Fri Apr 07 17:18:45 EDT 2017
Hope.Brian@epamail.epa.gov
FW: From Greg Abel
To: CMS.OEX@epamail.epa.gov

DRF

From: Mundell, Denise R [mailto:DRMundell@berkshirehathawayenergyco.com]
Sent: Friday, April 07, 2017 12:29 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Cc: Dravis, Samantha <dravis.samantha@epa.gov>
Subject: From Greg Abel

Administrator Pruitt,

On behalf of Greg Abel, please see attached.

Thank you,

Denise

Denise Mundell

Executive Assistant to the Chairman

Berkshire Hathaway Energy Company

P O Box 657

Des Moines, IA 50306-0657

(515) 242-4040

drmundell@berkshirehathawayenergyco.com

Greg Abel
Chairman, President and CEO

April 7, 2017

The Honorable Scott Pruitt
Administrator-U.S. Environmental Protection Agency
Washington, D.C.

Dear Administrator Pruitt:

Please accept my thanks for your recent attendance and remarks at the March 14, 2017 Edison Electric Institute CEO meeting. As I'm sure you felt, your remarks were very well received. I particularly appreciated our exchange and the invitation to provide a list of items of importance to our businesses, which is attached.

Berkshire Hathaway Energy's operating companies - MidAmerican Energy Company, NV Energy Inc., PacifiCorp, BHE Renewables LLC, Northern Natural Gas and Kern River Gas Transmission Company - are primarily involved in the generation, transmission, and distribution of energy, serving 4.7 million end users in the U.S. located 18 states. Eight percent of all of the natural gas used domestically flows through our pipelines. In addition, we own 7.5% of all wind generation and 4.5% of all solar generation in the U.S.

The large geographic scope of our businesses means that we are subject not only to numerous federal regulations and rulemakings, but also to the determinations of multiple regional administrators and offices. We are supportive of scientifically-based environmental regulations that are appropriately and consistently applied and consider costs and benefits. This is particularly important for our regulated utilities, since these environmental requirements have a direct impact on the energy costs and competitiveness of our customers and communities. Accordingly, we have a strong stake in advocating for balanced solutions. We also have worked closely with the states in which we serve or have assets, and support a strong respect for their processes and outcomes.

We appreciate that the change in administration will result in adjustments to both personnel and policy. We make long-term investments, requiring clear policy signals and a stable and consistent policy environment that will continue to allow us to best serve our customers while delivering sustainable energy solutions through the implementation of our core principles of customer service, employee commitment, environmental respect, regulatory integrity, financial strength and operational excellence.

BERKSHIRE HATHAWAY ENERGY
P.O. BOX 657 • DES MOINES, IA 50306-0657, U.S.A. • 515-242-4000 • FAX: 515-242-4031

The attached list of projects and issues demonstrates both the substantial interaction of our companies with the Environmental Protection Agency, as well as the need to move forward to provide clarity on a host of matters that are currently in flux. I appreciate the efforts of you and your team in reviewing these as part of your overall assessment of the Administration's policies going forward. We believe strongly that you have a unique opportunity to work constructively with the electric sector to advance measures that will benefit the country's environmental resources.

Please let me know if I or my team can provide any follow-up information as you review these issues.

Sincerely,

Gregory E. Abel

Attachment

Berkshire Hathaway Energy
Pending Issues involving Environmental Protection Agency Rules and Actions

Berkshire Hathaway Energy's U.S. operating companies support scientifically-based environmental regulations that are appropriately and consistently applied and consider costs and benefits. Our regulated electricity generating companies serve approximately 4.7 million end users in 18 states utilizing geothermal, hydroelectric, wind, solar, natural gas, coal and nuclear resources. These operating companies include MidAmerican Energy Company, an Iowa-based utility providing regulated electric and natural gas service in Iowa, Illinois, Nebraska and South Dakota; PacifiCorp, which provides regulated electric service in California, Idaho, Oregon, Utah, Washington and Wyoming; and NV Energy Inc., which provides regulated electric and natural gas service in Nevada. In addition, BHE Renewables, LLC, operates as an independent power producer and is the owner of natural gas, wind, geothermal, solar and hydro projects in New York, Arizona, Texas, California, Illinois, Kansas, Nebraska, and Hawaii. We also own and operate interstate gas pipelines – Kern River and Northern Natural Gas – that serve customers in Iowa, Illinois, Michigan, Minnesota, Nebraska, South Dakota and Wisconsin.

Regulatory certainty is key to advance our objectives in maintaining safe, reliable and affordable electric service for our customers. We have identified the issues below as important for Berkshire Hathaway Energy and EPA to work together to achieve a greater degree of certainty that achieves these objectives, as well as to appropriate safeguard the country's environment. One important theme is the need to recognize and respect the key role of states relative to delegated authorities and other state prerogatives. We work closely with the states we operate within and believe that the EPA should provide substantial respect for their processes and outcomes.

Regional Haze

- Utah Regional Haze Federal Implementation Plan (FIP) (PacifiCorp) – After many years of discussion and EPA's rejection of the Utah regional haze state implementation plan (SIP), Utah submitted an amended SIP which proposed a Best Available Retrofit Technology (BART) alternative, after consideration of the appropriate factors, including cost. Ultimately, EPA, weighing only one element of visibility improvement, rejected the SIP and issued a FIP which would impose an additional $700 million in control costs for virtually no visibility improvement. The FIP has been appealed in the 10th Circuit Court of Appeals (Utah, et al. v. EPA) where a judicial stay has been requested and merits briefing is underway. In addition, multiple petitions for reconsideration and request for administrative stay were submitted to EPA in September 2016; however, EPA has taken no action on the petitions. We encourage EPA to grant the petitions for reconsideration and take action to hold the ongoing judicial appeal in abeyance pending EPA's action on the reconsideration petitions, as well as to issue an administrative stay and consent to the court issuing a judicial stay pending, at a minimum, further resolution of the administrative petitions.

- Wyoming Regional Haze FIP (PacifiCorp) – Portions of the Wyoming regional haze FIP are being appealed before the 10th Circuit Court of Appeals (Wyoming, et al. v. EPA), which granted a judicial stay of the FIP's requirements. The case has been fully briefed

but oral argument has not yet been scheduled. Requests for reconsideration and administrative stay were filed in March 2014, and EPA has yet to take any action on those requests. We encourage EPA to take action on the request(s) for reconsideration and continue to support the judicial stay.

- Regional Haze Rule Amendments (MidAmerican Energy Company, NV Energy Inc. and PacifiCorp) – On January 10, 2017, the final amendments to the regional haze rule were published in the Federal Register, which, among other things, allows states to delay their regional haze SIPs for the next planning period from July 31, 2018 to July 31, 2021. The final regional haze rule amendments were appealed in the D.C. Circuit Court of Appeals. Under the final rule, the planning period remained the same – 2018 to 2028, to advance reasonable further progress in improving visibility. In cases where EPA has rejected a SIP and issued a FIP and litigation is ongoing, EPA should accept the state's definition of BART and resolve the need for any additional controls as part of the long-term strategy in the second planning period from 2018 to 2028. Doing so would resolve outstanding litigation, free up EPA and DOJ resources, and lift the burden from states to submit new SIPs without knowing whether their appeals are successful. EPA has previously determined that many western Class I areas experience only slight improvement in visibility despite the installation of costly controls at stationary sources. During the second planning period, EPA should, as required, assess non-stationary sources and other drivers that have a greater impact on visibility in Class I areas.

Management of Coal Combustion Residuals (MidAmerican Energy Company, NV Energy Inc. and PacifiCorp) **–** The regulation of coal combustion residuals (CCR) has the potential of imposing significant costs on both operating as well as retired or retiring coal-fueled units based on EPA's implementation of the program, resolution of outstanding litigation, and an upcoming rulemaking. EPA's review of the following specific items will be key in obtaining the desired degree of certainty to implement the rule cost effectively.

- Implementation of the WIIN Act's CCR Provisions – On December 26, 2016, President Obama signed into law the Water Infrastructure Improvement for the Nation Act ("WIIN Act"). A section of the WIIN Act established procedures for EPA to authorize the states to implement the CCR rule through state permit programs. If the states do not seek permit program approval, EPA is directed to implement the CCR rule through a federal permit program, provided Congress provides specific funding for EPA to do so. Absent state or federal CCR rules, facilities face primary implementation through citizens' suits. It is important to Berkshire Hathaway Energy's operating companies that EPA express strong support for Congressional funding of the WIIN Act. Adequate funding would allow EPA to implement the CCR rule for states that do not choose to adopt their own permit program. We also request that EPA expeditiously approve state CCR permit programs, including those with risk-based management controls.

Risk-Based Management Options – When the CCR rule was adopted, EPA did not have authority to implement the rule via a federal or state permitting program. Congressional passage of the WIIN Act changed this. As a result, the basis for EPA's previous concern regarding utilization of risk-based flexibility under a self-implementing rule no longer exists.

Therefore, EPA should amend the rule to incorporate risk-based management options contained in state and other EPA solid waste programs to eliminate the one-size-fits-all requirements and allow for assessment of risk in decision making for all facets of the rule, including groundwater monitoring. We understand EPA is positioned to issue guidance on state permitting programs in April 2017 and finalize the guidance in June 2017 and look forward to reviewing and providing comment on such guidance.

Steam Electric Effluent Limitation Guidelines (MidAmerican Energy Company, NV Energy Inc. and PacifiCorp) – Distinct from the CCR requirements, the Steam Electric Effluent Limitation Guidelines (ELGs) create additional impacts on coal, gas, nuclear and oil-fueled power plant operators related to the ability to discharge process-related wastes. A case in the 5th Circuit Court of Appeals (Southwestern Electric Power Co., et al. v. EPA), along with petitions for reconsideration, are pending. We encourage EPA to grant reconsideration, conduct a review of the guidelines, and implement action as appropriate.

Air Quality Standards and Regulations

- Western Interstate Ozone Transport (PacifiCorp) – EPA has relied on its modeling utilized in the eastern U.S. under the Cross State Air Pollution Rule to dispute modeling methodologies and results submitted by western states, including Utah and Wyoming, with respect to interstate transport of emissions, and particularly modeled impacts on the Denver, Colorado, metropolitan area. The states and other parties have raised concerns about EPA's modeling and analysis of interstate transport of emissions. In fact, Wyoming specifically requested more time to analyze the complex interstate transport issues that it felt EPA had failed to adequately address; however, the request was denied by EPA due to the alleged impact on a consent decree. In order to ensure reasonable and appropriate regulation based on scientifically supportable conclusions, EPA should allow states a reasonable period of time to conduct modeling that is more representative of western terrain.

- One Hour SO2 Standard in the Western U.S. (PacifiCorp) – The one-hour SO_2 standard requires that the states demonstrate compliance with the standard through modeling and/or monitoring. Complex terrain in the western U.S. makes the use of EPA's standards relating to predictive models and modeling protocol difficult, producing results that may not be scientifically supportable. EPA should examine its modeling protocols and required models and ensure that approved models take into consideration steep and complex terrain and restricted access when requiring modeling to be conducted.

- Title V Permit Reviews (BHE Renewables LLC, MidAmerican Energy Company, NV Energy Inc. and PacifiCorp) – We encourage EPA to take prompt action on Title V operating permit reviews. For example, PacifiCorp's Hunter plant Title V permit renewal was issued by the state of Utah under its delegated authority. As part of the approval process, the Utah Department of Environmental Quality submitted the permit to EPA for review; EPA failed to conduct a timely review, resulting in the Sierra Club filing of a petition with EPA to object to the permit. EPA did not respond to the petition and, ultimately, the Sierra Club filed a lawsuit against EPA for failing to take timely action on the permit. EPA agreed in a court-approved stipulation to respond to the Petition for

Objection to the Hunter Title V permit no later than August 31, 2017. EPA should take action to approve the Title V permit and deny Sierra Club's petition for objection in advance of the August 31, 2017, deadline.

Water Quality Regulations (BHE Renewables LLC, MidAmerican Energy Company, NV Energy Inc. and PacifiCorp)

- Waters of the U.S Rule – Even as EPA works to rewrite the waters of the U.S. rule consistent with the February 28, 2017, Executive Order and the March 1, 2017, Federal Register notice, it is of critical importance for EPA to maintain the cooperative process with the states for state water quality certifications under Clean Water Act Section 401 so that the nationwide permit program and related permit programs proceed without interruption. The Berkshire Hathaway Energy operating companies routinely rely on nationwide permits for construction and maintenance activities for numerous project-related actions, such as renewable energy development, and other activities critical to maintaining safe, reliable electricity supplies to our customers.

- Clean Water Act Section 401 – States have certification authority under Clean Water Act section 401 to impose a broad range of conditions on Federal Energy Regulatory Commission (FERC) hydroelectric project licenses. While intended to protect water quality, states often impose conditions unrelated to water quality. EPA has little or no legal ability to limit the scope of state water quality certifications and FERC also has little authority to reject state certification conditions even when a federal agency believes that the state has exceeded its authority. We encourage EPA to explore the potential of adopting regulations more narrowly defining the scope of statutory terms such as "water quality standards" and "appropriate requirement of state law".

- State Designations Under the Clean Water Act – By disapproving (or threatening to disapprove) state water quality standards and state Clean Water Act designations, EPA has leveraged the Clean Water Act to force states to adopt more aggressive water quality standards. For example, in the Pacific Northwest, this has resulted in states adopting water quality standards for temperature that are more stringent than natural stream conditions. These decisions make it difficult for states to issue discharge permits and 401 certifications with reasonable conditions. EPA should defer to states to implement reasonable water quality standards under section 303(d).

Superfund (MidAmerican Energy Company, NV Energy Inc. and PacifiCorp)

- Portland Harbor Superfund Site – We encourage EPA to address superfund sites in a manner that logically addresses the site and party dynamics and encourages cooperation among the potentially responsible parties. The Portland Harbor Superfund Site covers a large area and involves hundreds of potentially responsible parties. For remediation to effectively advance at sites such as this, it is critical that EPA entertain the idea of breaking up the site into smaller more workable pieces for remedial design and remedial action. The current mega-site approach taken by EPA is unwieldy and breeds expensive litigation; EPA should focus on smaller more targeted and manageable approaches. Further, EPA has failed to acknowledge the likelihood, given the site features, that recontamination will occur and established an extremely low cleanup standard.

Reasonable long-term performance standards should be established to reflect the likelihood of recontamination.

EPA's Consultative Role (BHE Renewables LLC, MidAmerican Energy Company, NV Energy Inc. and PacifiCorp)

- EPA Endangered Species Act Consultation on State Water Quality Standards – EPA (as well as the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS)) takes the position that it must consult with NMFS and the USFWS when it proposes to approve state water quality standards that are intended to protect designated uses that include Endangered Species Act (ESA)-listed species. Because of the large number of ESA-listed fish in the Pacific Northwest, this means that all state water quality standards intended to protect aquatic life must not only be approved by EPA, but they must also effectively be approved by NMFS and the USFWS and because the missions of NMFS and USFWS are narrowly focused on the protection of listed species, this results in extraordinarily stringent standards and substantial delays. In recent federal litigation in the state of Washington, EPA's position on consultation appears to have played an important role in the federal district court's decision to require EPA to consult. This issue is ultimately a question of statutory interpretation but EPA's position (as well as NMFS' and USFWS') will continue to carry substantial weight in future litigation on this issue. EPA should consider taking a position that it is not required to consult with NMFS and USFWS, under the ESA, when it proposes to approve state water quality standards.

EPA Regional Offices (BHE Renewables LLC, MidAmerican Energy Company, NV Energy Inc., PacifiCorp)

- Regional Office Staffing – As EPA considers potentially significant budget reductions, it is important to ensure that activities performed by regional offices are not stalled as a result of regional office consolidation or delegation of actions from EPA headquarters. There are a number of compliance programs that are maintained by the regional offices because the states have chosen not to accept delegation from EPA to administer those programs. For example, in Iowa, EPA Region 7 maintains the hazardous waste program as well as program oversight of manufactured gas plant activities and implementation of the Mercury and Air Toxics program.

Mon Apr 10 09:18:32 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Workplace Safety Resource for Your Business and Employees [WARNING: DKIM validation failed]
To: CMS.OEX@epamail.epa.gov

From: Andrew Welch [mailto: (b) (6)
Sent: Monday, April 10, 2017 3:33 AM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: Re: Workplace Safety Resource for Your Business and Employees [WARNING: DKIM validation failed]

Hi Scott,

I appreciate you're busy but I just wanted to follow up on the email I sent you the other day; copy included below for reference.

On Tue, Apr 4, 2017 at 7:42 AM, Andrew Welch (b) (6) > wrote:

Hi Scott,

I'd like to make a suggestion for a workplace safety resource to include on this page of your site http://www3.epa.gov/epahome/workplac.htm.

We've put together 'A Practical Guide for Your Business and Employees' where we explain the common potential hazards, safety measures that need to be put in place, and how these approaches can be applied to your business.

Here is the link - http://uk.rs-online.com/web/generalDisplay.html?id=i/practical-guide-for-your-business-and-employees.

If you are looking to update this page, I think our guide will make a useful addition.

Thank you for your consideration.
Andrew

AX-17-000-7305

Johnson, Karen

From: Cooper, Marian
Sent: Wednesday, April 26, 2017 1:03 PM
To: Johnson, Karen; Gantt, Melissa
Subject: FW: EPA Response to "A Practical Guide for Your Business and Employees" Link

This can be closed out now. Thanks

AX-17-000-7305

Marian Pechmann Cooper
Chief of Staff
Office of Administration and Resources Management
William Jefferson Clinton Federal Building-NORTH (3330)
Washington, DC 20460
office number -- 202 564-0620
office fax -- 202 564-0233

From: Vizian, Donna
Sent: Wednesday, April 26, 2017 12:13 PM
(b) (6)
Cc: Cooper, Marian <Cooper.Marian@epa.gov>
Subject: EPA Response to "A Practical Guide for Your Business and Employees" Link

Dear Mr. Welch,

Thank you for your email of April 10, 2017 to Administrator Scott Pruitt. I am responding on his behalf.

Thank you for sharing "A Practical Guide for Your Business and Employees." We take workplace safety very seriously at the EPA.

Best,
Donna

Donna Vizian
Acting Assistant Administrator
Office of Administration and Resources Management
U.S. Environmental Protection Agency

AMERICAN REFINING GROUP, INC.

RECEIVED

2017 APR 10 AM 11:58

OFFICE OF THE
EXECUTIVE SECRETARIAT

March 27, 2017

The Honorable Scott Pruitt
Administrator
United States Environmental Protection Agency
1200 Pennsylvania Ave NW
Washington, DC 20004

Re: Renewable Fuel Standard: Small Refinery Hardship Relief

American Refining Group, Inc. (ARG) a small refinery located in Bradford, Pennsylvania is writing you in concern for "hardship relief" it is seeking from the United States Environmental Protection Agency (USEPA). ARG petitioned the USEPA for "hardship relief" from the Renewable Fuel Standard (RFS) for the 2016 compliance year based on the disproportionate economic hardship the refinery would suffer if it was required to buy credits (called "renewable identification numbers" or "RINs") for compliance. ARG submitted its petition on January 31, 2017 and it has not received word on its "hardship relief" with the March 31, 2017 compliance date only four days ahead.

RFS compliance is one of the company's largest operating expenses. For 2016, as reported in the company's petition to EPA, ARG would have a cost of compliance from buying RINs of approximately $3million, compared to total profits of only $3 million. To put this in perspective, ARG would be paying more for RFS compliance than it pays for electric and water combined. To pay for RINs, the company has had to freeze hiring, stop making investments in its refinery, and has deferred non-critical maintenance. Without capital investments, contractors will not be hired, affecting the local community.

Our President has indicated that this is the type of job-crushing regulatory program that he intends to see fixed. Fortunately, it is within EPA's purview to grant relief now, before more jobs are lost and the local economy in Bradford, Pennsylvania is further harmed. For these reasons, we urge you to review the merits of ARG's petition and not to issue an adverse ruling, which could have the effect of costing American jobs and harming the local economy further.

Therefore, granting 2016 hardship relief will not result in less renewable fuel blending, it will simply avoid a substantial expense for a company unable to afford it. Renewable fuel has already been blended with the transportation fuel produced by ARG in 2016.

At a minimum, EPA should temporarily delay the compliance deadline to review the merits of ARG's petition. It is less than a week until the compliance deadline and the cost of

77 North Kendall Avenue • Bradford, PA 16701
Office (814) 368-1200 Fax (814) 368-1335
Web: http://www.amref.com eMail: arg@amref.com

RINs has increased in anticipation of the deadline. EPA is only required to "act" on ARG's petition at this time. 40 CFR 80.1442(e)(2)(ii). It may "act" on ARG's petition by temporarily delaying the compliance deadline while it reviews the merits of the petition.

Thank you for considering our request.

Sincerely,
American Refining Group, Inc.

Stephen L. Sherk

Stephen L. Sherk
Director, Environmental Affairs

Cc: The Honorable Glenn Thompson
United States Congressman, Pennsylvania's 5th District
124 Cannon HOB
Washington, DC 20515

AMERICAN REFINING GROUP, INC.
77 North Kendall Avenue • Bradford, PA 16701
Office (814) 368-1200 Fax (814) 368-1335
Web: http://www.amref.com eMail: arg@amref.com

AMERICAN REFINING GROUP, INC.
77 North Kendall Avenue
Bradford, PA 16701

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APR 10 2017

FCL 2035331

The Honorable Scott Pruitt
Administrator
United States Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, DC 20004

APR 10 2017

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL VEHICLE AND FUEL EMISSIONS LABORATORY
2565 PLYMOUTH ROAD
ANN ARBOR, MICHIGAN 48105-2498

OFFICE OF
AIR AND RADIATION

MAY 04 2017

Mr. Stephen L. Sherk
Director, Environmental Affairs
American Refining Group, Inc.
77 North Kendall Avenue
Bradford, Pennsylvania 16701

Dear Mr. Sherk:

I am writing in response to the petition from American Refining Group, Inc. (ARG) for a one-year extension of the small refinery exemption from the requirements of the Renewable Fuel Standard (RFS) program for the Bradford, PA Refinery. As you know, the Clean Air Act (CAA) provided that small refineries would be temporarily exempt from the RFS requirements through December 31, 2010. ARG's refinery qualifies as a small refinery that was covered by this temporary exemption.

Pursuant to CAA section 211(o)(9)(B) and 40 CFR 80.1441(e)(2) small refineries may petition the U.S. Environmental Protection Agency to extend the temporary RFS exemption on the basis that compliance with the RFS requirements will cause "disproportionate economic hardship." Pursuant to these provisions, ARG submitted a petition to the EPA dated January 31, 2017, to extend the exemption for the Bradford, PA Refinery from January 1, 2016, through December 31, 2016.

Based on our evaluation of all of the information described in Section III of the enclosed Decision Document, and after consultation with the Department of Energy, we have determined that ARG will experience "disproportionate economic hardship" at the Bradford, PA refinery by complying with its RFS requirements. See the enclosed Decision Document for a more detailed explanation of our evaluation and determination. Therefore, the EPA is granting ARG's petition requesting a further extension of Bradford, PA Refinery's RFS small refinery temporary exemption. This means that from January 1, 2016 through December 31, 2016, the Bradford, PA Refinery's gasoline and diesel production is not subject to the percentage standards of 40 CFR 80.1405, and ARG is not subject to the requirements of an obligated party for fuel produced at the Bradford, PA Refinery during that period.

If you have any questions, please contact Byron Bunker of my staff at 734-214-4155.

Sincerely,

Christopher Grundler, Director
Office of Transportation and Air Quality

Enclosure – Decision Document

RECEIVED

March 27, 2017

2017 APR 10 AM 11:59

OFFICE OF THE
EXECUTIVE SECRETARIAT

Mr. Scott Pruitt, Administrator
Environmental Protection Agency
Office of the Administrator, Mail Stop 1101A
1200 Pennsylvania Avenue
Washington, DC 20460

Re: **Suggestion for EPA Cost Control**

Dear Mr. Pruitt:

First of all, congratulations on your appointment to this extremely important role. I trust you will bring some sanity to the processes that have driven so much of American manufacturing either into the ground or out of the country.

As a chemical engineer working in industry (for FMC Corporation) I saw the Seattle Region 10 EPA slowly strangle over 20 years what was the world's largest, most efficient smelter making Elemental Phosphorus, at FMC Corporation in Pocatello, Idaho. That 'murder' killed 500 high-paying direct jobs. That plant is now 'flat ground' and there is only one phosphorus plant left in North America, at Soda Springs, Idaho. It is a complex story, but that is not my main purpose in writing today. It is just my background experience. Nowadays I submit EPA paperwork to the Region 2 EPA office in NYC, located at **290 Broadway**, surely some expensive space.

What I write about today is the EPA's practice of locating their Regional Offices in some of the most expensive real estate to be found in the USA. I am only personally aware of the Seattle and NYC offices, but in looking at the other regional offices I find Boston, Philadelphia, Atlanta, Chicago, Dallas, Denver and San Francisco. None of these rates as a place for "cheap office space" nor "cheap living". They are offices for 'overpaid city slickers' is the first impression that they give to their clients such as myself, not real working people close physically and mentally to the farms and factories of this nation. I see the siting practice in big, most-expensive cities as a fundamental flaw of the EPA. I urge you to set a course to rectify this.

I would urge you to look at moving the Regional Offices to places within their regions that are economically-distressed and that will provide both cheap office space and cheap, close-to-the-land living for the employees. In my own state of NY, I can immediately think of Elmira and Binghampton that could surely use some stimulation.

That is my suggestion; thank you for your time and consideration.

David A. Crea
(b) (6) ,
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Cc: Donald J. Trump, President, 1600 Pennsylvania Avenue, Washington, DC 20460

Mr. David A. Crea

(b) (6)

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APR 10 2017

FCL 2035433

20460-

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 2 4 2017

OFFICE OF
ADMINISTRATION
AND RESOURCES
MANAGEMENT

Mr. David A. Crea
(b) (6))
(b) (6) ;

Dear Mr. Crea:

Thank you for your March 27, 2017, letter to Administrator Pruitt on regional office locations at the U.S. Environmental Protection Agency. I am responding on his behalf. The EPA under the leadership of President Trump and Administrator Pruitt will be good stewards of the environment and the taxpayer's – your – money. You make very good points about expensive office space in places where the cost of living is also expensive. As the new administration here starts to looks at ways to reduce spending and lower the deficits, we will take your thoughtful recommendations into consideration.

Again, thank you for your letter.

Sincerely,

Donna J. Vizian
Acting Assistant Administrator

RECEIVED
2017 APR 10 AM 11:54
OFFICE OF THE
EXECUTIVE SECRETARIAT

March 30, 2017

Environmental Protection Agency
Mr. Scott Pruitt, Administrator
1101 A
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Dear Sir,
There is a serious contamination program going on in this country and being conducted by the US Air Force, as well as some private companies.

