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April 9, 2008

Mr. Benjamin Grumbles  
Assistant Administrator  
Office of Water  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

Dear Mr. Grumbles:

The Water Environment Federation (WEF) welcomes the opportunity to meet with you and other stakeholders together to discuss pharmaceuticals in water and drinking water systems. WEF supports the Agency's efforts to determine whether and at what levels pharmaceuticals and personal care products occur in water, their effects on public health and the environment, and if warranted, how best to remove them from wastewater and drinking water.

WEF believes that information in this developing area should be shared broadly among all stakeholders and looks forward to working with you to provide information to water utilities and the public. WEF uses the term *microconstituents* to define substances like pharmaceuticals that are found at low levels in the environment. WEF is committed to advancing understanding of microconstituents in the water environment and supports continuing efforts to safeguard the public and the environment including monitoring, assessment, prevention, and options for removal from the water environment.

In support of that commitment, WEF is utilizing our volunteer expertise to provide educational resources on microconstituents, including technical documents, workshops, seminars, webcasts, and more. WEF has formed a Community of Practice (CoP) for professionals interested in this important topic. Since its formation in 2005, the CoP has published six Technical Practice Updates (TPUs) on topics including analytical methods and monitoring, the effects of wastewater treatment, microconstituents in biosolids, source control, and a glossary of terms. A TPU specifically focused on pharmaceuticals is under development and should be completed in June.

In addition to these documents, WEF held a two-day seminar on microconstituents last year and is planning another conference in August 2009. In the past year, Federation volunteers and staff have organized two webcasts on public communication, a briefing for Congressional members and staff, and several

technical sessions on this topic at WEFTEC<sup>®</sup>, our annual conference and exposition.

WEF has created a special focus page on our website that provides users with a single point of access for resources on microconstituents, including TPUs, WEF's Position Statement on Microconstituents in the Environment, and a Resource Paper for the Public and Press on Microconstituents in Water. The address for this page is: [www.wef.org/ScienceTechnologyResources/Microconstituents/index](http://www.wef.org/ScienceTechnologyResources/Microconstituents/index). We encourage you to review the information WEF has assembled.

WEF recognizes the importance of this topic, applauds EPA for being proactive, and looks forward to the opportunity to meet with you and others together in an effort to continue advancing our understanding of this evolving and complex issue.

Sincerely,



William J. Bertera  
Executive Director

Cc: Jim Hanlon, Office of Wastewater Management  
Ephraim King, Office of Science and Technology  
Suzanne Rudzinski, Office of Science and Technology  
WEF Board of Trustees

# Emerging Pollutants of Concern

## *A Survey of State Activities and Future Needs*

Special Project of State/EPA Water Quality Standards Workgroup  
– led by Deb Smith, CA Regional Water Quality Control Board-LA  
January 2008

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## I. Introduction

Certain pollutants have been emerging as issues of concern in recent years as we have increased our monitoring and have the benefit of improved analytical methods for detecting and determining toxic and endocrine-related effects from a growing number of largely unregulated chemicals. Examples of these types of chemicals include phthalates, polybrominated diphenyl ethers (PBDEs), perfluorinated compounds, NDMA, pesticides, pharmaceuticals and personal care products such as toiletries, sun-screen agents, lotions, and cosmetics. We have reason to be concerned about allowing these chemicals to be discharged into our waters as there are extensive demonstrations in the literature of serious endocrine disrupting effects on fish and wildlife (e.g., feminized fish, premature spawning, eggshell thinning, abnormal reproduction, birth defects) from many of these chemicals. There is also cause for concern from human exposure to these compounds. Wastewater treatment is only partially effective at removing many of these chemicals and different treatment technologies tend to work for different compounds.

As water quality managers for our states, we are faced with decisions on how to move our programs forward to address these new challenges associated with emerging chemicals. Some of the questions we face include: Which of these chemicals need numeric criteria sooner rather than later? How do we prioritize these on an ongoing basis? How can we better craft and utilize our narrative criteria to regulate the remainder of these chemicals? What should we be monitoring for in the near term? How do we keep on top of the latest analytical methods? How do we make impairment decisions (based on water and/or biological impairments) for these compounds? What monitoring should we require for various types of permits? When do we segue from monitoring into deriving effluent limits for a particular chemical? What scientific information should we use to develop the limits? How would we determine Reasonable Potential? What kinds of biological monitoring should we require to identify and evaluate the effects of endocrine disrupting chemicals (EDCs)?

The broad issue of emerging chemicals has been a growing concern in recent years. At the 2006 Annual Meeting of the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA), the issue of emerging chemicals in water was noted as a priority by both the Monitoring, Standards and Assessment, and Research Task Forces. This issue has also been the subject of a series of three Monitoring, Standards and Assessment Task Force conference calls convened over the last year by Deb Smith (CA) and Scott Stoner (NY). Two EPA experts on this subject (Octavia Conerly from OW and Dr. Elaine Francis from ORD) participated on two conference calls where discussions included a summary of ongoing and planned EPA research as well as how states could be kept apprised of the results and provide input on future efforts.

An issue paper was also prepared by Deb Smith (CA) and discussed, along with three other issue papers (antidegradation, pathogens, and integrating standards with assessment), at a State-led meeting of the State/EPA Water Quality Standards Workgroup Meeting hosted by Oklahoma on February 19-20, 2007. These discussions, in turn, led to a discussion of the need for EPA and States to share their knowledge and the status of their respective programs in order to collectively define our needs and priorities in advancing the science and our thinking on these topics. At

this meeting, Deb Smith volunteered to develop and implement a survey as an initial step. Linda distributed the survey to all of the states and, specifically, to the Water Quality Standard contact(s), in July 2007 and responses were collected through August 2007.

The survey included questions about whether states had regulatory definitions for emerging chemicals, their level of interest and experience in emerging chemicals, current regulatory programs for these chemicals (including Rx collection programs), and existing research on emerging chemicals and, in particular, endocrine disrupting chemicals (EDCs). States were also asked for their near term (1-year) and longer term (5-year) priorities to further develop a coherent emerging chemicals program in water quality regulation. Thirty-seven organizations from 27 states responded to the survey. It is important to note that most respondents were affiliated with States' Water Quality Standards Programs. Therefore, much of the information provided reflects a respondent's individual experience and knowledge in the Water Quality Standards arena, and may not encompass all aspects of a State's Water Quality Control program(s) and activities. Additionally, much of the work on pharmaceutical collection programs, for example, may be occurring at a local level or through another state agency.

The survey results are summarized in this document. Thoughts regarding the information gathered in this survey as well as next steps will be discussed at a future State or State/EPA workgroup meeting. Thank you to all who participated in this effort. This information will be useful to share and guide future research and priorities to advance this issue.

