas drilling operations involving hydraulic fracturing operations, including releases of air pollutants from the practice of spray evaporation of return flow and process water from hydraulic fracturing operations?

RESPONSE: As directed by the request from the 2010 Congressional Appropriations Committee, the EPA's study is of the relationship between hydraulic fracturing and drinking water resources, thus the EPA considers air impacts outside the scope of the current study. Nonetheless, in the course of the EPA's evaluation of air emissions under the Clean Air Act (CAA Sections 111 and 112), including those of criteria pollutants and toxics, and available controls for such emissions from the oil and gas production sector, we intend to consider the impacts of those emissions on public health, as well as improvements to health that would be expected to result from possible revisions to the emission standards. Our assessment would not be specific to air emissions from fracturing activities per se, but would consider emissions from all relevant activities, including well completions, evaporation ponds, and spray evaporation operations.

12. The Safe Drinking Water Act prohibits the use of diesel fuel in hydraulic fracturing operations. However, there are reports that describe the use of diesel fuel in hydraulic fracturing operations. Please provide the Committee with an update on the EPA's efforts is investigate the use of diesel fuel in hydraulic fracturing operations, and the actions that the Agency has taken and could take to protect public health and environmental quality from any such use.

RESPONSE: The EPA is aware of reports that diesel fuel is being used in hydraulic fracturing fluids. We have embarked on an expeditious effort to clarify the permitting process as it relates to diesel use in hydraulic fracturing operations under the Underground Injection Control program. The law states that a permit must be issued for the use of diesel if injected underground for the purposes of hydraulic fracturing. We are in the process of engaging the public, industry, states and environmental groups as

we develop permitting guidance for companies that use diesel fuel. Our intention is to issue draft guidance for public comment, following a dialogue with stakeholders.

In addition, as described above, the EPA's study on the relationship between hydraulic fracturing and drinking water has already involved engagement with thousands of Americans across the country living in areas where hydraulic fracturing is taking place. This effort included the EPA requesting significant information from nine companies involved in this process regarding the chemical composition of the fracturing fluids they are injecting into the ground, including diesel fuel, and other information. The data requested is integral to the Hydraulic Fracturing Study and understanding any potential relationship between drinking water and hydraulic fracturing.

The EPA is committed to protecting public health and the environment and will not hesitate to take enforcement action against any entities continuing to use diesel fuel in hydraulic fracturing without authorization. Whether the EPA will take enforcement action against companies that injected diesel fuel in past hydraulic fracturing operations will depend on the particular facts and circumstances of each case. That said, in order to protect the confidentiality of potential case developments and assure effective enforcement, the EPA cannot comment on potential enforcement investigations or responses.

13. At least 2 EPA Regions have issued emergency orders pursuant to Section 1431 of the Safe Drinking Water Act to gas drilling companies engaged in hydraulic fracturing where EPA determined that contaminants in drinking water may present an imminent and substantial endangerment to the health of people drinking that water. Please provide the Committee with copies of all such emergency orders relating to drilling operations involving hydraulic fracturing.

RESPONSE: We assume the Senator is referring to the EPA's recent Fort Peck and Range orders. We have attached those orders here.
(See attached file: range_order.pdf).

(See attached file: poplar_order.pdf.) Previous orders issued in the Poplar matter may be found at: http://www.epa.gov/region8/compliance/

14. EPA has announced that it intends to regulate some drinking water contaminants as a group, rather than regulating one contaminant at a time. In your testimony, you state that EPA has selected a group of up to 16 volatile organic compounds (VOCS") as the first contaminant group under this new approach. Please explain how this approach provides greater public health protection and how it can help to expedite the pace of the Agency's development of such standards.

RESPONSE: The current approach to drinking water protection is focused on a detailed assessment of each individual contaminant of concern and can take many years. Addressing contaminants as a group rather than individually may provide public health protections more quickly and also allow utilities to more effectively and efficiently plan for improvements.

The agency determined that carcinogenic Volatile Organic Compounds (VOCs) are appropriate to regulate as a group because they meet the following factors:

(a) the public health goal is similar because they all may cause cancer;

(b) most of this group of VOCs can be measured by the same analytical method (i.e., EPA 524.2 located on the EPA web site at: http://www.epa.gov/sam/pdfs/EPA-524.2.pdf);
(c) many can be treated by the same treatment technologies (i.e., aeration and/or granular activated carbon); and
(d) a preliminary evaluation of occurrence indicates that some of these VOCs may co-occur and all are expected to be found in drinking water.

15. In March 2011, EPA announced the results of its Second 6-Year Review of existing National Primary Drinking Water Standards and identified trichloroethylene ("TCE") as a candidate for revision based on a review of the science on its health effects. Provide the Committee with the following:

A. The history of the Agency's development of a risk assessment for TCE, including the conclusions of any National Academy of Sciences reports concerning EPA's assessment and findings of TCE's health effects, including risks to children's health and cancer risks;

RESPONSE: In August 2001, the EPA released an "External Review Draft Trichloroethylene Health Risk Assessment: Synthesis and Characterization" for public review and comment. The EPA's Science Advisory Board (SAB) met in June 2002 to review this draft health assessment. In their review, released December 2002, the SAB commended the agency for its groundbreaking work in several important new areas in risk assessment, but identified a need to strengthen the rigor of the discussion and address several key substantive areas.[5]

In February 2004, the EPA hosted a Symposium on New Scientific Research Related to the Health Effects of Trichloroethylene. The purpose of this symposium was to gather information on recently published scientific research for use by the EPA in assessing the human health risks of TCE.

Subsequently, a federal interagency working group coordinated by the White House Office of Science and Technology Policy (OSTP) decided that a scientific consultation with a National Academy of Sciences (NAS) panel would be beneficial and informative to clarify the state of the science as the EPA moved forward in completing its health risk assessment. This consultation was initiated in September 2004 under sponsorship of the EPA and other federal agencies.

In February 2005, the EPA submitted four papers of key scientific issues related to TCE to the NAS. In July 2006, the NAS released the report "Assessing the Human Health Risks of Trichloroethylene: Key Scientific Issues Consultation." In this report, the NAS concluded that the "evidence on carcinogenic risk and other health hazards from exposure to trichloroethylene has strengthened since 2001." The NAS recommended that risk assessment be finalized "with currently available data."[6] Based on these reviews, symposia and reports, the EPA revised the draft health assessment for TCE.

In November 2009, the EPA released a "Toxicological Review of Trichloroethylene (External Review Draft)" for public comment and peer review by the EPA's SAB. In 2010, the EPA's SAB hosted a public meeting and several public teleconferences to review the draft document. The SAB peer review report was transmitted to the EPA Administrator on January 11, 2011. Overall, the SAB panel supported the EPA's scientific approaches to the risk assessment and found these to appropriately adhere

[5] http://www.epa.gov/sab/pdf/ehc03002.pdf
[6] National Research Council, Committee on Human Health Risks of Trichloroethylene (2006). "Assessing the Human Health Risks of Trichloroethylene: Key Scientific Issues."

to the EPA's risk assessment guidelines, and the SAB commended the EPA for its comprehensive approach and responsiveness to the NAS recommendations[7]. The SAB panel also made a number of recommendations aimed at enhancing the transparency of the draft assessment and strengthening the scientific basis for the conclusions presented.

B. The current status of EPA's assessment of the potential health risks from exposure to TCE; and

RESPONSE: The EPA is currently revising its "Toxicological Review of Trichloroethylene (External Review Draft)," taking into consideration external peer review and public comments. The draft will then undergo a final EPA internal review and an EPA-led interagency science discussion with other federal agencies and White House offices. The completed assessment is expected to be publicly available and posted on the IRIS database during the fourth quarter of FY 2011.

C. A schedule for EPA revision of its drinking water standard for TCE.

RESPONSE: The EPA plans to revise the TCE standard as part of the carcinogenic VOCs rulemaking. Regulatory efforts to begin addressing carcinogenic VOCs were initiated in March, 2011. Typically, it takes about two to two and a half years to develop a proposed rule and following that about two years to promulgate a final rule.

[7] http://yosemite.epa.gov/sab/sabproduct.nsf/02ad90b136fc21ef85256eba00436459/B73D5D39A8F184BD85257817004A1988/$File/EPA-SAB-11-002-unsigned.pdf

Senator James M. Inhofe

1. **What criteria does EPA use to determine whether to establish a uniform, national drinking water standard for any chemical?**

   a. Will these be the same criteria applied to chromium 6?
   b. Will these be the same criteria applied to perchlorate?
   c. Will these be the same criteria applied to Volatile Organic Compounds (VOCs)?

RESPONSE: The EPA's determination to promulgate a national primary drinking water regulation for unregulated contaminants is made based upon the three criteria established under Section 1412.b.1a of the Safe Drinking Water Act:

i. the contaminant may have an adverse effect on the health of persons;
ii. the contaminant is known to occur or there is a substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern; and
iii. in the sole judgment of the Administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems.

These criteria were utilized in the determination to regulate perchlorate in drinking water, and will be the criteria the agency uses to determine whether or not to include the eight unregulated carcinogenic volatile organic compounds (VOCs) as part of the carcinogenic VOC regulation the agency is currently developing. For currently regulated contaminants such as chromium and the eight regulated carcinogenic VOCs, the EPA will review and revise the regulation(s), as appropriate, and any revision shall maintain or provide for greater protection of the health of persons in accordance with Section 1412.b.9 of the Safe Drinking Water Act. For revisions, the EPA also uses the "meaningful opportunity" criterion to examine whether the contaminant is found at levels and frequency that would mean that a revised standard would provide a meaningful opportunity for health risk reduction for persons served by public water systems.

2. **How long does it normally take EPA to develop a thoughtful drinking water regulation, that is, from the time the draft IRIS Toxicological Review is started, through setting the maximum contaminant level goal and the development and publishing of the maximum contaminate level drinking water standard?**

RESPONSE: IRIS toxicological reviews and development of national primary drinking water standards are related actions which take place on separate timetables. The development of an IRIS Toxicological Review is a process that takes two years from initiation to completion for the majority of assessments. (see http://www.epa.gov/iris/process.htm for more information). For a simple assessment, it typically takes the agency 345 days to develop the draft document and then approximately another year for public comment, peer review, and revising the final assessment. However, for more complex assessments the process can take longer.

For the development of a new National Primary Drinking Water Standard, Section 1412.b.1.E of the Safe Drinking Water Act allows up to four years and three months (two years to propose, a year and a half to promulgate and up to a nine month extension) from the time a formal determination is made that a standard is needed pursuant to Section 1412.b.1 of the SDWA. For revisions to existing drinking

water standards, SDWA does not specify a time frame, but typically, we anticipate it will take between four and four and a half years. This time is used to perform the necessary analyses and consultations to propose revisions, obtain public comment, evaluate comments, revise analyses and promulgate the final rule.

3. Moving with speed, what is the shortest time it would take EPA to develop a thoughtful, deliberate, National Primary Drinking Water Standard for any chemical?

RESPONSE: We believe the three and a half year timeframe set out under Section 1412.b.1.E of the Safe Drinking Water Act (without the nine month extension at the option of the Administrator) represents a reasonable time to perform the necessary analyses and consultations to propose revisions and obtain public comment, evaluate comments, revise analyses and promulgate the final rule. The pace of the schedule will be impacted by the availability of the necessary science and the extent and substance of comments. In promulgating a national primary drinking water standard, the EPA must establish a maximum contaminant level goal, evaluate feasibility and affordability of removing the contaminant, and prepare a health risk reduction cost analysis. The EPA is required to consult with our Science Advisory Board, the National Drinking Water Advisory Council and the Department of Health and Human Services. We must also convene a Small Business Regulatory Enforcement Fairness Act Panel for rules that have a significant impact on small systems.

In situations of "an urgent threat to public health as determined by the Administrator after consultation with the Secretary of Health and Human Services," SDWA Section 1412.b.1.D allows that the Administrator may promulgate an interim national primary drinking water regulation for a contaminant without making an official regulatory determination and before completing all cost benefit analyses. These analyses must then be completed no later than three years after the date on which the interim regulation is promulgated.

4. Since the 1996 SDWA amendments were passed how many decisions has EPA made regarding whether or not to regulate constituents in drinking water? In that regard, how many times has EPA decided not to regulate a chemical?

RESPONSE: The agency has made 21 regulatory determinations since the 1996 amendments to the SDWA. The 1996 SDWA amendments define a process for decision making regarding currently unregulated contaminants. Steps include development of a Contaminant Candidate List (CCL) to identify priority contaminants for information collection, and then making regulatory determinations for at least five contaminants from the recent CCL every five years. The agency published final regulatory determinations not to regulate nine contaminants on the first Contaminant Candidate List (CCL) in July of 2003. The agency published final regulatory determinations not to regulate 11 contaminants on the second CCL in July 2008. In February 2011, the agency published the final regulatory determination to regulate perchlorate, which is the first positive regulatory determination by the EPA.

5. How many adjustments to existing drinking water regulations has EPA made through the 6 year review process? Please provide a list of all decisions.

RESPONSE: In July, 2003 the agency announced the review results for the agency's first Six-Year Review (Six-Year Review 1). The agency reviewed 69 National Primary Drinking Water Regulations (NPDWRs) that were established prior to 1997. These 69 NPDWRs include 68 chemical NPDWRs and the Total Coliform Rule (TCR). Based on the agency's review, as well as the public comments received

and other new information, a decision was made to revise the Total Coliform Rule (TCR). The agency determined that the 68 chemical NPDWRs remained appropriate at that time.

In March 2010, the agency announced the review results for the agency's second Six-Year Review (Six-Year Review 2). After performing a detailed review of 71 NPDWRs (promulgated prior to 2005), the agency believes that 67 NPDWRs remain appropriate (i.e., do not need to be revised at this time) and four NPDWRs are candidates for regulatory revision. These four NPDWRs include acrylamide, epichlorohydrin, tetrachloroethylene, and trichloroethylene.

In addition, several regulations have been revised "off cycle" (not as Six-Year Review decisions to revise), such as the Total Coliform Rule (revised via the Airline Drinking Water Rule), Lead and Copper Rule, Arsenic Rule, Stage 1 Disinfectants and Disinfection Byproducts Rule, Surface Water Treatment Rule, beta particles and photon emitters, gross alpha particle activity, and Radium-226/228.

6. **On March 29, 2010, EPA published its 6-year review of the drinking water regulation for total chromium and stated, "The Agency does not believe a revision to the NPDWR for total chromium is appropriate at this time." Since EPA based the total chromium drinking water standard, in large part, on a total hexavalent chromium level, what has changed?**

RESPONSE: The current drinking water standard of 0.1 mg/L for total chromium includes all forms of chromium. This standard was established in 1991 based on the best science available at that time and was based on a toxic health endpoint (skin dermatitis) of hexavalent chromium.

The EPA reviewed the total chromium NPDWR as part of its second Six-Year Review in March 2010 (75 FR 15499). The Six-Year Review conclusion stated that "The agency does not believe a revision to the NPDWR for total chromium is appropriate at this time [because] reassessment of the health risks associated with chromium exposure is being initiated and the agency does not believe it is appropriate to revise the NPDWR while that effort is in process." In September 2010, the EPA released a draft IRIS Toxicological Review for hexavalent chromium following oral exposure based on a review of the peer-reviewed published scientific literature. The external peer review panel met in May 2011, and the final peer review report was posted on the EPA's website on July 21, 2011. The EPA is reviewing the external peer review report and is evaluating the peer review and public comments and incorporating them into the assessment.

When this human health assessment is finalized the EPA will carefully review the conclusions and consider all relevant information to determine if the current standard should be revised and/or a new standard should be promulgated.

7. **Since the current National Drinking Water Standard for total chromium is 100 parts per billion and EPA established this standard based upon a consideration of chromium 6, is our US drinking water supply safe?**

RESPONSE:
The United States enjoys one of the safest supplies of public drinking water in the world. The EPA's current drinking water standard for total chromium of 100 ppb assumes that the sample is 100 percent hexavalent chromium, the more toxic form, and data reported to the EPA from the states shows that all water systems are in compliance with the current total chromium standard. This regulation was based

on the best available science at the time the standard was promulgated and so is as protective and precautionary as the science has allowed.

However, the science about health effects from hexavalent chromium is evolving. The agency is in the process of developing a new health assessment for hexavalent chromium based on new science. Once the health assessment is finalized, the EPA will carefully review the conclusions and consider all relevant information to determine if a new standard needs to be set in order to continue to ensure the safety of public water supplies.

8. How much chromium 6 did you assume in the 100 parts per billion?

RESPONSE: The EPA's regulation for total chromium assumes that all chromium in drinking water is hexavalent chromium.

9. Are there any US drinking water systems that are unsafe because of chromium 6 levels?

RESPONSE: Data reported to the EPA from states shows that all water systems are in compliance with the current total chromium standard.

10. In 2009, EPA indicated that it would publish its draft IRIS Toxicological Review for hexavalent chromium in 2012. I understand that in 2009, the Agency scientists were aware of mode of action research that would extend the research performed at high chromium 6 doses by the National Toxicology Program and use more environmentally-relevant doses as well. Since this research will be available in 2011 and will provide the data specified in EPA guidance documents, as EPA prefers, for the evaluation of chemicals for regulations, including mode of action, pharmacokinetics, genomics, and tissue specific concentrations at drinking water doses, why did EPA move up the release of the draft IRIS Toxicological Review to 2010?

RESPONSE: The EPA initiated a reassessment of the health effects of hexavalent chromium in the fall of 2008 in response to the release of the National Toxicology Program (NTP) study that demonstrated clear evidence of the carcinogenicity of ingested hexavalent chromium in laboratory animals exposed at doses above five ppm. At that time, the projected completion date was the fourth quarter, FY 2012. In May 2009, the EPA implemented a revised IRIS assessment development process, which accelerated the pace of completing assessments, including the assessment of hexavalent chromium. Based on the new process and agency needs, a revised schedule was generated in September 2009, with a projected completion date of fourth quarter, FY 2010. When the EPA was informed that an industry-sponsored hexavalent chromium research program was under development, the IRIS Toxicological Review had already been drafted and was undergoing Step 2 (agency review) of the IRIS process.

11. While I appreciate EPA's sensitivity to the importance of acting deliberately and in a timely manner to address chromium 6 in drinking water, I understand that in the expedited timeline, EPA plans to release its final IRIS Toxicological Review in the second quarter of 2011 before it considers the mode of action study results. Shouldn't EPA consider the results from this important study in their risk assessment rather than rush to finalizing its assessment as critical information becomes available?

RESPONSE: The EPA is committed to ensuring that all of its IRIS human health assessments are based on the most current and best available independently peer-reviewed published scientific information. Because the scientific information available on any chemical continues to evolve over time, EPA cannot always postpone assessments to wait for ongoing research to be published especially when there is already a good database available. The draft IRIS Toxicological Review for hexavalent chromium, released in September 2010, is an assessment of the health effects of hexavalent chromium following oral exposure based on a review of the peer-reviewed published scientific literature. The external peer review panel met in May 2011, and the final peer review report was posted on EPA's website on July 21, 2011. EPA is reviewing the external peer review report and is evaluating the peer review and public comments and incorporating them into the assessment.

12. Getting the science right the first time is a high priority for our regulatory decision making process. Hexavalent chromium in water at concentrations of more than 1 part per million (1,000 ppb) makes water turn yellow. Additionally, it is my understanding that the National Toxicology Program's Study used concentrations of 5,000 ppb (low dose) to 18,000 ppb (high dose) in their rodent study. In fact, the chromium 6 levels in the drinking water of the NTP study was so concentrated that many animals had noticeably reduced intake of water.

a. **As described in the EPA cancer guidelines, extrapolating results in animal studies should ideally be based upon an understanding of the mode(s) of action underlying the development of tumors in an animal study. If additional studies providing more information relative to mode of action were available soon, shouldn't EPA consider such information in its risk assessment?**

RESPONSE: The EPA is committed to ensuring that all of its IRIS human health assessments are based on the most current and best available independently peer-reviewed published scientific information. Because the scientific information available on any chemical continues to evolve over time, the EPA cannot always postpone assessments to wait for ongoing research to be published especially when there is already a good database available. The draft IRIS Toxicological Review for hexavalent chromium, released in September 2010, is an assessment of the health effects of hexavalent chromium following oral exposure based on a review of the peer-reviewed published scientific literature. The external peer review panel met in May 2011; and the final peer review report was posted on the EPA's website on July 21, 2011. The EPA is reviewing the external peer review report and is evaluating the peer review and public comments and incorporating them into the assessment.

b. **Since EPA's own guidelines [cancer risk guidelines, mode of action guidelines, and pharmacokinetic guidelines] indicate a preference for data at doses closer to human exposures, wouldn't EPA's IRIS Toxicological Review be improved if it included information on low-dose exposures to better extrapolate results from laboratory animals to human exposures?**

RESPONSE: **Yes.** The EPA does generally have a preference for data at doses close to human exposure levels.

c. **While I know that EPA scientists are aware of ongoing mode of action research at drinking water levels, are you aware that research on low-dose exposures and mode of action is underway?**

RESPONSE: The EPA is aware of the following mode of action and pharmacokinetic research that is currently being conducted on hexavalent chromium (the list was provided by the American Chemistry Council); however, we are not aware of any ongoing research that would be similar to the chronic NTP study but at lower levels of exposure to hexavalent chromium.

- Research on mouse genomics (manuscript to be submitted to journal for consideration in mid-August 2011)
- Research on ex vivo gastric fluid reduction (manuscript to be submitted to journal for consideration in mid-October 2011)
- Rodent physiologically based pharmacokinetic modeling (manuscript to be submitted to journal for consideration in late October 2011)
- Human physiologically based pharmacokinetic modeling (manuscript to be submitted to journal for consideration in late November 2011).
- Research on rate pathology and biochemistry and mouse comparison (manuscript to be submitted to journal for consideration in mid-August 2011).
- Research on rat genomics and mouse comparison (manuscript to be submitted to journal for consideration in late September 2011)
- Research on in vitro toxicity studies (manuscript to be submitted to journal for consideration in mid-October 2011)
- Research on in vivo target tissue genetic toxicity and mutation (manuscript to be submitted to journal for consideration in mid-November 2011)
- Mode of action based on study results (manuscript to be submitted to journal for consideration in mid-November 2011)
- Risk assessment based on study results (manuscript to be submitted to journal for consideration in late November 2011)

The EPA is also aware of the following two papers that were recently published in the peer-reviewed literature:

Thompson, C.M., L.C. Haws, M.A. Harris, N.M. Gatto, and D.M. Proctor. 2011. Application of the U.S. EPA Mode of Action Framework for Purposes of Guiding Future Research: A Case Study Involving the Oral Carcinogenicity of Hexavalent Chromium. Toxicol. Sci. (2011) 119(1): 20-40 first published online October 14, 2010 doi:10.1093/toxsci/kfq320
Toxicol Sci. 2011 Jun 28. http://toxsci.oxfordjournals.org/content/early/2011/06/28/toxsci.kfr164.long

Thompson, C.M., D.M. Proctor, L.C. Haws, Hebert, S.D. Grimes, H.G. Shertzer, A.K Kopec, J.G. Hixon, T.R. Zacharewski, and M.A. Harris. 2011. Investigation of the Mode of Action Underlying the Tumorigenic Response Induced in B6C3F1 Mice Exposed Orally to Hexavalent Chromium. Toxicol Sci. 2011 June 28. Kfr164 first published online June 28, 2011 doi:10.1093/toxsci/kfr164
http://toxsci.oxfordjournals.org/content/early/2011/06/28/toxsci.kfr164.full.pdf+html

13. Why isn't EPA using a formal Science Advisory Board process for hexavalent chromium, including a formal meeting of the SAB with public comment opportunity that is more appropriate for the peer review of a highly influential risk assessment?

RESPONSE: The IRIS Program utilizes several peer review options in achieving its goal of rigorous, independent external peer review of its health assessments, including the National Academy of Sciences (NAS), the EPA's Science Advisory Board (SAB), and independent expert peer reviews. All peer

reviews include identical steps in that they include a written public comment period, public meetings of the peer review panel with an opportunity for verbal public comment, and an opportunity for panelists to review public comments prior to the public meeting. The choice of peer review mechanism is made on a case-by-case basis and can be influenced by a number of factors. In the case of hexavalent chromium, the EPA determined that an independent, expert external peer review was an appropriate option.

14. Recent information reported by the California Cancer Registry from the area around the Hinkley, CA site, showed no increased incidence rate of cancer in the population. In fact, rates were slightly lower than the expected rates for all cancers. Given the reported findings and the EWG report that showed potentially broad detection of hexavalent chromium in drinking water supplies and the assumptions EPA has made in its draft IRIS Toxicological Review, are you surprised that there is not an increased rate of GI tumors in the US population?

RESPONSE: The contribution of hexavalent chromium in drinking water to individual and population-level cancer risk requires a comprehensive analysis that considers information on variation in chromium exposure over time and variation in other risk factors for specific types of GI cancers. The California Cancer Registry data from the Hinkley, CA site unfortunately are not robust enough to allow the EPA to make any inferences regarding changes in GI-related cancers in the U.S. population associated with changes in chromium levels in drinking water.

15. How is chromium affected by the treatment technologies used by systems?

RESPONSE: Hexavalent chromium, the toxic form of chromium, is not removed by most technologies commonly in-place at water systems (e.g., coagulation filtration, lime softening, primary disinfection, and corrosion control). A water system needs to have a different technology that can effectively remove hexavalent chromium. The first process option is an ion exchange process, which has a resin that chemically attaches hexavalent chromium when contaminated water comes into contact with it. The ion exchange process is a proven technology and is much more cost effective than reverse osmosis, which is a second process option. The reverse osmosis process uses a membrane that removes small particles like chromium effectively. A third process that can remove hexavalent chromium is reduction-coagulation filtration. Reduction-coagulation filtration differs from the commonly used coagulation filtration because it includes a step to chemically convert hexavalent chromium to chromium-3 before filtration.

If chromium is occurring as chromium-3 in source waters, instead of as hexavalent chromium, then some technologies that are commonly used today (e.g., coagulation filtration or lime softening) can effectively remove the chromium-3. If, however, both chromium-3 and hexavalent chromium are present and no treatment technology is currently in-place, then water systems will need to add either an ion exchange, or membrane, or reduction-coagulation filtration technology to remove them.

16. EPA recently provided technical guidance to the water utilities to monitor for chromium 6. Among the materials was a modified test method.

a. Are there a sufficient number of analytical laboratories across the US able to reliably detect hexavalent chromium at trace levels – the very low parts per trillion?

RESPONSE: The EPA believes there are a sufficient number of analytical laboratories, though sufficient lab capacity is dependent upon the number of water systems that ultimately decide to

voluntarily conduct the monitoring and how soon they wish to have it completed. Through recent discussions with some of the largest commercial drinking water laboratories, the EPA has learned that each of these laboratories has surplus capacity. The EPA also believes that many labs are responding to market demand by beginning to offer this analysis.

b. What type of quality assurance program is EPA planning to implement to ensure that laboratories are reliably able to measure hexavalent chromium at levels between 20 parts per trillion (0.02 ppb) and the EPA detection level of one ppb in drinking water?

RESPONSE: The monitoring guidance identifies modified EPA Method 218.6 as the suggested analytical procedure. Within this analytical method there are strict quality control requirements, detailed in Section 9 of the method. Any laboratory supporting the analysis should meet those quality control requirements to report valid data.

17. Utilities have raised concerns with my office about EPA's decisions regarding the technical assistance to monitor for chromium 6, including the lack of fully validated analytical method, inability for the agency to collect and use the data generated and lack of explanation of how to communicate the health effects to the public. Please explain EPA's decision making regarding the technical assistance and how EPA is responding to the concerns raised by utilities.

RESPONSE: The EPA is working with state and local officials to better determine how widespread and prevalent chromium-6 is in public drinking water systems. The agency evaluated the available peer reviewed analytical methods, consulted with state drinking water administrators and issued guidance to water systems on how to test for and sample drinking water specifically for hexavalent chromium. This guidance provided recommendations on the location and frequency of sampling as well as the recommended analytical method for sampling. The EPA continues to work with state and local drinking water officials to develop FAQs to address technical aspects of sampling and the analytical method as well as recommended responses to consumer's questions about hexavalent chromium in drinking water Information and guidance regarding hexavalent chromium can be found on the EPA's web site at: http://water.epa.gov/drink/info/chromium/index.cfm

18. Is EPA considering using the UCMR process for testing for hexavalent chromium?

RESPONSE: The UCMR3 was proposed on March 3, 2011. The EPA is requesting public comment on including hexavalent chromium within the UCMR monitoring program. The following text was published as part of the preamble:

The EPA has not included hexavalent chromium in the proposed list of chemicals for UCMR 3 monitoring; however, the EPA is aware of potential concerns about hexavalent chromium occurrence in public water supplies. The EPA thus requests comment on whether the agency should include hexavalent chromium as one of the 30 contaminants for UCMR 3 Assessment Monitoring. The EPA has recently issued voluntary guidance to water systems on monitoring for hexavalent chromium; including recommendations regarding the use of a modified version of EPA Method 218.6 for the analysis of samples and a recommended reporting level of 0.06 ug/L (see http://water.epa.gov/drink/info/chromium/guidance.cfm). If the EPA were to include hexavalent chromium in UCMR 3, the agency would incorporate it into Assessment Monitoring. Under this approach, the EPA would make hexavalent chromium monitoring mandatory for all large water systems and a subset of small systems; see also Section III.F.2 for further discussion of the Assessment

Monitoring approach. The EPA requests comments on what contaminant(s) should be removed from the list of 30 UCMR 3 contaminants if hexavalent chromium were added, as well as comments regarding the recommended and alternative analytical method(s) and the appropriate reporting level. The EPA also requests comments on whether total chromium should also be measured concurrent with hexavalent chromium. Side-by-side measurements may provide valuable information on relative occurrence and the utility of total chromium monitoring as a surrogate for hexavalent chromium.

19. At the hearing, you and Linda Birnbaum had different assessments of the ability for perchlorate to be naturally occurring. Is Perchlorate naturally occurring or is it strictly a man made chemical?

RESPONSE: I would like to correct my statement for the record. As I clarified in response to a question later in the hearing, perchlorate is both a naturally occurring and man-made chemical. Perchlorate is used to produce rocket fuel, fireworks, flares, and explosives. It can also be present as an impurity in disinfectant (bleach) solutions or occur through application of some organic fertilizers. In addition to these anthropogenic sources, perchlorate can occur naturally in certain types of soil deposits and research has also indicated that perchlorate may form from some natural atmospheric processes.

The following links to the EPA's press release and fact sheet on perchlorate clarify that perchlorate is both naturally occurring and man-made:
http://yosemite.epa.gov/opa/admpress.nsf/1e5ab1124055f3b28525781f0042ed40/6348845793f4cc5d8525782b004d81ae!OpenDocument
http://water.epa.gov/drink/contaminants/unregulated/upload/FactSheet_PerchlorateDetermination.pdf

20. At the hearing, you said that between 5 and 17 million people are exposed to perchlorate. How many of those people live in states with existing drinking water regulations for perchlorate?

RESPONSE: The range of 5 to 17 million people exposed to perchlorate in drinking water is based on analysis of occurrence data from the first Unregulated Contaminant Monitoring Rule (UCMR 1). The high end of the range, 17 million, is the total population served by systems with any detection of perchlorate above the Method Reporting Limit (MRL) of 4 ppb. The low end, five million, is adjusted to represent only the population estimated to be served by an individual sampling point that had a detection. That is, if a system only had a detection in one part of its distribution system, the estimate of five million people only includes the estimated population served by that portion of the system. California and Massachusetts are currently the only two states that regulate perchlorate in drinking water. Based on UCMR data, the population in these states served by systems that had any detection of perchlorate above 4 ppb is nine million people. California has a MCL of 6 ppb and Massachusetts has a drinking water standard of 2 ppb. In summary, a little more than half of the 5 to 17 million who may be exposed to perchlorate in drinking water live in the two states with perchlorate standards.

a. How many are exposed at levels above 10 ppb?

RESPONSE: Nationally, there were from 1.4 million to 1.7 million people exposed to perchlorate in drinking water at levels above 10 ppb, based on data collected under the UCMR 1.

b. How many are exposed at levels between 10 ppb and 6 ppb?

RESPONSE: Nationally, there were from 2.1 million to 6.7 million people exposed to perchlorate in drinking water at levels between 10 and 6 ppb, based on data collected under the UCMR 1.

c. How many are exposed at levels between 6 ppb and 2ppb

RESPONSE: There were from 3.4 million to 8.2 million people nationally exposed to perchlorate in drinking water at levels between 6 and 4 ppb. Note that the minimum reporting level (MRL) for perchlorate under UCMR 1 was 4 ppb so the agency's dataset does not reflect exposures below 4 ppb. These population estimates of those being exposed to perchlorate were approximated using Public Water Systems (PWSs) with detections greater than or equal to 4 ppb and would likely be greater if the UCMR 1 MRL had been lower than 4 ppb.

21. What cost of compliance data has EPA collected from the States that already regulate perchlorate?

RESPONSE: California and Massachusetts are the only two states that have already regulated perchlorate in drinking water, with Maximum Contaminant Levels (MCLs) of 6 ppb and 2 ppb, respectively. California estimated in its 2004 proposed rule that the average annual cost increase would be only about $18 per customer for those served by larger water systems (roughly a half a million customers). However, for about 1700 affected people served by small systems, the annual cost increase per service connection would range from $300 to $1580 with an average of $540. The following table (available at: http://www.cdph.ca.gov/services/DPOPP/regs/Pages/R-16-04-PerchlorateinDrinkingWater.aspx) provides a summary of estimated total annual costs and benefits for a proposed MCL (6 ppb) by system size.

System size	Ongoing monitoring for sources ND and < MCLof 6 ppb				Sources in Violation			Total Annual Costs for Systems > MCL	Average Cost per System with Treated Sources	Total Population Avoiding Exposure
	Annualized Routine		Quarterly for detections ≤ MCL		Total Annualized Treatment & O&M costs		Source and Trtd Wtr Monitoring			
	# sources	$1000	# sources	$1000	# sources	$1000	$1000	$1000	$1000	#
Small	6493	216	118	41.5	12	250	16.9	267	23.5	1,700
Large	5153	176	93	32.7	85	23,800	119.9	23,920	698.5	514,300
Totals	11,646	392	211	74.2	97	24,050	136.8	24,187	-----	515,100

22. How many systems have been granted variances by the states that already regulate perchlorate?

RESPONSE: No systems have been granted variances in either California or Massachusetts, the only two states that already regulate perchlorate in drinking water.

23. What new scientific information did you receive between April 2010 and September 2010 that lead you to change the Agency's position on the potential for health risk reduction for perchlorate through development of a MCL?

RESPONSE: In neither April 2010 nor September 2010 did the agency make any determination on the regulatory opportunity for health risk reduction through a national primary drinking water regulation for perchlorate. The determination process was ongoing at those times and all available information was under consideration. In October 2008, the EPA published a preliminary regulatory determination not to regulate perchlorate in drinking water (73 FR 60262). In this preliminary determination, the EPA had derived a single health reference level (HRL) of 15 µg/L based upon the reference dose (RfD), an estimate of perchlorate exposure from food for pregnant women, traditional adult body weight (70 kg)

and drinking water consumption (2 L/day) values. This single HRL was derived to reflect exposure to a pregnant woman and her fetus, which the National Research Council (NRC) identified as "the most sensitive population."

In August 2009, the EPA published the Perchlorate Supplemental Request for Comments (74 FR 41883) requesting comment on additional approaches to analyzing data related to the EPA's perchlorate regulatory determination. These additional comments were sought in an effort to ensure consideration of all potential options for evaluating whether there is a meaningful opportunity for human health risk reduction of perchlorate through a National Primary Drinking Water Regulation (NPDWR). Since the NRC identified infants and developing children as additional sensitive life stages, the EPA derived potential alternative HRLs for 14 life stages (age groups) using the RfD and life stage specific exposure information. These HRLs range from from 1 µg/L to 47 µg/L and are the concentrations of perchlorate in drinking water that may result in total perchlorate exposures (from food and water) greater than the RfD for individuals at each life stage.

For the purposes of the EPA's recently published determination to regulate perchlorate (76 FR 7762), the EPA considered these potential alternative HRLs to be levels of public health concern for purposes of the determination. The EPA made this determination by comparing these values to the best available data on the occurrence of perchlorate in public water systems. Given the range of potential alternative HRLs, the EPA reversed its October 2008 preliminary determination not to regulate perchlorate in drinking water. The EPA carefully reviewed and considered input from almost 39,000 public comments on the May 2007, October 2008, and August 2009 notices, in making its determination to regulate perchlorate in drinking water. The response to comment document can be found at: http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OW-2009-0297-0681.

24. Please provide the committee with a full list of scientific reports that the Agency has relied on to make the decision that a perchlorate MCL will present a meaningful opportunity for health risk reductions for persons served by public water systems.

RESPONSE: The scientific reports and public comments on which the EPA based its regulatory determination are available in the docket for the action. These materials can be accessed through the www.regulations.gov under Docket ID numbers EPA-HQ-OW-2008-0692 and EPA-HQ-OW-2009-0297. All documents in these dockets are listed on the http://www.regulations.gov Web site. Although listed in the index, some information is not publicly available, e.g., Confidential Business Information or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet, but will be publicly available in hard copy form.

25. You stated in your testimony that perchlorate may disrupt the normal growth and development of children in the womb. Do you have studies that show perchlorate is having this effect and if so, will you provide them?

RESPONSE:

We are not aware of any studies to date that positively show perchlorate directly disrupts specific parameters of normal physical growth and development (such as neonatal birth weight, length, and head circumference) of children in the womb.

However, studies show that perchlorate can interfere with the normal functioning of the thyroid gland by inhibiting the transport of iodide to the thyroid, resulting in a deficiency of iodide in the thyroid (NRC, 2005). The EPA's determination to regulate perchlorate is based on this health effect of iodide uptake inhibition to the thyroid. The transfer of iodide from the blood into the thyroid is an essential step in the synthesis of thyroid hormones, which play an important role in the regulation of metabolic processes throughout the body and are also critical to developing fetuses and infants, especially with respect to brain development (NRC, 2005). Because the developing fetus depends on an adequate supply of maternal thyroid hormone for its central nervous system development during the first and second trimester of pregnancy, iodide uptake inhibition from perchlorate exposure has been identified as a concern in connection with increasing risk of neurodevelopmental impairment in fetuses of hypothyroid mothers (NRC, 2005). Poor iodide uptake and subsequent impairment of the thyroid function in pregnant and lactating women have been linked to delayed development and decreased learning capability in their infants and children (NRC, 2005). Additionally, deficiency during childhood reduces child growth and cognitive motor function (Zimmerman, 2009).

26. The 2005 National Research Council Study on "Health Implications of Perchlorate Ingestion" disagreed with EPA's assessment that a transient change in serum thyroid hormone concentration was an adverse health effect. What is the adverse health effect that a perchlorate has on human health?

RESPONSE: The biochemical effect that perchlorate exposure has on human health results from a biochemical precursor event, specifically iodide uptake inhibition in the thyroid gland. This precursor effect precedes, and results in, the changes in serum thyroid hormone secretion that occurs at sufficiently high doses of perchlorate exposure. Over sufficient time, reduced production and release into the circulation of critical thyroid hormones can result in hypothyroidism and subsequent hypothyroidism-induced adverse health effects, including reduction in organ system metabolism (in individuals of any age) and abnormal fetal and child growth and development[11]. The magnitude of this precursor effect may change based upon exposure to other chemical goitrogens that compete for the same sodium-iodide symporter as does perchlorate, such as nitrates and thiocyanates.

27. You stated during the hearing that changes in thyroid production while a baby is forming can have impacts, on their development. Are there any studies showing perchlorate at levels below 0.007mg/kg/day, roughly the equivalent of 245 ppb in drinking water, cause changes in thyroid-related hormone production and if so, will you provide those?

RESPONSE:
Studies are usually designed to show associations between perchlorate levels and thyroid hormones; it is difficult to demonstrate causality. The Steinmaus et al. (2010) study is based upon an ecologic study design, which is among the weakest types of observational epidemiologic study designs. Thus, although it can identify an association between perchlorate levels in drinking water supplies and elevated TSH values in individuals who may have been exposed to those supplies, it cannot be considered alone to provide evidence of causality. The authors acknowledge the limitations of the study design and its statistical power, as well as the fact that the TSH values are a biomarker of an effect but do not signify an impact on health and/or development.

---

[11] Miller, MD; KM Crofton; DC Rice; RT Zoeller. Thyroid-disrupting chemicals: interpreting upstream biomarkers of adverse outcomes. Environ Health Perspect. 2009 Jul;117(7):1033-41. Epub 2009 Feb 12.

Steinmaus et al. (2010) examined the relationship between maternal drinking water perchlorate exposure during pregnancy to 24-hour or post 24-hour thyroid stimulating hormone (TSH) levels in newborns. They found a statistically significant increased adjusted prevalence odds ratio for high TSH serum concentrations (99.5 and 95 percentile) for the TSH sample collection age of 24 hours or less period. For the upper 99.5th percentile (25μU/mL TSH, the primary congenital hypothyroidism screening level), in TSH samples collected from newborn infants within 24 hours of their birth, the prevalence odds ratio for an infant having a TSH level value equal to or greater than 25 μU/mL was 1.53 (95% CI: 1.24 to 1.89) ($P < 0.0001$) (N=102), comparing pregnant women from perchlorate exposed (>5μg/L) and unexposed (≤5μg/L) communities. For the upper 95th percentile (15μU/mL TSH), in TSH samples collected from newborn infants within 24 hours of their birth, the prevalence odds ratio for having a TSH level value equal to or greater than 15 μU/mL was 1.23 (95% CI: 1.16 to 1.31) ($P < 0.001$) (N=1217). For hormone measurements taken after 24-hours, the odds ratio was not significant at the 99.9 percentile but was significant at the 95th percentile. In their analysis, mothers from communities with perchlorate concentrations greater than 5 μg/L (5ppb) were considered exposed and those with perchlorate levels < 5 μg/L (5 ppb) or without perchlorate measurements were considered unexposed.
Reference: Steinmaus C, Miller M, Smith A. 2010. Perchlorate in drinking water during pregnancy and neonatal thyroid hormone levels in California. Journal of Occupational Environmental Medicine 52: (12) 1217-1224.

28. How is perchlorate affected by the treatment technologies used by systems?
RESPONSE: Most technologies commonly in place at water systems (e.g., conventional filtration, primary disinfection, and corrosion control and iron and manganese removal) are not effective in removing perchlorate. A water system needs to have strong base ion exchange resin or nitrate/perchlorate selective resin or reverse osmosis technologies in-place to effectively remove perchlorate. Furthermore, it is necessary for systems using strong base ion exchange to optimize conditions to target perchlorate for its effective removal.

29. Currently, EPA is involved in a study of the relationship between hydraulic fracturing and drinking water. EPA's draft study plan will be before the Science Advisory Board in a few weeks for peer-review. What suggestions and changes can be made to the study design at this point? How will EPA proceed after the SAB completes its review?

RESPONSE: The Science Advisory Board (SAB) met March 7-8, 2011 to begin their review of the EPA's draft plan to study the potential impacts of hydraulic fracturing on drinking water resources. They met again on May 19, May 26 and July 5, 2011. At each meeting, they received comments from stakeholders and considered them as part of their deliberations. SAB is expected to provide their findings and recommendations to the EPA in a final report in about four to six weeks. The EPA will consider their recommendations as we revise the draft study plan. The Administrator of the EPA will provide a letter to SAB containing the EPA's response to SAB's recommendations. The EPA will conduct research as described by the study plan.

30. In September 2010, EPA voluntarily requested large volumes of information on hydraulic fracturing from nine service companies. What is the status of this information request?

RESPONSE: The EPA is evaluating the information provided by the respondents.

31. Prior to the hearing, you announced your decision to move forward and develop one regulation for Volatile Organic Compounds (VOCs) as a group under your new drinking

water strategy. How will EPA ensure that each chemical meets the requirements for regulation under the Safe Drinking Water Act?

RESPONSE: The Safe Drinking Water Act (SDWA) requires maximum contaminant levels (MCLs) be set as close to the maximum contaminant level goal (MCLG) as feasible. Regulated carcinogenic VOCs have MCLGs of zero. As part of the SDWA requirements, the EPA would revise the individual MCLs for regulated VOCs based upon analytical or treatment feasibility, benefit-cost considerations, and the SDWA requirement to at least maintain or improve public health protection with any revision. Before developing a national primary drinking water regulation for unregulated VOCs, SDWA requires that the EPA determine whether: 1) the contaminant may have an adverse effect on the health of persons; 2) the contaminant is known to occur or there is a substantial likelihood the contaminant will occur in public water systems with a frequency and at levels of public health concern; and 3) regulation of the contaminant presents a meaningful opportunity for health risk reductions for persons served by public water systems. If a positive determination is made, the EPA will develop MCLGs, and determine the feasibility.

32. Which VOCs are EPA planning to include in this proposed regulation?

RESPONSE: The agency is considering up to 16 compounds as part of the group regulation; eight currently regulated compounds (benzene; carbon tetrachloride; 1,2-dichloroethane; 1,2-dichloropropane; dichloromethane; tetrachloroethylene; trichloroethylene; vinyl chloride) and eight unregulated compounds (aniline; benzyl chloride; 1,3-butadiene; 1,1-dichloroethane; nitrobenzene; oxirane methyl; 1,2,3-trichloropropane and urethane).

33. Does EPA have occurrence and health effects data for each of these VOCs? If not, how is EPA planning to obtain data?

RESPONSE: The EPA has occurrence and health data for the regulated VOCs and is continuing to collect and evaluate occurrence and health effects data for the unregulated contaminants. The EPA will work with states, water systems and other federal agencies to obtain information that can inform the agency's evaluation of these contaminants in accordance with the Safe Drinking Water Act.

34. When does EPA plan to involve the Science Advisory Board in the development of this approach to regulating VOCs as a group?

RESPONSE: The Science Advisory Board will be involved during the rule making process before the group VOC regulation is proposed.

35. I believe the most important prong of the drinking water strategy you announced in March 2010 is the second point, to foster development of new drinking water technologies to address health risks posed by a broad array of contaminants. Please give me an update of what you have done in this area and how you are moving forward.

RESPONSE: The Water Technology Innovation Cluster (WTIC), which Administrator Jackson announced in January 2011, helps address this second principle of the drinking water strategy. The WTIC will bring new technologies to market by working with strategic partners, including the business and investment sectors, governments and universities to assess and promote the most viable technology

research developments. The strategic partnerships within the WTIC can further accelerate the research, development, evaluation, and commercialization of these new and more sustainable water technologies. There are new funding opportunities coordinated with this effort to address the challenges faced by small drinking water systems through research grants to institutions of higher education, not-for profit organizations and state and local governmental units as well as through contracts to small businesses. This includes approximately $8 million through the Science to Achieve Results (STAR) program for grants to eligible organizations to identify, develop and demonstrate novel and innovative treatment technologies and approaches for public drinking water systems. An approximate $3 million has been directed toward grants for innovative technologies to benefit small drinking water systems. Additionally, an approximate $5 million will be issued later this year for a National Center for Innovative Water Treatment Technology. The center will seek innovative technologies to treat priority groups of contaminants in drinking water and will facilitate the development and demonstration of these technologies. Additionally, there will be approximately $1.5 million in contracts made available through the Small Business Innovation Research (SBIR) program to support innovative water treatment technologies being developed by the private sector. Over 90 proposals were received from small businesses in response to this funding opportunity.

36. As you know, many of our water utilities are the number one users of electricity for the power companies that serve them. New treatment technologies are often very energy intensive. What is EPA doing to ensure that there are both cost effective and energy efficient treatment technologies available to treatment plants?

