Testimony of
Andrew D. Brunhart, General Manager
Washington Suburban Sanitary Commission
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Introduction

Chairman Davis, Ranking Member Waxman and Members of the Committee, thank you for inviting me to appear today as we come together to discuss a shared problem worthy of attention. I am Andrew Brunhart, General Manager for the Washington Suburban Sanitary Commission and I am honored to represent our 1,424 employees dedicated to providing safe, clean water to our communities in an environmentally and fiscally responsible manner. That is not just a lofty statement that we bring out at our annual meetings. That is our mission and it drives the work we do day in and day out.

We are here today to talk about a very specific topic: Ova Pollution in the Potomac. But I believe this topic is part of a larger discussion that requires leadership from all levels of government and industry to resolve. What is the value of water in our society and what legacy are we leaving our children in our rivers, streams, bays, and oceans? Being in the business of providing clean, safe water and treating what our communities send down the drains, I think about this question daily. I think about the existing science and technology we currently use to provide a service many in this country take for granted. The 20th Century innovators ensured that most Americans can turn on a tap and receive clean water on demand. This is an achievement we should be proud of and the WSSC has been an integral part of that legacy.

WSSC was founded in 1918 by great pioneers and innovators in the water industry. One of the people who worked on the original surveys that led to the creation of the Commission was the world-renown engineer, Abel Wolman. Wolman is widely known as the father of modern sanitary engineering. Among his many contributions, perhaps most significant was his development of chlorination - which made possible the adoption of simple, effective methods to curb waterborne diseases (typhoid and cholera, most notably). Since that time, WSSC employees have set standards that many around the world aspire to. We are committed to providing the best product possible to our 1.6 million customers throughout Prince George's and Montgomery Counties in Maryland. Throughout our entire history, WSSC has never had a water quality violation. We consistently meet or exceed all drinking water standards and we are very proud of that achievement.

Yet we are not content with our past achievements. The WSSC, working with our peers around the nation and the world, looks toward continuous improvements in science,

technology, investments, research, and business practices to get better at what we do. One example is our commitment to the American Water Works Association Research Foundation (AwwaRF). The WSSC is a founding member of AwwaRF and continues to play a proactive role within this member-supported, international, nonprofit organization that sponsors research to enable water utilities, public health agencies, and other professionals to provide safe and affordable drinking water to consumers. In addition to proactive participation in the AwwaRF decision making and research review processes, the WSSC contributed over $1.5 million to AwwaRF since 1983 to further their research efforts and scientific explanations. (See Attachment A)

That is why, I believe, we are here today. As an industry leader in providing safe, clean water and treating wastewater for our communities, the WSSC is equally as concerned as this Committee and all of your panelists about the reports of male smallmouth bass in the Potomac watershed found to be bearing eggs. This is not a new concern for the WSSC or for me personally. It was about this time last year that the Chair of WSSC and I met with Congressman Van Hollen to discuss EDCs and the potential impact on human health. I would like to take this opportunity on the record to thank Congressman Van Hollen for his steadfast commitment to both the environment and his constituents.

The WSSC did not create this situation, but I assure you, we are as committed as this Committee and every panelist here today to working with all interested stakeholders to resolve it.

EDC Background

As this is not a new concern for the WSSC, I would like to provide some of the facts we have gathered over time. (See Attachment B for details) Emotive speculation makes great headlines, but I believe we must step back and allow the science to drive us forward. While this is a problem that must be recognized and agreed upon as a national priority, the problem definition and eventual solutions must be based in and driven by science.

Recent studies of fish health in several sub-watersheds of the upper Potomac River were initiated by the US Geological Survey (USGS) as a result of lesions, parasites and die-offs, unexpectedly identified reproductive abnormalities (e.g., feminization of male fish or “intersex” condition). USGS researchers concluded that the fish have been affected by some type of environmental contaminant that apparently disrupted or modified the fish endocrine system (i.e., glands and hormones that control growth and development) as well as potentially weakening their immune systems. Similar findings have been reported in other areas of the United States. In fact, USGS conducted similar studies in 139 streams in 30 states and found 80 percent of those streams faced similar problems to those we face in the Potomac Watershed. The potential effects of endocrine disruption are worldwide and the wildlife serves as the sentinels. (SOURCE: Dr. Vicki Blazer, USGS, presentation at DWSP Partnership sponsored Workshop, September 2005.)

State of the Science – Virtually concurrent with the fish studies, USGS released findings of a national reconnaissance of stream water quality, which identified almost ubiquitous presence at very low concentrations (i.e., sub-parts per billion or parts per trillion) of dozens of organic wastewater compounds, including pesticides, industrial and household products chemicals such as plasticizers and flame retardants, detergents, antimicrobials, non-prescription drugs, prescription pharmaceuticals, natural and synthetic hormones and fragrances. A sub-set of these chemicals is known to have endocrine disrupting effects on fish, based on controlled laboratory studies. (SOURCE: Kolpin *et al.* (2002) *Environmental Science & Technology*, vol. 36, no. 6, pp.1202-1211.)