In the following sections, survey responses are described followed by some brief conclusions and recommendations to move forward. The survey results are organized into the following topical areas:

- Defining emerging chemicals of concern
- Level of interest and experience
- Current regulatory activities
- Pharmaceutical Collection Programs
- Research on Endocrine Disrupting Chemicals
- State Needs/Priorities

## II. Survey Results

### A. Defining Emerging Chemicals of Concern

**Question #10. Does your state/organization define emerging chemicals?**

Yes	No	I don't know
13.5%	75.7%	10.8%

Twenty-eight of the 37 respondents (76%) indicated that their agencies did not have a definition of emerging chemicals. Five of 37 respondents (14%) stated that their agency did have a definition of “emerging chemicals”. These five respondents were from the following states/organizations: Pennsylvania Department of Environmental Protection; New York Department of Environmental Conservation, Delaware River Basin Commission (interstate), San Francisco Water Board, and Kentucky Department of Environmental Protection. Four respondents did not know whether their agency defined emerging chemicals, while 17 respondents skipped Question 10. The respondents who answered “yes” provided the following definitions of emerging chemicals.

- “[Emerging contaminants are] chemicals that have only recently been introduced into the environment, or [it has] only recently been possible to analyze for them.” (Definition is used by the PA DEP in internal discussions and contract proposals.)
- “Generally ... emerging chemicals or emerging contaminants [are] those for which there are not US EPA ambient water quality criteria, for which we do not currently have water quality standards in place, that are being discharged to or found in the waters of the state and/or fish or human tissue, and for which concerns exist about toxicity to humans or aquatic life.” (Used by NY DEC, but not a formal regulatory definition.)
- “Emerging contaminants are substances that have been detected in humans or other living organisms, have been found to be toxic in some way, or are persistent in the environment. Emerging contaminants are not routinely monitored, have fate and transport that is not well understood and consensus has not been reached concerning toxicity.” (Used by Delaware River Basin Commission.)
- "Emerging contaminants are any synthetic or naturally occurring chemical or any microorganism that is not commonly monitored in the environment but has the potential to enter the environment and cause known or suspected adverse ecological and/or human health effects. In some cases, release of emerging chemical or microbial contaminants to the environment has likely occurred for a long time, but may not have been recognized until new detection methods were developed. In other cases synthesis of new chemicals or changes in use and disposal of existing chemicals can create new sources of emerging contaminants.” (Used by San Francisco Water Board; same definition as used by USGS Toxics Program<sup>1</sup>.)

<sup>1</sup> The U.S. Geological Survey (USGS) Toxic Substances Hydrology (Toxics) Program, initiated in 1982, defines “emerging contaminants” in the following way: “Emerging contaminants can be broadly defined as any synthetic or naturally occurring chemical or any microorganism that is not commonly monitored in the environment but has the potential to enter the environment and cause known or suspected adverse ecological and (or) human health effects. In some cases, release of emerging chemical or microbial contaminants to the environment has likely occurred for a long time, but may not have been recognized until new detection methods were developed. In other cases, synthesis of new chemicals or changes in use and disposal of existing chemicals can create new sources of emerging contaminants.”



- “Emerging chemicals are those substances for which the risks to human and/ or ecological health and safety were previously unknown, unrecognized, unanticipated, or unsuspected in the environment.” (Used by KY DEP.)

**11. Is the definition of ‘emerging chemicals’ contained in any regulatory documents or legislation?**

<b>Yes</b>	<b>No</b>	<b>I don’t know</b>
0%	66.7%	33.3%

Despite the five affirmative responses to Question 10, none of the survey respondents indicated that a formal definition of emerging chemicals was contained in legislation or regulation. Of the nine responses to Question 11, most respondents answered “no”, indicating that there was no definition of emerging chemicals in their state legislation or regulation.

**B. Level of Experience and Interest in Emerging Chemicals**

**12. Please tell us the level of interest/experience your state/organization has regarding emerging chemicals.**

<b>Already factored into our programs, looking to advance programs</b>	<b>Interested enough to investigate ways to incorporate into my programs</b>	<b>Very interested, but not ready to implement</b>	<b>Just curious, want to stay informed</b>
16.2%	62.2%	16.2%	5.4%

Thirty-seven responses were received; 17 survey respondents skipped this question. Only six respondents indicated that their agencies already factored emerging chemicals into their programs.

Twenty-three respondents (62%) indicated that their agency was interested enough to investigate ways to incorporate emerging chemicals into their agencies’ programs.

For the six who answered ‘very interested, but not ready to implement’, their additional comments regarding specific hurdles to implementing an emerging chemicals program are as follows:

- Lack of national ambient water quality criteria
- Lack of state resources to develop and adopt standards
- Analytical methodologies are still in development
- [State] laboratories do not have necessary analytical capability
- Funds are insufficient to contract outside laboratories
- Toxicological research is still inadequate (e.g. RfDs or potency factors)
- Acute and/or chronic aquatic life database still in development

Of those respondents who stated their agency was not ready to implement an emerging chemicals program, one indicated that their agency was requiring monitoring and special studies by permittees, while another indicated that they were trying to incorporate emerging chemicals into its State Water Monitoring Strategy.

**13. Please define your interest in emerging chemicals.**

Interested in 'classic' emerging chemicals (perchlorate, MtBE, NDMA, 1,4 dioxane, TBA)	Interested in endocrine disruptors	Interested in pharmaceuticals	Interested in source control (e.g. collection programs)	Interested in treatment technologies	Interested in analytical methods development	Interested in individual chemicals
88.9%	97.2%	97.2%	75%	77.8%	69.4%	61.1%

Thirty-six responses were received, while 18 survey respondents skipped this question. There was very strong interest among respondents in all three major categories of emerging chemicals (i.e. "classic", endocrine disruptors, and PPCPs). Fewer respondents expressed interest in individual chemicals.

There was also strong interest in source control and treatment technologies. Respondents expressed the relatively less interest in analytical methods development; however, still over two-thirds of respondents were interested in this. Furthermore, as discussed in Section F, the majority of respondents recognized that development of EPA approved analytical methods was the most important near-term priority to further programs to address emerging chemicals.

For the 15 who listed "specific treatment technologies, analytical methods or individual chemicals of interest", specific areas of interest are listed below.