RESPONSE: The EPA is commited to bringing innovation to market that is sustainable with regards to energy and water usage, economic considerations and treatment effectiveness. To this end, a sustainability-based protocol is under development to evaluate the techncial effectiveness and cost effectiveness of new and innovative drinking water treatment technologies. In collaboration with the WTIC, the protocol will evaluate energy metrics along with other factors of interest to water utilities such as treatment effectiveness, capital costs, operational requirements, residual disposal, and potential distribution system impacts. Ultimately, this will be used by communities to identify the most appropriate technology for their circumstances. Given the importance of energy issues to the water industry, it is expected that the energy component will be of prime importance

Additionally, the EPA is taking action to support sustainable infrastructure and promote implementation at water utilities of energy conservations measures, energy performance benchmarking programs, and use of energy audits and tracking systems at water and wastewater treatment facilities. Recent and ongoing actions include websites, fact sheets and webinars as well as tools such as energy efficiency criteria for inclusion in sanitary surveys and an energy baseline assessment/audit tool.

37. Does EPA consider the cost to power treatment technologies or the potential carbon footprint when assessing the affordability of a treatment system?

RESPONSE: Yes, the EPA considers the direct cost to power the drinking water treatment technologies including the cost of heating, air conditioning, ventilating and lighting buildings that water systems need to house the process equipment and chemical storage. The EPA includes these costs in its compliance costs estimates, which the EPA uses for determining the affordability of a treatment system. The EPA does not specifically assess the carbon footprint of these treatment systems.

38. When the Office of Pesticide Programs registers a pesticide do they consider environmental fate of the pesticide, including water fate?

RESPONSE: Yes. Under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the EPA's Office of Pesticide Programs requires applicants seeking to register a new pesticide to provide extensive data on the environmental fate of the pesticide. Among other types of required studies, the EPA requires laboratory studies of hydrolosis, photodegradation in water, and degradation in water under aerobic and anaerobic conditions. In general terms, these studies measure how long a pesticide will remain stable in water under different conditions and identify any degradation products formed. In addition, the EPA can require a field study of aquatic dissipation if data indicate the potential for aquatic exposure, for example because the pesticide is mobile, persistent, or bioaccumulative or if the pesticide is intended for application to water. The EPA uses data from these and other studies, along with information on where and how the pesticide will be used, to develop estimates of potential exposures in different environmental compartments, including water bodies.

39. At the hearing, in response to a question from Senator Barrasso, you implied that the consumption of drinking water containing certain contaminants can lead to autism in children. You said, "Our science may be good, but I don't know how you price the ability to try to forestall a child who may not get autism if they are not exposed to contaminated water." This statement has caused a great deal of concern among public water utilities. Please explain what you based this statement on and provide the committee with any data that EPA has that demonstrates a connection between drinking water contamination and autism.

RESPONSE: Over the past decade, we have seen the reported prevalence of such developmental disorders rise. The science is not evolved enough to explain the cause of the increase. While some recent studies suggest a possible association between environmental exposures and autism, data are limited and we do not yet know the extent to which environmental contaminants may contribute to autism, if at all. The EPA will base our actions on the latest science to ensure that we are on the forefront of protecting Americans from threats, when they do exist.

Senator Thomas R. Carper

1. **When can we expect to see EPA's revised standards for chromium 6, and what can our states be doing to prepare themselves for these new standards?**

RESPONSE: The draft IRIS Toxicological Review for hexavalent chromium, released in September 2010, is an assessment of the health effects of hexavalent chromium following oral exposure based on a review of the peer-reviewed published scientific literature. The external peer review panel met in May 2011, and the final peer review report was posted on the EPA's website on July 21, 2011. EPA is reviewing the external peer review report and is evaluating the peer review and public comments and incorporating them into the assessment.

Finalizing this health assessment is a critical step to assure a sound scientific and transparent basis for decision making. Once final, the EPA will carefully review the assessment and other relevant information to determine if a revised standard to address hexavalent chromium is needed. If the decision is to revise our existing standard, developing a revised drinking water standard typically takes between two to two and a half years to perform the necessary analyses and consultations to propose revisions and then will take about two years to obtain public comment, evaluate comments, revise analyses and promulgate the final rule.

The EPA encourages states to prepare themselves by working with their public water systems to conduct enhanced monitoring for chromium-6 in addition to the monitoring they are already required to perform for total chromium. The EPA believes that the enhanced monitoring will enable public water systems (PWSs) to better inform their consumers about the levels of chromium-6 in their drinking water, determine the levels of chromium-6 in their distribution systems, and assess the degree to which existing treatment is affecting the levels of chromium-6.

2. **Nitrate contamination continues to be a concern in Delaware. Is EPA looking into or planning to look into drinking contamination issues related to nitrate? Are there resources available to states to deal with nitrate contamination in drinking water?**

RESPONSE: The degradation of drinking and environmental water quality associated with excess levels of nitrogen and phosphorus (commonly called "nutrients") in our nation's water continues to be a challenge for states across the U.S. The EPA is taking a number of actions to address nutrient pollution, which includes nitrate, and we are not just focusing on nutrient pollution's ecological impacts. We recognize the potential impacts of nutrient pollution on drinking water as well and are integrating that consideration into our work.

In August 2009, the State-EPA Nutrients Innovation Task Group (NITG) issued an "Urgent Call to Action," finding that nutrients significantly affect drinking water supplies as well as recreational water quality and aquatic life. To address issues of contamination and propose solutions for reducing nitrogen and phosphorus loading, the State-EPA NITG Report presents options for new, innovative tools to improve control of nutrient pollution sources and discusses ways to more fully utilize the tools that we have already.

The EPA also works to support activities initiated by our Source Water Collaborative to address nutrients in sources of drinking water. The Collaborative is a coalition of 23 organizations that work in partnership to promote protection of sources of drinking water, at national, state and local levels. In

March, they sponsored a forum co-hosted by the EPA and state organizations, including Delaware, about water quality in the Delaware River Basin, where nutrient management is a critical concern. The Collaborative has recently formed a steering committee to begin developing an action oriented agenda on nutrient pollution.

States are in the front line in addressing nutrient pollution. In March, the EPA released a memorandum reaffirming the EPA's commitment to partnering with states and collaborating with stakeholders to make greater progress in accelerating the reduction of nitrogen and phosphorous loading in our nation's waters and to protect our nation's drinking water. The "Recommended Elements of a State Framework" is a tool to guide ongoing collaboration between the EPA Regions and the states and synthesizes key principles that are guiding and have guided agency technical assistance.

3. How can the Federal government focus its efforts to improve drinking water quality on pollution prevention? What kinds of tools and programs exist to prevent the pollution of drinking water and what new ones are needed?

RESPONSE: The EPA strongly believes that the most efficient and cost effective way of improving drinking water is through pollution prevention. The EPA's statutory authorities include important tools to prevent pollution of source water and we are committed to using these effectively and also to collaborate with our state partners and other stakeholders to achieve the goal of clean water. The EPA is using these authorities both to protect America's waters generally – which serve as America's drinking water sources – and to prevent pollution from entering our drinking water.

The agency recently released Coming Together for Clean Water, EPA's Strategy to Protect America's Waters, presenting a framework for how the EPA's national water program will implement the goals of the Clean Water Act to protect America's waters and address today's clean water challenges.[8] To develop this plan, the EPA brought together a diverse group of stakeholders and encouraged public participation. The document outlines Key Actions that the EPA is taking to increase protections for healthy waters, restore degraded waters, reduce pollution from discrete sources, and enhance watershed resiliency. In addition to helping to protect our nation's lakes, rivers, and streams for aquatic life and recreation, these actions will also help prevent pollution of our nation's drinking water sources. The EPA recognizes the clear opportunities presented by ensuring integration across our clean water and drinking water efforts.

Along with the Coming Together for Clean Water strategy, the EPA also continues to advance the four key elements of our Drinking Water Strategy. One of the Strategy's four principles is to use the authorities of multiple statutes where appropriate to help protect drinking water. Under this effort, the drinking water program and the toxics and pesticides programs are in the process of evaluating the Toxic Substances Control Act (TSCA), the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), and the Federal Food, Drug and Cosmetic Act (FFDCA) to identify specific authorities that may be pertinent to the goals of the drinking water strategy. The purpose of this evaluation is to identify opportunities for better protecting drinking water by limiting the occurrence of pesticides and toxic chemicals in drinking water sources, and by collecting, sharing, and assessing data on the potential occurrence and health effects of pesticides and toxic chemicals in drinking water. The programs have identified key contaminants of common interest and are comparing review and regulatory schedules to identify

---

[8] *Coming Together for Clean Water, EPA's Strategy to Protect America's Waters,* is available at https://blog.epa.gov/waterforum/wp-content/uploads/2011/04/ComingTogether-for-Clean-Water-FINAL.pdf.

opportunities to collect shared information and are identifying potential co-occurrence, common treatment, and analytical methods for contaminants.

The job of protecting national water quality can't be handled by the EPA alone, or even by the federal government alone. For success, this job requires a local focus and commitment to source water protection. One way the EPA works to encourage this is through our Source Water Collaborative, a coalition of 23 organizations joined to promote protection of drinking water sources at national, state and local levels. The Collaborative members have agreed to share information, develop recommendations together, and package and disseminate these recommendations to encourage actions that prevent contamination, promote development patterns and land use with limited threats to drinking water sources, and preserve the land needed to protect the quality of current and future sources of drinking water.

Senator Frank R. Lautenberg

1. **A House investigation revealed this week that oil and gas companies have been injecting diesel fuel into the ground as part of their fracking operations. While the Safe Drinking Water Act exempts some oil and gas activities, the law requires a permit for underground injection of contaminants like diesel fuel. Does EPA plan to prosecute the companies that have been injecting diesel fuel underground without permits?**

RESPONSE: The EPA will take action to ensure that those who use diesel fuel in hydraulic fracturing operations are doing so in compliance with the Underground Injection Control (UIC) requirements of the Safe Drinking Water Act. Whether the EPA will take enforcement action against companies that injected diesel fuel in past hydraulic fracturing operations will depend on the particular facts and circumstances of each case. That said, in order to protect the confidentiality of potential case developments and assure effective enforcement, the EPA cannot comment on potential enforcement investigations or responses.

2. **Scientists have reported disturbingly high numbers of fish with both male and female characteristics and other reproductive problems that could be linked to exposure to pharmaceuticals in the water. At a 2009 hearing, the head of EPA's water office told me that the agency was studying at least eight pharmaceuticals found in water. What has EPA done since 2009 to address this issue?**

RESPONSE: The EPA is continuing its work to address pharmaceuticals and other contaminants of emerging concern in water. The EPA is using a four-pronged approach aimed at improving science, improving public understanding, identifying partnership and stewardship opportunities, and taking regulatory action when appropriate. Most activities to date have been focused on efforts to increase our scientific knowledge regarding the presence of these compounds and to assist us in determining whether their presence may cause adverse impacts in the aquatic environment.

Prior to 2009, the agency took action to develop analytical methods for a number of pharmaceuticals in wastewater and biosolids. The EPA also initiated several occurrence studies, including exploratory studies of wastewater from Publicly Owned Treatment Works (POTWs) and of fish tissue, and also a study of a number of pharmaceuticals in biosolids from POTWs that was published in 2009. All of these studies are accessible from http://water.epa.gov/scitech/swguidance/ppcp/index.cfm.

Since 2009, the EPA has worked to further expand its knowledge of the extent to which these contaminants occur in the environment:

- During 2008 and 2009, the EPA and state teams collected fish and surface water samples from about 150 randomly selected urban river sites across the country as part of the National Rivers and Streams Assessment program. Surface water samples are being analyzed for 54 pharmaceuticals. Fish fillets will be analyzed for more than 20 pharmaceuticals and 15 personal care products In addition to fish tissue, the survey measures a wide variety of variables intended to characterize the chemical, physical, and biological condition of the Nation's flowing waters. These include water chemistry, nutrients, chlorophyll-a, sediment enzymes, enterococci, physical habitat characteristics, and biological assessments including sampling of periphyton, benthic macroinvertebrates, and fish community. Results are expected in 2012. Fish tissue samples were collected at an additional 150 U.S. coastal sites in the Great Lakes in 2010. These samples are

currently being processed and will be analyzed for pharmaceuticals as well as perfluorinated compounds, mercury, polybrominated diphenyl ethers (PBDEs), and fatty acid content, with results of these analyses expected in 2013.

- With a focus on keeping pharmaceuticals out of the water, the EPA studied unused pharmaceutical disposal practices at health care facilities. This study was prompted by the concern that potentially large amounts of pharmaceuticals are being flushed or disposed of down the drain, ultimately ending up in rivers, streams and coastal waters. The agency has drafted a guidance document of best management practices for health care facilities, which describes techniques for reducing or avoiding pharmaceutical waste, practices for identifying and managing types of unused pharmaceuticals, and applicable disposal regulations.[9] The guidance is designed to provide recommendations to hospitals, medical clinics, doctors' offices, long-term care facilities and veterinary facilities. The EPA expects that this document will help reduce the amount of pharmaceuticals that are discharged to water bodies. The agency plans to publish a final version of this document in 2011.

- In August 2010, the EPA released the results of an extensive literature review of published studies of the effectiveness of various treatment technologies for contaminants of emerging concern (CECs). The EPA reviewed over 400 articles that referenced treatment of CECs, about 100 of which contained treatment information which was entered into a searchable database and made available online. The EPA developed a report that compiles and summarizes the results reported by researchers in the last five years. The report discusses 16 of the over 200 CECs present in the database, and the average percent removals achieved by full-scale treatment systems that employ six of the more than 20 reported treatment technologies.[10]

- The EPA is working to expand its method for detecting pharmaceuticals and personal care products (EPA Method 1694) by adding several pharmaceuticals to the list of chemicals for analysis. In addition, the EPA is working to develop a new method to detect hormones.

---

[9] This draft guidance is available at http://water.epa.gov/scitech/wastetech/guide/upload/unuseddraft.pdf.
[10] The literature search database and report summarizing the effectiveness of treatment technologies is available at http://water.epa.gov/scitech/swguidance/ppcp/index.cfm.

Senator Sheldon Whitehouse

1. **The Centers for Disease Control has warned that partial lead service line replacement may not lower lead levels in drinking water, and may, at least temporarily, cause spikes in water lead levels. This has caused great concern in Providence, Rhode Island, which is required to undertake partial lead service line replacement on 7% of its service lines every year. My understanding is that EPA is updating its lead and copper rule. Is EPA planning to evaluate whether the program is reducing exposure?**

RESPONSE: Yes. The EPA plans to carefully consider the work of the EPA's Science Advisory Board (SAB) and the input provided by stakeholder comments as it prepares proposed revisions to the lead and copper rule. We expect a final report soon from the SAB that evaluates the study from the Centers for Disease Control and other studies that have examined tap water lead levels before and after partial lead service line replacements. The EPA has also sought stakeholder input on lead service line replacement issues, most recently at the November 4, 2010 stakeholder meeting and during environmental justice outreach on March 3, 2011. The EPA will consider the stakeholder comments and SAB's advice in its proposed rule revisions anticipated in spring 2012.

2. **The Rhode Island Department of Public Health is strapped for funding and unable to conduct a thorough study of the effects of partial lead service line replacement to Providence households. Could the new lead rule require testing of household drinking water and the blood lead levels of resident children, both before and after partial lead service line replacements, to track whether these partial replacements are helping or hurting the situation?**

RESPONSE: As part of its evaluation of the lead service line replacement requirements, the EPA is examining the requirements to perform water sampling following a replacement. The EPA is not considering requiring water systems to perform blood lead level testing of children in households where service lines have been replaced.

3. **What other research is being conducted, by the CDC or EPA, to determine whether partial lead service line replacements are helping to reduce lead exposure? What resources are available to undertake this type of research?**

RESPONSE: The EPA's Science Advisory Board is currently evaluating the effectiveness of partial lead service line replacements in reducing lead exposure. We expect a final SAB report soon that will assess the currently available scientific data and provide findings on whether partial lead service line replacements have been shown to reduce drinking water lead levels. The SAB report may also include recommendations for additional research. The EPA does not currently have resources designated for future research of the effectiveness of partial lead service line replacement, but will evaluate the SAB recommendations once complete. The EPA and the American Water Works Research Foundation (now Water Research Foundation) jointly funded the 2008 report entitled "Contribution of Service Line and Plumbing Fixtures to Lead and Copper Rule Compliance Issues." This report examined the effectiveness of both partial and full lead service line replacement at a limited number of sites. There are several challenges associated with assessing the impact of partial lead service line replacement, including the need to conduct the sampling at private homes where the replacement has occurred, the large number of samples required to establish a profile for a particular site, and tracking how the lead profile changes over time at that particular site.

Senator John Boozman

1. **My understanding is that EPA's assessment of the human health risks posed by exposure to hexavalent chromium may be driven by a failure to identify research projects that could help address data gaps in the database of existing research. Please address EPA's plans to consider data produced by soon to be completed studies that are designed to determine the mode of action and related health effects in laboratory animals to environmentally relevant dosages of hexavalent chromium in drinking water.**

RESPONSE: The EPA is committed to ensuring that all of its IRIS human health assessments are based on the most current and best available independently peer-reviewed published scientific information. Because the scientific information available on any chemical continues to evolve over time, the EPA cannot always postpone assessments to wait for ongoing research to be published especially when there is already a good database available. The draft IRIS Toxicological Review for hexavalent chromium, released in September 2010, is an assessment of the health effects of hexavalent chromium following oral exposure based on a review of the peer-reviewed published scientific literature. The external peer review panel met in May 2011, and the final peer review report was posted on the EPA's website on July 21, 2011. The EPA is reviewing the external peer review report and is evaluating the peer review and public comments and incorporating them into the assessment.

2. **Administrator Jackson, in developing the Peer Review Plan for the toxicological review of hexavalent chromium, EPA initially placed the plan in the "highly influential" OMB category. At some point, EPA modified this classification to "influential," which will lead to a much weaker level of peer review. Please explain this decision in light of the potential impact on drinking water systems across the country.**

RESPONSE: This is an incorrect assertion. The OMB category of "highly influential" has always been used for the IRIS hexavalent chromium assessment.

ENVIRONMENTAL PROTECTION AGENCY
REGION VI

IN THE MATTER OF: **RANGE RESOURCES CORPORATION** **and** **RANGE PRODUCTION COMPANY** Respondents. (Texas RRC Operator I.D. No. 691703) Proceedings Under Section 1431(a) of the Federal Safe Drinking Water Act, 42 U.S.C. § 300(i)(a).	Docket Number: SDWA-06-2011-1208 **EMERGENCY ADMINISTRATIVE ORDER**

STATUTORY AUTHORITY

The following findings are made and Order issued under the authority vested in the Administrator of the United States Environmental Protection Agency ("EPA") pursuant to the authority of Section 1431 of the Safe Drinking Water Act ("SDWA" or "Act"), 42 U.S.C. § 300(i).

EPA may issue such Orders upon receipt of information that contaminants are present in or are likely to enter an underground source of drinking water and may present an imminent and substantial endangerment to the health of persons, and EPA has determined that appropriate State and local authorities have not taken sufficient action to address the endangerment described herein and do not intend to take such action at this time, as described in Section 1431(a) of the Act, 42 U.S.C. § 300(i)(a).

The Administrator delegated the authority to issue this Order to the Regional Administrator of EPA Region 6, who further delegated such authority to the Director of the Compliance Assurance and Enforcement Division.

Federal law provides that violation of any terms of this Order may subject Respondents to a civil penalty of up to $16,500 per day of violation, assessed by an appropriate United States District Court, under SDWA § 1431(b), 42 U.S.C. §300i(b), as modified by the Debt Collection Improvement Act, 31 U.S.C. § 3701 and codified at 40 C.F.R. § 19.4.

FINDINGS OF FACT

1. Range Resources Corporation ("RRC") is a Fort Worth, Texas based independent natural gas company engaged in the exploration, development and acquisition of primarily natural gas properties in the Southwestern and the Appalachian regions of the United States. RRC is a Delaware corporation with its common stock listed and traded on the New York Stock Exchange under the symbol "RRC."

2. Range Production Company ("RPC") is a wholly-owned subsidiary of Range Resources Corporation operating in the State of Texas.

3. At all times relevant to this Order, RRC and RPC (hereinafter "Respondents") owned or operated the natural gas production facilities (collectively, "Gas Wells") identified as the Butler Unit Well 1-H ("Butler Well") (permitted at Atwood, JB Survey, Abstract #802, Hood County, 660 feet from the N line and 986 feet from the SE line) and the Teal Unit Well 1-H ("Teal Well") (permitted at Atwood, JB Survey, Abstract #802, Hood County, 703 feet from NE line and 948 feet from SE line).

4. Respondents contracted for and directed the drilling of the Butler Well in June 2009 and completed hydraulic fracture stimulation operations in August 2009. Gas production began from the Butler Well in August 2009.

5. Respondents contracted for and directed the drilling of the Teal Well in March and April of 2009 and completed hydraulic fracture stimulation operations in April 2009. Gas production began from the Teal Well in August 2009.

6. The Trinity Aquifer exists under twenty Texas counties, including Parker and Hood counties where the Gas Wells and the private drinking water wells described below are located.

7. As set forth more fully below, two domestic drinking water wells ("Domestic Well 1" and "Domestic Well 2"), located near the Gas Wells and utilizing the Trinity Aquifer, have been shown to contain methane, benzene, toluene, ethane, propane, and hexane. Some of these contaminants are at levels that may endanger the health of persons.

8. Domestic Well 1 lies approximately 120 feet in horizontal distance to the east-northeast from the track of the horizontal section of the Butler Well bore.

9. Domestic Well 2 lies approximately 470 feet in horizontal distance to the southeast from the track of the horizontal section of the Butler Well bore.

10. Domestic Wells 1 and 2 provide drinking water to nine people including both adults and children.

11. The Gas Wells are the only gas production facilities within approximately 2,000 feet of Domestic Wells 1 and 2.

12. Domestic Well 1 (32.56312 latitude, -97.79144 longitude) was drilled in April 2005 and was immediately used for human consumption, building construction, and landscape irrigation.

13. Neither the consumer, nor the well drilling service, observed or reported that the water from Domestic Well 1 contained any noticeable natural gas at the time of its drilling.

14. In late December 2009, approximately four months after the Gas Wells began producing gas, the owner of Domestic Well 1 first noticed that the water had begun to effervesce.

15. On July 26, 2010, the down-hole pump in Domestic Well 1 began experiencing mechanical problems soon identified by a water well service company as "gas locking."

16. "Gas locking" is a condition sometimes encountered in a down-hole pump when dissolved gas is released from solution by the action of the pump and prevents the pump from moving water.

17. In addition, on July 26, 2010, the gas in Domestic Well 1 was determined to be flammable.

18. On August 8, 2010, the owner contracted for water samples to be taken from Domestic Well 1. The samples showed the presence of benzene (3.1 μg/L), toluene (2.0 μg/L), dissolved methane (7,810 μg/L) and dissolved ethane (1,580 μg/L).

19. On August 17, 2010, TRRC took water samples from Domestic Well 1 that showed the presence of benzene (6.84 μg/L) and toluene (6.12 μg/L).

20. The consumer and well owner removed Domestic Well 1 from service during the first week of September 2010 due to the rising gas content within the drinking water and concerns with water quality, indoor air quality and potential explosivity.

21. EPA took samples of the gas from Domestic Well 1 and the Butler Well production stream on October 26, 2010 to perform compositional analysis and isotopic fingerprinting.

22. Isotopic fingerprinting is a method for determining the ratio of different isotopes of a particular element in an investigated material. Understanding this ratio helps scientists know the source of the investigated material.

23. Methane is a molecule comprised of one carbon atom for every four hydrogen atoms. Its chemical formula is CH_4.

24. While the carbon atoms in methane may be chemically identical, they may have different numbers of neutrons and different atomic mass. Atoms of the same element with different atomic mass are known as isotopes.

25. The isotopic fingerprint analysis of methane obtained on October 26, 2010 from Domestic Well 1 ($\delta^{13}C = -47.05$, $\delta D = -188.5$) and the isotopic fingerprint analysis of commingled produced gas from the Butler and Teal Wells ($\delta^{13}C = -46.60$, $\delta D = -183.9$) indicates that both gases are thermogenic in origin and likely to be from the same source.

26. The term "thermogenic," when applied to a gas like methane, means that the gas formed through deep geologic processes involving pressure, heat and time. The term is used to distinguish such gas from biogenic gas, which is formed through biological processes.

27. The compositional analysis of the gas obtained on October 26, 2010 showed that both gases contain significant amounts of heavier hydrocarbon components and that the hydrocarbon portion of each gas contains the same components. The presence of these hydrocarbons further indicates the presence of gas in Domestic Well 1 is likely to be due to impacts from gas development and production activities in the area.

28. On October 26, 2010, EPA also collected samples of water from Domestic Well 1 that showed the presence of dissolved methane (20,100 µg/L), ethane (5,27 µg/L), propane (2,820 µg/L), benzene (4.55 µg/L), toluene (3.47 µg/L), and hexane (31.7 µg/L).

29. The chemicals found in Domestic Well 1 pose a variety of risks to health of persons.

30. Methane poses a risk of explosion and fire. In large concentrations in air, it may pose a risk of asphyxiation. Natural methane, unlike treated methane, pumped to homes for cooking and heating, is odorless and colorless. Usually a minute amount of an odorant such as t-butyl mercaptan is added to natural gas used by consumers.

31. Benzene is a known human carcinogen. It can also cause anemia, neurological impairment and other adverse health impacts.

32. Hexane, propane, ethane and toluene may also cause adverse health impacts if inhaled or ingested.

33. On November 16, 2010, EPA advised the consumers of Domestic Well 1 to continue not using the water due to water quality and potential explosivity concerns.

34. Domestic Well 2 (32.56505 latitude, -97.79041 longitude) was drilled and completed in August 2002 and was immediately used for human consumption and landscape irrigation.

35. Neither the owner, nor the well drilling service company, observed or reported that the water from Domestic Well 2 contained any noticeable natural gas at that time.

36. In May 2010, the owner of Domestic Well 2 first noticed that the water had begun to effervesce.

37. On August 26, 2010, the consumer contracted for water samples to be taken from Domestic Well 2. The samples showed the presence of dissolved methane (10.9 µg/L). EPA sampled the water from Domestic Well 2 on October 26, 2010. Results from this sample showed the presence of dissolved methane (627 µg/L), ethane (38.5 µg/L), and propane (2.05 µg/L).

38. On November 23, 2010, EPA advised the consumers of Domestic Well 2 of the levels of natural gases in the water and that they may wish to cease using the water due to water quality and potential explosivity concerns.

39. EPA has consulted with the appropriate State of Texas and local authorities, including the Railroad Commission of Texas, the Texas Commission on Environmental Quality, and the Parker County fire marshal, regarding the presence of contaminants in the source of drinking water identified below and disclosed the potential endangerment to the health of persons.

40. The Railroad Commission of Texas ("TRRC") is the state agency with regulatory authority over oil and gas production activities and the potential endangerment discussed below. EPA has informed the TRRC of the endangerment and the proposed issuance of this Order. EPA has shared data and findings related to this matter with the TRRC and has consulted with the TRRC on the accuracy of the information upon which this Order is based. EPA has determined that that appropriate State and local authorities have not taken sufficient action to address the endangerment described herein and do not intend to take such action at this time.

41. The contaminants identified herein may present an imminent and substantial endangerment to the health of persons because methane in the levels found by EPA are potentially explosive or flammable, and benzene if ingested or inhaled could cause cancer, anemia, neurological impairment and other adverse health impacts.

CONCLUSIONS OF LAW

42. Benzene, methane, toluene, ethane and propane are "contaminants," as that term is defined in SDWA § 1401(6), 42 U.S.C. § 300f(6) and 40 C.F.R. § 141.2.

43. The Trinity Aquifer is an "underground source of drinking water," as that term is defined at 40 C.F.R. § 144.3.

44. The contaminants identified herein are present in the Trinity Aquifer.

45. Respondents are "person(s)," as defined by Section 1401(12) of the Act, 42 U.S.C. § 300f(12).

46. Respondents caused or contributed to the endangerment identified herein.

47. In accordance with SDWA § 1431(a), 42 U.S.C. § 300i(a), EPA has consulted with appropriate State and local authorities to confirm the correctness of the information on which this action is based.

48. EPA has determined that that appropriate State and local authorities have not taken sufficient action to address the endangerment described herein and do not intend to take such action at this time.

49. EPA has determined that this action is necessary to protect the health of persons.

ORDER AND GENERAL PROVISIONS

50. Based on these findings and pursuant to the authority of Section 1431(a) of the Act, 42 U.S.C. § 300i(a), EPA Orders that Respondents take the following actions:

A) Within twenty-four (24) hours of receipt of this Order, Respondents shall notify EPA in writing whether they intend to comply with this Order.

B) Within forty-eight (48) hours of receipt of this Order, Respondents shall provide replacement potable water supplies for the consumers of water from Domestic Well 1 and Domestic Well 2.

C) Within (48) forty-eight hours of receipt of this Order, Respondents shall install explosivity meters, approved by EPA, in the dwellings served by Domestic Wells 1 and 2.

D) Within five (5) days of receipt of this Order, Respondents shall submit to EPA a survey listing and identifying the location description (latitude and longitude) of all private water wells within 3,000 feet of the Butler wellbore track and 3,000 feet of the Teal wellbore track and all of the Lake Country Acres (TX1110059) public water supply system wells. This submittal shall include a plan for EPA's approval, to sample those wells identified in Order to determine if any of those wells have been impacted. The plan shall include head space (air) and dissolved constituent (water) sampling. The head space sampling shall commence no later than five (5) days after submittal of the plan.

E) Within fourteen (14) days of receipt of this Order, Respondents shall submit to EPA, for approval, a plan to conduct soil gas surveys and indoor air concentration analyses of the properties and dwellings served by Domestic Wells 1 and 2.

F) Within sixty (60) days of receipt of this Order Respondents shall develop, and submit to EPA for approval, a plan to: 1) identify gas flow pathways to the Trinity Aquifer; 2) eliminate gas flow to the aquifer if possible, and 3) remediate areas of the aquifer that have been impacted.

51. Each submittal made pursuant to this Order shall be sent by U.S. mail or by certified mail, with receipt requested to the address below. Electronic submittals will also be accepted.

U.S. EPA, Region 6
Water Enforcement Branch
1445 Ross Ave., Suite 1200
Dallas, TX 75202
Attn.: Chris Lister, (6EN-WR)
FAX: (214) 665-6672
Email: lister.chris@epa.gov

Railroad Commission of Texas
Site Remediation Section
William Travis Building
Austin, TX 78701
Attn: Peter Pope
Email: peter.pope@rrc.state.tx.us

52. Each submittal shall include reference to the docket number as shown on the first page of this Order.

53. All plans, reports, notices, or other documents submitted by Respondents pursuant to this Order, which make any representation concerning Respondents' compliance or noncompliance with any requirement of this Order, shall be accompanied by the following statement signed by a responsible corporate officer of the Respondents:

"I certify under the penalty of law that this document and all attachments were prepared by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel gathered and evaluated the information submitted. Based on my inquiry of any and all persons directly responsible for gathering and analyzing the information obtained, I certify that the information contained in or accompanying this submittal is to the best of my knowledge and belief, true, accurate, and complete. As to those identified portion(s) of this submittal for which I cannot personally verify the accuracy, I certify that this submittal and all attachments were prepared in accordance with procedures designed

to assure that qualified personnel properly gathered and evaluated the Information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, or the immediate supervisor of such person(s), the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

54. The certification shall also include the name, title, date and signature of the person or persons completing the certification.

55. Respondents shall submit to EPA and the State of Texas, at the addresses listed in Paragraph 53, the results of all sampling, tests, or other data generated pursuant to this Order by Respondents or their agents, consultants, or contractors.

56. If any event occurs which causes delay in the achievement of any requirement of this Order, Respondents shall have the burden of proving that the delay was caused by circumstances beyond the reasonable control of Respondents or any entity controlled by Respondents, including but not limited to their contractors and consultants, which could not have been overcome by due diligence. Respondents shall notify EPA verbally within 72 hours, and in writing within 7 days of the verbal notification, of the anticipated length and cause of the delay, the measures taken and/or to be taken to prevent or minimize the delay, and the time table by which Respondents intend to implement these measures. If EPA agrees that the delay or anticipated delay has been or will be caused by circumstances beyond the reasonable control of the Respondents, the time for performance hereunder shall be extended for a period equal to the delay resulting from such circumstances. Respondents shall adopt all reasonable measures to avoid or minimize delay. Failure of Respondents to comply with the notice requirements of this paragraph shall constitute a waiver of Respondents' right to request an extension to meet the requirements of this Order.

57. Nothing in this Order shall be construed to limit or otherwise affect EPA's authority under any applicable law or regulation including but not limited to EPA's authority to conduct inspections, to seek access to property, to request the provision of information, or to bring a civil or criminal enforcement action under the Safe Drinking Water Act or other applicable statutes or regulations.

58. Respondents may assert a confidentiality claim covering all or part of any information submitted to EPA pursuant to this Order. Any assertion of confidentiality must be accompanied by information that satisfies the items listed in 40 C.F.R. § 2.204(e)(4) or such claim shall be deemed waived. Information determined by EPA to be confidential shall be disclosed only to the extent permitted by 40 C.F.R. Part 2. If no such confidentiality claim accompanies the information when it is submitted to EPA, the information may be made available to the public by EPA without further notice to Respondents. EPA will not accept any confidentiality claim with regard to any physical or analytical data.

59. EPA, its contractors, employees, and representatives are authorized to enter and freely move about all property at Gas Wells pursuant to this Order for the purposes of, *inter alia*, interviewing facility personnel and contractors; inspecting records, operating logs, and contracts related to the facility; reviewing the progress of the Respondents in carrying out the terms of this Order; conducting such tests, sampling, or monitoring as EPA or its representatives deem necessary; using a camera, sound recording, or other documentary type equipment; and verifying the reports and data submitted to EPA by the Respondents. Respondents shall provide EPA and its representatives access to the facility at all reasonable times and to any other property to which access is required for implementation of this Order. Respondents shall permit such persons to inspect and copy all records, files, photographs, documents, and other writings, including all sampling and monitoring data, that pertain to work undertaken pursuant to this Order and that are within the possession or under the control of Respondents or their contractors or consultants.

60. This Order is effective upon receipt and will remain in effect until EPA provides notice of its termination. Notice will be given after the requirements of the Order have been satisfied.

61. This Order does not constitute a waiver, suspension, or modification of the requirements of the Act or implementing regulations, which remain in full force and effect. Issuance of this Order is not an election by EPA to forego any civil or criminal action otherwise available under the Act.

62. EPA expressly reserves all rights and defenses that it may have, including but not limited to the right to disapprove work performed by Respondents pursuant to this Order and to modify documents submitted by Respondents and require that Respondents implement those modifications. Nothing in this Order shall diminish, impair, or otherwise adversely affect the authority of EPA to enforce the provisions of this Order. This Order shall not be interpreted to relieve Respondents of their obligations to comply with any provision of the Act, its implementing regulations, or any other federal, state, or local law.

63. Failure to timely complete any requirement of this Order shall be deemed a violation of this Order, beginning on the first day that performance is scheduled to commence.

64. This Order shall not limit or otherwise preclude EPA from taking additional enforcement action, civil or criminal, pursuant to the SDWA, or any other available legal authority, should EPA determine that such action is appropriate. Issuance of this Order is not an election by EPA to forego any civil or criminal action otherwise authorized under the Act or other laws.

65. All actions required to be taken pursuant to this Order shall be undertaken in accordance with the requirements of all applicable local, State, and federal laws and regulations.

66. Respondents shall obtain or cause their representatives to obtain all permits and approvals necessary under such laws and regulations to perform work pursuant to this Order and shall submit timely applications and requests for any such permits and approvals. Failure to obtain any necessary permits or approvals shall not constitute grounds for an extension pursuant to Paragraph 56 of this Order.

67. This Order may be modified or amended by EPA to ensure protection of the health of persons. Such an amendment shall be in writing, shall have as its effective date the date on which it is received by Respondents, and shall be incorporated into this Order.

68. If any provision or authority of this Order, or the application of this Order to any party or circumstance, is held by any judicial or administrative authority to be invalid, the application of such provision(s) to other parties or circumstances and the remainder of the Order shall remain in force and shall not be affected thereby.

69. This Order shall be binding upon the Respondents cited herein and all their heirs, successors, and assignees. No change in ownership of the leases or properties shall alter the responsibility of the Respondents under this Order.

70. This Order constitutes final agency action for purposes of SDWA § 1448, 42 U.S.C. § 300j-7.

OPPORTUNITY TO CONFER WITH EPA

71. Respondents have the opportunity to confer informally with EPA concerning the terms and applicability of this Order. Respondents must contact Tucker Henson, Office of Regional Counsel, at (214) 665-2718 within seven (7) days of receipt of this Order to schedule such a conference. This conference is not an evidentiary hearing, does not constitute a proceeding to challenge the Order, and does not give Respondents a right to seek review of this Order. Any such conference with EPA will be held at the following location:

U.S. EPA, Region 6
Office of Regional Counsel (6RC-EW)
ATTN: Tucker Henson
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

12-7-10
Date

John Blevins
Director
Compliance Assurance and
Enforcement Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

In the matter of :	)	
Murphy Exploration & Production Co.,	)	**Emergency Administrative Order**
Pioneer Natural Resources USA, Inc., and	)	
Samson Hydrocarbons Co.	)	Docket No. SDWA-08-2011-_____
Respondents.	)	
East Poplar Oil Field	)	
Fort Peck Indian Reservation	)	
Montana	)	
Proceedings under Section 1431(a) of the Safe Drinking Water Act, 42 U.S.C. §300i(a)	)	

STATUTORY AUTHORITY

1. The following findings are made and order issued under the authority vested in the Administrator of the U.S. Environmental Protection Agency (EPA) by Section 1431(a) of the Safe Drinking Water Act (the Act), 42 U.S.C. §300i(a). The authority to take this action has been properly delegated to the undersigned EPA officials.
2. Violation of any term of this order may subject Respondents to a civil penalty of up to $16,500 for each day in which such violation occurs or failure to comply continues, pursuant to §1431(b) of the Act, 42 U.S.C. §300i(b). In addition, actions or omissions which violate any requirements of the SDWA or its implementing regulations may subject Respondents to a civil penalty of not more

than $32,500 per day per violation pursuant to §1423 of the Act, 42 U.S.C. §300h-2.

3. Within 72 hours after receiving this order, each Respondent shall notify EPA in writing whether it intends to comply with this order. Such notification shall be made to Nathan Wiser at the address identified in paragraph 100 of this order and to Mr. Wiser's email address: wiser.nathan@epa.gov.

LOCATION

4. This matter relates to lands within the exterior boundary of the Fort Peck Indian Reservation in Roosevelt County, Montana, and addresses groundwater contamination in and around the East Poplar oilfield, which field is approximately five miles northeast of the City of Poplar, Montana.

DESCRIPTION OF RESPONDENTS

5. Murphy Exploration & Production Company (Murphy) is a Delaware corporation doing business in the State of Montana and therefore is a "person" within the meaning of 40 C.F.R. §141.2 and §144.2 and Section 1401(12) of the Act, 42 U.S.C. §300f(12).

6. Pioneer Natural Resources USA, Inc. (Pioneer) is a Delaware corporation and therefore is a "person" within the meaning of 40 C.F.R. §141.2 and §144.2 and Section 1401(12) of the Act, 42 U.S.C. §300f(12). Pioneer acquired the assets of Mesa Petroleum Co. Mesa Petroleum Co. did business in the State of Montana.

7. Samson Investment Company is a Nevada corporation and therefore a "person" within the meaning of 40 C.F.R. §141.2 and §144.2 and Section 1401(12) of the Act, 42 U.S.C. §300f(12). Samson Hydrocarbons Company (Samson), a

subsidiary of Samson Investment Company, is a Delaware corporation and therefore is a "person" within the meaning of 40 CFR §141.2 and §144.2 and Section 1401(12) of the Safe Drinking Water Act, 42 U.S.C. §300f(12). By 1961, C.C. Thomas, an original oil operator on the East Poplar Oil Field, transferred the lease to produce oil from the "Huber" property to Emile A. Polumbus. Emile A. Polumbus later formed the Polumbus Petroleum Corporation ("Polumbus"). Polumbus did business in the State of Montana. Polumbus later merged with W.R. Grace & Co. (a Connecticut corporation) to become Grace Petroleum Corporation in 1976. Grace Petroleum Corporation did business in the state of Montana. On or about January 21, 1993, Samson Investment Company acquired all issued and outstanding stock of Grace Petroleum Corporation and became that company's successor in interest. On or about that same day, Samson Investment Company changed the name of Grace Petroleum Corporation to Samson Natural Gas Company. Samson Natural Gas Company changed its name to SNG Production Company on or about April 19, 1993. On or about December 28, 1994, SNG Production Company changed its name to Samson.

8. Respondents did own and/or operate oil and gas production facilities, including but not limited to oil or gas production wells, produced brine disposal wells, secondary recovery injection wells, drilled and abandoned dry holes, production and waste pits, storage tanks, oil/water separators, and distribution pipelines and pumping facilities, in the East Poplar Oil Field located within the following locations: Township 28 North, Range 51 East; Township 29 North, Range 50 East; Township 29 North, Range 51 East, on the Fort Peck Indian Reservation in

Roosevelt County in the State of Montana.

USGS STUDY BACKGROUND

9. This area in and around the East Poplar oil field has been studied by the United States Geological Survey (USGS), and its findings have been documented in peer-reviewed studies published by the USGS.[1] Groundwater in the area has been determined by the USGS to be contaminated with produced brine. In its 1997 publication, the USGS mapped approximately 12.4 square miles of groundwater contamination within its 21.6 square mile study area. Since then, recognizing the need to extend the study area, the USGS has been mapping this groundwater contamination over an area greater than 100 square miles. The final report of this larger area study is not yet available, but some provisional aspects of the report have been made available.

10. The USGS in 2009 and 2010 analyzed strontium isotopes and trace elements at its laboratory.

11. Generally, provisional information is considered by the USGS to be subject to revision because the data or data interpretation has not been subjected to the USGS's normal and customary peer-review process. The USGS does not consider the 2009 or 2010 strontium isotope and trace element laboratory data to be provisional, but it has not yet published its conclusions regarding the interpretation of the data.

12. Of the approximately 150 groundwater monitoring well sites located among 38

[1] Thamke, J., and Craigg, S., 1997, Saline-Water Contamination in Quaternary Deposits and the Poplar River, East Poplar Oil Field, Northeastern Montana, U.S.G.S. Water-Resources Investigation Report 97-4000.
Thamke, J.N., and Midtlyng, K.S., 2003, Ground-Water Quality for Two Areas in the Fort Peck Indian Reservation, Northeastern Montana, 1993-2000, U.S.G.S. Water-Resources Investigation Report 03-4214.

square-mile sections in the area, the USGS provisionally considers 44 of them to be considerably contaminated (total dissolved solids above 9,640 mg/l and chloride above 5,200 mg/l) and an additional 45 of them to be moderately contaminated (total dissolved solids above 1,170 mg/l and chloride above 330 mg/l).

13. This order is issued with EPA's understanding that the USGS plans to publish two additional reports: one on its area-wide groundwater contamination mapping effort covering more than 100 square miles, and one with its conclusions from its 2009 and 2010 strontium isotope and trace element analysis

14. Because EPA concludes the data shows an imminent and substantial endangerment to the City of Poplar's public water supply and to area residents drawing water from the aquifer it is issuing this order without waiting for the USGS to complete its publication process. If the published USGS reports lead to different conclusions, EPA will consider them at that time.

15. EPA also issues this order at this time to allow Respondents more time to plan how to comply with the drinking water treatment and/or alternative water supply requirements of paragraphs 79 through 83, which may be more cost effective for said Respondents compared to issuing an order later requiring drinking water treatment and/or alternative water to be immediately supplied.

EPA ADMINSTRATIVE ORDER BACKGROUND

16. EPA has issued four previous Emergency Administrative Orders under §1431 of the Act for matters in and around the East Poplar oilfield, as described below.

17. On September 30, 1999, EPA issued an order to several Respondents, including

Respondents Murphy and Pioneer. This order was amended on November 5, 1999, and November 30, 1999. As amended, the order required the provision of bottled drinking water to area residences and the production of records. This order bears docket number SDWA-8-99-68 (the current numbering convention for this docket would be SDWA-08-1999-0068) and was appealed to the U.S. Tenth Circuit Court of Appeals.

18. On August 16, 2001, EPA issued an order to Respondent Pioneer. This order required Pioneer to properly plug and abandon a leaking oil well for which it had acquired liability, known as the Biere #1-22 well, which was known to be a source of on-going groundwater contamination. The order also required Pioneer to monitor near the Biere #1-22 well to determine whether the plugging and abandonment was successful. This order bears docket number SDWA-08-2001-0027 and was not appealed.

19. On September 20, 2001, EPA issued an order to several Respondents including Murphy, Pioneer and Samson. This order was amended on October 3, 2001. This order cited documentation of spills and past practices in the East Poplar oil field, particularly the management of produced brine, which caused groundwater contamination. As amended, this order required Respondents to provide an alternate, whole-house supply of water to area residences and to monitor near the City of Poplar to detect the leading edge of the groundwater plume to determine the risk to the City of Poplar Montana's public drinking water supply wells. This order bears docket number SDWA-08-2001-0033 and was appealed to the U.S. Tenth Circuit Court of Appeals.

20. On July 20, 2004, EPA issued a consensual order bearing docket number SDWA-08-2004-0035, still in effect, to Respondents Murphy, Pioneer and Samson. This consensual order terminated those orders on appeal to the Tenth Circuit Court of Appeals and required those Respondents to (a) construct a drinking water pipeline to several residences in the area, (b) monitor certain private water wells, (c) hold and participate in a public meeting, (d) continue to provide bottled drinking water to identified homesites until the newly-required drinking water pipeline delivers drinking water to those homesites, (e) report monitoring information to EPA as it is collected, and (f) submit documents to EPA. The consensual order also requires Respondents to monitor 11 groundwater monitoring wells for the purpose of detecting contaminated groundwater getting close to the City of Poplar's public water supply wells. This groundwater monitoring program is referred to as the "Poplar Well Threat Study."
21. EPA's previous emergency orders expressed EPA's concern that this contaminated groundwater may move in the direction of the City of Poplar's drinking water wells.
22. Respondents have been conducting the required sampling at the 11 groundwater monitoring wells in the Poplar Well Threat Study. The annual reports of Poplar Well Threat Study have identified that contamination in the groundwater is moving in the general direction of the City of Poplar, but the conclusions reached in each Poplar Well Threat Study report do not indicate that the City is affected.
23. There is now mixing of contamination into the City of Poplar's public water supply wells, which suggest the Poplar Well Threat Study failed to fulfill its

objective of intercepting groundwater contamination before it reached the City's wells. EPA suggests this failure is caused by an inadequate monitoring well network and the type of monitoring being conducted to detect contamination. EPA also suggests that the groundwater movement between the contaminated groundwater plumes and the City of Poplar's public water supply wells is complex.

24. The Poplar Well Threat Study monitoring program did not use strontium isotopes, a method EPA now understands to be more sensitive for detecting this type of groundwater contamination.

FINDINGS OF FACT

25. There exists groundwater contamination in the area alluvium and glacial till from historic management of produced brine in and around the East Poplar oilfield. EPA's previous emergency administrative orders describe how this contamination occurred. In summary, the groundwater contamination resulted from Respondents managing produced brine in unlined pits, Respondents' various spills of produced brine and crude oil, and produced brine and crude oil leaking at Respondent Pioneer's improperly plugged oil well.

26. The glacial till and river valley alluvium constitute the only available source of drinking water in the general area, and the three public water supply wells that service the City of Poplar's approximately 2,900 residents as well as area residents using private water wells derive their water from the same groundwater that is contaminated further up-gradient.