This is the "military intra-flights", more accurately describes as "CHEM TRAILS".

Studies by qualified scientists, several from the EPA, are sounding the warning alarms as these procedures are not monitored for safety or for dangers to the environment, people, or animals.

I personally experience heart palpitations on days that the sky is cris-crossed with these Chem Trails, and on days the experiments are not going on, my heart is normal.

Studies have shown that they are using aluminum and barium to create clouds, and these same elements along with other damaging chemicals are turning up in our water and air.

Yesterday the sky was a beautiful blue with no clouds in sight. Then the Chem Trail planes began flying every which way across the sky, and soon there was a thin layer of cloudy stuff and no blue to be seen.

I was insultingly told by one agency that they are just commercial airline vapor trails. Anyone knows that airlines can't afford fuel to be flying around in circles and at very much higher altitude than allowed by government regulations.

I would ask that this be investigated and stopped by the EPA. When did our government allow its own citizens to be used as guinea pigs?

Please respond to my letter, as I feel this is a matter of life or death for me.

Regards,
Phyllis Couper

Phyllis Couper
(b) (6) 1
5

Phyllis Couper
(b) (6)

OAKLAND CA 945
03 APR 2017 PM 4 L

USA FOREVER

APR 10 2017

FCL 2035725

Environmental Protection Agency
Mr. Scott Pruitt, Administrator
1101 A
1200 Pennsylvania Ave, NW
Washington, DC 20460

20460-

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL VEHICLE AND FUEL EMISSIONS LABORATORY
2565 PLYMOUTH ROAD
ANN ARBOR, MICHIGAN 48105-2498

APR 19 2017

OFFICE OF
AIR AND RADIATION

Phyllis Couper
(b) (6)

Dear Ms. Couper:

Thank you for your letter of March 30, 2017, to U.S. Environmental Protection Agency Administrator Scott Pruitt concerning "contrails." The Administrator has asked me to respond to you on his behalf.

The EPA is not aware of any deliberate actions to release chemical or biological agents into the atmosphere. Jet aircraft do form contrails under certain atmospheric conditions. Contrails are line-shaped clouds or "condensation trails" composed of ice particles that are visible behind jet aircraft engines under certain atmospheric conditions. Jet aircraft engines operating at high altitudes emit tiny combustion-related particles as part of the exhaust emissions from the engine. High-altitude water vapor present in the ambient atmosphere reacts with these particles to form contrails.

These contrails then spread due to atmospheric turbulence and sometimes join with other contrails and expand into large, natural-looking clouds with cirrus characteristics that can cover large areas of the sky. (Cirrus clouds are wispy white, usually a natural phenomenon, consisting of minute ice crystals formed at high altitudes of 20,000 to 40,000 feet. These are normally associated with thunderstorms and the jet stream.) For a contrail to form there must be enough moisture in the air and the temperature must be cold enough to form ice crystals at the altitude at which the jet is flying. If the temperature is too warm or the air is too dry, contrails will not form.

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Also, a 1999 report issued by the Intergovernmental Panel on Climate Change (IPCC) entitled, "Aviation and the Global Atmosphere," discusses contrail formation and its effects in detail. A copy of

this report (ISBN number 0 521 66300 8) may be ordered through Cambridge University Press' web site at www.cambridge.org.* (The Summary for Policy Makers of this report is located on the IPCC web site at: http://www.ipcc.ch/pdf/special-reports/spm/av-en.pdf*.) The influence of contrails on cirrus clouds is noted as a key area of scientific uncertainty that limits the ability to project aviation impacts on climate and ozone. Further work is required to reduce scientific and other uncertainties of aviation impacts. The EPA and the FAA fully support continued research to address these issues.

In regard to air quality impacts, jet aircraft contribute much less air pollution than that from motor vehicles, however, their overall emissions are increasing every year as air travel becomes more popular. In addition, jet aircraft can contribute significantly to ground-level ambient air pollution in the immediate vicinity of an airport, especially emissions of nitrogen oxides (NOx) and hydrocarbons (HCs) which contribute to the formation of ozone. Additional detailed information on aircraft emissions can be found in an EPA report, "Evaluation of Air Pollutant Emissions from Subsonic Commercial Jet Aircraft" (April 1999) that provides an estimation of the contribution of aircraft to air quality emissions in ten urban areas.

The aircraft emission standards for gas turbine (jet) engines which power civil aircraft have been in place for about 30 years. Before an engine type can be sold or installed on an aircraft, the manufacturer must test its emissions on the ground by simulating in-use conditions. The EPA sets the emission standards for the engines, and the FAA monitors the certification process and enforces the standards. Emission standards apply to essentially all commercial aircraft, comprising scheduled and freight airlines. Three classes of aircraft—military aircraft, piston-engine aircraft, and helicopters—are presently not covered. Controls on engine smoke and prohibitions on fuel venting were instituted in 1974 and have been revised several times since then. Beginning in 1984, limits were placed on the amount of unburned HCs which turbine engines can emit per landing and takeoff cycle. In May of 1997, the EPA adopted the then existing emission standards for gas turbine engines of the International Civil Aviation Organization (ICAO) for NOx and carbon monoxide (CO). In addition, in November 2005, the EPA adopted more stringent NOx standards that were formally accepted by ICAO in February of 1999 and which went into effect in 2004.

In addition, in May 2012, the EPA adopted even more stringent NOx emission standards and related provisions for aircraft gas turbine engines with rated thrusts greater than 26.7 kilonewtons. These engines are used primarily on commercial passenger and freight aircraft. The requirements were previously adopted by the ICAO. Included in the rule are two new tiers of more stringent emission standards for NOx. These are referred to as Tier 6 standards and Tier 8 standards. The Tier 6 standards became effective for newly-manufactured aircraft engines in 2013.

Finally, in July 2016, the EPA finalized the Clean Air Act finding that greenhouse gas emissions from certain classes of engines used in aircraft contribute to the air pollution that causes climate change, endangering public health and welfare under the Clean Air Act. These findings focus on the six well-mixed greenhouse gas (GHG) emissions that together represent the largest driver of human-caused climate change: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The EPA will use the final endangerment and contribution findings for aircraft GHG emissions to evaluate potential control options that could include aircraft engine GHG standards. Any future proposed aircraft engine standards would be open to public comment and review.

Information on air pollutant emissions from aviation, including the reports and regulations mentioned here, is available on the EPA's website at https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-emissions-nonroad-vehicles-and-engines.

Again, thank you for your letter. I appreciate the opportunity to be of service and trust the information provided is helpful.

Sincerely,

Kathryn A. Sargeant for

William J. Charmley, Director
Assessments and Standards Division

* Please note that we are providing these links for your reference only. In doing so, the EPA does not endorse any non-government web sites (or the information they contain), companies, or applications. In addition, the EPA cannot attest to the accuracy of non-EPA information provided on these third-party web sites.

DONALD J. HORVATH
Attorney At Law

1099 E. Champlain Drive, Ste. A-115
Fresno CA 93720-5033
Phone: 559.250.1170

19 March 2017

Honorable Scott Pruitt, Administrator
Environmental Protection Agency
Office of the Administrator, 1101A
1200 Pennsylvania Ave.
Washington, D.C. 20460

Dear Mr. Pruitt:

On the mornings of 7 and 17 March 2017, I observed several airplanes flying relatively low over the City of Fresno dumping a white substance into the air. I could see the actual planes in sufficient detail to determine that they were too small to be commercial airliners and too slow to be military jet fighters.

The white substance took substantial time to dissipate and eventually looked like a straight line streak of wispy clouds. The lines of white substance usually were placed parallel to each other, but at times they crossed.

Who is paying the cost to have these planes fly around and dump a white substance into the atmosphere? The price of the required planes and aviation fuel alone would be substantial; the white substance could be very expensive if it is worth the effort to dump into the atmosphere from multiple planes.

What is the white substance these planes were dumping into the air above the city where I live?

Is this white substance any risk to the health of human beings living under or near the place it is dumped into the atmosphere?

Why is this white substance being dumped into the atmosphere?

Thank you.

Sincerely yours,

Donald J. Horvath

RECEIVED
2017 APR 10 AM 11:24
OFFICE OF THE
EXECUTIVE SECRETARIAT

Donald J. Horvath
Attorney at Law
1099 E. Champlain Drive, Ste. A-115
Fresno, CA 93720-5033

FRESNO CA 936

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APR 10 2017

FCL 2035524

Honorable Scott Pruitt, Administrator
Environmental Protection Agency
Office of the Administrator, 1101A
1200 Pennsylvania Ave.
Washington, D.C. 20460

20460-

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL VEHICLE AND FUEL EMISSIONS LABORATORY
2565 PLYMOUTH ROAD
ANN ARBOR, MICHIGAN 48105-2498

APR 19 2017

OFFICE OF
AIR AND RADIATION

Donald J. Horvath
1099 E. Champlain Drive, Ste. A115
Fresno, California 93720-5033

Dear Mr. Horvath:

Thank you for your letter of March 19, 2017, to U.S. Environmental Protection Agency Administrator Scott Pruitt concerning "contrails." The Administrator has asked me to respond to you on his behalf.

The EPA is not aware of any deliberate actions to release chemical or biological agents into the atmosphere. Jet aircraft do form contrails under certain atmospheric conditions. Contrails are line-shaped clouds or "condensation trails" composed of ice particles that are visible behind jet aircraft engines under certain atmospheric conditions. Jet aircraft engines operating at high altitudes emit tiny combustion-related particles as part of the exhaust emissions from the engine. High-altitude water vapor present in the ambient atmosphere reacts with these particles to form contrails.

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Again, thank you for your letter. I appreciate the opportunity to be of service and trust the information provided is helpful.

Sincerely,

Kathryn A. Sargeant for

William J. Charmley, Director
Assessments and Standards Division

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James Wheeler
Pennsylvania

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Maryland

Local Government Advisory Committee
to the Chesapeake Bay Executive Council

April 4, 2017

Chesapeake Executive Council:

We are writing to request your support in advocating for maintaining EPA Chesapeake Bay Program funding at the current level of $73 million. As noted in your 2016 Resolution to Support Local Government Engagement (2016 Resolution), "citizens desire clean water in their local streams and rivers and local, state and federal elected officials are responsible to their constituents to help maintain the quality of life that clean water provides."

In your 2016 Resolution you also noted that "current levels of public funding and private investment are insufficient to carry out conservation and restoration activities that achieve local healthy streams, rivers and a vibrant Chesapeake Bay." Additionally, you committed to pursue opportunities to increase public funding and private investment for local implementation of conservation and restoration activities that achieve local healthy streams, rivers and a vibrant Chesapeake Bay, particularly activities that reduce pollutants from stormwater runoff and address the problem of recurrent flooding.

The elimination of funding for the EPA Chesapeake Bay Program, as proposed in the President's 2018 Budget Blueprint, will limit our ability to protect healthy waters, put a halt to many local water protection and restoration initiatives, and threaten the scientific integrity of the restoration effort.

Local governments throughout the watershed are investing millions of dollars to protect and restore local waters. Bay Program funding and other federal programs such as the Clean Water and Drinking Water State Revolving Funds, along with state funding, are vital to our success.

We know you share our understanding that a healthy Chesapeake Bay is an economic engine for our region and a critical resource for our nation and hope that we can count on your support of our efforts.

Sincerely,

The Honorable Bruce Williams
Chair, Local Government Advisory Committee

cc. Nick DiPasquale, EPA Chesapeake Bay Program

Mary S. Gattis, LGAC Coordinator
3310 Market Street, Suite A | Camp Hill, PA 17011 | 717-475-8390 | mgattis@allianceforthebay.org

Chesapeake Bay Program
A Watershed Partnership

Alliance for the Chesapeake Bay

612 Hull Street
Suite 101 C
Richmond, VA 23224

Alliance for the Chesapeake Bay

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Administrator Scott Pruitt
USEPA
1200 Pennsylvania Ave, N.W
Washington DC
20460

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 21 2017

Mr. Bruce Williams
Chair, Local Government Advisory
Committee to the Chesapeake
Bay Executive Council
3310 Market Street, Suite A
Camp Hill, Pennsylvania 17011

OFFICE OF THE
CHIEF FINANCIAL OFFICER

Dear Chair Williams:

Thank you for your letter of April 4, 2017, to Scott Pruitt, Administrator of the U.S. Environmental Protection Agency, expressing concern about the agency's Fiscal Year 2018 President's Budget, submitted to Congress in May, for the Chesapeake Bay program.

As the nation's largest estuary, the Chesapeake Bay is an important water resource, and the Administrator remains committed to improving environmental conditions and human health for Americans that live and work in the six Chesapeake Bay states. Under his leadership, the EPA will work collaboratively with states, local governments, and Members of Congress to provide flexibility to address important priorities, such as those shared by the Chesapeake Bay states and Washington D.C.

The President's Budget focuses federal funding for core work in air and water quality, contaminated land clean-ups, enforcement, and ensuring the safety of chemicals in the marketplace. The budget aims to reduce redundancies and inefficiencies and prioritize the EPA's core statutory mission of providing Americans with clean air, land, and water. While many in Washington insist on greater spending, the EPA is focused on greater value and real results. With support from our state and local partners – and by working with you and your representatives in Congress, we can make a real difference in communities across America.

Again, thank you for your letter. If you have further questions, please contact me or your staff may contact James Blizzard, in the EPA's Office of Congressional and Intergovernmental Relations, at blizzard.james@epa.gov or (202) 564-1695.

Sincerely,

David A. Bloom
Acting Chief Financial Officer

cc: Nick DiPasquale, Director
Chesapeake Bay Office

INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO

OFFICE OF THE COMMISSIONER
UNITED STATES SECTION

RECEIVED
2017 APR 10 AM 11:33
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EXECUTIVE SECRETARIAT

March 28, 2017

The Honorable Dianne Jacob
San Diego County Board of Supervisors
1600 Pacific Highway, Room 335
San Diego, CA 92101-2470

Dear Chairwoman Jacob:

With regard to your March 16, 2017 letter regarding the February 2017 event that resulted in sewage contamination in the Tijuana River Valley and nearby coastal areas, I share your concern about the recurring nature of the transboundary sewage problem affecting San Diego County.

As you are aware, the International Boundary and Water Commission (IBWC) in the 1990s constructed an international wastewater treatment plant to capture and treat a portion of Tijuana wastewater to U.S. standards. This has greatly improved sanitation conditions in the Tijuana River Valley and nearby coastal waters over the last two decades. However, as evidenced by the February spill and other events, there is an ongoing problem of sewage flows that are not able to be captured and treated at the wastewater treatment plants in both countries.

The IBWC certainly has a large role to play in addressing this problem. The IBWC investigation into the February spill referenced in your letter will contain recommendations on how to improve communications about transboundary spills as well as proposals to prevent them from occurring in the first place.

The Commission is also working through various binational work groups established under a 2015 IBWC agreement, Minute No. 320, "General Framework for Binational Cooperation on Transboundary Issues in the Tijuana River Basin," to address priority issues of water quality, sediment, and trash. One part of this effort is to develop recommendations so that, during and after rainfall, there is an improved notification process and operational reliability of a pumping station in Mexico that prevents sewage from flowing into the United States.

However, the IBWC is only one of the agencies that must be a part of the solution. Tijuana faces various challenges that contribute to the transboundary sanitation problem including a growing population, homes built in areas without infrastructure, aging sanitation infrastructure, and limited funding. The entities with authority to support construction and maintenance of sanitation infrastructure in Mexico have a key role to play in the solution, including potentially the Border Environment Cooperation Commission/ North American Development Bank (the entities established following NAFTA to support development of environmental infrastructure along the U.S.-Mexico border), U.S. Environmental Protection Agency, and of course local, state, and federal agencies in Mexico.

I look forward to working with authorities in San Diego County to ensure appropriate response to any transboundary spills that may occur and welcome your support and input for implementation of solutions.

Sincerely,

Edward Drusina, P.E.
Commissioner

cc: Governor Edmund G. Brown, Jr.
State of California
c/o State Capitol, Suite 1173
Sacramento, CA 95814

Secretary of State Rex W. Tillerson
United States Department of State
2201 C St. NW, 7th Floor
Washington, DC 20520

Administrator Scott Pruitt
United States Environmental Protection Agency
Mail Code 1101A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

UNITED STATES SECTION
INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO
THE COMMONS, BUILDING C, SUITE 100
4171 NORTH MESA STREET
EL PASO, TEXAS 79902-1441

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Administrator Scott Pruitt
United States Environmental Protection Agency
Mail Code 1101A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

W. B. OSBORN
OIL AND GAS OPERATIONS

MAILING ADDRESS:
P.O. Box 8C
SAN ANTONIO, TEXAS 78217-8190

OFFICE: (210) 826-8654

SHIPPING ADDRESS:
1250 N. E. Loop 410, Suite 600
SAN ANTONIO, TEXAS 78209-1535

FAX: (210) 826-7318

Honorable Scott Pruitt, Administrator
Environmental Protection Agency
Office of the Administrator 1101A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

April 5, 2017

Dear Mr. Pruitt,

W. B. Osborn Oil and Gas Operations would like to formally request that the EPA issue its Final Permit for the Smith 1-17 Well in Mecosta County; United States Environmental Protection Agency Permit Number MI-107_2D-0013; (Michigan Department of Environmental Quality (MDEQ) Permit Number 60879). This permit pertains to an ordinary salt water disposal well, integral to normal oil and gas operations, to reinject produced salt water back into the formation that the salt water was sourced.

The original completed application for permission to dispose of produced salt water (Permit Number MI-107_2D-0013) back into the formation that sourced the salt water was filed on **July 20, 2014**.

In **September, 2015** we received a letter that contained the Draft Permit for the subject well (attached). It includes the following statement: "Review of the permit application indicates that no significant environmental impact should result from the proposed injection." We were notified that a 30 day period comment period was announced. The letter further states that: "At the end of the public comment period you will be notified if any significant changes in the draft permit are required. **If no changes are made, the final permit will be issued without prior notification**" (emphasis added).

We understand that subsequently, the EPA decided to hold a public hearing to allow the public an opportunity to present any exceptions to the findings of your staff which would require changes to the proposed permit. On January 21, 2016 a public hearing was held for that purpose. We further understand that the process to respond to each of the comments you received was required by your staff. However, at no time subsequent to the initial comment period or the public hearing and subsequent commenting processes, were we notified that any "significant changes in the draft permit are required."

In **September, 2016**, we wrote to the EPA and requested a written explanation for the delay, and a timetable to expect the issuance of the final permit. We received the explanation that a large number of comments had been received concerning our permit and that a response was being prepared for each and every comment. That process would include a legal review before those responses were sent out and that no specific timetable could be provided.

Again, through that whole process we have not been notified that any significant change to the permit have been identified.

Let me be candid, the time to process this application (**over one year**) and this delay of **over a year-and-a-half**, is effectively a rejection of our permit application without merit or basis in fact. The fact that the final permit has not been issued by the EPA, compounded by the fact that no significant changes have been identified nor deemed necessary, has taken our rights to conduct our oil and gas operations in accordance with existing rules and regulations. Tens of thousands of dollars in unnecessary costs have been incurred due to these delays. If no changes to the permit were found to be required, the permit should have been issued while your staff worked on responses to the comments it deemed necessary. All interested parties would have been served.

We believe it is time to stop the Obama-era delays promulgated to the detriment of such an important industry to the American economic engine as the oil and gas business.

We respectfully ask that your office intervene in this matter. Specifically, we request your office to instruct your Region V office, Ms. Tinka G. Hyde, Director, Water Division, to issue the Final Permit for our operations.

Thank you very much for your consideration of this issue. We agree that we have the right and responsibility to produce our nation's hydrocarbon reserves and protect the environment at the same time.

Best regards,

C. Curtis Crumrine, III, P.E.

C. Curtis Crumrine, III P.E.
Vice President
W. B. Osborn Oil and Gas Operations
1250 NE Loop 410, Suite 600
San Antonio, Texas 78209

C: Ms. Tinka G. Hyde, Director, Water Division
Environmental Protection Agency
Region V (WU-16J)
77 West Jackson Boulevard
Chicago, IL 60604-3507

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

RECEIVED
OCT 19 2016

OCT 13 2016

REPLY TO THE ATTENTION OF
WU-16J

C. Curtis Crumrine, III P.E.
Vice President
W. B. Osborn Oil and Gas Operations
Post Office Box 8C
San Antonio, Texas 78217-8190

Dear Mr. Crumrine:

I am writing in response to your September 28, 2016 letter to Tinka Hyde in which W. B. Osborn Oil and Gas Operations asked for an explanation for the passage of time between the public hearing on the draft permit decision for the Smith 1-17 injection well held on January 21, 2016, and today. W. B. Osborn also asked for a remedy for this "delay" and for identification of the time at which the U.S. Environmental Protection Agency will issue a final permit for the well.

EPA held the hearing because we had received written requests indicative of significant public interest in the draft permit. The indications proved correct: an estimated 175 people attended the hearing, the hearing transcript summed to 85 pages, and 54 parties provided an additional 175 pages of written comments (including attachments) on the draft permit decision.

Federal regulations require EPA to respond to significant comments when a final permit decision is issued. Between receipt of the hearing transcript on February 10, 2016, and today, EPA has reviewed all of the text that the court reporter and people who commented in writing submitted, identified text that does not communicate a comment, categorized comments as either within or outside the scope of the draft permit decision, identified comments that are significant, and grouped significant comments that make similar points. EPA is in the process of preparing responses to significant comments that are within the scope of the draft permit decision.

I understand and appreciate W. B. Osborn's concern about the passage of time between the hearing and today. In response, last week I communicated to you several actions I have taken to accelerate the pace of work. While EPA cannot commit to a specific date by which it will issue a final permit decision, the permit writer will provide you with periodic updates on his progress.

Reaching a final decision on your permit application is one of the two highest priorities within the permit function of this Branch. (Permitting is one of five principal functions of the Branch.)

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Please do not hesitate to contact me at (312) 886-2446 if you have any questions or would like to further discuss this matter.

Sincerely,

Stephen M. Jann, Chief
Underground Injection Control Branch

W. B. OSBORN
OIL AND GAS OPERATIONS

MAILING ADDRESS:
P.O. Box 8C
SAN ANTONIO, TEXAS 78217-8190

OFFICE: (210) 826-8654

SHIPPING ADDRESS:
1250 N. E. Loop 410, Suite 600
SAN ANTONIO, TEXAS 78209-1535

FAX: (210) 826-7318

Ms. Tinka G. Hyde
Director, Water Division
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3590

To the attention of: WU-16J

September 28, 2016

Re: Final Permit for the Smith 1-17 Well in Mecosta County;
United States Environmental Protection Agency Permit Number MI-107_2D-0013;
Michigan Department of Environmental Quality (MDEQ) Permit Number 60879

Dear EPA,

W. B. Osborn Oil and Gas Operations would like to respectfully request written explanation for the delay in the issuance of the Final Permit for the Smith 1-17 in Mecosta County, MI, your proposed remedy for this delay, as well as a specific time that you will be issuing the Final Permit.

One year ago, we received your letter that contained the Draft Permit for the subject well (attached). We understand that subsequently, the EPA decided to hold a public hearing to allow the public an opportunity to present any exceptions to the findings of your staff which would require changes to the proposed permit. On January 21, 2016 a public hearing was held for that purpose. We further understand that the process to respond to each of the comments you received was required by your staff.

We have not received notification of significant (or any) changes required in the permit. We have not received notification of the issuance of the Final Permit. In fact, we have diligently contacted Mr. Ross Micham of your staff routinely to ascertain the status of the issuance of the Final Permit and we were repeatedly told that the completion of this permit "was his highest priority, according to his supervisor."

One year ago, your letter stated in the third paragraph: "At the end of the public comment period you will be notified if any significant changes in the draft permit are required. If no changes are made, the final permit will be issued without prior notification."

That did not occur. Therefore, we believe that since you have not provided notification of any significant change required to the draft permit, you should issue the Final Permit.

Thank you for your consideration of this matter and we look forward to hearing back from you soon.

Best regards,

C. Curtis Crumrine, P.E.

C. Curtis Crumrine, III P.E.
Vice President
W. B. Osborn Oil and Gas Operations

Cc: Mark Snow, Michigan DEQ
Ross Micham, EPA
Steve Jann, EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 16 2015

REPLY TO THE ATTENTION OF:
WU-16J

CERTIFIED MAIL 7009 1680 0000 7675 6570
RETURN RECEIPT REQUESTED

W.B. Osborn, III, President
W.B. Osborn Oil & Gas Operations
1250 NE Loop 410, Suite 600
San Antonio, Texas 78209

RE: Draft Permit for the Smith 1-17 Well in Mecosta County; U. S. Environmental Protection Agency Permit Number MI-107-2D-0013; Michigan Department of Environmental Quality (MDEQ) Permit 60879

Dear Mr. Osborn:

The U.S. Environmental Protection Agency has prepared an Underground Injection Control (UIC) draft permit for the Smith 1-17 injection well. Please see the enclosure. We have announced a 30 day period and three days to account for the delay caused by mailing in which WB Osborn Oil & Gas Operations or any other person may comment on the draft permit.

To preserve your right to appeal any final permit decision that may be made in this matter under Title 40 of the Code of Federal Regulations (40 C.F.R.) § 124.19, you must either participate in a public hearing or send in written comments on this draft permit decision. A hearing is not planned at this time. Following such participation, the first appeal for review of any condition of the final permit decision must be made to the Environmental Appeals Board of the EPA. Such a petition must include a statement of the reasons supporting review of the decision, including a demonstration that the issue(s) being raised for review were raised during the public comment period (including any public hearing). The petition should, when appropriate, show that each condition being appealed is based on either, (1) a finding of fact or conclusion of law which is clearly erroneous, or (2) an exercise of discretion or an important policy demonstration which the Environmental Appeals Board should, in its discretion, review.

According to 40 C.F.R. § 124.10(b) and § 124.20(d), a public notice of the preparation of a draft permit shall allow at least a 30 day public comment period and three days to account for the delay caused by mailing. At the end of the public comment period you will be notified if any significant changes in the draft permit are required. If no changes are made, the final permit will be issued without prior notification.

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If you have any questions, please contact Ross Micham of my staff by telephone at (312) 886-4237 or by email to micham.ross@epa.gov.

Sincerely,

for Tinka G. Hyde
Director, Water Division

Enclosures

cc: Mark Snow, MDEQ

United States
Environmental Protection
Agency

EPA Seeks Comments on Draft Underground Injection Permit

WB Osborn Oil & Gas Operations

Mecosta County, Michigan October 2015

How to comment

You may comment on the proposed permit approval in writing. Please refer to: **Smith 1-17,** permit number **MI-107-2D-0013**

Mail, email or fax comments to:
Ross Micham
U.S. EPA, Water Division
UIC Branch (WU-16J)
77 W. Jackson Blvd.
Chicago, IL 60604-3590
Email: micham.ross@epa.gov
Fax: (312) 692-2425
Phone: (312) 886-4237

Comment period

The Agency will accept written comments until **November 9, 2015** (midnight postmark).