- Chemicals of Interest:
  - perchlorate
  - perfluorinated compounds, including PFOS/PFOA
  - Cyanobacteria toxins
  - phthalates
  - flame-retardants (PBDEs)
  - bactericides (triclosan/triclocarban)
  - pesticides, including atrazine and DEET
  - pharmaceuticals, including sulfamethoxazole (antibiotic), dilantin (antiepileptic), carbamazepine (anticonvulsant), azithromycin (antibiotic)
  - alkylphenol ethoxylates
  - nonylphenol ethoxylates
  - bisphenol A (plasticizer)
  - 17B-estradiol Estrone 17a-ethynyl estradiol Estriol a-zearalonol Testosterone 11-ketotestosterone 4-Androstenedione Progesterone
  - Melengestrol acetate, Trenbolone (growth promoters)
  - dimethylxanthine (caffeine metabolite)
  - cotinine (nicotine metabolite)
  - tonalide (fragrance)

- Treatment
  - Ability of wastewater treatment plants to remove emerging chemicals from their effluents
    - Which [Pharmaceuticals and Personal Care Products] PPCPs (and at what concentrations) pass through secondary and tertiary treatment at POTWs
  - Which treatment technologies can reliably remove these chemicals
    - Onsite wastewater treatment techniques
    - POTW techniques
  - Source reduction
  - "Treatment based" regulation for unregulated organic contaminants.
- Analytical methods:
  - Analytical methods to detect emerging chemicals, including full scan gas chromatography-mass spectrometry electronic data from water, sediment, and bivalve tissue. Blood plasma tests from harbor seal pups and sea otters.
  - Bioassays for PPCPs

### C. Current Regulatory Activities

**14. Of the more classic emerging chemicals which do you currently regulate?**

Perchlorate	1,4 dioxane	MtBE	TBA	NDMA	1,2,3-Trichloropropane
55.6%	55.6%	88.9%	33.3%	22.2%	44.4%

Eighteen responses were received, while 36 respondents skipped this question. In Question 15, below, five respondents indicated that their agency regulates other emerging chemicals, in addition to the above, including some monitoring of alkylphenol ethoxylates; nonylphenol; Cr6; arsenic; 1,2-Dibromo-3-chloropropane (DBCP)<sup>2</sup>; and polybrominated diphenyl ethers (PBDEs).

**15. Please identify other emerging chemicals that you regulate.**

Pharmaceuticals and EDCs, Alkylphenol ethoxylates, Nonylphenol, Cr6, Penta, octa, deca PBDE	Arsenic	DBCP	Polybrominated diphenyl ether
100%	20%	20%	20%

Five responses were received, while 51 respondents skipped this question.

<sup>2</sup> Soil fumigant and nematocide for crops.

**16. Please describe your requirement/activities for each chemical.**

	<b>We monitor surface water</b>	<b>We monitor ground water</b>	<b>We require dischargers to monitor</b>	<b>We have water quality standards</b>	<b>We regulate with narrative water quality objectives</b>
Perchlorate	4.5%	18.2%	31.8%	9.1%	36.4%
1,4 dioxane	5.9%	11.8%	17.6%	17.6%	47.1%
MtBE	14.7%	23.5%	17.6%	17.6%	26.5%
TBA	7.7%	7.7%	23.1%	0%	61.5%
NDMA	0%	10%	20%	10%	60%
1,2,3-Tricloropropane	16.7%	16.7%	11.1%	5.6%	50%

22 responses received, 32 skipped. Agencies monitored “classic” emerging chemicals (i.e. perchlorate, 1,4 dioxane, MtBE) most often, and much more frequently in groundwater than surface water. However, more agencies appear to rely upon dischargers to monitor for these chemicals as part of their permit requirements than monitor independently.

A few respondents indicated that their agency has [numeric] water quality standards for these chemicals; however, most respondents indicated that their agency regulates the chemicals using narrative water quality objectives.

Respondents provided the following additional narrative information on monitoring and regulatory requirements for emerging chemicals.

1.	<p>(CA Regional Water Quality Control Board – LA Region) Regarding groundwater monitoring above, CA has a statewide monitoring program known as “GAMA”, Groundwater Ambient Monitoring &amp; Assessment that monitors for some of these chemicals. Groundwater accounts for up to 40 percent of the state's water supply. Since 1984, over 8,000 public water wells have been shut down - some due to the detection of chemicals such as MTBE, solvents, and perchlorate. The Groundwater Ambient Monitoring Assessment (GAMA) Program was created by the State Water Resources Control Board to address these concerns. The main objectives of the GAMA Program are to improve statewide ambient groundwater quality monitoring and assessment and to increase the availability of information about groundwater quality to the public. Partial List of Analytes measured under GAMA (emerging chemicals) include Methyl tert-Butyl Ether (MTBE), Perchlorate (ClO4-), N-nitrosodimethylamine (NDMA) Pesticides, Wastewater indicators (Commonly used compounds (e.g. caffeine, fragrances, insect repellents) that can enter ground water from the discharge of treated wastewater), Pharmaceuticals [that can enter ground water from discharge of treated wastewater, recycled water, or reclaimed water] We have started requiring certain dischargers to monitor for</p>
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	<p>pharmaceuticals. Three POTWs have required monitoring for perchlorate, 1,4 dioxane, MTBE, NDMA, and 1,2,3 trichloropropane. Several Water Recycling Permits (direct injection) require monitoring for perchlorate, 1,4 dioxane, MTBE, TBA, and NDMA. In addition, they must monitor for additional emerging pollutants per CA Dept. of Public Health unregulated contaminants list. In addition, we also request monitoring pharmaceutical and endocrine disrupting chemicals, including ethinyl estradiol, 17-B estradiol, estrone, bisphenol A, nonylphenol and nonylphenol polyethoxylate, octylphenol and octylphenol polyethoxylate, polybrominated diphenyl ethers, acetaminopen, amoxicillin, azithromycin, caffeine, carbamazepine, ciprofloxacin, ethylenediamine tetra-acetic acid (EDTA), gemfibrozil, ibuprofen, iodinated contrast media, lipitor, methadone, morphine, salicylic acid, triclosan</p>
2.	(OH EPA) Any chemical can be listed for monitoring and regulation under NPDES permit activities.
3.	(IN DEM) Umbrella Narrative: "For all waters of the State existing beneficial uses shall be maintained and protected." "No degradation of water quality shall be permitted which would interfere with or become injurious to existing and potential uses."
4.	(VT Agency for Natural Resources) These compounds are regulated by the general "no toxics in toxic amounts" proviso in the state's water quality standards. VT has no specific water criteria for these compounds. For MtBE, VT has carried out a very limited set of surface water studies.
5.	(CT DEP) These chemicals are addressed at remediation sites when they are present due to releases from the site in question. Various remediation criteria have been developed/are in development for both human health and ecological protection.
6.	(VA DEQ) The monitoring for MTBE is occasional.
7.	(San Diego Water Board) Monitoring is required of dischargers where there has been an accidental release from Underground Storage Tanks or other sources to groundwater.
8.	(AL DEM) Requires dischargers to monitor PFOA and PFOS.
9.	(NJ - DRBC) Currently monitoring fish tissue for PBDE and PFC. A 2007 survey of surface water is planned for a target list of emerging contaminants. Proposed DRBC Target List For Emerging Contaminants of Concern: sulfamethoxazole; trimethoprim; carbamazepine; diltiazem; dehydronifedipine; acetaminophen; codeine; diazinon; N,N-diethyltoluamide (DEET); ethanol-2-butoxy-phosphate; bis(2-ethylhexyl)phthalate; nonylphenol; tri(2-chloroethyl)phosphate; tri(dichlorisopropyl)phosphate; bisphenol A; Triclosan; ethynylestradiol; Perfluorooctanoic acids (PFOA); Perfluoropentanoate; Perfluorohexanoate; Perfluoroheptanoate; Perfluorooctanoate; Perfluorononanoate; Perfluorodecanoate; Perfluoroundecanoate; Perfluorododecanoate; Perfluorobutanesulfonate; Perfluorohexanesulfonate; Perfluorooctanesulfonate; Polybrominated Diphenyl Ethers (PBDE); 2,2',4-TriBDE (BDE-17); 2,4,4'-TriBDE (BDE-28); 2,2',4,4'-TetraBDE (BDE-47); 2,3',4,4'-TetraBDE (BDE-66); 2,3',4',6-TetraBDE (BDE-71); 2,2',3,4,4'-PentaBDE (BDE-85); 2,2',4,4',5-PentaBDE (BDE-99); 2,2',4,4',6-PentaBDE (BDE-100); 2,2',3,4,4',5'-HexaBDE (BDE-138); 2,2',4,4',5,5'-HexaBDE (BDE-153); 2,2',4,4',5,6'-HexaBDE (BDE-154);