27. The peer-reviewed studies by the USGS described in paragraph 9 include its

findings of groundwater contamination from oil field activities.

28. There exists a 15 square mile area generally following the Poplar River which is located such that there are confirmed contaminated groundwater plumes present or up-gradient, while the City's wells are down-gradient, placing this area generally between the sources of contamination and the City's wells. This area is not presently fully characterized with regard to the presence of groundwater contamination. There are residents living in this same 15 square mile area drawing water from the same alluvium and glacial till aquifer via their private water wells. The 15 square mile area is described as follows, starting from north to south:

In Township 29 North, Range 51 East:
- Section 31
- Section 32

In Township 28 North, Range 51 East:
- Section 4 (W/2 and NE/4)
- Section 5 (E/2 and SW/4)
- Section 8
- Section 9 (W/2)
- Section 17
- Section 18 (E/2)
- Section 19
- Section 20 (W/2)
- Section 29
- Section 30
- Section 31
- Section 32

In Township 28 North, Range 50 East:
- Section 25 (SE/4)
- Section 36 (E/2)

In Township 27 North, Range 50 East:
- Section 1 (S/2 and NE/4)

In Township 27 North, Range 51 East:
- Section 6.

29. Groundwater in the East Poplar oilfield area was shown in 1999 and 2000 at

several locations to have benzene contamination. Replicate water well samples collected by the Fort Peck Office of Environmental Protection (OEP) at one home site during this time span had respective benzene concentrations of 0.058 and 0.078 mg/l (58 and 78 micrograms/liter), while samples taken by the USGS at five other locations in the field had benzene concentrations between 0.0016 and 0.0051 mg/l (1.6 to 5.1 micrograms/liter).

30. Groundwater in the East Poplar oilfield area was shown in 1999 and 2000 to have 1,4-dichlorobenzene contamination. Samples collected by the OEP and the consulting firm MSE-HKM, Inc. during this time at eight different locations in the field had 1,4-dichlorobenzene concentrations between 0.00056 and 0.00083 mg/l (0.56 to 0.83 micrograms/liter).

31. Groundwater in the East Poplar oilfield area was shown in 1999 and 2000 to have toluene contamination. Samples collected by the OEP and the consulting firm MSE-HKM, Inc. during this time at five locations in the field had toluene concentrations between 0.00008 and 0.0028 mg/l (0.08 to 2.8 micrograms/liter).

32. Groundwater in the East Poplar oilfield area was shown between 1982 and 2000 to have elevated total dissolved solids concentration. Samples collected by the USGS, OEP, and the consulting firm MSE-HKM, Inc. during this time at 65 locations in the field had total dissolved solids concentrations above the secondary maximum contaminant level (MCL)[2] (500 mg/l) including 22 above 10,000 mg/l and the highest at 67,000 mg/l.

33. Groundwater in the East Poplar oilfield area was shown between 1982 and 2000 to have elevated chloride concentration. Samples collected by the USGS, OEP,

[2] See Title 40 of the Code of Federal Regulations Part 143

and the consulting firm MSE-HKM, Inc. during this time at 41 locations in the field had chloride concentrations above the secondary MCL (250 mg/l) including 23 above 5,000 mg/l and the highest at 67,000 mg/l.

34. Groundwater in the East Poplar oilfield area was shown between 1982 and 2000 to have elevated sodium concentration. Samples collected by the USGS, OEP, and the consulting firm MSE-HKM, Inc. during this time at 56 locations in the field had sodium concentrations above 250 mg/l including 14 above 5,000 mg/l and the highest at 43,000 mg/l.

35. Groundwater in the East Poplar oilfield area was shown between 1982 and 2000 to have elevated sulfate concentration. Samples collected by the USGS, OEP, and the consulting firm MSE-HKM, Inc. during this time at 52 locations in the field had sulfate concentrations above the secondary MCL (250 mg/l) including 12 above 1,000 mg/l and the highest at 1,910 mg/l. Samples collected by the consulting firm PBS&J as recently as 2008 show sulfate concentration as high as 2,150 mg/l.

36. Manganese is found in the groundwater throughout the East Poplar oilfield area. Its concentration in the sampled produced brine is between 0.062 and 0.130 mg/l. Manganese in drinking water above 0.30 mg/l has adverse human health affects as described in paragraph 53. When the brine is in the presence of aquifer materials, such as shown in samples collected at monitoring wells showing high concentrations of dissolved solids, manganese values increase significantly. In 2010, the USGS collected a sample showing a manganese concentration of 5.12 mg/l at monitoring well USGS 09-06, located within a groundwater

contamination plume. In 1982, the USGS collected a sample showing manganese concentration of 14 mg/l at monitoring well W-16 (since renamed monitoring well USGS 92-11), also within a groundwater contamination plume. Manganese in the groundwater at concentrations above 0.30 mg/l has been found at 33 different locations in the field since 1982. This pattern is due to an increase in water-rock interaction occurring in the presence of the high ionic strength brine in which the produced brine contamination creates the secondary effect of dissolving manganese into the groundwater. In samples collected in 2010 and analyzed at the USGS Yucca Mountain Branch Laboratory, manganese concentrations entering the three public water supply wells for the City of Poplar ranged from 0.507 to 0.890 mg/l. Under current conditions, the City of Poplar's drinking water treatment system effectively removes manganese to below an endangering concentration, but it is unknown whether such treatment would remain effective if the manganese concentration entering the City's wells were to rise as high as 14 mg/l, a value observed in contaminated groundwater.

37. There have been three different efforts made to estimate the time lapse before the groundwater contamination plumes in the East Poplar oilfield reach the City of Poplar public supply wells. In March 2002, the Montana Department of Environmental Quality estimated a groundwater travel time of approximately 3 years (arriving in 2005) for a contamination plume to influence the source water for at least one of the Poplar public water supply wells. In March 2003, the consulting firm Land and Water Consulting, Inc., whose name later changed to PBS&J, under the direction of the Respondents Murphy, Samson and Pioneer,

estimated a travel time of 109 years (arriving in 2112) for contamination influence on the Poplar public water supply wells. In September 2008, the consulting firm S.S. Papadopulos & Associates, Inc., under the direction of the OEP, conducted a modeling effort yielding several contaminant travel time estimates based on different assumptions. The two flowpaths assumed included (1) contaminants flowing directly with groundwater movement to the City's wells, and (2) contaminants flowing first into the Poplar River and then re-entering the groundwater and arriving at the City's wells. Using various inputs into the model, these two flowpaths resulted in a range of 3.5 years to more than 200 years in the groundwater-only scenario, and a range of 1.63 years to 49.5 years in the scenario with contaminants moving into the Poplar River and then to the City's wells.

38. Water samples from the City of Poplar's Well #3 (COP-3) were collected by the OEP on March 3, 2009 and May 28, 2009. These sample results showed chloride concentration increased at the COP-3 from 439 mg/l on March 3, 2009 to 782 mg/l on May 28, 2009, an increase of 78%.

39. To determine if the chloride in COP-3 originated from a contaminated groundwater plume, OEP convened a technical workgroup comprised of representatives from OEP, Respondents, EPA, the Montana Department of Environmental Quality and the USGS, and the workgroup agreed to the use of isotopic ratios and trace elements. The results of the trace element and isotopic investigation show that produced brine is found in the City of Poplar's public water supply, which accounts for the increase in chloride, total dissolved solids and manganese concentration in COP-3.

40. Samples collected in May, June and August 2009, and in July 2010, by the OEP and the USGS were analyzed at the USGS Yucca Mountain Project Branch laboratory in Lakewood, Colorado. The samples were collected from all three of the City of Poplar's public water supply wells, as well as 14 groundwater monitoring wells from the glacial till and alluvium, one groundwater supply well from the Judith River Formation, two surface water samples from the Poplar River, and two salt water disposal wells in the East Poplar oilfield, disposing of produced brine. The analyses included tests for trace metals in the samples collected July 2010 and strontium isotopes in all the samples collected in 2009 and 2010. The results of these sample analyses are summarized in Tables 1 and 2.

41. Strontium (Sr) is an alkaline-earth element that behaves, in geochemical and biological cycles observed in nature, in a manner similar to calcium. Sr is composed of four stable (nonradioactive) isotopes--^{84}Sr, ^{86}Sr, ^{87}Sr, and ^{88}Sr. For all practical purposes, the relative abundance of ^{84}Sr, ^{86}Sr, and ^{88}Sr are constant in nature, whereas some of the ^{87}Sr is created from the radioactive decay of rubidium-87 (^{87}Rb) with a half-life of 48.8 billion years.

42. In the past 20 years, strontium isotope ratios, expressed as $^{87}Sr/^{86}Sr$, have been successfully used as natural tracers[3] to study groundwater mixing. Because natural fractionation of Sr is nonexistent or exceedingly small in the hydrologic environment, $^{87}Sr/^{86}Sr$ values of dissolved Sr are not being affected by temperature, pressure, or changes of water into steam or ice. However,

[3] Shand, P., Darbyshire, D.P.F., Love, A.J., and Edmunds, W.M., 2009, Sr isotopes in natural waters: Applications to source characterization and water-rock interactions in contrasting landscapes: Applied Geochemistry, v. 24, p. 574-586.
Banner, Jay L., 2004, Radiogenic isotopes: systematic and applications to earth surface processes and chemical stratigraphy: Earth-Science Reviews, v. 65, p. 141-194.

groundwater $^{87}Sr/^{86}Sr$ values and Sr concentrations can be changed by mixing with other groundwater. The use of Sr isotopes in conjunction with dissolved major and minor ions and trace metals is a way to understand and quantify the effects of mixing where there are different groundwaters having chemically and isotopically distinct signatures, referred to as groundwater "end members."

43. In the East Poplar oilfield, oil is produced mainly from the Charles Formation of the Mississippian-aged Madison Group. The Mississippian geologic time period was between 318 and 359 million years ago. From oldest to youngest, the Madison Group is composed of the Lodgepole Formation, the Mission Canyon Formation, and the Charles Formation. The Mission Canyon and Charles Formations are thick limestone and dolomite rock formations. These rocks were formed at the bottom of an ancient ocean. There have been different ocean Sr isotope ratios dating back into geologic time.[4] Using a well-understood curve of the ocean Sr isotope ratio values through geologic time, the ocean water incorporated during the deposition and burial of the sediments that later became the Madison group, would likely have had Sr isotope ratios between 0.7080 and 0.7083.

44. Five samples were collected in 2009 at locations later repeated in 2010 and were analyzed for Sr concentrations and $^{87}Sr/^{86}Sr$ only: COP-1, COP-3, M-71, Huber 5D, and USGS06-11. Twenty-three samples collected in July 2010 from East Poplar oilfield included samples from 14 monitor wells, brine from two disposal wells and one water make-up well, two from the Poplar River, and four samples

[4] McArthur, J.M., Howarth, R.J., Bailey, T.R., 2001, "Strontium Isotope Stratigraphy: LOWESS Version 3: Best Fit to the Marine Sr-Isotope Curve for 0-509 Ma and Accompanying Look-up Table for Deriving Numerical Age", in Journal of Geology, vol. 109, p. 155-170.

from the COP public water supply wells. These samples were analyzed by the USGS for total dissolved solids, major and minor dissolved ions, trace metals, and Sr isotopes. The results of the 2010 analyses are shown in Table 1. Figure 1 is a map compiled by the USGS showing the sample locations. The map also shows other monitor well locations in the area. The colors on the map differentiate among highly contaminated groundwater (red), moderately contaminated groundwater (yellow), and uncontaminated groundwater (blue).

45. Figure 2 is a representation of the total dissolved solids and strontium values from the 2010 data, plotted at each sample location. The y-axis is logarithmic because of the large differences in measured values. There is a high correlation between these total dissolved solids and strontium (the correlation coefficient for the results is 0.9825). As a result, for plotting purposes, strontium can be used as a surrogate for total dissolved solids.

46. Figure 3 is a representation of 2010 data, plotting the reciprocal of the strontium concentration on the x-axis (in L/mg) against $^{87}Sr/^{86}Sr$ values on the y-axis. This type of plot demonstrates a linear mixing relationship between end members.[5] In Figure 3, high levels of groundwater contamination and the correlative increase in concentration of strontium plot to the left. Simple mixing between two groundwater end members appears on this plot as a straight line between each end member.

47. Spider diagrams[6] can be used for comparing major and trace element

[5] Gaure, Funter, and Mensing, Teresa M., 2005, Isotopes: Principles and Applications, 3rd edition, Chapter 16.
[6] Wilson, Marjorie, 1989, Igneous Petrogenesis—A Global Tectonic Approach: Unwin Hyman, London, p. 19-21.

compositions of any material including ground water. Because of the large difference in concentrations of the different elements, ratios of the concentrations are usually displayed on a logarithmic plot. Figure 4 compares the ratios of key elements in COP-3 and COP-2 with those in COP-1. COP-1 and COP-2 are very similar in their concentrations of elements so the plot of their loci of ratios approximates a straight line at a y-value of 1. In contrast, COP-3 is depleted in sulfate but enriched in other major ions, especially chloride, bromide, and iodide. Such a pattern would develop by adding produced brine to water represented by COP-1 and COP-2, because most produced brine is enriched in chloride, bromide, and iodide, but relatively depleted in sulfate.[7] Figure 4 also compares in similar fashion the highly contaminated groundwater from monitoring well MOC-11 to COP-1, and a similar pattern is displayed, especially showing the relative depletion in sulfate in the MOC-11 water compared to the chloride, bromide and iodide.

48. On November 19, 2010, the OEP collected samples from the City of Poplar's public water supply, and the samples were analyzed at the EPA Region 8 laboratory for metals, anions, volatile organic compounds, total dissolved solids, alkalinity, pH, and electrical conductance using analytical methods prescribed for drinking water samples.[8] Samples collected at the same time and at each sample point were also sent to the USGS Yucca Mountain Project Branch laboratory in Lakewood, Colorado. The EPA Region 8 sample results are shown in Table 3. At the time the samples were collected, the pump at the COP-3 was broken, so

[7] Breit, George N., and Skinner, Chris, 2002, Produced waters database: U.S. Department of the Interior, U.S. Geological Survey Oct 2006 modified
[8] See Title 40 of the Code of Federal Regulations, Part 141

samples were collected solely from COP-1 and COP-2, both before and after drinking water treatment, and samples were also collected from the point at which the blended public water supply enters the water distribution system for the City of Poplar. Another sample was collected from within the distribution system (i.e. from a tap receiving its water from the City of Poplar's public water). At each location sampled, a replicate sample was also collected and analyzed.

49. Poplar's Verne E. Gibbs Health Center has a unit for administering dialysis to patients having renal problems. To function properly, this dialysis method requires water containing a limited amount of dissolved solids. Patients requiring dialysis treatment have compromised kidneys and need the treatment to prevent build-up of uric acid in their bloodstream. Unabated, uric acid build-up in human bloodstream can lead to death. The Health Center relies on the City of Poplar public water supply for operation and uses a reverse osmosis water treatment system to purify the water used for dialysis. On July 27, 2009, during a period when COP-1 was taken off-line and with the City supplying public water using an unusually high amount fraction from COP-3 containing its relatively higher concentration of dissolved solids, the purification capabilities of the reverse osmosis system were overwhelmed. This led to the shut down of the dialysis unit.

50. The Tribal Water Resources Office (WRO) issues groundwater use permits on the Fort Peck Indian Reservation. The presence of the groundwater contamination in and around the East Poplar oil field has effectively prevented the Tribal WRO from issuing at least two such permits in the last three years, including one permit that would have supported a new public water supply (PWS).

HEALTH EFFECTS OF CONTAMINANTS

51. Benzene is a known human carcinogen. A causal relationship between benzene exposure and leukemia has been clearly established. EPA, in its consensus position on toxicological effects, the Integrated Risk Information System ("IRIS"), uses human occupational data to estimate the added risk of contracting cancer from exposure to benzene. Epidemiologic studies and case studies provide clear evidence of a causal association between exposure to benzene and acute nonlymphocytic leukemia and also suggest evidence for chronic nonlymphocytic leukemia and chronic lymphocytic leukemia. Other neoplastic conditions that are associated with an increased risk in humans are hematologic neoplasms, blood disorders such as preleukemia and aplastic anemia, Hodgkin's lymphoma, and myelodysplastic syndrome. These human data are supported by animal studies which indicate that exposure to benzene increases the risk of cancer in multiple species at multiple organ sites (hematopoietic, oral and nasal, liver, forestomach, preputial gland, lung, ovary, and mammary gland). According to IRIS, dated January 2000, the consumption of drinking water containing 0.078 mg/l benzene is associated with an added risk of cancer of between 1 in 10,000 people and 1 in 100,000 people.

52. In 1999, EPA toxicologist Dr. Robert Benson stated that water with a TDS concentration in excess of 1,000 to 2,000 mg/l is unpalatable and will not be voluntarily consumed by individuals. If an individual has no other source of water and is forced to consume water with TDS levels over 10,000 mg/l, the adverse health effects include severe osmotic diarrhea and severe dehydration.

Continued consumption after the onset of the above conditions may result in death.

53. There is a lifetime health advisory for manganese of 0.3 mg/l and is based on prevention of neurological damage which can lead to lethargy, increased muscle tonus, tremor and mental disturbances. Death has been attributed to humans consuming drinking water with manganese at levels as high as 28 mg/l.

54. The primary drinking water MCL for toluene is 1 mg/L. Toluene has adverse effects on the nervous system, the liver, and the kidney. The health effects of toluene are summarized at http://www.epa.gov/ncea/iris.

55. The primary drinking water MCL for ethylbenzene is 0.7 mg/L. Ethylbenzene has adverse effects on the liver and kidney. The health effects of ethylbenzene are summarized at http://www.epa.gov/ncea/iris.

56. The primary drinking water MCL for xylenes is 10 mg/L. Xylenes have adverse effects on the nervous system. The health effects of xylenes are summarized at http://www.epa.gov/ncea/iris.

IMMINENT AND SUBSTANTIAL ENDANGERMENT FINDING

57. Section 1431 of the Act allows EPA to take action, "upon receipt of information that a contaminant which is present in or likely to enter a public water system or an underground source of drinking water...may present an imminent and substantial endangerment to the health of persons." The action EPA may take "may include (but shall not be limited to)...issuing such orders as may be necessary to protect the health of persons who are or may be users of such system (including travelers), including orders requiring the provision of alternate water

supplies by persons who caused or contributed to the endangerment..."

58. Respondents contaminated groundwater in and around the East Poplar oilfield from their past practices managing produced brine in unlined pits, various spills of produced brine and crude oil, and from produced brine and crude oil leaking at Respondent Pioneer's improperly plugged oil well.

59. The groundwater contamination in and around the East Poplar oilfield is located up-gradient of the City of Poplar's public water supply wells and has been shown to contain total dissolved solids at levels up to 91,100 mg/l, chloride at levels up to 58,000 mg/l, sodium at levels up to 43,000 mg/l, sulfate at levels up to 2,150 mg/l, manganese at levels up to 14 mg/l, benzene at levels up to 0.078 mg/l, ethylbenzene at levels up to 0.0052 mg/l, toluene at levels up to 0.0028 mg/l, and xylenes at levels up to 0.0021 mg/l.

60. Every estimate of the movement of the East Poplar oilfield groundwater contamination plume(s) has concluded that such plume(s) will reach the City of Poplar's public water supply wells.

61. The 2009 and 2010 USGS Sr isotope and trace element data as plotted in Figure 3 illustrates the following conclusions:

    a. A nearly horizontal array of data points (the main trend) displays mixing between samples uninfluenced by contamination on the right (colored blue) and highly contaminated samples on the left (colored red), and

    b. The samples from the COP wells plot at intermediate positions on the main trend. Also, there is a distinct difference between the COP-3 and the

other two COP wells (COP-1 and COP-2). This means the COP well water is a mixture between the groundwater end members and is influenced by contamination, especially COP-3 which plots further to the left.

62. The spider diagram figure 4 showing relative concentrations of trace elements is further evidence that produced brine is mixing particularly into the COP-3 well.
63. The data expressed in Figures 1 - 4 indicates that the City of Poplar's water supply is now mixing with produced brine found in groundwater contamination areas in and around the East Poplar oilfield.
64. Because the up-gradient contamination is now mixing with the City's wells, the contamination may be flowing through a 15 square mile area located in an intermediate position where residents are drawing their drinking water from the same alluvium and glacial till aquifer, and the contamination may be entering these residents' private water wells.
65. Humans who drink water containing the constituents at the concentrations described in paragraph 59 will suffer adverse health effects that could lead to death.
66. The entry of produced brine into the City of Poplar's water supply represents an imminent and substantial endangerment to the people drinking the water.
67. The entry of produced brine into the City of Poplar's water supply during a period when COP-3 was contributing relatively higher amounts of supplied water caused the water purification system at the Vern E. Gibbs Health Center dialysis center to cease functioning and led to the shut down of dialysis treatment.

68. The Tribes' inability to issue groundwater use permits due to the presence of the groundwater contamination in and around the East Poplar oil field, including one permit that would have supported a new PWS, has effectively precluded the use of this aquifer as a drinking water resource.

69. No other appropriate governmental agency has taken the actions necessary to protect the health of persons whose source of drinking water is the contaminated aquifer.

70. EPA has determined that this action is necessary to protect the health of persons.

ORDER

71. Based on these findings and pursuant to the authority of Section 1431(a) of the Act, 42 U.S.C. § 300i(a), EPA orders that Respondents, in summary, take the following actions. Respondents shall (a) collect monthly samples at the City of Poplar's public water supply for analysis to detect impending contamination, (b) upon homeowner's request, collect monthly samples from homeowner's private water wells to detect impending contamination, (c) if triggered by an action level, provide treated or alternate drinking water to the City of Poplar, (d) if triggered by an action level, provide bottled water to affected homeowners, and (e) submit to EPA a plan for studying aquifer remediation options. The detailed actions are set forth below.

Sample and Analyze the Poplar Public Water Supply

72. On or after the effective date of this order, Respondents shall arrange to collect samples from the City of Poplar's public drinking water supply. Samples shall be collected, at a minimum, at the frequency shown in Table 4 and shall be

analyzed, at a minimum, for the parameters displayed in Table 4. For the purposes of this paragraph, samples shall consist of a raw water from each public water well and a sample taken at the point of entry into the public water distribution system. The first sample collection shall occur before the end of December, 2010.

73. Table 4 lists the required analytical methods applicable to the samples collected. For the required strontium isotope analysis, the laboratory must calibrate its reported data against the EN-1 standard, commonly used in laboratories analyzing samples for Sr isotopes.

74. EPA or its representative may obtain split samples during any sampling event. It shall be EPA's responsibility to have sample bottles ready and available, and to coordinate with the designated sampling team for timing and logistics purposes.

75. Respondents shall alert EPA at least seven (7) days prior to each sampling event, to allow EPA or its representative to collect split samples if desired.

76. Respondents shall pay for the sample collection efforts and sample analysis directed in this order. Respondents shall not charge the City of Poplar or its area citizens for any such sampling or analysis.

77. Respondents shall design the analysis work done by chosen laboratories in a manner to maximize repeatability and minimize any inter-laboratory variability in sample results. Samples shall be analyzed using drinking water methods, if one exists, at a laboratory certified to conduct drinking water methods.[9]

78. Respondents shall design the sample schedule to meet the frequency described in Table 4 with samples collected at approximately the same point within the sample

[9] See Title 40 of the Code of Federal Regulations, Section 141.28

collection interval.

Provide Safe Public Drinking Water If Needed

79. Respondents shall, if any of the monitored water quality parameters from water supply wells is confirmed to exceed a threshold value shown in Table 5, supply safe drinking water to the point of entry into the distribution network currently used by the City of Poplar to distribute its public water. Respondents shall bear the cost of providing such water. Paragraphs 80 through 83 describe the details for this process.

80. If results from the City of Poplar pubic water supply point-of-entry sample show an exceedance of the any of constituents listed in Table 5, Respondents shall, within 72 hours of any Respondent learning of the exceedance, sample again for each constituent exceeding the value shown in Table 5. Each re-sampled constituent found to be above the threshold value in Table 5 shall be deemed a confirmed exceedance.

81. Samples collected for confirming an exceedance shall be analyzed at the same laboratory that produced the original exceedance value. Only if the original laboratory is incapable of analyzing the re-sample shall an alternate laboratory be considered, and only after consultation with the alternate laboratory to ensure it employs the same analytical methods as those used at the original laboratory.

82. The threshold values shown in Table 5 for these constituents are based on the following rationale: the groundwater contamination plumes in the area have considerably higher concentrations of constituents named in Table 5 than are presently found in the City of Poplar's public water supply. At the concentrations

found in the more contaminated areas of the groundwater plume, the water would be rendered dangerous to drink and may not be useable for other domestic purposes. The contamination has moved and is now entering the City of Poplar's public water supply. The concentrations of the constituents listed in Table 5 are likely to increase and may do so abruptly with the arrival of the bulk of one or more of the groundwater contamination plumes. The threshold values represent an "early warning" of an impending condition whereby the public water wells are rendered unusable. The "early warning" is chosen to allow Respondents adequate time to react to new information to install the requisite treatment or alternate supply of public drinking water for the City of Poplar.

83. Upon a confirmed exceedance of one or more of the parameters in Table 5 in the City of Poplar's water, as described in paragraph 80, Respondents shall within seven days provide a safe supply of drinking water to the City of Poplar. The safe supply of drinking water shall meet all primary drinking water standards at the point of entry into the City's public water system, shall meet secondary drinking water standards such that the aesthetic characteristics of the water are equal to or better than those measured by EPA's November 19, 2010, sample results, and shall meet the current volumetric demand for consumptive uses in the homes of people served by the City's public water system. Respondents shall assure there are trained drinking water personnel operating the public water supply system, as the water supply is amended through Respondents' complying actions. This responsibility for ensuring there are trained operators at the public water supply shall include reasonable financial assistance to the City for its existing public

water supply system operator if one now exists, or, if trained personnel are not now present, Respondents shall provide the necessary means to obtain trained personnel.

Sample and Analyze the Private Water Wells

84. On or after the effective date of this order, and upon a request by any homeowner residing within the 15 square mile area described in paragraph 28, Respondents shall collect monthly samples for analysis of the constituents found in Table 4 from such homeowner's private water well used for human consumption. If the residence employs any water treatment, the minimum number of samples collected shall include both a raw and finished water sample. If there is no water treatment employed, the minimum number of samples collected shall be one raw water sample.

85. EPA or its representative may obtain split samples during any sampling event. It shall be EPA's responsibility to have sample bottles ready and available and to coordinate with the designated sampling team for timing and logistics purposes.

86. Respondents shall alert EPA at least seven (7) days prior to each sampling event, to allow EPA or its representative to collect split samples if desired.

87. Respondents shall pay for the sample collection efforts and sample analysis directed in this order. Respondents shall not charge the homeowner for any such sampling or analysis.

88. Homeowners within this 15 square mile area whose water supply is currently via one or more private wells may request to have their well water sampled and analyzed. Homeowners may contact either EPA or OEP, using the respective

contact information found in paragraph 100, EPA and OEP will communicate about homeowner well water sampling requests.

89. EPA will transmit to Respondents, via email, the information about homeowner well water sampling requests.

90. Upon receipt by Respondents of the homeowners wishing their water sampled, Respondents shall add these homes to a monthly sampling schedule. Unless there are fewer than 7 days prior to the next scheduled sampling event at the City of Poplar, newly added sample locations at private residences shall be collected during the City of Poplar sampling. For those timing situations where fewer than 7 days exist before the City of Poplar sampling is scheduled, the newly added sample locations at private residences shall be collected at the next monthly sampling event of the City of Poplar's public water.

91. Within seven days after Respondent receives the residential water sample results from the laboratory, the laboratory results shall be sent to each individual homeowner, and copies shall be submitted to the addresses in paragraph 100.

Provide Bottled Drinking Water to Area Residents Using Private Wells if Needed

92. If any of the monitored water quality parameters from a private homeowner's water well is confirmed to exceed a threshold value shown in Table 5, Respondents shall supply bottled drinking water to such private homeowner. Respondents shall bear the cost of providing such bottled water. Paragraphs 93 through 96 describe the details for this process.

93. If results from any private homeowner's well water show an exceedance of the any of constituents listed in Table 5, Respondents shall, within 72 hours of any

Respondent learning of the exceedance, sample again for each constituent exceeding the value shown in Table 5. Each re-sampled constituent found to be above the threshold value in Table 5 shall be deemed a confirmed exceedance.

94. Samples collected for confirming an exceedance shall be analyzed at the same laboratory that produced the original exceedance value. Only if the original laboratory is incapable of analyzing the re-sample shall an alternate laboratory be considered, and only after consultation with the alternate laboratory to ensure it employs the same analytical methods as those used at the original laboratory.

95. The threshold values shown in Table 5 for these constituents are based on the following rationale: the groundwater contamination plumes in the area have high concentrations of constituents named in Table 5, such that the contaminants upon arriving at a private homeowner's well, would render said water dangerous to drink and may not be useable for other domestic purposes. The contamination has moved and is now entering the City of Poplar's public water supply. The groundwater movement is complex and the contaminated groundwater may invade the area listed in paragraph 28. The concentrations of the constituents listed in Table 5 are likely to increase if the contaminated groundwater arrives abruptly with the bulk of one or more of the groundwater contamination plumes. The threshold values were chosen to represent an "early warning" of an impending condition whereby one or more homeowner's private water well is rendered unusable. The "early warning" is chosen to allow Respondents adequate time to react to new information to provide bottled water to such homeowners.

96. Upon a confirmed exceedence of one or more of the parameters in Table 5 in any

homeowner's private well water, as described in paragraph 93, Respondents shall within seven days provide bottled water such homeowner. The bottled drinking water shall meet all primary drinking water standards at the point of entry into the City's public water system, shall meet secondary drinking water standards such that the aesthetic characteristics of the water are equal to or better than those measured by EPA's November 19, 2010, sample results. The quantity of bottled water to be delivered upon a confirmed exceedance shall, at a minimum, be calculated as 2 liters per day per resident, unless this quantity is deemed by the homeowner to exceed their need.

SUBMIT A PLAN TO EPA TO PROVIDE AQUIFER REMEDIATION OPTIONS

97. Within 90 days of the effective date of this order, Respondents shall submit to EPA for approval, a plan describing how Respondents intend to identify options for cleaning, capturing or otherwise removing the groundwater contamination endangerment to the alluvium and glacial till. The plan shall include the following components.

    A. A review of available data relevant for characterizing the groundwater contamination and associated hydro-geologic setting,

    B. Identify gaps in the data necessary to characterize the groundwater contamination and associated hydro-geologic setting, and describe how such gaps would be filled,

    C. Identify options for cleaning, capturing or otherwise removing the groundwater contamination,

    D. Descriptions of efficacy testing and/or modeling to fully evaluate the

options in subparagraph C above, and a time estimate for conducting efficacy testing and/or modeling.

E. A time estimate to fully evaluate and recommend a preferred remedial option.

OTHER REQUIREMENTS

98. Respondents shall diligently seek any necessary approvals for complying with any requirements in this order.

99. Respondents shall continue to meet requirements in paragraphs 79 through 83 until the earlier of: (1) the City of Poplar's PWS is served by the Dry Prairie / Fort Peck Rural Water System, being built by the U.S. Bureau of Reclamation and said water system has been operating without exceeding any MCLs for a period of one month, or (2) EPA releases Respondents from these paragraphs.

100. Reporting:

Any reporting required under this Order shall be directed to recipients as follows:

For EPA,
Nathan Wiser
Mailing address: 1595 Wynkoop Street, Denver CO 80202 (8ENF-UFO)
Email address: wiser.nathan@epa.gov
Phone number (303) 312-6211;

For City of Poplar,
Linda Christiansen,
Mailing address: P.O. Box 630, Poplar MT 59255.
Street address: 406 2nd Ave West, Poplar MT 59255.
Email address: cityofpoplar@nemontel.net
Phone number (406) 768-3483;

For Montana DEQ,
Jon Dilliard
Mailing address: 1520 E. Sixth Ave., P.O. Box 200901, Helena, MT 59620-0901
Email address: jdilliard@mt.gov
Phone number: (406) 444-2409; and

For Fort Peck Tribes Office of Environmental Protection:
Deb Madison
Mailing address: P.O. Box 1027, Poplar MT 59255
Street address:
Email address: 2horses@nemontel.net
Phone number: (406) 768-2389.

101. The provisions of this Order shall apply to and be binding upon Respondents, their officers, directors, agents, successors and assigns. Notice of this Order shall be given to any successors in interest contemporaneous with succession. Action or inaction of any persons, firms, contractors, employees, agents, or corporations acting under, through or for Respondents, shall not excuse any failure of Respondents to fully perform their obligations under this Order.

102. This Order does not constitute a waiver, suspension, or modification of the requirements of any federal statute, regulation, or condition of any permit issued thereunder, including the requirements of the Safe Drinking Water Act, which remain in full force and effect. Issuance of this Order is not a waiver by EPA to forego any additional administrative, civil, or criminal action(s) otherwise authorized under the Act.

103. This Emergency Administrative Order is a final agency action by EPA.

104. This Emergency Administrative Order is binding on all Respondents.

105. Unless otherwise indicated, all days referred to in this Order are considered to be calendar days.

106. The effective date of this Order shall be three (3) days from the date of issuance, not including the day of issuance.

Issued this _____ day of _____, 2010.

_____
Sandra A. Stavnes, Director
UIC/FIFRA/OPA Technical Enforcement Program
Office of Enforcement, Compliance, and Environmental Justice
United States Environmental Protection Agency, Region 8

_____
Michael T. Risner, Director
Legal Enforcement Program
Office of Enforcement, Compliance, and Environmental Justice
United States Environmental Protection Agency, Region 8

Table 1a. 2009 and 2010 Sample Locations and Descriptions

Sample Source	Description
COP-1	City of Poplar Public Water Supply Well #1
COP-2	City of Poplar Public Water Supply Well #2
COP-3	City of Poplar Public Water Supply Well #3
DS-1	City of Poplar distributed system water, collected at point of entry into distribution system
DS-2	City of Poplar distributed system water, collected at point within the distribution system
EPU 1-D	Salt Water Disposal Well
EPU 4-G	Groundwater Well - Use unknown
Huber 5-D	Salt Water Disposal Well
LAW-M04	Groundwater Monitoring Well
LAW-M07	Groundwater Monitoring Well
M-3	Groundwater Production Well
M-71	Groundwater Production Well
MOC-11	Groundwater Monitoring Well
MOC-4	Groundwater Monitoring Well
PNR-27	Groundwater Monitoring Well
PR-R-PR-009	Surface Water - Poplar River
PR-R-PR-042	Surface Water - Poplar River
USGS 06-11	Groundwater Monitoring Well
USGS 06-8	Groundwater Monitoring Well
USGS 09-2	Groundwater Monitoring Well
USGS 09-6	Groundwater Monitoring Well
USGS 09-7	Groundwater Monitoring Well
USGS 92-11	Groundwater Monitoring Well
USSG 09-3	Groundwater Monitoring Well

Table 1b. USGS July 2010 Sample Results: Inorganic Constituents

Sample	Charge Balance	Lab pH	Lab SC	Na	Mg	K	Ca	F	Cl	HCO_3	SO_4	NO_3	Br
	percent		µs/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LAW-M04	-0.2	7.4	4640	556	153	12.6	221	0.18	1290	378	278	0.04	0.342
COP-1	-0.1	7.6	1926	337	32.6	5.87	66.0	0.38	189	600	271	0.11	1.81
COP-2	0.3	7.7	1934	338	33.6	5.94	67.8	0.38	190	594	277	0.02	1.81
COP-3	0.1	7.4	3230	518	56.0	8.20	109	0.28	783	516	105	<0.02	7.80
COP-3	-0.2	7.4	3280	524	54.3	8.17	109	0.30	788	525	106	<0.02	7.82
EPU 1-D	-1.4	7.0	150000	42800	213	691	1460	5.05	70600	242	1350	<0.80	23.0
EPU 4-G	-0.3	6.5	18490	4190	19.5	9.56	100	0.57	6610	214	2.67	2.9	66.2
Huber 5-D	-1.2	7.0	116400	32200	143	438	854	5.71	51800	274	1700	0.67	10.3
LAW-M07	-0.5	7.8	1211	223	22.4	4.57	38.1	0.39	28.1	540	194	<0.02	0.082
M-3	-0.9	7.6	5130	773	139	12.7	172	0.21	1400	543	315	<0.03	0.494
M-71	-0.5	7.4	2428	364	49.4	6.55	87.0	0.25	533	401	146	<0.02	0.134
MOC-11	-0.9	7.0	24990	5180	274	26.0	512	0.21	8700	480	1250	<0.12	17.9
MOC-4	-0.6	7.2	8690	1200	282	17.3	381	0.15	2460	443	928	0.05	1.33
PNR-27	-0.8	6.7	34900	5160	1320	61.9	1610	0.16	12900	722	2060	201	3.41
PR-R-PR-009	0.7	8.8	1499	297	40.0	8.33	19.0	0.45	11.8	669	279	<0.02	0.079
PR-R-PR-042	0.8	8.7	1779	331	50.3	9.08	28.9	0.42	120	642	287	<0.02	0.128
USGS 06-11	0.0	7.6	1246	239	20.9	4.22	38.3	0.41	22.1	605	172	0.06	0.096
USGS 06-8	-0.1	7.7	1166	248	12.5	3.76	23.6	0.43	18.0	558	165	<0.02	0.076
USGS 09-2	-0.7	7.6	2388	445	26.2	5.70	56.0	0.39	460	580	110	<0.02	4.83
USGS 09-6	-1.3	6.5	19810	2310	778	33.2	967	0.10	7360	243	376	<0.10	3.08
USGS 09-7	-1.0	7.4	5480	718	174	12.9	225	0.16	1580	421	327	<0.03	0.367
USGS 92-11	-1.1	8.1	6330	1400	12.7	7.65	36.0	0.48	1730	614	309	0.08	0.643
USSG 09-3	-0.8	7.7	2147	374	34.1	6.02	60.7	0.26	315	487	272	3.7	0.150

Table 2. USGS 2009-2010 Sample Results: Strontium (Sr) Isotope

Sample	Sample Date	Sr (µg/l)	$^{87}Sr/^{86}Sr$
COP-1	7/21/10	668	0.70821
COP-1	6/24/09	594	0.70819
COP-2	7/21/10	691	0.70823
COP-3	7/21/10	1,110	0.70821
COP-3	7/22/10	1,120	0.70821
COP-3	5/28/09	1,020	0.70819
EPU 1-D	7/22/10	83,000	0.70916
EPU 4-G	7/22/10	5,960	0.70683
Huber 5-D	7/22/10	47,300	0.70991
LAW-M04	7/20/10	2,230	0.70828
LAW-M07	7/21/10	432	0.70814
M-3	7/22/10	1,980	0.70813
M-71	7/19/10	831	0.7082
M-71	5/28/09	716	0.70817
MOC-11	7/22/10	6,990	0.70812
MOC-4	7/20/10	3,890	0.70828
PNR-27	7/22/10	26,000	0.70793
PNR-27	7/22/10	26,000	—
PR-R-PR-009	7/21/10	406	0.70818
PR-R-PR-042	7/21/10	569	0.70814
USGS 06-11	7/19/10	369	0.70814
USGS 06-11	6/24/09	397	0.70811
USGS 06-8	7/19/10	241	0.70811
USGS 09-2	7/20/10	529	0.70825
USGS 09-6	7/20/10	12,500	0.70819
USGS 09-7	7/20/10	2,510	0.70822
USGS 92-11	7/20/10	833	0.70741
USSG 09-3	7/19/10	647	0.70812

Table 3. USGS November 2010 Sample Results: Organic and Inorganic Constituents

Sample Source	COP-1	COP-1	COP-1	COP-1	COP-2	COP-2	COP-2	COP-2	DS-1	DS-1	DS-2	DS-2
Sample Type	U	UR	T	TR	U	UR	T	TR		R		R
Inorganic Constituents (mg/L)												
Sodium	289	278	285	261	294	294	316	302	323	320	289	283
Calcium	43.7	41.5	44.7	43	56.8	59.3	62.2	58.5	65.9	65.9	45.9	44.3
Potassium	4.76	4.55	4.81	4.63	5.35	5.3	5.52	5.42	5.77	5.61	4.99	4.81
Magnesium	24.7	23.4	24.9	24	27.1	27.1	37.8	37.8	39.4	38.3	25	24.4
Manganese	0.366	0.339	<0.002	<0.002	0.0073	0.0072	<0.002	<0.002	<0.002	<0.002	0.003	0.002
Iron	1.89	1.81	<0.10	<0.10	0.111	0.1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Strontium	0.48	0.459	0.468	0.424	0.693	0.704	0.65	0.618	0.685	0.679	0.471	0.459
Chloride	120	120	138	142	121	121	121	122	136	134	229	228
Bromide	1.2	1.2	<0.5	<0.5	2.3	2.3	0.9	0.9	0.9	1	<0.5	<0.5
Sulfate	233	231	234	234	290	289	398	401	388	383	229	228
Alkalinity	477	477	449	449	487	488	502	502	502	503	450	449
TDS	1,040	1,030	1,020	1,030	1,110	1,110	1,270	1,280	1,270	1,270	1,030	1,020
Organic Constituents (µg/L)												
1,1,1-trichloroethane					0.92	0.92						
1,1-dichloroethene					0.24 J	0.26 J						
2-butanone			0.18	0.27 J	0.94	1.04					0.10 J	0.10 J
Acetone			1.34	2.25	9.82	10.6					0.76 J	1
Bromochloromethane					4.31	4.28						
Bromodichloromethane	0.12 J	0.31 J	29.8	30.3	27.5	28.1	4.73	4.39	4.15	4.3	18.6	19.5
Bromoform	0.18 J	0.44 J	59.5	58.4	24.8	25	11.3	11.2	10.9	11.2	59.4	93.3
Carbon tetrachloride						0.13 J						
Carbon disulfide					0.27 J	0.25 J						
Chloroform	0.11 J	0.30 J	6.32	6.42	17.2	17.5	1.4	1.3	1.21	1.21	3.4	3.56
Chloromethane			0.27 J	0.37 J							0.17 J	0.20 J
Dibromochloromethane	0.22 J	0.6	70.8	71.5	36.4	36.9	8.97	8.6	8.03	8.29	44.7	70
Dibromomethane					8.36	8.51					0.1 J	0.15 J
Ethylbenzene							0.24 J	0.24 J				
m, p-xylene							0.60 J	0.64 J				
Methyl acetate	0.24 J	0.24 J	0.31 J	0.43 J	0.21 J	0.22 J	0.18 J	0.18 J	0.20 J	0.21 J	0.26 J	0.31 J
Methyl iodide					0.55	0.54						
Methylene chloride					0.84	0.86						
o-xylene							0.24 J	0.26 J				
Tert-butyl alcohol			1.11	2							0.72	0.86
Tetrahydrofuran					0.63	0.59						
Toluene					0.48 J	0.46 J	0.84 J	0.86	0.17 J	0.17 J		

U =Untreated, sample collected as raw water
T =Treated, sample collected after Fe, Mn removal and chlorination treatment
R =Replicate sample, sample collected immediately following initial sample
J =Sample result is above method detection limit and below method reporting limit

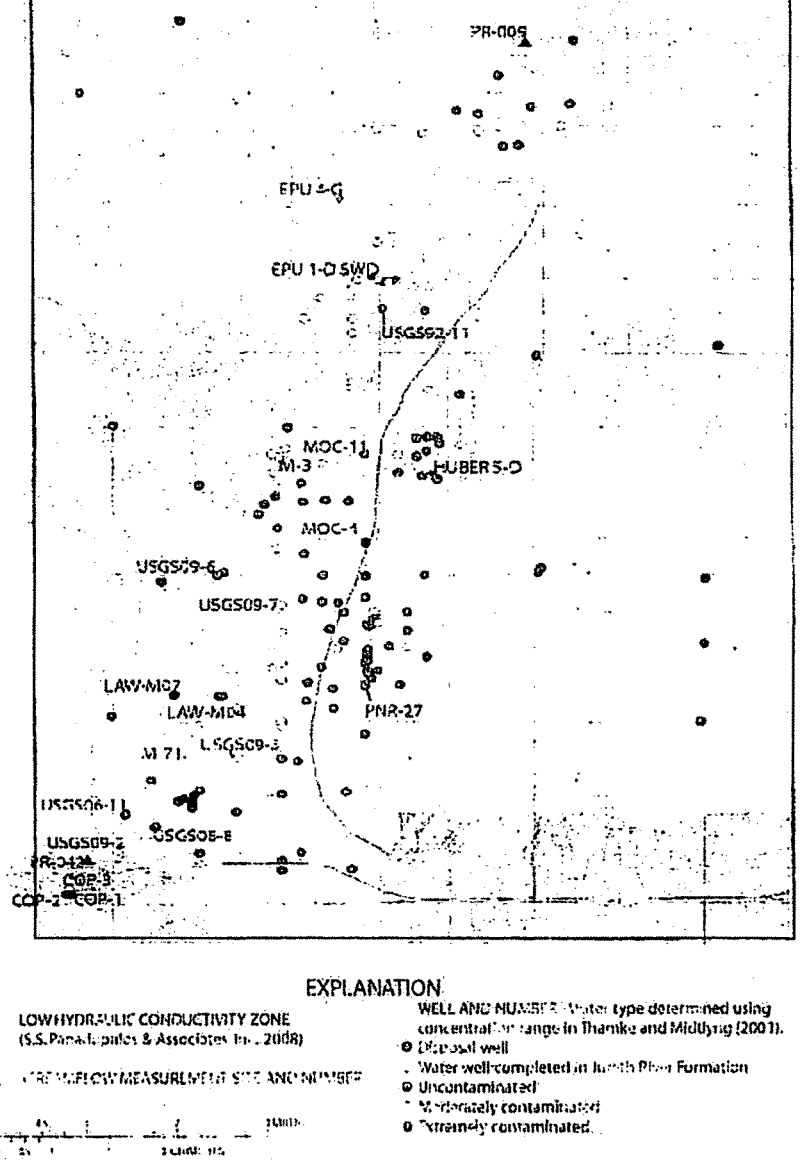
Table 4. Sampling Parameters, Schedule and Methods

Analyte	Sample Collection Frequency	EPA Analytical Method (See 40 CFR Part 141)
Benzene	Monthly	524.3
Toluene	Monthly	524.3
Ethylbenzene	Monthly	524.3
Xylenes (total)	Monthly	524.3
Total Dissolved Solids (TDS)	Monthly	160.1
Strontium (Sr) Isotope	Monthly	The $^{87}Sr/^{86}Sr$ ratio must be accurate to within ±0.00002. The data must be calibrated against the EN-1 standard.
Strontium (Sr)	Monthly	300.0
Manganese (Mn)	Monthly	200.7
Sodium (Na)	Monthly	200.7
Sulfate (SO_4)	Monthly	300.0
Chloride (Cl)	Monthly	300.0
Calcium (Ca)	Monthly	200.7
Bromide (Br)	Monthly	300.0
Iodide (I)	Monthly	Method reporting limit must be at least 5 micrograms per liter
Lithium (Li)	Monthly	Method reporting limit must be at least 0.5 micrograms per liter
Barium (Ba)	Monthly	200.7 or 200.8

Table 5. Action Levels Imposed on Samples Collected by Respondents

Constituent	Action Level (mg/L)	Sample point
Benzene	0.001	Entering distribution system
Toluene	0.2	Entering distribution system
Ethylbenzene	0.14	Entering distribution system
Xylenes	2	Entering distribution system
Total Dissolved Solids (TDS)	2,000	Entering distribution system
Manganese (Mn	0.3	Entering distribution system
Sodium (Na)	400	Entering distribution system
Sulfate (SO_4)	500	Entering distribution system
Chloride (Cl)	250	Entering distribution system

Figure 1. Generalized location of low hydraulic conductivity zone, selected surface-water sites, and selected wells, East Poplar oilfield.



