Critique of EPA's Failure to Quantify and Monetize Health and Economic Benefits of Cleaner Source and Drinking Water Gained from the Steam Electric Power Generating Point Source Category Rulemaking

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The 5.5 billion pounds of pollution that power plants discharge into our rivers, lakes, and streams each year places a heavy burden on our drinking water resources.[1] Many of the pollutants discharged by power plants, including arsenic, mercury, lead, bromide, and nitrogen, have long been identified as contaminants that pose serious health risks when present in tap water or which complicate drinking water treatment. Nearly 40% of power plants discharge this dangerous pollution within 5 miles of an intake for a public water system.[2] Eighty-five percent of power plants are located within 5 miles of a public well.[3]

The record for the rulemaking to revise the Effluent Limitation Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category (Steam Electric ELGs) demonstrates that power plant discharges contaminate source waters, which Public Water Systems are responsible for treating to meet federal Safe Drinking Water Act (SDWA) standards. EPA notes that "[a]lthough many of the pollutants (e.g., selenium, mercury, arsenic, nitrates) in the evaluated waste streams would *likely* be reduced to safe levels during drinking water treatment, these pollutants could potentially impact the effectiveness of the treatment processes, which increase public drinking water treatment costs."[4] Yet EPA doesn't quantify or monetize benefits arising from reduced drinking water treatment costs or better health as a result of cleaner source waters.

Integration of Clean Water Act and Safe Drinking Water Act (SDWA) programs has been an area of increasing interest and effort inside EPA and among diverse stakeholders during the last decade. EPA's "Drinking Water Strategy," announced in 2010, includes several initiatives intended to strengthen public health protection from contaminants in drinking water.[5] The third strategy goal is to "Use the authority of multiple statutes to help protect drinking water."[6] The Steam Electric ELGs are a perfect example of why the integration of multiple statutes is necessary to protect drinking water. This critical Clean Water Act rule will have a direct impact on contaminants known to be discharged into sources of drinking water by power plants. Finalizing an ELG that maximizes the reduction of public health risk from drinking water

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[1] U.S. Envtl. Prot. Agency, Environmental Assessment for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (EPA-821-R-13-003) 3-13 tbl. 3-2 (Apr. 2013) [hereinafter EA].
[2] EA at 3-33 tbl. 3-13.
[3] *Id.*
[4] *Id.* at 3-32 (emphasis added).
[5] U.S. Envtl. Prot. Agency, Water: Drinking Water Strategy, http://water.epa.gov/lawsregs/rulesregs/sdwa/dwstrategy/ (last visited Sept. 19, 2013).
[6] *Id.*

will directly support Safe Drinking Water Act goals and EPA's Drinking Water Strategy. In addition, Option 5, which will keep over 5 billion pounds of pollution from entering waterways every year, is also in keeping with EPA's FY 2011-2015 Strategic Plan.[7] In Goal 2, Protecting America's Water, a key strategy supporting "Protecting Public Health" is "Continuing to Protect Sources of Drinking Water From Contamination."[8] Finalizing Option 5 provides a significant opportunity for EPA to deliver on this goal, and EPA should account for drinking water benefits arising from this rulemaking.

Clean, safe drinking water is one of our most important resources. Our Public Water Systems—and their consumers—bear the burden of cleaning up toxic discharges from power plants. Thus, it is critical that EPA more thoroughly consider, both qualitatively and quantitatively, the impact of power plant pollution on drinking water, and monetize the health and economic benefits that will be gained as a result of Steam Electric ELGs that eliminate or significantly reduce discharges of dangerous pollution.

I. EPA failed to monetize health benefits arising from cleaner drinking water as a result of the ELGs.

EPA did not monetize health benefits arising from the removal of power plant pollution from source waters for drinking water.[9] EPA's rationale for not including these important benefits in its analysis is that "public drinking water supplies are already treated for pollutants that pose human health risks."[10] EPA's rationale is flawed for several reasons. First, not all MCLs are set at a level that eliminates the risk of adverse health effects.[11] Second, power plants discharge some pollutants that pose health risks, but are not currently regulated in drinking water.[12] Third, some water systems do exceed MCLs.[13] Finally, monitoring for dangerous pollution in drinking water can be infrequent (i.e. every 9 years).[14] Thus, EPA should account for benefits arising from the removal of power plant pollution from source waters in this rulemaking.