Major advances have been made in analytical detection methods, which allowed the chemicals to be identified in the environment at ultra-low concentrations. This advancement is not in harmony with our scientific understanding of chemicals impacts on human health which causes confusion. Thus, there is a great need for scientific advancing. While occurrence of some chemicals in our streams and observed impacts on fish indicate that we face a significant environmental issue (for fish and wildlife), there is no reliable research that indicates occurrence of similar impacts in the human. Human exposures to chemicals are not similar to fish exposure which live in water for their entire life and are subject to bioaccumulation and bioaugmentation of toxic chemicals. The scientific focus of regulators has been on toxicity of pesticides (e.g., cancer and birth defects); whereas, a new effort is now being given to "sub-chronic" (i.e., low-dose) and non-fatal abnormal effects outcomes such as endocrine disruption. The practice of extrapolating laboratory observations of animal toxicity and adverse effects to human health effects is not yet adequately developed for endocrine disrupting chemicals (EDCs).

The USGS has extended its occurrence studies of micro-contaminants in ground water, sediments and drinking water (intake raw waters). (SOURCE: Dana Kolpin, USGS, presentation at DWSP Partnership sponsored Workshop, September 2005.) Both the Potomac and Patuxent water plant intakes were tested once each in 2002, and traces at the part-per-billion level of herbicides, household products constituents (flame retardant and detergent) and common drugs (e.g., caffeine and a nicotine byproduct) were found. Fewer than 1/3 of the substances detected are suspected fish EDCs. No regulated human health maximum contaminant levels (MCLs) were violated. (SOURCE: Ingrid Verstraeten, USGS in email to Plato Chen, WSSC.) Sources of micro-contaminants appear to include both point sources (e.g., wastewater treatment plant effluent, industrial effluents, and confined animal feeding operations) and non-point sources (e.g., storm water runoff from urban and agricultural land). Meanwhile, the drinking water industry has sponsored more than a dozen studies of EDCs, including their treatability under conventional water treatment processes and by advanced technology processes. (SOURCE: Kim Linton, AwwaRF, presentation at DWSP Partnership sponsored Workshop, September 2005.) Conventional processes such as sedimentation and chlorination (i.e., disinfection) have been proven to remove or degrade many of the trace substances, and advanced oxidation (e.g., ozone), absorption by activated carbon and nano-filtration/reverse-osmosis have been demonstrated to significantly reduce contaminant concentrations in finished drinking water. (SOURCE: Snyder *et al.* (2003) *Environmental Engineering Science*, vol. 20, no. 5, pp. 449-469.)

Challenge for Utilities – The ubiquitous occurrence of ultra-low concentration industrial and pharmaceutical contaminants in surface waters and drinking source waters is a national level concern that cannot be addressed adequately in a piecemeal manner by individual water utilities. In the case of surface water supplies drawn from a large watershed such as the Potomac River, an individual utility does not have jurisdiction over the multiple states and land uses in the headwaters. Accordingly, the research, funding and grants, guidelines and policy must be coordinated and sponsored at the national level. Government agencies can play a direct part in this (e.g., EPA, USGS, USDA, FDA) along with nationally influential independent or trade research agencies (e.g., NRC/NSF, AWWA-RF) and universities. Utilities can contribute limited funding and expertise to these efforts.

Despite the national nature of this challenge, water utilities including WSSC have been proactive. They support and fund advanced research via AwwaRF and are pursuing source water protection. WSSC also uses advanced wastewater treatment in all of its plants. Given the national nature of this concern and its complexity requires leadership and funding from the government and other key stakeholders. In the long run, implementation of pollution prevention and source control best management practices offers the fairest approach to reduce impacts to drinking water supplies. National level partnerships with the chemical, pharmaceutical and agricultural industries may be a starting point.

Realities in Water Utility Industry

Water utilities are often targets when situations like this arise. Although the water WSSC provides to our customers consistently meets or exceeds all standards set for clean drinking water, ours is not always a clean business. We must treat everything that literally goes down the drains. Whether flushing household cleaning products, expired prescription medications, garbage, oils, or a host of other items that common sense tells us should not be in our water, water utilities like the WSSC are expected to treat the wastewater collected by our systems.

While our record is exemplary, we realize we are not perfect. Any endeavor involving human beings will experience mistakes. Yet, we have taken every precaution possible to train our employees; invest in and upgrade our infrastructure; and contribute to ongoing science, research and development for continued improvement in every aspect of our business lines.

The water business is one of gravity. We are continually challenged by what comes down the drains and downstream. Contributing to the treatment challenges are those upstream that send their runoff our way.

Role Government Can Play

Government has and can continue to play a critical role in the legacy we leave our children through a consistent commitment for leadership, focus, and funding. Neither the WSSC nor any other utilities testifying today created this situation and none of us can

solve this problem alone. Congress should play a significant role in addressing the required scientific research, but you should be wary of simply creating additional regulation to patch the problem. I believe EPA possesses the necessary statutory authority and regulations to address this problem. What the EPA has been lacking is consistent funding commitments from Congress.