	2,2',3,4,4',5',6-HeptaBDE (BDE-183); 2,3,3',4,4',5,6-HeptaBDE (BDE-190); DecaBDE (BDE-209).
10.	(FL DEP) "Free from" narrative standards prohibit a variety of harmful endpoints, such as chronic toxicity, etc., but no standards exist that apply directly to emerging substances of concern.
11.	(IL EPA) Numeric criteria for MtBE and dioxane; the MtBE criterion has been used in permitting.
12.	(OK Water Resources Board) Perchlorate standards only recently promulgated for fish and wildlife (acute and chronic) and human health. Still to be reviewed by EPA Region 6.
13.	(NM Environment Department) The Petroleum Storage Tank Bureau monitors for MtBE. Occasional monitoring for perchlorate around the Los Alamos National Lab (LANL) and special projects. Monitoring for 1,2,3 Trichloropropane in volatile organic samples taken in lakes (3 samples per year), streams & rivers (1-2 per year).
14.	(MT DEQ) Human health water quality standards for MTBE for both groundwater and surface water. Both are set at 30 ug/L based on taste and odor thresholds given in EPA 822-f-97-008 December 1997.

**17. Which of these classes of pharmaceuticals and personal care products do you regulate?**

	We regulate	We do not regulate	We monitor surface water	We monitor groundwater	We require discharges to monitor	We have water quality standards	We regulate with narrative water quality objectives
Antibiotics	0%	70.6%	8.8%	2.9%	2.9%	0%	14.7%
Steroids	0%	70.6%	8.8%	2.9%	2.9%	0%	14.7%
Anti-inflammatories	0%	7.5%	6.3%	0%	3.1%	0%	15.6%
Hormones	0%	68.6%	11.4%	2.9%	2.9%	0%	14.3%
Beta blockers	0%	77.4%	6.5%	0%	0%	0%	16.1%
Anti depressants	0%	77.4%	6.5%	0%	0%	0%	16.1%
Chemo-therapeutics	0%	74.2%	6.5%	0%	0%	0%	19.4%
Sunscreens	0%	77.4%	6.5%	0%	0%	0%	16.1%
Cosmetics	0%	75.0%	9.4%	0%	0%	0%	15.6%

30 responses received, 24 skipped. Most agencies do not regulate any pharmaceuticals or personal care products (PPCPs). Agencies monitor for PPCPs more commonly in surface water than groundwater; however, even so, very few respondents even indicated that surface water monitoring was conducted. If agencies do regulate these chemicals, it is done using narrative water quality objectives, not numeric water quality standards.

**18. What other classes of, or individual pharmaceuticals and personal care products do you regulate? Please describe your monitoring requirements and standards for each.**

Twelve responses were received, while 42 respondents skipped this question. For the 12 who provided a response, it is listed as follows:

- (LA Water Board) Only small subsets of permittees are currently required to monitor for these (a few POTWs and direct injection projects).
- (MO DNR) Narrative criteria apply to any pollutant or contaminant that impairs a beneficial use within waters of the state. Examples of other pollutants not listed [in Question 17] might be antibiotics or pharmaceuticals related to aquaculture or other animal feeding operations.
- (IN DEM) Narrative criteria always apply when there are no numeric criteria.
- (VT Agency of Natural Resources) Cooperative effort with USGS to carry out an initial, screening-level assessment of pharmaceuticals in select surface waters.
- (CT DEP) Evaluating/regulating the discharge of alkylphenol ethoxylates.
- (FL DEP) A demonstration of harmful effects is needed to trigger a regulatory response. None of these substances currently have specific standards.
- (SC DHEC) Need EPA-approved analytical methodologies and criteria.
- (IL EPA) We do not directly regulate any of these substances through criteria, although whole effluent toxicity testing assures that lethality is not occurring if these constituents are present. We are currently looking into ways to assess the endocrine disrupting potential of discharged effluent. This could serve as a means to regulate endocrine disrupters for which we have no criteria.
- (NJ DEP) These chemicals are not regulated at this time. NJ is exploring options for "treatment-based" regulation for classes of unregulated organic chemicals.
- (KY DEP) Caffeine is used as a surrogate for the above chemical groups in groundwater monitoring.

**19. Where you have monitored for emerging chemicals, please describe the results of your monitoring:**

	We do not monitor	We have detected in ambient water	Prevalent in ambient surface water	Prevalent in ambient groundwater	Prevalent in effluent
Perchlorate	57.7% (15)	11.5% (3)	3.8% (1)	19.2% (5)	0.0% (0)
1,4 dioxane	81.0% (17)	0.0% (0)	0.0% (0)	9.5% (2)	0.0% (0)
MtBE	48.0% (12)	20.0% (5)	4.0% (1)	36.0% (9)	0.0% (0)
TBA	82.6% (19)	4.3% (1)	0.0% (0)	8.7% (2)	0.0% (0)
NDMA	90.9% (20)	4.5% (1)	4.5% (1)	0.0% (0)	4.5% (1)
Antibiotics	80.0% (20)	12.0% (3)	0.0% (0)	4.0% (1)	8.0% (2)
Steroids	87.0% (20)	4.3% (1)	0.0% (0)	0.0% (0)	13.0% (3)
Anti-inflammatories	84.0% (21)	8.0% (2)	0.0% (0)	4.0% (1)	4.0% (1)

	We do not monitor	We have detected in ambient water	Prevalent in ambient surface water	Prevalent in ambient groundwater	Prevalent in effluent
Hormones	<b>76.9% (20)</b>	15.4% (4)	0.0% (0)	3.8% (1)	3.8% (1)
Beta blockers	<b>100.0% (21)</b>	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)
Anti-depressants	<b>87.5% (21)</b>	4.2% (1)	0.0% (0)	4.2% (1)	4.2% (1)
Chemotherapeutics	<b>100.0% (21)</b>	0.0% (0)	0.0% (0)	0.0% (0)	0.0% (0)
Sunscreens	<b>95.5% (21)</b>	0.0% (0)	0.0% (0)	4.5% (1)	0.0% (0)
Cosmetics	<b>90.9% (20)</b>	4.5% (1)	0.0% (0)	4.5% (1)	0.0% (0)
Others	<b>80.0% (8)</b>	10.0% (1)	10.0% (1)	0.0% (0)	0.0% (0)

For most of the emerging chemicals listed, the majority of respondents stated that the chemicals were not monitored. The two exceptions were for MtBE and perchlorate – two “classic” emerging chemicals; approximately half of the respondents indicated that monitoring was conducted for these two chemicals. Respondents who indicated that their agency monitors “other” emerging chemicals, identified the following chemicals or classes of chemicals: DEET; phthalates; triclosan; flame-retardants; PFOA and PFOS.