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[7] *See* U.S. Envtl. Prot. Agency, FY 2011-2015 EPA Strategic Plan: Achieving Our Vision (Sept. 30, 2010), *available at* http://water.epa.gov/resource_performance/planning/index.cfm#2009.

[8] *Id.*

[9] U.S. Envtl. Prot. Agency, Benefit and Cost Analysis for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category (EPA-821-R-13-004) 2-4 to 2-5 (Apr. 2013) [hereinafter BCA].

[10] *Id.* at 2-4. At the same time, EPA acknowledges that "treatment may not remove all contaminants from the drinking water supplies and there may be some incremental health-related benefits associated with reduced concentrations arising from the proposed ELGs." *Id.* at 2-4 to 2-5.

[11] U.S. Envtl. Prot. Agency, Drinking Water Standards & Health Effects (EPA-816-F-04-037) (June 2004) [hereinafter Drinking Water Standards], *available at* http://water.epa.gov/lawsregs/guidance/sdwa/upload/2009_08_28_sdwa_fs_30ann_standards_web.pdf.

[12] Power plants discharge 158,000 pounds of vanadium annually. EA at 3-13 tbl. 3-2. Although there is no MCL for vanadium at this time, this pollutant is on the Contaminant Candidate List. U.S. Envtl. Prot. Agency, Contaminant Candidate List 3 – CCL, http://water.epa.gov/scitech/drinkingwater/dws/ccl/ccl3.cfm#chemical (last visited Sept. 15, 2013).

[13] *See, e.g.*, U.S. Envtl. Prot. Agency, Office of Water, Fiscal Year 2011 Drinking Water and Ground Water Statistics (EPA-816-R-13-003) (Mar. 2013), *available at* http://water.epa.gov/scitech/datait/databases/drink/sdwisfed/upload/epa816r13003.pdf.

[14] 40 C.F.R. § 141.23(c)(4).

A. Some MCLs are set at a level that does not eliminate the risk of adverse health effects.

Under the SDWA, EPA is required to conduct cost-benefit analysis and an additional feasibility analysis when setting MCLs and other standards.[15] When setting health-based drinking water standards, EPA first "[d]etermine[s] whether a contaminant should be regulated based on peer-reviewed science, including data on: how often the contaminant occurs in the environment; how humans are exposed to it; the health effects of exposure (particularly to vulnerable subpopulations)."[16] Based on this information, EPA sets a Maximum Contaminant Level Goal (MCLG), which is the level at which EPA expects no health risks.[17] MCLGs "take into account the risks of exposure for certain sensitive populations, such as infants, the elderly, and persons with compromised immune systems."[18] Next, EPA sets an enforceable MCL "as close to MCLGs as feasible, considering available technology and costs."[19] Before finalizing any proposed MCL, EPA must "complete an economic analysis to determine whether the benefits of that standard justify the costs. If not, [the Agency] may adjust the MCL for a particular class or group of systems to a level that 'maximizes health risk reduction benefits at a cost that is justified by the benefits.'"[20] Thus, an MCL may be set at a level that does not eliminate adverse health impacts, especially to vulnerable populations like children and the elderly. In the case of a known carcinogen, for example, the MCLG is always zero, but MCL's higher than zero have been set for carcinogens in drinking water.[21]

Arsenic illustrates this point. Power plants dump nearly 80,000 pounds of arsenic into surface waters each year. Arsenic is a potent carcinogen, and has been linked to miscarriages, stillbirths, and infants with low birth weights when ingested in drinking water.[22] Arsenic can also cause cancer, including skin tumors and internal organ tumors,[23] and is also connected to heart problems, nervous system disorders, and intense stomach pain.[24] The MCLG for arsenic is zero, meaning that any amount of arsenic can cause adverse health effects.[25] EPA initially proposed that the MCL be set at 0.005 mg/l,[26] and the MCL for arsenic was finalized at 0.010 mg/l.[27] Yet any amount of arsenic presents increased health risk in water, even if that water meets federal drinking water standards.