I would like to offer two suggestions I believe to be constructive and urge this Committee to consider them for possible action.

First, a Watershed Restoration Congressional Caucus should be created at the inception of the 110th Congress to serve as a real working group for all stakeholders. This group should include Members of Congress from across the nation, water utilities and associations, environmental groups, agricultural groups, corporations, developers, pharmaceuticals, EPA, Army Corps of Engineers, USGS, and state governments. Congressional leadership would provide the focus in briefings, legislation development, funding considerations, and education. The goal should be to push the science and research forward to keep us ahead of the curve. It would be a forum where solutions could be approached in a comprehensive, proactive way that would allow for input on Congressional authorizing and appropriating language, as well as regulations and grant programs.

Second, Congress should restore funding to both the EPA's State and Tribal Assistance Grant (STAG) program and previous AwwaRF appropriations. STAG grants have been declining for the past decade. Restored funding is critical to proactively address the science and research requirements to protect our water supply. In addition, AwwaRF has also seen a steady decline in federal commitments to its research efforts, placing heavier burdens on the approximately 900 drinking water utilities and other members that today provide more than 80% of the $30 million annual budget. Congress must reaffirm its commitment to this national research organization as it works to answer our national drinking water and environmental questions. (See Attachments C and D)

Summary

While this issue is of concern for water utilities, it is a major environmental issue worthy of serious national attention. We should ask ourselves the question again: What is the value of water in our society and what legacy are we leaving our children in our rivers, streams, bays, and oceans?

I am fully confident that with continuous funding commitments from Congress and the EPA along with investments made by industry leaders like WSSC, we can push the science to understand this situation better. It is important that we create a forum like a Congressional Caucus where Members of Congress, their staff, and stakeholders can work through issues together as you consider various policy options that have direct and indirect effects on EDCs in our waterways.

At WSSC, we take the concerns of our customers very seriously and we respect their opinions on this issue. Our goal is to provide clean water to our families today while

ensuring our legacy of clean water for our children and their children. Most of us at WSSC are not just employees but customers as well. We drink WSSC water too and we want it to be just as safe for our families as those around us. We look forward to working with this Committee, your colleagues throughout Congress, the EPA, our peers, environmental groups, and other industry stakeholders to continue exceeding safe water standards for our communities and those across America.

Thank you Mr. Chairman and I look forward to answering any questions you or the Committee might have.

ATTACHMENT A

American Water Works Association Research Foundation (AwwaRF)

Background on AwwaRF

The Awwa Research Foundation (AwwaRF) is a member-supported, international, nonprofit organization that sponsors research to enable water utilities, public health agencies, and other professionals to provide safe and affordable drinking water to consumers. Its mission is advancing the science of water to improve the quality of life.

AwwaRF works to achieve the mission in three ways:

- By sponsoring research. AwwaRF sponsors an anticipatory and scientifically credible research program that is responsive to the needs of the water supply community.

- By developing knowledge. AwwaRF identifies the practical benefits of research findings and delivers this knowledge to stakeholders throughout the water supply community.

- By promoting collaboration. AwwaRF cultivates partnerships with organizations around the world to leverage funding and share expertise.

The Foundation was established in 1966 to provide a centralized, practical research program for the drinking water community. Its research program, which is highly respected as being one of the most scientifically credible and best-coordinated in the world, focuses on four main goal areas: high-quality water; efficient and customer-responsive organization; infrastructure reliability; and environmental leadership. Specific research projects focus on treatment, distribution, resources, monitoring and analysis, management, and health effects.

The Foundation is comprised of, and largely funded by, member organizations that voluntarily subscribe in order to support and benefit from the water-related research that the Foundation sponsors. Close to 900 water utilities worldwide currently subscribe to the Foundation. In addition, more than 50 water-related consulting firms and manufacturing companies are subscribers. The majority of our subscribers are in the United States. Others are located in Canada, Australia, and Europe. Our collaborating partners are situated all over the globe.

Since its inception, the Foundation has sponsored more than $370 million in research, represented by more than 600 completed research projects. Subscribers provide more than $10 million annually to fund research. This money is supplemented each year by several million dollars allocated by the U.S. government and is leveraged through collaborative partnerships with other research organizations.

In addition to monetary support, the high level of research activity sponsored by the Foundation would not be possible without the efforts of more than 700 subscriber

volunteers who serve on committees and councils, providing expertise in a variety of research topic areas.

Subscribers steer the Foundation in almost every respect. The Foundation is governed by an elected board of trustees, most of whom are water utility managers. The board also includes representatives appointed by the Association of Metropolitan Water Agencies, the National Association of Water Companies, and the American Water Works Association, as well as three members elected from the Foundation's subscriber base.