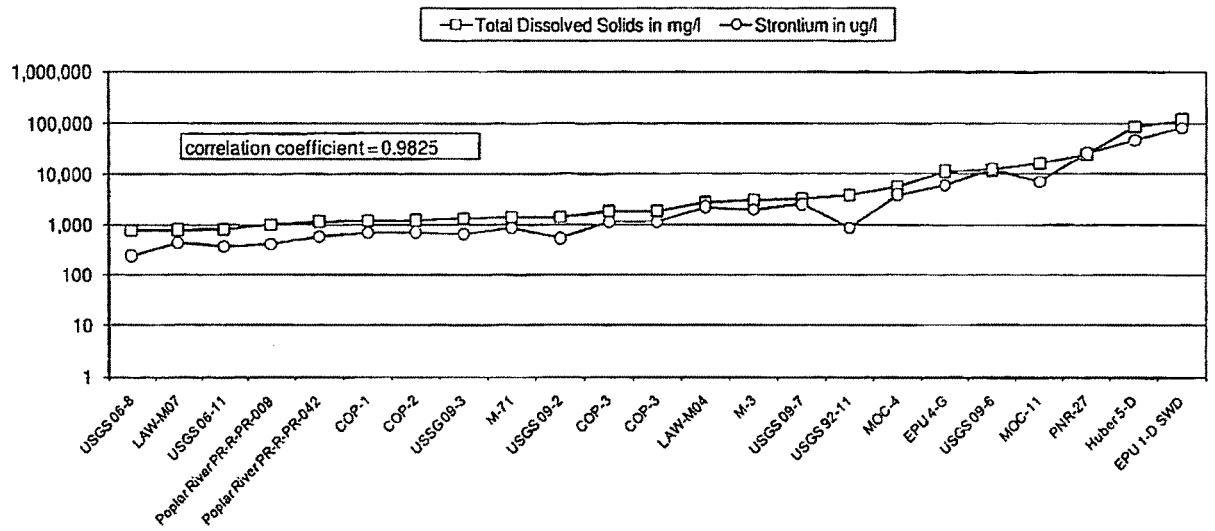
EXPLANATION

LOW HYDRAULIC CONDUCTIVITY ZONE
(S.S. Papadopulos & Associates Inc., 2008)

▲ STREAMFLOW MEASUREMENT SITE AND NUMBER

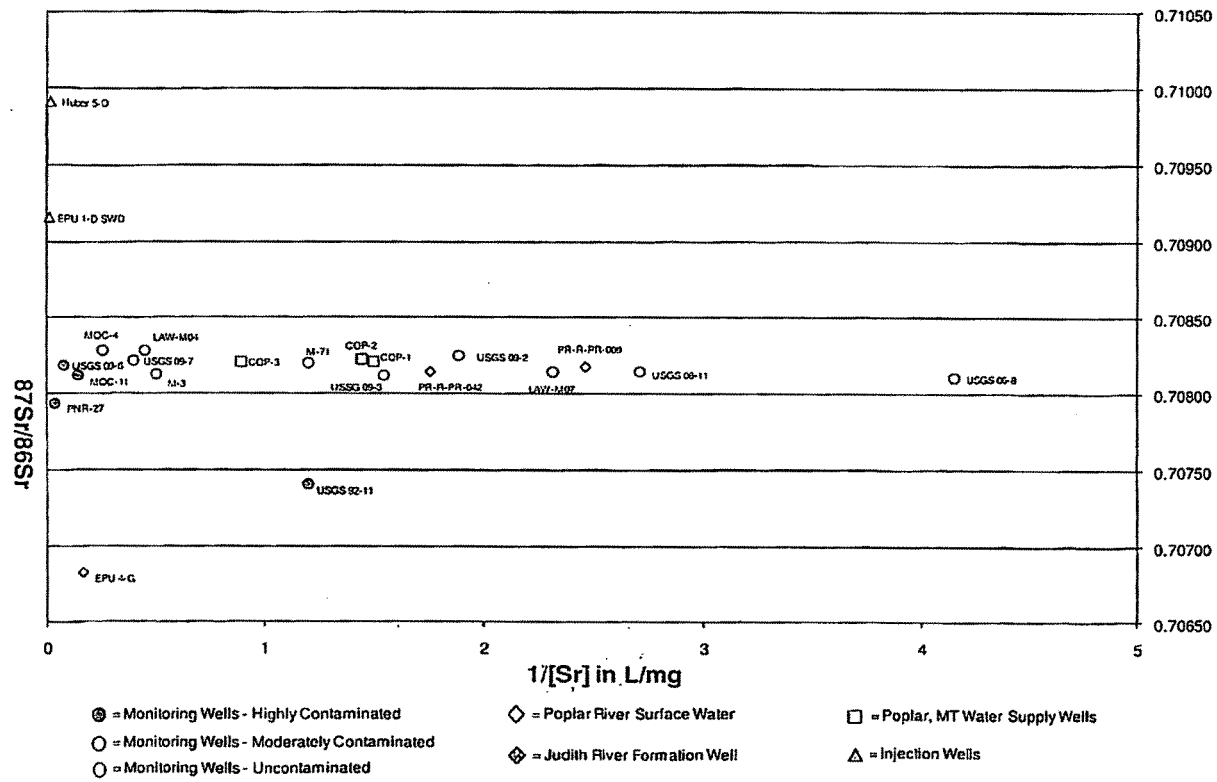
WELL AND NUMBER—Water type determined using concentration range in Thamke and Midtlyng (2001).
- Disposal well
- Water well completed in Fort Peck Formation
- Uncontaminated
- Moderately contaminated
- Extremely contaminated

Figure 2, TDS and Strontium Concentrations
USGS 2010 Samples



Concentration

Figure 3, Reciprocal Strontium
USGS 2010 Samples



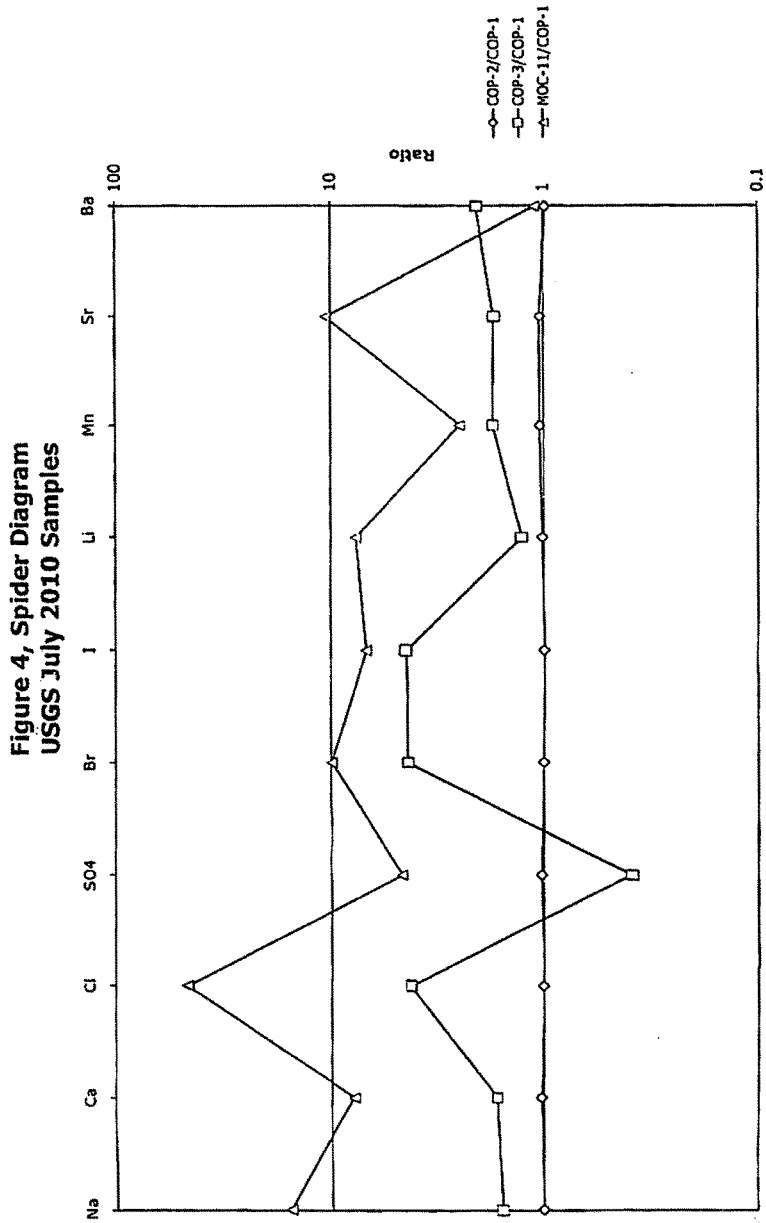


Figure 4, Spider Diagram
USGS July 2010 Samples
Na
Ca
Cl
SO4
Br
I
Li
Mn
Sr
Ba
100
10
1
0.1
Ratio
COP-2/COP-1
COP-3/COP-1
MOC-11/COP-1

Senator BOXER. Thank you, Administrator.
Dr. Birnbaum.

STATEMENT OF LINDA BIRNBAUM, PH.D., D.A.B.T., A.T.S., DIRECTOR, NATIONAL INSTITUTES OF ENVIRONMENTAL HEALTH SCIENCES AND NATIONAL TOXICOLOGY PROGRAM

Ms. BIRNBAUM. Madam Chairwoman and distinguished members of the Committee, I am pleased to appear before you today to present testimony on our current understanding of chemical contaminants in drinking water. My name is Linda Birnbaum, and I am the Director of the National Institute of Environmental Health Sciences of the National Institutes of Health, and also Director of the National Toxicology Program.

NIEHS and NTP continue to fund research on hazardous chemicals in the environment that can affect human health, including chemical contaminants in drinking water. Today I will talk about three of these contaminants: hexavalent chromium, perchlorate and trichloroethylene.

Chromium VI is part of man industrial processes, such as electroplating, stainless steel production, leather tanning, textile manufacturing and wood preservation. It was featured in the movie Erin Brockovich and listed in the NTP report on carcinogens since 1980 as a known human carcinogen. It is well established that ingestion of high concentration of chromium VI can lead to severe gastrointestinal distress and death. The NTP has done extensive animal testing on chromium VI in drinking water, and found that it causes cancer in laboratory animals following exposure in drinking water.

NIEHS is also funding university researchers studying chromium VI. Scientists at New York University are looking at chromium VI toxicity and the expression of genes that may ultimately lead to cancer. A research group at Brown University, funded by our Superfund research program, is studying how exposure to chromium VI modifies DNA in human cells. This research gives information about dose and biological response and why one person is affected when another person is not.

Other researchers in the group at brown are developing new methods for removing chromium VI from water supplies.

Perchlorate, another chemical of concern, is found naturally in our climate, but it is also manufactured in the U.S. for munitions, flares and fireworks. We are concerned about perchlorate, because it can affect thyroid function by inhibiting the transport of iodide into the thyroid gland. Iodide uptake is necessary for the normal production of thyroid hormones, which are essential in fetal and post-natal brain development. In pregnant women, severe iodide deficiency results in neurodevelopmental problems in the fetus and newborn.

So we need to ask if perchlorate in drinking water is linked to neurodevelopmental problems in infants. We also need to learn if perchlorate has effects on vulnerable groups, such as low birthweight or pre-term infants. This is a very hot area of research.

A series of papers from the CDC and NIEHS between 2009 and 2011 confirm that perchlorate levels in fetuses and infants compare with perchlorate levels in their moms. At this point, we are not

sure if low doses of perchlorate in drinking water result in harm to human development. But it is an important question.

Again, cleanup is a key focus of our work. Through our Superfund research program, we are supporting development of online perchlorate detection and remediation systems, and a portable unit for water source analysis in the field.

Now to trichloroethylene, or TCE. TCE is a solvent widely used for degreasing and cleaning materials and as a household cleaner. Due to its widespread use, TCE is often found as a contaminant in groundwater and drinking water. TCE can evaporate from contaminated water, creating a risk of inhalation exposure.

This is important in the enclosed space of the home, where showering, dishwashing and laundry activities can increase the potential for exposure by both inhalation and absorption through the skin. Children exposed to TCE contaminants have been reported to have experienced increase respiratory disease, such as bronchitis, asthma and pneumonia.

In this case, the wells supplying the drinking water were contaminated with a mixture of volatile organic compounds besides TCE, including the related compound, perchlorethylene. The link between exposure to TCE in humans is uncertain. Once study of more than one and a half million residents in 75 different towns showed higher incidences of leukemia and non-Hodgkins lymphoma in groups of females exposed to TCE concentrations greater than 5 parts per billion.

Several studies conducted in Woburn, Massachusetts led the Massachusetts Department of Health to conclude there was an eightfold higher risk of leukemia in children whose mothers were exposed to solvent-contaminated drinking water during pregnancies. These studies again involved a mixture of chemicals, including TCE, in the water.

TCE was listed in 2005 as reasonably anticipated to be a human carcinogen in the congressionally mandated NTP report on carcinogens. The listing was based on evidence from seven human studies, along with the studies in laboratory animals. Both showed that TCE exposure caused tumors, especially in the liver. A review of epidemiological literature showed that TCE was associated with higher incidences of liver cancer, kidney cancer, non-Hodgkins lymphoma, prostate cancer and multiple myeloma. But these studies were based on a relatively small number of exposed workers and were confounded by exposure to other volatile organic solvents and risk factors.

Our work on TCE is continuing in several Superfund programs. The new Northeastern University Center is testing drinking water in Puerto Rico for TCE. This multi-disciplinary project combines hydrogeological, epidemiological and mechanistic research to determine if any of these chemicals are associated with the risk of preterm birth. They are also testing a new remediation strategy using solar energy to break down TCE in groundwater.

The University of Washington Center is using genetically engineered poplar trees to break down organic chemicals. The University of Kentucky Center has pioneered a new type of nanoparticle filter that removes TCE from water.

In conclusion, it is important to remember that determining risk from chemical exposures through drinking water, or through any other route of exposure, is a complicated enterprise. New data are telling us to look beyond chemical concentrations in water or air, and instead to look at the chemical concentrations inside our bodies. We also need to consider the timing of exposure our individual genetic susceptibility and the fact that our exposures are always to a mixture of chemicals.

At NIEHS, we are proud to provide the best possible science in support of the incredibly difficult task that our sister regulatory agencies face. We are committed to advancing the science to new heights, using the newest tools to improve our understanding of the effects of environmental chemicals and to promote effective strategies for exposure reduction and disease prevention.

Thank you for the opportunity to testify, and I will be happy to answer your questions.

[The prepared statement of Mr. Birnbaum follows:]

STATEMENT OF LINDA S. BIRNBAUM, PH.D., DABT, ATS, DIRECTOR, NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES, NATIONAL INSTITUTES OF HEALTH; AND DIRECTOR, NATIONAL TOXICOLOGY PROGRAM, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Mr. Chairman and distinguished members of the Subcommittee—I am pleased to appear before you today to present testimony on our current understanding regarding chemical contaminants in drinking water. My name is Linda Birnbaum; I am the Director of the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health and the Director of the National Toxicology Program (NTP).

NIEHS and NTP have funded years of research on hazardous chemicals in the environment that can affect human health, including chemicals that are sometimes found as contaminants in drinking water. I will address three specific contaminants of interest: hexavalent chromium, perchlorate, and trichloroethylene.

Hexavalent chromium, or chromium VI, is a form of chromium that is produced and used in many industrial processes, such as electroplating, stainless steel production, leather tanning, textile manufacturing, and wood preservation. Many people know of it as the chemical contaminant featured in the movie, "Erin Brockovich". This chemical is listed in the NTP's Report on Carcinogens as a known human carcinogen; it was first listed in 1980.[1] The chromium molecule exists mostly in either trivalent (chromium III) or hexavalent (chromium VI) states. Chromium III is an essential micronutrient at low doses, although it can be toxic in large doses; chromium VI is about a thousand times more toxic than chromium III.[2]

It is well established that ingestion of high concentrations of hexavalent chromium can lead to severe gastrointestinal distress and death. Review of unfortunate accidental exposures and suicides indicates an acute lethal concentration as low as 4.1 milligrams of hexavalent chromium per kilogram body weight.[3] Long term exposures of workers to hexavalent chromium on the skin have been shown to cause severe skin lesions and irritation.[4] However, these effects are not expected at the very much lower doses associated with most people's exposure from public drinking water.

When inhaled, chromium VI is genotoxic to humans, meaning that it can damage DNA through the production of reactive oxygen.[5] The carcinogenic effects of breathing chromium VI (nasal, sinus, and lung cancer) are well established. However, for a long time, this genotoxic mechanism and resultant carcinogenicity from inhalation were not so clear for the case where it is ingested, as in drinking water. NTP has

---

[1] Report on Carcinogens, Eleventh Edition, *http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s045chro.pdf.*

[2] *http://www.atsdr.cdc.gov/csem/chromium/chromium.html.*

[3] Saryan LA, Reedy M. 1988. Chromium determinations in a case of chromic acid ingestion. J Anal Toxicol 12:162–164.

[4] Gibb HJ, Lees PSJ, Pinsky PF, et al. 2000a. Clinical findings of irritation among chromium chemical production workers. Am J Ind Med 38:127–131.

[5] Goulart M., Batoreu MC, Rodrigues AS, Laires A., Rueff J. Lipoperoxidation products and thiol antioxidants in chromium exposed workers. Mutagenesis (5): 311–315.

done extensive animal testing to provide information on chromium VI toxicity and carcinogenicity via drinking water. The NTP studies showed that sodium dichromate dihydrate, a water-soluble salt of chromium VI, caused cancer in laboratory animals following oral ingestion in drinking water.[6]

NIEHS-funded researchers are continuing work on chromium VI. Investigators at New York University have been looking at mechanisms of ingested chromium VI toxicity, exploring the ways in which it may affect epigenetic programming[7] and gene silencing and ultimately lead to cancer. Another research group at Brown University is studying the mechanism of DNA-chromium VI adduct formation and DNA-protein crosslinking by chromium VI using in vitro models. They have suggested that the DNA modifications produced by chromium VI in human cells could serve as highly specific indicators of individual dose.[8] A separate study in a rat model is looking at whether lactational exposure to chromium VI affects ovarian development in offspring. Even more importantly, other NIEHS-funded researchers in our Superfund research program are developing new methods for removing chromium VI and other metals from water supplies.

Perchlorate is a chemical found naturally in arid climates and is manufactured in the U.S. for a variety of uses primarily as a solid rocket propellant (e.g., in munitions, flares and fireworks). In the past, perchlorate has been used in the treatment of human diseases and is still used as a diagnostic tool in medicine (the perchlorate discharge test, which is used to diagnose thyroid defects involving abnormal iodide processing).[9] Perchlorate is of interest as a drinking water contaminant, because it can affect levels of thyroid hormones by inhibiting the transport of iodide into the thyroid.[10] [11] Inhibition of iodide uptake can disturb the normal production of thyroid hormones that play an essential role in fetal and post-natal neurodevelopment. These hormones also regulate neuropsychological development in children and adults. Usually, the body maintains normal production of thyroid hormones even in cases of iodide deficiency. However, in pregnant women, severe iodide deficiency can result in adverse neurodevelopmental effects in the fetus and newborn. This raises the possibility that a similar outcome could be produced by exposure to perchlorate in drinking water at sufficient levels and for a sufficient period of time. However, to date, human studies on environmental exposure to low levels of perchlorate have been inconsistent.[12] [13] The authors of a 2005 National Research Council study, "Health Implications of Perchlorate Ingestion", based their conclusions primarily on clinical data collected in controlled settings, particularly those described in an article by MA Greer and his colleagues.[14] The NRC found the epidemiological studies in human populations to be limited with respect to this question.[15] Further research is required to determine if there are effects on vulnerable groups such as low birth weight or preterm infants, or whether maternal perchlorate exposure (with or without low dietary iodide intake) causes neurodevelopmental outcomes in infants.

Information continues to be generated about these questions. A series of papers between 2009 and 2011 has confirmed that fetuses and infants demonstrate exposure to levels of perchlorate that are associated with maternal levels, albeit not with concentrations in their drinking water.[16] [17] A cross-sectional study of 1641 first trimester pregnant women (including 1002 pregnant women with low urinary iodide

---

[6] NTP 2008a. Final technical report on the toxicology and carcinogenesis studies of sodium dichromate dihydrate in F344/N rats and B6C3F1 mice. Accessed at *http://ntp.niehs.nih.gov/files/546*_web_FINAL.pdf.

[7] Epigenetic programming refers to the ways in which nonsequence-related modifications of the DNA molecule regulate gene expression.

[8] Macfie A, Hagan E, Zhitkovich A. 2010. Mechanism of DNA-protein cross-linking by chromium. Chem. Res. Toxicol., 2010, 23 (2), pp 341–347.

[9] Meller J, Zappel H, Conrad M, Roth C, Emrich D, Becker W *Exp Clin Endocrinol Diabetes*. 1997; 105 Suppl 4:24–7.

[10] Kirk AB. 2006. Environmental perchlorate: why it matters. Anal Chim Acta 567:4–12.

[11] Wolff J. 1998. Perchlorate and the thyroid gland. Pharmacol Rev 50:89–105.

[12] Blount BC, Pirkle JL, Osterloh JD, Valentin-Blasini L, Caldwell KL 2006 Urinary perchlorate and thyroid hormone levels in adolescent and adult men and women living in the United States. Environ Health Perspect 114:1865–1871.

[13] Pearce EN, Lazarus JH, Miyth PPA, et al. 2010. Perchlorate and thiocyanate exposure and thyroid function in first-trimester pregnant women. J Clin Endocrin Metabol 95:73207–73215.

[14] 14 Greer MA, Goodman G, Pleus RC, Greer SE 2002 Health effects assessment for environmental perchlorate contamination: the dose response for inhibition of thyroidal radioiodine uptake in humans. Environ Health Perspect 110:927–937.

[15] http://www.nap.edu/openbook.php?record_id=11202&page=R1.

[16] Blount BC, Rich DQ, Valentin-Blasini L et al. 2009 Perinatal exposure to perchlorate, thiocyanate, and nitrate in New Jersey mothers and newborns. Environ Sci Technol. 43:7543–7549.

[17] Borjan M, Marcella S, Blount B, et al. 2011. Perchlorate exposure in lactating women in an urban community in New Jersey. Science of the Total Environment 409: 460–464.

levels) found no relationship between urinary perchlorate and clinical measures of serum TSH and freeT4 (Pearce et al. 2010). In another report, perchlorate exposure was associated with increased urinary thyroid-stimulating hormone (TSH) in infants with low urinary iodide, although T4 levels were not reduced.[18] In a recent ecological epidemiological study in California, researchers were able to show elevated TSH levels in infants from perchlorate-exposed communities (defined as drinking water levels greater than 5 micrograms/liter).[19] The question of whether these hormone levels[20] result in actual impacts on health and development is unknown and remains an important question for further research.

Development of new techniques for remediation is also important in this area. In a Small Business Innovative Research project, part of our Superfund Research Program, NIEHS is supporting a group that is working to transform a proof-of-concept prototype for an online perchlorate detection and remediation system. They will also develop a companion field portable prototype for water source spot analysis in the field.

Trichloroethylene (TCE) is a solvent that is widely used for degreasing and cleaning metals. TCE has many other industrial uses as an extraction solvent for organic oils, as a reactant in the production of other chemicals, and in the manufacturing of fluorocarbons. TCE is widely available as a household cleaner and is found as an ingredient in a number of consumer products such as adhesives, rug cleaning fluid, paint removers, spot removers, and typewriter correction fluid.[21] Due to its widespread use throughout the U.S., TCE is often found as a contaminant in groundwater and drinking water.[22] Due to its volatility and low water solubility, TCE can readily evaporate from contaminated water posing an additional concern for inhalation exposure. This is particularly important in the enclosed space of the home where showering, dishwashing, and laundry activities can increase the potential for exposure by both inhalation and absorption through the skin.

TCE has been a contaminant of concern for decades. In a 1988 report, children exposed to a water supply that included TCE contamination, were reported to have experienced increased respiratory disease such as bronchitis, asthma and pneumonia.[23] In this case, the wells supplying drinking water were contaminated with multiple solvents besides TCE, including a related chemical, tetrachloroethylene (also known as perchloroethylene or perc). As in this case, human epidemiological studies are often complicated by exposures to mixtures, making interpretation of the data difficult.

The link between exposure to TCE and cancer in humans is controversial due, in part, to such mixed chemical exposures. However, a statistically significant association between TCE exposure and increased incidence of leukemia among the highest group of exposed females was demonstrated in a study conducted in New Jersey[24]. Again, this study was complicated by several uncertainties, including lack of detailed information about the magnitude of individual exposures and a poor understanding of the relative exposure contribution from inhalation and ingestion. A follow-up study of over 1.5 million residents in 75 different towns showed statistically significant elevations in total leukemias, child leukemia, acute lymphatic leukemia and non-Hodgkin's lymphoma in groups of females exposed to TCE concentrations greater than 5 ppb.[25] A more recent occupational study, published in 2007 and ad-

---

[18] Cao Y, Blount BC, Valentin-Blasini, et al. 2010. Goitrogenic anions, thyroid-stimulating hormone, and thyroid hormone in infants. Environ Health Perspect 118: 1332–1337.

[19] Steinmaus C, Miller MD, Smith AH. 2010. Perchlorate in drinking water during pregnancy and neonatal thyroid hormone levels in California. J Occ Environ Med 52:1217–1224

[20] Haddow JE, Palomaki GE, Allan WC, Williams JR, Knight GJ, Gagnon J, O'Heir CE, Mitchell ML, Hermos RJ, Waisbren SE, Faix JD, Klein RZ 1999 Maternal thyroid deficiency during pregnancy and subsequent neuropsychological development of the child. N Engl J Med 341:549–555

[21] http://www.atsdr.cdc.gov/csem/tce/tcewhere__found.html

[22] http://www.atsdr.cdc.gov/csem/tce/tcewhere__found.html

[23] Byers VS, Levin AS, Ozonoff DM, et al. 1988. Association between clinical symptoms and lymphocyte abnormalities in a population with chronic domestic exposure to industrial solvent-contaminated domestic water supply and a high incidence of leukemia. Cancer Immunol Immunother 27:77–8 1

[24] Fagliano J, Berry M, Bove F, et al. 1990. Drinking water contamination and the incidence of leukemia: An ecologic study. Am J Public Health 80:1209–1212

[25] Cohn P, Klotz J, Bove F, et al. 1994. Drinking water contamination and the incidence of leukemia and nonHodgkin's lymphoma. Environ Health Perspect 102:556–561

justing for multiple chemical exposures, showed associations between occupational exposures to TCE and prostate cancer.[26]

Following several controversial studies conducted in Woburn, MA, the Massachusetts Department of Health concluded that there was an 8 fold higher risk of leukemia in the group that was exposed in utero, and that this increase may be related to the exposure of mothers to solvent-contaminated drinking water during pregnancy[27]. These studies, too, are complicated by mixed chemical exposures and uncertainties about the levels of exposure.

Trichloroethylene was listed in the NTP's Report on Carcinogens as reasonably anticipated to be a human carcinogen based on limited evidence of carcinogenicity from seven studies in humans supported by evidence of carcinogenicity in experimental animals, in which tumors occurred at several of the same sites (especially liver) as in humans.[28] A contemporary review of epidemiological literature showed that TCE was associated with excess incidences of liver cancer, kidney cancer, non-Hodgkin's lymphoma, prostate cancer, and multiple myeloma, with the strongest evidence for the first three cancers.[29] Nevertheless, as was noted at the time, these studies were based on a relatively small number of exposed workers and were confounded by exposure to other solvents and other risk factors.

More recent studies have been detailed in reviews appearing in the peer-reviewed literature in 2006 and 2008.[30] [31] Much information has emerged about the complexity of the biological effects of exposure to TCE. The understanding of metabolism of TCE has been critical to this process, because for many types of observed toxicity, the active agent or agents is actually a mixture of metabolites of the parent TCE compound, acting in concert with each other, with the parent, and with other co-contaminants typically encountered along with TCE such as tetrachloroethylene.[32] More recent epidemiology provides further support for associations between TCE exposure and some level of excess risk of kidney cancer, liver cancer, and lymphomas, and to a lesser extent, cervical cancer and prostate cancer.[33] However, scientists continue to debate the interpretation of these studies, considering such factors as different classifications of lymphomas, differences in data and methods for assigning TCE exposure status, and different statistical approaches.[34]

NIEHS-funded work on TCE is continuing in several programs. The new Northeastern University Superfund Research Center grant is investigating drinking water as a possible source for chemical exposures (TCE, phthalates, and others) in Puerto Rico. This multidisciplinary project combines hydrogeological, epidemiological and mechanistic research on these and other chemicals to determine whether any are associated with risk of preterm birth. This Center is also testing a new remediation strategy that utilizes solar energy as a means to break down TCE in groundwater. The University of Washington's Superfund Research Center investigates a plant-based remediation strategy (phytoremediation) to break down organic chemicals such as TCE and tetrachloroethylene. Their innovative approach utilizes a poplar tree that has been genetically modified to express a mammalian gene (CYP2E1) that rapidly metabolizes TCE inside the plant.[35] The University of Arizona is investigating the geological properties that determine movement of TCE and tetrachloroethylene underground and are applying their research at the Tucson International Airport Area (TIAA) Superfund complex. Understanding how these chemicals migrate and dissolve will aid in the removal or clean-up of these contami-

---

[26] Krishnadasan, A., Kennedy, N., Zhao, Y., Morgenstern, H. and Ritz, B. (2007), Nested case-control study of occupational chemical exposures and prostate cancer in aerospace and radiation workers. American Journal of Industrial Medicine, 50: 383?390. doi: 10.1002/ajim.20458

[27] MDPH 1996. Draft Final Report. Woburn Childhood Leukemia Follow-up Study. Massachusetts Department of Public Health. Boston, Massachusetts.

[28] http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s180tce.pdf

[29] Wartenberg, D., D. Reyner and C.S. Scott. 2000. Trichloroethylene and cancer: epidemiologic evidence. Environ Health Perspect 108 Suppl 2: 161–76.

[30] Chiu WA, Caldwell JC, Keshava N, Scott CS. 2006. Key scientific issues in the health risk assessment of trichloroethylene. Environ Health Perspect 114:1445–1449.

[31] Caldwell JC, Keshava N, Evans MV. 2008. Difficulty of mode of action determination for trichloroethylene: An example of complex interactions of metabolites and other chemical exposures. Environ Mol Mutagen 49:142–154.

[32] Ibid

[33] Scott CS, Chiu WA. 2006. Trichloroethylene cancer epidemiology: a consideration of select issues. Environ Health Perspect 114:1471–1478.

[34] Ibid

[35] Kang, J.W., H. Wilkerson, Federico M. Farin, Theodor K. Bammler, Richard Beyer, Stuart E. Strand, and Sharon Lafferty Doty. 2010. Mammalian cytochrome CYP2E1 triggered differential gene regulation in response to trichloroethylene (TCE) in a transgenic poplar. Functional & Integrative Genomics. 10:417–424. *http://www.springerlink.com/content/2x65311062345327/*

nants. The NIEHS Superfund program also funds new technologies for remediation of TCE contamination, such as the methods under development by a group at the University of Kentucky. They have pioneered a new type of nanoparticle filter that shows promise for the removal of TCE and other chemicals.

In conclusion, it is important to remember that determining risk from chemical exposures, through drinking water or through any other route of exposure, is a complex, nuanced enterprise. New data are telling us to consider not only dose, but timing of exposure, inherent susceptibility of the exposed individual, and effects of multiple types of exposures when determining risk from a particular chemical. Making these regulatory decisions is the responsibility of EPA and our other regulatory agency partners. At NIEHS, we are proud of the role we have played and continue to play in providing the best possible science to support this incredibly difficult task. We are committed to advancing the science to new heights, using the newest tools in the biomedical sciences to improve our understanding of the effects of environmental chemicals and to promote effective strategies for exposure reduction and disease prevention.

Thank you for the opportunity to testify. I will be happy to take your questions.

Senator BOXER. Thank you.

Administrator Jackson, how prevalent is perchlorate in the drinking water across the Nation?

Ms. JACKSON. Studies show that perchlorate is in the drinking water of between 5 million and 17 million Americans.

Senator BOXER. My information says it is about 28 States, is that about right?

Ms. JACKSON. I do believe that is right, 26 States and 2 territories, ma'am.

Senator BOXER. OK. That is in detectable levels, I am assuming, above the level that you are looking at setting a standard at?

Ms. JACKSON. I think that is an accurate assumption, Chairman.

Senator BOXER. So we are looking at a major problem here. What about chromium VI? Do we know that?

Ms. JACKSON. That is a little bit more difficult, and it is part of the reason that our initial intervention with water systems is to help them know how to test for it at very low levels. We currently regulate total chromium at 100 parts per billion, and chromium VI is part of that. But what part of total chromium is chromium VI is the operative question.

Senator BOXER. So that first step of advising drinking water systems to test for chromium VI is, one of the reasons is, I am assuming, is to see how prevalent it is across the country? Is that right?

Ms. JACKSON. Yes. Because the EWG report was a snapshot, and doesn't give us a sense of whether and how often we are going to see this contaminant.

Senator BOXER. Are you having good feedback from the local folks? Or are they complaining about the fact they have to test? What are you hearing?

Ms. JACKSON. Well, the first thing we got were lots of questions. I think it is fair to say that putting out a standard testing methodology, we did that in part because we knew people were looking at the EWG methodology and didn't know if they could replicate it. So we took a peer-reviewed method and we put it out. I think people were generally grateful for that. I know witnesses on the next panel, some of them may take the position we shouldn't ask or test. But I don't think that is the kind of answer that the American people expect when they are presented with a new contaminant that we know science is saying is probably more dangerous than we originally believed it to be.

Senator BOXER. So when do you think you will have the science back, the results of these tests back?

Ms. JACKSON. The results of the tests will come in over the course of this year. What we are waiting on now is the peer review, the external peer review of our risk assessment of chromium VI. This is based on the NTP finding that chromium VI causes cancer in our drinking water, which is brand new. We have done a risk assessment there. That will take us almost, probably through the rest of this year.

Then what I have said is, we will move as quickly as possible after the peer review is done and we are sure we have good science, to change the regulations, to change the standards.

Senator BOXER. Right. But when will you start getting back the results of the testing from the various drinking water systems across the country? Was that, they are going to start reporting that back to you?

Ms. JACKSON. Right. That is voluntary. They are not under orders to do it. But there are also, of course, purveyors, as we heard, who feel a responsibility to make sure they are getting good data for their customers.

Senator BOXER. What do you know now? Do you have any notion of how many systems chromium VI is showing up in at higher levels?

Ms. JACKSON. Because the levels are so much lower, we do know, there has been data taken in the past, before the EWG study, that shows that there are systems with chromium VI in them. That chromium moves between chromium III and chromium VI. Chromium III is not bad. Chromium VI is where we have real health concerns, public health concerns.

Senator BOXER. But you don't have, as you do with perchlorate yet, the number of systems that are impacted or the States that are affected by chromium VI?

Ms. JACKSON. Fifteen percent, Madam Chair, of systems detect total chromium. Other studies have shown 30 to 40 percent of systems may have total chromium, because we measure that. What we don't have is how much of that is chromium VI.

Senator BOXER. But we will have that, I assume, before you make your recommendations?

Ms. JACKSON. Absolutely. That will be important information for us to have. Because of course, occurrence and the decision about being able to intervene and how to intervene will be based on where we are seeing it and why.

Senator BOXER. Could you comment on the importance of the agency using the best available science to develop drinking water standards for perchlorate? How are you doing that? What are your next steps toward setting a standard?

Ms. JACKSON. I could not emphasize enough the importance of using sound science, the best available science, peer-reviewed science. But I also want to say that the difference here, the prior Administration actually made a decision not to act on perchlorate. The difference here is actually very simple. It is protection of children and protection of mothers who are carrying children. The issue here is that extra layer of protectiveness for pregnant women. Because changes in thyroid production while a baby is forming can

have impacts, demonstrated impacts, as we heard Dr. Birnbaum say, on their development. Developmental issues in children is a huge problem.

So we are erring on the side of looking for a level that will be protective. But we will also do it according to the Safe Drinking Water Act.

Senator BOXER. Thank you very much. I don't think there is any one of us here who hasn't said, our children are our future, and that is one of the reasons we are here. I just have to say, you make me very proud, as Senator from California. Because sometimes we get into arguments that are based on philosophy rather than what is really happening to people, our people that we are sworn to protect. So I just want to thank you for that.

Senator Inhofe.

Senator INHOFE. Thank you, Madam Chairman.

Let me go ahead and put the language from the opinion of the Court in the record immediately following the request that you made to have it be a part of the record.

[The referenced information follows:]

Senator INHOFE. That language is: "If the scientific uncertainty is so profound that it precludes EPA from making a reasonable judgment as to whether greenhouses gases contribute to global warming, the EPA must say so."

The other thing, and this was brought up by Senator Barrasso, I know that this is on water, this hearing. But I agree with you, it is appropriate to bring up anything that is within the jurisdiction of this Committee. When he talks about the endangerment finding, I think it is very important, since we have Administrator Jackson here, I will recall a question that I asked Administrator Jackson, this would have been last December, right before I left for Copenhagen, when I asked the question, I have a feeling that we will be making an endangerment finding in the next few days. When you do, I would like to find out, ask you for the record, what science you would be basing it on. Your answer was, "For the proposal, the agency relied in large part on the assessment reports developed by the Intergovernmental Panel on Climate Change." That is the U.N. IPCC that we have talked about quite often.

Now, coincidentally, that was precisely the same time that ClimateGate came up, that was characterized as one of the worst scandals in our recent history. *The Daily Telegraph* in London said this scandal could well be the greatest in modern science. Clive Cook, who is quite an environmentalist, in the *Atlantic Magazine* said "The closed-mindedness of these supposed men of science, their willingness to go to any length to defend a pre-conceived message, is surprising even to me. The stink of intellectual corruption is overpowering."

I just want to keep getting this into the record, because this seems to be the science, in fact, we are writing about this right now. I think it is kind of interesting to see the kind of responses that we have been getting. I think it is important. We have said relying on science, sound science, so many times during the course of this hearing, and our previous hearings, that I think that we need to be doing that.

Madam Administrator, let me real quickly just, I would just like to have the assurance that as you progress in the health effects of chromium VI that you would commit to this Committee that the EPA is not rushing the decisionmaking process and will allow for a full and complete assessment of the data. It was the California water agencies that came out with the report that to treat the chromium to a lower level has a cost of $300 to $500 per acre foot, which is actually more than the purchase of the water itself. So that is a commitment I would like, that you would take all these things into consideration before coming to conclusions.

Ms. JACKSON. Senator, I commit to following the Safe Drinking Water Act, which puts in place a number of reviews, small business reviews, HHS consultation, a cost benefit analysis, a technology analysis to look at availability, and an impact to small systems. All of that is mandated by the law, and it is part of the reason it takes up to 2 years for EPA to propose a new standard.

Senator INHOFE. The following question would take too long to answer, so I am going to ask you to answer it for the record, if you would. That is, in April 2010, the Inspector General declared or concluded that the EPA's science level was good. Then the standard came out in September of the same year, between those months. I would ask you, what led to the change in the agency position, specifically between those 2 months, on perchlorate?

Then last, since the time is short and we have good attendance, and I am very thankful that we do, one of the things that I want to be very careful about is, I know that there is an effort out there to start regulating hydraulic fracturing. Not many people realize that with the huge reserves that we have, and the United States does have the largest recoverable reserves in coal, oil and natural gas, of any country in the world, that this particular technology that has been used since 1948, of hydraulic fracturing, is something, and I know this, because in 1948, it started in my State of Oklahoma, that there has not been a case, a documented case of groundwater contamination using hydraulic fracturing.

If we are to develop the shale, particularly in any of these close formations, it has to be done, 100 percent of these recoverable reserves can only become a reality if we are using certain techniques. No. 1 would be that of hydraulic fracturing.

So I would like to have you, and the request I would make of you, any response you want to make right now, of course, would be fine, but also of any further investigation into that technique, I want to be a part of it. Perhaps I can offer some personal expertise from personal experience, from our experience in Oklahoma.

Ms. JACKSON. Senator, we look forward to working with you. On hydraulic fracturing, we are about to round up our work plan, which has gone through peer review and public comment. We expect in the next month or two to have the work plan for our study finished.

I want to make two points on hydraulic fracturing. One is that it is not an unregulated activity. Many localities, many States regulate various aspects of the drilling process. One thing I think EPA can do to add to the body of knowledge is to determine whether there are any holes in that regulatory structure. It is not nec-

essarily Federal regulation that will be needed. It could be, I am not prejudging that.

The second thing I will say is that I think what would give the American people comfort, with all that they are seeing about this technology, is a knowledge that regulators are not backing away from looking at it, but rather are doing everything we can to understand and ensure we have good science.

Senator INHOFE. That you would take into consideration those regulations that come from the States because of the varying applications of this technology from State to State.

Ms. JACKSON. Certainly, sir. States are different, geology is different, the number of people and population density are different. But there may be a need for a Federal role. We simply don't know, and this study will take a while.

I have to say for the record on climate change that after there were questions raised about one specific line of emails, there were numerous peer review studies and people who went back and rereviewed and found that the data and the questions about the data and that scientific judgment did not change the basic science that man-made emissions are changing our climate, changing our atmosphere, degrading it to the point that it is impacting our planet. That is what the endangerment finding says.

Senator INHOFE. That there are opposing views to your recommendations.

Ms. JACKSON. I absolutely acknowledge opposing views, including yours, Senator.

Senator BOXER. Senator Inhofe went over 2 minutes and 25 seconds. But I do have to correct the record, because you quoted me as saying it is appropriate to ask about carbon pollution. What I said was that this is a hearing on safe drinking water. But everyone has the right to say whatever they want, because it is America and we do that.

But I would hope we would stick to the Safe Drinking Water Act. Because as we see Dr. Birnbaum sipping on her water, we all need to make sure that our kids, our grandkids and our families are drinking safe water.

I also want to make a statement here. We are going to, Senator Barrasso and Senator Inhofe, we are going to absolutely look at the science of carbon pollution and its impact on our people, on our planet. So you will have plenty of time, because we are absolutely going to keep up with the science.

So let me assure you of that, don't be fearful that we are not going to talk about it, because we really are looking forward to talking about it and working with Senator Whitehouse, because he has some oversight responsibility and he is working on getting us going with some hearings.

So we now are going to call on Senator Cardin.

Senator CARDIN. Thank you, Madam Chair.

Whether it is the Clean Water Act or the Clean Air Act, Administrator Jackson, I want to thank you for following the science. You have, we have documented hundreds of thousands of lives that have been saved, and the impact that clean water and clean air have on our economy, how important it is. For my State of Maryland, it goes beyond just health, it goes beyond just the economy.

The health of the Chesapeake Bay is critically important for the quality of life for the people who live in this region.

So my constituents want you to follow the science. But perhaps we need to do a better job in showing how we have connected the dots in saving lives and helping our economy and saving iconic features of this Nation for future generations.

I want to ask you about the chromium VI, both our witnesses about the chromium VI. Because as you know, one of the cities that was reported was Bethesda, MD. We are being asked, should people who are a certain type take precautions in drinking the water that comes out of the tap in Maryland. What is the time line that you are looking at in being able to give further direction as to the potential risks that are out there in regard to chromium VI?

Ms. JACKSON. I will speak first about the regulatory time line, sir, and that comes straight of the Safe Drinking Water Act. There are a number of requirements once we get the risk assessment. We have already issued guidance on how to test. We have offered technical assistance. But it could take up to 2 years, I think that will be the outside timeframe, for EPA to propose a safe level of chromium VI, to change the standard to include chromium VI. Then there is public comment and 18 months to final after that.

Senator CARDIN. Should we be, are there target groups that should be taking precautions?

Ms. JACKSON. I think the first thing is to test, to understand whether or not this one sample that was taken in Bethesda is representative of a problem in the entire system, and if so, why. That is the guidance we have already offered.

I want the people of Bethesda, the people of America, to understand that our risk assessments look at lifetime, years and years of exposure to a chemical. So there is not something that is going to happen because of 1 day or 2 days. But that if there is real concern out there, there are products available in the marketplace, you have to make sure when you buy one of these that it actually treats chromium VI, but there are products that are available.

Senator CARDIN. Dr. Birnbaum.

Ms. BIRNBAUM. The NTP studies not only show that chromium VI in drinking water was associated with cancer in both rats and mice, and both males and females, but it also showed that the levels that were associated with that cancer were within a factor of 10 of some of the highest levels that have been reported of human exposure, and within a factor of 50 of what we commonly see in drinking water, contaminated drinking water supplies. So we are not talking about thousands and thousands and thousands of fold greater levels.

So I think there is some concern, I think we really don't now whether there is a susceptible population. That is what some of the basic research that we are funding is trying to understand, is what makes people especially susceptible.

Senator CARDIN. I would just ask that if risk factors become known that there be transparency and that we, that the public be made aware as soon as possible.

I want to move to coal ash. There is some information out there that coal ash is a source of chromium VI. Madam Chairman, I will ask unanimous consent to put into the record a report from Earth

Justice and Physicians for Social Responsibility that relates to that issue of coal ash and chromium VI.

Senator BOXER. Without objection, so ordered.

[The referenced document was not received at time of print.]

Senator CARDIN. I guess my question is, is EPA looking at coal ash as a source of chromium VI in our drinking water?

Ms. JACKSON. We are looking more broadly at coal ash as a source of several pollutants in our drinking water, and in fact have proposed and taken over 400,000 comments on regulation of coal ash to protect primarily our drinking water supplies.

Senator CARDIN. I would point out that coal ash that are put in landfills, we are concerned about. Coal ash that has been recycled and used for useful products, such as cement or, we would hope under RCRA, you would have the ability to distinguish between the coal ash that is being put at risk in our environment, and those that are being recycled.

Ms. JACKSON. That is absolutely right, Senator. I agree with that completely.

Senator CARDIN. Thank you.

Thank you, Madam Chair.

Senator BOXER. Thank you very much.

Senator Johanns.

Senator JOHANNS. Madam Chair, thank you.

Let me if I might, because I mentioned this letter in my opening comments, just offer for the record, Madam Chairman, actually it is a letter that was written to the Ranking Member and I was copied. It is from Douglas R. Clark, the President of the Metropolitan Utilities District. I thought it was a very thoughtful letter.

Senator BOXER. We will put it in the record, absolutely.

[The referenced document was not received at time of print.]

Senator JOHANNS. Great.

Doctor, if I could start my questioning with you, and bear with me, here, because not only am I one of the newest members to the Committee, I don't come here with the scientific background that you possess or that the Administrator possesses. So it is going to be very important that you visit with me in easily understood terminology.

To start out with, in response to a previous question by Senator Cardin, you talked about some research that had been done relative to chromium VI with animals. Then you talked about factor of, and factor of this. I want you to put that in language that I can understand. What are you telling me there, that they were exposed to exceedingly high levels that we have not found in drinking water yet?

Ms. BIRNBAUM. The levels to which the animals were exposed in drinking water have been seen in human populations, not in this country, for example, but in China, where levels of the same concentration have been used.

Senator JOHANNS. Have you found any drinking water anywhere in the United States that has hit those levels?

Ms. BIRNBAUM. I have not seen that in drinking water. But I am not an expert in all the drinking waters that have been measured. As Administrator Jackson has been saying, they are doing a major

study now to try to understand the extent of contamination of drinking water by chromium VI.

Senator JOHANNS. OK. So what you are saying to me, now in understandable language, is that we exposed or somehow rats and mice got exposed to these exceedingly high levels, that at least to your knowledge we haven't found in any drinking water in the United States, and they had a problem.

Ms. BIRNBAUM. There are some studies that are within a factor of 10 of some levels that have been reported in the United States.