Information repository

You may see the draft permit at: **Big Rapids Community Library,** 426 South Michigan, Big Rapids, Michigan; Hours: Monday, Wednesday & Friday 10 a.m. to 5 p.m., Tuesday & Thursday 11 a.m. to 7 p.m., Saturday 9 a.m. to 12 p.m. or at www.epa.gov/r5water/uic.

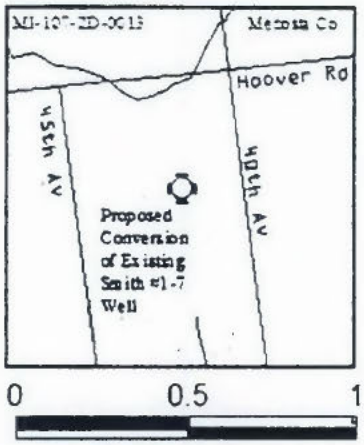
Administrative Record

You may see the full administrative record, including all data WB Osborn Oil & Gas Operations submitted, at the EPA's Chicago regional office (*address above*), 9 a.m. to 4 p.m., weekdays. For an appointment to see the files, contact Ross Micham (*see above*).

Right to appeal

You have the right to appeal any final permit decision if you make an official comment during the comment period or participate in the public hearing. A public hearing is not planned at this time. The first appeal must be made to the Environmental Appeals Board.

The U. S. Environmental Protection Agency plans to allow WB Osborn Oil & Gas Operations, 1250 NE Loop, Suite 600, San Antonio, Texas 78209 to inject fluid underground by approving the company's application for what EPA calls a Class II injection well permit.



If EPA makes its approval final, WB Osborn Oil & Gas Operations may inject salt water into a rock formation 3860 feet below the surface through a well at the SE ¼, Section 17, T16N, R7W, Mecosta County. WB Osborn Oil & Gas Operations has permit #60879 from the Michigan Department of Environmental Quality (MDEQ) for this well.

EPA is accepting comments from the public on this proposed permit approval (*see box, left*). The public comment period, which ends **Monday, November 9, 2015**, includes 30 days for comments as required by law, plus an additional three days for any delay caused by mailing.

During the comment period, you may ask EPA – in writing – to hold a formal public hearing (*see address, left*). Be sure to say specifically what issues you want to raise. EPA will hold a hearing if there is significant interest. If there is a hearing, EPA will publish a notice at least 30 days prior. You will have an opportunity to make oral comments or submit written comments. EPA will consider all comments it receives, and then issue a final decision along with a response to significant comments.

The Safe Drinking Water Act requires EPA to regulate the underground injection of fluids through wells to protect the quality of underground sources of drinking water. Issuing permits is one way EPA does this. You can find the regulations governing underground injection wells at Title 40 of the Code of Federal Regulations, Parts 144 and 146.

EPA does not have the authority to change the surface location of the injection well. If you have questions or concerns about the well's location, contact the MDEQ, P.O. Box 30256, Lansing, Michigan 48909 and phone number (517) 241-1515.

To learn more about EPA's Underground Injection Control program, or to join our mailing list visit www.epa.gov/r5water/uic/index.htm.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

STATEMENT OF BASIS FOR ISSUANCE OF UNDERGROUND INJECTION CONTROL (UIC) DRAFT PERMIT

Permit Number: **MI-107-2D-0013**

Facility Name: **Smith 1-17**

WB Osborn Oil & Gas Operations of San Antonio, Texas, has applied for a U. S. Environmental Protection Agency (EPA) permit for the Smith 1-17 injection well to be used for noncommercial brine disposal in Mecosta County, Michigan.

Review of the permit application indicates that no significant environmental impact should result from the proposed injection. EPA, therefore, intends to issue a permit for this well. Under the authority of Title 40 of the Code of Federal Regulations (40 C.F.R.) Parts 144 and 146, EPA permits must specify conditions for construction, operation, monitoring, reporting, and plugging and abandonment of injection wells so as to prevent the movement of fluids into any Underground Source of Drinking Water (USDW). General provisions for EPA UIC permit requirements are found at 40 C.F.R. Parts 144 and 146, while regulations specific to Michigan injection operations are found at 40 C.F.R. Part 147 Subpart X. In accordance with 40 C.F.R. § 124.7, general information and highlighted permit conditions specific to this well are as follows:

Area of Review (AOR) and Corrective Action: In accordance with 40 C.F.R. §§ 144.55, 146.6 and 146.7, this is the area surrounding the well within which the applicant must research wells which penetrate the injection zone. If any of these wells are improperly sealed, completed or abandoned, and might provide a conduit for fluid migration, the applicant must develop a corrective action plan as shown in Attachment C of the permit to address the deficiency. The applicant has provided documentation on the well population within 1/4 mile of the injection well (i.e., the AOR). There are 1 producing, 0 injection, 0 temporarily abandoned, and 0 plugged and abandoned wells within the 1/4 mile radius AOR which penetrate the injection zone. Based on current information, there are no inadequately constructed wells within the AOR so there is no need for a corrective action.

Underground Sources of Drinking Water (USDWs): USDWs are defined by the UIC regulations as aquifers or portions thereof which contain less than 10,000 milligrams per liter of total dissolved solids and which are being or could be used as a source of drinking water. The base of the lowermost possible USDW in the vicinity of the injection well has been identified at approximately 566 feet below ground surface. This water-bearing formation is the Glacial Drift.

Injection and Confining Zone: Injection for noncommercial brine disposal is limited by the permit to the Dundee Formation in the interval between 3860 and 4098 feet below ground surface. This injection zone is separated from the lowermost USDW by approximately 3294 feet of rock strata. The confining zone is composed of the rocks of the Traverse Limestone and Bell Shale between 3262 and 3860 feet below ground surface.

Construction Requirements: The proposed conversion of the injection well meets the regulatory criteria of 40 C.F.R. § 146.22. This requires that all newly converted wells which inject fluids which are brought to the surface in connection with oil or natural gas production, or for enhanced recovery of oil or natural gas, be sited so that they inject into a formation which is separated from any USDW by a confining zone free of known open faults or fractures within the AOR. All Class II wells must also be cased and cemented to prevent the movement of fluids into or between USDWs. The permittee shall not convert the well until a final permit has been issued.

Injection Fluid: The injected fluid is limited by the permit to salt water. The expected maximum daily volume of fluid to be injected is 5040 barrels.

Maximum Injection Pressure: The maximum injection pressure shall be limited to 976 pounds per square inch gauge (psig). EPA calculated this limit using the formula on page A-1 of the draft permit. This limitation will ensure that the pressure during injection does not initiate fractures in the confining zone adjacent to the lowermost USDW during injection operations. This in turn ensures that the injection pressure will not cause the movement of injection or formation fluids into a USDW as prohibited by 40 C.F.R. § 146.23(a)(1).

Monitoring and Reporting Requirements: In accordance with 40 C.F.R. §§ 144.54 and 146.23, the applicant will be responsible for observing and recording injection pressure, flow rate, annulus pressure, and cumulative volume on a weekly basis and reporting this to EPA on a monthly basis. The applicant will also be responsible for observing, recording and reporting annulus liquid loss on a quarterly basis. An analysis of the injected fluid must be submitted on an annual basis. In addition, the applicant is required to conduct and pass a two-part Mechanical Integrity Test (MIT), in accordance with 40 C.F.R. § 146.8, before authorization to inject is granted, and after the well is completed. The applicant is also required to repeat the annulus pressure test, which is the first part of the MIT, at least once every five (5) years thereafter. If a temperature or noise log or another method as approved by the Director is used to determine the second part of the MIT (i.e., the absence of fluid movement), then the applicant will be required to repeat this test at least once every five (5) years thereafter. These tests will provide EPA with an evaluation of the integrity of the tubular goods (casing, tubing and packer) as well as documentation as to the absence or presence of fluid movement behind the casing.

Plugging and Abandonment: In accordance with 40 C.F.R. §§ 146.10 and 146.24(d), the permit includes a plugging and abandonment plan for an environmentally protective well closure at the time of cessation of operations. WB Osborn Oil & Gas Operations has demonstrated adequate financial responsibilities to close, plug, and abandon this underground injection operation. A State bond in the amount of $250000 has been established for this purpose with Frost National Bank.

Issuance and Effective Date of Permit: In accordance with 40 C.F.R. § 124.15, the permit will become effective immediately upon issuance if no public comments are received that request a change in the draft permit. However, in the event that public comments are received that requested a change in the draft permit then the permit will become effective 45 days after the date of issuance unless the permit is appealed. In accordance with 40 C.F.R. § 144.36(a), the permit will be in effect for the life of the facility, unless it is otherwise modified, revoked and reissued, or terminated as provided at 40 C.F.R. §§ 144.39, 144.40, and 144.41. The permit will expire in one (1) year if the permittee fails to commence construction, unless a written request for an extension of this one (1) year period has been approved by the Director. The permit will be reviewed by EPA at least once every five (5) years from its effective date for consistency with new or revised Federal regulations.

Questions and requests for additional information may be submitted to Ross Micham at (312) 886-4237 or micham.ross@epa.gov via the internet. The date for closure of the comment period includes the required 30 days for public comment and an additional three days for the delay caused by mailing. The public comment period will close as described in the Public Notice. Requests for a hearing must be submitted in writing. If EPA determines that there is significant public interest in the draft permit, a public notice of a scheduled hearing will be published locally and mailed to interested parties.

To preserve your right to appeal any final permit decision that may be made in this matter under 40 C.F.R. Part 124, you must either send in written comments or participate in a public hearing on the draft permit decision. (A hearing is not planned at this time.) The first appeal must be made to the Environmental Appeals Board; only after all agency review procedures have been exhausted may you file an action in the appropriate Circuit Court of Appeals for review.

U.S. Environmental Protection Agency
Region 5 (WU-16J)
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Act Tinka for

Tinka G. Hyde
Director, Water Division

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PERMIT: CLASS II

Permit Number: **MI-107-2D-0013**

Facility Name: **Smith 1-17**

Pursuant to the provisions of the Safe Drinking Water Act, as amended 42 U.S.C. §§ 300f et seq., and implementing regulations promulgated by the U.S. Environmental Protection Agency at Parts 124, 144, 146, and 147 of Title 40 of the Code of Federal Regulations (40 C.F.R.),

WB Osborn Oil & Gas Operations of San Antonio, Texas

is hereby authorized to convert and operate an injection well located in Michigan, Mecosta County, T16N, R7W, Section 17, SE 1/4 Section, for injection into the Dundee Formation at depths between 3860 and 4098 feet, upon the express condition that the permittee meet the restrictions set forth herein. Injection shall not commence until the operator has received authorization in accordance with Part I(E)(10) of this permit.

The injection shall be limited to noncommercial brine disposal from production wells owned or operated by WB Osborn Oil & Gas Operations.

All references to Title 40 of the Code of Federal Regulations are to all regulations that are in effect on the date that this permit is effective. All terms used in this permit shall have the meaning set forth in the SDWA and implementing regulations at 40 C.F.R. Parts 124, 144, 146, and 147.

This permit shall become effective on _____ and shall remain in full force and effect during the operating life of the well, unless this permit is otherwise revoked and reissued, terminated or modified pursuant to 40 C.F.R. §§ 144.39, 144.40, and 144.41. This permit shall also remain in effect upon delegation of primary enforcement responsibility to the State of Michigan, unless that State chooses to adopt this permit as a State permit. The permit will expire in one (1) year if the permittee fails to commence construction, unless a written request for an extension of this one (1) year period has been approved by the Director. The permittee may request an expiration date sooner than the one (1) year period, provided no construction on the well has commenced. This permit will be reviewed at least every five (5) years from the effective date specified above.

Signed and dated:_____

DRAFT

_____
Tinka G. Hyde
Director, Water Division

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PART I

GENERAL PERMIT COMPLIANCE

A. EFFECT OF PERMIT

The permittee is allowed to engage in underground injection in accordance with the conditions of this permit. The underground injection activity, otherwise authorized by this permit or rule, shall not allow the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any Primary Drinking Water Regulation pursuant to 40 C.F.R. Part 142 or may otherwise adversely affect the health of persons. Any underground injection activity not specifically authorized in this permit or otherwise authorized by permit or rule is prohibited. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations. Compliance with the terms of this permit does not constitute a defense to any action brought under Section 1431 of the Safe Drinking Water Act (SDWA), or any other law governing protection of public health or the environment.

B. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 C.F.R. §§ 144.39, 144.40, and 144.41. The filing of a request for a permit modification, revocation and reissuance, termination, or the notification of planned changes or anticipated noncompliance on the part of the permittee does not stay the applicability or enforceability of any permit condition.

C. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

D. CONFIDENTIALITY

In accordance with 40 C.F.R. Part 2 and § 144.5, any information submitted to EPA pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the validity of the claim will be assessed in accordance with the procedures in 40 CFR Part 2 (Public Information). Claims of confidentiality for the following information will be denied:

(1) The name and address of the permittee; and,

(2) Information which deals with the existence, absence or level of contaminants in drinking water.

E. DUTIES AND REQUIREMENTS

1. Duty to Comply

The permittee shall comply with all conditions of this permit, except to the extent and for the duration such non-compliance is authorized by an emergency permit pursuant to 40 C.F.R. § 144.34. Any permit noncompliance constitutes a violation of the SDWA and is grounds for enforcement action, permit termination, revocation and reissuance or modification.

2. Penalties for Violations of Permit Conditions

Any person who operates this well in violation of permit conditions is subject to civil penalties, fines, and other enforcement action under the SDWA and may be subject to such actions under the Resource Conservation and Recovery Act. Any person who willfully violates a permit condition is subject to criminal prosecution.

3. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action to state that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

4. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

5. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

6. **Duty to Provide Information**

The permittee shall furnish to the Director, by the date specified by the Director, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required by this permit to be retained.

7. **Inspection and Entry**

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be retained under the conditions of this permit;

c. Inspect, at reasonable times, any facilities, equipment (including monitoring equipment), practices, or operations, regulated or required under this permit; and

d. Sample or monitor the injected fluids, at reasonable times, for the purposes of assuring permit compliance, or as otherwise authorized by the SDWA, at any location.

8. **Records**

a. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and copies of all records required by this permit, for a period of at least three (3) years from the date of the sample, measurement or report. The permittee shall also maintain records of all data required to complete this permit application and any supplemental information submitted under 40 C.F.R. §§ 144.31 and 144.51. These periods may be extended by request of the Director at any time by written notice to the permittee.

b. The permittee shall retain records concerning the nature and composition of all injected fluids until three (3) years after the completion of plugging and abandonment in accordance with the plugging and abandonment plan, contained in Part III(B) of this permit. The owner or operator shall continue to retain the records after the three (3) year retention period unless he delivers the records to the Regional Administrator or obtains

written approval from the Regional Administrator to discard the records.

c. Records of monitoring information shall include:

(i) The date, exact place, and the time of sampling or measurements;

(ii) The individual(s) who performed the sampling or measurements;

(iii) A precise description of both sampling methodology and the handling of samples;

(iv) The date(s) analyses were performed;

(v) The individual(s) who performed the analyses;

(vi) The analytical techniques or methods used; and,

(vii) The results of such analyses.

9. **Notification Requirements**

a. **Planned Changes** - The permittee shall notify and obtain the Director's approval at least thirty (30) days prior to any planned physical alterations or additions to the permitted facility, or changes in the injection fluids. Within ten (10) days prior to injection, an analysis of new injection fluids shall be submitted to the Director for approval in accordance with Parts II(B)(2) and II(B)(3) of this permit.

b. **Anticipated Noncompliance** - The permittee shall give at least thirty (30) days advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. **Transfer of Permits** - This permit is not transferable to any person except after notice is sent to the Director at least thirty (30) days prior to transfer and the requirements of 40 C.F.R. § 144.38 have been met. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the SDWA.

d. **Compliance Schedules** - Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted to the Director no later than thirty (30) days following each schedule date.

e. **Twenty-Four Hour Reporting**

(i) The permittee shall report to the Director any noncompliance which may endanger health or the environment. This information shall be provided orally within twenty-four (24) hours from the time the permittee becomes aware of the circumstances, and shall include the following information:

(a) Any monitoring or other information which indicates that any contaminant may cause an endangerment to an underground source of drinking water; or,

(b) Any noncompliance with a permit condition or malfunction of the injection system which may cause fluid migration into or between underground sources of drinking water.

(ii) A written submission shall also be provided as soon as possible but no later than five (5) days from the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

f. **Other Noncompliance** - All other instances of noncompliance shall be reported at the time when monthly reports are submitted under Part II(B)(3)(a) of this permit. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

g. **Other Information** - If or when the permittee becomes aware that the permittee failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application or in any report to the Director, the permittee shall promptly submit such facts or corrected information in accordance with 40 C.F.R. § 144.51(l)(8).

h. **Report on Permit Review** - Within thirty (30) days of receipt of the final issued permit, the permittee shall report to the Director that the permittee has read and is personally familiar with all terms and conditions of this permit.

10. **Commencing Injection**

The permittee shall not commence injection into any newly drilled or converted well until:

a. Formation data and injection fluid analysis have been submitted in accordance with Parts II(A)(6) and II(B)(2), respectively;

b. A report on any logs and tests required under Parts II(A)(5) and III(D) of this permit has been submitted;

c. Mechanical integrity of the well has been demonstrated in accordance with Part I(E)(17);

d. Any required corrective action has been performed in accordance with Parts I(E)(16) and III(C); and,

e. Construction is complete and the permittee has submitted to the Permit Writer, by certified mail with return receipt requested, a notice of completion of construction using EPA Form 7520-10 and either:

(i) The Director has inspected or otherwise reviewed the new injection well and finds it is in compliance with the conditions of the permit; or,

(ii) The permittee has not received, within thirteen (13) days of the date of the Director's receipt of the report required above, notice from the Director of his or her intent to inspect or otherwise review the new injection well, in which case prior inspection or review is waived and the permittee may commence injection.

11. **Signatory Requirements**

All reports required by this permit and other information requested by the Director shall be signed and certified according to 40 CFR § 144.32.

12. **Notice of Plugging and Abandonment**

The permittee shall notify the Director at least forty-five (45) days before conversion or abandonment of the well.

13. **Plugging and Abandonment**

The permittee shall plug and abandon the well as provided in the plugging and abandonment plan contained in Part III(B) of this permit. Plugging shall occur as soon as practicable after operation ceases but not later than two (2) years

thereafter. During the period of non-operation, the well must be tested to ensure that it maintains mechanical integrity, unless the permittee fulfills the other requirements under 40 C.F.R. § 144.52(a)(6), prior to expiration of the two (2) year period. The permittee shall notify the Director of plugging and abandonment in accordance with the reporting procedures in Part I(E)(12) of this permit.

14. **Financial Responsibility**

The permittee shall maintain financial responsibility and resources to plug and abandon the underground injection well in accordance with 40 C.F.R. § 144.52(a)(7) as provided in Attachment R of the permit application corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The permittee shall not substitute an alternative demonstration of financial responsibility from that which the Director has approved, unless the permittee has previously submitted evidence of that alternative demonstration to the Director and the Director has notified the permittee in writing that the alternative demonstration of financial responsibility is acceptable. The financial responsibility mechanism shall be updated periodically, upon request of the Director, except when Financial Statement Coverage is used as the financial mechanism, this coverage must be updated on an annual basis.

15. **Insolvency**

a. In the event of the bankruptcy of the trustee or issuing institution of the financial mechanism, or a suspension or revocation of the authority of the trustee institution to act as trustee or the institution issuing the financial mechanism to issue such an instrument, the permittee must submit an alternative demonstration of financial responsibility acceptable to the Director within sixty (60) days after such event. Failure to do so will result in the termination of this permit pursuant to 40 C.F.R. § 144.40(a)(1).

b. An owner or operator must also notify the Director by certified mail of the commencement of voluntary or involuntary proceedings under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within ten (10) business days after the commencement of the proceeding. A guarantor of a corporate guarantee must make such a notification if he/she is named as debtor, as required under the terms of the guarantee.

16. **Corrective Action**

The permittee shall shut in the injection well whenever he/she or EPA determines that operation thereof may be causing upward fluid migration through the well bore of any improperly plugged or unplugged well in the area of review and shall take such steps as he/she can to properly plug the offending well(s). Any

operation of the well which may cause upward fluid migration from an improperly plugged or unplugged well will be considered a violation of this permit. If the permittee or the EPA determines that the permitted well is not in compliance with 40 C.F.R. § 146.8, the permittee will immediately shut in the well until such time as appropriate repairs can be effected and written approval to resume injection is given by the Director. In addition, the permittee shall not commence injection until any and all corrective action has been taken in accordance with any plan contained in Part III(C) of this permit and the requirements in Part I(E)(10) of this permit have been met.

17. **Mechanical Integrity**

a. The permittee must establish (prior to receiving authorization to inject), and shall maintain mechanical integrity of this well, in accordance with 40 CFR § 146.8.

b. A demonstration of mechanical integrity, in accordance with 40 C.F.R. § 146.8, shall be performed at least every five (5) years from the date of the last approved demonstration. The permittee shall notify the Director of his/her intent to demonstrate mechanical integrity at least thirty (30) days prior to such demonstration.

c. The permittee shall demonstrate the mechanical integrity of the well by pressure testing whenever:

(i) the tubing is removed from the well or replaced;

(ii) the packer is reset; or,

(iii) a loss of mechanical integrity occurs. Operation shall cease whenever one of the aforementioned conditions occurs and not resume until the Director gives approval to recommence injection.

d. The Director may, by written notice, require the permittee to demonstrate mechanical integrity at any time.

e. The permittee shall cause all gauges used in mechanical integrity demonstrations to be calibrated prior to the demonstration.

f. The permittee shall cease injection if a loss of mechanical integrity occurs or is discovered during a test, or a loss of mechanical integrity as defined by 40 C.F.R. § 146.8 becomes evident during operation. Operations shall not be resumed until the Director gives approval to recommence injection.

g. The permittee shall notify the Director of the loss of mechanical integrity, in accordance with the reporting procedures in Parts II(B)(3)(d) and

I(E)(9)(e) of this permit.

h. The permittee shall report the result of a satisfactory mechanical integrity demonstration as provided in Part II(B)(3)(d) of this permit, except the first such result after Permit issuance, which shall be sent to the Permit Writer.

18. **Restriction on Injected Substances**

The permittee shall be restricted to the injection of fluids brought to the surface in connection with oil or natural gas production or those fluids used in the enhancement of oil and gas production as specified in 40 C.F.R. § 146.5(b). Further, no fluids other than those from sources noted in the administrative record for this permit and approved by the Director shall be injected.

PART II

WELL SPECIFIC CONDITIONS FOR UNDERGROUND INJECTION CONTROL PERMITS

A. CONSTRUCTION REQUIREMENTS

1. **Siting**

Notwithstanding any other provision of this permit, the injection well shall inject only into a formation which is separated from any USDW by a confining zone that is free of known open faults or fractures within the area of the review.

2. **Casing and Cementing**

Injection wells shall be cased and cemented to prevent the movement of fluids into or between underground sources of drinking water. The casing and cement to be used in the construction of the well shall be as contained in Attachments L and M of the permit application corresponding to this permit action which is hereby incorporated by reference as if they appeared fully set forth herein.

3. **Tubing and Packer Specifications**

Injection shall only take place through tubing with a packer set in the long string casing within or below the nearest cemented and impermeable confining system immediately above the injection zone. Tubing and packer specifications shall be as represented in engineering drawings contained in Attachments L and M of the permit application corresponding to this permit action which are hereby incorporated by reference as if they appeared fully set forth herein. Any proposed changes shall be submitted by the permittee in accordance with Part I(E)(9)(a) and (b) of this permit.

4. **Wellhead Specifications**

For every injection well, the operator shall provide a female fitting, with a cutoff valve, to the tubing at the wellhead, so that the amount of injection pressure being used may be measured by a representative of EPA by attaching a gauge having a male fitting.

5. **Logs and Tests**

Upon approval of the surface casing and cementation records by the Director, any logs and tests noted in Part III of this permit shall be performed, unless already provided. Prior to commencement of injection, the permittee shall submit a descriptive report prepared by a knowledgeable log analyst interpreting the results of those logs and tests to the Director for approval along with the notice of

completion required in Part I(E)(10) of this permit.

6. **Formation Data**

If not already provided, the permittee shall determine or calculate the following information concerning the injection formation and submit it to the Director for review and approval, prior to operation:

a. Formation fluid pressure;

b. Fracture pressure; and,

c. Physical and chemical characteristics of the formation.

7. **Prohibition of Unauthorized Injection**

Any underground injection, except as authorized by permit or rule issued under the UIC program, is prohibited. The construction, including drilling, of any well required to have a permit is prohibited until the permit has been issued.

B. OPERATING, MONITORING AND REPORTING REQUIREMENTS

1. **Operating Requirements**

a. Beginning on the effective date of this permit, the permittee is authorized to operate the injection well, subject to the limitations and monitoring requirements set forth herein. The injection pressure and injected fluid shall be limited and monitored as specified in Parts I(E)(18) and III(A) of this permit.

b. Injection at a pressure which initiates fractures in the confining zone or causes the movement of injection or formation fluids into or between underground sources of drinking water is prohibited.

c. Injection between the outermost casing protecting underground sources of drinking water and the well bore is prohibited.

d. The annulus between the tubing and the long string casing shall be filled with a liquid designed to inhibit corrosion. The annulus liquid will be monitored in accordance with Parts II(B)(2)(d) and II(B)(3)(b) of this permit. Any specific annulus requirements are contained in Part III(A) of this permit.

2. **Monitoring Requirements**

a. Samples and measurements, taken for the purpose of monitoring as required in Part II(B)(3), shall be representative of the monitored activity. Grab samples shall be used to obtain a representative sample of the fluid to be analyzed. Part III(A) of this permit describes the sampling location and required parameters for injection fluid analysis. The permittee shall identify the types of tests and methods used to generate the monitoring data. The monitoring program shall conform to the one described in Part III(A) of this permit.

b. **Analytical Methods** - Monitoring of the nature of injected fluids shall comply with applicable analytical methods cited and described in Table I of 40 C.F.R. § 136.3 or in Appendix III of 40 CFR Part 261 or by other methods that have been approved by the Director.

c. **Injection Fluid Analysis** - The nature of the injection fluids shall be monitored as specified in Part III(A) of this permit. An initial analysis of the injection fluid is contained in Attachment H of the permit application corresponding to this permit action which is hereby incorporated by reference as if it appeared fully set forth herein. The Director may, by written notice require the permittee to sample and analyze the injected fluid at any time.

d. **Injection Pressure, Annulus Pressure, Annulus Liquid Loss, Flow Rate and Cumulative Volume** - Injection pressure, annulus pressure, flow rate and cumulative volume shall be recorded at least weekly and shall be reported monthly as specified in Part III(A) of this permit. Annulus liquid loss shall be recorded at least quarterly and shall be reported in accordance with the provisions of Part II(B)(3)(b), as the volume of liquid added to the annulus to keep it filled in accordance with Part II(B)(1)(d). All gauges used in monitoring shall be calibrated in accordance with Part I(E)(17)(e) of this permit.