The research agenda is developed in consultation with subscribers, drinking water community experts, working professionals, and technical advisory groups. Hundreds of suggestions are examined to identify high-priority projects most crucial to the drinking water community. The final research agenda is then approved by the board of trustees.

Each approved project is assigned an advisory committee of volunteer experts in a specific area of study. The advisory committees evaluate proposals, select contractors, and monitor projects through to completion.

A full-time staff of more than 40 employees serves as the coordinating group for the various research functions. Staff includes professionals with expertise in biological sciences, chemistry, engineering, management, and communications.

Summary of On-going and Completed Research Sponsored by AwwaRF

Completed/Published Projects

1. Endocrine Disruptors and Pharmaceuticals in Drinking Water #2598
Examines potential implications of endocrine disruptors and pharmaceutically active compounds in drinking water and wastewater. Provides an overview of the health effects, occurrence, potential treatment options, and mainly the research agenda for future years. Research partners: WERF and WRF. Published in 2001.

2. Assessment of Waters for Estrogenic Activity #2642
Modifies, validates, and utilizes in vitro screening tests for the presence of estrogenic compounds in water samples. Also performs in vivo tests in combination with in vitro tests to determine the significance of the presence of estrogenic compounds in source waters, finished drinking waters, and effluent streams. Published in 2003.

3. Risk Communication for Emerging Contaminants #2776
Develops, tests, and evaluates proactive strategies and tools for utilities to identify and track emerging drinking water contaminants (e.g., endocrine disruptors, pharmaceuticals, MTBE [methyl tertiary-butyl ether], radon, etc.). Also provides strategies and tools for utilities to proactively and effectively communicate information to the public about the emerging contaminants. Published in 2004.

4. Occurrence Survey of Pharmaceutically Active Compounds #2617
Investigates the occurrence of a limited number of pharmaceutically active compounds in source and treated waters. Uses findings to further define and prioritize future research on

the occurrence, treatment, and potential public health impacts of pharmaceutically active compounds in water. Research partner: WRF. Published in 2005.

On-Going Research

1. Toxicological Relevance of Endocrine Disruptors and Pharmaceuticals in Drinking Water #3085
   Will conduct an extensive literature review on the known toxicity of EDCs and pharmaceuticals including naturally occurring EDCs and pharmaceutically active compounds. Will analyze various raw and finished drinking waters for a suite of EDCs and pharmaceuticals, and will screen various bottled waters, beverages, and food products. Will also use an in vitro bioassay to assess the estrogenicity of various waters, beverages, and foods. Will conduct risk assessments for chemicals of interest based on findings. Tailored Collaboration partner: Southern Nevada Water Authority.

2. Evaluation of Conventional and Advanced Treatment Processes to Remove Endocrine Disruptors and Pharmaceutically Active Compounds #2758
   Will determine removal efficiencies of conventional and advanced treatment processes for compounds classified as endocrine-disrupting chemicals (EDCs) and pharmaceutically active compounds (PhACs). Will ultimately predict contaminant removal a priori by a given treatment process or set of treatment processes.

3. Evaluation of Triclosan Reactivity in Chlorinated and Monochloraminated Waters #2902
   Will study the reaction of triclosan, a commonly used anti-microbial agent in personal care products, with free chlorine and monochloramine. Will characterize the kinetics, mechanism, and products of interactions, evaluate the influence of water quality on the reaction rates, and develop mechanistic models that describe the reactions occurring.

4. Toxicological Relevance of Endocrine Disruptors and Pharmaceuticals in Drinking Water #3085
   Will conduct an extensive literature review on the known toxicity of EDCs and pharmaceuticals including naturally occurring EDCs and pharmaceutically active compounds. Will analyze various raw and finished drinking waters for a suite of EDCs and pharmaceuticals, and will screen various bottled waters, beverages, and food products. Will also use an in vitro bioassay to assess the estrogenicity of various waters, beverages, and foods. Will conduct risk assessments for chemicals of interest based on findings. Tailored Collaboration partner: Southern Nevada Water Authority.

5. Removal and Fate of EDCs and Pharmaceuticals in Bank Filtration Systems #3136
   Project update not available. Partnership with Water Technology Center, funded in 2005, completion date TBD.

6. Pharmaceuticals, Personal Care Products and Endocrine Disruptors--Occurrence, Fate and Transport in the Great Lakes Water Supplies and the Effect of Advanced Treatment Processes on Their Removal #3071
   Will investigate the occurrence and fate of selected EDCs/PPCPs in surface water, and their removal by conventional ozonation and advanced oxidation treatment processes. Will examine the concentrations of target compounds before and after various treatment processes and as a function of pertinent parameters including ozone dose, hydrogen peroxide dose, pH, alkalinity, total organic carbon, turbidity, and temperature. Tailored Collaboration partner: Windsor Utilities Commission.

7. Impact of UV and UV - Advanced Oxidation Processes on Toxicity of Endocrine-Disrupting Compounds in Water #2897
   Will assess, through the use of bioassays and chemical analyses, the degradation, by-product formation, and subsequent toxicity of endocrine-disrupting compounds following UV and UV-oxidation treatment of water.