Senator JOHANNS. When you say factor of 10, 10 times?

Ms. BIRNBAUM. Right, that the levels that our animals got were 10 times higher than some reported levels that people in the United States might be drinking.

Senator JOHANNS. OK.

Ms. BIRNBAUM. I think it is very important that when you try to extrapolate from animal studies to humans, animals have to drink a much higher concentration than people do to get the same amount into their bodies. That is kind of a difficult concept. But when you go to the doctor and he takes a blood sample, he is measuring a certain amount of chemical in your blood. In order to get that same amount of chemical in the blood, for example, of a rat or mouse, you often have to expose them to a much higher dose.

Senator JOHANNS. So we have rat or mouse studies out there.

Ms. BIRNBAUM. There are also quite a number of human studies that have demonstrated significant, statistically significant associations between chromium in drinking water, high levels of chromium in drinking water, and cancer. Another thing is, at least in certain cases, as I mentioned for trichloroethylene, when you use water coming out of your tap in an enclosed environment, like a shower, or laundry, certain chemicals can become volatilized, and then you can inhale them. We have known for over 30 years that inhaled chromium VI definitely causes cancer in people.

Senator JOHANNS. OK. Now, Administrator Jackson, you have issued a guidance, right, relative to testing of chromium VI? That is what this letter referenced. In issuing that guidance, which causes people out there to do things, and I am guessing you hope they do, and spend money and et cetera, what scientific analysis or study did your folks rely upon that would cause you to take that step? This is no trick question. I am literally looking for a list of the studies they reviewed.

Ms. JACKSON. Well, sir, we can get you a list of information. What we did is encourage utilities to monitor. When this chromium VI study came out, I met with almost a dozen Senators in the Capitol, many of them from the cities at the top of the list. One of the things I committed to was giving technical assistance to utilities on how to monitor. So if they got data, it could be the result of a peer-reviewed methodology.

So the methodology and the guidance that we issued was based on a peer-reviewed method. It was changed just slightly to make it useful to the utilities, but not in a way that we believe required another peer review. It was an attempt to make sure people had, from the Federal Government, what we believed would be the next prudent step.

Senator JOHANNS. Here is the challenge with what you just told me. No. 1, I wonder what those studies are, and I am going to be anxious to get that list. So I will request that you provide that to all of us here. But No. 2, when you describe the action that you are expecting them to take, it is not very simple. This is a utility, for example, that complies with, that exceeds all Clean Drinking Water standards. If I am not mistaken, they had to go to another part of the country to get this tested.

So I just want to make sure that before we send them off doing that we have a sound scientific basis to do that. Thank you, Madam Chair.

Senator BOXER. Senator Lautenberg.

Senator LAUTENBERG. Thank you, Madam Chairman.

I listened for information that can help us do better at protecting our citizens. I guess if we stop putting out fires, it would be job-crushing for firemen. If we stopped writing laws here, it would be job-crushing for people working here.

I take it that neither one of those things would be acceptable and that it is hard to understand whether or not there is any benefit to putting people, and to regulate at all, because if we didn't do these programs, A, it would hurt health, and B, I guess it would be called job-crushing. I don't get it. Because when these things are dressed up in that fashion, we are off the topic. We are not discussing the reality of health damage here. What we are doing is, we are simply overriding, saying, look, the EPA scientists, court decisions, they don't mean anything. These, if we do these regulations, it might help human health, help my kids, my grandchildren, everybody else's in the room have better health than it would be in the final analysis. Job-crushing. It may save lives. But if we stop regulating, then we would have a net gain. I don't understand that and I must tell you.

Safe drinking water, Administrator Jackson and Dr. Birnbaum, currently allows EPA to allow only temporary monitoring for no more than 30 of the potentially hundreds of unregulated contaminants in our drinking water. In light of the success of other right-to-know programs at EPA, could the public benefit from a targeted increase in monitoring for unregulated contaminants?

Ms. JACKSON. Senator, I agree that the public has a fundamental right to know what is in their drinking water, what is in their water supply. Increased targeted monitoring would be useful in helping us to identify emerging threats, things that we don't know about but that we need to know for future generations. It should be done in a common-sense fashion, always balancing the burden on water systems against the potential threat to human and public health.

Senator LAUTENBERG. Dr. Birnbaum, do you have any view that is different there?

Ms. BIRNBAUM. Only that I would agree. I think I certainly, as a citizen, as we all are in this room, would very much like to know what it is that I am drinking.

Senator LAUTENBERG. The shocking thing is that these programs develop almost in reflex action, it is in response to a condition, it is in response to the Superfund site that we found up in Massachusetts, created a Jimmy fund and so forth. It is response to crippling

things for our children and the health of our elderly, those who are most fragile. But those things get no credit. The fact that I present here for you, in living color, that there are things that help people live longer. I hope they will keep on doing what they have been doing in the halls of science, because maybe I can reach maturity without further failure.

[Laughter.]

Senator LAUTENBERG. At a hearing of this Committee 2 years ago, I pointed out that only 6 percent of the water systems that broke the law were fined or punished by State or Federal officials. Don't object, Senator Inhofe, please. This rate provides little incentive to comply with the law. The head of EPA's enforcement assured me that a new policy would bring more systems into compliance.

How many systems have come into compliance since this testimony in 2009?

Ms. JACKSON. Well, sir, because of proactive enforcement by EPA and our enforcement program led by Cynthia Giles, back in January 2010, we had almost 9,000 systems that had potential serious violations of the Safe Drinking Water Act. We have identified only 6,466 as of January of this year. So we are down by over 3,000 systems, certainly not acceptable, but that is the result of proactive work by EPA and by States and local governments to really crack down when we find violations of our Nation's safe drinking water requirements.

Senator LAUTENBERG. Madam Chairman, I have other questions I will submit in writing. But again, I wonder, when I hear statements made here that talk to the particularly dark side of things, job crushing, et cetera, I wish we could examine it from the front side and say, how many lives would you like to save, how many kids would you like not to have difficulties with their health and getting to school and being like other kids. We don't seem to start on that side. We start on the side that said, job crushing. Thank you very much.

Senator BOXER. Thank you so much.

Next we will hear from Senator Barrasso.

Senator BARRASSO. Thank you very much, Madam Chairman. As a physician who has taken care of families all across the State of Wyoming for 24, 25 years, I know how important it is to work on preventive programs to keep people healthy. I would contend that America's physical health and our fiscal health, both our physical health and our fiscal health, are both tied to rulings out of the Environmental Protection Agency.

So I find it interesting, and I have been trying to stick to the topic of water, that from the EPA, inside the EPA that has just come out, this is the January 28, this year, 2011, "Activists hope Vermont TMDL sets precedent for weighing climate impacts with regard to water quality requirements." This is all about water.

So when I look at this, Administrator Jackson, considering that the EPA has recently allowed TMDLs to be used in consideration of effects of climate change, and specifically with the lake in Vermont, one of the members of our Committee is from Vermont, my question is, how many of these 43,000 TMDLs that the AMA lists as approved, because this is one that was approved, how many

of those that are approved could now be revised in the future to consider the effects of climate change? This is what this is all about, using climate change as a way to regulate water. We have seen it in a State impacting one of our members. When you look at a list of how many TMDLs there are by State, people at this table all have many more than we have in Wyoming.

Ms. JACKSON. Senator, the work on Lake Champlain, that is the Lake Champlain TMDL, under the Clean Water Act, this is not a Drinking Water Act issue, this is a Clean Water Act discharge of contamination issue, continues and has been going on now through several administrations. I am not sure that I can confirm that that TMDL has been approved, but we will certainly get you that information for the record.

Let me just say, the goal of the TMDL process, under the Clean Water Act, is to lessen and lessen the amount of contamination that goes into our water bodies. Lake Champlain is much prized and is having trouble with nutrients and algae. It is becoming, there are pockets of the lake that are dying out. So your specific question about climate is secondary, regardless of what inside the EPA says, to the overall goal of the Clean Water Act and the TMDL process, which is to protect the quality of our surface water.

Senator BARRASSO. I guess the question comes down to, can something be reopened once there has been something given. That is the concern that I am going to continue to raise with the Committee, retroactively going after something that has already been granted.

The President had an executive order stating that agencies should consider when taking a look at the costs and benefits, he said "Values that are difficult or impossible to quantify, including equity, human dignity, fairness, and disruptive impacts," I think it is easy to measure unemployment, 9.4 percent, we know that our debt has gone up $3 trillion in the last 2 years, we have 3 million more unemployed in the last 2 years, we know that burdensome regulations do have an impact on jobs, and it is quantifiable.

My question is, is the language in the President's executive order, does it allow you to basically use anything you want in terms of making, saying benefits outweigh the costs?

Ms. JACKSON. I think the President's far-reaching executive order makes clear that there are some things that are hard to price. Our science may be good, but I don't know how you price the ability to try to forestall a child who may not get autism if they are not exposed to contaminated water. I think the language in that order is about those things where we can be protective, for a reasonable amount of money, to make sure that our children and future generations are not guinea pigs.

Senator BARRASSO. One of the comments in the President's order included, he said, modify, streamline, repeal regulations, he also said expand regulations. Are there additional expansions that you are planning?

Ms. JACKSON. As the President said, and I think our regulatory calendar, we have been very transparent with the regulations that are coming, many of them as a result of court actions, many because of regulations that were thrown out as illegal, proposed by the last Administration. We have a huge Clean Air Act backlog of

regulations, public health regulations. But the President was very clear that, in the State of the Union, that we will be very smart about regulation, but we will not back away from creating and enforcing those regulations that have resulted in 92 percent of Americans having clean water, and that our air quality has gotten better, even as our GDP has grown 204 percent in this country.

Senator BARRASSO. Final question. Susan Dudley, George Washington University, talks about 132 economically significant Federal Government regulations, meaning that the impact of $100 million per year, and that we now have 40 percent more Federal regulations in this period of time under President Obama, than we did even under President Bill Clinton. The regulatory work force has grown 16 percent in Mr. Obama's first 2 years in office. We now have 276,000 public members, while private employment has continued to fall.

Do you have any idea how many private sector jobs have been lost because of these increased regulations?

Ms. JACKSON. Senator, I think the recent recession, all people agree, was a result of lack of regulation of the housing market that caused a collapse of our housing market. So the public health regulations under the Clean Water Act and Clean Air Act, I have not seen one of the industries claim that it was those regulations that somehow caused the housing market to implode.

Senator BARRASSO. Thank you, Madam Chairman.

Senator BOXER. Thank you. Senator Merkley.

Senator MERKLEY. Thank you very much, Madam Chairman, and Administrator Jackson.

I know you are familiar with the Bull Run Reservoir, which is a remote basin in the Cascade Mountains surrounded by old growth that humans are not allowed to have access to, and is the principal water source for the Portland metro region. You all have worked with us to establish a monitoring regime for cryptosporidium. That data has been now compiled under that monitoring regime and the city will be seeking a variance to establish appropriate circumstances based on that data and this pristine water source.

I believe EPA has now delegated to the State of Oregon responsibility for enforcing that part of the Clean Water Act, and so I believe the city will be applying to the State. So if the State approves a variance, will the EPA, does that kind of settle the question, or does the EPA then consider the possibility of appealing it or overturning it?

Ms. JACKSON. Senator, thank you for your strong interest in protecting that watershed. I still haven't seen it. My commitment to you is that EPA will work to support the State, to work closely with the State on the variance determination and help them in looking, if there are any conditions, will work with them. We don't expect that we would be working in opposition to them.

Senator MERKLEY. Thank you. On your next trip to the Northwest, I continue to extend the chance to see that extraordinary green infrastructure first-hand, if you will.

Then turning to chromium VI, the EPA standard, current standard of 100 parts per billion, is quite different than the California standard at 6 parts per billion and a proposed California standard

of 0.2 parts per billion. There is a 5,000 times difference between current EPA and proposed California. Do you have any sense where EPA's guidance will end up in this spectrum?

Ms. JACKSON. It would be irresponsible of me, Senator, to guess a number at this point. As you heard, there are a number of, required by law, by the Safe Drinking Water Act, analyses that we do. We certainly have to look at cost and feasibility and the particular impact on a smaller system in terms of public health. It is too soon for me to tell.

Senator MERKLEY. Any insights on that, Doctor?

Ms. BIRNBAUM. I think we need to see what the science is telling us. As Administrator Jackson has mentioned, it is currently out for peer review, their large assessment of the health effects and actual risk assessment. I think when that is completed and the peer review is completed on that, EPA will be able to move forward in some decisionmaking.

Senator MERKLEY. Thank you. I appreciate the rigorous scientific process that you are going through to try to reach a decision that is correct for the health of citizens in our Nation. We do have a real interest in it in Oregon, because one of the tests that were in your earlier sampling across the Nation was from Oregon that found some hexavalent chromium. So folks are kind of in rapt attention and interested in the dialog on what is healthy and appropriate.

Thank you.

Senator BOXER. Just two little pieces of information for the colleagues. We are considering the FAA bill on the floor, and they expect up to three votes around 5 or 6. Just thought people would want to know that. That is early evening.

The other thing is, just wanted to put in the record a document from the Office of Environmental Health Hazard Assessment from California. The last days of the Schwarzenegger Administration, they strengthened the proposed drinking water public health goal for chromium VI, based on the threats to children and other sensitive populations. I am going to put that in the record without objection.

[The referenced document was not received at time of print.]

Senator BOXER. I now call on Senator Boozman.

Senator BOOZMAN. Thank you, Madam Chair.

I appreciate your testimony very much. I don't think there is any question at all that we don't need to prevent contaminants in drinking water. Again, I think everyone in this room is 100 percent with you.

Dr. Birnbaum, again, after listening to you, I agree, everyone agrees that at some level, chromium VI causes cancer. The problem is figuring out what that level is.

That is so important, because it seems like, well, there is a finite amount of money that have to deal with these problems. If we unnecessary ratchet down standards, that becomes very, very expensive to do, there is no money for these other things.

Now, I don't know at this point, based on the science, if the cities that were investigated, if that is a problem. I can take you right now to hundreds of areas throughout the United States that have leaky pipes, that every time it rains hard, the sewer overflows. The pathogens surrounding there, we would all agree, are a huge prob-

lem. But again, there is no money for that, or there is not enough money. We are not doing as good a job as we can. So it is important that we get this right.

Then also the unintended consequences, as you treat for these things, the chemicals that you use to get it out, disposing of what you are getting out and things like that.

I have a problem with the methodology. There is a lot of criticism from the cities about the Environmental Working Group. Is it true, Ms. Jackson, that in Milwaukee that this was just from a tap some place within the city?

Ms. JACKSON. Yes, I believe what the EWG has said is that they went to random taps, one in each city that is reported.

Senator BOOZMAN. Again, and logically, I am an optometrist, I am not an expert on these things, but I do understand if you logically really wanted to find out what was going on, you would at least sample many sources within the city.

Then also, as they did, they came back and they sampled the intake area, they sampled within the system and they sampled the discharge. Dr. Birnbaum, what do you think about that type of methodology? I mean, that makes no sense at all, does it?

Then again, many of these cities were not notified until they read about this in the newspaper, and all of a sudden, they have this possible public issue on their hands that was done from a single source.

Ms. BIRNBAUM. I think that the EWG report is what, in scientific terms, we would call is hypothesis generating. It proposes that there might be a problem. But we need, and the EPA is beginning to get that information, we need some kind of statistically based sampling of water supplies in this country in order to understand. A single sample, you really don't know where the contamination is coming from and even if it is real. So it needs to be repeated.

Senator BOOZMAN. But you never do things in that manner. The problem is, the press takes that and they don't know what you have just stated. So all of a sudden, it becomes gospel. So it is a real problem. It is hard for those of us who want to help when you have situations like that, it is hard to have confidence in the system as you go forward.

In the testimony, Oklahoma City asked for the methodology, and evidently haven't been able to obtain it. Do you have a reason that you won't give the methodology to them?

Ms. JACKSON. I believe you are talking about the Environmental Working Group's methodology. She doesn't—we would have that. That is why we decided rather than to do that, to offer a methodology to water systems that could be used that had been peer-reviewed that we believed was State of the science. These are very low levels for chromium VI.

Senator BOOZMAN. I understand. But I think that they should have the right, you have essentially implied that something is going on, they should have the right to have the methodology that you used, I would very much like to see that also. I think the Committee would very much like to see that also, so that we can see, your credibility is on the line here. For you to have credibility, for us to have faith in what you are doing, I think we need to understand your working process in doing that.

Ms. JACKSON. Yes. Two clarifications, Senator. First, we have given a methodology that we believe is the one that should be used for systems who want to do their own testing. We have recommended that that is a reasonable next step.

The second thing I would like to say is, the EWG study alone might have been something that we could dismiss. The really important piece of scientific information is that we are in the middle of a peer review that shows that chromium VI, which we previously thought was not a problem in water, is a problem in water and causes cancer. If that is true, that is a game-changing piece of information that will likely mean we have to address it through changing our standards. That science was going on before the EWG report came out. It has been out there for quite some time. The only reason we are not able to finalize it is, we are going through a peer review, very important step, to make sure that we have this right.

Senator BOOZMAN. I would like to see, again, the science, well, the lack of science, I think, that the working group used, and would like a copy of that. I think Oklahoma City is entitled to that also. Thank you.

Ms. BIRNBAUM. I think, Senator, that you will be able to ask the head of the EWG to provide that for you when he testifies on the next panel.

Senator BOOZMAN. Very good. I will do that.

Senator BOXER. Thank you.

A couple of points. PG&E, which is our utility, paid millions of dollars in a settlement to the residents of Hinkley, this is a stockholder corporation, because there were levels of chromium VI. There were huge lawsuits. They settled the matter for hundreds of millions of dollars. It was the theme of the Erin Brockovich film. So there is a lot of different things out there.

I just want to say, Dr. Birnbaum, I don't know what you are talking about when you say it poses, you say it is a hypothesis-based study. Does that mean that it poses an important question? Is that what that means, a hypothesis-based study? What is your definition?

Ms. BIRNBAUM. I think it means that we have to look further.

Senator BOXER. Right. So if somebody says it is a snapshot in time, would you buy that as what they showed us?

Ms. BIRNBAUM. Yes, I think it is. It is a snapshot in time. Whether you would find the same thing if you measured the same tap waters next month, I don't know.

Senator BOXER. Well, obviously. It is a snapshot.

Senator BOOZMAN. Madam Chair?

Senator BOXER. I think when you say, hypothesis-based, I don't know what that means. I would appreciate it if you, just for my position here, you are saying it is a study that should be taken further. Is that what you mean by that?

Ms. BIRNBAUM. I would agree. I think it is a study that raises the question, do we have a problem here.

Senator BOXER. OK. Senator Udall.

Senator UDALL. Thank you, Madam Chair. I really appreciate your holding this hearing.

The point that I think Senator Lautenberg made, and I think Administrator Jackson, you also made, is one that in the case of doing cleanup, and trying to extract chemicals or contaminants or things from our drinking water, there is a whole job growth side of this. Rather than being job killing or job crushing, you actually have an entrepreneurship side. I think you mentioned that a little bit.

We have seen in New Mexico small businesses helping to solve drinking water problems. Several companies in New Mexico are actually getting back into manufacturing, making things in America here. We had one, Madam Chair, a company testified, the name of the company was Miox, testified before this Committee last year about their new processes they were getting into.

So I think it is important to emphasize that probably every State around this Committee table has small businesses who are working on these kinds of things. I very much appreciate your making that point in your testimony.

One of the questions, and let me just say, to preface this question, New Mexico has some big challenges when it comes to both the contaminants you are talking about, the perchlorate and the chromium VI. We have seen in this Environmental Working Group report chromium VI found at levels above 1 part per billion in Albuquerque, over 20 times the newly proposed standard in California. That was the eighth highest level in the investigation. Perchlorate also found in groundwater monitoring wells at national labs in New Mexico, in White Sands Missile Range.

So the first question I would like to ask Administrator Jackson, what are the major sources of chromium in drinking water? How did it get there, and what can or should have been done to prevent chromium from making its way into drinking water sources?

Ms. JACKSON. Well, as you heard in Dr. Birnbaum's opening statement, there are a number of industrial processes that can produce chromium, everything from plating and tanning operations. Also, since chromium is a mineral, it can be found as a contaminant in things like coal, so it will show up in the emissions from a coal-fired plant or even potentially an oil-fired plant.

Then it is also naturally occurring in the ground, like arsenic, another pollutant that we regulate and have made tremendous progress in your State, Senator, but not without having to work with lots of systems and with the State very closely. We are also looking at the potential for chromium itself and possibly chromium VI to come from fixtures. We don't have enough information right now to know about that. Last but not least, it is very important for us to work with the providers to understand whether it comes from any of our disinfection activities, whether that actually increases the likelihood of chromium III transforming into chromium VI.

Senator UDALL. When you mentioned that these companies, through their various industrial processes, have put out the chemicals, rather than putting the costs over on a utility or some other place, it would seem to me that we should return to the principle, which I think was the basis of the Environmental Protection Agency, was the polluter pays. So when we have companies that are out there that are, as a by-product or however they are putting out these chemicals, and they are getting into the groundwater, we

need to try at every level, from district attorneys to attorneys general to your enforcement effort to make sure that they are held accountable and that the polluters pay the price of this kind of thing.

Would you agree with that, and does your enforcement operation try to move forward with those kinds of actions to send a message to the community that, you shouldn't be doing this, you shouldn't be contaminating drinking water?

Ms. JACKSON. Congress long ago embraced the idea that the polluter pays, that our groundwater, our drinking water belongs to us, and that as much as possible, industry should first prevent pollution and help to clean it up. Where we are now is that we are learning about emerging problems. As we do, we have to speak straightforwardly to the American people and to industry about the need to not take them for granted or look the other way as these problems emerge. They are not happy stories. But we don't get healthier by ignoring them.

Senator UDALL. Thank you, and I have other questions that I will submit for the record. Thank you, Madam Chair.

Senator BOXER. Thank you.

I want to put into the record, because Senator Boozman raised the issue of cost, which I think is essential, we need to know cost benefit. I am going to put into the record an analysis by the National Cancer Institute that found in 2006 the direct cost of cancer care in America $104 billion. They have the numbers for 2005, the indirect cost in lost time and productivity at $135 billion. So you add that together, $240 billion a year. So it is critical, I think, that we look at the costs of this from every perspective, the cost benefit. I will put that into the record.

[The referenced document was not received at time of print.]

Senator BOXER. Now, it is our time to thank you both very much for being here, for sharing your morning with us, close to almost afternoon. I think that we will be seeing a lot more of both of you as we move forward in this Congress. Thank you very much.

We will call up our next panel, Mr. Ken Cook, the president of the Environmental Working Group. Ms. Carrie Lewis, from the Milwaukee Water Works, was due to be here. But because of severe weather, she was unable to travel to D.C. But she will have her testimony delivered by Diane VanDe Hei, executive director, Association of Metropolitan Water Agencies.

Mr. Steven D. Lewis, the city manager of the city of Norman, due to severe weather, Mr. Lewis was unable to travel. But he is putting his statement in the record, without objection. I know we will have him on the phone, is that correct? He cannot be on the phone. OK. We will not do that, but I am sure, I will give extra time to Senator Inhofe to ask questions. Really, I will. So you will get 10 minutes for your questions.

Mr. Chuck Murray, general manager of Fairfax Water. Dr. Thomas Burke, associate dean for Public Health Practice and Training, Johns Hopkins Bloomberg School of Public Health.

I think all of you probably were very interested in the first panel. We really do need your expertise.

So I would ask that we come to order, and those leaving please do so quietly. We will start with you, Mr. Cook, president, Environmental Working Group. Welcome.

STATEMENT OF KENNETH A. COOK, PRESIDENT, ENVIRONMENTAL WORKING GROUP

Mr. COOK. Chairman Boxer, Ranking Member Inhofe——

Senator BOXER. Excuse me, Mr. Cook.

Senator INHOFE. Let me just interrupt a moment. Unfortunately, I will not be able to stay. I want to hear all of your statements. My concern is that you address the unfunded mandate portion of this. Those of us who have been mayors of cities, and I would identify with the remarks that were made by Senator Johanns, are very much concerned about this. So I would like to have you address that during the course of your statements.

Thank you, Madam Chairman.

Senator BOXER. OK. I am sorry, Mr. Cook, but we welcome you again.

Mr. COOK. Thank you very much. Chairman Boxer and Ranking Member Senator Inhofe and distinguished members of the Committee, I very much appreciate the opportunity to testify today. We have prepared testimony, of course, to submit for the record. I would like to briefly summarize that, and if I may, address some of the issues that have come up in the discussion about our study. Because they are very important ones.

Let me start off by saying, we have been working on drinking water issues at the Environmental Working Group for a long time. The reason we looked into hexavalent chromium, the reason we formed the hypothesis, was because we prepared, since 2005, the only source that you can go to to look across the country, a very large data base, of as many of the drinking water contamination reports that have been filed by utilities with State agencies as we could assemble.

When we looked at this set of data, we were able to determine that there were a number of cities that had detected and reported, as EPA required, total chromium levels. Our hypothesis was that if there were a number of cities that had total chromium, it was very likely that, if anyone bothered to look, we would find hexavalent chromium.

California is the only State that tests for hexavalent chromium, and where they have tested for it, they have fairly routinely found it. It is not an accident that California, from a scientific standpoint, is driving the Nation in terms of trying to understand the implications of very low levels of ingestion of hexavalent chromium as a carcinogen.

We recognized, and have stated in the study throughout its coverage that this puts water utilities in a bind. This is not a contaminant that they have put into the water. When we briefed the trade associations and called in advance to a number of the utilities, we made that very clear, that we recognized this was not their problem. Of the utilities we contacted before releasing the study, Norman was the only one, Norman, OK was the only one that really understood that this came from geological sources.

But when we went ahead and submitted the tests, the samples, we followed a protocol that was published the day we published the report. It is in great detail, we have made it available to everyone. We used the methodology that EPA is now recommending for water utilities who wish to follow it, because it was approved by the Envi-

ronmental Protection Agency for hexavalent chromium at those low levels. The detection limit is .02 parts per billion, which is the health guidance that has been recommended most recently for California.

We were only able to conduct one sample per city in the time and with the funds we had available. But there has been new testing that has been conducted by a number of the cities and has been made public. Here is what they found. In Honolulu, they have reported 11 samples. We don't know the methodology, at least from what is before me, for certain. We don't know the exact location of where the samples were taken. But they found between .32 and 4.0 parts per billion. We found 2 parts per billion. So some of their samples were higher, some were lower.

In the case of Madison, WI, they found, in four wells that they tested, .4 to 1.79 parts per billion. We found in our study 1.58. Again, within the range.

Milwaukee tested and found .19 parts per billion to .22 parts per billion. We found .18. Again, right in the middle. In the case of Norman, we have not seen the results yet. We look forward to that.

In the case of Bend, OR, they have also reported results after our study. They tested four samples of source water from the Evian facility, .25 to .65. We found .78. That is the only city that has found slightly lower levels than the levels we found.

Thank you, Madam Chairman.

[The prepared statement of Mr. Cook follows:]

STATEMENT OF KENNETH A. COOK, PRESIDENT, ENVIRONMENTAL WORKING GROUP

Madam Chair, Ranking Member Inhofe and distinguished members of the committee: My name is Kenneth A. Cook. I am the President of Environmental Working Group (EWG), a nonprofit research and advocacy organization based here in Washington, DC, with offices in Ames, Iowa, and Oakland, California. I thank the members of the committee for holding this important hearing and for the opportunity to testify.

Ensuring safe, accessible drinking water is a core responsibility of the United States government. The United States has some of the best tap water in the world. But the safety of our drinking water is under constant stress. Among the major problems:

- Infrastructure is crumbling and decaying.
- Programs to protect source water lack funding.
- Utilities often can't afford to test for and treat contamination.
- Some disinfectants used to treat polluted water actually break down into toxic substances.
- The Environmental Protection Agency (EPA) has not established drinking water standards for so-called "unregulated contaminants," harmful chemicals such as the industrial pollutant hexavalent chromium, the rocket-fuel component perchlorate and the perfluorinated chemicals PFOA and PFOS, active ingredients in stain removers and carpet cleaners.

We believe that Administrator Jackson's national drinking water strategy has put EPA on the right track. The agency has made significant strides over the past 2 years to improve the quality of our drinking water. We welcome recent EPA moves to review water contaminants by class, develop new drinking water safety technologies and use other statutes such as the Federal pesticide law and toxics law to ensure water quality. We support EPA's initiatives to work with states to publish State and locality specific water quality data online and to give guidance to utilities on how to test and treat water for chromium-6 contamination. But more must be done to protect our nation's drinking water supply.

Since 2005 the Environmental Working Group has published a searchable online data base of tap water quality called "The National Drinking Water Data base." Our data base synthesizes more than 20 million public water quality records. It allows citizens to look up water quality reports by zip code so they can learn more about regulated and unregulated water contaminants in their local water supply. The

most recent edition of EWG's National Drinking Water Data base was published jointly in December 2009 with The New York Times' award-winning series "Toxic Waters," which has done much to educate Americans about the State of the nation's water quality.

I. EWG'S CHROMIUM-6 REPORT

On December 20, 2010, the Environmental Working Group released a study entitled "Cancer-Causing Chromium-6 Pollution in U.S. Tap Water," which reported the results of our laboratory tests of drinking water from 35 cities. EWG conducted samplings in 35 cities whose annual water quality reports indicated significant total chromium pollution. Unfortunately, the total chromium measure doesn't tell residents what they most need to know, because the metallic element comes in several forms, including trivalent chromium, a mineral essential to health, and the toxic pollutant chromium-6, also known as hexavalent chromium or the "Erin Brockovich chemical," for her storied campaign to uncover industrial dumping.

The Federal National Toxicology Program has concluded from animal testing that the pollutant shows "clear evidence of carcinogenic activity." An EPA draft review called chromium-6 in tap water "likely to be carcinogenic to humans."

Because few jurisdictions test specifically for chromium-6, EWG engaged volunteers to collect samples, using a standard protocol, from unfiltered taps in homes or in public buildings. We sent these samples to a nationally recognized laboratory. The tests found toxic hexavalent chromium in the water supplies of 31 cities, serving more than 26 million Americans.

On December 31, 11 days after we released our report, California lowered its chromimum-6 public health goal from 0.06 to 0.02 parts per billion (ppb). Our chromium-6 readings in all 31 cities were higher than California's new proposed safe limit. This is troubling.

In fact many members of this committee represent states where we found high concentrations of chromium-6. Among them:

- Riverside, CA–1.69 ppb
- San Jose, CA –1.34 ppb
- Los Angeles, CA–0.20 ppb
- Sacramento, CA–0.16 ppb
- Omaha, NE–1.07 ppb
- Albuquerque, NM–1.04 ppb
- Bend, OR–0.78 ppb
- Bethesda, MD–0.19 ppb
- Syracuse, NY–0.12 ppb
- Buffalo, NY–0.07 ppb

The highest level detected was 12.9 ppb in Norman, Oklahoma.

This study was meant to be a "snapshot" of chromium-6 contamination in the country, not a comprehensive assessment of each community's water supply. More comprehensive tests should be undertaken immediately. The number of Americans drinking tap water contaminated with chromium-6 is likely far higher than indicated by EWG's tests. At least 74 million people in nearly 7,000 communities drink tap water polluted with total chromium, according to EWG's 2009 analysis of water utility tests from 48,000 communities in 42 states. We don't know how many of those communities have water polluted with chromium-6. We should find out. People have a right to know whether they are being exposed to this dangerous substance.

II. EPA'S CURRENT TOTAL CHROMIUM STANDARD DOES NOT ADEQUATELY PROTECT PUBLIC HEALTH FROM CHROMIUM-6 EXPOSURE

EWG's report is the broadest publicly available survey of chromium-6 to date. In California, the only State that requires testing for chromium-6, water systems have detected it in tap water supplied to more than 31 million residents. Chromium-6 is commonly discharged from steel and pulp mills and metal-plating and leather-tanning facilities. Naturally occurring chromium-6 can enter water supplies through erosion of soil and rock.

The EPA has set a legal limit of 100 parts per billion of total chromium to protect against "allergic dermatitis" (skin irritations or reactions). Total chromium is composed primarily of toxic hexavalent chromium, or chromium-6, and the necessary mineral trivalent chromium, which regulates glucose metabolism. Our tests found that in most cases, the largest component of total chromium was the hexavalent form.

Yet the EPA's legal limit for total chromium is 1,700 times higher than California's proposed public health goal for hexavalent chromium, and 5,000 times higher

than the most recent proposed public health goal issued by California. This disparity shows that the total chromium regulation is out of sync with the established science on the public health risks of chromium-6 exposure.

The California Environmental Protection Agency establishes drinking water public health goals based on public health considerations using the best available data in the scientific literature. Setting a public health goal is the first step toward establishing a statewide enforceable drinking water limit. In response to the National Toxicology Program's finding that chromium-6 in drinking water shows "clear evidence of carcinogenic activity" in lab animals, California proposed a public health goal of 0.06 parts per billion. The California EPA asserted: "The findings of available human, animal, genotoxic, and toxicokinetic studies all indicate that hexavalent chromium is a possible human carcinogen by the oral route." On December 31, 2010, California lowered its public health goal for hexavalent chromium to 0.02 ppb, based on research on "early in life exposures and cancer potency" of chromium-6.

The US EPA's most recent analysis of chromium-6 toxicity, released in draft form in September 2010, cites significant cancer concerns linked to exposure to the contaminant in drinking water. It highlights several disorders reported in animal studies, including anemia and damage to the gastrointestinal tract, lymph nodes and liver.

Chromium-6 is particularly dangerous to people whose stomachs are insufficiently acidic. They appear to have limited availability to convert hexavalent chromium to trivalent chromium.

Children are also at heightened risk. According to the National Academy of Sciences, the developing organs of children and infants are more vulnerable to damage from chemical exposures and children are less able to excrete dangerous chemicals.

III. EPA SHOULD RESIST INDUSTRY'S WELL-DOCUMENTED EFFORTS TO PREVENT SPECIFIC REGULATION OF CHROMIUM-6

Many Americans are familiar with chromimum-6 because of the film "Erin Brockovich," and Ms. Brockovich's tireless work to expose Pacific Gas & Electric Co.'s (PG&E) dumping of the chemical into the groundwater around the small California community of Hinkley. In 1996, thanks in large part to Ms. Brockovich's investigation, Hinkley residents won a $333 million settlement from the giant utility. Less heralded is the case of the residents of Kettleman City, Calif., who settled with PG&E for $335 million in 2006. The machinations during this lawsuit brought to light the utility's efforts to cover up health risks associated with chromium-6.

The Kettleman story began nearly 25 years ago in China's Lioang Province, when researchers found an increased risk of stomach cancer and a "significant excess of overall cancer mortality" among villagers whose drinking water was polluted by a chromium ore processing facility. Ten years later the Journal of Occupational and Environmental Medicine published a paper that was purportedly written by the same Chinese research team and that reversed the earlier conclusion. Scientists and regulators, including EPA officials, cited the paper in research and safety assessments. However, investigations by EWG and the Wall Street Journal in 2005 disclosed that a consulting firm named ChemRisk, hired by PG&E, had conducted its own analysis of the Chinese data and deliberately excluded reports of cancer cases that pointed to an association with chromium-6. ChemRisk submitted the paper to the Journal of Occupational and Environmental Medicine without disclosing PG&E's involvement. In 2006, the journal retracted the paper, citing undisclosed "financial and intellectual input to the paper." For decades, industry has worked to prevent regulation of chromium-6 and it's time for the government to act to protect public health—especially the health of vulnerable populations like children and pregnant women—from this cancer-causing chemical.

IV. EPA SHOULD ESTABLISH A SPECIFIC DRINKING WATER STANDARD FOR CHROMIUM-6

Immediately after we released our 35-city report on December 20, EPA Administrator Lisa P. Jackson told a bipartisan group of 10 Senators, including members of this committee, that the agency would complete a scientific review of the chemical by summer and might consider mandating cities to test for chromium-6 in tap water. Thank you, Madam Chair, for your letter with Senator Feinstein, to the Administrator urging EPA to act quickly to decide whether to issue a health advisory on chromium-6 under the Safe Drinking Water Act.

The EPA reacted swiftly with a four-point plan to help water utilities assess chromium-6 pollution and a pledge to set a nationwide safety standard. Administrator

Jackson announced that EPA would provide technical assistance to the 31 chromium-6 communities listed in our report. Earlier in January, EPA implemented point two of its plan and issued enhanced guidance detailing where and how often water utilities should collect samples and outlining protocols for laboratory testing.

We support EPA's quick action in light of our report's findings. Three cities we sampled have conducted their own tests and found similar results, and many water utilities across the country are assessing potential chromium-6 pollution in their drinking water. We will continue to press for more protective Federal standards for chromium-6 in drinking water, and we look forward to working with the agency and water utilities to address this health concern.

As I mentioned, we estimate that at least 74 million Americans in 42 states drink chromium-polluted tap water, much of it likely in the form of hexavalent chromium. EPA's legal upper limit for total chromium, 100 parts per billion, was set nearly 20 years ago and is wholly inadequate. Furthermore, EPA has not set a new drinking water standard under the Safe Drinking Water Act since 2001. Three-quarters of the current standards date from 1991 and 1992 and have not been modernized. Since 1996, EPA has reviewed toxicity and water pollution data for 138 unregulated chemicals but declined to set a safe and legally enforceable drinking water standard for any of these chemicals.

It's important that EPA move quickly to set an enforceable drinking water standard for chromium-6 and require water utilities to test for it. However, the past lack of action has shown that when it comes to setting enforceable drinking water standards the agency often needs a legislative push. Therefore, we strongly support Senator Boxer and Senator Feinstein's legislation, S. 79, which would establish a timeline for EPA to set a health advisory and specific chromium-6 drinking water standard.

V. THE FEDERAL GOVERNMENT SHOULD PROVIDE SUBSTANTIAL FUNDING FOR SOURCE WATER PROTECTION AND FOR WATER UTILITIES TO CONDUCT NECESSARY INFRASTRUCTURE UPGRADES, WATER TESTING AND TREATMENT

The best way to remove chromium-6 from the nation's drinking water is to keep it out in the first place. Environmental Working Group strongly supports increased investment in source water protection, including the reauthorization and full funding of the drinking water and clean water State revolving loan funds.

But where hexavalent chromium already contaminates local water supplies, no one-size-fits-all solution exists. Some utilities may be able to respond adequately to high levels of hexavalent chromium in finished tap water by modifying disinfection procedures. For instance, chlorine, widely used as a tap water disinfectant, can cause trivalent chromium to become the hexavalent form. Another common disinfectant, chloramine, does not trigger this effect. Other utilities might be wise to shift to other water sources, drawing less water from more contaminated sources. Technologies effective for reducing hexavalent chromium in tap water include membrane filtration by nanofiltration and reverse osmosis, anion exchange, reduction followed by coagulation and precipitation, and absorption. Over the past year, the city of Glendale, California, for example, has been evaluating two new hexavalent chromium treatment and testing facilities. Research conducted at these facilities and around the country can help local utilities address chromium-6 contamination.

Cleaning up hexavalent chromium pollution has its costs. But ignoring it is not an option. Cities like Norman and Milwaukee deserve credit for following up promptly on our findings. The next step is to find ways to minimize contamination that could damage human health.

We also strongly support efforts to address other so-called "unregulated contaminants," such as the rocket fuel ingredient perchlorate and the perfluorinated chemicals PFOA and PFOS. It's time for us to catch up to the science and to regulate these known drinking water contaminants.

But here's the bottom line: our nation's water utilities need help. We must provide them with the necessary funding for infrastructure upgrades, water treatment technologies, and testing protocols to protect our drinking water supply. Our health —and especially our children's health—depends on their doing the job right. And in these stark fiscal times, protecting our nation's public drinking water supply should be a top funding and oversight priority for Congress.

REFERENCES

ACC (American Chemistry Council). 2010. Letter to the Office of Environmental Health Hazard Assessment. June 17, 2010.

AWWARF (American Water Works Association Research Foundation, now the Water Research Foundation). 2004. Occurrence Survey of Boron and Hexavalent Chromium.

Anderson SA, Valentine JL, Fernando R, Sparacino CM, Collins B. 2002. Chromium accumulation in the tissues of rats, mice and guinea pigs exposed to sodium dichromate dihydrate in drinking water for twenty-one days. Toxicol Sci 66(Suppl 1): 138.

Beaumont JJ, Sedman RM, Reynolds SD, Sherman CD, Li LH, Howd RA, et al. 2008. Cancer mortality in a Chinese population exposed to hexavalent chromium in drinking water. Epidemiology 19(1): 12–23.

Borneff J, Engelhardt K, Griem W, Kunte H, Reichert J. 1968. [Carcinogens in water and soil. XXII. Mouse drinking water experiments with 3,4-benzopyrene and potassium chromate]. Arch Hyg Bakteriol 152(1): 45–53.

Brandt-Rauf P. 2006. Editorial retraction. Cancer mortality in a Chinese population exposed to hexavalent chromium in water. Journal of Occupational and Environmental Medicine/American College of Occupational and Environmental Medicine 48(7): 749.

CDPH (California Department of Public Health). 2009. Chromium-6 in Drinking Water Sources: Sampling Results. California Department of Public Health, Sacramento, CA. February 17, 2009. Available at: www.cdph.ca.gov/certlic/drinkingwater/Pages/Chromium6sampling.aspx.

Costa M. 1997. Toxicity and carcinogenicity of Cr(VI) in animal models and humans. Critical Reviews in Toxicology 27(5): 431–442.

Donaldson RM, Jr., Barreras RF. 1966. Intestinal absorption of trace quantities of chromium. The Journal of Laboratory and Clinical Medicine 68(3): 484–493.

Donohue JM, Lipscomb JC. 2002. Health advisory values for drinking water contaminants and the methodology for determining acute exposure values. Sci Total Environ 288(1–2): 43–9.

EPA (Environmental Protection Agency). 2000. Hazard summary for chromium compounds. Available at: www.epa.gov/ttn/atw/hlthef/chromium.html.

EPA (Environmental Protection Agency). 2003. Six-Year Review 1 of Drinking Water Standards. EPA 815–F–03–001. U.S. Environmental Protection Agency, Office of Water. July 2003. Available at: www.epa.gov/safewater/review/first_review.html.

EPA (Environmental Protection Agency). 2009. Six-Year Review 2 Health Effects Assessment: Summary Report. EPA 822–R–09–006. U.S. Environmental Protection Agency, Office of Water. October 2009. Available at: www.epa.gov/safewater/review/second_review.html.

EPA (Environmental Protection Agency). 2010a. Toxicological Review of Hexavalent Chromium (CAS No. 18540–29–9) (External Review Draft). EPA/635/R–10/004A. September 2010. Available at: oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=498712.

EPA (Environmental Protection Agency). 2010b. Drinking Water Contaminants. Available at: www.epa.gov/safewater/contaminants/index.html.

EWG (Environmental Working Group). 2005. Chrome-Plated Fraud: How PG&E's scientists-for-hire reversed findings of cancer study. Available at: www.ewg.org/erinbrockovichchromium6lawsuit/.

EWG (Environmental Working Group). 2006. Letter to JOEM. Available at: www.ewg.org/node/21952.

EWG (Environmental Working Group). 2009. EWG's Drinking Water Quality Analysis and Tap Water Data base. Available at: http://www.ewg.org/tap-water/home.

Finley BL, Kerger BD, Katona MW, Gargas ML, Corbett GC, Paustenbach DJ. 1997. Human ingestion of chromium (VI) in drinking water: pharmacokinetics following repeated exposure. Toxicology and Applied Pharmacology 142(1): 151–159.

Gwiazda R. 2008. Review of the document "Public Health Goal for hexavalent chromium in drinking water" Prepared by the Office of Environmental Health Hazard Assessment (OEHHA) of the California Environmental Protection Agency in January 2008: Pesticide and Environmental Toxicology Branch, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Available at: www.oehha.org/water/phg/pdf/Cr_Gwiazda090909.pdf.

IARC (International Agency for Research on Cancer). 1990. Chromium and chromium compounds. International Agency for Research on Cancer. IARC Monogr Eval Carcinog Risks Hum 49:49–214.

Kerger BD, Paustenbach DJ, Corbett GE, Finley BL. 1996. Absorption and elimination of trivalent and hexavalent chromium in humans following ingestion of a bolus dose in drinking water. Toxicology and Applied Pharmacology 141(1): 145–158.

Lai H, McNeill LS. 2006. Chromium redox chemistry in drinking water systems. J Environ Eng 132(8): 842–851.

McCarroll N, Keshava N, Chen J, Akerman G, Kligerman A, Rinde E. 2010. An evaluation of the mode of action framework for mutagenic carcinogens case study II: chromium (VI). Environmental and Molecular Mutagenesis 51(2): 89–111.

NAS (National Academy of Sciences). 1993. Pesticides in the Diets of Infants and Children. Washington DC: National Academy Press.

NRC (National Research Council). 2008. Phthalates and Cumulative Risk Assessment: The Task Ahead. Available at: www.nap.edu/catalog/12528.html.

NTP (National Toxicology Program). 2007. Actions on Draft NTP Technical Reports Reviewed by the NTP Board of Scientific Counselors Technical Reports Review Subcommittee, May 16–17, 2007, Minutes available at: ntp.niehs.nih.gov/files/TRRS_MIns_May_2007_bs8rgMW[1]1.pdf.

NTP (National Toxicology Program). 2008. NTP Technical Report on the Toxicology and Carcinogenesis Studies of Sodium Dichromate Dihydrate (CAS No. 7789–12–0) in F344/N Rats and B6C3F1 Mice (Drinking Water Studies). NTP TR 546, NIH Publication No. 07–5887: National Toxicology Program, National Institutes of Health, U.S. Department of Health and Human Services. Available at: http://ntp.niehs.nih.gov/files/546_web_FINAL.pdf.

OEHHA (Office of Environmental Health Hazard Assessment). 2009. Draft Public Health Goal for Hexavalent Chromium in Drinking Water: Pesticide and Environmental Toxicology Branch, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Available at: www.oehha.ca.gov/water/phg/pdf/Cr6PHGdraft082009.pdf.

OEHHA (Office of Environmental Health Hazard Assessment). 2010. Peer Review Comments regarding 2001 Draft Public Health Goal for Hexavalent Chromium in Drinking Water. Available at: www.oehha.ca.gov/water/phg/chrom-2010.html.

USGS (United States Geological Survey). Mineral Commodity Summaries: Chromium. January 2010.

Zhang JD, Li S. 1997. Cancer mortality in a Chinese population exposed to hexavalent chromium in water. Journal of Occupational and Environmental Medicine/American College of Occupational and Environmental Medicine 39(4): 315–319.

Zhang JD, Li XL. 1987. [Chromium pollution of soil and water in Jinzhou]. Zhonghua yu fang yi xue za zhi [Chinese Journal of Preventive Medicine] 21(5): 262–264.

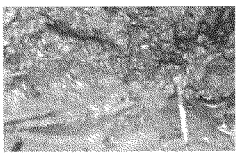
ATTACHMENT A

Cancer-Causing Chromium-6 Pollution in U.S. Tap Water, Environmental Working Group (December 20, 2010) (available at http://static.ewg.org/reports/2010/chrome6/html/home.html)

ENVIRONMENTAL WORKING GROUP

Chromium-6 in U.S. Tap Water

Rebecca Sutton, PhD
EWG Senior Scientist



http://www.ewg.org/chromium6-in-tap-water

http://www.ewg.org/chromium6-in-tap-water

Contents

Background

i. Executive Summary 4
ii. Study Findings 8
iii. Industry Tactics 11
iv. Government Failings 15
v. Progress in California 17
vi. Methodology 19
vii. References 21

This PDF is QR Mobile Interactive

Scan this QR code with your web and camera featured smart phone and be taken to the online report for Cancer Causing Chromium 6 in U.S. Tap Water.