Power plant discharges also contain bromide, which is difficult to remove short of evaporating wastewater to crystallize out these pollutants. "While bromide itself is not thought to be toxic at levels present in the environment," this pollutant reacts with chemicals commonly

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[15] Drinking Water Standards.
[16] *Id.*
[17] *Id.*
[18] *Id.*
[19] *Id.*
[20] *Id*
[21] *Id.*
[22] Agency for Toxic Substances and Disease Registry, Toxicological Profile for Arsenic 18 (2007), *available at* http://www.atsdr.cdc.gov/toxprofiles/tp2.pdf.
[23] *Id.*
[24] *Id.* at 20-22.
[25] 66 Fed. Reg. 6,976, 6,981 (Jan. 22, 2001).
[26] 65 Fed. Reg. 38,888 (Jun. 22, 2000).
[27] 66 Fed. Reg. at 6,981.

used in wastewater treatment systems to form disinfection byproducts (DBPs), including bromate, trihalomethanes (TTHMs), and halogenated acetic acids (HAAs).[28] "Studies indicate that exposure to TTHMs and other DBPs from chlorinated water are associated with human bladder cancer" and can increase risk of liver, kidney, and central nervous system problems.[29] In addition, some studies report associations with DBPs and adverse reproductive and developmental effects.[30] See "Potential Drinking Water Effects of Bromide Discharges from Coal-Fired Electric Power Plants" for a more detailed discussion of the human health risks associated with DBPs.[31]

EPA has set MCLs for bromate, TTHMs, and HAAs.[32] The MCL for bromate is 0.010 mg/l, but the MCLG is zero.[33] The MCL for TTHMs is 0.080 mg/l, but the MCLG for specific TTHMs are zero for bromodichloromethane, zero for bromoform, 0.060 mg/l for dibromochloromethane, and 0.070 mg/l for chloroform—all of which are below the MCL.[34] Similarly, the MCL for HAAs is 0.060 mg/l, and the specific MCLG for specific HAAs are zero for dichloroacetic acid, 0.020 mg/l for trichloracetic acid, and 0.070 mg/l for monochloroacetic acid.[35] With the exception of the MCLG for monochloroacetic acid, all of the specific MCLGs for HAAs are below the MCL.[36] In describing how EPA set the current MCLs for DBPs, EPA states that

> [d]isinfection byproducts are a special case because decreasing disinfection byproduct risk could increase risks from disease-causing microorganisms. Eliminating or significantly decreasing disinfection to stop disinfection byproduct formation would seriously compromise overall public health protection. *The Agency's priority is maintaining protection from disease-causing microorganisms.* However, there are a number of things that water systems can do to reduce the levels of disinfection byproducts in drinking water (such as decreasing the amount of disinfectant and removing as much organic material as possible prior to disinfection).[37]

While this comment does not address EPA's judgment as to the relative risks associated with DBPs in relation to the importance of protecting public health from disease causing

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28 *See, e.g.*, EA at 3-10; 78 Fed. Reg. 34,432, 34,505 (June 7, 2013).
29 EA at 3-10-3-11.
30 John S. Reif et al., Reproductive and Developmental Effects of Disinfection By-Products in Drinking Water, 104 Envtl. Health Perspectives 1056 (Oct. 1996), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1469476/pdf/envhper00341-0056.pdf;
31 Jeanne M. VanBriesen, Potential Drinking Water Effects of Bromide Discharges from Coal-Fired Electric Power Plants (2013).
32 U.S. Envtl. Prot. Agency, National Primary Drinking Water Regulations (EPA-F-09-004) (May 2009), *available at* http://water.epa.gov/drink/contaminants/upload/mcl-2.pdf.
33 *Id.*
34 *Id.*
35 *Id.*
36 *Id.*
37 U.S. Envtl. Prot. Agency, Water: Stage 2 DBP Rule: Basic Information, http://water.epa.gov/lawsregs/rulesregs/sdwa/stage2/basicinformation.cfm#twelve (last visited Sept. 15, 2013) (emphasis added).

microorganisms, the fact is that the MCLs for DBPs do not eliminate all adverse health effects. Any additional contamination beyond the MCLG presents some health risk. In conclusion, removal of any additional discharges which leads to lower concentrations of a contaminant for which the MCLG is zero or lower than the MCL has public health benefit. EPA improperly failed to account for benefits arising from reduced health risks from drinking water that is cleaner as a result of the ELGs.