8. Comprehensive Utility Guide for Endocrine Disruptors and Pharmaceuticals In Drinking Water #3033
   Will synthesize existing knowledge on endocrine disrupting compounds (EDCs), pharmaceutically active compounds (PhACs), and personal care products (PCPs) in drinking water supplies. Will also include what is known about health effects, analysis, occurrence, and behavior in drinking water treatment processes for this broad range of compounds.

9. Pharmaceuticals, Personal Care Products and Endocrine Disruptors--Occurrence, Fate and Transport in the Great Lakes Water Supplies and the Effect of Advanced Treatment Processes on Their Removal #3071
   Will investigate the occurrence and fate of selected EDCs/PPCPs in surface water, and their removal by conventional ozonation and advanced oxidation treatment processes. Will examine the concentrations of target compounds before and after various treatment processes and as a function of pertinent parameters including ozone dose, hydrogen peroxide dose, pH, alkalinity, total organic carbon, turbidity, and temperature. Tailored Collaboration partner: Windsor Utilities Commission.

10. Toxicological Relevance of Endocrine Disruptors and Pharmaceuticals in Drinking Water #3085
    Will conduct an extensive literature review on the known toxicity of EDCs and pharmaceuticals including naturally occurring EDCs and pharmaceutically active compounds. Will analyze various raw and finished drinking waters for a suite of EDCs and pharmaceuticals, and will screen various bottled waters, beverages, and food products. Will also use an in vitro bioassay to assess the estrogenicity of various waters, beverages, and foods. Will conduct risk assessments for chemicals of interest based on findings. Tailored Collaboration partner: Southern Nevada Water Authority.

11. Evaluation of Triclosan Reactivity in Chlorinated and Monochloraminated Waters #2902

Will study the reaction of triclosan, a commonly used anti-microbial agent in personal care products, with free chlorine and monochloramine. Will characterize the kinetics, mechanism, and products of interactions, evaluate the influence of water quality on the reaction rates, and develop mechanistic models that describe the reactions occurring.

12. Evaluation of Conventional and Advanced Treatment Processes to Remove Endocrine Disruptors and Pharmaceutically Active Compounds #2758
Will determine removal efficiencies of conventional and advanced treatment processes for compounds classified as endocrine-disrupting chemicals (EDCs) and pharmaceutically active compounds (PhACs). Will ultimately predict contaminant removal a priori by a given treatment process or set of treatment processes.

ATTACHMENT B

Briefing on Endocrine Disrupting Chemicals (EDCs)
WSSC White Paper

Background and Challenges

1-Background

Development and body functions of many organisms are directed by a regulatory system called the endocrine system. The system includes a center in the brain (hypothalamus) and numerous glands. The glands produce compounds (hormones) at several locations in the body and distribute them via the blood stream as chemical messengers to regulate the actions of tissues located in other parts of the body. The hypothalamus constantly monitors the hormone levels in the blood. If levels of a hormone get too high or too low, the hypothalamus sends signals to the gland that produces this hormone to gear up, slow down, or shut off to keep the 50 trillion cells in our body fully coordinated. Endocrine Disrupting Chemicals (EDCs), mostly man-made, are those which could interfere with this regulatory function because they may either mimic or suppress the action of the body's natural hormones. Because these chemicals are increasingly present in the environment as a result of human activities and they only require tiny amounts to disrupt endocrine functions, EDCs may have major impacts on ecology and perhaps human health.

The U.S. EPA has defined EDCs as "Exogenous chemical substances or mixtures that alters the structure or function(s) of the endocrine system and causes adverse effects at the level of the organism, its progeny, population, or subpopulation of organisms, based on scientific principles, data, weight-of-evidence, and precautionary principle." Pharmaceutically Active Compounds (PhACs) (e.g., prescription drugs) and Personal Care Products (PCPs) (e.g., pain medication) may also impact the endocrine system and are generally considered as EDCs, although sometimes they are considered as separate groups.

The EDCs impact animals and humans mainly by interfering with the functions of this complex control system that operates at the cellular level. As an example, EDCs can damage the glands that produce hormones or may mimic the natural hormones produced by the gland and mislead the target organs to misperform. Some EDCs lodge in hormone receptor cells and block the activity of natural hormones. This can produce "Hormonal Chaos" in the body, with major impacts on an organism's functions.

Examples of EDCs include DDT and alachlor (pesticides/herbicides used in agriculture), metals such as cadmium and lead (used in commercial/industrial applications), plasticizers (used in toys and most plastic products), and polynuclear aromatic hydrocarbons (associated with oil spills and storm runoff). The number of known EDCs is quite limited; however, the potential number of EDCs may be very high as more than 87,000 untested man-made chemicals are currently on the market.