3. **Reporting Requirements**

Copies of the monitoring results and all other reports shall be submitted to the Director at the following address:

U.S. Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590
Attn: UIC Branch (WU-16J)

a. **Monthly Reports** - Monitoring results obtained during each week shall be recorded on a form which has been signed and certified according to 40 C.F.R. § 144.32. The first report shall be postmarked no later than the

10th day of the month after authorization to inject has been granted. Thereafter, forms shall be submitted at the end of each month and shall be postmarked no later than the 10th day of the month following the reporting period. This report shall include the weekly measurements of injection pressure, annulus pressure, flow rate and cumulative volume as required in Parts II(B)(2)(d) and III(A) of this permit.

b. **Quarterly Reports** - Monitoring results obtained each quarter shall include the measurement of annulus liquid loss as required in Parts II(B)(2)(d) and III(A) of this permit. Reports shall be submitted at the end of each quarter and shall be postmarked no later than the 10th day of the first month of the following quarter.

c. **Annual Reports** - Monitoring results obtained each year shall include the measurements of injected fluid characteristics as required in Part III(A) of this permit. Reports shall be submitted at the end of each anniversary year and shall be postmarked no later than the 10th day of the first month of the following year.

d. **Reports on Well Tests, Workovers, and Plugging and Abandonment** - The applicant shall provide the Director with the following reports and test results within sixty (60) days of completion of the activity:

(i) Mechanical integrity tests, except tests which the well fails in which case twenty-four (24) hour reporting under Part I(9)(e) is applicable;

(ii) Logging or other test data;

(iii) Well workovers (using EPA Form 7520-12); and

(iv) Plugging and abandonment.

PART III

SPECIAL CONDITIONS

These special conditions include, but are not limited to plans for maintaining correct operating procedures, monitoring conditions and reporting, as required by 40 C.F.R. Parts 144 and 146. These plans are described in detail in the permittee's application for a permit, and the permittee is required to adhere to these plans as approved by the Director, as follows:

A. OPERATING, MONITORING AND REPORTING REQUIREMENTS (ATTACHED)

B. PLUGGING AND ABANDONMENT PLAN (ATTACHED)

C. CORRECTIVE ACTION PLAN (ATTACHED)

OPERATING, MONITORING AND REPORTING REQUIREMENTS

Characteristic	Limitation	Minimum Monitoring Requirements		Minimum Reporting Requirements
		Freq.	Type	Freq.
*Injection Pressure	976 psig (maximum)	weekly		monthly
Annulus Pressure		weekly		monthly
Flow Rate		weekly		monthly
Cumulative Volume		weekly		monthly
Annulus Liquid Loss		quarterly		quarterly
**Chemical Composition of Injection Fluid		annually	grab	annually

SAMPLING LOCATION: The sample location is at the well head

*The limitation on wellhead pressure serves to prevent confining-formation fracturing. This limitation was calculated using the following formula: [{.80 *psi/ft* - (0.433 *psi/ft*)(specific gravity)} x depth] - 14.7 *psi*. The maximum injection pressure is dependent upon depth and specific gravity of the injected fluid. The Dundee Formation at 3860 feet was used as the depth and a specific gravity of 1.255 was used for the injected fluid.

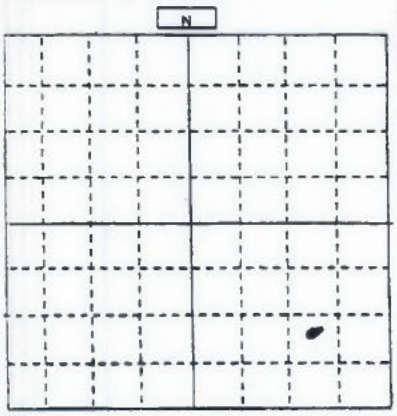
**Chemical composition analysis shall include, but not be limited to, the following: Sodium, Calcium, Magnesium, Barium, Total Iron, Chloride, Sulfate, Carbonate, Bicarbonate, Sulfide, Total Dissolved Solids, pH, Resistivity (ohm-meters @ 75°F), and Specific Gravity.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

PLUGGING AND ABANDONMENT PLAN

WELL NAME & NUMBER, FIELD NAME, LEASE NAME & NUMBER	NAME, ADDRESS, & PHONE NUMBER OF OWNER / OPERATOR
Smith 1-17 Fork Oil Field	WB Osborn Oil & Gas Operations 1250 NE Loop 410, Ste 600 San Antonio Texas 78209

Locate Well and Outline Unit on Section Plat - 640 Acres



STATE	COUNTY	STATE PERMIT NUMBER
Michigan	Mecosta	60879

SURFACE LOCATION DESCRIPTION

_NW_ 1/4 of _SE_ 1/4 of _SE_ 1/4 of Section _17_ Township 16N__ Range _7W_

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT

Surface Location 961 ft. From (N/S) South Line of Quarter Section

And 888 ft. From (E/W) East Line of Quarter Section

TYPE OF AUTHORIZATION

- ☑ Individual Permit
- ☐ Rule
- ☐ Area Permit

Number of Wells in Area Permit _____

US EPA Permit Number _____

WELL ACTIVITY

- ☐ Class I
  - ☐ Hazardous
  - ☐ Nonhazardous
- ☑ Class II
  - ☑ Brine Disposal
  - ☐ Hydrocarbon Storage
  - ☐ Enhanced Recovery
- ☐ Class III
- ☐ Class IV

CASING/TUBING/CEMENT RECORD AFTER PLUGGING AND ABANDONMENT

Size	Wt (lb/ft) TBG/CSG	Original Amount (CSG)	CSG to be Left in Well	Hole Size	Sacks Cement Used	Type
16"	??	90'	90'	Drive		
11 3/4"	42# J-55	508'	508'	14 3/4"	150/185	A/poz
8 5/8"	24# J-55	1218'	1218'	10 5/8"	175/250	A/poz

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- ☑ Balance Method
- ☐ Dump Bailer Method
- ☐ Two Plug Method
- ☐ Other

CEMENT TO PLUG AND ABANDON DATA	Plug #	Plug #	Plug #	Plug#	Plug #	Plug #	Plug #
Size of Hole or Pipe in Which Plug Will Be Placed (inches)	4.95"	4.95"	4.95 &7.875	7 7/8"	8.09"		
Calculated Top of Plug (ft.)	3900'	3400'	1746'	1310'	0'		
Measured Top of Plug (ft.)	3900'	3400'	1746'	1310'	0'		
Depth to Bottom of Plug (ft.)	3901'	3900'	2296'	1710'	1310'		
Sacks of Cement to be Used	Bridge Plug	55 Sxs	149 sxs	115 sxs	396 sxs		
Slurry Volume to be Used (cu. Ft.)		59 Cu ft	175.8 cu ft	135.7 cu ft	467.2 cu ft		
Slurry Weight (lb./gal.)		15.6#	15.6#	15.6#	15.6#		
Type of Cement, Spacer or Other Material Used		Fresh Water	Fresh Water	Class A	class A		
Type of Preflush Used		Fresh Water	fresh Water	Fresh	Fresh		

DESCRIPTION OF PLUGGING PROCEDURE

1. Notify Epa and MDEQ 45 days before Plugging. Be sure part 2 MIT current.
2. Displace hole with Fork Dundee Brine. Release Packer and trip out of hole. Set Bridge Plug at 3900'.
3. Spot 55 Sacks Class A cement from 3900-3400'
4. Free point shoot and pull 5 1/2" casing at 2196'
5. Spot 149 sxs Class A from 2296-1746',Spot 115 sxs Class A from 1710-1310' Spot 396 sxs Class A from 1310-0' (see attached procedure for more detail)
6. Cut off all casings 3' below grade weld on 1/2" plate. Weld MDEQ permit # on cap.
7. Supply Epa with statement the well was plugged in accordance with on file EPA p&A plan. Prepare and file MDEQ and EPA plug Reports

ESTIMATED COST OF PLUGGING AND ABANDONMENT

Cement	$ -	1,276	Cast Iron Bridge Plug	$ -	1,523
Logging	$ -	5,500	Cement Retainer	$ -	0
Rig or Pulling Unit	$ -	9,300	Miscellaneous	$ -	4,645
	$ -		Total	$ -	33,444

CERTIFICATION

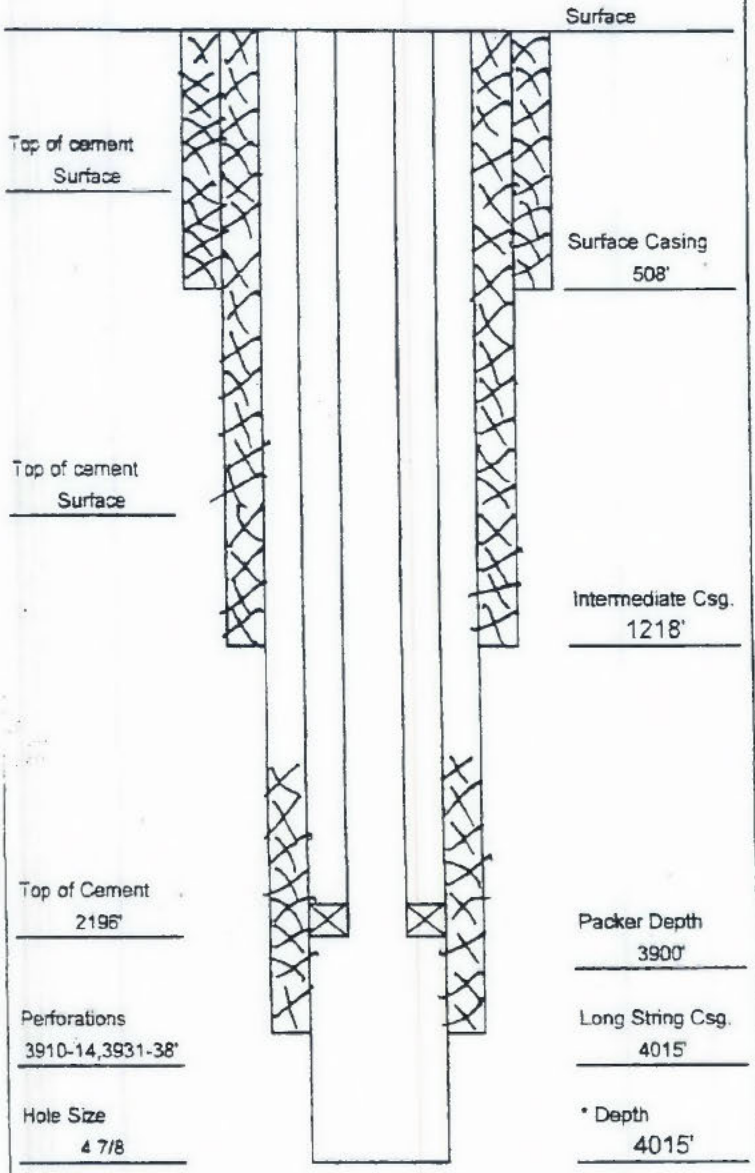
I certify under the penalty of law that I have examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref.40 CFR 144.32)

NAME AND OFFICIAL TITLE	SIGNATURE	DATE SIGNED
C. Curtis Crumrine, III Vice President	C. Curtis Crumrine III Vice President	06/18/2015

EPA Form 7520-14

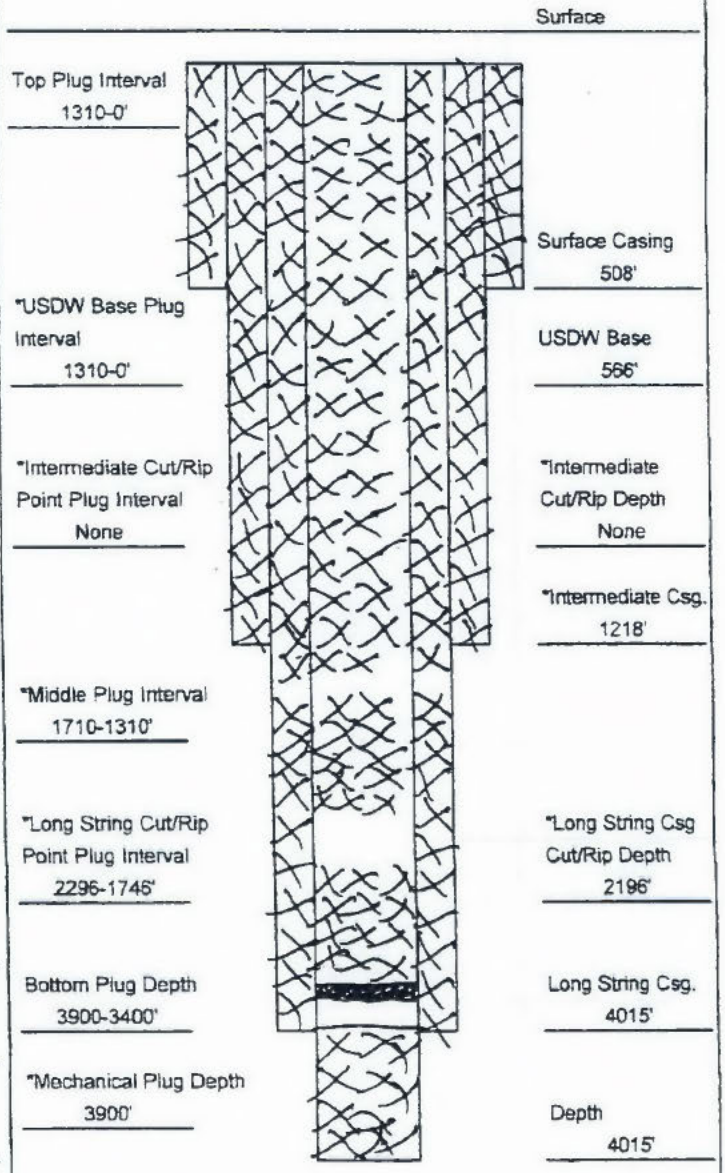
ORIGINAL WELL CONSTRUCTION DURING OPERATION

WB Osborn Oil & Gas Operations
Smith 1-17



* Add Any Additional Information
* May not Apply

PLUGGING AND ABANDONMENT



* Add Any Additional Information
* May not Apply

LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Specify Open Hole/ Perforations/ Varied Casing	From	To	Formation Name
Freepoint, shoot and pull 5 1/2" casing	2196'	0'	Coldwater

CORRECTIVE ACTION PLAN

No corrective action is required at this time.

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W. B. OSBORN OIL & GAS OPERATIONS
P.O. BOX 8C
SAN ANTONIO, TEXAS 78217

Hon. Scott Pruitt, Administrator
Environmental Protection Agency
Office of the Administrator 1101A
1200 Pennsylvania Avenue NW
Washington, DC 20460

FCF2027533

APR 10 2017

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAY 0 2 2017

REPLY TO THE ATTENTION OF:
WU-16J

C. Curtis Crumrine, III P.E.
Vice President
W. B. Osborn Oil and Gas Operations
Post Office Box 8C
San Antonio, Texas 78217-8190

Dear Mr. Crumrine:

Thank you for your April 5, 2017 letter to Administrator Pruitt regarding the W. B. Osborn Oil and Gas Operations' Smith 1-17 injection well in Mecosta County, Michigan. You mention a delay since applying for a permit for the well and request that the U.S. Environmental Protection Agency issue a final permit. Your letter has been directed to me for a response.

I noted in your letter that you understand that EPA held a public hearing due to significant public interest in the draft permit. You also mentioned that you understand that a large number of comments on the draft permit were received and that responses to these comments needed to be prepared. Preparing a response to comments for the W.B. Osborn draft permit has required considerable staff time and effort, as explained by Stephen Jann in his October 13, 2016 letter to you. The draft response to comments consists of 52 pages of single-spaced text.

It may also be helpful if I provide some details on the general process for responding to comments on a draft permit decision.

The response to comments must meet the requirements set forth in 40 C.F.R. Section 124.17. EPA needs to ensure that responses are included for all significant comments on the draft permit decision and that EPA can successfully defend the responses should a person appeal any final permit decision to the Environmental Appeals Board under 40 C.F.R. Section 124.19. Under 40 C.F.R. Section 124.17(a), EPA must issue the response to comments at the same time it issues a final permit decision. Thus, it is not permissible to first issue a final permit and then subsequently issue the response to comments. The response must specify whether any changes have been made between the draft and final permit decision due to the comments.

I understand and appreciate W. B. Osborn's concern about the passage of time between the hearing and today. Legal review of the response to comments has been completed and program staff are giving the document a final review prior to making a recommendation to me on the final permit decision. I anticipate a final decision will be made within the next three weeks.

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Please do not hesitate to contact Mr. Jann at (312) 886-2446 if you have any questions or would like to further discuss this matter.

Sincerely,

Christopher Korleski
Director, Water Division

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.
HEADQUARTERS: P.O. BOX 33695 DENVER, COLORADO 80233-0695 303-452-6111

March 31, 2017

RECEIVED
2017 APR 10 AM 11:54
OFFICE OF THE
EXECUTIVE SECRETARIAT

The President
The White House
1600 Pennsylvania Avenue NW
Washington, DC 20500

Dear Mr. President:

On behalf of Tri-State Generation and Transmission Association, Inc. and the 43 member systems we serve, I want to thank you for signing *Presidential Executive Order on Promoting Energy Independence and Economic Growth.* We appreciate your support of the clean and safe development of the nation's energy resources and your understanding of how federal regulations, like the Environmental Protection Agency's Clean Power Plan, can negatively impact these efforts. We agree there is a better way to achieve environmental goals.

Tri-State is the wholesale power supplier, operating on a not-for-profit basis, to 43 electric cooperatives and public power districts that serve more than one million consumers throughout nearly 200,000 square-miles of Colorado, Nebraska, New Mexico and Wyoming. We believe that affordable and reliable power, responsibly generated and delivered, is the lifeblood of the farms, ranches, small towns and businesses that our members serve.

As a cooperative, Tri-State's operations are cost-based and all the expense of complying with regulations are passed on to our members, a fact the EPA ignored when crafting the Clean Power Plan and why Tri-State and other cooperatives were active in the rulemaking process and challenged the rule in court. Since it was proposed, Tri-State has argued the Clean Power Plan was unlawful, unworkable, and should be abandoned by the EPA. We argued that the stakes are too high to risk implementing legally flawed, poorly conceived regulations that have the real potential to harm our members and rural communities across the West.

If the Clean Power Plan is ultimately rescinded – or significantly revised to address our concerns – it would tremendously benefit our members, which rely on fossil fuel generation as a source of affordable and reliable power. Our employees that work at our plants and coal mines, as well as the communities in which they live, would also gain a measure of reprieve.

The executive order also addresses other federal regulations and policies we have expressed concerns with either during the rulemaking processes or through legal challenges. Specifically, we support modifications to methodologies used under the National Environmental Policy Act (NEPA), which currently calls for unreasonable requirements for transmission lines and mining facilities. We also support your order ending the controversial coal leasing moratorium put in

place by the previous administration. Tri-State looks forward to working constructively with your administration to help craft workable and effective regulations.

In the meantime, Tri-State will continue to invest in the efficiency of our facilities, maintain best practices and diversify our generation portfolio. In 2016, 26 percent of the energy delivered by the association and our member systems to their members/consumers came from renewable resources, but fossil fuels remain an important part of the association's diverse portfolio that keeps energy affordable and reliable.

With that in mind, we believe your actions are a step in the right direction for the country, our members and the rural consumers they serve. We thank you for your support of rural America.

Respectfully,

Micheal S. McInnes

Micheal S. McInnes
Chief Executive Officer

MSM/cm

cc: The Honorable Ryan Zinke, Secretary of the Interior
The Honorable Rick Perry, Secretary of Energy
The Honorable Scott Pruitt, Administrator of the Environmental Protection Agency

TRI-STATE GENERATION AND TRANSMISSION ASSOCIATION, INC.
P.O. BOX 33695 • DENVER, COLORADO 80233-0695

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APR 10 2017

FCL 2035503

The Honorable Scott Pruitt
Administrator of the Environmental
Protection Agency
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

A Touchstone Energy® Cooperative

RECEIVED
2017 APR 10 AM 11:30
OFFICE OF THE
EXECUTIVE SECRETARIAT

March 30, 2017

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

RE: Call for resignation of Scott Pruitt

To whom it might concern:

I am calling for the immediate resignation of Scott Pruitt, current Administrator of the EPA. Mr. Pruitt's comments on climate change shows that he is unwilling or incapable of leading an agency that guards our nation's ecological and biological resources.

He needs to step down immediately for the sake of our great nation.

Thank you for your time.

Respectfully,

Keith Neijstrom
(b) (6) [redacted]5
[redacted]

Keith Neijstrom

[redacted] (b) (6)

This mail was received damaged by the EPA Mail Center. Please contact the sender regarding the contents.

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APR 10 2017

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Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

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PUERTO RICO ELECTRIC POWER AUTHORITY

SAN JUAN, PUERTO RICO

www.prepa.com

GPO BOX 364267
SAN JUAN, PR 00936-4267

March 31, 2017

RECEIVED
2017 APR 10 PM 1:53
OFFICE OF THE
EXECUTIVE SECRETARIAT

Mr. Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

RE: Mercury and Air Toxics Standards
Notification of Tune-up
Palo Seco Power Plant Unit 3

Dear Mr. Pruitt:

Pursuant to 40CFR 63.100021(e)(9), the Puerto Rico Electric Power Authority (PREPA) hereby notifies of its intention to conduct a tune-up for the abovementioned generating unit.

The proposed starting date is scheduled as follows:

1. Palo Seco Unit #3: April 5, 2017

If there is any change to the proposed schedule, PREPA will notify of such change as soon as practicable.

For additional information, please contact Eng. Rafael Marrero Carrasquillo, Air Quality and Environmental Studies Department Manager, at 787-521-4988.

Cordially,

Efrain Paredes Maisonet, Director
Planning and Environmental Protection

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APR 10 2017

CN-078-04339

EMERGENCY PETITION TO THE EPA ADMINISTRATOR

Scott Pruitt
Administrator, Environmental Protection Agency

I am alarmed by your longstanding hostility to environmental protection and your advocacy on behalf of big polluters. We need a strong EPA to safeguard everything from clean air to children's health, from clean water to our nation's pollinators. America's bedrock laws and shared values have always placed environmental protection *above* corporate self-interest.

That is why I will be closely watching to see whether you act to protect America's bees from neonic pesticides and products, sold by companies like Monsanto and Bayer. Mounting scientific evidence points to neonics as a leading culprit in the devastating collapse of bee colonies. We can't afford to lose more bees — not when one in every three bites of food we take depends on them. I am calling on you to heed the latest science and impose an immediate ban on all uses of neonic pesticides that pose a risk to bees.

You have an obligation to uphold the mission of the EPA *by doing what's best for bees and people* — not what's most profitable for agrochemical companies. If you choose instead to sacrifice bees, I will stand alongside NRDC and hold you accountable under the law in federal court.

Sincerely,

X Marcel Tenenbaum
Mildred G. Tenenbaum

Signature

Marcel & Mildred Tenenbaum
(b) (6)

CN7M

Mildred G Tenenbaum
[redacted] (b) (6)

NEW YORK NY 100-
05 APR 2017 PM 15 L

MR. SCOTT PRUITT, Administrator
ENVIRONMENTAL PROTECTION
AGENCY
1200 PENNSYLVANIA AVE.
WASHINGTON, D.C. 20460

APR 10 2017

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EMERGENCY PETITION TO THE EPA ADMINISTRATOR

Scott Pruitt
Administrator, Environmental Protection Agency

I am very alarmed by your longstanding hostility to environmental protection and your advocacy on behalf of big polluters. We need a strong EPA to safeguard everything from clean air to children's health, from clean water to our nation's pollinators. America's bedrock laws and shared values have always placed environmental protection *above* corporate self-interest.

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You have an obligation to uphold the mission of the EPA *by doing what's best for bees and people* — not what's most profitable for agrochemical companies. If you choose instead to sacrifice bees, I will stand alongside NRDC and hold you accountable under the law in federal court. yes ? will !

Sincerely,

X Clay Becelia
Signature

Ms. Mary Becelia
(b) (6) r
3

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Scott Pruitt
Director, EPA
Jefferson Clinton Building North
1200 Pennsylvania Ave NW
Washington, DC 20004

April 1, 2017

RECEIVED
2017 APR 10 AM 11:36
OFFICE OF THE
EXECUTIVE SECRETARIAT

Mr. Scott Pruitt
Environmental Protection Agency
1200 Pennsylvania Ave., N.W.
Washington, DC 20460

Re: Lake Casitas, Ojai, Ca.

Dear Mr. Pruitt,

First let me say congratulations on you appointment as administrator of the EPA.

I am writing you concerning a very big problem in a very small town. I live in Ojai California, estimated population about 8000. Ojai and the Ojai Valley, as it is sometimes called, is primarily a farming community. The majority of the Valley is made up of independent small family farms. The average farm can be anything from a couple of acres to several hundred acres. Our farm is one such smaller farm of 40 acres. We grow avocadoes, oranges and tangerines. The Ojai Valley relies on several different water sources. Some of the farmers on the Valley floor have wells (which have suffered greatly in our long term drought). The wells are fed by way of a series of catchment ponds. Others like our farm rely on the water purchased from Lake Casitas. Lake Casitas is a local lake that relies on its supply from rain water and rain water runoff.

Since California has suffered long term drought (some eight years' worth), the farmers here have suffered also. The cost of water has increased tremendously as well as the imposed reduction of water allocation.

It is now claimed that after our recent rain this year that most of California is out of the drought. Not so for the Ojai Valley. The Valley did not receive as much rain or as frequent as other parts of the state. The rain water the Valley did receive found much of it (as much as 75% at one time) diverted from running into Lake Casitas and going to the ocean in order to save the "endangered" southern steelhead trout. The same goes for the catchment ponds. As of March 23rd this year, according to the CMWD water conservation manager Ron Merckling , Lake Casitas stood at 44 percent of capacity.

The reported reasoning behind diverting most of the rain water run off to the Ocean as reported in the Ojai Valley News March 24, 2017 is as follows:

"...the necessary authorization from the National Marine Fisheries Service (NMFS) still had not been issued to allow a diversion. The $1.3 million spreading grounds are a series of ponds ...When the valve in a concrete diversion chamber is opened, water runs from San Antonio Creek to the ponds ...The ponds, in turn, direct the water to four nearby injection wells that help replenish the Ojai Basin.