Download QR Reader for your Smartphone:
www.i-nigma.mobi

Acknowledgments

Principal Author: Rebecca Sutton, PhD

Editors: Jane Houlihan, Renee Sharp & Nils Bruzelius

Databases & Mapping: Chris Campbell & Sean Gray

Web Design: Dean Clark

This report was made possible by the support of the John Merck Fund, the Johnson Family Foundation, the Park Foundation and the Turner Foundation.

EWG thanks Erin Brockovich and Bob Bowcock for their continued efforts to protect public health, and Max Costa (New York University School of Medicine) for his review of our report.

Interns Jacob Booher, Marisa Evanouski, Samara Geller and Kimi Schell made significant contributions to this research. We also thank EWG contacts nationwide who made this study possible by volunteering to collect water samples for analysis.

http://www.ewg.org/chromium6-in-tap-water

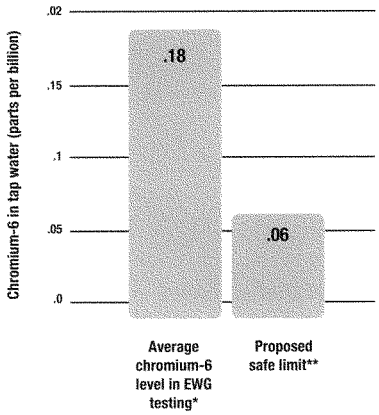
Executive Summary

Tap water from 31 of 35 U.S. cities tested contains hexavalent chromium (or chromium-6), the carcinogenic "Erin Brockovich chemical," according to laboratory tests commissioned by Environmental Working Group (EWG). The highest levels were detected in Norman, Okla.; Honolulu, Hawaii; and Riverside, Calif.

Despite mounting evidence of the contaminant's toxic effects, including a U.S. Environmental Protection Agency (EPA) draft toxicological review that classifies it as "likely to be carcinogenic to humans" when consumed in drinking water, the agency has not set a legal limit for chromium-6 in tap water and does not require water utilities to test for it. Hexavalent chromium is commonly discharged from steel and pulp mills as well as metal-plating and leather-tanning facilities. It can also pollute water through erosion of soil and rock.

The National Toxicology Program has found that hexavalent chromium in drinking water shows clear evidence of carcinogenic activity in laboratory animals, increasing the risk of otherwise rare gastrointestinal tumors (NTP 2007, 2008). In response to this study and others, California officials last year proposed setting a public health goal for chromium-6 in drinking water of 0.06 parts per billion (ppb). This is the first step toward establishing a statewide enforceable limit (OEHHA 2009).

Levels of the carcinogen in 25 cities tested by EWG were higher than California's proposed public health goal. Tap water from Norman, Okla. (population 90,000) contained more than 200 times California's proposed safe limit.



***Geometric average based on level of chromium-6 measured in 35 U.S. cities and a statistical estimate for the four cities where no chromium-6 was detected. The lowest level detectable by these tests is 0.02 ppb. For the purpose of calculating the nationwide average, the concentration of chromium-6 in these four cities was assumed to be 0.01 ppb, or half of the lowest detectable level.**

****"Proposed safe limit" is California EPA's proposed public health goal (OEHHA 2009).**

Source: EWG-commissioned testing for hexavalent chromium in tap water from 35 cities.

Top Five Chromium-contaminated Cities Tested by EWG

City	City Population	Hexavalent Chromium Contamination Level in Tap Water
Norman, Oklahoma	89,952	12.9 ppb
Honolulu, Hawaii	661,004	2.00 ppb
Riverside, California	280,832	1.69 ppb
Madison, Wisconsin	200,814	1.58 ppb
San Jose, California	979,000	1.34 ppb

Millions of Americans drink chromium-contaminated water

EWG's investigation is the broadest publicly available survey of hexavalent chromium to date. The 31 cities with chromium-polluted tap water draw from utilities that collectively serve more than 26 million people. In California, the only state that requires testing for hexavalent chromium, water utilities have detected the compound in tap water supplied to more than 31 million people, according to an EWG analysis of data from the state water agency (EWG 2009).

EWG's tests provide a one-time snapshot of chromium-6 levels in 35 cities. But chromium pollution is a continuous, ongoing problem, as shown by the annual water quality reports that utilities must produce under federal law. Over the years, nearly all of the 35 cities tested by EWG regularly report finding chromium (in the form of total chromium) in their water despite using far less sensitive testing methods than those used by EWG.

The total number of Americans drinking tap water contaminated with this compound is likely far higher than is indicated by EWG's tests. At least 74 million people in nearly 7,000 communities drink tap water polluted with "total chromium," which includes hexavalent and other forms of the metal, according to EWG's 2009 analysis of water utility tests from 48,000 communities in 42 states (EWG 2009).

The EPA has set a legal limit in tap water for total chromium of 100 ppb to protect against "allergic dermatitis" (skin irritation or reactions). Measures of total chromium include the essential mineral trivalent chromium, which regulates glucose metabolism, as well as the cancer-causing hexavalent form. Preliminary EWG-commissioned water tests found that in most cases, the majority of the total chromium in water was in the hexavalent form, yet the EPA's legal limit for total chromium is 1,700 times higher than California's proposed public health goal for hexavalent chromium. This disparity could indicate significant cancer risk for communities drinking chromium-tainted tap water.

The EPA's new analysis of hexavalent chromium toxicity, released in draft form in September 2010 (EPA 2010a), cites significant cancer concerns linked to exposure to the contaminant in drinking water. It highlights health effects documented in animal studies, including anemia and damage to the gastrointestinal tract, lymph nodes and liver.

Industry deception delayed protections

The plight of the cancer-stricken residents of Hinkley, Calif., who in 1996 won a $333 million settlement from Pacific Gas and Electric Co. for contaminating their tap water with hexavalent chromium, was the basis of the 2000 movie "Erin Brockovich," starring Julia Roberts.

Subsequently, a 2005 Wall Street Journal investigation and a separate EWG report based on court documents and depositions from a similar lawsuit in Kettleman City, Calif. revealed that PG&E had hired consultants to publish a fraudulent analysis of cancer mortality in Chinese villagers exposed to hexavalent chromium, in an attempt to disprove the link between the chemical and cancer. The study was published in the respected Journal of Occupational and Environmental Medicine, and scientists and regulators — including the EPA — cited the fraudulent article in research and safety assessments. The journal retracted the paper in 2006 in response to EWG's request for corrective action.

California officials then conducted a rigorous re-assessment of the study data, finding a statistically significant increase in stomach cancer among the exposed. Their analysis is consistent with laboratory evidence from the National Toxicology Program and others showing that hexavalent chromium in tap water causes gastrointestinal tumors in multiple species.

Industry has sought for more than six years to delay state-mandated regulation of hexavalent chromium in tap water in California. Aerospace giant Honeywell International Inc. and others have stalled the adoption of the advisory public health goal by pressing for additional external scientific peer review. California's Department of Public Health can neither set nor enforce a mandatory tap water standard for hexavalent chromium until the goal is finalized.

Recommendations

At least 74 million Americans in 42 states drink chromium-polluted tap water, much of it likely in the form of cancer-causing hexavalent chromium. Given the scope of exposure and the magnitude of the potential risk, the EPA should move expeditiously to establish a legal limit for the chemical in tap water and require water utilities to test for it.

The state of California must establish a strong standard for hexavalent chromium in tap water immediately. A truly health-protective hexavalent chromium regulation will reduce the cancer risk for Californians and serve as a model for the nation. With an enforceable standard already six years past the statutory deadline and the health of millions of Californians at stake, the state cannot move too quickly.

http://www.ewg.org/chromium6-in-tap-water

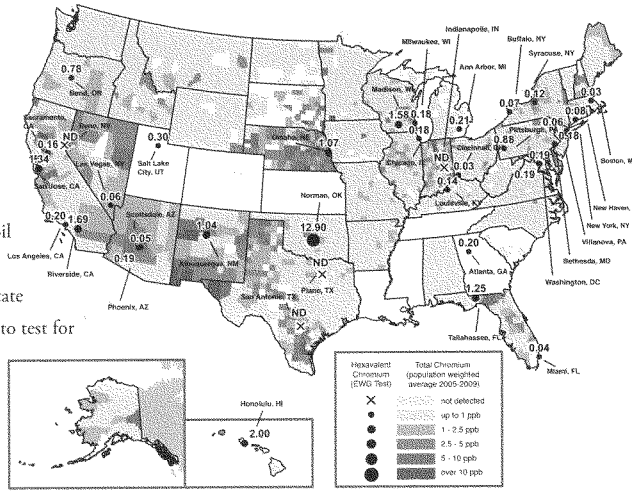
Study Findings

Carcinogenic Erin Brockovich Chemical Found in Tap Water Across the U.S.

Tests commissioned by the Environmental Working Group (EWG) detected carcinogenic hexavalent chromium in 31 of 35 tap water samples — 89 percent — collected in cities across the country. EWG targeted a mix of large cities and some smaller ones where testing by local water utilities had previously detected potentially significant amounts of "total chromium." This less specific measurement includes trivalent chromium, an essential mineral that regulates glucose metabolism, as well the cancer-causing hexavalent form, also called chromium-6.

Hexavalent chromium (or chromium-6) gets into water supplies after being discharged from steel and pulp mills as well as metal-plating and leather-tanning facilities. It can also pollute water through erosion of soil and rock.

In California, the only state that requires water utilities to test for hexavalent chromium, the state's Environmental Protection Agency (California EPA) has proposed a "public health goal," or maximum safe concentration, of 0.06 parts per billion (ppb) in tap water to protect against excess

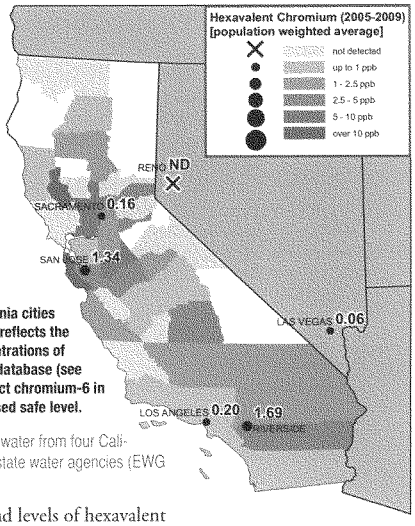


Above figure: Black dots indicate EWG's test sites and measured hexavalent chromium concentrations in parts per billion (ppb). Size of dot reflects the level found. Brown-shaded areas represent population-adjusted average concentrations of total chromium by county, calculated from EWG's national tap water database (see Study Methodology).

Sources: EWG-commissioned testing for hexavalent chromium in tap water from 35 cities; EWG analysis of water utility testing data obtained from state water agencies (EWG 2009).

cancer risk. However, the state's current testing protocols are significantly less sensitive than those of the independent laboratory hired by EWG and may identify only the most extreme cases of contamination. Chromium-6 levels in tap water in all four California cities tested by EWG exceeded the proposed public health goal. (Once the goal is established, state regulators plan to embark on a rule-making process to set a legally enforceable upper limit.)

Chromium-6 is a common pollutant in California tap water



EWG measured concentrations of hexavalent chromium in four California cities — Los Angeles, Riverside, Sacramento and San Jose. Size of red dots reflects the level found. Colored areas reflect population-adjusted average concentrations of hexavalent chromium by county, as calculated from EWG's tap water database (see Study Methodology). The state's current testing protocols cannot detect chromium-6 in amounts lower than 1 ppb, more than 16 times higher than the proposed safe level.

Sources: EWG-commissioned testing for hexavalent chromium in tap water from four California cities; EWG analysis of water utility testing data obtained from state water agencies (EWG 2009).

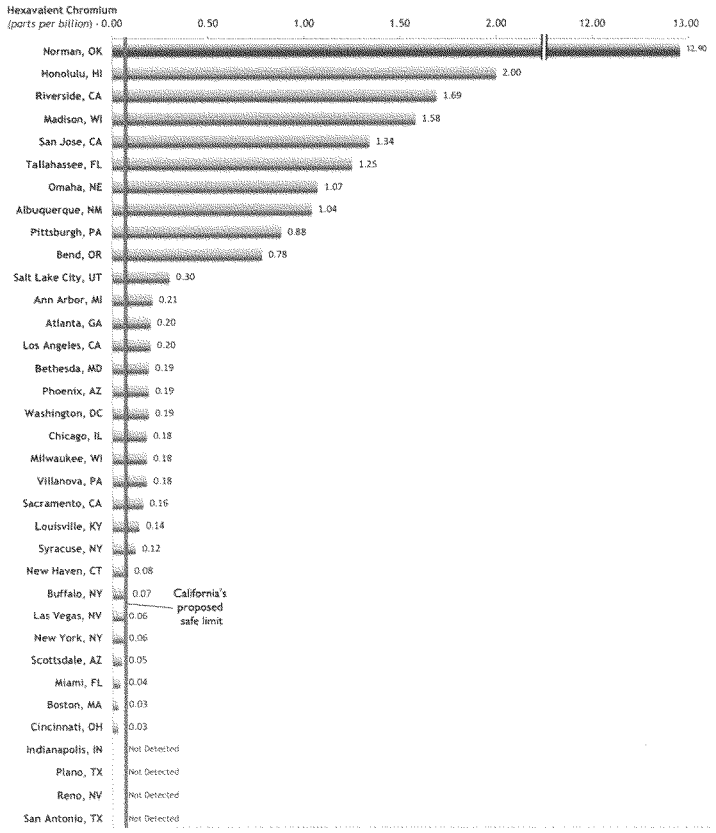
Nationally, samples from 25 cities tested by EWG had levels of hexavalent chromium higher than the safe limit proposed in California.

For total chromium, the US Environmental Protection Agency has set a legal limit of 100 ppb in tap water to protect against "allergic dermatitis" (skin irritation or reactions). California's legal limit for total chromium is half that — 50 ppb.

EWG's analysis of California's tap water testing data indicates that chromium-6 constitutes more than half of the total chromium found in most water supplies, a finding further supported by initial data from EWG's nationwide survey. A proprietary 2004 study by the Water Research Foundation for its paying members, including water utilities, found that hexavalent chromium contamination of tap water was more common for systems using groundwater wells than for those drawing surface water (AWWARF 2004). The EPA's 100 ppb legal limit for total chromium is more than 1,600 times higher than the California's proposed public health goal for hexavalent chromium. This could mean that communities with higher concentrations of total chromium face a cancer risk well above the levels typically considered safe.

http://www.ewg.org/chromium6-in-tap-water

Chromium-6 levels in 25 cities' tap water exceed safe limit proposed by California officials*



Source: EWG-commissioned testing for hexavalent chromium in tap water from 35 cities.
*Proposed safe limit is California EPA's proposed public health goal (OEHHA 2009).

Industry Tactics

Industry falsified key study of "Erin Brockovich chemical"

Chromium is a naturally occurring metal used in steel manufacturing, leather tanning, welding and the production of dyes, pigments and alloys. It is often used to plate metal surfaces and is a major component of pesticides used in pressure-treated lumber for outdoor decks, play sets and other structures (one form was banned in 2005). Chromium was also widely used as an anti-corrosive agent in industrial cooling towers until the federal government banned the practice in 1990 (EPA 2000). It is an essential component in making stainless steel, its most common use, and super-alloys (USGS 2010).

The toxic form of chromium is not regulated in tap water

Chromium has multiple forms, and the two most common have dramatically different consequences for human health. Trivalent chromium (chromium-3) is a nutrient essential to sugar and lipid metabolism, but hexavalent chromium (chromium-6) is a dangerous toxin. Since 1990, international health authorities have identified it as a known human carcinogen when inhaled (IARC 1990), and a growing body of evidence has linked hexavalent chromium in drinking water to stomach and gastrointestinal cancers.

In 1992, the EPA set the legal limit in tap water for total chromium — a mixture of hexavalent and trivalent chromium — at 100 ppb to protect against skin reactions known as "allergic dermatitis" (EPA 2010b). However, a safety standard that lumps levels of a toxic carcinogen with a nutrient necessary for health is like grouping arsenic and vitamin C.

Recent California Department of Public Health tests of drinking water detected hexavalent chromium in 2,208 of more than 7,000 water sources (CDPH 2009). A review of EWG's tap water quality database indicates that more than 74 million Americans may be exposed to total chromium through tap water, and more than 13.7 million Californians may be exposed to hexavalent chromium (EWG 2009).

New evidence overturns claims that chromium-6 is harmless

Various conditions can cause trivalent chromium to change to hexavalent chromium and vice versa. The widely used tap water disinfectant chlorine, for instance, can cause trivalent to become hexavalent (Lai 2006). Highly acidic conditions can cause hexavalent to become trivalent. For years, scientists assumed that all hexavalent chromium was converted to trivalent by the stomach's acidic environment, rendering it harmless.

It is now clear, however, that some of this toxic chemical can pass through the stomach unchanged and penetrate tissues and organs throughout the body (Costa 1997). Studies in both animals and people show that exposure to hexavalent chromium via drinking water leads to elevated chromium levels in tissues, particularly the gastrointestinal tract, blood, liver, kidneys and spleen, and in increased toxicity (Kerger 1996; Finley 1997; Anderson 2002; NTP 2008; EPA 2010a).

Industry deceit covered up cancer connection

Research on the effects of chromium-6 in drinking water has focused on increased cancer risk. More than 20 years ago, researchers found an increased risk of stomach cancer and a "significant excess of overall cancer mortality" among villagers in China's Liaoning Province whose drinking water had been polluted by a chromium ore processing facility (Zhang 1987).

This research should have triggered a flurry of scientific and regulatory scrutiny, but the study was published in a Chinese-language medical journal, making it largely inaccessible to U.S. researchers and regulators. Ten years later, in April 1997, the Journal of Occupational and Environmental Medicine (JOEM) published a paper, purportedly by the same Chinese research team, that reversed the earlier conclusion. It said that the data from Liaoning Province "do not indicate an association of cancer mortality with exposure to [hexavalent chromium]-contaminated groundwater" (Zhang 1997).

Investigations by EWG and the Wall Street Journal (EWG 2005) revealed that ChemRisk, a consulting firm hired by Pacific Gas & Electric Co. (PG&E) to fight the Erin Brockovich lawsuit over contamination in Hinkley, Calif., had distorted data from the Chinese study and placed the falsified paper in a respected scientific journal in order to reverse the original conclusion linking hexavalent chromium to stomach cancer.

Exposé outed corrupt consultant

EWG's review of documents and depositions from a Kettleman City, Calif. lawsuit against PG&E revealed that ChemRisk's employees — with the knowledge of PG&E's attorneys — had conducted their own analysis of the original Chinese data in 1995-97, deliberately excluding reports of cancer cases in the province that pointed to an association with hexavalent chromium. They then wrote and submitted their paper for publication without disclosing that they worked for ChemRisk or that PG&E had paid for the new "study."

Kettleman City, like Hinkley, is home to a PG&E station that pumps natural gas from a Texas pipeline to California customers. Both facilities used hexavalent chromium to cool the natural gas and then dumped

it into unlined ponds that allowed the contaminant to leach into groundwater.

In the Brockovich lawsuit, residents of Hinkley sued PG&E for polluting their tap water with hexavalent chromium — the basis for the Julia Roberts film released in 2000. PG&E paid $333 million to settle the Hinkley case before the falsified paper was published, but scientists and regulators — including the EPA — subsequently cited the paper in research and safety assessments. In response to EWG's request for corrective action (EWG 2006), the journal retracted the paper in 2006, citing in particular the fact that "financial and intellectual input to the paper by outside parties was not disclosed" (Brandt-Rauf 2006). Also in 2006, PG&E settled with the Kettleman City victims of chromium-6 contamination for $335 million.

As part of its toxicological review, the California Environmental Protection Agency's (California EPA) Office of Environmental Health Hazard Assessment (OEHHA), charged with setting a public health goal for the contaminant in tap water, conducted a rigorous re-analysis of the Chinese data. That work once again demonstrated a statistically significant increase in stomach cancer among the hexavalent chromium-exposed villagers compared to Liaoning Province's overall population (Beaumont 2008).

Laboratory studies bolster cancer link

Animal studies have provided additional evidence linking hexavalent chromium to cancer. A study by federal toxicologists on rats and mice revealed statistically significant, dose-related increases in tumors of the duodenum and small intestine in mice, and statistically significant increases in tumors of the oral cavity in rats (NTP 2008). Based on these data, the National Toxicology Program's (NTP) Board of Scientific Counselors concluded that hexavalent chromium in drinking water shows clear evidence of carcinogenic activity (NTP 2007).

These results agree with those of an earlier study that was marred by a number of limitations, including the outbreak of a viral infection in the mice under study (Borneff 1968). Nevertheless, a thorough statistical analysis of these data that accounted for the limitations still found a significant increase in stomach tumors (OEHHA 2009).

The NTP findings led the US EPA to list hexavalent chromium as a priority for evaluation under its Integrated Risk Information System (IRIS), which last reviewed the health concerns associated with this contaminant in 1998. In September 2010, the agency released a draft toxicological review, concluding that chromium-6 in drinking water is "likely to be carcinogenic to humans" (EPA 2010a). Unfortunately, the EPA has also cited its ongoing investigation as a reason to delay adopting a more health-protective federal

limit for chromium in tap water (EPA 2009).

In contrast, California has moved ahead. California EPA scientists drew a clear conclusion: "The findings of available human, animal, genotoxic, and toxicokinetic studies all indicate that hexavalent chromium is a possible human carcinogen by the oral route" (OEHHA 2009). Dr. R. Gwiazda, a reviewer of the draft public health goal for chromium-6 in tap water, summed it up best: "Overall, the document convincingly demonstrates that indeed there is a relationship between exposure to [hexavalent chromium] via the oral route and the development of cancer in the gastrointestinal tract" (Gwiazda 2008).

Some people are especially vulnerable

Some individuals may be especially susceptible to the carcinogenic effects of chromium-6. Specifically, people with less acidic stomachs appear to have limited ability to convert hexavalent chromium to trivalent chromium, exposing them to higher levels of the toxic form and putting them at greater risk.

A low-acid stomach can be caused by several widely used medications, such as antacids and proton pump inhibitors used to treat common disorders including gastroesophageal reflux disease, peptic ulcer disease and chronic gastritis. Other conditions that can inhibit stomach acid production include pernicious anemia, pancreatic tumors, infection with Helicobacter pylori (a common bacterium linked to ulcers), mucolipidosis type IV and some autoimmune diseases. People with pernicious anemia have also been found to absorb hexavalent chromium more readily (Donaldson 1966).

Fetuses, infants and children also have higher sensitivity to carcinogenic chemicals. According to the National Academy of Sciences (NAS), children's developing organ systems are more vulnerable to damage from chemical exposures, and children are less able than adults to detoxify and excrete chemicals (NAS 1993). A recent evaluation by US EPA scientists in response to the agency's 2005 revised Cancer Guidelines noted that hexavalent chromium causes germ cell mutations and DNA deletions in developing embryos, indicating a need for age-dependent adjustment factors for risk assessments to account for the toxin's increased damage in developing bodies (McCarroll 2010).

Chronic exposure to hexavalent chromium in tap water is likely to raise everyone's risk of cancer, but the young and the medically impaired may be especially vulnerable. These susceptible subpopulations deserve special protections.

Government Failings

EPA slow to set drinking water limits for chromium-6

Despite growing recognition of hexavalent chromium's carcinogenic potential, including EPA's draft designation of it as a likely human carcinogen, the agency has taken no action to limit levels of this toxic compound in drinking water. The agency has left in place an inadequate standard for total chromium, set nearly 20 years ago, that does not distinguish between toxic hexavalent and nutritionally essential trivalent chromium and cites "allergic dermatitis" as the only relevant health concern.

The EPA has reviewed its standard for total chromium twice since setting it in 1992. In 2003, the agency determined that even though new research on chromium-6 indicated cause for concern, information gaps prevented establishment of a more protective standard (EPA 2003). Six years later, the EPA again delayed action on a stricter standard, this time because it had initiated an evaluation of hexavalent chromium via its Integrated Risk Information System (IRIS) (EPA 2009). The draft toxicological review released in September as part of this process identified exposure to hexavalent chromium in drinking water as likely to cause cancer to humans, and cited animal studies linking it to a variety of other health effects, including anemia and damage to the gastrointestinal tract, lymph nodes and liver (EPA 2010a).

Drinking water standards are drastically out-of-date

The EPA's inaction is but one example of the agency's lack of resolve in protecting Americans' tap water. The agency has not set a new, enforceable drinking water standard for any contaminant since 2001, even though the Safe Drinking Water Act requires the EPA to assess the need for standards for at least five new chemicals every five years. Three-fourths of the current standards, including for total chromium, were set in 1991 and 1992 and have not been updated since.

Since 1996, the EPA has reviewed data on toxicity and water pollution for 138 chemicals, but in every case it declined to set a safety standard. EWG's analysis of its tap water quality database showed that collectively these chemicals pollute drinking water used by more than 111 million Americans (EWG 2009).

The framework under which the EPA sets drinking water standards is outdated. For example, the agency is not required to set maximum legal limits for contaminants at levels that protect the health of children or to consider the heightened vulnerability of the fetus and newborns (Donohue 2002).

In addition, the EPA sets maximum legal limits for contaminants as if people are exposed to just one at a

time. That's not the reality — research shows that people carry hundreds of chemicals in their bodies at any given time. A growing number of studies also show that the risks add up when people are exposed to multiple chemicals that can act in tandem to cause harm — and that total risk can be greater than the sum of the parts (NRC 2008).

At long last, signs of progress

For the 114 contaminants that the EPA does regulate, EWG's drinking water quality analysis found that water suppliers achieved 92 percent compliance with mandatory health standards, demonstrating that utilities can and do meet enforceable limits when they exist (EWG 2009). However, the EPA's failure to develop meaningful standards for hexavalent chromium and scores of other contaminants leaves the public at risk.

Recently the federal government has begun to focus a critical eye on hexavalent chromium and other water contaminants. When EPA Administrator Lisa Jackson took office, she announced that protecting America's drinking water would be one of seven agency priorities. In keeping with this goal, the EPA has announced plans to set a legal limit for perchlorate in tap water, which would make it the first new chemical to be regulated in drinking water in a decade. Meanwhile, the Toxic Chemicals Safety Act (H.R. 5820), introduced in the House of Representatives this summer, specifically lists hexavalent chromium as a priority chemical for safety evaluation.

EWG recommends that the EPA set a legal limit for hexavalent chromium in drinking water as quickly as possible and require all water utilities to test for it. The EPA can speed the process by streamlining the IRIS assessment. We hope that Administrator Jackson's leadership on this critical issue will reduce cancer risk for all Americans.

Progress in California

California Moving Slowly in the Face of Industry Resistance

State law required California to adopt a drinking water standard for hexavalent chromium, the "Erin Brockovich chemical," by Jan. 1, 2004. But with a legislature that regularly disregards its constitutional deadline for adopting a state budget, it is hardly surprising that state agencies now lag more than six years behind in protecting residents from this cancer-causing contaminant.

In August 2009, the Office of Environmental Health Hazard Assessment (OEHHA), part of California's Environmental Protection Agency, completed the first step in the process, releasing a draft "public health goal" for chromium-6 in tap water (OEHHA 2009). The agency proposed a goal of 0.06 parts per billion (ppb) to limit the increased lifetime cancer risk to one additional case of cancer for every million people chronically exposed at this level through drinking water.

The California EPA, however, did not take into account the special sensitivity of fetuses and infants, as recommended recently by federal EPA scientists (McCarroll 2010), or of people with common medical conditions that may increase uptake of hexavalent chromium. An exposure limit of 0.06 ppb may not adequately protect the health of many Californians.

Industry, meanwhile, has pushed back. Honeywell International, Inc., along with the Association of California Water Agencies, has filed requests for an additional external scientific peer review of the draft document. (In 2003, a federal judge in Newark, N.J. ordered Honeywell, a producer of aerospace systems, engineering services and consumer products, to carry out an estimated $400 million cleanup of chromium waste along Jersey City's waterfront, citing "a substantial risk of imminent damage to public health and safety and imminent and severe damage to the environment.") The American Chemistry Council, an industry trade group, sought to rewrite the charge of the second peer review committee and influence the composition of the group (ACC 2010), all in an effort to weaken the proposed public health goal.

Four of the five independent scientists taking part in this additional, industry-instigated review process, now complete, expressed strong support for the proposed public health goal for hexavalent chromium (OEHHA 2010).

Concentrations of chromium-6 in tap water signal concern

In California, the only state to require tap water tests for hexavalent chromium, current water pollution

levels are a cause for concern. The chemical was detected in 2,208 out of more than 7,000 tap water systems analyzed as of 2008 (CDPH 2009). These tests could only detect hexavalent chromium down to 1 ppb, more than 16 times higher than the state's proposed public health goal. About 10 percent of the samples had levels of 5 ppb or higher.

EWG's tap water quality database, including more recent test information, shows that 13.7 million Californians could be drinking water contaminated with at least 1 ppb of hexavalent chromium (EWG 2009). With a more sensitive test, hexavalent chromium would be detected in far more water systems.

Currently, California's tap water standard for total chromium is 50 ppb, half the federal standard. Both the federal and state standards combine hexavalent chromium and the essential nutrient trivalent chromium, and are more than 800 and 1,600 times higher, respectively, than the proposed California public health goal for chromium-6. The fact that these regulations lump a cancer-causing contaminant with an essential nutrient underscores the need for reform of water standards.

Inching towards a tap water standard

The California Safe Drinking Water Act of 1996 requires the California EPA to perform risk assessments and adopt goals for contaminants in drinking water based on public health considerations alone. These goals do not have the force of regulation and represent only the first step in creating a mandatory standard.

Once the California EPA has finalized its public health goal for hexavalent chromium, the California Department of Public Health (CDPH) must establish a state drinking water standard known as a Maximum Contaminant Level. These standards take economic factors and technical challenges into account and should be as close as feasible to the corresponding public health goal.

EWG urges the California EPA to promptly finalize its public health goal for hexavalent chromium and calls on the CDPH to take immediate action to establish a sound regulatory standard. Regulation of this extremely common contaminant is already six years overdue.

Study Methodology

City Selection: EWG targeted 35 cities in 23 states and the District of Columbia for tap water testing. We chose large cities as well as cities whose water utilities reported frequent detections of total chromium, based on our review of state records compiled in EWG's national tap water database (EWG 2009) and on annual water quality reports published by water suppliers.

Sample Collection: EWG recruited water collectors via its staff and their contacts. Tap water samples were collected from unfiltered taps in homes or in public buildings such as hospitals, libraries and malls. Utility bills were typically reviewed to verify the water source of each sample.

All volunteers used a standardized sample collection protocol. Samplers ran the cold-water tap for two minutes to clear pipes of standing water and then collected approximately 100 mL of tap water in a 125 mL HDPE container. Samples were packed in coolers with chilled freezer packs and immediately shipped to the laboratory for analysis. With few exceptions, samples arrived within 24 hours of collection.

Hexavalent Chromium Analysis: Hexavalent chromium levels in tap water samples were measured by Exova (Santa Fe Springs, Calif.; www.exova.com), an ISO/IEC 17025-accredited analytical laboratory, using EPA method 218.6. Samples were prepared through adjustment to pH 9.0-9.5 and filtration. Then a 1,200 microliter portion of the sample was introduced into an ion chromatograph. A guard column removed organics from the sample before hexavalent chromium as CrO42- was separated on an anion exchange separator column. Post-column derivatization of the hexavalent chromium with diphenylcarbazide was followed by detection of the colored complex at 540 nm. This method has a detection limit of 0.02 parts per billion.

Exova's procedures for quality assurance and quality control include use of duplicate and matrix spike analyses (or matrix spike & matrix spike duplicate analyses) for 5 percent of each batch of samples. The Relative Percent Difference (RPD) between duplicates should fall within the control limit of 13 maximum. Spike recovery can range from 74-to-117 percent.

Exova also measured total chromium levels in tap water samples using EPA method 200.8; these results are not reported here because the detection limit was five times higher than that for the hexavalent chromium measurements. As a result, for 11 of 35 samples no total chromium could be detected using this method. Hexavalent chromium was the dominant form of chromium present in 21 of 24 samples (88 percent) for which total chromium could be quantified.

http://www.ewg.org/chromium6-in-tap-water

Chromium Mapping: The maps of population-adjusted average total and hexavalent chromium by county were constructed using the EWG tap water database (EWG 2009). Averages were computed by summing the population served times the average chromium level for each water supplier serving the county, then dividing by the total population served by the county's water suppliers. Average levels account for variations in testing frequency.

References

ACC (American Chemistry Council). 2010. Letter to the Office of Environmental Health Hazard Assessment. June 17, 2010.

AWWARF (American Water Works Association Research Foundation, now the Water Research Foundation). 2004. Occurrence Survey of Boron and Hexavalent Chromium.

Anderson SA, Valentine JL, Fernando R, Sparacino CM, Collins B. 2002. Chromium accumulation in the tissues of rats, mice and guinea pigs exposed to sodium dichromate dihydrate in drinking water for twenty-one days. Toxicol Sci 66(Suppl 1): 138.

Beaumont JJ, Sedman RM, Reynolds SD, Sherman CD, Li LH, Howd RA, et al. 2008. Cancer mortality in a Chinese population exposed to hexavalent chromium in drinking water. Epidemiology 19(1): 12-23.

Borneff J, Engelhardt K, Griem W, Kunte H, Reichert J. 1968. [Carcinogens in water and soil. XXII. Mouse drinking water experiments with 3,4-benzopyrene and potassium chromate]. Arch Hyg Bakteriol 152(1): 45-53.

Brandt-Rauf P. 2006. Editorial retraction. Cancer mortality in a Chinese population exposed to hexavalent chromium in water. Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine 48(7): 749.

CDPH (California Department of Public Health). 2009. Chromium-6 in Drinking Water Sources: Sampling Results. California Department of Public Health, Sacramento, CA. February 17, 2009. Available at: www.cdph.ca.gov/certlic/drinkingwater/Pages/Chromium6sampling.aspx.

Costa M. 1997. Toxicity and carcinogenicity of Cr(VI) in animal models and humans. Critical Reviews in Toxicology 27(5): 431-442.

Donaldson RM, Jr., Barreras RF. 1966. Intestinal absorption of trace quantities of chromium. The Journal of Laboratory and Clinical Medicine 68(3): 484-493.

Donohue JM, Lipscomb JC. 2002. Health advisory values for drinking water contaminants and the methodology for determining acute exposure values. Sci Total Environ 288(1-2): 43-9.

EPA (Environmental Protection Agency). 2000. Hazard summary for chromium compounds. Available at: www.epa.gov/ttn/atw/hlthef/chromium.html.

EPA (Environmental Protection Agency). 2003. Six-Year Review 1 of Drinking Water Standards. EPA 815-F-03-001. U.S. Environmental Protection Agency, Office of Water. July 2003. Available at: www.epa.gov/safewater/review/first_review.html.

EPA (Environmental Protection Agency). 2009. Six-Year Review 2 Health Effects Assessment: Summary Report. EPA 822-R-09-006. U.S. Environmental Protection Agency, Office of Water. October 2009. Available at: www.epa.gov/safewater/review/second_review.html.

EPA (Environmental Protection Agency). 2010a. Toxicological Review of Hexavalent Chromium (CAS No. 18540-29-9) (External Review Draft). EPA/635/R-10/004A. September 2010. Available at: oaspub.epa.gov/eims/eimscomm.getfile?p_download_id=498712.

EPA (Environmental Protection Agency). 2010b. Drinking Water Contaminants. Available at: www.epa.gov/safewater/contaminants/index.html.

EWG (Environmental Working Group). 2005. Chrome-Plated Fraud: How PG&E's scientists-for-hire reversed findings of cancer study. Available at: www.ewg.org/erinbrockovichchromium6lawsuit/.

EWG (Environmental Working Group). 2006. Letter to JOEM. Available at: www.ewg.org/node/21952.

EWG (Environmental Working Group). 2009. EWG's Drinking Water Quality Analysis and Tap Water Database. Available at: http://www.ewg.org/tap-water/home.

Finley BL, Kerger BD, Katona MW, Gargas ML, Corbett GC, Paustenbach DJ. 1997. Human ingestion of chromium (VI) in drinking water: pharmacokinetics following repeated exposure. Toxicology and Applied Pharmacology 142(1): 151-159.

Gwiazda R. 2008. Review of the document "Public Health Goal for hexavalent chromium in drinking water" Prepared by the Office of Environmental Health Hazard Assessment (OEHHA) of the California Environmental Protection Agency in January 2008: Pesticide and Environmental Toxicology Branch, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Available at: www.oehha.org/water/phg/pdf/Cr_Gwiazda090909.pdf.

IARC (International Agency for Research on Cancer). 1990. Chromium and chromium compounds. International Agency for Research on Cancer. IARC Monogr Eval Carcinog Risks Hum 49:49-214.

Kerger BD, Paustenbach DJ, Corbett GE, Finley BL. 1996. Absorption and elimination of trivalent and hexavalent chromium in humans following ingestion of a bolus dose in drinking water. Toxicology and Applied Pharmacology 141(1): 145-158.

Lai H, McNeill LS. 2006. Chromium redox chemistry in drinking water systems. J Environ Eng 132(8): 842-851.

McCarroll N, Keshava N, Chen J, Akerman G, Kligerman A, Rinde E. 2010. An evaluation of the mode of action framework for mutagenic carcinogens case study II: chromium (VI). Environmental and Molecular Mutagenesis 51(2): 89-111.

NAS (National Academy of Sciences). 1993. Pesticides in the Diets of Infants and Children. Washington DC: National Academy Press.

NRC (National Research Council). 2008. Phthalates and Cumulative Risk Assessment: The Task Ahead. Available at: www.nap.edu/catalog/12528.html

NTP (National Toxicology Program). 2007. Actions on Draft NTP Technical Reports Reviewed by the NTP Board of Scientific Counselors Technical Reports Review Subcommittee, May 16-17, 2007, Minutes available at: ntp.niehs.nih.gov/files/TRRS_MIns_May_2007_bs8rgMW[1]1.pdf.

NTP (National Toxicology Program). 2008. NTP Technical Report on the Toxicology and Carcinogenesis Studies of Sodium Dichromate Dihydrate (CAS No. 7789-12-0) in F344/N Rats and B6C3F1 Mice (Drinking Water Studies). NTP TR 546, NIH Publication No. 07-5887: National Toxicology Program, National Institutes of Health, U.S. Department of Health and Human Services. Available at: http://ntp.niehs.nih.gov/files/546_web_FINAL.pdf.

OEHHA (Office of Environmental Health Hazard Assessment). 2009. Draft Public Health Goal for Hexavalent Chromium in Drinking Water: Pesticide and Environmental Toxicology Branch, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Available at: www.oehha.ca.gov/water/phg/pdf/Cr6PHGdraft082009.pdf.

OEHHA (Office of Environmental Health Hazard Assessment). 2010. Peer Review Comments regarding 2001 Draft Public Health Goal for Hexavalent Chromium in Drinking Water. Available at: www.oehha.ca.gov/water/phg/chrom092010.html.

USGS (United States Geological Survey). Mineral Commodity Summaries: Chromium. January 2010.

Zhang JD, Li S. 1997. Cancer mortality in a Chinese population exposed to hexavalent chromium in water. Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine 39(4): 315-319.

Zhang JD, Li XL. 1987. [Chromium pollution of soil and water in Jinzhou]. Zhonghua yu fang yi xue za zhi [Chinese Journal of Preventive Medicine] 21(5): 262-264.

RESPONSES BY KENNETH COOK TO ADDITIONAL QUESTIONS FROM SENATOR BOXER

Question 1. The Environmental Working Group's recent investigation found chromium-6 in the tap water of 31 cities across the Nation. Describe what the main message is from your report and the steps that you believe EPA should take to address the potential public health threats from chromium-6 in tap water?

Response. The main message from our "Chromium-6 in U.S. Tap Water" study is that the pollution from chromium-6 in U.S. drinking water is more widespread than was previously acknowledged or known by water utilities and EPA. Americans have a right to know what contaminants are in their tap water. Another message is that more testing is needed on the prevalence of chromium-6 in drinking water and that the EPA must set a safety standard as soon as possible. For those reasons EWG fully supports EPA's Guidance for Enhanced Monitoring of Hexavalent Chromium in Drinking Water, which was released on January 11, 2011. We are pleased to see that our study and EPA's guidance has motivated cities and utilities to test their water. In most cases the cities found similar or even higher levels of chromium-6 than our results:

- Honolulu, HI
- EWG Study—2.00 parts per billion (ppb)
- Honolulu Board of Water Supply—0.32 ppb to 4.00 ppb from 11 samples
- Madison, WI
- EWG Study—1.58 ppb
- Madison—0.40 ppb to 1.79 ppb from four wells
- Milwaukee, WI
- EWG Study—0.18 ppb
- Milwaukee—0.19 ppb to 0.22 ppb from 18 samples
- Bend, OR
- EWG Study—0.78 ppb
- Avion Water (private water supplier)—0.25 ppb to 0.65 ppb from four samples

We also fully support your legislation, S. 79, the Protecting Pregnant Women and Children From Hexavalent Chromium Act of 2011, to ensure that EPA does set a drinking water standard for this dangerous chemical.

Question 2. Describe what your organization found regarding industry's influence on the science concerning the potential health effects from drinking chromium-6.

Response. In 2005 investigations by Environmental Working Group and *The Wall Street Journal* revealed that ChemRisk, a consulting firm hired by Pacific Gas & Electric Co. (PG&E) to fight the Hinkley, California lawsuit had placed a falsified article in the Journal of Occupational and Environmental Medicine (JOEM).

In the 1980's researchers in China's Liaoning Province found an increased risk of stomach cancer and a "significant excess of overall cancer mortality" among villagers who had drinking water polluted by a chromium ore processing facility. These findings did not receive much attention because they were published in a Chinese-language medical journal.

In 1997, however, the JOEM published a paper, purportedly by the same Chinese research team, which reversed the previous conclusion and said the data actually "do not indicate an association of cancer mortality with exposure to [hexavalent-chromium]-contaminated groundwater." EWG and *The Wall Street Journal* investigated the article only to discover that the report was fabricated. The journal retracted the fraudulent paper in 2006. Subsequently, California officials conducted a re-assessment of the study data and found a statistically significant increase in stomach cancer among people exposed to chromium-6.

This industry deception alarms us especially given the extent of chromium-6 contamination nationwide.

Question 3. Describe the Environmental Working Group's views on the need to address perchlorate contamination in drinking water.

Response. We've believed that EPA must set a safe drinking water standard on perchlorate for many years. We thank you for your leadership in pushing the agency for more than a decade. We also applaud Administrator Jackson's announcement at the February 2, 2011 hearing that EPA is moving forward with development of a first-ever national drinking water standard for perchlorate. We look forward to seeing the agency's proposed rule establishing this standard.

Scientific research has established that perchlorate in significant amounts disrupts production of thyroid hormones, and adequate thyroid hormones are crucial to normal brain development and growth in the fetus, infants and young children.

EWG has documented the significant concerns and presence of perchlorate including in our "Rocket Fuel in Drinking Water" report, released in 2003, which determined that it had been found in drinking water, groundwater or soil in at least 43

states. Our 2008 analysis of FDA data, "FDA Food Testing Shows Widespread Rocket Fuel Contamination of Commonly Consumed Foods and Beverages," found that 75 percent of nearly 300 commonly consumed foods and beverages—dairy, vegetables and fruit—were contaminated with perchlorate.

The time for regulation of perchlorate is now. The science is well established and we encourage EPA to move swiftly in finalizing perchlorate regulations.

RESPONSE BY KENNETH COOK TO AN ADDITIONAL QUESTION FROM SENATOR CARPER

Question. How can the Federal Government focus its efforts to improve drinking water quality on pollution prevention? What kinds of tools and programs exist to prevent the pollution of drinking water and what new ones are needed?

Response. The most cost effective and best way to prevent chromium-6 pollution of the nation's drinking water is to keep it from getting in there in the first place. Environmental Working Group fully supports increased investment in source water protection, including aquatic buffers and erosion and sediment control, and urges cities to follow EPA's Guidance for Enhanced Monitoring of Hexavalent Chromium in Drinking Water so that we can get a fuller perspective of the prevalence of chromium-6 pollution. A more complete picture will allow the Federal Government to better target financial resources for source water protection.

We also urge congressional efforts to restore President Obama's proposed fiscal year budget cuts to the drinking water and clean water State revolving funds. We need to make a full investment in our water infrastructure. The price of doing so will not go down, it will just continue to increase. With investment delays, more Americans will be exposed to dangerous chemicals in their drinking water.

RESPONSES BY KENNETH COOK TO ADDITIONAL QUESTIONS FROM SENATOR LAUTENBERG

Question 1. The Safe Drinking Water Act currently allows EPA to require only temporary monitoring for no more than thirty of the hundreds of unregulated contaminants in our drinking water. This leaves additional testing to groups like EWG. Do you think the Safe Drinking Water Act should be amended to allow EPA to increase monitoring for unregulated contaminants?

Response. In December 2009, Environmental Working Group released our "National Drinking Water Data base." (available at: *http://www.ewg.org/tap-water/home)* This study assembled an unprecedented 20 million drinking water quality tests performed by water utilities between 2004–2009. It showed 316 contaminants in water supplied to 256 million Americans in 48,000 communities in 45 states. Nearly 64 percent—202—of the 316 contaminants in drinking water remain unregulated by the EPA. It is clear that Administrator Jackson has taken a strong first step through the agency's drinking water strategy. EPA needs to rid our drinking water of these so-called "unregulated contaminants."

In 2010, EPA Administrator Jackson announced the agency's new drinking water strategy with the goal of more quickly and effectively reviewing and addressing the health risks posed by drinking water contaminants. This new strategy includes goals to address contaminants as groups, foster development of new drinking water technologies, use of multiple authorities like TSCA, and partner with states to develop shared access to monitoring data. These are all steps in right direction.

On March 4, 2011 EPA released the proposed contaminants for the third Unregulated Contaminant Monitoring Rule (UCMR 3) including perfluorinated compounds. Unfortunately, EPA has not set a new drinking water standard under the Safe Drinking Water Act since 2001. It is important that EPA not be limited in the amount of chemicals they are allowed to include in the UCMR. Instead, Congress should require that EPA monitor a set minimum number of unregulated contaminants. Congress should also continue its robust oversight of EPA's efforts—or lack thereof—in setting safe drinking water standards.

Question 2. As you know, I have introduced legislation to reform the Toxic Substances Control Act to require companies to prove that chemicals are safe for their intended use. How would reforming TSCA help improve drinking water quality?

Response. The Safe Chemicals Act would help improve drinking water quality because the safety standard in the legislation requires that EPA consider aggregate or cumulative exposures to a chemical for vulnerable populations. The exposure must present a negligible risk of an adverse effect. This safety standard means that upon enactment of the Safe Chemicals Act, EPA will be tasked with looking at all routes of exposure for chemicals including through drinking water, consumer prod-

ucts and personal care products. EPA is already operating under its new drinking water strategy, one tenant of which is to utilize multiple authorities. Unfortunately the safety standard under TSCA is so weak that only five chemicals have been regulated in 35 years. Under the Safe Chemicals Act, EPA will be able to improve water quality by regulating chemicals that pose a risk to human health through all routes of exposure including drinking water.

Senator BOXER. Thank you. That is very helpful.

We will now hear from Ms. Diane VanDe Hei.

STATEMENT OF DIANE VANDE HEI, EXECUTIVE DIRECTOR, ASSOCIATION OF METROPOLITAN WATER AGENCIES

Ms. VANDE HEI. Good morning, Madam Chairman, Ranking Member Inhofe and the rest of the Committee.

My name is Diane VanDe Hei. I am Executive Director of the Association of Metropolitan Water Agencies. It is an organization of the Nation's largest drinking water systems, serving over 130 million people with safe drinking water.

Carrie Lewis, Superintendent of Water for the city of Milwaukee, was invited to testify today, but due to weather conditions in the Midwest, was unable to make it. I know she would like to be here.