2- EDCs as Another Challenge to Human Health

Bacteria, viruses, mutagenic chemicals, and radiation are well known environmental agents with potential for causing human diseases. A good number of scientists have postulated that EDCs are a new class of environmental agent and could be a cause of major human disabilities and malfunctions. This phenomenon came to light when the intergenerational health effects of the synthetic estrogen diethylstilbestrol (DES), a hormone administered to women for treatment of menopause and prevention of spontaneous abortion, were observed. The use of DES was approved by the Food and Drug Administration in 1941. It was found to cause cancer in experimental animals in 1959. In 1971, an association was found between mothers who took DES and a rare form of vaginal cancer in their daughters. The FDA warned physicians against the use of DES in 1972, thirty-one years after its introduction in the market. As another example, in the 60s, it was learned that wildlife exposure to chlorinated pesticides caused major reduction in their reproductive capabilities. Sex organ changes in fish, such as those observed in the Potomac River, are more recent examples of the impact.

EDCs have two unique features, which distinguish them from other agents. First, they do not appear to exhibit conventional toxicological dose-response characteristics. In contrast to conventional contaminants, they may cause significant problems at very low levels. As an illustration of how low these levels may be the human lifetime exposure to an EDC at 100 parts per trillion via water supply, assuming 70 years of life and drinking two liters of water per day, amounts to only 0.005 gram (less than 1/6 of a drop of water). Second, EDCs are also very powerful during the early stage of life, but their impacts may have a long lag time, which may not be observable in the offspring until, after they reach adulthood.

The biological plausibility of EDC impacts based on observations on wildlife and on test animals in research laboratories appear to be quite strong, but uncertainty exists regarding their health effects in humans. A 2002 study sponsored by the World Health Organization states: “Generally, studies examining EDC-induced effects in humans have yielded inconsistent and inconclusive results, which are responsible for the overall data being classified as “weak”. This classification is not meant to downplay the potential effects of EDCs; rather, it highlights the need for more rigorous studies.”

Another human health issue regarding EDCs is that the mainstream research has focused mainly on the impacts of the EDCs on reproductive functions. However, quite a number of scientists are concerned that the impacts can be much wider and many other bodily functions may be affected. As an example, more than 130 scientists, mostly European, gathered in Prague on May 10-12, 2005 and issued a 38-item declaration on EDCs. Item 6 of the declaration states that “Little or no information is currently available regarding the effects of endocrine disruptors on disease condition outside the reproductive system such as metabolic syndrome, neural development, childhood cancers, cognitive development, immune problems, psychological disorders, learning and memory development, and others. In many cases there are causal links between endocrine disruptors and these diseases and more scientific information is required.”

3- EDCs Challenges for Water Supply

EDCs have been found in both ground and surface waters. In a few cases, they also have been found in finished waters. However, no human heath impacts related to EDCs from water supply have been reported in the mainstream literature. Despite this, the customers perceive the issue as troubling, and their perceptions can become our reality. Furthermore, some scientists believe that conventional methods used for assessing the safe level of EDCs have major shortcomings. The conventional method uses animal testing and mainly assesses the impacts on their reproductive system. The critics believe that the impacts are often not seen in the offspring until after they reach adulthood and not necessarily in the exposed organism, that the impacts are not limited to the reproductive system, and that the method considers EDCs one at a time and, thus, ignores the impacts of a mixture of EDCs. As these issues are debated in the scientific community, the customers may become more concerned and the utilities must be prepared to address their concerns.

Conventional water treatment plants are designed to remove/control contaminants such as particulate matter, disease causing pathogens, and taste and odor generating compounds. Water utilities have done a great job in managing these groups of contaminants and are proud that their achievements have been recognized by the National Academy of Engineering as one of the top 20 engineering achievements of the 20th Century. However, conventional treatment is not very effective in removing chemicals that may have health impacts at very low levels in water (micro- pollutants).

Disinfection by-products (DBPs) are examples of micro-pollutants. They became an issue in the early 1970s when much better measuring methods became available; at the same time, we began to learn that they might cause cancer. Several hundreds of the DBPs have been identified. However, the EPA has been able to regulate only 9 of the DBPs in the past 35 years due to limited occurrence data and scientific knowledge of health effects. Even with the limited number of regulated DBPs, most water utilities will have to go beyond the conventional treatment provided by their plants to meet the upcoming new DBP requirements.

Compared to DBPs, EDCs, including PCPs and PhACs, are much more prevalent and may have health impacts at much lower levels. Regulating these potentially large numbers of micro-pollutants with the conventional approach would take much longer than 35 years and designing water treatment plants to remove them to extremely low levels will be major technical and financial challenges. Despite this, water utilities have to face these challenges and address their customers' concerns. AwwaRF has conducted several studies on the issue, and we can provide further information on them.

4- EDCs Challenges for Wastewater Services

Domestic wastewater also contains several groups of EDCs. Some are natural compounds produced by the human body or consumed with food, and then excreted into wastewater. Others are man-made such as those found in contraception drugs, detergents, and PCPs. Metals such as cadmium and certain polynuclear aromatic hydrocarbons (PAHs) are also

EDCs. Advanced wastewater treatment is quite effective in removing many of these EDCs. However, some will remain in the effluent. This could be primarily a general ecological issue, or it could become a human health issue if the plant effluent is discharged above a water supply intake. Also the removed portion of the EDCs is accumulated in biosolids and could make the land application of biosolids more controversial/problematic. Similar to AwwaRF, the WERF also has conducted several studies on the issue.