From those respondents whose agencies do monitor for some of these emerging chemicals, the following information on monitoring results was provided.

NY DEC:

- MtBE has been found in approximately five percent of the groundwater wells surveyed.

VA DEQ:

- Occasional monitoring for MtBE has shown detectable levels in some cases.

NC DEQ:

- MtBE, perchlorate and 1,4 dioxane are most often found at detectable concentrations in conjunction with waste sites - contaminant plumes.

IL EPA:

- None of these substances have been tracked in continuous monitoring programs for surface and ground water. However, perchlorate and MtBE have been detected in ground water at contaminated sites such as former military sites and oil refineries.

KY DEP:

- Detected in groundwater at or near our detection limits, but not in surface waters. However, monitoring has been limited in scope and may not reflect the extent of the problem. Even MtBE, which has been analyzed in groundwater across the state, has only been consistently detected in a few locations.



CA Regional Water Quality Control Board (Los Angeles Region):

- NDMA is prevalent in the effluents of POTWs that chlorinate.

AL DEM:

- PFOS and PFOA have been detected in surface and ground water at specific locations.

OK Water Resources Board:

- Only one confirmed and one possible effluent source of perchlorate. Discharger is aware and is making necessary preparations for treatment.

NM Environment Department:

- Caffeine in effluent; Oxytetracycline in effluent, though it is not repeated consistently on follow-up sampling due to photodegradation.

MT DEQ:

- bisphenol-A, caffeine, atrazine, carbamazepine, DEET, gemfibrozil, pentoxifylline have also been detected in ambient water.

Additionally, two states identified monitoring studies by the USGS to identify the prevalence of certain types of emerging chemicals in surface and ground waters. The Pennsylvania DEP, through a contract with USGS, has completed Phase 1 of a study of antibiotics (suite of 29 compounds) and pharmaceuticals (suite of 21 compounds) in southcentral PA. Twelve streams were sampled over an 8-month period, upstream and downstream of wastewater discharges and/or intensive agricultural operations. Six wells were also sampled. Phase II of the study has just begun. Phase II includes: more analytes (pharmaceuticals, antibiotics, hormones, *E. coli*, Crypto, enterococcus), more statewide sample sites, inclusion of WQN stations, and histopathological fish studies. In Florida, the USGS has done some pilot studies in groundwater and springs.

**20. Please elaborate on treatment required [for emerging chemicals].**

Eight responses were received; while 46 respondents skipped this question. For the 8 who provided a response, treatment information is listed as follows:

1. (CA Regional Water Quality Control Board – LA Region) NDMA is regulated per the California Toxics Rule and effluents must be treated to meet these limits. For groundwater cleanups; for groundwater basins that serve as drinking water sources, the California Department of Health Services has approved/permitted anion exchange and bioreactors for the treatment of perchlorate. For 1,4-dioxane, hydrogen peroxide plus ultraviolet (UV) light or Ozone have been very effective treatment technologies. Bioremediation and specially designed granulated activated carbon are also effective depending on the site-specific conditions in groundwater. UV photolysis (low and medium pressure) has been permitted by California Department of Health Services as an effective treatment method for N-nitrosodimethylamine (NDMA), especially when the treated groundwater is used as drinking water.

2. (VT Agency for Natural Resources) MtBE treatment involves individual sites with impacted groundwater. The prevalence of MtBE contamination is expected to decline with the phase-out of this oxidant in northeastern gasoline supplies.
3. (CA Regional Water Quality Control Board – San Diego Region) Clean up is required, however, responsible party chooses treatment.
4. (OK Water Resources Board) Only reliable treatment process for perchlorate is the fluidized bed reactor.
5. (ME DEP) Maine state law prohibits the sale of certain products with penta, octa, and deca PBDEs (PL 2007, c. 296).
6. (IL DEP) Sites contaminated due to leaking underground gas storage tanks must be treated for BETX and MTBE, methods are air stripping and/or carbon filtration.

### D. Pharmaceutical Collection Programs

Most respondents indicated that their specific agency did not have guidelines for proper disposal of pharmaceuticals, or pharmaceutical collection programs. This type of program seems to more commonly reside under the state health department, or local health agencies.

**21. *Does your state/organization have guidelines related to the proper disposal of pharmaceuticals?***

I Don't Know	No	Yes
24.2%	57.6%	18.2%

33 responses received, 21 skipped. For the 6 who answered 'yes', most indicated that their agency does not have formal guidelines, but recommends various ways of properly disposing of these chemicals, including:

- Mixing pharmaceuticals with soda, and disposing of them in the trash, rather than flushing them down the drain
- Take them to a household hazardous waste collection center.
- Take leftover medications to the pharmacy where they were purchased.

Two states indicated that there was a state agency that establishes guidelines for proper disposal of pharmaceuticals; these are the PA Department of Health, which has guidelines for hospitals, nursing homes and other facilities, and the Montana Department of Health and Senior Services. Additionally, the PA DEP is working with other partners (including EPA Region III) to make improvements to the guidelines.

**22. Does your organization participate in a pharmaceutical collection program?**

I Don't Know	No	Yes (Who operates your pharmaceutical collection program?)
24.2%	57.6%	18.2%

50 responses received, 4 skipped. Most state water quality agencies do not operate a pharmaceutical collection program. Though some agencies work with local groups, including cities, counties and sanitation districts, to encourage proper disposal of prescription drugs and some are working to establish pharmaceutical collection programs. For example, in Los Angeles, some wastewater permittees (City of Los Angeles, County of Los Angeles, County Sanitation Districts of Los Angeles County) have established a "No Drugs Down the Drain Program". Additionally, NDEQ has provided a "Keep Nebraska Beautiful" grant to one entity in the state for a pharmaceutical collection program in western Nebraska. Rx collection programs are more often operated by a state health department, such as the NM Department of Health. It is possible that more states have Rx collection programs, but because they are operated under different regulatory agencies, survey respondents were not aware of these programs.