B. EPA does not regulate all pollutants from power plants that cause adverse health impacts if consumed.

EPA's rationale for failing to monetize health benefits arising from cleaner drinking water assumes that all power plant pollution risk is addressed by SDWA standards. However, EPA has not established a drinking water standard for all pollutants from power plants which present public health risks. In past rulemakings, EPA has acknowledged the need to account for health impacts from pollutants discharged from the point source category that do not have an MCL.[38] EPA should do the same here.

Two common power plant pollutants demonstrate this point. Vanadium and boron pose public health risks and there are no MCLs for these contaminants to date. Power plants discharge approximately 158,000 pounds of vanadium each year.[39] Vanadium is on the EPA's Contaminant Candidate List (CCL), which identifies unregulated pollutants that may require a drinking water standard.[40] Ingestion of vanadium can cause diarrhea and stomach cramps, and the contaminant has "also been linked to the development of some neurological disorders and cardiovascular diseases."[41]

Boron is another common metal in power plant discharges for which EPA has not set an MCL. Each year, power plants discharge 54,300,000 pounds of boron.[42] Boron can cause nausea, vomiting, and diarrhea when consumed.[43] "Exposure to large amounts of boron (about 30 g of boric acid) over short periods of time can affect the stomach, intestines, liver, kidney, and brain and can eventually lead to death."[44] In addition, "low birth weights, birth defects, and developmental delays have occurred in newborn animals whose mothers were orally exposed to high doses of boron (as boric acid)."[45] EPA should have accounted for benefits arising from reduced exposure to these pollutants in drinking water as a result of the ELGs.

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[38] *See* U.S. Envtl. Prot. Agency, Economic, Environmental, and Benefits Analysis of the Final Metal Products & Machinery Rule (EPA-821-B-03-002) 13-8 (Feb. 2003) ("EPA assumed drinking water treatment systems will reduce concentrations to below adverse effect thresholds for all chemicals for which EPA has published a drinking water criterion. Therefore, pollutants examined in the MP&M drinking water analysis include only six carcinogens for which current drinking water criteria are not available.").
[39] EA at 3-13 tbl. 3-2.
[40] 74 Fed. Reg. 51,850, 51,853 (Oct. 8, 2009).
[41] EA at 3-5 tbl. 3-1.
[42] *Id.* at 3-13 tbl. 3-2.
[43] *Id.* at 3-4 tbl. 3-1.
[44] Agency for Toxic Substances & Disease Registry, Public Health Statement: Boron § 1.5 (Nov. 2010), *available at* http://www.atsdr.cdc.gov/toxprofiles/tp26-c1-b.pdf.
[45] *Id.* § 1.6.

C. EPA acknowledges violations of MCLs at some water treatment systems.

EPA's rationale for not quantifying benefits arising from cleaner drinking water as a result of the ELGs is also flawed because it assumes that all water treatment systems are in compliance with all MCLs at all times. Yet this is not the case.[46] In its most recent drinking water report, EPA notes that the overall national average for compliance with health-based drinking water standards is approximately 93%, with some regions as low as 84%.[47] In 2011, there were 8,522 violations of MCLs at 4,010 community water systems alone.[48] The population potentially impacted by these violations was nearly 15 million people.[49] That same year, EPA reports over 76,000 monitoring and reporting violations at 17,519 systems, affecting over 60 million people.[50]

EPA's report also identifies MCL violations of DBP standards.[51] For all water treatment systems subject to the rule, there were 2,599 MCL violations of the Stage 1 DBP rule at 1,026 systems serving over 3 million people.[52] In fact, in the supporting documents for this rulemaking, EPA states that drinking water utilities have "not[ed] that . . . bromide concentrations have made it increasingly difficult for them to meet Safe Drinking Water Act requirements for TTHMs."[53] A recent report by several drinking water utilities in Pittsburgh, PA notes that "[a] number of US drinking water utilities have struggled to comply" with EPA's Stage 1 DBP rule and "even more utilities anticipate difficulty meeting the more stringent requirements" of the Stage 2 DBP rule that recently took effect.[54] Thus, for the purposes of the analysis for the ELGs, EPA should not assume that all systems are in compliance with all MCLs at all times.