5- EDC Related Issues for our Metropolitan Area

As mentioned previously, specific human health effects of EDCs are generally unknown or not established at this time. Furthermore, there is very little monitoring data showing the occurrence (or non-occurrence) of EDCs due to limited capabilities and accepted standardized methods for lab detection at the low levels of potential concern. The primary source of monitoring data that is available at this time is a limited reconnaissance survey conducted by USGS for the metropolitan Washington region (performed in 2002). This survey effort took one sample from select water treatment plant intakes and wastewater treatment plant outfalls and analyzed the samples for a suite of suspected EDCs (including about 230 different hormones, pesticides, industrial chemicals, and PCP compounds). WSSC's Potomac and Patuxent WTPs were included in the survey. The Potomac WFP raw water only had detections of 17 compounds, 6 of which are known or suspected EDCs, and none of them are hormones. The Patuxent WFP raw water only had detections of 11 compounds, 4 of which are known or suspected EDCs, and none of them are hormones. None of these compounds was present in levels exceeding existing MCLs.

We also have data collected as part of the routine regulatory monitoring required under existing Safe Drinking Water Act (SDWA) rules. Of the >100 compounds monitored under the SDWA, only a small number (*i.e.*, those having a Maximum Contaminant Level, or MCL) are potential/suspected EDCs. For those potential/suspected EDCs that have an MCL, an analysis of the SDWA monitoring data since 2000 shows that only two have been detected at levels greater than the MCL in the raw water, and none have ever been detected at levels greater than the MCL in the finished water.

Although there is a paucity of directly relevant information, suspected EDC effects in fish have been reported in some Potomac River sub-watersheds upstream of the metropolitan area and WSSC's Potomac WFP intake. However, this is a national issue related to wide use of chemicals and, thus, is not limited to the Potomac River. The identity of the contaminant(s) that might be responsible for the observed EDC effects are being investigated, and possible sources for the contaminants are also being examined. However, the transport, fate and persistence of potential fish EDC contaminants to downstream Potomac River areas (including drinking water intakes in the metropolitan area) have not been identified or studied. In addition, no correlation has been established between observed wildlife (fish) EDC effects and potential human health effects, or what pharmaceutically active dose would be needed to produce any human health effect.

The suspected EDC effects on fish in the Potomac are based on the following information:

- Fish kills and widespread incidences of fish lesions in the South Branch Potomac River (Hardy County, West Virginia); follow-up studies discovered many reproductive anomalies among smallmouth bass, including egg production and egg-yolk precursor protein in male fish (*i.e.*, feminization).

- Earlier studies had found feminization of male common carp in the Shenandoah River near Millville (Jefferson County), West Virginia.

- Feminized male smallmouth bass were recently reported (December 2004) in the Potomac River near Sharpsburg (Washington County), Maryland, 170 miles downstream of Hardy County, WV. It is currently unknown if the suspected EDC effects are due to contaminants that have flowed downstream from West Virginia, or if a local Maryland source(s) of contamination may be responsible.

    - Recent sampling in the South Branch Potomac River and Cacapon River indicated presence of pesticide, flame retardant, and PCP residues in stream water; several of these compounds were also found in blood plasma collected from intersex fish. Some of the detected compounds are known or suspected as EDCs in fish.

Responses to EDC Challenges at the National Level
and by the WSSC and the Potomac DWSP Partnership

6- The EPA Approach

The EPA received programmatic mandates from Congress in 1996, under the Food Quality Protection Act (FQPA) and Safe Drinking Water Act (SDWA). Under the SDWA, EPA plans to screen down the universe of tens of thousands of potential contaminants to a proposed contaminant candidate list of about a thousand and then, using the expert judgment narrow it down further to about 100 substances. These 100 potential EDCs will be investigated in detail. However, the EPA is just beginning to grapple with the significant challenges of a very complex subject and no quick or simple answer will likely emerge soon. Nine years has gone by and EPA still has not standardized a testing protocol, mainly due to the complex nature of the problem.