This morning, I would like to talk to you about the drinking water regulatory process from the point of view of the drinking water utility community and about the recent report from the EWG group that detected traces of chromium VI in the drinking water of 31 communities.

Like the members of the Committee, AMWA's members are committed to ensuring the provision of safe, healthy drinking water to the public. As you can see from Carrie's written testimony, Milwaukee Water Works is a leader in testing its water for unregulated contaminants, and frequently interacts with both EPA and the customers regarding water quality. In fact, Milwaukee tests for over 500 contaminants, and that information is put on their public website, when they are only required to monitor for 90. So they go above and beyond what is required by Federal law and State law in terms of monitoring. They are very open to the public in terms of what they find. You will find with the rest of this testimony, the question is, what do you tell them about what you found.

But even with the collaboration, the chromium VI issue has been particularly difficult for Milwaukee, and many other drinking water systems cited in the report. First, it was a big surprise to many utilities to find out about the EWG report through newspaper headlines. Most of them would have liked to have had a phone call saying, here is a heads-up, this is what we found, this is what is coming out. Furthermore, the report's methodology of collecting a single sample from the distribution system with no sense of where or when the sample was taken, should not be used to draw broad inferences about a water utility's quality.

While utilities want their customers to know what is in their water, we must also understand what reported levels of contaminants, often in the parts per billion or parts per trillion level, mean for the public. This is where EPA comes in. Utilities count on the agency to conduct solid peer-reviewed research to inform us about which contaminants at what levels we should focus on to protect public health and meet water quality standards. The regulatory process put in place by the Safe Drinking Water Act amendments

of 1996 was designed to do this. We believe the process as designed works well.

This is why AMWA has some concerns about the guidance EPA released last month, to have water systems voluntarily sample their water supplies for chromium VI. While we agree that the public must be made aware of harmful contaminants in their drinking water, before encouraging utility testing, the screening methodology should be approved by EPA and the public health impacts of the contaminants should be established.

Additionally, the January 11th guidance recommends using California's certified laboratories to analyze water samples for chromium VI at a reporting level of .06 parts per billion and a 5-day holding time. Although California's method is only approved for a reporting level of 1 part per billion and a 24-hour holding time. So there is a problem. If you are sending utilities to California laboratories to have their samples tested, and the guidance is saying there is a 5-day holding time and the method is only approved for 24 hours, the quality control and what is the use of that data comes into question. So that needs to be sorted out between EPA, its guidance and the States and the utilities, what is the method they should be using.

Morever, once water systems test for chromium VI, it is unclear how to communicate the results to the public. We have covered that.

Therefore, AMWA would urge EPA to continue moving forward with its research into chromium VI, which will result in additional data that can inform any appropriate regulation through the Safe Drinking Water Act. AMWA believes that the best public health protection will result if EPA follows the existing regulatory framework that was designed by Congress to the 1996 amendments. The drinking water community will support and comply with the standards that are the product of this established process, as we always have.

Thank you, Madam Chairman.

[The prepared statement of Ms. Lewis follows:]

STATEMENT OF CARRIE LEWIS, SUPERINTENDENT, MILWAUKEE WATER WORKS ON BEHALF OF THE ASSOCIATION OF METROPOLITAN WATER AGENCIES

Good morning Madame Chairman, Ranking Member Inhofe, and members of the Committee. My name is Carrie Lewis and I am the Superintendent of Milwaukee Water Works in Milwaukee, Wisconsin. The Water Works provides high-quality drinking water to more than 860,000 people in Milwaukee and 15 surrounding communities.

I also serve on the board of directors of the Association of Metropolitan Water Agencies (AMWA), which is an organization representing the largest publicly owned drinking water utilities in the United States. AMWA's members provide clean and safe drinking water to more than 130 million Americans from Alaska to Puerto Rico.

Today I am here to discuss AMWA's view of EPA's drinking water regulatory process, as well as the approach Milwaukee Water Works takes to removing contaminants from our drinking water supplies and the testing we conduct to ensure that our water remains in compliance with all State and Federal regulations. This issue has gained increased attention due to a report released by the Environmental Working Group (EWG) in December alleging that the drinking water of thirty-one cities across the United States—including Milwaukee—contains detectable levels of chromium-6. Chromium-6 is, according to EPA's draft Integrated Risk Information System (IRIS) toxicological assessment, a suspected carcinogen if ingested by humans over a lifetime. Chromium-6 is a component of total chromium, which is regulated by EPA with a maximum contaminant level (MCL) of 100 parts per billion

(ppb). At this time, there is not a separate Federal drinking water regulation for chromium-6, nor does EPA require drinking water systems to test their water supplies for the chemical.

Additionally, because Chairwoman Boxer has introduced S. 78 and S. 79, bills that would set timelines within which EPA would have to set enforceable drinking water standards for perchlorate and chromium-6, respectively, I will share some thoughts as to how the water utility community believes we can work with the government to best protect public health while adhering to the regulatory process established through the Safe Drinking Water Act (SDWA) and also reasonably allocating the resources currently available to local communities.

DRINKING WATER SYSTEMS PRIORITIZE PUBLIC HEALTH PROTECTION

Like all drinking water systems, Milwaukee Water Works is committed to protecting public health. The utility meets all State and Federal requirements for safe and healthful drinking water by subjecting its Lake Michigan sourcewater to a multiple-step process to remove illness-causing microorganisms and contaminants. The water is disinfected with ozone, a highly reactive gas that destroys microorganisms, removes taste and odor, and reduces byproducts from chlorine disinfection. Coagulation, settling, and biologically active filtration remove additional particles. Fluoride is added for dental health consistent with CDC recommendations, and a phosphorous compound is added to help control corrosion of lead and copper pipes. Finally, chloramine disinfection ensures safe drinking water throughout the distribution system and at consumer faucets.

In addition to this robust treatment regime, Milwaukee complies with EPA regulations that require drinking water systems to test their water supplies for more than ninety different regulated and unregulated contaminants that are, based on the best available science, thought to pose the greatest risks to human health. But Milwaukee Water Works actually goes above and beyond this requirement, testing its source and treated drinking water for over five hundred contaminants—more than five times the number required by EPA. We voluntarily conduct this monitoring as a precaution to ensure safe water, to collect baseline data for study, to understand how contaminants may affect public health, and to prepare for future regulations.

In 2004 Milwaukee became one of the first utilities in the United States to test its source and drinking water for endocrine-disrupting compounds (EDCs). In 2005, it was one of the first to test for pharmaceuticals and personal care products (PPCPs). To date, none of these substances have been found in Milwaukee's drinking water. In 2008, the Associated Press cited Milwaukee as one of only twenty-eight major utilities in the U.S. to test source and treated water for emerging contaminants such as EDCs and PPCPs, and Milwaukee was the first U.S. utility to post its test results on the Internet. As you can see, Milwaukee Water Works takes great pride in ensuring the safety and quality of the drinking water that is distributed to our customers.

In response to concerns about chromium-6 raised by the EWG report, in January the utility conducted independent tests for the chemical. Three rounds of samples were collected from six separate locations: untreated Lake Michigan water entering Milwaukee's two water treatment plants; fully treated water as it leaves each treatment plant; and two locations in the distribution system. Samples analyzed using EPA method 218.6 identified the presence of chromium-6 at 0.22 ppb in untreated source water, at 0.20 ppb in treated water leaving each treatment plant, and at 0.19 ppb at two points in the distribution system. We immediately communicated this information to our customers, and also confirmed to them that there is no health evidence or indication that Milwaukee's drinking water is unsafe for human consumption or use. Furthermore, there is no need for customers to purchase or install special filtration devices at faucets, water fountains, or at any other point-of-use location at homes and businesses.

While Milwaukee acted quickly following the release of EWG's report, we would have begun our own monitoring for chromium-6 sooner if EWG had shared their findings with us immediately after they tested Milwaukee's water, rather than waiting several months to release their data from across the country to the media en masse. Moreover, in the absence of additional utility testing we were concerned that public confidence in our drinking water supply would be undermined by the widely reported results of a single water sample from a single faucet, which according to EWG was collected from somewhere within our service area sometime during the past several months. This uncertainty was unacceptable to us, so we decided to move forward with our own testing.

Along these same lines, on January 11 EPA released a guidance to help water systems voluntarily sample source water, plant treated water, and water in the distribution system for chromium-6 on a quarterly basis. But while AMWA appreciates the goal of properly informing the public about the quality of drinking water using standardized scientific methods, the association has several reservations about the guidance. For example, the guidance refers to using California's certified laboratories to conduct chromium-6 analysis at a reporting level of 0.06 ppb and a holding time of up to 5 days. However, California currently approves this method only for a reporting level of 1.0 ppb and a 24-hour holding time. In addition, questions about proper sampling technique and sample preservation are not addressed in the guidance, which leads to uncertainty as to whether the resulting data will be valid since EPA does not officially approve the method described in the guidance.

Some of these questions have prompted some drinking water utilities to choose to not test for chromium-6 until EPA has completed its risk assessment for the contaminant, which is expected later this year. This decision reflects the fact that, in the absence of solid human health data from EPA, it is impossible to tell the public with any certainty what exactly the results of these tests may mean. As a result, some utilities will choose to expend their limited resources focusing on testing and treating for other chemicals—those for which EPA has already established a clear human health link. Each of these approaches is valid, and they demonstrate the hazards of stirring concerns about a particular contaminant before all of the necessary research is complete.

SENSIBLE REGULATION THROUGH THE SAFE DRINKING WATER ACT

As we've heard today, reports in the news media about unregulated drinking water contaminants such as chromium-6, perchlorate, and pharmaceutical and personal care products often lead to calls that EPA should "move expeditiously" to set legal drinking water limits for emerging contaminants. To that end, the bills introduced by Chairwoman Boxer last week would require EPA to set enforceable drinking water standards for perchlorate and chromium-6 no later than 1 year after the enactment of each measure. But AMWA would caution against undermining the SDWA process and forcing EPA to regulate certain contaminants simply because they have been highlighted by an outside group or featured in the news media. Instead, EPA must maintain the latitude to conduct and complete sound, transparent research that determines whether, and at what level, chromium-6 and other contaminants may pose threats to human health.

This current system, put in place by the Safe Drinking Water Act amendments of 1996, is a reasonable and effective way to establish drinking water standards. Before making a determination to regulate a drinking water contaminant, EPA must consider the potential adverse effects of the contaminant on human health, the frequency and level of the contaminant's occurrence in public drinking water systems, and whether regulation will present a meaningful opportunity to reduce public health risks. These requirements set a high bar for the Agency, but they ensure that the regulations are well vetted and that dollars subsequently spent by utilities to detect and remove these contaminants are put to good use.

SDWA requires EPA to consider regulating new contaminants on an ongoing basis, as new scientific data becomes available. Every 5 years, EPA must publish a Contaminant Candidate List of unregulated drinking water contaminants for which additional research will be prioritized. EPA must make a decision on whether to regulate at least five of these contaminants every 5 years, ensuring that the Agency has a frequent opportunity to examine the best available science for the most researched unregulated contaminants.

Every 6 years, EPA must review all currently regulated contaminants and make a decision on whether there are any National Primary Drinking Water Regulations for which current health effects assessments, changes in technology, or other factors provide a health or technical basis to support a regulatory revision that will maintain or strengthen public health protection. For the last Six-Year Review, published in 2010, EPA stated that it was awaiting the final risk assessment for chromium-6 before making a decision about revising the total chromium regulation. The IRIS assessment for chromium-6 was released for peer review on September 30, 2010.

Finally, SDWA requires EPA to maintain an Unregulated Contaminant Monitoring Program to collect data on unregulated contaminants that are suspected to be present in drinking water supplies, and gives the EPA administrator the power to promulgate a drinking water regulation on an expedited basis for a contaminant found to be an urgent threat to public health following consultation with the Department of Health and Human Services, the Centers for Disease Control, and the National Institutes of Health. Clearly, EPA has at its disposal the regulatory tools

necessary to make informed and scientifically sound decisions about drinking water regulations.

Perhaps just as importantly, SDWA recognizes that there are occasions when it will be technologically impossible or infeasible for a drinking water utility to remove a contaminant to the point where it poses absolutely zero risk of a public health impact. Therefore, when regulating a contaminant EPA publishes both a non-enforceable "maximum contaminant level goal" (MCLG) which represents the level at which there is no known risk to human health, and an enforceable MCL, a binding limit set as close to the MCLG as is feasible after considering the best available treatment technology and cost factors. To be clear, as California's Office of Environmental Health Hazard Assessment explained in a December 31, 2010 press statement, a drinking water contaminant goal "is not meant to be the maximum 'safe' level" of a given chemical in drinking water. Instead, "it represents a stringent health-protective goal" that is used "to develop and enforceable regulatory standard."[1]

Consequently, EWG's report should not be read to suggest that the drinking water of Milwaukee or any other community poses a threat to the public because its chromium-6 level meets or exceeds California's proposed public health goal for the contaminant. To the contrary, the city of Milwaukee Department of Public Health has determined that there is no evidence of an imminent public health risk or threat of acute illness due to low levels of chromium-6 in the city's water supply. For these reasons, AMWA believes Congress should not force EPA to prematurely terminate its study of chromium-6 or any other emerging contaminant.

POLICY RECOMMENDATIONS

As the committee performs important oversight of EPA's drinking water program, AMWA's message is quite simple: public health protection is paramount, and we fully support SDWA's defined process for identifying, regulating and revising drinking water contaminants. But Congress should not overreact to any outside organization's unscientific report on drinking water quality by passing legislation such as S. 78 or S. 79 and requiring EPA to regulate certain contaminants within an arbitrary period of time. If Congress were to require municipal water systems to increase their testing or alter their treatment of water supplies in response to each and every report published by an activist group, it would introduce into the process a political component that the SDWA statute was designed to exclude. Allowing Congress, not EPA, to decide when certain emerging contaminants must be regulated would irrevocably weaken the Safe Drinking Water Act, undermine public confidence in the water supply, and add significant costs to local communities—all while delivering questionable public health benefits.

Instead, AMWA believes that the best public health protections will result if Congress, as Chairwoman Boxer argued in January, respects EPA's authority to craft drinking water regulations and set environmental standards "in a measured, moderate, responsible way," and does "not interfere with the ability of the EPA and the states to act in accordance with the law to respond to what the scientists are telling us."[2] If, pursuant to the requirements of the Safe Drinking Water Act, EPA research determines that the presence of a certain level of chromium-6 in drinking water presents a human health risk, then the Agency should establish an enforceable standard that can reasonably and feasibly be met by the nation's drinking water systems. The drinking water community will support and comply with standards that are the product of this established process, as we always have.

There are effective steps that AMWA urges Congress to take to ensure that utilities have the resources available to keep clean and safe drinking water flowing to all of their customers. For example, AMWA supports reauthorization of the Drinking Water State Revolving Fund (DWSRF), a Federal program that offers loans to help water systems comply with Federal drinking water standards. While the program largely aims to help small community water systems comply with SDWA standards (especially considering that EPA has reported that ninety-six percent of all health-based SDWA violations occur at utilities serving fewer than 10,000 people[3]), it could be strengthened by making more funds available for projects at very

[1] "OEHAA Releases Revised Draft Public Health Goal for Hexavalent Chromium," December 31, 2010. *http://www.oehha.ca.gov/water/phg/pdf/Chrom6press123110.pdf.*

[2] "Senator Boxer Delivers Remarks on Protecting Our Landmark Environmental Laws and Creating Jobs," January 6, 2011. *http://epw.senate.gov/public/index.cfm?FuseAction=Majority.PressReleases&ContentRecord_id=5cc0f6df-802a-23ad-4d13-bc6e386b53fe.*

[3] "Testimony of Peter S. Silva, Assistant Administrator for Water, and Cynthia J. Giles, Assistant Administrator for Enforcement and Compliance Assurance, U.S. Environmental Protection Agency, Before the Committee on Environment and Public Works, U.S. Senate," December

large water systems that serve nearly half of America's population. Metropolitan utilities that serve more than 100,000 people represent thirty-five percent of the drinking water infrastructure need identified in EPA's 2007 Drinking Water Needs Survey, but through 2009 had received only twenty-three percent of DWSRF funds distributed since the program's inception. In addition to strengthening the DWSRF, Congress should consider new and innovative programs to help water utilities cope with rising infrastructure costs, such as a water infrastructure bank or a similar program that focuses on urban water infrastructure and public health.

Similarly, Congress should reject calls to reduce funding for the DWSRF as a means to cut Federal spending. While we can all agree that the Federal budget deficit needs to be addressed, the fact remains that the nation's drinking water systems will need to spend nearly $335 billion over the next 20 years just to maintain current levels of service.[4] These costs are not optional, and cannot be ignored without putting public health at risk. A strong DWSRF program is essential to preserve a safe and secure water supply.

Finally, AMWA supported passage of last year's "Reduction of Lead in Drinking Water Act," which was sponsored by Chairwoman Boxer and Ranking Member Inhofe and updated SDWA's statutory definition of "lead-free" as it applies to new pipes and plumbing fixtures that carry drinking water. Improving technology made a lower lead standard attainable, and the legislation won bipartisan support because it will implement the new standard in such a way that will not saddle communities with prohibitive costs. It is through such collaborative, achievable measures that Congress can best protect public health and the quality of the drinking water supply. Technical questions about whether and at what level to regulate emerging contaminants in the drinking water supply, on the other hand, should continue to be considered at EPA through the transparent process outlined by Congress in the Safe Drinking Water Act.

Thank you for the opportunity to testify at this important hearing today. I look forward to answering any questions that you may have.

RESPONSE BY CARRIE LEWIS TO AN ADDITIONAL QUESTION FROM SENATOR BOXER

Question. Describe the importance that utilities place on ensuring that they provide safe drinking water that protects public health, including the health of pregnant women, infants, and children, from dangerous contaminants.

Response. Protecting public health through the provision of clean and safe drinking water is the top priority of Milwaukee Water Works and all drinking water utilities. To ensure that the health of our customers is protected, we rely on the Environmental Protection Agency to tell us what levels of certain contaminants in drinking water present a known public health risk, and to establish a maximum contaminant level (MCL) for these contaminants. It is then our job to treat our water so that it is in compliance with these established standards.

While we take pride in providing safe drinking water to all of our customers, we understand the special importance of protecting the health of vulnerable populations, such as pregnant women, infants, and children. We therefore appreciate that the Safe Drinking Water Act (SDWA) requires EPA to consider the effect of contaminants on vulnerable populations on several different occasions during the regulatory process. First, as EPA decides whether to regulate a given drinking water contaminant, SDWA Sec. 1412(b)(1)(C) requires the Administrator to take into consideration "the effect of such contaminants upon subgroups . . . (such as infants, children, pregnant women, the elderly, individuals with a history of serious illness, or other subpopulations) . . . at greater risk of adverse health effects."

Additionally, when proposing an enforceable MCL for a drinking water contaminant, SDWA Section 1412(b)(3)(C)(i)(V) requires EPA to consider the health effects of the contaminant on the general population as well as subgroups such as "infants, children, pregnant women, the elderly, individuals with a history of serious illness," and others that may be at greater health risk due to exposure to contaminants in drinking water. We are pleased that the SDWA statute requires the health and safety of these vulnerable subpopulations to be taken into account, and that these considerations are subsequently reflected in enforceable standards promulgated by EPA.

8, 2009. *http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore—id=b773e8ed097b8a-4d87-9835a-cf0f644ff6ef.*

[4] "EPA's 2007 Drinking Water Infrastructure Needs Survey and Assessment Fact Sheet," February 2009. *http://water.epa.gov/infrastructure/drinkingwater/dwns/upload/2009—03—26—needs survey—2007—fs—needssurvey—2007.pdf.*

RESPONSES BY CARRIE LEWIS TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. I am always concerned about how cities and local governments are dealing with the unfunded mandates that are passed down from the Federal Government. I know stricter drinking water standards and clean water standards force many of our communities to either raise rates or seek additional funding from other sources. How can we ensure that utilities like yours are not facing the constant threat of having to raise rates and still meeting drinking water standards?

Response. First, I want to make clear that the drinking water community believes that if sound scientific research demonstrates that a drinking water contaminant poses a human health risk, EPA should promulgate standards that protect the public to the maximum extent that can be feasibly attained.

AMWA believes that the process established under the 1996 amendments to the Safe Drinking Water Act is the best mechanism to achieve the objective of protecting public health in a cost effective manner. After determining that the best available science warrants the regulation of a contaminant, EPA has 24 months to propose a maximum contaminant level goal (MCLG), which represents the level at which the contaminant would pose zero threat to public health. EPA also proposes a drinking water maximum contaminant level (MCL), which is set as close to the MCLG as feasible, as defined by Sec. 1412(b)(4)(D). SDWA then provides EPA with an additional 18 months to promulgate a final MCLG and MCL. This MCL is an enforceable standard set as close to the MCLG as is feasible after considering factors such as the best available treatment technology and cost.

Maintaining this process as EPA makes future drinking water contaminant regulatory decisions—particularly the 18-month period between the announcement of the proposed MCLG and MCL and the promulgation of the binding MCL—is essential to ensuring that regulations are based on sound science while also keeping costs under control. If this 18-month period were truncated, we would be concerned that EPA may be forced to issue binding MCLs without completely considering the technical or financial feasibility of the proposed standards. As a result, utilities could be required to comply with mandates that otherwise might have been found to be infeasible, or to spend excessive amounts of ratepayer dollars to attempt to meet these requirements.

There are other steps Congress can take to help water utilities cope with regulatory compliance costs and protect the public from spikes in water rates. AMWA supports robust funding for the Drinking Water State Revolving Fund (DWSRF), which offers loans to help water systems improve their infrastructure to comply with Federal drinking water standards. EPA's 2007 Drinking Water Needs Survey reported that the nation's drinking water systems will need to spend nearly $335 billion over the next 20 years just to maintain current levels of drinking water service, so for many communities DWSRF loans are a helpful supplement to local funding.

Question 2. Please explain the process that your utility goes through in deciding how to spend the limited resources and how those decisions are affected by new regulations.

Response. Every year, budgeting and spending decisions at Milwaukee Water Works become more challenging as we try to balance out spending with anticipated revenue. We also try to prioritize our budget wish list, separating "must-do" items such as meeting regulatory requirements and protecting public health and safety, from "important-to-do" items like some infrastructure projects. And last, there are the "nice-to-do" things. This list is growing longer each year because the "must-do" and "important-to-do" items take up a larger and larger part of available revenue.

Municipal drinking water utilities in Wisconsin are regulated by the Public Service Commission, which allows the utility to recover the full cost of service plus a reasonable rate of return. Even so, it is always a difficult decision to request water rate increases. When the "must-do" list expands, such as when additional regulations are promulgated, costs are passed along to ratepayers and fewer "important-to-do" and "nice-to-do" projects get addressed.

Question 3. What are some of the challenges that utilities face in responding to media reports about unregulated contaminants?

Response. First, Milwaukee Water Works has the benefit of a strong, collaborative relationship with our local health department. Without that joint agency response to media reports about contaminants the utility would be very challenged to communicate the "risk" concepts to the public, such as pathways of exposure of chemicals, acceptable risk, and dose-response relationships.

But even with the joint agency response, it is difficult to explain to the media and the public that trace levels of various substances have always been present in drink-

ing water, although advances in technology now allow us to measure them at ever-lower concentrations. The mere ability to measure for these contaminants at smaller and smaller levels does not equate to increased public health risks, though this increased knowledge can be used to inform future research.

Furthermore, it can be difficult to explain the concept of "less than" a detection limit in a lab sample to reporters who think that "<2" ("less than 2") means that the compound is present at a level below 2. What this actually means is that the analytical method used has a lower limit below which the method cannot quantify an amount, and that the compound may or may not be present below that lower limit. But when the media is asking for conclusive answers on water quality measurements, it can be hard to explain that we are bound by the limits of our testing capabilities.

Question 4. Did you ever request the EWG report data directly from EWG? Did you ever determine where their sample came from?

Response. Milwaukee Water Works did not contact EWG directly following the release of their chromium-6 report. This decision was based on an earlier experience the utility had in trying to get the group to correct errors in the December 2009 report which contained information on bromate. In that instance, Milwaukee Water Works believed that EWG incorrectly stated that our utility exceeded the regulatory limit for bromate based on a single value above the limit in their data set. Our view was that because the bromate regulation is based on a running annual average of samples, it is erroneous to report that a single sample value constitutes a violation.

Milwaukee Water Works made multiple efforts to get EWG to correct this error in their bromate report, beginning 4 months before the report was published, but we were rebuffed. This report was very damaging to the utility, and fueled our belief that EWG is more interested in generating headlines than publishing valid data. For this reason, we decided that it would not be worthwhile to attempt to engage with the group following the release of the chromium-6 report.

These beliefs were also reinforced when EWG chose to not directly advise Milwaukee Water Works of their chromium-6 test results, but instead released their data to the media. While I do understand that EWG alerted staff of water associations such as AMWA that a report about chromium-6 was coming, EWG did not provide specific information about the cities tested—only that there would be 35 cities mentioned in the report. EWG did not tell association staff the specific date of the report release until a few days before it hit the papers, and the group did not respond to association requests for information on the sample locations for the cities identified in the report.

Question 5. Please explain the difficulty that the city has in communicating with citizens about the EWG report and what it means for them.

Response. The most common question we received was, "Is the water safe to drink?" The Milwaukee Health Department felt confident to say that "there is no reason to believe the water is unsafe," but that does not sound terribly reassuring. As I said before, water utilities rely on EPA to tell us which contaminants pose health risks to the public, and at this time the only Federal regulation of chromium-6 in drinking water is through SDWA's 100 ppb MCL for total chromium. Milwaukee's water meets this standard, but the EWG report has caused a lot of confusion in the community.

In an attempt to provide more clarity to the public, the Milwaukee Health Department confirmed that there was no disease in the community that chromium-6 would be expected to cause. But when dealing with a chronic (not acute) contaminant, that is not very reassuring. We also tried to explain that nothing about the water had changed—there had been no recent spill or other event that added the chromium-6 to the water. But again, simply telling the public not to worry because this contaminant had probably been in the water for some time is not very effective, either.

Question 6. What is the expected background concentration of hexavalent chromium in your source water? Is your source water from groundwater or surface water combination? What causes the background concentrations of chromium (trivalent and hexavalent) in your source water to vary?

Response. Milwaukee Water Works did not expect any hexavalent chromium to be found in our source water. The intakes for our treatment plants are 1.5 miles out in Lake Michigan, a pristine surface water source, and are rarely impacted by land-based activities associated with chromium use. We do not (yet) have any information about whether or not this parameter will vary, or what the cause may be. We have initiated quarterly sampling of source water, treatment plant finished water, and distribution system water, consistent with the guidance published by EPA.

Question 7. How can chromium be removed from public drinking water systems?

Response. EPA reports that treatment methods such as coagulation/filtration, ion exchange, reverse osmosis, and lime softening are effective for treating water to comply with the current total chromium MCL of 100 ppb. But it is less clear how effective these methods may be in treating water to achieve lower levels of chromium-6.

Several water utilities in California are currently conducting studies to answer this question. Three technologies being evaluated at the pilot scale for use by drinking water systems include strong base anion exchange resin, weak base anion exchange resin and reduction/coagulation/filtration (RCF) approaches. Reverse osmosis is not considered viable for utilities in some regions, such as California, because of the high percentage of reject water. However, the ultimate efficacy of these treatment options will also depend on a combination of factors, such as:

- The level of chromium-6 permitted in finished water;
- The quality of the raw water being treated;
- Operational costs; and
- Treatment waste disposal options and costs.

Question 8. Describe your challenges with the conversion of trivalent chromium in source water to hexavalent chromium by water treatment operations.

Response. Milwaukee Water Works does not have information about this yet, but hope to learn more as we conduct quarterly sampling.

Question 9. Utilities have raised concerns with my office about EPA's decisions regarding the technical assistance to monitor for chromium 6, including the lack of a fully validated analytical method, inability for the agency to collect and use the data generated and lack of explanation of how to communicate the health effects to the public. How can EPA clarify and assist Milwaukee with the technical assistance it provided?

Response. Staff from Milwaukee Water Works did have a fruitful telephone conversation with officials from EPA's Region 5 and the Wisconsin Department of Natural Resources. We had a good discussion about the tradeoffs of the various analytical methods, as well as the merits of using an experienced laboratory certified in the type of method (if not the exact method), and the importance of as short a holding time as possible prior to analysis.

Despite these discussions, further clarification would be helpful. Of greatest value would be some language for risk communication when there is no or little information about a contaminant and its public health effects. Chromium-6 will not be the last contaminant that will pose a risk communication challenge to utilities. It is very difficult to communicate uncertainty to customers without losing their confidence, but scientific uncertainty is a reality. If Milwaukee Water Works could quote the EPA about this, it would improve the credibility of the communication.

Additional information that would be very helpful would be more about the chemistry of chromium-3 and chromium-6, in simple terms that we could use for our customers. We would also appreciate more information from EPA on which specific questions to ask a laboratory about how it would verify its sample results (QA/QC procedures) in order to support the method detection level and method reporting levels outlined in the guidance.

Question 10. Are you supportive of a drinking water regulatory process that relies on science to help guide decisionmaking? Do you think the current SDWA provides a clear, transparent, science driven process for making decisions regarding drinking water regulation?

Response. Yes, Milwaukee Water Works and AMWA believe that the drinking water regulatory process must be based on sound, peer-reviewed scientific research. The current SDWA requires a careful, transparent, science-based route to guide the development of drinking water contaminant regulations, and we support following this process for all such determinations in the future.

Question 11. Is there anything else you would like to add for the record?

Response. I would just reiterate that our top priority is protecting public health by delivering clean and safe drinking water to our customers. Utilities rely on EPA to conduct careful, unbiased research to determine at what concentration various drinking water contaminants carry human health impacts, and pride themselves on complying with the drinking water regulations that result.

RESPONSE BY CARRIE LEWIS TO AN ADDITIONAL QUESTION FROM SENATOR LAUTENBERG

Question. Ms. Lewis, you have testified that the Milwaukee Water Works goes beyond the current monitoring requirements of the Safe Drinking Water Act, monitoring for over five hundred (500) contaminants.

Doesn't this show that additional monitoring to protect the public's right-to-know can be feasible and cost-effective?

Response. All public drinking water systems must comply with EPA regulations that require finished water to be tested for more than ninety different contaminants that are, based upon the best available science, thought to pose the most significant risk to human health in drinking water. Utilities must report the results of this testing to the public on an annual basis. Every 5 years, EPA is required by SDWA to issue a new Unregulated Contaminant Monitoring Rule, which can ultimately require utilities to temporarily monitor for as many as thirty additional unregulated contaminants. This framework allows water systems to make informed projections on how much money should be budgeted for water quality testing.

For a variety of reasons, Milwaukee Water Works has decided to devote additional resources to testing its water for many more contaminants than is required by EPA. But this decision comes at a cost, with our testing regime costing our ratepayers roughly $200,000 per year.

While other utilities could also test their water supplies for more and more contaminants, we must remember that this additional testing would come at a cost to them as well. This would mean either higher water rates for the public, or fewer dollars available to address other needs such as infrastructure replacements and upgrades. We believe that each individual utility is best equipped to decide what, if any, testing beyond EPA's requirements for contaminants linked to a significant health risks makes sense for their own community.

To give another example of testing costs, the Metropolitan Utilities District of Omaha, Nebraska reported in a January 13, 2011 news release that its compliance with EPA's guidance recommending quarterly testing for chromium-6 will cost the utility $12,000 per year. This may not sound like much, but the utility reported that it represents nearly 0.9 percent of its annual water quality budget of $1.4 million. It is therefore easy to predict how these costs could dramatically impact utility budgets if testing for more and more contaminants were to be required.

RESPONSE BY CARRIE LEWIS TO AN ADDITIONAL QUESTION FROM SENATOR CARPER

Question. How can the Federal Government focus its efforts to improve drinking water quality on pollution prevention? What kinds of tools and programs exist to prevent the pollution of drinking water and what new ones are needed?

Response. The drinking water community has long believed that the best way to ensure safe drinking water is to keep harmful contaminants and pollutants out of source waters in the first place. Fortunately, various Federal laws currently contribute to this objective. For example, the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) gives EPA the authority to restrict the use of pesticides that may find their way into source waters. The Toxic Substances Control Act (TSCA) gives EPA the authority to restrict the introduction of new contaminants into the marketplace, particularly ones that may find their way into our waterways. And under its Drinking Water Strategy, EPA is beginning to share information and information needs between the Office of Groundwater and Drinking Water and the Office of Chemical Safety and Pollution Prevention.

Just last year, President Obama signed into law the "Secure and Responsible Drug Disposal Act," which requires the Attorney General to issue regulations enabling communities to more easily hold take-back events to collect unused pharmaceutical drugs. This should reduce the amount of unused prescription drugs that consumers flush into the wastewater system. And the most recent Farm Bill authorized the Agricultural Water Enhancement Program (AWEP), through which farmers and water systems can receive financial and technical assistance on collaborative projects to improve water quality in their shared watershed.

While these policies and programs help protect drinking water quality, more can be done. For example, EPA can better use its authority to require chemical manufacturers and importers to perform reporting, recordkeeping and testing of chemicals to determine the health effects of these chemicals and also restrict their use if they are found to harm public health through drinking water exposure.

The protections of the Clean Water Act could be better used to leverage the protection of drinking water. For example, the protection of source waters for drinking water uses could and should be a consideration in addressing non-point source pol-

lution problems in the development of TMDLs in a way that is consistent with the drinking water MCLs. EPA should work to develop water quality criteria standards for contaminants that are regulated in drinking water, particularly those with acute effects, such as Cryptosporidium.

Finally, the 2012 Farm Bill will offer an opportunity to reduce the flow of nitrates and other contaminants from farm operations into water bodies by linking Federal agricultural assistance with activities that protect and preserve nearby water quality. AMWA hopes to work with members of the Senate to craft policies that achieve these goals.

Senator BOXER. OK. Mr. Chuck Murray, Fairfax Water, we thank you so much for being here, General Manager.

STATEMENT OF CHARLES MURRAY, GENERAL MANAGER, FAIRFAX WATER

Mr. MURRAY. Thank you, Madam Chairman, members of the Committee.

My name is Charles Murray, I am General Manager of Fairfax Water, Virginia's largest drinking water utility and one of the 25 largest drinking water utilities in the Nation.

Fairfax Water is a non-profit public water authority governed by a 10-member board of directors who are appointed by the board of supervisors of Fairfax County. Fairfax Water provides retail or wholesale service to nearly 1.7 million people in northern Virginia. That translates into 1.7 million reasons to provide drinking water of the highest quality.

I am testifying today on behalf of the American Water Works Association, or AWWA. We welcome the opportunity to speak to the drinking water issues that are before the Committee.

AWWA is an international non-profit scientific and educational association of professionals dedicated to safe drinking water. We continually support drinking water regulations that are developed through a transparent process based on the best available science and that provide meaningful public health protection in an affordable manner. Two of the key issues before the Committee are hexavalent chromium, perchlorate and proposals to mandate regulation within a year. We believe it is in the public interest to address these concerns with these contaminants within the regulatory framework that is already in place.

As you know, the Safe Drinking Water Act mandates rigorous process for evaluating risks to public health and determining what risk management actions are appropriate. The Act requires that the regulatory process use the best available peer-reviewed science, a principle that this Administration strongly endorses.

These principles are critical to ensure that actual risks are addressed and that limited resources are directed based on complete information. Should funds be misdirected on risks that have not been fully or appropriately vetted, a community's resources cannot be recovered to address the genuine risks and other important community needs.

As I stated earlier, we support drinking water regulations that are developed through a transparent process, based on the best science and provide meaningful health protection in an affordable manner. This foundation of sound science must not be compromised. The Safe Drinking Water Act affords the Environmental Protection Agency a robust, transparent methodology upon which

it can evaluate, propose and promulgate regulations. Unfortunately, the proposed legislation before the Senate on chromium and perchlorate seems to discount the principles of the Safe Drinking Water Act, the same principles to which the Administration has committed.

The same can be said for EPA's recent actions. The tone, delivery and content of EPA's responses to EWG's report regarding hexavalent chromium implies that regulatory change is an urgent and foregone conclusion. EPA has gone outside the structure set forth in the Safe Drinking Water Act, which places drinking water utilities in an untenable position.

These actions cause me great concern. EPA has urged drinking water utilities to collect samples throughout the treatment process to better understand the occurrence and concentration of hexavalent chromium. However, the agency has not afforded itself the benefit of the data yielded in this sample collection, because there is no national repository for the data. Had the process established under the Safe Drinking Water Act been followed, the monitoring would have been conducted under the unregulated contaminant monitoring rule and would resolve any issues relating to the analytical methodology and data collection.

As it stands, a community now must decide, absent critical information, such as a clear understanding of the actual risks associated with the presence of very low levels of hexavalent chromium, if it should expend the resources to conduct this monitoring. Should a drinking water utility conduct this monitoring, how will it convey the results and their meaning to its customers?

At Fairfax Water, we made the decision to monitor. This decision was based on the level of concern expressed by our customers. We have monitored and found that one of our water sources has no detectable level of hexavalent chromium. In the other source, the level was found at the reporting limit of the method, so, extremely low levels.

But the real question that I am constantly asked to answer is, is the water safe? Is the level of hexavalent chromium and the level of perchlorate or the level of the next new contaminant of interest in the water going to harm me and my family? These are valid questions, ones that must be answered by a consistent, robust, transparent framework.

So you may ask, how do we, Fairfax Water, answer these questions. We posted our results to our website and explain that there is a process in place at EPA to evaluate the risks and make decisions about the appropriate level of regulation to address public health concerns. We explain that EPA is currently reviewing the risks and will finalize its risk assessment for hexavalent chromium later this year. At that time, EPA can make a determination if further regulatory action is warranted.

We acknowledge that the processes for determining the actual risks for human health from different substances or compounds can seem frustratingly slow. Science can be complicated. However, it is only by applying methodical, peer-reviewed studies that we can know where actual risk lies. We encourage the Congress to allow the unregulated contaminant monitoring rule, the contaminant candidate list and the 6-year review processes created in the 1996

amendments to the Safe Drinking Water be allowed to work. EPA and AWWA and its members are committed to supporting the Act and these tools that help make sound regulatory decisions.

Further, we pledge to continue to provide field data, participate in studies related to these processes, and make our methodologies transparent. We realize these are tough times for the Federal budget.

Senator BOXER. I am sorry, sir, could you just finish that thought?

Mr. MURRAY. The bottom line is that Congress does not need to legislative individual drinking water standards. The Safe Drinking Water Act was amended in 1996 to provide a scientifically sound and transparent method for selecting substances for regulation.

[The prepared statement of Mr. Murray follows:]

STATEMENT OF CHARLES MURRAY, GENERAL MANAGER, FAIRFAX WATER, VA., ON BEHALF OF THE AMERICAN WATER WORKS ASSOCIATION

Good morning, Madam Chairwoman and members of the Committee.

My name is Charles Murray and I am General Manager of Fairfax Water, Virginia's largest drinking water utility and one of the nation's 25 largest drinking water utilities. Fairfax Water is a non-profit, public water authority governed by a 10-member board of directors who are appointed by the Board of Supervisors of Fairfax County. Fairfax Water provides retail or wholesale service to nearly 1.7 million people in the Northern Virginia communities of Fairfax, Loudon and Prince William counties, the city of Alexandria, the Town of Herndon, Ft. Belvoir, and Dulles Airport. To my staff and me at Fairfax Water, that translates to nearly 1.7 million reasons to provide drinking water quality of the highest quality.

This morning, I am testifying on behalf of the American Water Works Association (AWWA), and we welcome this opportunity to speak to the drinking water issues that are before the committee today. AWWA is an international, nonprofit, scientific and educational association of professionals dedicated to safe drinking water. We have always supported drinking water regulations that are developed through a transparent process, are based on the best available science, and that provide meaningful public health protection in an affordable manner.

Two of the key issues before the Committee are chromium-6 and perchlorate. As you know, the Safe Drinking Water Act (SDWA) mandates a rigorous process for evaluating risks to public health and determining what risk management actions are appropriate. The Act requires that the regulatory process use the best available, peer-reviewed science, a principle this administration has strongly endorsed, as described by the March 9, 2009, Memorandum for the Heads of Executive Departments and Agencies on Scientific Integrity. These principles are important to ensure that the Agency directs water providers to address actual risks and doesn't misdirect limited resources based on incomplete or faulty information. Once misdirected, a community's resources cannot easily be recovered to address genuine risks and other important community needs.

Unfortunately, the recent EPA actions on chromium-6 seem to discount the principles of the Safe Drinking Water Act, the same principles to which the Administration is committed.

For example:

1. *Unregulated Contaminant Monitoring Rule.* EPA's recent chromium-6 monitoring guidance does not employ a fully validated analytical method.

Nor are there validated performance standards for laboratories. Absent these things, it is not possible to be confident about the error bar around any sample, to compare samples analyzed by different laboratories, or even to confidently compare different samples analyzed by the same laboratory. Moreover, there is no mechanism provided for the Agency's collection of test results so as to inform future potential regulatory decisions. Given these shortcomings, the scientific value of the data that utilities may collect is unclear.

The Agency has available to it a regulatory structure that addresses these issues through the Unregulated Contaminant Monitoring Rule (UCMR).

UCMR is a time-tested process for obtaining a meaningful and actionable national occurrence dataset for contaminants of potential concern in drinking water. All laboratories currently engaged in UCMR monitoring are using well-characterized analytical methods that meet known performance requirements. Similarly, sampling re-

quirements are developed with the goal of producing a dataset that supports regulatory decisionmaking. If the Agency wished utilities to undertake extensive testing for chromium-6, we believe the UCMR process would have provided the appropriate tool.

2. *Risk Communication / Health Advisories. EPA has not completed a risk assessment to support its recommendations on chromium-6.* Neither water systems nor the public have a clear idea of whether minute quantities of chromium-6 represent a health risk, and if so, the nature of that risk. Therefore, utilities are placed in the untenable position of not being able to explain to their customers the relevance of the monitoring that EPA has recommended. Risk communication with the public on potential health effects in drinking water is difficult under the best of circumstances. The Agency's seemingly hurried response to chromium-6 questions compounds this challenge.

The preliminary Integrated Risk Information System (IRIS) Toxicological Review on chromium-6 has not completed peer review. The Toxicological Review is built upon a number of embedded assumptions, some of which are known to be controversial. Moreover, the IRIS document is just the first step in the risk assessment process, as it only characterizes the potential hazard associated with chromium-6. Actually completing the risk assessment process will require substantial effort by EPA. To date, EPA has not clearly conveyed this process to the public.

3. *Taking Regulatory Action.* The tone, delivery, and content of EPA's chromium-6 action implies that regulatory change is urgent and a foregone conclusion. In fact, the current Maximum Contaminant Level (MCL) for total chromium was addressed in the second 6-year review of drinking water regulations that was published on March 29, 2010. As a result of this review, EPA stated that "The Agency does not believe a revision to the NPDWR [National Primary Drinking Water Regulations] for total chromium is appropriate at this time. A reassessment of the health risks associated with chromium exposure is being initiated, and the Agency does not believe that it is appropriate to revise the NPDWR while that effort is in process."

EPA has a clear process for reviewing existing Maximum Contaminant Level Goals (MCLGs) and MCLs in response to evolving science. Under the SDWA, the decision on whether or not an MCL should be revised includes a consideration of whether doing so provides a meaningful opportunity for health risk reduction. In its two 6-year reviews, the Agency has had opportunities to lower the MCL for chromium and elected not to do so. We believe this important fact should have been conveyed by the Agency in its recent memorandum on chromium-6.

The decisionmaking process outlined in the Safe Drinking Water Act is consistent with both the Presidential Memorandum on Scientific Integrity and the more recent Executive Order on Improving Regulation and Regulatory Review. These two directives emphasize the importance of making smart decisions based on the best available science so that regulations result in a public health benefit.

AWWA believes EPA's recent activity related to chromium-6 discounts the scientific rigor of the SDWA and contravenes the spirit of the Presidential memorandum and executive order. We believe that future actions on chromium-6 and other contaminants must use proven processes and be better informed by sound science.

PERCHLORATE

We believe that the same scientific processes and faithfulness to the Safe Drinking Water Act must be maintained in considering whether or how to regulate perchlorate in drinking water. As you know, the SDWA defines three key criteria for regulation of contaminants:

> i. the contaminant may have an adverse effect on the health of persons;
>
> ii. the contaminant is known to occur or there is a substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern; and
>
> iii. in the sole judgment of the Administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems.

Given the weight of evidence available at that time and AWWA's independent assessment of occurrence and exposure, we concurred with EPA's preliminary determination that regulation of perchlorate would not present a "meaningful opportunity for health risk reduction for persons served by public water systems." We continue to support that preliminary determination. AWWA also concurs with the agency's Inspector General, who said that regulatory action under the Safe Drinking Water Act is not appropriate.

Data from the UCMR has revealed that detection of perchlorate in drinking water was geographically widespread but at very low concentrations. Significantly, there is little correlation between perchlorate detection in drinking water and known points of perchlorate release to the environment identified by the USEPA (with the exception of certain points in the Lower Colorado River). Perchlorate has been detected in drinking water in less than 5 percent of the nation's large community water systems (>10,000 population served). When detected, perchlorate was typically present at concentrations of less than 12 ug/L and was generally found in less than one-half of the sources for systems which sampled multiple sources.

RECOMMENDATIONS

We acknowledge that scientific processes for determining the actual risks to human health from different substances or compounds can seem frustratingly slow. However, it is only by following methodical, peer-reviewed studies that we can know where actual risk lies. We recommend that Congress allow the UCMR, Contaminant Candidate List and Six-Year Review processes created in the 1996 Amendments to the Safe Drinking Water Act to be allowed to work. AWWA and its members pledge to continue to provide field data and studies related to these processes and to continue to make our methodologies transparent.

We also recommend that the resources of community water systems and more significantly their customers be focused on the direct threats to safe water about which we are certain. Studies by AWWA and EPA show that hundreds of billions of dollars must be invested in water infrastructure soon and very soon if we are to continue to provide safe and sufficient water to our fellow citizens and the health protection that wastewater systems provide. We realize that water utilities also have responsibilities to maintain or work toward self-sustaining rates, exercise the best asset management practices, and better communicate the need for investment in water infrastructure. We pledge to continue these efforts.

We realize these are tough times for the Federal budget. However, there is a continuing need for additional funding for human health effects research for drinking water contaminants. We urge Congress to support additional funding in this arena and we urge that EPA's research efforts be tied more closely to its regulatory program. We would like to see the Agency's finite water research dollars prioritized toward projects that study water contaminants.

We thank the Committee for its efforts to reauthorize and improve the State revolving loan fund program in the last Congress. We offer our cooperation in working toward similar legislation in this Congress.

CONCLUSION

The bottom line is that Congress should not legislate individual drinking water standards. The SDWA was amended in 1996 to provide a scientifically sound and transparent method for selecting the appropriate substances for regulation and for selecting the appropriate maximum contaminant level for contaminants. We should allow the best available science, not the political process, to be the ultimate driver in regulatory decisions.

AWWA and its members look forward to continuing to work with all facets of the drinking water community to ensure that the Nation focuses its resources on the greatest threats to public health, and that the nation's drinking water supply remains safe and affordable.

RESPONSES BY CHARLES MURRAY TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. We hear a lot from the smaller drinking water utilities around the country about problems complying with unfunded drinking water mandates such as new rules or additional testing. How does Fairfax Water respond to these mandates and challenges?

Response. Although Fairfax Water is not a small utility, the State Revolving Loan Fund program is an essential tool used by small and medium-sized drinking-water utilities to fund regulatory program-compliance efforts. The funding for this program is essential to providing safe drinking water to those served by the smaller systems. Fairfax Water is not eligible to receive such funding, so these costs are simply passed on to our customers.