D. In some cases, water treatment system monitoring for pollutants discharged from power plants is infrequent.

EPA's assumption also ignores the potential for violations of drinking water standards to remain undetected under infrequent Federal and State monitoring requirements. For example, federal regulations require public drinking water systems to monitor for inorganic chemicals (including antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, mercury, nickel, selenium, and thallium) once during an initial period of one year for surface water systems or three years for groundwater systems.[55] However, States can reduce the monitoring requirement

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[46] U.S. Envtl. Prot. Agency, Office of Water, Fiscal Year 2011 Drinking Water and Ground Water Statistics (EPA-816-R-13-003) (Mar. 2013), *available at* http://water.epa.gov/scitech/datait/databases/drink/sdwisfed/upload/epa816r13003.pdf.
[47] *Id.* at 17.
[48] *Id.* at 18-19. A "community water system" is "a public water system that supplies water to the same population year-round." *Id.* at 5.
[49] *Id.* at 19.
[50] *Id.* at 18-19.
[51] *Id.* at 25, 28.
[52] *Id.* at 25.
[53] EA at 3-11.
[54] Stanley States et al., Marcellus Shale Drilling and Brominated THMs in Pittsburgh, PA, Drinking Water, 105 Journal American Water Works Association E432, E432, E448 (Aug. 2013) (noting that Marcellus Shale drilling activities and coal plants account for increases in bromide concentrations in Allegheny River Systems).
[55] 40 C.F.R. § 141.23(c)(1).

to only once every nine years if three consecutive samples from initial monitoring produce results below the applicable MCL.[56] Infrequent monitoring over several years is not sufficient to identify whether a drinking water system is consistently complying with MCLs. Because many systems may monitor infrequently for pollutants in power plant discharges, EPA should not assume that all systems are in compliance at all times for the purposes of determining whether the ELGs will result in health benefits from cleaner source waters.

II. EPA did not quantify or monetize benefits from reduced drinking water treatment costs.

EPA also failed to monetize benefits from reduced drinking water treatment costs arising from cleaner source waters as a result of the ELGs. EPA states that

> [t]he proposed ELGs are expected to reduce costs of drinking water treatment (e.g., filtration and chemical treatment) by reducing metal concentrations and eutrophication in source waters. Eutrophication is one of the main causes of taste and odor impairment in drinking water, which has a major negative impact on public perceptions of drinking water safety. Additional treatment to address foul tastes and odors can significantly increase the cost of public water supply. Further, public drinking water sources do not always effectively remove bromides (a steam electric pollutant) from raw surface waters. Elevated bromide concentrations in source waters result in increased trihalomethanes (THMs) in drinking water. Drinking water utilities downstream of bromide sources are increasingly finding it difficult to meet drinking water standards for THMs. If water treatment is not sufficient, an alternate water source needs to be substituted (if available). Longterm solutions might require the development of new raw water supplies, which would involve costs for the acquisition of land (if available), regulatory review and permitting, development of infrastructure (dams, pumps, pipes), and watershed protection.[57]

EPA did not quantify or monetize these important benefits because of "data limitations."[58] Yet the EPA Office of Ground Water and Drinking Water routinely estimates incremental costs associated with drinking water treatment during the SDWA regulatory process.[59] In addition, the Office of Water has quantified and monetized the benefits from reduced drinking water treatment

[56] 40 C.F.R. § 141.23(c)(4). In addition, reduced monitoring for cyanide requires the State to determine that the system is not vulnerable due to lack of any industrial source of cyanide. 40 C.F.R. § 141.23(c)(2).
[57] BCA at 2-9.
[58] *Id.* at 2-10.
[59] U.S. Envtl. Prot. Agency, Arsenic in Drinking Water Rule Economic Analysis (EPA-815-R-00-0026) (Dec. 2000).

costs as a result of improved surface water quality from an ELG in the past.[60] EPA should do the same here.