7- The Basis of the WSSC Approach

The approach that the WSSC is pursuing is based on several considerations:

a- We believe that the EPA approach, which is based on risk assessment and animal testing, could be very cumbersome and slow. On the other hand, as more facts about EDCs become available, we believe the concerns of our customers will rise and we must respond to their concerns. So far we have received only two inquiries from our customers on how the WSSC is handling the EDCs issue, but this is likely to increase with greater media attention.

b- We recognize that there are uncertainties related to the significance of EDCs in terms of human health risks, especially via the drinking water exposure route. Nevertheless, we may not want to wait for EPA's final determination. This is based on our need to be responsive to our customers, as stated above, and to pursue a Precautionary Principle (PP) framework, which, stated simply, means it is better to be safe than sorry.

c- The PP framework is a well-recognized approach in the health and environmental fields. It was adopted unanimously by the 130 scientists who issued the Prague Declaration. Item 23 of the Declaration states "For the foreseeable future, regulation of endocrine disruptors will have to cope with the tension between the biological plausibility of serious, perhaps irreversible damage and delays in generating data suitable for comprehensive risk assessment. In view of the magnitude of the potential risks, we strongly believe that scientific uncertainty should not delay precautionary action for risk reduction."

d- We desire to pursue the PP framework in a manner that will not cause undue fear in our customers and to assure them that we will be ahead of the knowledge curve by pursuing the PP framework.

e- There is some potential for legal liability. Although, there is a move in Congress to create some liability protection for water utilities for non-regulated contaminants, the liability may remain. The proposed Bill (HR 1540) amends Section 1449 of the SDWA. Some of the amended language seems to be general in nature. The proposed Bill is quite protective for utilities in regard to regulated contaminants. However, its new Section (f) (2) allows suing utilities for unregulated contaminants, although under relatively strict conditions. Despite the strictness, it puts a major responsibility on utilities and makes them vulnerable even when they are in full compliance for all of the regulated contaminants. Passage of such a bill could become another driver to pursue the PP framework.

f- We realize that source control may be the most practical action at this time. The sources of EDCs are often scattered upstream of water intakes and are not controlled by utilities. Thus, we need to partner with others to gain influence and cost effectiveness for management practices. We were able to establish such a partnership, after several years of work, in September 2004 as described below.

8- Formation and Work of the Potomac River DWSP Partnership

About 7 years ago, the WSSC Environmental Group Leader accepted an invitation by the Maryland Department of the Environment (MDE) to serve on a Task Force to develop a Source Water Protection Program for Maryland as required by the EPA. This participation enhanced the trust of MDE in WSSC capabilities. Consequently, MDE gave WSSC a grant of $380,000 to conduct, on behalf of MDE, a Source Water Assessment **(**SWA) for all Maryland water plants that withdraw water from the Potomac River. One of the recommendations of the SWA was to create a regional partnership to protect the Potomac River for water supply needs. We pursued this recommendation and the Potomac River Drinking Water Source Protection (DWSP) Partnership was created in

September 2004. Since then, the Partnership has adopted a Strategy Plan, which includes two priority issues to be pursued, namely pathogens and emerging contaminants. EDCs are the first group of emerging contaminants on the Partnership priority list. Dr. Martin Chandler of the WSSC Environmental Group chairs the EDCs workgroup of the Partnership.

One of the significant efforts of the Partnership was to hold an expert workshop on EDCs to gain a better understanding of this complex issue and to develop a framework for potential actions that the Potomac DWSP Partnership can pursue. Dr. Chandler coordinated the planning for the workshop. We wanted to make the workshop not just a vehicle for knowledge sharing, but also a mechanism to integrate existing expertise in a framework. We issued a Task Order to our Water Research BOA consultant to prepare a draft framework for discussion by a panel of experts, mainly the scientists who gave presentations during the workshop. We guided the consultant with the key elements of the framework. The draft of the framework was discussed in the workshop. In brief, it included three steps: 1- raw water assessment for presence of EDCs and finding/prioritizing the sources of the observed EDCs; 2- identifying the BMPs for controlling their sources; and 3- keeping the customers and stakeholders informed about the findings. However, no consensus was reached on the first two steps.

Subsequently, the representatives of the three large metro DC utilities using the Potomac River followed up the workshop with more deliberation and have reached a preliminary consensus for a revised framework. The consensus includes developing a joint approach for communicating with our customers about EDCs, performing a survey of water utilities nationwide to identify how they are facing the EDC challenges, encouraging AwwaRF to support research for an EDC monitoring/management strategy for utilities, and pursuing legislation to protect utilities from liability for non-regulated contaminants.

There is one specific BMP that WSSC may want to consider because it is within our ability to implement. Given that EDCs major impacts seem to occur during pregnancy, use of highly purified bottled water for sensitive populations may be one of the BMPs. It may be beneficial to sensitive customers. It also could provide utilities with some degree of legal protection against liability related to non-regulated contaminants. However, it can be perceived that the water we supply to our general customers is not safe.

9- The Next Step

Our next step, after the adoption of the framework by the Partnership, is to obtain funding to pursue the framework. We will consider shared funding by the members of the Partnership as well as grant funding. We also will consider pursuing the framework via the Tailored Collaboration Program of AWWARF.

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ATTACHMENT C

WSSC Letter to Senator Mikulski for STAG and AwwaRF funding FY07

ATTACHMENT D

History of EPA and STAG funding from the Congressional Research Service

ATTACHMENT E

PowerPoint Presentation on “Intersex Fish and EDC Issues” by WSSC to the Montgomery County Council T&E Committee, September 2006.