**23. Please describe the biggest hurdles in implementing your Rx collection program and how you overcame them (cost, security, DEA, disposal).**

Seven responses received, 44 skipped. For those who responded, the two hurdles are, first, the rules and regulations pertaining to handling, mailing and disposal of pharmaceuticals (i.e. controlled substances) and, second, public awareness regarding proper disposal and available disposal venues. None of the respondents provided information on whether and how their agency overcame these hurdles.

**24. Please provide a contact (name, phone, e-mail) for your collection program.**

Only three contacts were provided in the surveys for Rx collection programs. These were:

- San Francisco Water Board, Naomi Feger, 510-622-2328, NFeger@waterboards.ca.gov
- Maine DEP, Ann Pistell, 207-287-7703, Ann.E.Pistell@maine.gov
- IL EPA, David Walters, 217-782-9261, david.walters@illinois.gov

It is possible that more states have Rx collection programs, but because they are operated under different regulatory agencies, survey respondents were not aware of these programs.

### E. Research on Endocrine Disrupting Chemicals

**25. Has your agency conducted any studies to evaluate endocrine disrupting effects in aquatic life in your state/region?**

I Don't Know	No	Yes (please describe the study and give contact information)
5.9%	64.7%	29.4%

34 responses received, 20 skipped. For the 10 who responded "Yes", their responses are listed as follows:

1.	(Missouri) Dr. Huang from the University of Missouri- Rolla conducted studies within the last couple of years.
2.	(Ohio EPA) We have an ongoing special study on Tinkers Creek in northeast Ohio due to suspected impairment from PPCPs.
3.	(Pennsylvania) Phase II of USGS study is underway - includes fish tissue studies
4.	(Virginia) Ongoing studies of the Shenandoah fish kills
5.	(CA Regional Water Quality Control Board, Central Valley Region) <a href="http://www.waterboards.ca.gov/swamp/docs/reglrpts/rb5_swamp_eedcrpt.pdf">http://www.waterboards.ca.gov/swamp/docs/reglrpts/rb5_swamp_eedcrpt.pdf</a>
6.	(Nebraska) NDEQ has contracted with the University of Nebraska to conduct a study entitled: "Steroidogenic Compounds and Pharmaceuticals from Wastewater Treatment Plants: Occurrence and Potential Effects on Local Fish Populations." This is a two-year study (2006-2007). The final report is scheduled for 2008.
7.	(Maine) Effects based studies on fish from several rivers and streams to be seen in annual SWAT reports Rivers module at <a href="http://www.maine.gov/dep/blwq/docmonitoring/swat/index.htm">http://www.maine.gov/dep/blwq/docmonitoring/swat/index.htm</a>
8.	(New Mexico) Mr. Scott Hopkins (scott.hopkins@ state.nm.us) conducted a study in conjunction with EPA; via vitellogenin production in male fathead minnows. Result: low hit in Las Vegas, NM effluent, strong hit in Roswell, NM effluent.
9.	(ORANSCO) Compared methods of detection in ambient water. Looked for effects in native fish populations. Contact Erich Emery (emery@orsanco.org)
10.	(New Jersey) We have looked at reproductive effects of atrazine on frogs in field conditions.

**26. Have other agencies/organizations in your state/region conducted an EDC study?**

I Don't Know	No	Yes (please specify compounds, if known)
38.2%	5.9%	55.9%

34 responses received, 20 respondents skipped this question. A significant number of respondents did not know whether other agencies or organizations in their state had conducted EDC Studies. Nineteen respondents answered in the affirmative; their responses are listed as follows:

1.	(CA Regional Water Quality Control Board – LA Region) Yes. Two studies are being conducted in the Los Angeles Region on EDCs. The goal of the first is to identify the types of potential EDCs present in surface waters where endocrine disrupting effects are being observed in fish (i.e. near POTW outfalls). This study focuses on the development of an in situ sampling technology using solid phase microextraction (SPME) to identify EDCs that may accumulate in sediment and tissue. The SPME results will be compared to results from conventional methods (i.e. GC- or LC/MS). The first year has been completed of a three-year study. The PI is Dr. Keith Maruya, Principal Scientist of Chemistry Group, Southern California Coastal Water Research Project (SCCWRP). The goals of the second study are to measure and compare the impacts of EDCs in fish from various habitats and locations (i.e. reference sites, bays, coastal waters) in the Southern California Bight, and identify the chemicals causing these impacts. A significant part of the study is focused on methods development to detect endocrine disruption in fish. Specifically, a quantitative Vitellogenin (VTG) assay method will be developed as well as a gene microarray for coastal fish. Two years have been completed of the five-year study. The PI is Dr. Steve Bay, Principal Scientist of Toxicology Group, SCCWRP. Other collaborators involved in the two studies include researchers from UCSD, UCR, Cal State Long Beach, Southern Nevada Water Authority, Mississippi State Chemistry Lab, the Ocean Institute, OCSD, City of San Diego, City of Los Angeles, and CSDLAC. Both the City of Los Angeles and County Sanitation Districts of Los Angeles County are conducting Special Studies (under their NPDES permits) at the Hyperion and Joint Plant Wastewater Treatment Plants, respectively. For 2006/2007, Hyperion is conducting "Documentation of Human-derived Sex Steroid Hormones in Southern California Bight Flatfish" to quantitatively determine the effect of hormones in their effluent on fish near their outfall. At the Joint Plant, the following special studies are being conducted in 2007/2009: "Patterns of Endocrine Disruption in Flatfish Near Major Ocean Outfalls in the Southern California Bight"; "Assessment of Reproductive Cycle Disruption in a Flatfish on the Palos Verdes and San Pedro Shelves"; and "Endocrine Disruption in Coastal Flatfish: Chemical Characterization of EDCs Associated with Major Ocean Outfalls in the Southern California Bight", in order to quantitatively determine the effect of EDCs from their effluent on fish near their outfall.
2.	(Missouri) We believe that several universities have studied EDCs.
3.	(Pennsylvania) USGS Study, 9 streams in PA, 1999 - 2000 Villanova University study (Dr. Suri), Chester County, PA, 2005 Current cooperative study between DEP and USGS
4.	(Indiana) USGS NAWQA Program (Larry Barber lbarber@usgs.gov) USGS Biological Resource Program (Steven L. Goodbread)
5.	(Vermont) USGS - Contact is Ann Chalmers, USGS Water Science center, Montpelier, VT, and Pat Phillips, USGS, Albany, NY
6.	(CA Regional Water Quality Control Board – SF Region) 2006 RMP study of 39 pharmaceuticals and personal care products in S.F. Bay. Of the chemicals