Completed in 2014, the spreading grounds have yet to make a diversion. Even though the WPD has had the required permit in hand since 2012, the NMFS must give its approval before the permit can be used. And for the NMFS to give its approval, it must first review an in-depth study, conducted by WPD of the flow condition in San Antonio Creek during such heavy rains as the ones that fell in the Ojai Valley at the end of January. The required study was conducted...data sent to NMFS overnight on Feb.2. A month later...NMFS sent word the data had been reviewed, but there had been no green light to use the permit as of March 21. The NMFS is concerned for the welfare of the southern steelhead trout." (1)

Let it be said that the same sort of nonsense is happening in regards to the run off for the Lake Casitas Water District (CMWD) as reported in a newsletter from CMWD. The report is as follows:

"Water from the Ventura River is redirected into the Lake via the Robles Canal and the local watershed. The latest rain event has produced the largest diversions since 2011. Flows in the Ventura River need to be maintain for a given period before diversions can occur. This is due to regulatory requirements related to fish and other water agencies downstream...Diversions lasted for little more than two days, starting on Sunday, January 22, 2017, resulting in increasing lake volume from 35.3 to 36.7 %. We will need a lot more rain this year before we are able to recover from the last five years of drought." (2)

We as human beings and farmers find this protection of a trout ridiculous. The endangered species list, including a trout and the end result of the protection of such trout over the livelihood and protection of our farms and businesses, is criminal.

I am writing you Mr. Pruitt in an urgent request to please help us. It is of no use for me to request our local politicians in Ventura County or our State Congresspersons and Senators since they helped write the laws that protect the fish.

I know that you have inherited a mountain of problems caused by previous administrations; I only ask that you please look into this issue as presented to you. We are more than likely not going to receive any more rain this year as rainy season is coming to a close. I can only hope that you may be helpful in removing any fish or other species from the endangered list or find another way of allowing any forth coming rains in the future to go directly into our water supply.

Most Sincerely,

Margaret Melton

Margaret Melton
(b) (6)
(b) (6)

(1) Ojai Valley News March 24, 2017
(2) Casitas Municipal Water District Home Page 2017

Peggy Melton

[redacted] (b) (6)

SANTA CLARITA CA 913

01 APR 2017 PM 3 L

APR 10 2017

Mr Scott Pruitt
Environmental Protection Agency
1200 Pennsylvania Ave. N.W.
Washington DC 20460

20460-

FCL 2035278

161A

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

Margaret Melton
(b) (6)

Dear Ms. Melton:

Thank you for your inquiry to Administrator Pruitt, dated April 1, 2017. EPA Region 9, which is responsible for the Pacific Southwest, received your letter on May 5, 2017 and was asked by EPA Headquarters to reply directly.

The concerns articulated in your letter center around two very important issues: water supply in the context of an extended drought, and the impact that regulatory actions for endangered species may be having on your farming activities in light of that drought. Your letter requests that the EPA look into these issues, with the hope that species could be removed from the endangered list, and/or that future water be allowed to go directly to your supply.

Although the EPA works with other agencies on a variety of issues, neither of these requests are within the EPA's legal authorities. The federal Endangered Species Act (ESA) is administered by the U.S. Fish and Wildlife Service (FWS), and the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS). Delisting an established species requires data demonstrating species recovery, public input, and other factors that the FWS and/or NMFS must consider to take such an action. I have provided links to the NMFS website, which may be useful to you in exploring the process and criteria for listing, and de-listing, imperiled species.[1]

Similarly, although the EPA partners with states to regulate surface water quality, water rights and distribution area areas of state and local authority. I understand from your letter that you have been dissatisfied with local government's responses to your concerns; the state of California, through state and regional Water Quality Control Boards, is the government body with higher authority. I have enclosed a brochure from the CA water board's website, which includes points of contact in the LA Region. As with all Regional Boards, your Regional Water Quality Control Board encourages public participation.

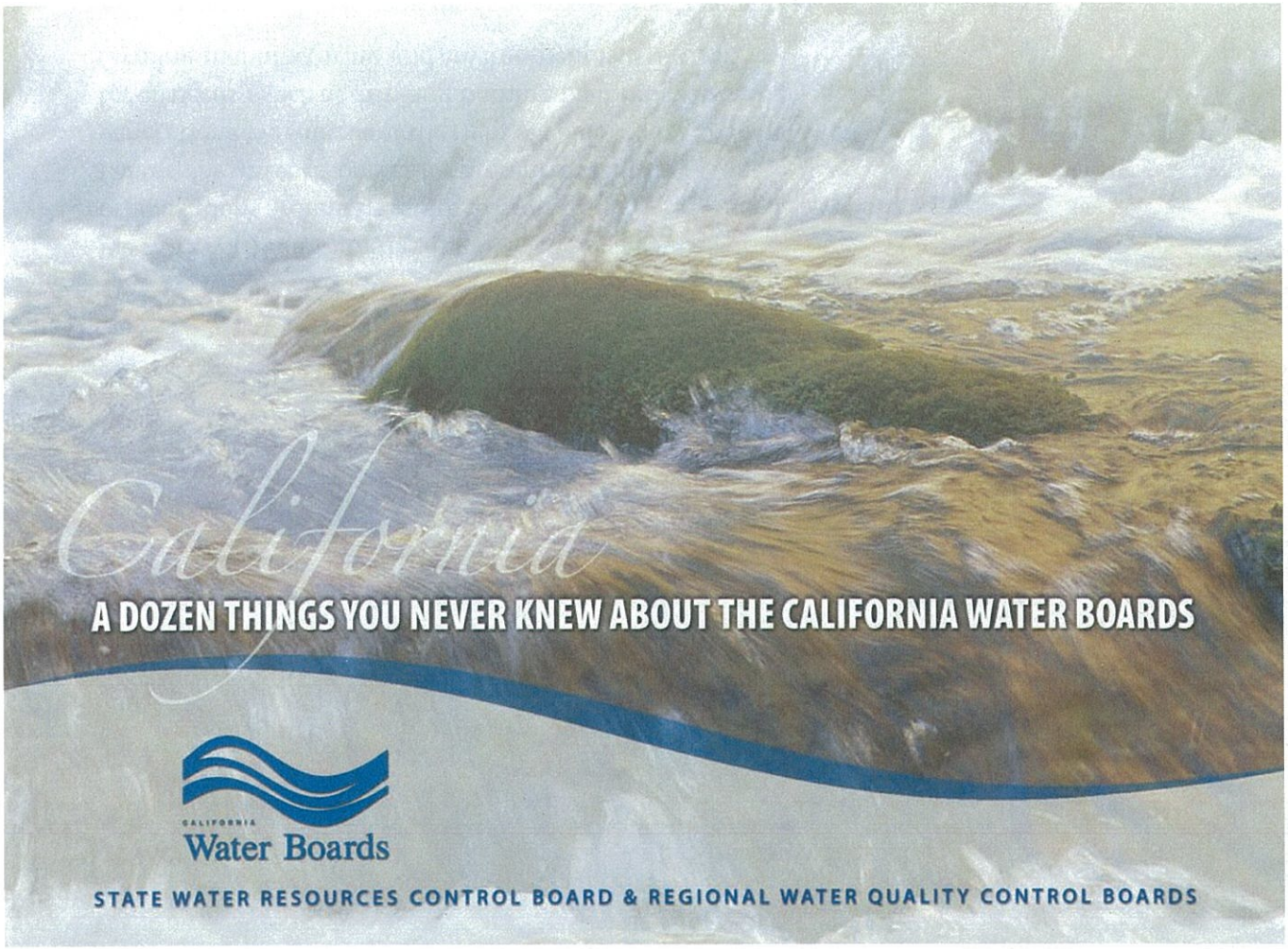
Thank you again for contacting the U.S. Environmental Protection Agency. I hope this response and these resources are helpful.

Sincerely,

5/9/17

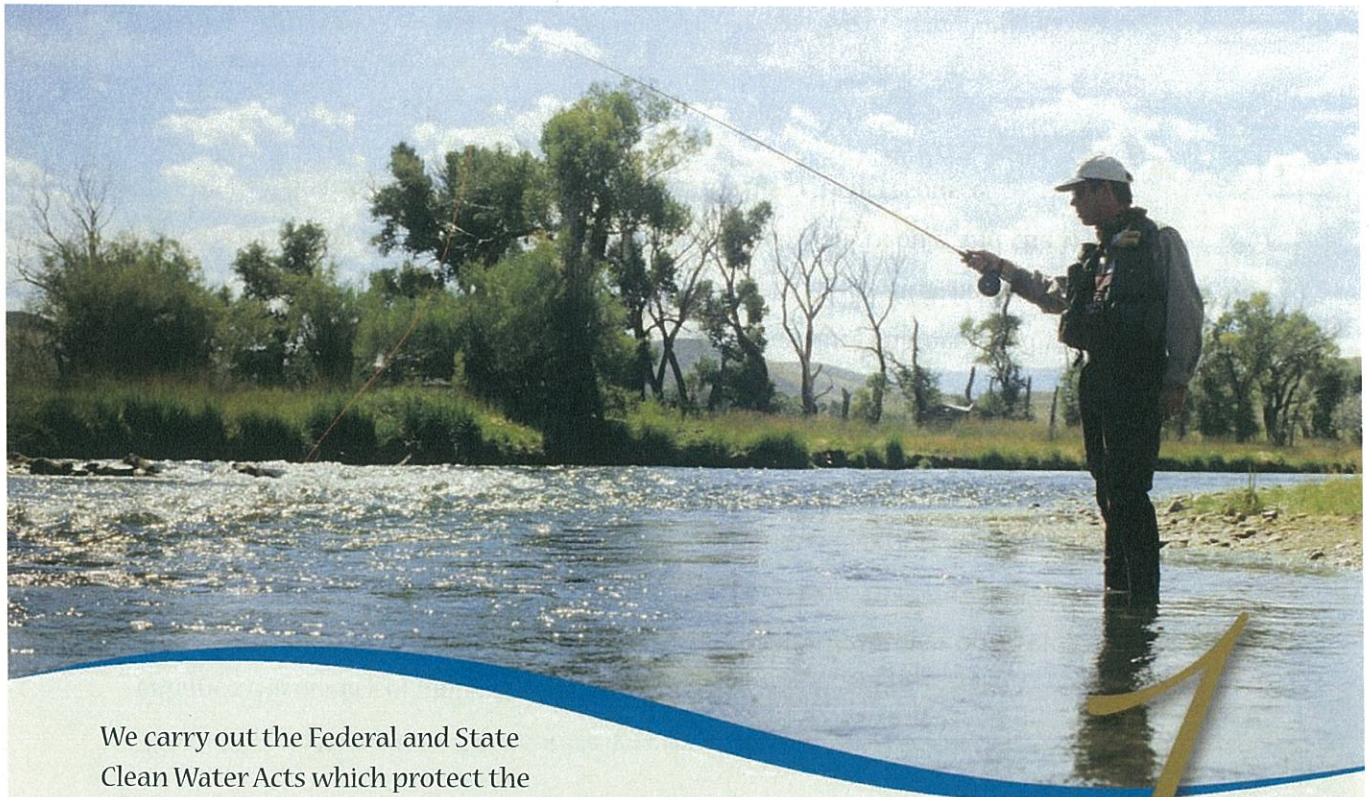
Jason Brush
Acting Assistant Director, Water Division
U.S. Environmental Protection Agency, Region 9

[1] http://www.nmfs.noaa.gov/pr/laws/esa/policies.htm



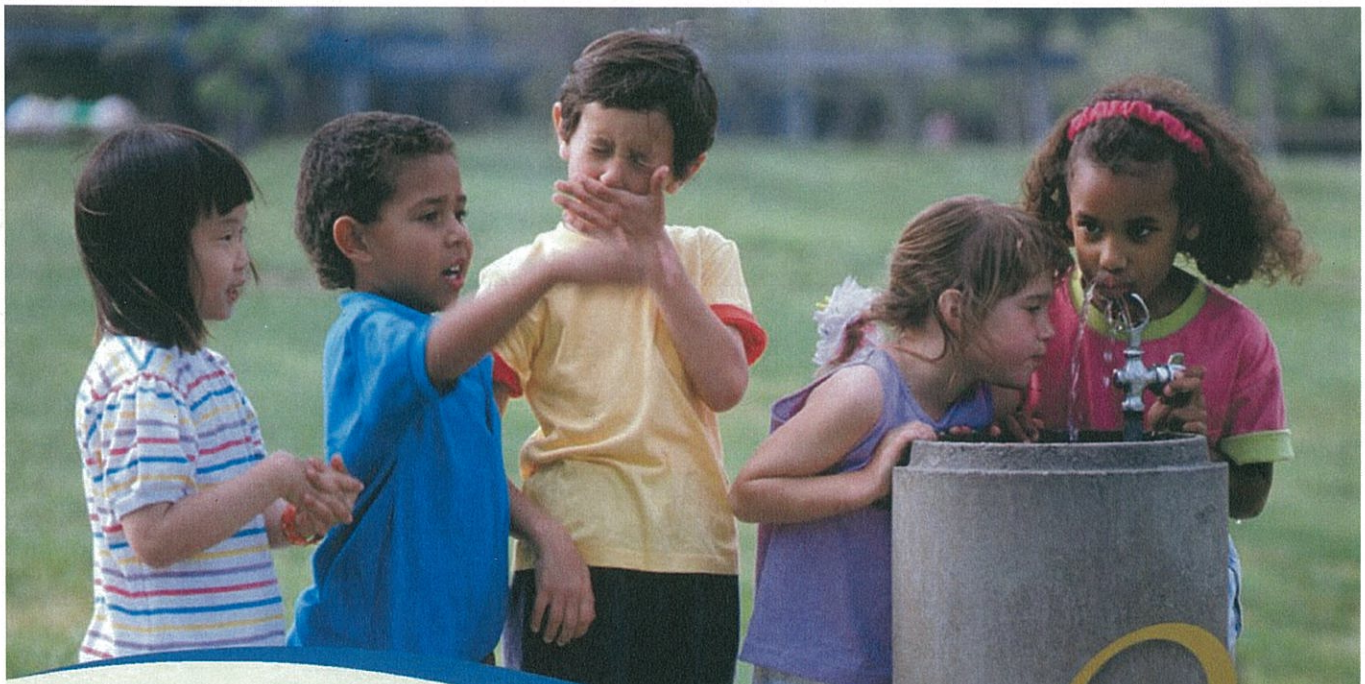
Introduction

The "California Water Boards" are state government departments that protect and enhance the quality of our state's waters for present and future generations. The California Water Boards are made up of the State Water Resources Control Board, along with the nine Regional Water Quality Control Boards. The State Water Board develops statewide policy and regulations for water quality control and allocates water rights. The Regional Water Boards provide local implementation of policy and regulations, develop long-range plans for their areas, issue waste discharge permits and take enforcement actions against violators. While some of these activities are more well-known than others, all are essential to providing California individuals, families, farmers, cities, industry and the environment with water needed to keep our state healthy and productive. Water is precious to all people and the Water Boards are proud to be protectors of this critical resource.



1

We carry out the Federal and State Clean Water Acts which protect the quality of nearly 1.6 million acres of lakes, 1.3 million acres of bays and estuaries, 211, 000 miles of rivers and streams, and about 1,100 miles of coastline.

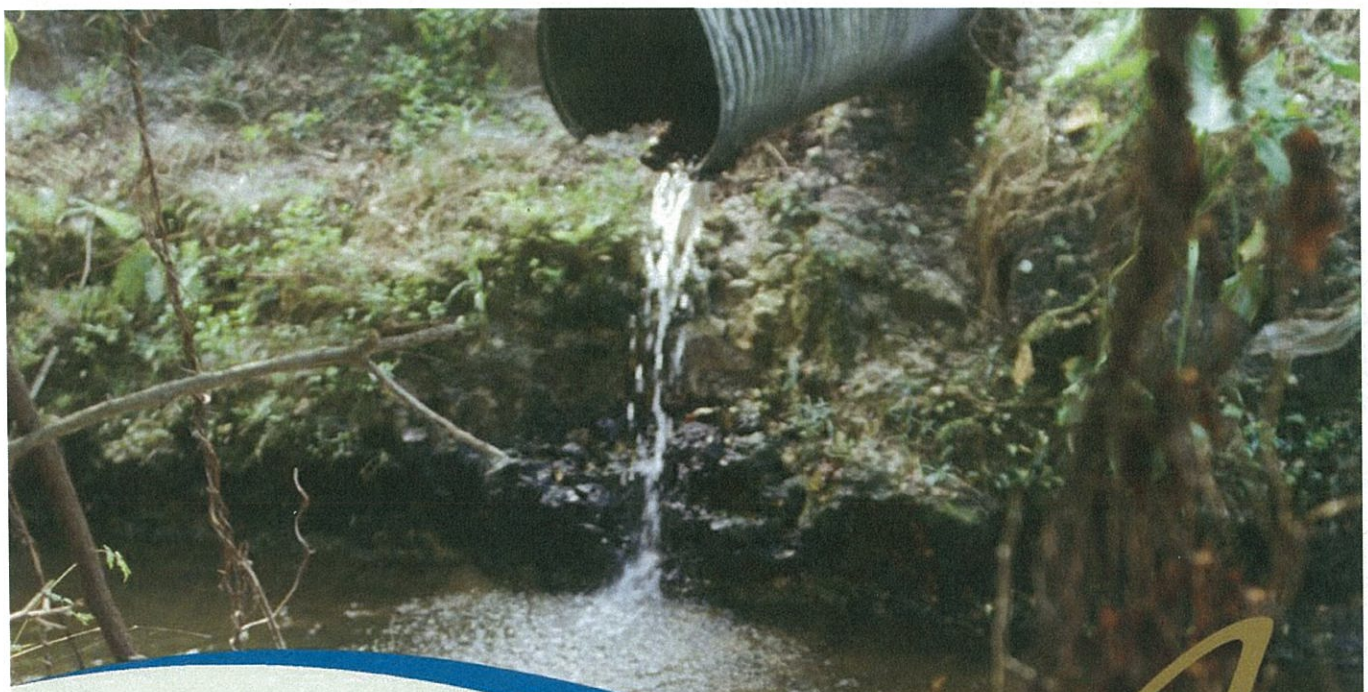


2

We work with communities and organizations around the state to protect California's water resources for present and future generations. We safeguard the right of Californians to clean water for all needs – such as drinking, bathing, boating, swimming, farming, manufacturing, and environmental uses.

3

Through education and out- reach
we improve the public's understanding
and knowledge of the importance of water quality and
the role we all can play to protect our resources.



4

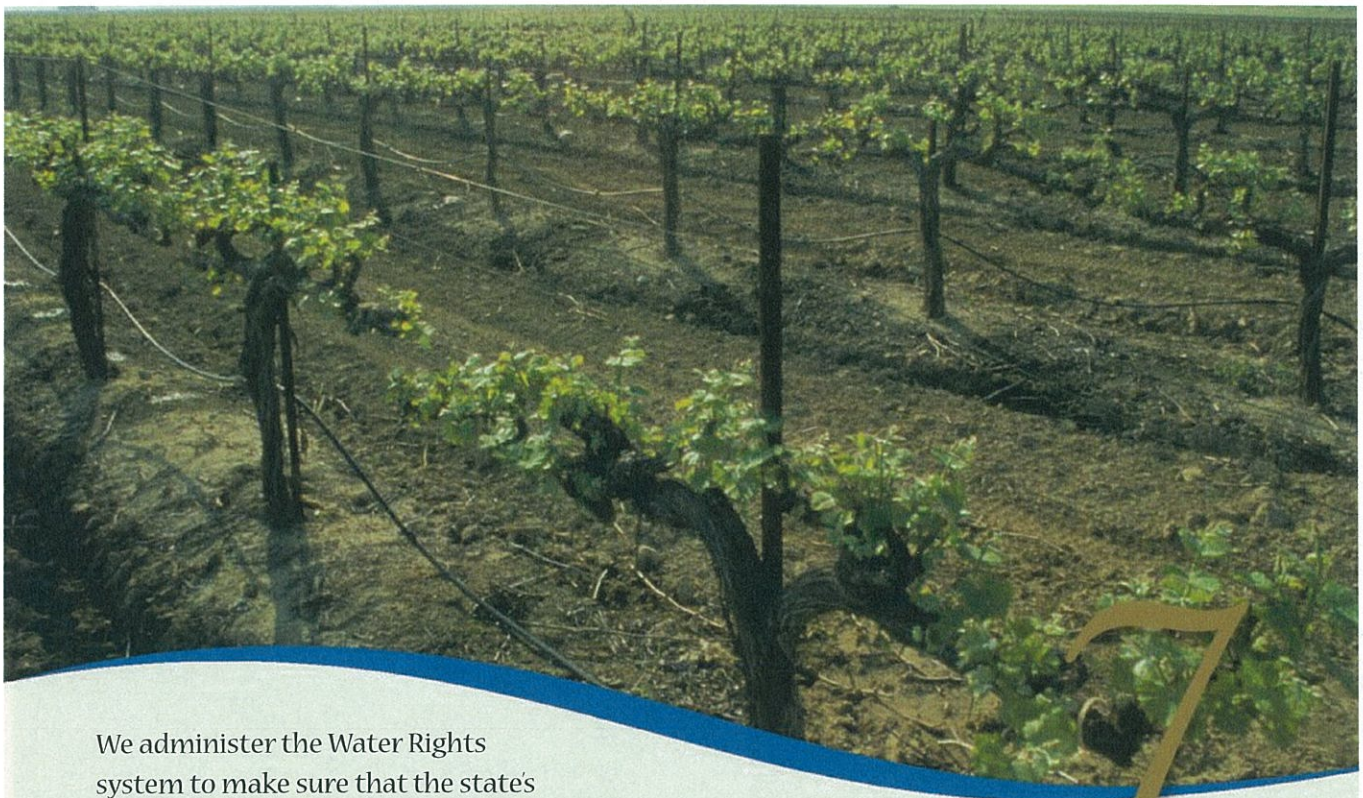
We take enforcement actions
against those who violate federal and state
environmental laws and regulations.

5

We have allocated billions of dollars for the construction of sewage treatment plants throughout California and we certify that sewage treatment plant operators are trained and able to protect the public's health and the environment.

6

We distribute millions of dollars in bond money and state revolving fund money to communities for water quality protection, including water quality planning, treatment of stormwater, and clean beaches.

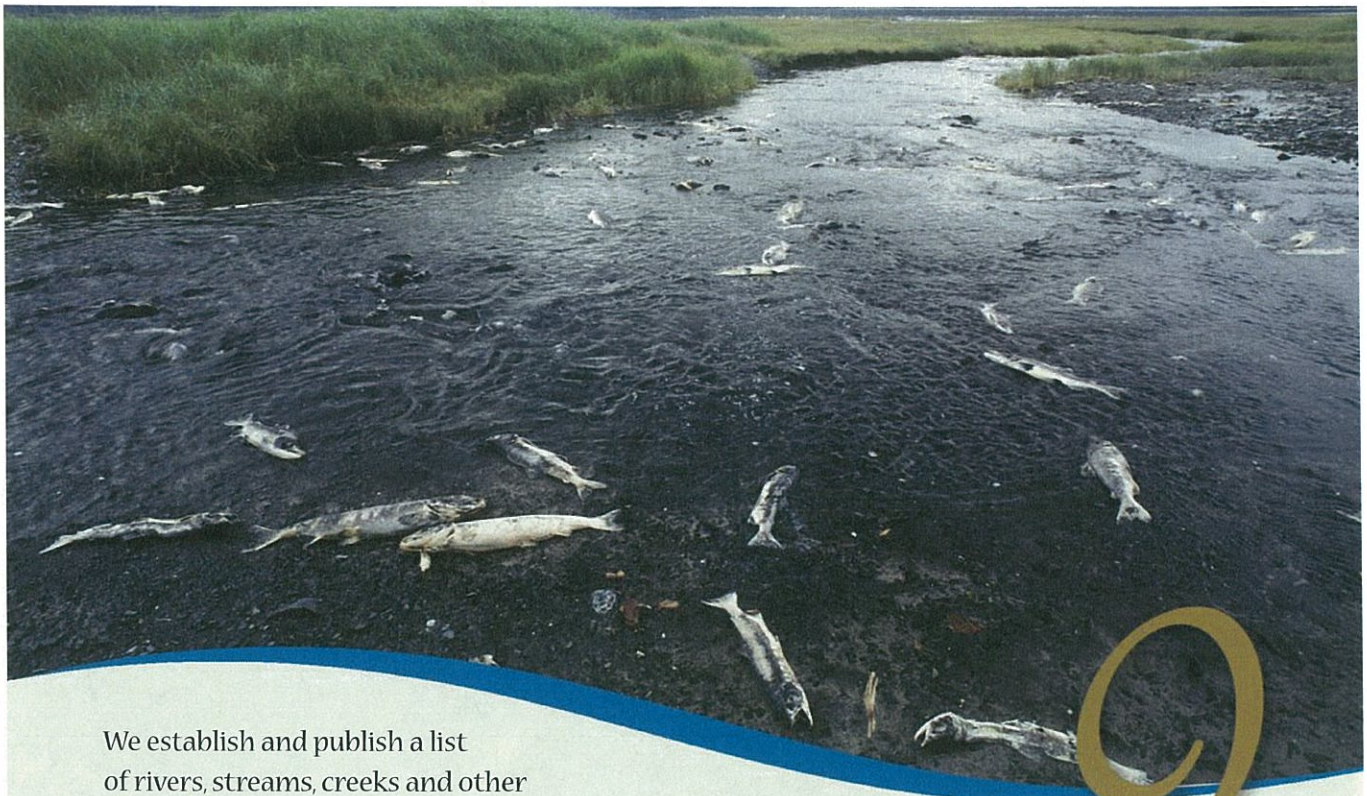


7

We administer the Water Rights system to make sure that the state's water resources are developed, conserved and utilized equitably and that vested rights, water quality and the environment are safeguarded.