In 2008, EPA estimated avoided costs of drinking water treatment from reduced sediment loadings from construction sites as a result of the proposed ELG.[61] EPA estimated "[s]ediment concentrations and drinking water influent volumes . . . for each surface drinking water intake in the United States."[62] "EPA [then] calculated the costs of treatment chemicals and sludge disposal by surface drinking water intake . . ." and compared the baseline and post-compliance costs to estimate the cost savings arising from the requirements of the ELG.[63] EPA also conducted a sensitivity analysis to address uncertainty.[64] EPA has provided no reason why they cannot do the same analysis here.

Furthermore, during the regulatory processes to set MCLs, the Office of Ground Water and Drinking Water estimates the incremental capital, operating and maintenance, and waste disposal costs associated with drinking water treatment for the purposes of compliance with a potential MCL.[65] For example, in the rulemaking to revise the arsenic MCL, EPA evaluated the following costs for various treatment systems to meet the MCL of 0.010 mg/l where source waters were 0.011 mg/l and 0.050 mg/l: capital, operating and maintenance, waste disposal, waste disposal operating and maintenance, and annual.[66] In other words, EPA is able to estimate incremental operating and maintenance costs to clean up water contaminated at various levels. Thus, monetizing benefits arising from reductions in source waters pollution as a result of the proposed Steam Electric ELGs is possible.

As EPA notes in the Benefit and Cost Analysis for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, these costs can be significant.[67] Increased pollution in source waters means increased costs associated with additional chemicals, more frequent replacement of filters and adsorptive media, waste disposal, and additional training,[68] all of which EPA must quantify and monetize in order to better represent the benefits associated with the ELGs. "Bromide is particularly difficult and expensive to remove and its associated brominated DBPs are among the most harmful."[69] In some cases, systems must switch disinfectants, "which carries increased costs as well as a need for additional training of operators. For example, the switch to chloramine requires addition of

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[60] U.S. Envtl. Prot. Agency, Environmental Impact and Benefits Assessment for Proposed Effluent Guidelines and Standards for the Construction and Development Category (EPA-821-R-08-009) (Nov. 2008).
[61] *Id.* at 9-1 to 9-14.
[62] *Id.* at 9-2.
[63] *Id.*
[64] *Id.*
[65] U.S. Envtl. Prot. Agency, Arsenic in Drinking Water Rule Economic Analysis (EPA-815-R-00-0026) (Dec. 2000).
[66] *Id.* at Exhibit 6-2a and 6-2b.
[67] BCA at 2-9.
[68] *See, e.g.*, EA at 3-32; Memo from Lydia Lambert & Kristi Bubb, ERG, to Bill Swietlik, EPA, Re Drinking Water Treatment Technologies that Can Reduce Metal and Selenium Concentrations Associated with Discharges from Steam Electric Power Plants (DCN SE02154) (Sept. 2, 2010).
[69] Wei-Hsiang Chen et al., Delta Drinking Water Quality and Treatment Costs Technical Appendix H iv (Sept. 2008), *available at* http://www.ppic.org/content/pubs/other/708EHR_appendixH.pdf.

phosphate to control lead releases that can be caused by the transition . . . ."[70] Water treatment systems may also be forced to find an alternative drinking water supply, which can carry substantial costs.[71] One system in California estimated these additional costs at approximately $20 to $60 per square acre-foot, resulting in increased costs of $30 to $90 million dollars each year.[72]

In conclusion, Steam Electric ELGs that eliminate or significantly reduce discharges of toxic pollution from power plants will have a significant and positive impact on the quality of drinking water and the cost of treatment. Finalizing Option 5 provides EPA with a unique opportunity to advance the goals of both the Clean Water Act and SDWA and ensure the public has access to safe drinking water. Thus, EPA should quantify and monetize these important benefits.

[70] Jeanne M. VanBriesen, Potential Drinking Water Effects of Bromide Discharges from Coal-Fired Electric Power Plants (2013).
[71] Wei-Hsiang Chen et al., Delta Drinking Water Quality and Treatment Costs Technical Appendix H iii (Sept. 2008), *available at* http://www.ppic.org/content/pubs/other/708EHR_appendixH.pdf.
[72] *Id.* at iv.