	detected in the Bay all were well below the available ecological acute and chronic toxicity values found in the literature.
7.	(Virginia) Wheeling, WV EPA, USGS working in partnership on the Shenandoah fish kills
8.	(CA Regional Water Quality Control Board – San Diego Region) Southern California Coastal Water Research Project (SCCWRP), Doris Vidal, EDC in fish
9.	(Nevada) USGS has conducted EDC studies on the Colorado River.
10	(Florida) Bio-magnification factors for PBDE's ranged from 3:1 to 85:1 in sharks and dolphins in a Florida study (Birnbaum 2006). Birnbaum, L. 2006. Median levels of PBDE 47, 99, 153 in human milk from different countries. US Environmental Protection Agency. Experimental Toxicology Division. < <a href="http://www.hesiglobal.org/NR/rdonlyres/A41C84C0-B32A-493D-911D-32449D97C814/0/10bPBDEpresentation.pdf">http://www.hesiglobal.org/NR/rdonlyres/A41C84C0-B32A-493D-911D-32449D97C814/0/10bPBDEpresentation.pdf</a>
11.	(Nebraska) The U.S. Geological Survey conducted a pharmaceutical study in 1999 in the vicinity of confined livestock feeding operations in Nebraska. The findings were reported in a national report.
12.	(North Carolina) Ecosystem Enhancement Program (EEP) Barbara Grimes USGS (not DWQ) - Mary Georgino
13.	(Maine) University of Maine, by Dr. Greg Mayer One report in DEP 2006 SWAT report.
14.	(Ohio) ORSANCO in Ohio River
15.	(Illinois) IDNR/INHS did a study (research only) several years ago related to a proposed women's prison, the prison was not built in part due to endocrine disruption concerns in the receiving water which contained endangered fish (no contact info). A very comprehensive study is underway in the Chicago waterways involving U.S. EPA (GLNPO, Region 5 WD and WPTD, CRL, ORD Cincinnati, and Office of Water HQ), MWRDGC, USDA, USGS, St. Cloud State, and Baylor University. The study involves PPCPs, hormones, and APEs (nonylphenol and nonylphenol ethoxylates) in effluent, water, and fish tissue from multiple waterways. Todd Nettesheim of U.S. EPA GLNPO gave a presentation on this study and is the only contact I'm aware of - (312)353-9153, nettesheim.todd@epa.gov
16.	(New Mexico) THE NM Fish and Wildlife Service; Joel Lusk (505-761-4709); you'd have to contact them for study description.
17.	West Virginia DEP
18.	(Montana) Dr. Bill Woessner, University of Montana, detected PPCPs in wastewater
19.	(New Jersey) We have looked at the occurrence of some of these compounds in human breast milk, umbilical cord blood and maternal blood.

**27. Have EDC compounds been implicated in these studies (estradiols, phenols, PBDEs)?**

I Don't Know	No	Yes (please specify compounds, if known)
58.1%	6.5%	35.5%

31 responses received, 23 skipped. For the 11 who responded "Yes", their responses are listed as follows:

1.	(Missouri) Beta-estradiols caused a predominance of female fish.
2.	(Pennsylvania) Villanova study detected: estradiols dihydroequilin estriol estrone equiline progesterone norgestrel gestodene
3.	(Indiana) APEO, EDTA, nonylphenols, triclosan, caffeine, hormones, estradiols, etc. Biomarkers in common carp (vitellogenin and gonad histopathology).
4.	(Vermont) See previous page for a listing of detected compounds. We have not done effects-level studies yet.
5.	(Florida) PBDE
6.	(Nebraska) -ethynyl estradiol $\alpha$ -estradiol Estrone 17 $\beta$ 17 Estriol
7.	(Maine) EE2, BPA, OPEs
8.	(Illinois) Yes, PPCPs, hormones, and APEs (NP plus several ethoxylate chains).
9.	(New Mexico) Yes, but undefined.
10.	(Montana) caffeine, sulfamethoxazole, others
11.	(New Jersey) Perchlorate in breast milk Series of compounds in blood.

## F. State Needs/Priorities

It is clear from the survey results that although states have a great degree of interest in this topic and need to develop and implement regulations to address water quality effects from these compounds, water quality regulatory agencies often have limited information about the latest research findings from other agencies or academics beyond their jurisdictions. One of the most pressing near-term and ongoing needs is to have a repository of information on the various issues/research areas and a way to regularly share and communicate these findings in the context of our water quality regulatory environment. Possible mechanisms include:

- Results and publications resulting from studies being conducted by U.S. EPA, academics and federal and state agencies need to be regularly compiled and shared with states and other interested parties.
- EPA/State forums need to be held on a regular basis in order to share results and communicate ideas for advancing these efforts.
- Regional working groups on ECCs should be convened to link the academic community with regulatory agencies (e.g. water quality, public health, fish and game) so that regulatory agencies can utilize, where appropriate, the most current research findings and analytical methods for ECCs in their activities.
- A plan should be developed to logically weave together the various study objectives and results in order to maximize the integration of knowledge and planning of next steps so that we can address these issues in a timely manner.
- Pilot studies for evaluating treatment technologies need to be conducted and shared with EPA and states.

- States need to share ideas for utilizing narrative criteria for regulating these compounds prior to the development of specific numeric criteria.

Given the current situation and the hurdles identified by respondents, the survey specifically solicited respondents’ priorities for advancing the state of science and regulatory framework for emerging chemicals. States were asked to prioritize needs for the next year as well as the next five years.

Overall, over the next year, the majority of respondents (56%) felt that developing EPA-approved analytical methods was among the top three priorities. The second most frequently stated priority for the coming year was to conduct research on endocrine disruption effects (53%). The third most frequently stated priority was to develop water quality criteria (50%).

**28. PRIORITIES FOR NEXT YEAR. Please list your top three priorities for emerging chemical research/technical support that you would like to see addressed over the next year.**

	First	Second	Third	Number of respondents who consider this within their top 3 priorities	Percentage of respondents who consider this within their top 3 priorities
Development of EPA approved analytical methods	8	5	6	19	56%
Development of water quality criteria	6	4	7	17	50%
Development of treatment technologies	1	2	1	4	12%
Treatment effectiveness research	1	1	5	7	21%
Endocrine disruption effects research	7	8	3	18	53%
Research on ecological effects of endocrine disruption	3	8	4	15	44%
Technical assistance for establishing pharmaceutical collection programs	3	2	2	7	21%
Compilation and sharing of relevant literature	5	2	3	10	29%

answered question

34



**28. PRIORITIES FOR NEXT YEAR. Please list your top three priorities for emerging chemical research/technical support that you would like to see addressed over the next year.**

	First	Second	Third	Number of respondents who consider this within their top 3 priorities	Percentage of respondents who consider this within their top 3 priorities
			skipped question	20	

Over the next five years, the overall priorities of respondents shifted to development of water quality criteria (59%) and implementation in the form of development of treatment technologies (47%).