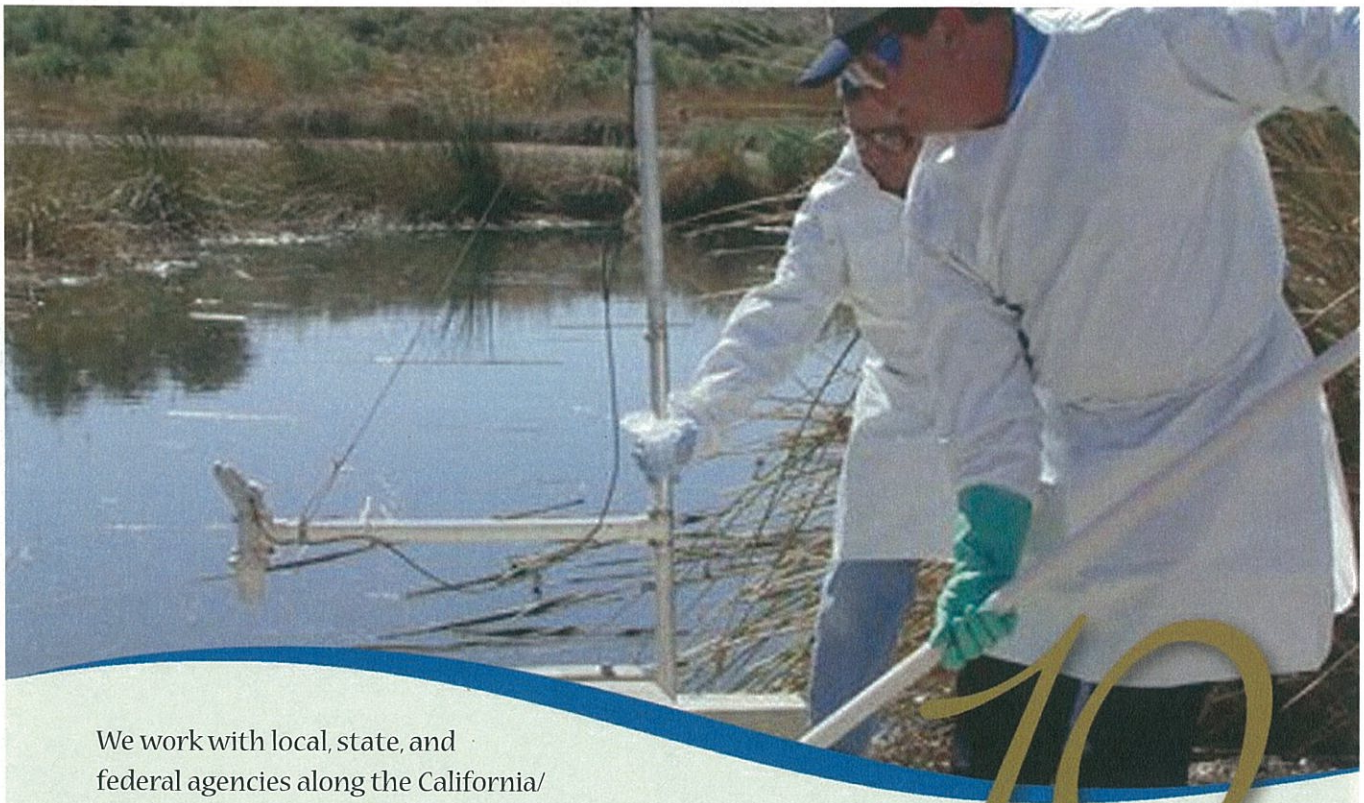
8

We are California scientists, engineers, biologists and geologists with top scientific and technical training. We make science-based decisions about water quality and water rights and we never forget that we work for the people of California.



9

We establish and publish a list of rivers, streams, creeks and other water bodies that do not meet federal water quality standards, develop plans to restore their water quality, and direct the implementation of those plans.

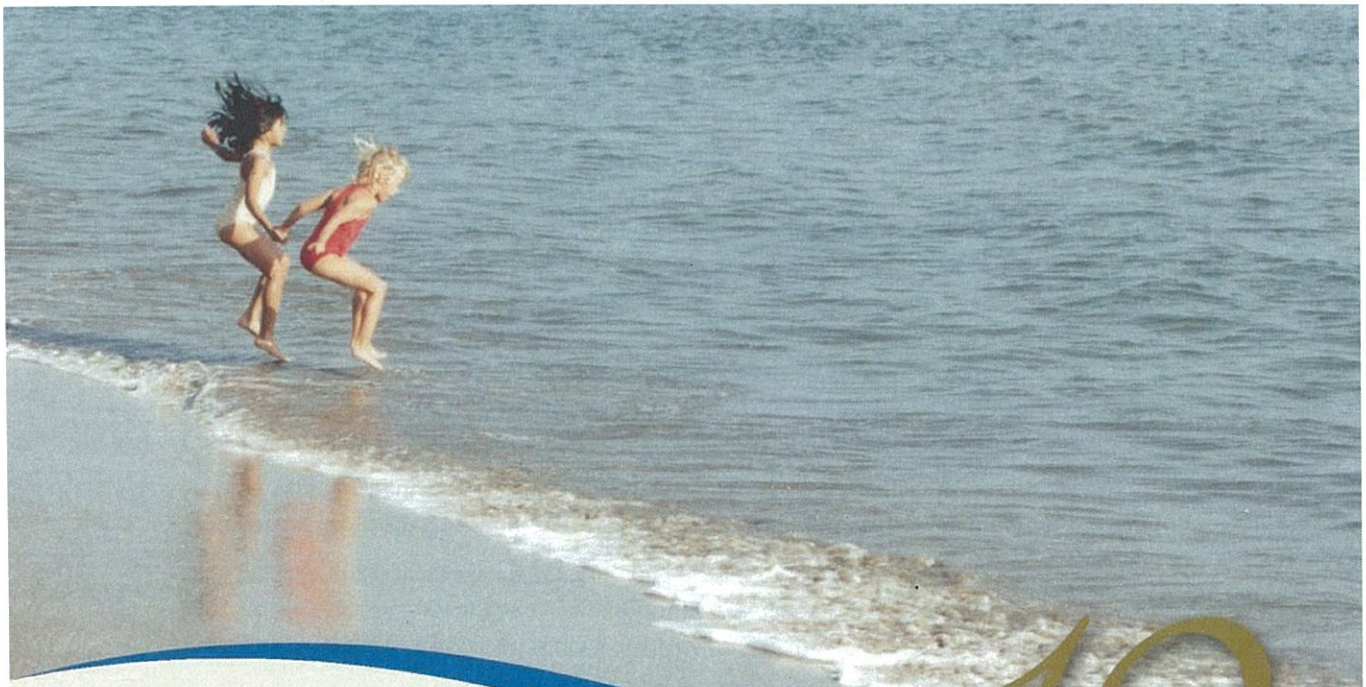


10

We work with local, state, and federal agencies along the California/Mexico border to ensure that water quality issues, including wastewater and the Salton Sea, are addressed.

We restore and protect watersheds, rivers and streams that are essential to California fisheries, recreation, wildlife preservation, and the economy.

11



We protect the state's unique and precious water resources, including Areas of Special Biological Significance on the California coast, such as sections of Carmel, San Diego, and Santa Catalina. Our work includes monitoring, identification of pollution sources, and funding for restoration.

12

Protecting Water Quality Through:

Regulation and Enforcement of: aquatic pesticides, biosolids, brownfields, groundwater pollution, activities affecting wetlands, dredge and fill, stormwater runoff, irrigated agriculture, construction runoff, septic tanks, sanitary sewer systems, underground tanks, timber harvesting, landfills, nonpoint source pollution, mines, and discharges to rivers, lakes, bays, and the ocean.

Financial Assistance for: construction of wastewater treatment plants, nonpoint source control, clean beaches, agricultural discharge monitoring and reduction, water recycling, stormwater control, repair and replacement of underground storage tanks, and watershed management.

Monitoring Programs: Groundwater Ambient Monitoring and Assessment Program and the Surface Water Ambient Monitoring Program.

Coordinating Efforts: environmental justice, environmental education, Ocean Protection Council, public participation, U.S. - Mexico Border Affairs, Climate Action Team, and Bay Delta.

Protecting Water Rights Through:

- **Regulation and Enforcement of Water Rights**
- **Water Rights Adjudications**
- **Bay Delta Planning**
- **Instream Flow Studies**

State Water Resources Control Board

P.O. Box 100, Sacramento, CA 95812-0100
www.waterboards.ca.gov

Office of Legislative Affairs: (916) 341-5251 · Office of Public Affairs: (916) 341-5254 · Financial Assistance: (916) 341-5700 · Water Quality: (916) 341-5455 · Water Rights: (916) 341-5300

Regional Water Resources Control Boards

NORTH COAST REGION (1)
www.waterboards.ca.gov/northcoast
5550 Skylane Blvd., Suite A
Santa Rosa, CA 95403
info1@waterboards.ca.gov
(707) 576-2220 TEL · (707) 523-0135 FAX

SAN FRANCISCO BAY REGION (2)
www.waterboards.ca.gov/sanfranciscobay
1515 Clay Street, Suite 1400
Oakland, CA 94612
info2@waterboards.ca.gov
(510) 622-2300 TEL · (510) 622-2460 FAX

CENTRAL COAST REGION (3)
www.waterboards.ca.gov/centralcoast
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401
info3@waterboards.ca.gov
(805) 549-3147 TEL · (805) 543-0397 FAX

LOS ANGELES REGION (4)
www.waterboards.ca.gov/losangeles
320 W. 4th Street, Suite 200
Los Angeles, CA 90013
info4@waterboards.ca.gov
(213) 576-6600 TEL · (213) 576-6640 FAX

CENTRAL VALLEY REGION (5)
www.waterboards.ca.gov/centralvalley
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670
info5@waterboards.ca.gov
(916) 464-3291 TEL · (916) 464-4645 FAX

Fresno branch office
1685 E Street, Suite 200
Fresno, CA 93706
(559) 445-5116 TEL · (559) 445-5910 FAX

Redding branch office
415 Knollcrest Drive
Redding, CA 96002
(530) 224-4845 TEL · (530) 224-4857 FAX

LAHONTAN REGION (6)
www.waterboards.ca.gov/lahontan
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
info6@waterboards.ca.gov
(530) 542-5400 TEL · (530) 544-2271 FAX

Victorville branch office
14440 Civic Drive, Suite 200
Victorville, CA 92392
(760) 241-6583 TEL · (760) 241-7308 FAX

COLORADO RIVER BASIN REGION (7)
www.waterboards.ca.gov/coloradoriver
73-720 Fred Waring Dr., Suite 100
Palm Desert, CA 92260
info7@waterboards.ca.gov
(760) 346-7491 TEL · (760) 341-6820 FAX

SANTA ANA REGION (8)
www.waterboards.ca.gov/santaana
California Tower
3737 Main Street, Suite 500
Riverside, CA 92501-3339
info8@waterboards.ca.gov
(951) 782-4130 TEL · (951) 781-6288 FAX

SAN DIEGO REGION (9)
www.waterboards.ca.gov/sandiego
9174 Sky Park Court, Suite 100
San Diego, CA 92123
info9@waterboards.ca.gov
(858) 467-2952 TEL · (858) 571-6972 FAX

THE STATE WATER RESOURCES CONTROL BOARD IS A DEPARTMENT OF THE CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY. ITS MISSION IS TO PROTECT & ENHANCE THE QUALITY OF OUR STATE'S WATERS FOR PRESENT AND FUTURE GENERATIONS.

For further information, contact us at: State Water Resources Control Board
Office of Legislative Affairs
1001 I Street • Sacramento, CA 95814 • (916) 341-5251
http: www.waterboards.ca.gov

CALIFORNIA
Water Boards

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
STATE WATER RESOURCES CONTROL BOARD & REGIONAL WATER QUALITY CONTROL BOARDS

GIBSON DUNN

Gibson, Dunn & Crutcher LLP
1050 Connecticut Avenue, N.W.
Washington, D.C. 20036-5306
Tel 202.955.8500
www.gibsondunn.com

Douglas R. Cox
Direct: +1 202.887.3561
Fax: +1 202.530.9539
DCox@gibsondunn.com

Client: G 27192-00006

RE
2017 APR 10 AM 11:36
OFFICE OF THE
EXECUTIVE SECRETARIAT

April 4, 2017

The Honorable E. Scott Pruitt, Administrator
Office of the Administrator – 1101A
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Re: Federalist Society Luncheon

Dear Administrator Pruitt:

Thank you very much for speaking at the recent Federalist Society luncheon. Your remarks were very thoughtful, funny and interesting. The large audience was a testimony to our members' interest in the work of the Agency, particularly under changed circumstances.

Thank you again for being willing to participate in our program.

Good luck in your very challenging job.

Very truly yours,

Douglas R. Cox

Douglas R. Cox
DRC/pr

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The Honorable E. Scott Pruitt, Administrator
Office of the Administrator – 1101A
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

DEC 1 0 2017

20460-

National Bomb Squad Commanders Advisory Board
600 Boulevard South, Suite 104, Huntsville, AL 35802
www.nbscab.org

RECEIVED
2017 APR 10 AM 11:41
OFFICE OF THE
EXECUTIVE SECRETARIAT

NBSCAB MEMBERS

Randall Sterett
Chairman
Orange County Sheriff

John Adamek
Vice-Chair
St Paul Police Department

Christopher King
Secretary
Jacksonville Sheriff's Office

Robert Conroy
Baltimore County Police Dept

Christopher Ennis
Delaware State Police

Scott Fees
Edmond Police Department

Mark Gutke
Jefferson County Sheriff

Darrel Kandil
Hillsborough County Sheriff

Steve Roberson
Winnebago County Sheriff

Christopher Rogers
Pima Regional Bomb Squad

Jarrett Seal
Tampa Police Department

Mark Torre
New York City Police Dept.

The Honorable Scott Pruitt
Administrator, Environmental Protection Agency
USEPA Headquarters
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

March 28, 2017

Dear Administrator Pruitt:

The National Bomb Squad Commanders Advisory Board (NBSCAB) represents all 466 bomb squads and nearly 2,800 bomb technicians in the United States. The purpose of this letter is to seek your assistance in addressing a critical and urgent environmental regulatory issue of concern to NBSCAB, all FBI accredited public safety bomb squads, and Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) certified explosive specialists in the United States. This issue concerns the storage, treatment, and destruction of seized illegal fireworks, other explosives, and pyrotechnics.

Public safety bomb squads and ATF explosive specialists routinely destroy large quantities of these dangerous materials. According to a survey conducted by the NBSCAB, public safety bomb squads and the ATF destroy more than 300,000 pounds of fireworks annually.[1] Handling, storing, transporting, and treating these fireworks and explosives presents a number of safety, security, environmental, technical, and procedural challenges.

It is very concerning to our community that the safest method to dispose of these fireworks and other dangerous materials, open burning and detonation, can place these public safety officers in potential violation of EPA regulations.[2]

To this end, we respectfully request the EPA:

> Exempt by rule-making authority, FBI accredited public safety bomb squads and ATF certified explosive specialists from the need for a RCRA permit for the treatment/destruction of seized fireworks, other explosives, and pyrotechnics until an EPA approved and readily available technological solution, and a streamlined permitting process is developed. The exemption is only for FBI accredited public safety bomb squads and ATF certified explosive specialists, and is only for the treatment/destruction of seized fireworks, other explosives, and pyrotechnics.

Thank you for your attention to this matter. Please contact me at 714-412-5732 or Rsterett@ocsd.org if you have any questions.

Randy Sterett
Randy Sterett
NBSCAB Chairman

---

[1] This is the annual average for 2008-2012, and is based on an extrapolation of responses from 41% of the 467 public safety bomb squads in the U.S.

[2] Specifically, permitting regulations associated with the Resource Conservation and Recovery Act (RCRA)

NBSCAB
600 Blvd South
Suite 104
Huntsville, AL 35802

BIRMINGHAM
AL 350
04 APR '17
PM 1 L

APR 1 0 2017

FCL 2035506

ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF THE ADMINISTRATOR
HONORABLE SCOTT PRUITT
MAIL CODE: 1101A
1200 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, DC 20460

20460-

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 1 7 2018

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

NOW THE
OFFICE OF LAND AND
EMERGENCY MANAGEMENT

Mr. Randall Sterett
Chairman
National Bomb Squad Commanders Advisory Board
600 Boulevard South, Suite 104
Huntsville, Alabama 35802

Dear Mr. Sterett:

Thank you for writing on behalf of the National Bomb Squad Commanders Advisory Board to request U.S. Environmental Protection Agency (EPA) action concerning the storage, treatment and destruction of seized illegal fireworks, pyrotechnics and other explosives.

The EPA recognizes the technological and regulatory concerns that bomb squads and explosives specialists face when treating and destroying seized waste fireworks and other energetic materials. We appreciate the constructive interactions you have had with the EPA on these issues and your interest in understanding the various aspects of the Resource Conservation and Recovery Act (RCRA).

The RCRA program addresses both safety and environmental aspects of managing hazardous waste, like the potential for hazardous releases, and includes provisions that enable several approaches for handling waste fireworks. For example, the RCRA regulations provide an exemption from RCRA permitting for those entities that generate hazardous waste and send that hazardous waste off site within certain timeframes (often 90 days). Once sent off site, there are commercial treatment, storage and disposal facilities that are permitted to accept energetic wastes and can provide further assistance. Similarly, in many cases, fireworks that are reused or repurposed would not be subject to RCRA requirements. Moreover, the RCRA regulations contain streamlined provisions for emergency situations, which is of particular concern when dealing with explosives. For more information, please see the EPA's "*Memorandum on the Safe Handling, Storage and Treatment of Waste Fireworks*," issued July 2017, which can be found at https://www.epa.gov/hwpermitting/safe-handling-storage-and-treatment-waste-fireworks.

In addition, since RCRA is frequently authorized to be administered on a state-by-state basis, and because states may be more stringent or broader in scope than the federal regulations, individual state provisions would be important to consider as well. Federal and state rulemaking processess can take extensive time to complete.

In light of such considerations, we are unable to accommodate your request for a rulemaking exempting your activities at present. At the same time, we have an effort underway to explore the use of alternatives to open burning and open detonation. We are assessing the availability of proven and readily

available alternative treatment options for energetic wastes, like the materials you described. We stand ready to work with the National Bomb Squad Commanders Advisory Board in this regard.

To follow up, a good contact on my staff is Sonya Sasseville, who can be reached at sasseville.sonya@epa.gov or (703) 308-8648.

Sincerely,

Barry N. Breen
Acting Assistant Administrator

Dear Mr. Pruitt,

We would like to ask for your help with our problem. Craig Butler of the Ohio EPA and the City of Marietta, Ohio are trying to force three outlying areas that are not part of the City, Devola, Oak Grove and Reno to hook into the City's sewer system unnecessarily.

Several years ago, Marietta wanted to upgrade their sewer system but didn't have enough money to do so. One of the "then" County Commissioners told them to "Go ahead and build it and we'll get Devola, Oak Grove and Reno on it to help pay for it." The City says they had a "contract" from this meeting and they called it an "intergovernmental agreement" between the County and the City to hook these areas into their sewer. They had a permit to install, which expired. They also had a "one time" extension for their permit to install, which also expired. Neither the "then" County Commissioners or the City were considering what was in the best interest of Washington County residents, only how the City of Marietta could benefit monetarily from this. There will be absolutely no benefit to this sewer except these outlying areas will then be "debt slaves" to the City of Marietta forever. There will be no benefit to the environment and the water will not be any safer to drink. The homes in these outlying areas have perfectly functioning septic systems so there is no need for the unnecessary expense of hooking into the city's sewer. The OEPA is targeting Devola first. Over one hundred (118) septic systems were inspected during a "witch hunt" (at the homeowner's expense) and none were found to be leaking. A few minor defects were found, such as a cracked lid and these were fixed immediately. Craig Butler, of the Ohio EPA told me himself that he doesn't know of any failing septic systems in Devola, but yet he continues to perpetuate the lie that Devola has "failing Septic Systems" and wants the areas hooked into Marietta's sewer. He says it's just a

"good idea". When septic tanks are emptied as normal maintenance, they are thoroughly inspected then also and none have been found to be leaking. All three targeted outlying areas (Devola, Oak Grove and Reno) contain several large farms which spray and inject manure on and into their fields. These farms are right beside the river and have creeks that also run into the river. I asked Mr. Butler about this and he said that is perfectly legal. The area of Devola had a nitrate count in their water that was slightly elevated. The people of Devola paid 2.8 million Dollars to build a Reverse Osmosis Water Treatment Plant which was approved by the EPA. Since this plant was built and two full years before it was completed, Devola has not had an elevated nitrate count.

We have been fighting this sewer idea since we found out about it. The City and County tried to sneak this by us and then tell us it was a "done deal". The cost will be about Twenty Five Thousand (25,000) Dollars per household to be paid by the homeowner. Half of this will have to be paid in cash and they will apply the balance to our property taxes. On top of that, we will have a sewer bill of over Eighty (80) dollars a month, which they can raise anytime they want.

Even our own current County Commissioners are currently appealing Mr. Butler's ruling to sewer Devola. Please see copy of letter enclosed.

Also, Mr. Richard Daniel, President of our Washington County Board of Health, which has jurisdiction over Septic Systems, wrote a letter and sent it to Mr. Butler outlining 9 reasons why the idea of sewering Devola should be dropped. Please find copy of said letter enclosed.

Also please find enclosed a copy of a letter written to our local Newspaper by The Washington County Health Commissioner, Dr. Richard Wittberg. In this letter, Dr. Wittberg states that sewering Devola, Oak Grove and Reno will actually introduce more nitrates into the river than the what the EPA is accusing our septic systems of and therefore they cannot support the OEPA in their efforts to

sewer Devola, Oak Grove and Reno.

The City of Marietta already raised their rates 8 to 15 dollars per billing cycle (2 months) for existing sewer customers to pay for their sewer plant upgrades. Making Devola residents pay this ridiculous, astronomical amount of money to run the sewer lines and to hook into Marietta's sewer unnecessarily will do nothing but take much needed money from our pockets and put it into theirs. A lot of these people are struggling to pay their bills now, this added, unnecessary cost is certainly not going to help anyone to fix a problem that simply does not exist! If the EPA would perform a cost/benefit analysis for this project, they would discover a lot of cost for the residents of Devola, Oak Grove and Reno and absolutely no benefit. There will not be any less pollution, the water will not be any safer to drink and our property will not be worth any more. For all three outlying areas to hook into Marietta's sewer will cost Marietta absolutely nothing. The entire bill is to be paid by the affected homeowners. Allowing this to continue and pass WILL cause many people, and not just retired people on fixed incomes to lose their homes.

Most people here live paycheck to paycheck. It is not fair, responsible or even sensible to force people to lose their homes because Craig Butler thinks the unnecessary sewering of Devola is a "good idea".

We are BEGGING you, PLEASE help us stop this NONSENSE!

THANK YOU SO MUCH!

Rick & Donna Bauer

WASHINGTON COUNTY GENERAL HEALTH DISTRICT
An Equal Opportunity Employer

342 Muskingum Drive
Marietta, Ohio 45750
Phone (740) 374-2782
Fax (740) 376-7074
www.washingtongov.org/health

Public Health
Prevent. Promote. Protect.

February 13, 2015

Mr. Craig W. Butler
Ohio EPA - Director's Office
P.O. Box 1049
Columbus, Ohio 43216-1049

Dear Mr. Butler,

Regarding: Devola Septic Systems/Devola Phase-2 Sewer Project

Recognizing that approximately 320 residential septic systems in Devola were permitted, were installed, were inspected, are currently operating as originally permitted, and that all system designs were previously approved by the State, and

Considering that the original complaint made by the Washington County Health Commissioner in 2011, was identified as "unsafe nitrate level in the drinking water", but acknowledging that since January of 2014 this complaint has been completely satisfied by Ohio Environmental Protection Agency (OEPA) approval and successful operation of the reverse osmosis upgrade at the Devola water plant, and

Considering that our health department staff have conducted an inspection of approximately half of the systems in Devola, which resulted in improvements to several of the systems that could potentially change the ground water profile, and

Considering that there are several steps the Board of Health could take to further protect ground water quality, such as regular inspections of existing systems and elimination of dry wells within 1000 feet of municipal water supply, which would be substantially cheaper than sewers, and

Considering OEPA has identified a 300 foot separation between surface and the water supply that should adequately protect the Devola aquifer from any septic contamination, and

Considering that our Health Commissioner has reviewed the data collected by the OEPA and published in their 2011 report titled "Unsafe Water Supply Investigation, Putnam Community Water Association, Devola, Washington County" and does not believe that the data it presents supports Ohio EPA's claim that septic systems are contaminating the groundwater, and

Considering that there is a strong possibility that sewering the remaining homes may not change the current nitrate levels in the ground water, and

Considering that the currently proposed cost to sewer Devola is a financial hardship on the Devola residences affected, especially given that the original unsafe water complaint has been satisfied, and, finally,

Considering that the Washington County Board of Health finds there is currently no immediate or imminent threat to public health due to the Devola septic systems,

Therefore, the Washington County Board of Health respectfully requests the Washington County Board of County Commissioners and Ohio Environmental Protection Agency to either dismiss in its entirety the Devola Phase-2 Sewer Project or, at the very least, to delay the project until proof can be submitted to us and the residents of Devola that this project will have a significant beneficial effect on public health and the environment. At a minimum, we would request that OEPA hold a public hearing in

READERS' LETTERS

3-29-17

Is Devola sewering really warranted?

The Ohio Environmental Protection Agency (OEPA) claims that Devola needs to have sewers in order to protect public health. The Washington County Health Department has examined their data, and we don't feel they have made their case. While there are many reasons why we object to their science, two stand out. First, OEPA claims that nitrates in the groundwater are at a high level and can only be fixed by sewers. The OEPA was not able to detect any other contaminants (prescription drugs, bacteria, etc.) and are only focused on nitrates in the groundwater. Nitrates in the groundwater can come from natural sources, from farm activity, and from lawn fertilizing in addition to septic systems. High nitrates in drinking water can cause health problems in the very young and the very old, but the drinking water in Devola is protected by equipment that removes about two-thirds of the nitrates from the raw water. Current nitrate levels in drinking water are well below OEPA set limits. This same equipment that removes nitrates from the drinking water may also be solving the higher nitrate levels in the groundwater. Prior to the equipment being installed, nitrate levels at the water plant were going up at a rate of around .25 mg/liter per year. After its installation, levels appear to be going down at a rate of around 2 mg/liter. In other words, the problem may be fixing itself, probably because water is being sent to the homes that have lower nitrates than the previous "closed loop" system. It is hard to understand why millions of dollars need to be spent to fix something that may be fixing itself.

Secondly, it is hard to understand how sewering will fix nitrate levels in the "waters of the State." Septic systems in Devola are reducing nitrates as water moves through the soil profile. Sewering would collect all the nitrates, concentrate them at the sewage treatment plant, and dump them into the river. High nitrates in the river can lead to algae blooms, which are a public health threat. If OEPA is worried about nitrates, sewering is a worse fix than the current systems which remove at least a portion of the nitrates. Sewering will remove none.

It would be nice if OEPA would come to Washington County and answer questions like these, but they have cancelled their public hearing on the issue. The cost of what OEPA is demanding is very high while the benefit appears to be very low and perhaps non-existent. We cannot support the OEPA in their efforts to force sewering in Devola, Oak Grove and Reno.