Question 2. I appreciate your support for drinking water infrastructure funding. I want you to know that I believe one of the best ways to deal with the many issues involving drinking water is to continue to fund the State Revolving Loan Fund program. We cannot expect our communities to continue to provide safe drinking water

if they do not have the resources to meet their infrastructure needs. I know you understand the tight budgets we are all facing. Could you explain the process that your utility goes through in deciding bow to spend the limited resources available to Fairfax water and how those decisions are affected by new regulations?

Response. This is a critical question. Second only to the importance of public health and safety in the delivery of public drinking water is the financing for that water service. It is probably the No. 1 concern of ratepayers and a non-profit public utility such as ours. Fairfax Water uses a 10-year financial-planning horizon. We carefully look at our planning, capital improvements, and operation and maintenance needs, and then estimate our priorities for the next decade. Drawing on that information, we create a 10-year Capital Improvement Plan and a financial-planning document. These documents are the inputs into our rate model. Our Board of Directors reviews these plans annually. Our staff also conducts an annual analysis of our rates, fees, and charges to ensure that we capture the true cost of service. Fairfax Water typically raises its rates by a few cents each year to keep up with the increasing cost of business. Steady, small increases, consistently over time, are much better for our customers than large, jarring increases intermittently. This consistent approach has helped Fairfax Water maintain a AAA financial rating, thereby keeping to a minimum the cost of borrowing monies.

When new regulations come along, it is important that the process for developing these regulations recognizes that utilities need time to factor the cost of the regulation into not only the financial-planning process, but also the standard operations of the utility. Taking regulations out of the normal development process and shortening the timeframe does not allow a utility adequate time to prepare financially, much less physically, for the implementation of new treatment techniques.

As technology allows us to measure compounds at ever-lower levels, the ability to remove compounds becomes more complex and exponentially more expensive. As lower standards are contemplated, it often forces drinking-water utilities to consider treatment techniques beyond conventional methods, such as membrane filtration. Such methods are extremely costly. There must be sufficient time in the regulatory development process to allow drinking-water utilities to plan, fund, install, and train for new technologies.

Question 3. In your testimony, you discuss EPA's issuance of guidance outside of the UCMR process. Please tell the committee bow testing for chromium-6 would have benefited from being included in the UCMR instead of a separate guidance document?

Response. The EPA has suggested that drinking-water utilities collect samples throughout the treatment process to better understand the occurrence and concentration of hexavalent chromium. However, the EPA has not afforded itself the benefit of this data. Under the proposed action, there is no national collection repository for the results. Had the monitoring been conducted under the Unregulated Contaminant Monitoring Rule, any issues relating to analytical methodology and data collection would have been resolved. Using the methodology established in the Unregulated Contaminant Monitoring Rule, all data collected would be available to EPA for analysis. As it stands, absent critical information such as a clear understanding of the actual risks associated with the presence of very low levels of hexavalent chromium, a community must now decide if it should expend the resources to conduct this monitoring. And should a drinking-water utility conduct this monitoring, how will it convey the results to its customers?

Question 4. Where is Fairfax most interested in focusing resources over the next few years?

Response. Reinvestment in distribution-system infrastructure is what we are most interested in.

Question 5. What are some of the challenges that utilities face in responding to media reports about unregulated contaminants?

Response. Undoubtedly the biggest challenge of responding to questions involving unregulated contaminants is the assumption that drinking water is unsafe just because a contaminant is being discussed or is in question. The purpose of research and testing for unregulated contaminants is to determine whether these compounds are found at a frequency and level of concern. Utilities often are put in a difficult position of trying to respond to customer concerns before the science is fully developed.

Question 6. Are you supportive of a drinking water regulatory process that relies on science to help guide decisionmaking? Do you think the current SDWA provides a clear, transparent, science driven process for making decisions regarding drinking water regulation?

Response. Yes, I am absolutely supportive of a drinking-water regulatory process that relies on science to help guide decisionmaking. As I testified, I believe the Safe Drinking Water Act mandates a rigorous process for evaluating risks to public health and determining what risk-management actions are appropriate. The Safe Drinking Water Act requires that the regulatory process use the best available, peer-reviewed science. These principles are critical to ensure that actual risks are addressed and that limited resources are assigned to the highest risks based on complete and accurate information. Should funds be misdirected on risks that have not been fully or appropriately vetted, a community's resources cannot be recovered to address genuine risks and other important community needs.

I support drinking-water regulations that are developed through a transparent process, are based on the best available science, and that provide meaningful public-health protection in an affordable manner. This foundation of sound science must not be compromised. The Safe Drinking Water Act affords the EPA a robust, transparent methodology upon which it can evaluate, propose, and promulgate regulations.

RESPONSE BY CHARLES MURRAY TO AN ADDITIONAL QUESTION FROM SENATOR CARPER

Question. How can the Federal Government focus its efforts to improve drinking water quality on pollution prevention? What kinds of tools and programs exist to prevent the pollution of drinking water and what new ones are needed?

Response. As I testified, I support drinking-water regulations that are developed through a transparent process, are based on the best available science, and that provide meaningful public-health protection in an affordable manner. This basis of sound science must not be compromised. The Safe Drinking Water Act affords the Environmental Protection Agency (EPA) a robust, transparent methodology upon which it can evaluate, propose, and promulgate regulations.

In addition to the Safe Drinking Water Act, the Clean Water Act provides real opportunities for improved source-water protection. The EPA can link the discharge permitting authorities of the Clean Water Act with the vulnerabilities identified in the Source Water Assessments required by the Safe Drinking Water Act and create safer, cleaner sources for drinking water by limiting upstream discharges of contaminants.

Senator BOXER. OK, thank you very much.

Dr. Burke, I want you to know that Senator Cardin is very proud that you are here today. I am going to put his introduction of you into the record. But I think I should say a couple of words about you.

You are from the Johns Hopkins Bloomberg School of Public Health. You serve as a professor in the Department of Health Policy and Management, Associate Dean of Public Health Practice and Training, Director of both the Johns Hopkins Center for Excellence in Environmental Public Health Tracking and the Center for Excellence in Environmental Health Practice. You are the Chair of the National Academy of Sciences Committee on Improving Risk Analysis, along with positions on several other commissions and boards, and lots of other things. An award winner, and we welcome you.

STATEMENT OF THOMAS A. BURKE, PH.D., MPH, PROFESSOR AND ASSOCIATE DEAN FOR PUBLIC HEALTH PRACTICE, JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH, DIRECTOR OF THE JOHNS HOPKINS RISK SCIENCES AND PUBLIC POLICY INSTITUTE

Mr. BURKE. Thank you, Senator. It is good to be here, and I have submitted written testimony. I would like to hit some of the high points of the discussion, though, and summarize.

As you mentioned, I chair the National Academy panel on how EPA does risk assessment. Today, I would like to address three

things. One, the broad issue of chromium VI in water; second, our current approaches to risk assessment; and finally, leave you with some recommendations as we think about how we protect drinking water in the future.

First of all, being a professor, I had to give you some pictures and some slides. At the end of my testimony, there are some pictures that show just how mobile chromium is in the environment. Although Hudson County, NJ, didn't make it into the movie, certainly as a chromate capital throughout the Nation, New Jersey grappled with this issue of chromium moving through the environment and it is very soluble and it is not surprising that we are beginning to find it as we look.

Perhaps most relevant today is that I led the States' efforts to investigate the chromium slag, and also to look at drinking water, and conducted some of the first tests of toxics in drinking water. To the issue of can we do it, is it feasible, we have made great progress in reducing toxic chemicals in the water.

Now, the current EPA standard for chromium in drinking water is outdated. It does not reflect current science. Because our understanding has evolved, as you have heard today. There is little argument today that chromium VI is a carcinogen. It is a carcinogen by the route of oral exposure, drinking water. Also, combined with the exploratory studies of the Environmental Working Group, this is not a surprise to scientists in the field, we have assumed that chromium VI, the water-soluble part of chromium, would be present in the Nation's drinking water, and indeed, we are beginning to understand that evidence.

This is a wake-up call. But we have broader issues. The challenges of chemical pollutants in drinking water go far beyond that very narrow risk that EPA now regulates. We have learned that virtually anything we flush down our drains shows up in low levels in our tap water, from personal care products to fuel additives, pharmaceuticals to persistent toxics, we know that water contains a complicated mixture of chemicals. It is time for us to rethink how we address these.

If you look at the way EPA does its work, one substance at a time, one environmental medium at a time, it takes an awful long time. In fact, if we are going to continue this one at a time process, our National Academy panel that looked at this said this system is bogged down and sometimes it takes 10 to 20 years for a risk assessment to be completed.

There are inherent uncertainties in the science. They have made risk assessments a convenient target for those who seek to avoid regulation or the cost of remediation. We have witnessed these battles over MTBE, perchlorate, arsenic and now chromium VI. Unfortunately, raising doubt about public health impacts has become a successful strategy for delaying action.

As a former State regulator, I am a realist. I understand the concerns about costs. There are no quick solutions to removing toxic substances from our drinking water. Our tap water reflects our way of life.

But if we are going to be responsible and preserve our drinking water resources, we have to move forward. So I would like to con-

clude with a brief list of recommendations for the Committee to consider.

First, this one at a time, 20-year process, is bogged down. We have to be more efficient. We need to shift from reaction to chemicals in the water to prevention of contamination. We have to improve the protection of our surface in-ground water resources. We have to expand State and regional water monitoring efforts.

The Environmental Working Group did a great service, I think, by conducting this evaluation. But it is unfortunate that our States and our EPA regions don't have the capacity to conduct this kind of monitoring.

We have to recognize the potential cumulative impact of this mixture of multiple contaminants, many of which have common health end points, effects on development and neurological development. Most importantly, perhaps, we have to advance our drinking water treatment technologies to better remove contaminants and their precursors.

Controlling pathogens has been a cornerstone of public health to prevent infectious disease. Now we must also recognize that monitoring and reducing chemical contamination in our drinking water is an essential component of our public health efforts to prevent chronic disease.

Thank you for this opportunity to speak with you today. I am anxious to answer questions.

[The prepared statement of Mr. Burke follows:]

STATEMENT OF THOMAS A. BURKE, PROFESSOR AND ASSOCIATE DEAN FOR PUBLIC HEALTH PRACTICE, JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH AND DIRECTOR OF THE JOHNS HOPKINS RISK SCIENCES AND PUBLIC POLICY INSTITUTE

Thank you for the opportunity to address the Committee on Environment and Public Works, Oversight Hearing on Public Health and Drinking Water Issues. I am Dr. Thomas Burke, Professor and Associate Dean at the Johns Hopkins Bloomberg School of Public Health. I am also Director of Johns Hopkins Risk Science and Public Policy Institute. I have served as a member of the National Academy of Sciences Board on Environmental Science and Toxicology, and am a Member of the EPA Science Advisory Board. I also served as Chair of the National Academy of Sciences Committee on Improving Risk Analysis Approaches Used by the U.S. EPA. Perhaps most relevant to today's topic, I served as Director of Science and Research at the New Jersey Department of Environmental Protection, and in response to tremendous concerns about the State's high cancer rates, led the first State efforts to monitor and reduce toxic chemical contaminants in drinking water. Later as Deputy Commissioner of Health for the State, I participated in the State efforts to implement the New Jersey Safe Drinking Water Act and to establish health-based standards for toxic pollutants.

It is also relevant to today's hearing to tell you that I grew up in Jersey City, in Hudson County New Jersey, the nation's center of chromate production during much of the past century. Later, I led the State Health Department efforts to investigate the public health impacts of the uncontrolled disposal of billions of pounds of chromium slag. I am all too familiar with our historical failure to act to control worker and population exposures to chromium 6. As you can see in the picture 1, I am also familiar with the great mobility of the water-soluble chrome 6 in the environment. This picture is shows the bright yellow chromium in a rain-flooded area near one of the hundreds of disposal sites throughout the community. There were mountains of this slag known as the 'chemical mountains' throughout the county. My wife Marguerite even recalls learning to ice skate on the frozen yellow water near one of the chromate plants. Picture 2 shows the basement of a home near a disposal site after flooding. Those crystals are chromium, most likely with a high concentration of the carcinogenic chromium 6. This hazard touches many communities throughout the country, including my current home, Baltimore. Picture 3 show the remediation work underway at a former chromate plant in the Inner Harbor. Not a good place to try to contain a highly soluble carcinogenic pollutant.

The EPA standard for chromium in drinking water is outdated, and does not reflect current science. Our understanding of the public health hazards of chromium has been continually evolving over the past 70 years—from early recognition of the acute effects of high exposure on the skin, respiratory and digestive systems; to the epidemiological studies demonstrating high lung cancer rates in workers. Now, the findings of the National Toxicology Program of oral and intestinal cancers in laboratory animals from ingestion of water soluble chromium 6, coupled with epidemiological evidence from communities exposed through contaminated drinking water in China, provide a new perspective on the public health risks. In addition, the EPA has recently determined that hexavalent chromium is "likely to be carcinogenic to humans" via the oral route of exposure. (EPA 2010) Additionally, available evidence indicates that chromium interacts with DNA, resulting in DNA damage and mutagenesis. Based on the weight of the available evidence, hexavalent chromium is proposed to act through a mutagenic mode of carcinogenic action. These findings, coupled with the Environmental Working Group (EWG 2010) report of the widespread presence of chromium 6 in the nation's drinking water supplies indicate it is time to act to understand and reduce population risks.

California has been leading the Nation in the testing of drinking water supplies for chromium 6. The California Office of Environmental Health Hazard Assessment has proposed a Public Health Goal of .06 ppb. This is a sound public health approach and is consistent with the New Jersey's Safe Drinking Water Act, which specifies that drinking water standards for carcinogens be based on a health-based goal of one in one million. The recent guidance issued by EPA Administrator Lisa Jackson, also represents a step in the right direction in recognizing and addressing the hazards of chromium 6.

The public health challenges of chemical pollutants in drinking water go far beyond the current very narrow list of regulated pollutants. The nation is more dependent than ever on re-used water. With modern analytical methods we now know that the chemicals we flush down that drain are showing up in low levels in our tap water. From personal care products to fuel additives; pharmaceuticals to persistent toxic chemicals; we now know that our water contains a complicated mixture of chemicals with a broad range of potential yet unknown public health impacts. Our national biomonitoring efforts have also indicated that these chemicals are present in our bodies.

The Safe Drinking Water Act has been tremendously successful in monitoring the quality of our water supplies and reducing exposure to harmful pollutants. At both the State and national levels the compliance with monitoring and health based standards has been excellent and continually improving. We witnessed great reductions in population exposure to organic solvents and disinfection by products. (This despite the fact that states and EPA faced an outcry of protests from industry claiming "it couldn't be done, the costs would be prohibitive"!)

Now we face new challenges. The recent NAS report on risk assessment at EPA found that the system is "bogged down". (NAS 2009) The timeframe for risk assessments is often decades long. The inherent uncertainties toxicology and epidemiology studies have made the risk assessments a convenient target for those who seek to avoid regulation or the costs of remediation. We have witnessed these battles over MTB, perchlorate, arsenic, and now chromium 6. Unfortunately, raising doubt about public health impacts has become a successful strategy for delaying action.

The NAS Report "Science and Decisions" (NAS 2009) recommends that EPA begin to move beyond the current single substance, single media approach to environmental decisions. From a public health perspective it is important that we begin to recognize and address the cumulative effects that constant low-level exposures to chemical may be having on our health. Consideration of the cumulative impacts should guide not only our assessment of public health risks, but also our enforcement strategies to prevent pollution and our engineering strategies to improve drinking water quality.

As a former State regulator, I am a realist. As a member of the EPA SAB I am also aware of the limitations of the Agency's resources. There are no quick or solutions to removing toxic chemicals from our drinking water. Our tap water reflects our way of life and all the benefits that chemicals have brought us. However, our current approach is outdated and needs to be more responsive to emerging science. If we are going to preserve our drinking water resource from emerging threats such as "fracking" for natural gas or the accumulation of nano-materials, we must aggressively move forward with improved monitoring, exposure evaluation, and assessment of public health risks. Lack of certainty about contaminants and their potential effects cannot continue to be an excuse for lack of action to protect public health.

I would like to conclude with a brief list of recommendations for the Committee to consider:

- Shift from reaction to contaminants to prevention of contamination of our drinking water
- Improve protection of surface and groundwater sources
- Expand regional and State water monitoring efforts to identify contaminants and their sources
- Recognize of the potential cumulative impacts of multiple contaminants with common health endpoints in the standards setting process
- Advance drinking water treatment technologies to better remove chemical contaminants and their precursors

Controlling pathogens in drinking water has been a cornerstone of our public health efforts to prevent infectious disease. Now we must also recognize that monitoring and reducing chemical contamination of our drinking water is an essential component of our public health effort to prevent chronic disease

Thank you for this opportunity to speak with you today on this important public health challenge.

References

EPA (Environmental Protection Agency). 2010a. Toxicological Review of Hexavalent Chromium (CAS No. 18540–29–9) (External Review Draft). EPA/635/R–10/004A. September 2010. Available at: *oaspub.epa.gov/eims/eimscomm.getfile?p*_download_id=498712.

EWG (Environmental Working Group) 2010. Cancer causing Chromium 6 in U.S. tap water. *http://static.ewg.org/reports/2010/chrome6/html/references.html*

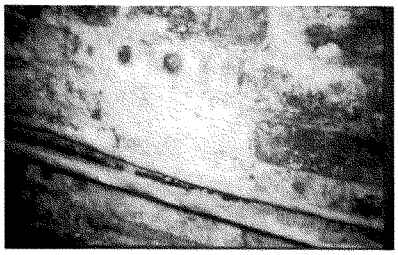
NTP. (2008) NTP technical report on the toxicology and carcinogenesis studies of sodium dichromate dihydrate (CAS No. 7789–12–0) in F344/N rats and B6C3F1 mice (drinking water studies). Washington, DC: National Toxicology Program; NTP TR 546. Available online at *http://ntp.niehs.nih.gov/files/546*_web_FINAL.pdf

OEHHA (Office of Environmental Health Hazard Assessment). 2009. Draft Public Health Goal for Hexavalent Chromium in Drinking Water: Pesticide and Environmental Toxicology Branch, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Available at: *www.oehha.ca.gov/water/phg/pdf/Cr6PHGdraft082009.pdf.*

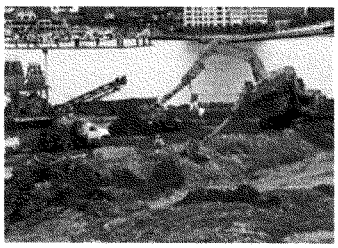
! " #$ % & % (! $) *+ % & + , $) (& (
- . / (0 #1 2(+) 3(4 +#25+) 3(

6# 1) *. 3(72(
8" $% +1(9 :(; ' #<. =(6" > =(4 6? (
(
(
(

Wet Basement Leaching!



Baltimore Chromium Cleanup



Senator BOXER. Thank you very much.

I would like to address our two water people. I first got started in Marin County as a county supervisor, so I was pretty close to the water district people and the whole issue of drinking water. You are both saying, very clearly, Congress, keep out of this, this has nothing to do with you, let's just have the EPA do whatever they do and follow the law.

Well, let's just set aside for a minute any kind of prejudices on who should act. Let's just make believe we are just a person in the United States of America who is raising a family who wants to make sure when they drink the water, it is safe. They don't really care, if you, Mr. Murray, take action on your own, because I know you care a lot about this, and you might just say, we are not happy with our quality, we are going to move forward without the Federal Government. They don't care if the State government does it, they don't care if the Federal Government—they don't care if the Environmental Working Group brings to light all this, they want the water safe.

So let me tell you my view, because you are not going to be happy with it, but in the interest of fairness here, I believe that in the 1996 law, the Safe Drinking Water Act, the rewrite of the Water Act, what Congress wanted to happen was for the EPA to begin to move on these emerging contaminants. They expected that EPA would move on these emerging contaminants.

They didn't expect that not one emerging contaminant would be regulated from 1996 to as we sit here. Not one thing has happened. Nothing. It reminds me of what happened when Senator Feinstein threw up her hands when she looked at the exposure of our kids to pthalates. She said, I am not waiting around for the Consumer Product Safety Commission to act, they are not acting. We are going to do it.

In essence, we did it. At that time, I said if we don't see the national Government implementing the laws then Congress is going to take it upon itself.

Now, in the 1996 Act, Congress is the one who said, you shall regulate arsenic. Because I could tell you, knowing what I see, I don't think arsenic, we could have had the same fight over that.

Now, I understand from your point of view that you would rather let things go as they are. But I want to say this. As the author of the bill to regulate, to have EPA set a standard for perchlorate, and I don't say what it should be, I just say it should be based on science and also chromium VI based on science, and someone from California, where we have set goals and standards for these two very dangerous contaminants, and I would put in the record, because I know we all want science. I have it. I have the science here. Some people are asking for it on perchlorate. I put in the record these scientific studies on what perchlorate does to babies and to fetuses in the womb.

I am saying to you, to my water people out there, please work with us. Now, EPA is going to set a standard, we hope, for perchlorate. They are going to do it based on the science. I hope that you will work with us. If in fact you support the 1996 law, as you said you do, and you are calling for regular order, that is what EPA is doing, regular order. They are also engaged in regular order

when it comes to chromium VI. They said what the Environmental Working Group did was a snapshot of 1 day. I think Mr. Cook has given great credibility today when he compares what the systems are doing with his report, they were pretty much on target there in his snapshot.

So I want to just say to all of you, and I will withhold my questions until the next round, that I hope you will work with us and not against us. Because we represent the same people. Whether the EPA is moved forward because we say, set a standard, and we show why, or they are moving forward because they have seen some science that isn't definitive but is giving them a sense of it, I need you to work with us, not against us. We are your friends. I don't like unfunded mandates. Senator Inhofe and I agree. We want to make it possible for you to do your work.

But I told you what the cost of cancer is to our society from the National Cancer Institute. You are looking at upwards of $200 billion a year. So to say that you support the Drinking Water Act and regular order is great. But what you don't say is that there hasn't been one thing done by the EPA except what Congress demanded, which is set a standard for arsenic, and now we are going to move forward with perchlorate, I hope, and chromium VI. Because if we don't do it, I will tell you what, the States are going to start to do it. Pretty soon, the cities are going to say, why aren't we doing it, because it is their people that are going to say, protect us from chromium VI.

I will definitely give you a chance to answer in the next round, but I want to give Senator Boozman a chance here.

Senator BOOZMAN. Thank you, Madam Chair.

Again, I think that we all agree that at some level, that this is a serious problem. The question is, what level that is.

Help me, now, with California, their level, their suggested level is .02 at this point? OK. But there is no, you have Riverside, much higher than that. But there is no inducement for them to go down to that, that is just a suggested place to go.

I guess, and then it looked like that they went from, I think in the testimony they went from .06 to .02, based on your stuff. What I would like from you, Dr. Burke, and Mr. Cook, I would really like the science that you have, give me a list of stuff that I need to look at so we can see where we need to go.

I also think that it really makes a huge difference that if we are talking about Riverside being at 1.69 now, what is the cost it is going to have to incur to go down to .06? What benefit are we going to get out of that?

Then also, what is the cost of going from .06 down to .02? I don't mean to be rude, but the idea of them going from .06 to .02 based on your study, where it is a tap in a city throughout, I don't think that you all would do that, Dr. Burke, in the sense if you truly were trying to, now, again, I understand what you were doing and things.

But the problem is that the sweeping generalizations come out of a scientific effort that you generally, I don't think, Dr. Burke, would make based on an effort like that. In other words, that is pretty shaky. So again, I would like to see good studies, what you have there. Somebody at some point, Madam Chair, I really would

like to know the cost and the bang for the buck, as opposed to, as we go to these very ratcheted, why don't we just say zero? Yet there is a reason we don't say zero, because it is expensive to do these. There is a finite amount of money. You have to have some practicality in all this.

Can you comment on that? I think you understand what I am trying to say, not in a very good way.

Mr. BURKE. I absolutely understand, as a former regulator. We have to be practical. We have to move forward in public health protection. But we have to face the realities of our current limitations with pollution. There is an approach to that. The approach is not to cite the cost as a reason not to respond to the science. The approach is to get folks together and say, what can we practically do to reduce population exposure and how can we move forward.

Now, on other pollutants, like benzene, that is in gasoline, it is all over the environment, the goal is zero, because that is a well-recognized leukemogen. The public health goal, and a goal to reduce cancer to one in a million, is a target. But I think we have to get there incrementally. That is possible.

But what we shouldn't be doing is throwing out the science because of the cost. They are two separate issues. I think as we move forward, we have to acknowledge that and have practical steps. Ultimately, it is going to come down to protecting the source water and doing what is feasible, as we have with other pollutants.

So you raise a very important point.

Senator BOOZMAN. I agree, you don't throw out the science because of the cost. But you do have good science to go where you are going, as opposed to emotion and not using common sense.

Mr. BURKE. Absolutely.

Senator BOOZMAN. Sometimes we see that. That is a real concern.

Mr. BURKE. Absolutely.

Senator BOOZMAN. Yes?

Mr. COOK. Senator, thank you, I think you have put your finger on it. But I think most Americans don't understand that under the Safe Drinking Water Act, EPA routinely concludes what a safe level would be, and they come to that conclusion and publish it. Then the regulated level that they enforce is considerably higher, weaker. Precisely because they take into consideration the kind of concerns that you have mentioned, costs. We have limited resources. I think that is also what Professor Burke was getting at.

So one of the questions in our study was, is it there? If I may say, I think if we hadn't looked, there isn't a water utility that is complaining about it now that would have looked on their own. Second, we said in our report, it is a snapshot, and the first thing we really need to consider, apart from the science of toxicity that has been discussed so eloquently, is how widespread is this? We need to look more widely. I think that process is underway now, but it is still voluntary. We may not get many more samples in. Or we may. I hope we do.

Then we can have this discussion. There is no question that we are not worried about rats getting cancer. That is not why we are studying the animals. We are worried because there is an accumulation of evidence in this case that low level exposure does pose a

risk of cancer in people. Because of that, that is why our study really made the impact that it made. If that science hadn't ripened as far as it has ripened, matured as far as it has matured, our study, I think, wouldn't have had any impact. But the fact is, there is science.

Senator BOOZMAN. Thank you, Madam Chair.

Senator BOXER. Thank you so much.

I want to tell you a story about Santa Monica, California, a beautiful place, if you haven't visited it. Senator Boozman, just on your way out, I want to tell you this quick story. In Santa Monica, they found out they had huge amounts of MTBE in the drinking water. The reason they found out is, no one tested, you could smell it. You could taste it. It was a very unsafe level.

So here is what happened. No one, for a period of time, could drink the water. Senator Feinstein and I and members of the House, both Republican and Democrat from California, were able to get some funding. We helped them clean it up and now they can drink the water in Santa Monica.

I can tell you that the worst thing we can do for our economy and for everything else is to ignore these issues. I know you don't want to, and I know what you are pressing toward is the science, the feasibility. So on your way out the door, I am going to tell you, I am going to send you a scientific report on chromium VI that was done in California by one of our universities, which was the key scientific factor in them setting that low standard. It is absolutely true, sometimes you don't go down to zero, because you don't have to go down to zero. Sometimes you have to go down that low.

So it is about protecting the health. But I think it is important to note that the EPA has to do a cost benefit analysis, they have to, in addition to the science. They also have to make a finding that what they are proposing, the standard they are proposing is technologically and economically feasible.

So I just wanted you to feel better about that. I have been steeped in these things for a long time. I think that the arguments you raised are absolutely appropriate. But I honestly think we have answers to them.

So I look forward to working with you and sending you those studies.

Senator BOOZMAN. Thank you, Madam Chair. I appreciate that. Again, though, you have a situation where on the chart several California cities that are quite high compared to .02, and yet, the reality is that the State, the Federal Government, has not allocated those resources. It is, the question is, is .02 where we want to be at? Is it .04, .06, whatever? At this point, that is, I don't think we really know that.

Senator BOXER. Right. In California, we have set .02 as a goal. They reduced it from .06 to .02, because the UC people found, when they looked at the science and they looked at the babies and they looked at the pregnant women, that that was the level you could assure that they would be protected. But it is a goal.

Because of your point that you are making, it has to be technologically, economically feasible. It has to have a cost benefit analysis.

So I honestly think we have the tools at our disposal to do this right. But I also find, and I thank you for your contribution, but I also find it disturbing that not one emerging contaminant has been regulated since 1996. It makes no sense, as the cancer rates skyrocket in this country. Something is wrong there.

All I am asking for is honesty here, from everybody. If people tell me, we can't afford it, that is my job, to help you get help fixing it. I don't like unfunded mandates, and I never have. I want to fund these issues. Because I don't want my people exposed to chromium VI. If the water district is saying, it is too costly, I need to help you. But we shouldn't mix up, as I think Dr. Burke points out, the truth of what it is going to mean to protect our people with the cost. We have to see those two things and we have to work to make sure that we can help these districts protect their people. We don't want children being born whose brains are not developed as they should. We don't want children being born with all kind of birth defects. We found out, for example, with lead, the great news is, when you protect them from exposure, they are fine. Even the ones who had some exposure before.

So I think this Committee has a proud history of working across party lines to protect the public. But I would ask, since I have made a number of comments and I didn't give people a chance to respond, I will go down and have you each make a closing statement. Go ahead, Mr. Cook, and we will go next to Ms. VanDe Hei.

Mr. COOK. Chairman Boxer, I commend you for the hearing. We support your legislation. We supported it for a long time. We have been worried about chromium VI, you have been worried about it for well over a decade officially. So this is not a new subject.

But I think that we stand ready to work with the Committee, not just on the health and assessment side, but also on the funding side. We have worked very cordially with our colleagues at the water associations for many years, supported their requests for additional money, lobbied side by side with them in some cases on contaminant issues. So I think that you are right, this is not a partisan issue, it is not a regional issue, this is an American issue. We want to have clean water, and we have some barriers in the way that we have to deal with.

So thank you.

Senator BOXER. Well, thank you for all your work.

If I could just say, keep on doing what you are doing. If people don't like it, that is their right. I like it. Because I want a snapshot. I don't take it as the last word. I just take it as a warning, as a red flag, as a moment to say, wait a minute, this is a snapshot today and this is a little surprising. I think the group should welcome it, and I think there are some that do. But I certainly welcome it, as Chairman of this Committee, and I encourage you to keep on doing our job. Because at a time of budget deficits, I think Mr. Murray was honest about that, these are tough times, very tough times for everybody.

But the world goes on and our kids are being born, and we are relying on them for our future. We can't stop the science or telling the truth to the American people. These are hard times. We have to look at what we are facing and we have to decide what is most

important. What you are doing is saying, time out, let's take a look at this. We don't want to look at it, but let's do it.

So I am with you all the way in your work. I hope you continue it.

Ms. VanDe Hei.

Ms. VANDE HEI. Thank you, Chairman Boxer.

I guess just a couple of things. I would like to say, in our testimony we did not intend to say that Congress had no role in the Safe Drinking Water Act. In fact, Congress enacted the Safe Drinking Water Act and has a very important role in oversight, to make sure that that Act is implemented the way you intended it. So I would like to make that clear.

We also wonder why there have been no new contaminants regulated, and we believe the process is there to do that. So I would ask that perhaps someone look at EPA's structure, and where the people at Triangle Park, what they are studying versus what the program office needs in terms of data to sort of support a regulation. About 18 years ago, those offices were separated. We got program offices, science was taken away from it. I think that is part of the reason why you don't see new regulations coming down the road.

I would also like to followup with something that Ken mentioned, and that is, there is confusion about what an MCLG is and what an MCL is. We would support one number. We have tried for years to get Congress to look at that issue, because it is hard to explain to somebody why you can have an MCLG of zero and a standard that is different than that. So we would love to work with you on that part.

Senator BOXER. Thank you.

Mr. Murray.

Mr. MURRAY. Thank you, Madam Chair.

I think we are all seeking for meaningful opportunities for risk reduction. We can argue that the Clean Water Act gave us a framework to get to those meaningful opportunities for risk reduction, and we can argue that maybe that process isn't working as well as it should be working.

But we can't replace that process with water utilities chasing the contamiannt du jour. Right now, Fairfax Water is monitoring for 30 plus compounds, new compounds over the last year, year and a half, that have been raised as contaminants of concern. We don't know what to say about it. We post the data on our website, and we don't have decent health effects information to speak intelligently to our customers about it.

We remove a lot of them. But to what levels is it safe? So I think your concerns with how we can improve the process of getting to meaningful risk reduction is real. Thank you.

Senator BOXER. Thank you.

Dr. Burke.

Mr. BURKE. I think the most important thing that the Committee can do is break the logjam. You are absolutely right about no movement forward since the mid-1990's. Even that movement has been quite little. We are actually stuck back in the late 1970's, I think, in Safe Drinking Water. I think it comes down to this: prevention is not a bad word. In public health, it is what we do. Lack of abso-

lute certainty and arguments about cost, and there shouldn't be an excuse for lack of action.

So I would hope that as we move forward, you can use the science, apply it better, take a hard look at the way EPA does things, and streamline it so that we can better protect public health.

Senator BOXER. Thank you so much, all of you.

We will have our test case with perchlorate and chromium VI, because EPA is moving ahead. I hope our friends at the water agencies will work with us. You are going to have a chance to publicly comment. I will be looking forward to what you say on this issue of perchlorate. It is all across the country, it is all over the place. We already know the problem it causes with thyroid.

So I hope you will work with us. Look, I think that straightforward, honest declarations here are in order. If we find that perchlorate is a danger, and we have proved it to the water districts and we have proved it to everyone, I think the water districts should support it and say, we will be honest, we are going to need help in doing it. Let's get to that point, rather than try to use every delaying tactic, so that we just continue on with increasing cancer rates, with, I have a bill that will get EPA more involved in coordinating cancer cluster action.

When we hear people in different States that say, we don't know what is happening, we don't know why there is this hot spot of leukemia over here, and why there is a hot spot of other problems over here. Right now, there isn't a way to respond except with the local people doing something, the EPA maybe being called and what we are trying to do is get all this information under one roof and try to answer these questions. A lot of the questions could lead back to water.

We have a cancer hot spot, it was brain tumor, it was a hot spot of brain cancer in children in Idaho. Senator Crapo and I, across party lines, have gotten together to move forward with this cancer cluster bill. It may lead to the water. Because as it turns out, we found out the one thing we know, there was mining, and a lot of those toxins went into a lake, and the kids swam in that lake. I don't know if it was in the drinking water, we don't know all that.

But the point is, it is our responsibility to protect the health and safety of our people, all of us. This is our job. Whether you are a non-profit, a profit, we need to all be mindful of that. We can't harm the people.

My role as Chairman here is just to point out that we are not moving quickly enough on some of these contaminants that have been around a long time. There is a lot of information. States like Massachusetts, New Jersey, California, are moving forward. It is really our job. Why should a person in California be safer from chromium VI than he is in any other State? It is not right. It is just one country under God. We have to protect all of our people.

So I am going to look forward to working with all of you, because you are all a piece of this puzzle. I think in the spirit of cooperation that I hope we will continue to have that we will be able to get behind some of these obvious problems and solve them. Because that is our job.

I want to thank each and every one of you for being here and for your very honest, straightforward testimony. We stand adjourned, and thank you.

[Whereupon, at 12:40 p.m., the committee was adjourned.]

[Additional material submitted for the record follows:]

STATEMENT OF STEVE LEWIS, CITY MANAGER, CITY OF NORMAN, OK

Madam Chairwoman and members of the Committee, thank you for the opportunity to testify. I am Steve Lewis, City Manager of Norman Oklahoma and responsible to our citizens for the safety of their drinking water. The city of Norman first learned of the Environmental Working Group (EWG)'s reported levels of Chromium 6 in our water supply through the news media. Norman, Oklahoma was identified as having one of the highest levels of Chromium 6 of the 35 cities tested. In spite of our requests, the EWG has refused to share the sampling data details with us, so confirmation of their report has not been possible. What we do know is that a single water sample was used to undermine public confidence in the safety of our water supply.

Total chromium is regulated by the EPA as a primary drinking water contaminant with a maximum contaminant level (MCL) of 100 parts per billion (ppb). This level of protection was set by the EPA in 1992 based on the best available science. Two subsequent EPA reviews concluded that the total chromium MCL is still protective of public health and as precautionary as the current science dictates. We applaud EPA's continued diligence to regulatory rulemaking based on good science and look forward to the result of the current Chromium 6 scientific review to be finalized later this year.

In Norman, total chromium is tested in accordance with requirements of the Oklahoma Department of Environmental Quality (ODEQ) and the United States Environmental Protection Agency (EPA). Approximately 30 percent of our water supply is groundwater, where chromium occurs naturally. Chromium testing results are reported annually to our customers in our Consumer Confidence Report (CCR); the latest CCR reported total chromium values for our groundwater wells between 11 and 86 ppb, all of which are below the regulatory limit of 100 ppb. Seven new water wells have been tested for total chromium since issuance of the CCR and their levels range from "non-detect" to 80 ppb. The surface Water Treatment Plant, that treats Lake Thunderbird water, has total chromium levels of "non-detect". All of our potable water, whether groundwater or surface water, is 100 percent in compliance with all current EPA regulations.

Based on EPA's suggested recommendations, the city of Norman has begun comprehensive testing specifically for Chromium 6 at each of our wells as well as within the distribution system. With this additional information, Norman will be in a better position to address our customers concerns and to respond if a change in the chromium regulation is promulgated.

The residents of Norman may rest assured that the city of Norman is committed to providing water that is safe to drink for all members of our community. As previously noted, the EPA is currently evaluating new health effects data on Chromium 6 and that evaluation is expected to be complete in late 2011. Norman is prepared to vigorously respond in a way that protects public health and meets Federal and State of Oklahoma standards.

Consistent with our commitment to provide safe drinking water, the Mayor and I have appointed a Chromium 6 Working Group that will be constituted of senior city management and three members of the City Council. There will also be representatives on a technical advisory committee who bring expertise in chemistry and geology, public health, and water system engineering to work with this group as we continue to monitor the chromium public health issues.

But more is needed from our regulators, and this is my main point to you today. We are in a new age of communication and information. The EWG report was designed to alarm the American people as to the safety of their drinking water and caused them to question the ability of utilities like Norman to protect the public health of our customers; when, in fact, the public water supply system in Norman Oklahoma provides the safest and most economical drinking water option that good science and good public health policy would dictate.

We need more from our regulators than just reports on the technical details of rules and rulemaking. We need our regulatory bodies, especially EPA, to engage the American public in an open and honest discourse about the safety of their drinking water with the same media approach that our detractors use. EPA's December 2010, response to the EWG study was helpful, but did not provide any specific guidance

regarding how to respond to concerned customers. We need to be proactive, not reactive.

The safety of the American Public's drinking water is one of the most impressive success stories of the last 100 years. Protecting public health means more than acting on the good science that EPA develops and fosters. It means providing the confidence to our citizens and customers that their drinking water is the safest source of water available to them. To accomplish the complete mission of protection of the public health, our industry must be able to communicate our message more effectively than those who would have our customers think otherwise. America's drinking water is safe, reliable and economical. And we can all be proud of that fact.

Norman will continue to work closely with the ODEQ and the EPA to assure our drinking water is safe for human consumption. Norman continues to support research by the EPA, the Water Research Foundation (WRF), and other government and scientific organizations. I appreciate the opportunity to testify and demonstrate Norman's actions, and I am pleased to respond to any questions you may have.

RESPONSE BY STEVEN LEWIS TO AN ADDITIONAL QUESTION FROM SENATOR BOXER

Question. Describe the importance that utilities place on ensuring that they provide safe drinking water that protects public health, including the health of pregnant women, infants, and children, from dangerous contaminants.

Response. The City's foremost priority is to provide safe drinking water to the community. A safe and reliable water supply is the "life blood" to any community and the utility employees and City leaders take that responsibility very seriously. All utility employees must be licensed to be able to work at the water treatment plant. Last year alone, we performed over 170,000 water quality tests (some every 15 minutes) to insure the water meets all State and Federal quality regulations.

RESPONSES BY STEVEN LEWIS TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. Mr. Lewis, I want you to know that I understand the commitment of the city of Norman to providing water that is safe to drink and protective of public health for all members of your community. I remember in 2006, Norman addressed a similar challenge regarding a federally mandated reduction of the MCL for arsenic from 50 ppb to 10 ppb. I know we helped the city of Norman secure $1.5 million in Federal Grant moneys between 2005 and 2006 to help the city perform major modifications to its groundwater supply and remain in compliance with the new arsenic rule. How much is Norman spending to deal with this new Chromium 6 report?

Response. We appreciate your help and concern in meeting the previous mandated reduction of arsenic in the drinking water. Overall the city of Norman spent over $11 million to deal with the change in arsenic regulations, which caused a significant rate increase to our customers.

We are currently performing additional testing and reviewing alternatives to deal with a potential change in the chromium regulation. We are also investing a considerable amount of time to educate our customers about the issue and have formed a senior management committee and a technical working group to help us determine the status of this issue within the scientific community.

With regards to potential costs for treatment of chromium 6, we cannot make an exact determination without guidance from the Federal Government regarding appropriate treatment technologies and, if applicable, what the Maximum Contaminant Level (MCL) may be for chromium six, or total chromium. Since the scientific review necessary to determine these levels is incomplete, this point it is like hitting a moving target. However, our current engineering estimates run anywhere from about $44 million to over $100 million, depending on the mandated removal levels.

Question 2. Have you received any more communication from EWG regarding where and when the sample they tested was obtained? How would that information help you understand the implication of this report?

Response. We have received information from EWG as to when the sample was taken, but not as to where the sample was taken. The point was not whether or not the sample resulted in a chromium reading. We acknowledge there is naturally occurring chromium in the Garber-Welling aquifer. The issue is to whether the test could be duplicated, whether there was adequate laboratory QA/QC, and alarming our customers about a substance where we already meet Federal regulations.

Question 3. Please explain the difficulty that the city has in communicating with citizens about the EWG report and what it means for them.

Response. As mentioned, the EWG report was unnecessarily alarming to our customers about a substance that we currently monitor and for which we have always been below the federally mandated regulatory limits. The EWG report also stated that chromium is a 'contaminant' and 'pollutant' which was misleading since the chromium in our supply results from naturally and commonly occurring deposits in the earth's crust. Because of the alarming nature of the report, customers believed there was an acute (i.e. immediate) danger to their health from drinking the water, not realizing that the possibility of any ill effects would be from continuous consumption and only at levels above the regulatory MCL, and would take many years to develop (if at all). The report caused many, many customers to distrust the water utility and the City, when we work hard to protect the public health and to meet all State and Federal regulations.

Question 4. What is the expected background concentration of chromium in your source water? Is your source water from groundwater or surface water or a combination? What causes the background concentrations of chromium (trivalent and hexavalent) in your source water to vary?

Response. Water for the city of Norman comes from two sources: groundwater and surface water. Lake Thunderbird is a reservoir that Norman shares with Del City and Midwest City. On an annual basis, about 70 percent of Norman's water comes from this Lake. Water tested from LakeThunderbird had a result of 9ppb for total chromium. The other source of water for Norman is from the Garber-Wellington aquifer. This is a large aquifer that serves many communities East of Oklahoma City. We currently have 26 operating wells in this aquifer. Water from the aquifer tested anywhere from 10ppb to 90ppb. The chromium in the Garber-Wellington aquifer is naturally occurring.

Question 5. How can chromium be removed form public drinking water systems?

Response. We are reviewing engineering option and opinions as to how to remove chromium from water. Some of the options include, a lime softening plant, ion exchange and membrane filters. Any of these options will be a huge expense to our customers and significantly increase their water rates.

Question 6. I am always concerned about how cities and local governments are dealing with the unfunded mandates that are passed down from the Federal Government. I know stricter drinking water standards and clean water standards force many of our communities to either raise rates or seek additional funding from other sources. How can we ensure that utilities like yours are not facing the constant threat of having to raise rates and still meeting drinking water standards?

Response. The city of Norman operates the Water and Wastewater utilities as 'enterprise funds', meaning the customers that use the service, pay for the service. So, all the utility revenues must come from the customers. As mentioned in a previous question, we had to significantly increase water rates to meet the change in the arsenic rule in 2006. Now, depending on what level the new chromium MCL is determined to be, we will have to increase the water rate to our customers.

As previously stated, we see it as our duty to protect the public health at all times and work hand in hand with Federal and State regulatory agencies to address new concerns that may appear on the horizon. As persons that could potentially impact how the Federal Government responds to the Chromium 6 issue, we only ask that you ensure that if a new regulation is promulgated that the current scientific process utilized to determine human health impacts from a particular component is maintained and "sound" scientific reasons are provided for this mandate to our utility. In addition, we ask that these mandates, whatever they may be, have funding mechanisms in place that provide some measure of relief for utilities, such as ourselves, to protect the public health to the best of our abilities.

Question 7. Utilities have raised concerns with my office about EPA's decisions regarding the technical assistance to monitor for chromium 6, including the lack of a fully validated analytical method, inability for the agency to collect and use the data generated and lack of explanation of how to communicate the health effects to the public. How can EPA clarify and assist Norman with the technical assistance it provided?

Response. As you are aware, when we first learned about a proposed chromium MCL in the parts per trillion we were shocked to learn there was not a laboratory in the region that could provide testing results at that detection limit. In addition, the chance for a laboratory error (either in sample collection, storing or testing) when testing for substances in the ppt range is very probable.

Question 8. Are you supportive of a drinking water regulatory process that relies on science to help guide decisionmaking? Do you think the current SDWA provides

a clear, transparent, science driven process for making decisions regarding drinking water regulations?

Response. The city of Norman supports the EPA in their regulatory process that uses science to determine their decisionmaking. We would be disappointed if regulations were determined based on inconclusive data, bullying by special interest groups, fear or a 'knee jerk' reaction to assumptions.

Question 9. Is there anything else you would like to add for the record?

Response. Not at this time.

RESPONSE BY STEVEN LEWIS TO AN ADDITIONAL QUESTION FROM SENATOR LAUTENBERG

Question. If not for EWG's monitoring of your water systems, the public would probably not be aware of the presence of chromium six in their drinking water. Could stronger Federal monitoring requirements help you catch these problems earlier and allow you to address them?

Response. Our community, our customers, and we as a utility were already aware of the level of chromium in the water supply. Each year we publish and mail to each customer the Consumer Confidence Report (CCR). This report lists compliance information with respect to Federal requirements for our drinking water supply. As an added service to our customers, we also provide this information on the City's website that is available any time. The EWG report created an unnecessary alarm in the community about a substance that is already regulated and that we currently meet the Federal Maximum Contaminant Level (MCL). In our opinion, stronger Federal requirements for monitoring would not have any impact on this matter as all of the required information was available to our utility and our customers through the normal Federal monitoring requirements.

The EWG report put 'the cart before the horse' so to speak, by making alarming inferences about a substance before there is agreement within the scientific and regulatory community regarding their assertions. As stated, we (water utilities all over the nation) work hard and are diligent in providing safe, potable water to all our customers. We strive and promise to meet all State and Federal regulations.

RESPONSE BY STEVEN LEWIS TO AN ADDITIONAL QUESTION FROM SENATOR CARPER

Question. How can the Federal Government focus its efforts to improve drinking water quality on pollution prevention? What kind of tools and programs exist to prevent the pollution of drinking water and what new ones are needed?

Response. Analytical technologies and techniques continue to improve and, as a result, we are able to find more substances in the water than ever before. Detecting substances in the parts per billion (ppb) and parts per trillion (ppt) ranges reliably and consistently outpace the State agencies' and local laboratories' ability to duplicate these tests. In addition, the Federal Government and EPA must insure that in addition to simply detecting additional substances in water, sufficient scientific basis exists to determine if the substance poses a problem to the population. This is critical because of the high cost to the community to remove these substances. New federally mandated drinking water regulations without Federal financial assistance will directly impact how much our customers pay for their water.

○