**29. PRIORITIES FOR NEXT FIVE YEARS. Please list your top three priorities for emerging chemical research/technical support that you would like to see addressed over the next five years.**

	First	Second	Third	Number of respondents who consider this within their top 3 priorities	Percentage of respondents who consider this within their top 3 priorities
Development of EPA approved analytical methods	7	4	3	14	44%
Development of water quality criteria	9	6	4	19	59%
Development of treatment technologies	5	5	5	15	47%
Treatment effectiveness research	0	5	6	11	34%
Endocrine disruption effects research	4	5	2	11	34%
Research on ecological effects of endocrine disruption	2	3	4	9	28%
Technical assistance for establishing pharmaceutical collection programs	4	2	5	11	34%
Compilation and sharing of relevant literature	0	1	1	2	6%

answered question 32  
skipped question 22

## **G. Conclusions, Priorities and Recommendations**

In conclusion, almost all survey respondents were interested in investigating ways to incorporate emerging chemicals into their monitoring and regulatory programs. There was equally strong interest among respondents in endocrine disrupting chemicals and pharmaceuticals and personal care products. Respondents expressed less interest in “classic” emerging chemicals such as MtBE, perchlorate, and 1,4 dioxane, most likely because these are no longer truly emerging issues as they are more well understood, more frequently monitored for in water, and better regulated.

Despite respondents’ strong interest, there are significant hurdles to monitoring and regulating emerging chemicals. First, analytical methods are still under development for many of these chemicals, and where methods do exist, many state laboratories still do not have the capability to run these analytical tests. Even when analytical methods exist, there is little information on which subset of chemicals will likely yield results and monitoring for all of these chemicals would be extremely costly. As a result, there is little to no routine monitoring for the presence of these chemicals, particularly EDCs and PPCPs, in surface and ground waters. Additionally, while there is significant evidence from individual studies that these chemicals are causing endocrine disrupting effects, these studies are few, and there is no inventory or centralized database to house the ecological toxicological effects data. Finally, there are no US EPA recommended water quality (numeric) criteria and no state water quality standards for most of these chemicals.

Currently, most monitoring and regulation is for the older “classic” emerging chemicals, including MtBE, perchlorate, and 1,4 dioxane. Even for these chemicals, most monitoring is done by dischargers and regulation often relies upon narrative water quality objectives, rather than numeric criteria. There is virtually no ambient monitoring or regulation of PPCPs.

It makes sense to have a near-term focus on analytical methods so as to limit barriers to monitoring in order to characterize the extent of the problem and identify the most prevalent compounds in effluents and in ambient water.

Companion to this work, research on more specific toxicological and EDC effects need to be made a priority. Studies to evaluate ecological effects in populations of organisms that experience endocrine disrupting effects need to be conducted. Levels of concern, if not criteria, need to be developed.

Research on treatment removal technologies also needs to be a high priority so that solutions are readily available to remove these pollutants, when found at levels causing, or contributing to, water quality impairments.

Lastly, as mentioned in the previous section, forums (state to state and state/EPA) for communication on these issues need to be created in order to facilitate regulatory advancements in these areas.

## **Acknowledgements**

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**Appendix One - Summary of Participants and Contact Information**  
(Alphabetical order by State/Interstate)

Name	Address	Phone	E-mail	State
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## Appendix Two - Supplemental Information Sent by Participants

- Montana Department of Environmental Quality  
Helena Valley Ground Water: Pharmaceuticals, Personal Care Products, Endocrine Disruptors (PPCPs), and Microbial Indicators of Fecal Contamination  
By Kathleen (Kate) J. Miller and Joseph Meek  
<http://www.mbmq.mtech.edu/pdf-open-files/mbmq532-helenavalley.pdf>
- USEPA "Pharmaceuticals and Personal Care Products"  
<http://www.epa.gov/ppcp/>
- Network of reference laboratories for monitoring of emerging environmental pollutants (NORMAN)  
Emerging environmental pollutants: Key issues and challenges  
<http://www.norman-network.net/public/workshops/stresa.htm>
- Danger feared from chemicals getting into bay  
San Francisco Chronicle – 7/11/07  
By Jane Kay, Staff Writer  
<http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/07/11/MNGFVQUHC21.DTL>
- California Regional Water Quality Control Board – North Coast  
Surface Water Samples Test Free of Strong EEDC Activity  
[www.waterboards.ca.gov/swamp](http://www.waterboards.ca.gov/swamp)

## **Appendix Three - Additional Web Resources and Information on Emerging Chemicals**

ECOS-DoD Sustainability Work Group's November 2005 Forging Partnerships on Emerging Contaminants Forum, Summary of State Responses to Emerging Contaminant Survey

[http://www.ecos.org/files/2527\\_file\\_EC\\_Survey\\_response\\_summary.pdf](http://www.ecos.org/files/2527_file_EC_Survey_response_summary.pdf)

EPA – ORD Multi-Year Plan for Endocrine Disruptors (FY2000-2012)

<http://epa.gov/osp/myp/edc.pdf>

EPA Region 2 Science Day: Non-Regulated Pollutants - Brominated Flame Retardants (BFRs) & Pharmaceuticals & Approaches to Emerging Chemicals Issues Workshop

<http://www.newmoa.org/prevention/chemicalspolicy/workshops/science2005/compendium/index.cfm>

EUROPA > European Commission > Environment > Chemicals > Endocrine Disruptors

[http://ec.europa.eu/environment/endocrine/index\\_en.htm](http://ec.europa.eu/environment/endocrine/index_en.htm)

Fluoride Action Network Pesticide Project

<http://fluoridealert.org/pesticides/pfos.pfoas-page.htm>

Food and Drug Administration, Endocrine Disruptor Knowledge Base

<http://edkb.fda.gov/>

Gordon Research Conferences, ENVIRONMENTAL ENDOCRINE DISRUPTORS, June 8-13, 2008

<http://www.grc.org/programs.aspx?year=2008&program=envendo>

National Institutes of Health, National Institute of Environmental Health Sciences

<http://www.niehs.nih.gov/health/topics/agents/endocrine/index.cfm>

Natural Resources Defense Council, Issues: Health, Endocrine Disruptors

<http://www.nrdc.org/health/effects/gendoc.asp>

US EPA Office of Research and Development (ORD), National Risk Management Research Laboratory (NRMRL), Endocrine Disrupting Chemicals Risk Management Research

<http://www.epa.gov/ORD/NRMRL/EDC/>

U.S. Geological Survey (USGS) Toxic Substances Hydrology (Toxics) Program, Emerging Contaminants Project

<http://toxics.usgs.gov/regional/emc/index.html>

US EPA, Office of Prevention, Pesticides and Toxic Substances, Office of Science Coordination and Policy, Endocrine Disruptors

<http://www.epa.gov/scipoly/oscpendo/index.htm>

World Health Organization

[http://www.who.int/ipcs/publications/endocrine\\_disruptors/endocrine\\_disruptors/en/index.html](http://www.who.int/ipcs/publications/endocrine_disruptors/endocrine_disruptors/en/index.html)

**Appendix Four – Link to “Emerging Pollutants of Concern” Survey**

[http://www.surveymonkey.com/s.aspx?sm=rruWhQFkCqhtZAN0jZXvMA\\_3d\\_3d](http://www.surveymonkey.com/s.aspx?sm=rruWhQFkCqhtZAN0jZXvMA_3d_3d)