Dr. Richard A. Wittberg
Washington County Health Commissioner

BEAVER

(b) (6)

FCL 2035472

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SCOTT PRUITT - EPA ADMINISTRATOR
EVIRONMENTAL PROTECTION AGENCY
MAIL CODE - 1101 A
1200 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, DC 20460

APR 10 2017

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

MAY 1 2 2017

WN-15J

Rick and Donna Beaver
(b) (6)

Dear Mr. and Mrs. Beaver:

I am responding on behalf of the Acting Regional Administrator, Robert Kaplan, regarding the letter you sent to U.S. Environmental Protection Agency Administrator Pruitt on April 10, 2017.

In your letter, you expressed concern about the Ohio Environmental Protection Agency's (OEPA) 2011 request to the Washington County Commissioners to construct a community-wide sewer system in Devola, Ohio, to replace the individual septic systems currently used by residents.

The actions being taken are the result of high levels of nitrates detected in 2009 by the Putnam Community Water Association (PCWA) in drinking water provided to Devola residents and in response to a request to OEPA from the Washington County General Health District's Board of Health to address this public health nuisance. OEPA determined in 2010 that Devola's failing septic systems were the source of the nitrates in Devola and surrounding areas. Two actions were taken in 2011 to address this public health issue. First, PCWA installed a reverse osmosis treatment system to remove the nitrates from the drinking water. Second, the Washington County commissioners agreed to install sewers to address the source of the nitrates.

In recognition of the costs associated with this solution, OEPA offered grants and loans to assist the Washington County commissioners in the construction of the sewer project, as well as ultimately agreeing that the installation of sewers in the Devola area could be conducted in phases. Additional funding sources may be available to Washington County commissioners through grants and loans from federal and state agencies.

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Please be assured that EPA understands your concerns and we appreciate you sharing your input in this matter. If you have any further questions concerning this response, please contact Scott Ireland of my staff at (312) 886-8121 or at Ireland.Scott@epa.gov.

Sincerely,

Christopher Korleski
Director, Water Division

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, DC 20426

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Docket No.: P-2221-038

Administrator
Gina McCarthy
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington , DC 20460

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Empire District Electric Company Project No. 2221-038

NOTICE OF INTENT TO FILE LICENSE APPLICATION, FILING OF PRE-APPLICATION DOCUMENT (PAD), COMMENCEMENT OF PRE-FILING PROCESS, AND SCOPING; REQUEST FOR COMMENTS ON THE PAD AND SCOPING DOCUMENT, AND IDENTIFICATION OF ISSUES AND ASSOCIATED STUDY REQUESTS

(March 24, 2017)

a. Type of Filing: Notice of Intent to File License Application for a New License and Commencing Pre-filing Process

b. Project No.: 2221-038

c. Dated Filed: January 26, 2017

d. Submitted By: Empire District Electric Company

e. Name of Project: Ozark Beach Hydroelectric Project

f. Location: On the White River near the Town of Forsyth, in Taney County, Missouri. The project occupies 5.1 acres of United States lands administered by the U.S. Army Corps of Engineers.

g. Filed Pursuant to: 18 CFR Part 5 of the Commission's Regulations

h. Potential Applicant Contact: Blake Mertens, Vice President of Energy Supply and Delivery Operations, Empire District Electric Company, P.O. Box 127, Joplin, MO 64802, (417) 625-6587 or bmertens@empiredistrict.com; and Randy Richardson, Plant Manager, Empire District Electric Company, 2537 Fir Road, Sarcoxie, MO 64862, (417) 625-6138 or RRichardson@empiredistrict.com.

i. FERC Contact: Colleen Corballis at (202) 502-8598 or e-mail at colleen.corballis@ferc.gov.

j. Cooperating agencies: Federal, state, local, and tribal agencies with jurisdiction and/or special expertise with respect to environmental issues that wish to cooperate in the preparation of the environmental document should follow the instructions for filing such requests described in item o

below. Cooperating agencies should note the Commission's policy that agencies that cooperate in the preparation of the environmental document cannot also intervene. *See* 94 FERC ¶ 61,076 (2001).

k. With this notice, we are initiating informal consultation with: (a) the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act and the joint agency regulations thereunder at 50 CFR, Part 402 and (b) the State Historic Preservation Officer, as required by section 106, National Historic Preservation Act, and the implementing regulations of the Advisory Council on Historic Preservation at 36 CFR 800.2.

l. With this notice, we are designating Empire District Electric Company as the Commission's non-federal representative for carrying out informal consultation, pursuant to section 7 of the Endangered Species Act and section 106 of the National Historic Preservation Act.

m. Empire District Electric Company filed with the Commission a Pre-Application Document (PAD; including a proposed process plan and schedule), pursuant to 18 CFR 5.6 of the Commission's regulations.

n. A copy of the PAD is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's website (http://www.ferc.gov), using the "eLibrary" link. Enter the docket number, excluding the last three digits in the docket number field to access the document. For assistance, contact FERC Online Support at FERCONlineSupport@ferc.gov, (866) 208-3676 (toll free), or (202) 502-8659 (TTY). A copy is also available for inspection and reproduction at the address in paragraph h.

Register online at http://www.ferc.gov/docs-filing/esubscription.asp to be notified via e-mail of new filing and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

o. With this notice, we are soliciting comments on the PAD and Commission's staff Scoping Document 1 (SD1), as well as study requests. All comments on the PAD and SD1, and study requests should be sent to Randy Richardson at the address above in paragraph h. In addition, all comments on the PAD and SD1, study requests, requests for cooperating agency status, and all communications to and from Commission staff related to the merits of the potential application must be filed with the Commission.
The Commission strongly encourages electronic filing. Please file all documents using the Commission's eFiling system at http://www.ferc.gov/docs-filing/efiling.asp. Commenters can submit brief

comments up to 6,000 characters, without prior registration, using the eComment system at http://www.ferc.gov/docs-filing/ecomment.asp. You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support at FERCOnlineSupport@ferc.gov. In lieu of electronic filing, please send a paper copy to: Secretary, Federal Energy Regulatory Commission, 888 First Street, NE, Washington, D.C. 20426. The first page of any filing should include docket number P-2221-038.

All filings with the Commission must bear the appropriate heading: "Comments on Pre-Application Document," "Study Requests," "Comments on Scoping Document 1," "Request for Cooperating Agency Status," or "Communications to and from Commission Staff." Any individual or entity interested in submitting study requests, commenting on the PAD or SD1, and any agency requesting cooperating status must do so by May 26, 2017.

p. Although our current intent is to prepare an environmental assessment (EA), there is the possibility that an Environmental Impact Statement (EIS) will be required. Nevertheless, this meeting will satisfy the NEPA scoping requirements, irrespective of whether an EA or EIS is issued by the Commission.

Scoping Meetings

Commission staff will hold two scoping meetings in the vicinity of the project at the times and places noted below. The daytime meeting will focus on resource agency, Indian tribes, and non-governmental organization concerns, while the evening meeting is primarily for receiving input from the public. We invite all interested individuals, organizations, and agencies to attend one or both of the meetings, and to assist staff in identifying particular study needs, as well as the scope of environmental issues to be addressed in the environmental document. The times and locations of these meetings are as follows:

Evening Scoping Meeting

Date:	April 18, 2017
Time:	6:30 p.m.
Location:	Taney County Courthouse, 1st Floor Hearing Room 132 David Street, Forsyth, MO 65653
Phone:	(417) 546-7204

Daytime Scoping Meeting

Date:	April 19, 2017
Time:	9:00 a.m.
Location:	Taney County Courthouse, 1st Floor Hearing Room 132 David Street, Forsyth, MO 65653
Phone:	(417) 546-7204

SD1, which outlines the subject areas to be addressed in the environmental document, was mailed to the individuals and entities on the Commission's mailing list. Copies of SD1 will be available at the scoping meetings, or may be viewed on the web at http://www.ferc.gov, using the "eLibrary" link. Follow the directions for accessing information in paragraph n. Based on all oral and written comments, a Scoping Document 2 (SD2) may be issued. SD2 may include a revised process plan and schedule, as well as a list of issues, identified through the scoping process.

Environmental Site Review

The potential applicant and Commission staff will conduct an Environmental Site Review of the project on Tuesday, April 18, 2017, starting at 1:00 p.m. All participants should meet at the Ozark Beach Dam parking lot, located at 3292 State Highway Y, Forsyth, MO 65653. All participants are responsible for their own transportation. Anyone planning on participating in the site visit, or with questions about it, should contact Mr. Randy Richardson of Empire District Electric Company at (417) 625-6138 or RRichardson@empiredistrict.com on or before April 11, 2017.

Meeting Objectives

At the scoping meetings, staff will: (1) initiate scoping of the issues; (2) review and discuss existing conditions and resource management objectives; (3) review and discuss existing information and identify preliminary information and study needs; (4) review and discuss the process plan and schedule for pre-filing activity that incorporates the time frames provided for in Part 5 of the Commission's regulations and, to the extent possible, maximizes coordination of federal, state, and tribal permitting and certification processes; and (5) discuss the appropriateness of any federal or state agency or Indian tribe acting as a cooperating agency for development of an environmental document.

Meeting participants should come prepared to discuss their issues and/or concerns. Please review the PAD in preparation for the scoping meetings. Directions on how to obtain a copy of the PAD and SD1 are included in paragraph n of this document.

Meeting Procedures

The meetings will be recorded by a stenographer and will be placed in the public records of the project.

Nathaniel J. Davis, Sr.,
Deputy Secretary.

Norfolk Southern Corporation
Three Commercial Place
Norfolk, Virginia 23510-2191

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EXECUTIVE SECRETARIAT

Laura Hoag
Director Strategic Planning
(757) 629-2894

April 4, 2017

RE: Docket No. AB-290 (Sub No. 388X), Norfolk Southern Railway Company
Abandonment – in Atlanta, Georgia

On November 11, 2016, Norfolk Southern Railway Company (NSR) sent your agency a Combined Environmental and Historic Report (E&HR) in anticipation of filing an Abandonment Notice of Exemption. NSR recently revised the milepost it intends to abandon in the above referenced proceeding. Enclosed is the revised E&HR describing the mileposts NSR is now proposing to abandon in Atlanta, Georgia. Please respond to the revised report within twenty-one days.

If you have any questions concerning this proposed abandonment and/or the enclosed E&HR, please contact LaWada Poarch at (757) 629-2803.

Sincerely,

Laura Hoag

Laura Hoag

CY – William Mullins
Greg Summy

Enclosure

BEFORE THE
SURFACE TRANSPORTATION BOARD

AB-290 (Sub-No. 388X)

NORFOLK SOUTHERN RAILWAY COMPANY

PROPOSED ABANDONMENT

BETWEEN MILEPOST DF 632.1 AND MILEPOST DF 633.1

IN ATLANTA, GEORGIA

Combined Environmental and Historic Report

Norfolk Southern Railway Company ("NSR") submits this Combined Environmental and Historic Report pursuant to 49 C.F.R. § 1105.7(e) and 49 C.F.R. § 1105.8(d), respectively, in connection with its proposed abandonment of 1.0 mile of rail line between Milepost DF 632.1 and Milepost DF 633.1 in Atlanta, Georgia.

Original: November 11, 2016
Revised: April 4, 2017

ENVIRONMENTAL REPORT

49 CFR 1105.7(e)(1)

Proposed Action and Alternatives

Describe the proposed action, including commodities transported, the planned disposition (if any) of any rail line and other structures that may be involved, and any possible changes in current operations or maintenance practices. Also describe any reasonable alternatives to the proposed action. Include a readable, detailed map and drawings clearly delineating the project.

RESPONSE: NSR proposes to abandon 1.0 mile of rail line between Mileposts DF 632.1 and DF 633.1 (the "Line") in Atlanta, Georgia. There are no customers served on the Line to be abandoned. NSR will convey the remaining easement and wye right-of-way to Atlanta BeltLine, Incorporated for urban development and to improve the City of Atlanta's ("City") infrastructure.

Following abandonment, the Line's rail and related track material will be salvaged. Salvage will consist of removing the rail and track material from the existing roadbed. The contour of the existing roadbed will remain as is, and existing drainage systems will remain intact. When the rail and track material are removed, the contractor will smooth the roadbed to a level surface. No ballast will be removed, and no soil disturbance will occur. No digging or burying of any kind will be permitted. Accordingly, NSR believes that no storm water mitigation measures – including, but not limited to, a National Pollutant Discharge Elimination System permit – will be required. All salvaged steel components will either be reused or sold as scrap. Crossties may be reused in other railroad operations, or they will be disposed of in accordance with applicable federal and state laws and regulations. There is one bridge on the Line.

The alternative to abandonment is to not abandon the Line and retain the track in

place. This alternative is not satisfactory. NSR would continue to incur opportunity and other holding costs that would need to be covered by non-existent shippers were the Line to be retained.

A map depicting the Line is attached as **Appendix A**. An example of the railroad's letter to federal, state and local government agencies along with a list of the consulting agencies NSR has contacted is attached as **Appendix B.** Comments received as a result of NSR's original report dated November 11, 2016 can be found in **Appendix C.**

49 CFR 1105.7(e)(2) Transportation system.

Describe the effects of the proposed action on regional or local transportation systems and patterns. Estimate the amount of traffic (passenger or freight) that will be diverted to other transportation systems or modes as a result of the proposed action.

RESPONSE: Effects of the proposed action on regional or local transportation systems and patterns would be negligible. There is no rail freight or passenger traffic originating or terminating on the Line .

49 CFR 1105.7(e)(3) Land use.

(i) Based on consultation with local and/or regional planning agencies and/or a review of the official planning documents prepared by such agencies, state whether the proposed action is consistent with existing land use plans. Describe any inconsistencies.

RESPONSE: An outline of future land use plans has been requested from the City and Fulton County, which were asked to comment on the consistency of the proposed abandonment with existing land use plans. The City has indicated the proposed abandonment does not affect the City's long-range land use plans and complies with future land use. A copy of the City's response letter to NSR's original report is attached as part of **Appendix C**.

(ii) Based on consultation with the U.S. Soil Conservation Service, state the effect of the proposed action on any prime agricultural land.

RESPONSE: Consultation was requested from The United States Department of Agriculture Natural Resources Conservation Service ("USDA NRCS"). The USDA NRCS has determined no further action is needed. A copy of the USDA NRCS response letter to NSR's original report is attached as part of **Appendix C**.

(iii) If the action affects land or water uses within a designated coastal zone, include the coastal zone information required by Sec. 1105.9.

RESPONSE: Consultation was requested from the Georgia Department of Natural Resources Coastal Resources Division. NSR has no reason to believe that, the proposed abandonment would be inconsistent with the coastal zone management plan as the Line is not within a coastal zone. Fulton County is outside Georgia's coastal area and this abandonment will not have foreseeable impacts to coastal uses or resources. A copy of the Coastal Management Program response letter to NSR's original report is attached as part of **Appendix C**.

(iv) If the proposed action is an abandonment state whether or not the right-of-way is suitable for alternative public use under 49 U.S.C. 10906 and explain why.

RESPONSE: The railroad has fee simple interest title to the right-of-way underlying the wye of the Line proposed for abandonment; thus, NSR may have a corridor available for redeployment for alternative public use(s). However, NSR is planning to convey the remaining easement and wye right-of-way to Atlanta BeltLine, Incorporated for urban development and to improve the City's infrastructure.

49 CFR 1105.7(e)(4) Energy.

(i) Describe the effect of the proposed action on transportation of energy resources.

RESPONSE: Development and transportation of energy resources will not be

affected by the abandonment.

(ii) Describe the effect of the proposed action on recyclable commodities.

RESPONSE: Movement or recovery of recyclable commodities will not be affected by the abandonment. There is no rail freight or passenger traffic originating or terminating on the Line .

(iii) State whether the proposed action will result in an increase or decrease in overall energy efficiency and explain why.

RESPONSE: The proposed action will not result in any material impact in overall energy efficiency.

(iv) If the proposed action will cause diversions from rail to motor carriage of more than:
(A) 1,000 rail carloads a year; or
(B) An average of 50 rail carloads per mile per year for any part of the affected line, quantify the resulting net change in energy consumption and show the data and methodology used to arrive at the figure given.

RESPONSE: The diversion of traffic to motor carriers will not exceed the thresholds set forth at 49 CFR §1105.7(e)(4) as no diversions will occur. Accordingly, there is no need to produce data on diverted traffic or to quantify the net change in energy consumption.

49 CFR 1105.7(e)(5) Air.

(i) If the proposed action will result in either:
(A) An increase in rail traffic of at least 100 percent (measured in gross ton miles annually) or an increase of at least eight trains a day on any segment of rail line affected by the proposal, or
(B) An increase in rail yard activity of at least 100 percent (measured by carload activity), or
(C) An average increase in truck traffic of more than 10 percent of the average daily traffic or 50 vehicles a day on any affected road segment, quantify the anticipated effect on air emissions.

RESPONSE: The above thresholds will not be exceeded.

(ii) If the proposed action affects a class I or nonattainment area under the Clean Air

Act, and will result in either:
(A) An increase in rail traffic of at least 50 percent (measured in gross ton miles annually) or an increase of at least three trains a day on any segment of rail line,
(B) An increase in rail yard activity of at least 20 percent (measured by carload activity), or
(C) An average increase in truck traffic of more than 10 percent of the average daily traffic or 50 vehicles a day on a given road segment, then state whether any expected increased emissions are within the parameters established by the State Implementation Plan.

RESPONSE: The above thresholds will not be exceeded.

(iii) If transportation of ozone depleting materials (such as nitrogen oxide and Freon®) is contemplated, identify: the materials and quantity; the frequency of service; safety practices (including any speed restrictions); the applicant's safety record (to the extent available) on derailments, accidents and spills; contingency plans to deal with accidental spills; and the likelihood of an accidental release of ozone depleting materials in the event of a collision or derailment.

RESPONSE: Not applicable.

49 CFR 1105.7(e)(6) Noise.

If any of the thresholds identified in item (5)(i) of this section are surpassed, state whether the proposed action will cause:
(i) An incremental increase in noise levels of three decibels Ldn or more; or
(ii) An increase to a noise level of 65 decibels Ldn or greater.
If so, identify sensitive receptors (e.g., schools, libraries, hospitals, residences, retirement communities, and nursing homes) in the project area, and quantify the noise increase for these receptors if the thresholds are surpassed.

RESPONSE: The above thresholds will not be exceeded.

49 CFR 1105.7(e)(7) Safety.

(i) Describe any effects of the proposed action on public health and safety (including vehicle delay time at railroad grade crossings).

RESPONSE: Abandonment of the Line will have no adverse impact on public health and safety.

(ii) If hazardous materials are expected to be transported, identify: the materials and quantity; the frequency of service; whether chemicals are being transported that, if mixed, could react to form more hazardous compounds; safety practices (including any speed restrictions); the applicant's safety record (to the extent available) on derailments,

accidents and hazardous spills; the contingency plans to deal with accidental spills; and the likelihood of an accidental release of hazardous materials.

RESPONSE: Not applicable.

(iii) If there are any known hazardous waste sites or sites where there have been known hazardous materials spills on the right-of-way, identify the location of those sites and the types of hazardous materials involved.

RESPONSE: The railroad has no knowledge of hazardous waste sites or sites where there have been known hazardous material spills on the right-of-way or in adjacent areas.

49 CFR 1105.7(e)(8) Biological Resources.

(i) Based on consultation with the U.S. Fish and Wildlife Service, state whether the proposed action is likely to adversely affect endangered or threatened species or areas designated as a critical habitat, and if so, describe the effects.

RESPONSE: The railroad has requested input from the U.S. Fish and Wildlife Service ("USFWS") to ascertain any impacts to surrounding habitats and species. USFWS stated the proposed action is not expected to have a significant impact on fish and wildlife resources. A copy of the USFWS response letter to NSR's original report is attached as part of **Appendix C**.

(ii) State whether wildlife sanctuaries or refuges, National or State parks or forests will be affected, and describe any effects.

RESPONSE: The Line does not appear to pass through state parks or forests, national parks or forests, or wildlife sanctuaries. No adverse effects on wildlife sanctuaries, national parks or forests, or state parks or forests are anticipated.

49 CFR 1105.7(e)(9) Water.

(i) Based on consultation with State water quality officials, state whether the proposed action is consistent with applicable Federal, State or local water quality standards. Describe any inconsistencies.

RESPONSE: The railroad does not intend to remove or alter the contour of the roadbed underlying the Line to be abandoned by way of excavation or other ground-disturbance activity. Accordingly, no soils will be disturbed as a result of the proposed abandonment, and no storm water mitigation measures – including, but not limited to, a National Pollutant Discharge Elimination System permit – will be required. There is one structure on the Line. There are no plans to undertake in-stream work, or dredge and/or use any fill materials in connection with the proposed abandonment, so, for this reason also, the proposed abandonment will not result in water quality impacts. Consultation has been requested from the Georgia Department of Natural Resources Environmental Protection Division. The USDA NRCS' State Conservationist determined that no watershed dams are in the downstream and no easements in the vicinity of the proposed project would be affected by activities. A copy of the USDA NRCS' State Conservationist letter to NSR's original report is attached as part of **Appendix C**.

(ii) Based on consultation with the U.S. Army Corps of Engineers, state whether permits under section 404 of the Clean Water Act (33 U.S.C. 1344) are required for the proposed action and whether any designated wetlands or 100-year flood plains will be affected. Describe the effects.

RESPONSE: The geometry of the roadbed will not be altered and no in-stream work is contemplated. No discernible effects on either 100-year flood plains or adjacent wetlands are expected in connection with the proposed abandonment. Consultation was requested from the U.S. Army Corps of Engineers and permit is required. A copy of its letter to NSR's original report is attached as part of **Appendix C**.

(iii) State whether permits under section 402 of the Clean Water Act (33 U.S.C. 1342) are required for the proposed action.

RESPONSE: The railroad does not plan to remove or alter the roadbed underlying the Line to be abandoned, to undertake in-stream work or to dredge or use any fill materials. There will be no excavation or other ground-disturbance activity, and, because no soils will be disturbed, no storm water mitigation measures – including, but not limited to, a National Pollutant Discharge Elimination System permit – will be required. The railroad anticipates that the abandonment will not affect water quality and that additional permitting under Section 402 will not be required. Nevertheless, NSR has requested input from Georgia Department of Natural Resources Environmental Protection Division.

49 CFR 1105.7(e)(10) Proposed Mitigation.

Describe any actions that are proposed to mitigate adverse environmental impacts, indicating why the proposed mitigation is appropriate.

RESPONSE: Abandonment of the involved Line is not expected to produce adverse environmental impacts for the reasons set forth above. Only minimal physical activity may occur as a result of the proposed abandonment, such as removal of rail, ties, and other railroad appurtenances. The railroad will undertake all reasonable mitigation associated with these activities as directed by the Board to assure the abandonment does not produce adverse environmental impacts.

HISTORIC REPORT

49 CFR 1105.8(d)

PROPOSED ACTION AND ALTERNATIVES

Norfolk Southern Railway Company ("NSR") proposes to abandon 1.0 mile of Line between Mileposts DF 632.1 and DF 633.1 in Atlanta, Georgia (the "Line"). There are no customers served on the Line to be abandoned. NSR will convey the remaining easement and the wye right-of-way to Atlanta BeltLine, Incorporated for urban development and to improve the City of Atlanta's ("City") infrastructure.

Following abandonment, the rail and related track material will be salvaged. Salvage will consist of removing the rail and track material from the existing roadbed. The contour of the existing roadbed will remain as is and existing drainage systems will remain intact. When the rail and track material are removed, the contractor will smooth the roadbed to a level surface. No ballast will be removed, and no soil disturbance will occur. No digging or burying of any kind will be permitted. Accordingly, NSR believes that no storm water mitigation measures – including, but not limited to, a National Pollutant Discharge Elimination System permit – will be required. All salvaged steel components will either be reused or sold as scrap. Crossties may be reused in other railroad operations, or they will be disposed of in accordance with applicable federal and state laws and regulations. There is one bridge on the Line. The alternative to abandonment is to not abandon the Line and retain the track in place. This alternative is not satisfactory. NSR would continue to incur opportunity and other holding costs that would need to be covered by non-existent shippers were the Line to be retained.

A map depicting the Line proposed for abandonment is attached in **Appendix A**.

ADDITIONAL INFORMATION

(1) **U.S.G.S. Topographic Map** - Map was furnished to the Georgia Historic Preservation Division, Department of Natural Resources.

(2) **Written Description of Right of Way** - The right-of-way width ranges from 50 feet to 100 feet along the main track centerline. Pursuant to Surface Transportation Board policy, the railroad's right-of-way will constitute the Area of Potential Effect ("APE") for this undertaking.

(3) **Photographs** – There is one bridge on the Line. A photograph of the bridge was furnished to the Georgia Historic Preservation Division.

(4) **Date of Construction of Structures** – There is one bridge on the Line located at milepost 633.10 and the mid-point crosses over Clear Creek. The structure is a timber trestle that is 130 feet in length with ten spans and was constructed in 1925. The rest of the bridge from the mid-point was previously abandoned.

(5) **History of Operations and Changes Contemplated** – The 1.0 mile Line extends from Milepost DF 632.1 to Milepost DF 633.1 in Atlanta, Georgia, and is known as the "Decatur Street Belt".

On June 29, 1870, the Atlanta and Richmond Air-Line Railway Company consolidated with the Georgia Air Line Railway Company and the Air Line Railroad Company of South Carolina. It was controlled by the Richmond and Danville Railroad, predecessor of the Southern Railway Company. In September, 1873, the line from Charlotte, North Carolina to Atlanta, Georgia was completed.

In November, 1874, the Atlanta and Richmond Air-Line Railway Company entered into receivership and was sold under foreclosure in December, 1876. In

February, 1877, it was reorganized as the Atlanta and Charlotte Air Line Railway Company. The Atlanta and Charlotte Air Line Railway Company was incorporated by consolidation agreement on April 4, 1877, filed May 17, 1877 in Georgia and May 21, 1877 in South Carolina and North Carolina. The line became part of the Atlanta and Charlotte Air Line Railway Company.

The Atlanta and Charlotte Air Line Railway Company operated together with the Richmond and Danville Railroad and the North Carolina Railroad under the name Piedmont Air Lines. In 1881, the Richmond and Danville Railroad took possession of the Atlanta and Charlotte Air Line Railway Company and all of its operating branches from Charlotte Junction to the City.

On July 1, 1894, Southern Railway Company assumed control and operation of The Atlanta and Charlotte Air Line Railway Company. Southern Railway Company's control and operation of the Atlanta and Charlotte Air Line Railway Company continued until the consolidation of the Norfolk and Western Railway Company and the Southern Railway Company as subsidiaries of Norfolk Southern Corporation in 1982.

(6) Summary of Documents In Carrier's Possession That Might Be Useful for Documenting a Structure That Is Found To Be Historic – While plans may be available for the structure on the Line, it is most likely that any such plans are standard plans used for the construction of similar structures on the dates of construction.

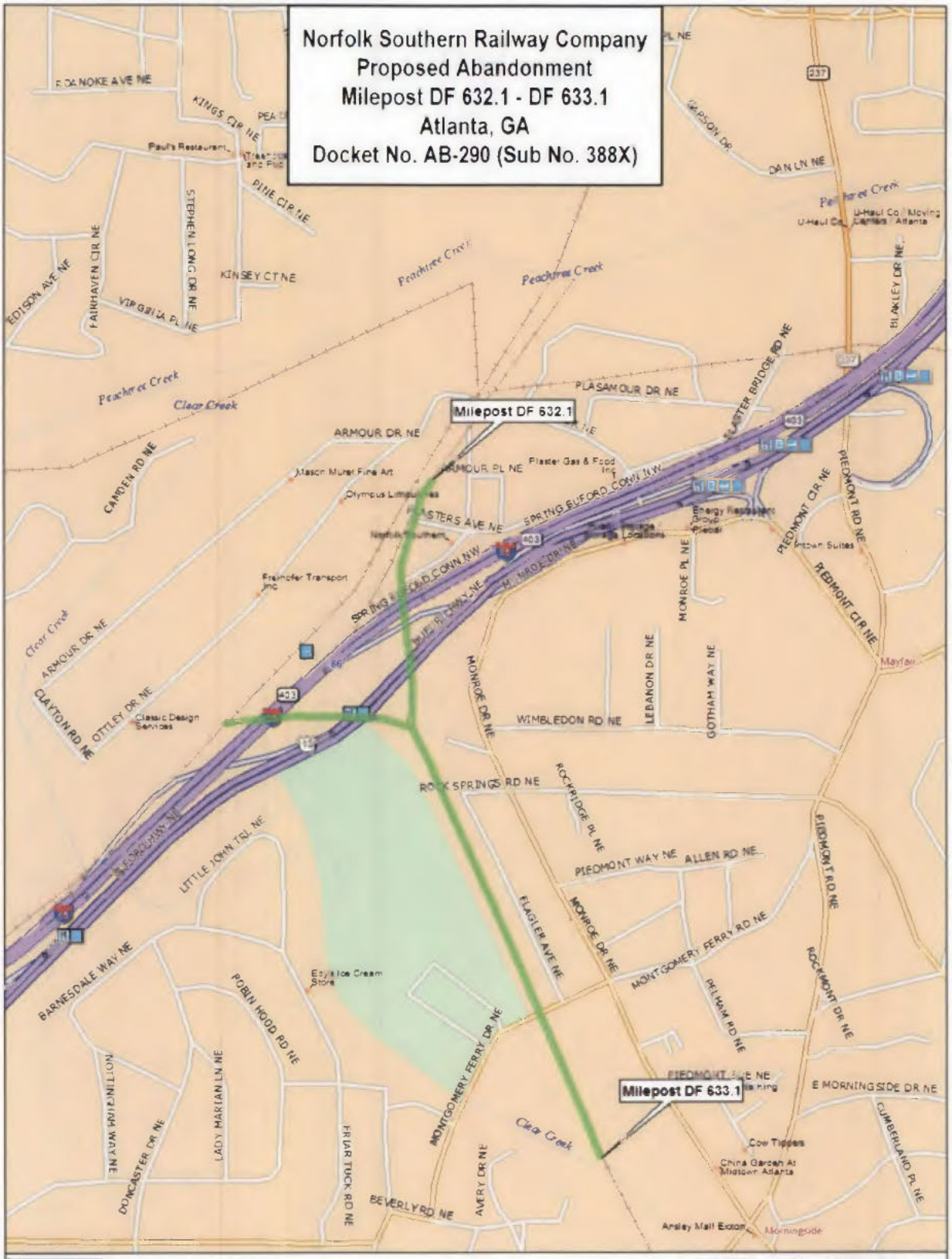
(7) Opinion Regarding Criteria For Listing In The National Register Of Historic Places – There is one structure on the Line within the APE for this undertaking. The railroad has no reason to believe that there is any likelihood of finding archaeological resources or historic properties on the Line proposed for abandonment.

(8) Subsurface Ground Conditions That Might Affect Archaeological Recovery

The railroad is not aware of any prior subsurface ground disturbances or environmental conditions that would affect archaeological recovery. Moreover, abandonment of the Line and salvage of material from its surface will not affect any potential archaeological resources. The subsurface of the right-of-way was initially disturbed in the construction of the Line by grading and filling. Abandonment and salvage of the Line will not result in activities below the surface, or below the level of initial disturbance.

(9) Follow-Up Information - Additional information will be provided as appropriate.

APPENDIX A
Site Map


Norfolk Southern Railway Company
Proposed Abandonment
Milepost DF 632.1 - DF 633.1
Atlanta, GA
Docket No. AB-290 (Sub No. 388X)
Milepost DF 632.1
Milepost DF 633.1
ROANOKE AVE NE
KINGS CIR NE
PINE CIR NE
STEPHEN LONG DR NE
KINSEY CT NE
FAIRHAVEN CIR NE
EDISON AVE NE
VIRGINIA PL NE
Peachtree Creek
Clear Creek
CAMDEN RD NE
ARMOUR DR NE
ARMOUR PL NE
PLASAMOUR DR NE
PLASTER BRIDGE RD NE
BLANKLEY DR NE
PIEDMONT CIR NE
PIEDMONT RD NE
SPRING BUFORD CONN NW
MASTERS AVE NE
MONROE PL NE
MONROE DR NE
LEBANON DR NE
GOTHAM WAY NE
WIMBLEDON RD NE
CLAYTON RD NE
OTTLEY DR NE
ROCK SPRINGS RD NE
ROCKRIDGE PL NE
PIEDMONT WAY NE
ALLEN RD NE
LITTLE JOHN TRL NE
BARNESDALE WAY NE
FLAGLER AVE NE
MONTGOMERY FERRY RD NE
ROBIN HOOD RD NE
PELHAM RD NE
ROCKMONT DR NE
E MORNINGSIDE DR NE
CUMBERLAND PL NE
MONTGOMERY FERRY DR NE
LADY MARIAN LN NE
FRIAR TUCK RD NE
AVERY DR NE
BEVERLY RD NE
DONCASTER DR NE
Cow Tippers
China Garden At Midtown Atlanta
Ansley Mall Exton
Morningside
DELORME
Data use subject to license.
© DeLorme. DeLorme Street Atlas USA® 2011
www.delorme.com
MN (5.2° W)
Data Zoom 14-2

APPENDIX B
Agency Letter

Norfolk Southern Corporation
Three Commercial Place
Norfolk, Virginia 23510-2191

Strategic Planning Department
Three Commercial Place
Norfolk, VA 23510-9207

November 17, 2016

RE: Docket No. AB-290 (Sub-No. 388X), Norfolk Southern Railway Company Abandonment – in Atlanta, Georgia

Dear Sir/Madam:

Norfolk Southern Railway Company (NSR) plans to request authority from the Surface Transportation Board (STB) to abandon the segment of rail line between Milepost DF 632.5 and Milepost DF 633.1, a distance of 0.6 miles located in Atlanta, GA.

Enclosed is a Combined Environmental and Historic Report (Report) which describes the proposed abandonment and other pertinent information. A map of the proposed track abandonment can be found in **Appendix A** of this report. **Appendix B** of this report lists the various agencies receiving it. **Appendix C** of this report lists the various agency responses.

The railroad does not anticipate adverse environmental impacts; however, if you identify any adverse environmental effects, please describe the actions that would assist in alleviating them. Please provide us with a written response indicating any concerns or lack thereof, which will be included in the Report and sent to the Surface Transportation Board (STB).

This Report is being provided so that you may submit information that will form the basis for the STB's independent environmental analysis of the proceeding. If you believe any of the information is incorrect, if you think pertinent information is missing, or if you have any questions about the Board's Environmental Review process, please contact the Office of Environmental Analysis (OEA) by telephone at (202) 245-0245 or by mail to:

Surface Transportation Board
395 E Street, S.W., Room 1106
Washington DC 20423-0001

Please refer to the above Docket when contacting the STB. Applicable statutes and regulations impose stringent deadlines for processing this action. For this reason your written comments (with a copy to us) would be appreciated within three weeks.

Your comments will be considered by the Board in evaluating the environmental impacts of the contemplated action. In order for us to consider your input prior to filing with the STB, NSR must receive your comments within three weeks. Please provide information to LaWada Poarch by email at LaWada.Poarch@nscorp.com or by mail to:

LaWada Poarch
Abandonments Coordinator
Norfolk Southern Corporation
Strategic Planning Department
Three Commercial Place
Norfolk, VA 23510
(757) 629-2803

Sincerely,

Laura Hoag

Laura Hoag
Director Strategic Planning
Norfolk Southern Railway Company

Attachment

APPENDIX C
Agency Responses

Poarch, Lawada G.

From:	Kilpatrick, Cora <ckilpatrick@atlantaga.gov>
Sent:	Wednesday, August 31, 2016 1:44 PM
To:	Poarch, Lawada G.
Cc:	Milton, Rodney; lharrop@atlbeltline.org
Subject:	[EXTERNAL] Docket AB-290 (Sub-No. 388X), Norfolk Southern Railway Company - Abandonment - in Atlanta
Attachments:	NS Abandonment BeltLine Ansley Mall.pdf

Good afternoon Ms. Poarch: Commissioner Tim Keane is in receipt of your letter dated July 18, 2016 regarding the above subject. We have researched and confirmed there is no impact. Future land use map complies and shows the ROW as "Transportation Communications & Utilities".

Thank you.

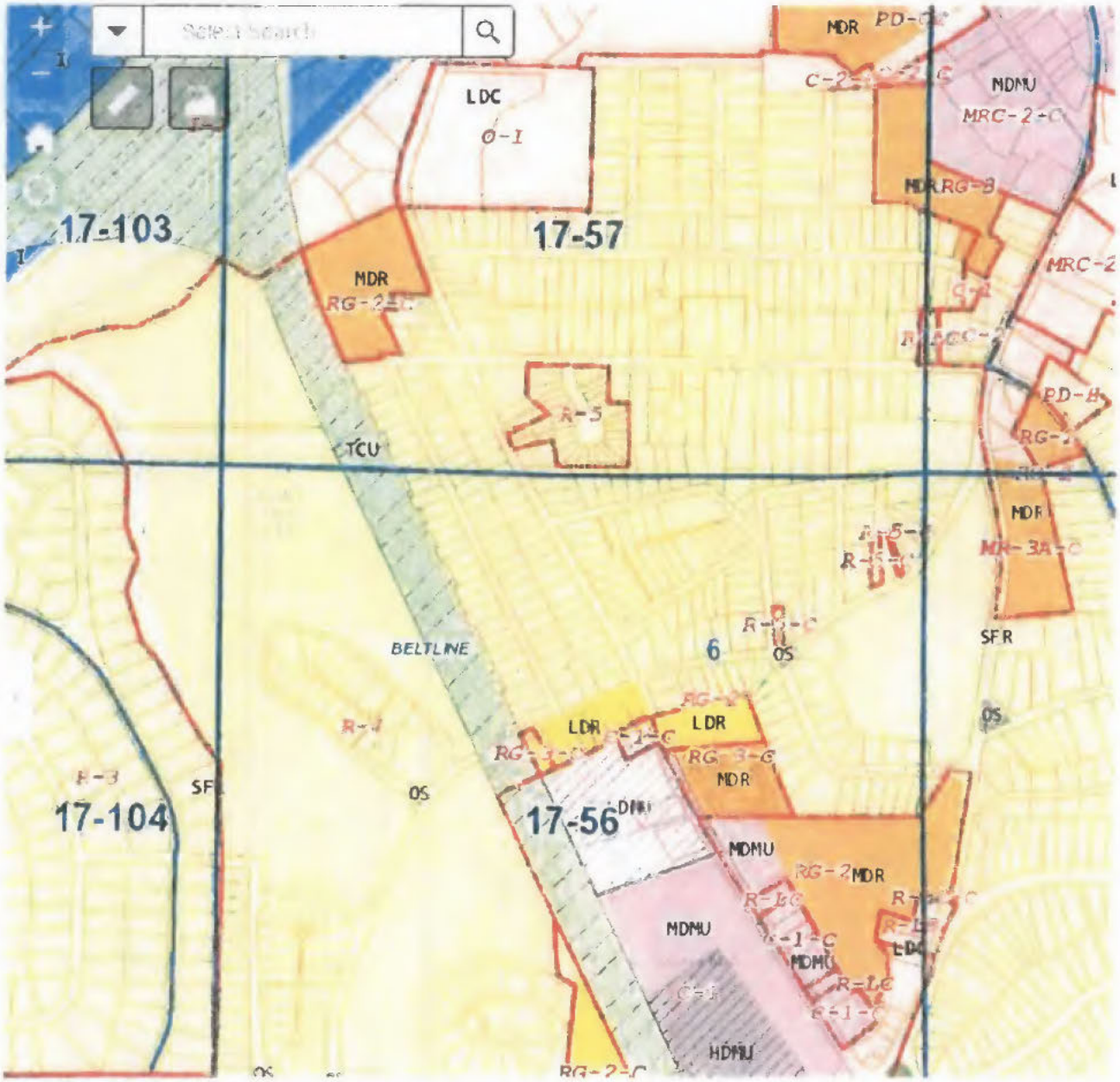
CORA E. KILPATRICK| Executive Assistant to Commissioner Tim Keane | City of Atlanta
Department of Planning and Community Development | 55 Trinity Avenue Ste 1450 | Atlanta, GA 30303
tel: (404) 330-6037 fax: (404) 658-7638
Email:ckilpatrick@atlantaga.gov | www.atlantaga.gov

"The Department of Planning & Community Development...because customer service is important to us."

From: Alhadeff, Heather
Sent: Wednesday, August 31, 2016 1:02 PM
To: Kilpatrick, Cora
Subject: NS abandonment

Heather Alhadeff, AICP, LEED GA
Program Management Officer, Special Projects & Initiatives
City of Atlanta | Dept. of Planning & Community Development
55 Trinity Ave. SW, Suite 1459 | Atlanta, GA 30303
Direct: 404-330-6439 | Cell: 404-640-8117 | halhadeff@atlantaga.gov

The City's future land use map identifies the right-of-way as a TCU (Transportation-Commiuncations-Utilities) land use. Therefore, this abandonment does not affect our long range plans. A copy of the future land use map is below.



The original letter of request can be found on the following pages.

Norfolk Southern Corporation
Three Commercial Place
Norfolk, Virginia 23510-9202

Per .....

Laura Hoag
Director, Strategic Planning
(757) 823-5267

Heather,
Please handle.
Cara

July 18, 2016

Commissioner Tim Keane
Planning & Community Development
55 Trinity Avenue, SW, Suite 1450
Atlanta, GA 30303

RE: Docket AB-290 (Sub-No. 388X), Norfolk Southern Railway Company - Abandonment – in Atlanta, GA

Dear Mr. Keane:

Norfolk Southern Railway Company is considering the abandonment of 0.6 miles of rail line between Milepost DF 632.5 and Milepost DF 633.1 in Atlanta, GA. A map is included depicting the area under consideration.

Following abandonment, the line's rail and related track material will be salvaged. Salvage will consist of removing the rail and track material from the existing roadbed. The contour of the existing roadbed will remain as is, and existing drainage systems will remain intact. When the rail and track material are removed, the contractor will smooth the roadbed to a level surface. No ballast will be removed, no soil disturbance will occur (and, accordingly, no National Pollutant Discharge Elimination System permit will be required). No digging or burying of any kind will be permitted. All salvaged steel components will either be reused or sold as scrap. Crossties may be reused in other railroad operations or they will be disposed of in accordance with applicable federal and state laws and regulations.

During the removal of rail and track materials, if any, Norfolk Southern does not anticipate the use of any new access roads, the need to conduct dredging, or the use of fill. Only existing public and private access roads and the Norfolk Southern right of way should be needed to facilitate operations. In addition, the underlying roadbed will not be disturbed. Norfolk Southern will also take all measures to prevent and/or control the occurrence of spills or of any pollutants from entering surrounding waterways.

Should Norfolk Southern abandon the rail segment, the authorization of the Surface Transportation Board is required. In addition, Federal Regulation 49 C.F.R. 1105.7 (3i) requires Norfolk Southern to address the following statement:

(l) "Based on consultation with local and/or regional planning agencies and/or a review of the official planning documents prepared by such agencies, state whether the proposed action is consistent with existing land use plans. Describe any inconsistencies."

Your consideration of our proposed action in conjunction with Atlanta's long range plans would be appreciated. Please provide comments on how an abandonment of this particular rail segment would interact with such plans, and if possible provide a planning map. Your response and questions can be directed to LaWada Poarch by phone, email, or regular mail:

LaWada Poarch, Abandonments Coordinator
Strategic Planning – 12th Floor
Norfolk Southern Corporation
3 Commercial Place
Norfolk, VA 23510
(757) 629-2803
Lawada.poarch@nscorp.com

Best regards,

Laura Hoag

Laura Hoag

Attachment

USDA
United States Department of Agriculture

August 3, 2016

LaWada Poarch, Abandonments Coordinator
Strategic Planning – 12th Floor
Norfolk Southern Corporation
3 Commercial Place
Norfolk, VA 23510

Re: Early Coordination Request for Docket AB-290 (Sub-No. 388X), Norfolk Southern Railway Company – Abandonment – in Atlanta, GA

Dear Ms. Poarch:

This letter is in reference to your request for information on the possible impacts the proposed railway abandonment project may have on land use, conservation, water quality and other general environmental concerns that may be of interest to our agency. The following outlines our concerns with the proposed project with regards to farmland protection, and Natural Resources Conservation Service (NRCS) watershed dams and project easements.

Farmland Protection

The Farmland Protection Policy Act (FPPA) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency. For the purpose of FPPA, farmland includes areas located within soil mapunits rated as prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land uses, but not water or urban built-up land. It should be noted that the FPPA does not authorize the Federal Government to regulate the use of private or nonfederal land or, in any way, affect the property rights of owners.

NRCS uses a Land Evaluation and Site Assessment (LESA) system to establish a farmland conversion impact rating score on proposed sites of federally funded and assisted projects. This score is used as an indicator for the project sponsor to consider alternative sites if the potential adverse impacts on the farmland exceed the recommended allowable level. It is our understanding that the proposed project involves federal funds or assistance, and thus could be subject to this assessment. However, this project is completely contained within a US Census Bureau urban area (Atlanta, GA 03817), and is thus exempt from this assessment. You need take no further action for FPPA purposes.

Natural Resources Conservation Service
Georgia State Office
355 East Hancock Avenue - Athens, GA - 30601-2775
Voice: 706-546-2272 Fax: 855-417-8490

An Equal Opportunity Provider and Employer

NRCS Watershed Dams

More than 50 years ago, the U.S. Department of Agriculture was authorized by Congress to help local communities with flood control and watershed protection through the Watershed Program (PL-534 Flood Control Act of 1944 and PL-566 Watershed Protection and Flood Prevention Act). As a result, local communities, with NRCS assistance, have constructed over 11,000 dams in 47 states since 1948. These dams were originally constructed for protection of farmlands from flooding impacts. In 2000, PL-566 was amended to provide NRCS authorization to assist communities with rehabilitation of their aging dams. The legislation authorizes NRCS to work with local communities and watershed project sponsors to address public health and safety concerns and potential environmental impacts of aging dams.

We have reviewed our records and have determined that there are no such structures in the vicinity or downstream of the proposed project that would be affected by these activities.

NRCS Easements

NRCS easements relate to our Wetland Reserve Program and the Farm and Ranchland Protection Program. We have reviewed our records and have determined that there are no such easements in the vicinity or downstream of the proposed project that would be affected by these activities.

NRCS appreciates this opportunity to comment. If you have questions or need any additional information, please contact Dan Wallace of my staff at (706) 546-2244 or dan.wallace@ga.usda.gov.

Sincerely,

TERRANCE O. RUDOLPH
State Conservationist

cc: Michael Watson, Assistant State Conservationist (FO), NRCS, Griffin, GA
Valerie Pickard, District Conservationist, NRCS, Marietta, GA
Greg Clark, Resource Soil Scientist, NRCS, Griffin, GA
Dan Wallace, State Resource Inventory Coordinator, NRCS, Athens, GA
Jim Lathem, State Soil Scientist, NRCS, Athens, GA

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
COASTAL RESOURCES DIVISION

MARK WILLIAMS
COMMISSIONER

A.G. 'SPUD' WOODWARD
DIRECTOR

July 26, 2016

Ms. LaWada Poarch, Abandonments Coordinator
Strategic Planning – 12th Floor
Norfolk Southern Corporation
3 Commercial Place
Norfolk, Virginia 23510

RE: Proposed Abandonment, Docket No. AB-290 (Sub No. 388 X), Atlanta, Fulton County

Dear Ms. Poarch:

Staff of the Georgia Coastal Management Program has reviewed your July 18, 2016 letter and attachments for the above referenced action to abandon 0.6 miles of rail line from Railroad Milepost DF 632.5 to Milepost DF 633.1 in Atlanta, Fulton County, Georgia.

Fulton County is outside Georgia's coastal area and this abandonment action will not have reasonably foreseeable impacts to coastal uses or resources. The project site is not located in a Coastal Barrier Resource Act area. Please feel free to contact Kelie Moore or me if we can be of further assistance.

Sincerely,

A.G. "Spud" Woodward
Director

SW/km

ONE CONSERVATION WAY | BRUNSWICK, GEORGIA 31520-8686
912.264.7218 | FAX 912.262.3143 | WWW.COASTALGADNR.ORG

Norfolk Southern Corporation
Three Commercial Place
Norfolk, Virginia 23510-9202

RECEIVED
JUL 22 2016
ATHENS, GA

Laura Hoag
Director, Strategic Planning
(757) 629-2884

July 18, 2016

U.S. Fish and Wildlife Service
Southeast Region 4
105 Westpark Drive
Westpark Center, Suite D
Athens, GA 30606

U. S. Fish and Wildlife Service
105 Westpark Drive, Suite D
Athens, GA 30606
706-613-9493 Fax 706-613-6059

FWS Log No. N6-16-208-FULT

Based on the information provided, the proposed action is not expected to significantly impact fish and wildlife resources under the jurisdiction of the U.S. Fish & Wildlife Service.

Donald W. Imm, Ph.D., Field Supervisor — Date 7/26/16

RE: Docket AB-290 (Sub-No. 388X), Norfolk Southern Railway Company – Abandonment – in Atlanta, GA

Dear Sir or Madam:

Norfolk Southern Railway Company is considering the abandonment of 0.6 miles of rail line between Milepost DF 632.5 and Milepost DF 633.1 in Atlanta, GA. A map is included depicting the area under consideration.

Following abandonment, the line's rail and related track material will be salvaged. Salvage will consist of removing the rail and track material from the existing roadbed. The contour of the existing roadbed will remain as is, and existing drainage systems will remain intact. When the rail and track material are removed, the contractor will smooth the roadbed to a level surface. No ballast will be removed, no soil disturbance will occur (and, accordingly, no National Pollutant Discharge Elimination System permit will be required). No digging or burying of any kind will be permitted. All salvaged steel components will either be reused or sold as scrap. Crossties may be reused in other railroad operations or they will be disposed of in accordance with applicable federal and state laws and regulations.

During the removal of rail and track materials, if any, Norfolk Southern does not anticipate the use of any new access roads, the need to conduct dredging, or the use of fill. Only existing public and private access roads and the Norfolk Southern right of way should be needed to facilitate operations. In addition, the underlying roadbed will not be disturbed. Norfolk Southern will also take all measures to prevent and/or control the occurrence of spills or of any pollutants from entering surrounding waterways.

Should Norfolk Southern abandon the rail segment, the authorization of the Surface Transportation Board is required. In addition, Federal Regulations 49 C.F.R. 1105.7 (8i) and (8ii) require Norfolk Southern to address the following statements:

(i) "Based on consultation with the U.S. Fish and Wildlife Service state whether the proposed action is likely to adversely affect endangered or threatened species or areas designated as a critical habitat, and if so, describe the effects."

(ii) "State whether wildlife sanctuaries of refuges, National or State parks or forests will be affected, and describe any effects."

Norfolk Southern believes that our actions will not adversely impact any endangered or threatened species and their habitats or wildlife sanctuaries and parks; however we would appreciate your review and input. Please direct your response and questions to LaWada Poarch at LaWada.Poarch by phone, email, or regular mail:

LaWada Poarch, Abandonments Coordinator
Strategic Planning – 12th Floor
Norfolk Southern Corporation
3 Commercial Place
Norfolk, VA 23510
(757) 629-2803
Lawada.poarch@nscorp.com

Best regards,

Laura Hoag

Laura Hoag

Attachment

Poarch, Lawada G.

From: Shannin, Philip SAS <Philip.A.Shannin2@usace.army.mil>
Sent: Wednesday, September 21, 2016 2:33 PM
To: Poarch, Lawada G.
Subject: [EXTERNAL] Docket AB-290 (Sub-No. 388X)

Based on your project description in your July 18, 2016 letter to the South Atlantic Divison, the abandonment of the rail line and track material salvage would not require a permit from my agency. Please note that my office is the correct office for further questions, not the South Atlantic Division. I may be reach at the e-mail above or at 678-422-2729.

Philip Shannin
Piedmont Permits Section Chief
Savannah District, USACE

NS

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APR 10 2017

NS

Norfolk Southern Corporation
Three Commercial Place
Norfolk, VA 23510

USEPA
Ariel Rios Building
Mail Code 1101-a
1200 Pennsylvania Ave NW
Washington, DC 20460-0002

Return Requested

WSC Consulting
17 Northwood Commons Place
Chico, California 95973-7213

Government Contracts ■ Books ■ Research ■ Consulting

April 7, 2017

The President
The White House
1600 Pennsylvania Avenue N.W.
Washington, DC 20500-0004

Re: Draining the Swamp: The Need to Reform the Government Contractor Selection Process

Dear Mr. President:

As you know, the process by which our Department of Defense selects contractors is wasteful and often corrupt. It is costing us billions in taxpayer dollars. But I have a cure for this problem.

Not only is the currently mandated process wasting billions of dollars, it often results in poor choices for contractors who provide us vital goods and services. These choices are often hard to defend if challenged, and are often far from providing us the best value for our money. Worse still, the current process offers a favorable environment in which corrupt officials can exploit taxpayers through kickbacks or sweetheart deals.

Unfortunately, other federal agencies tend to emulate the Department of Defense's irrational process for evaluating contractor proposals. Billions more of taxpayer dollars are, therefore, wasted each year by other federal agencies, as well.

The details of my cure for this problem are described in the enclosed article "Tools for Deciphering Best Value" that is being published in the May-June 2017 edition of the *Defense Acquisition, Technology, and Logistics* magazine. The Defense Acquisition University should be commended for its willingness to publish an article espousing a process contrary to and critical of the DoD's approach to contractor selection.

Most Respectfully,

William Sims Curry, CPCM, NCMA Fellow

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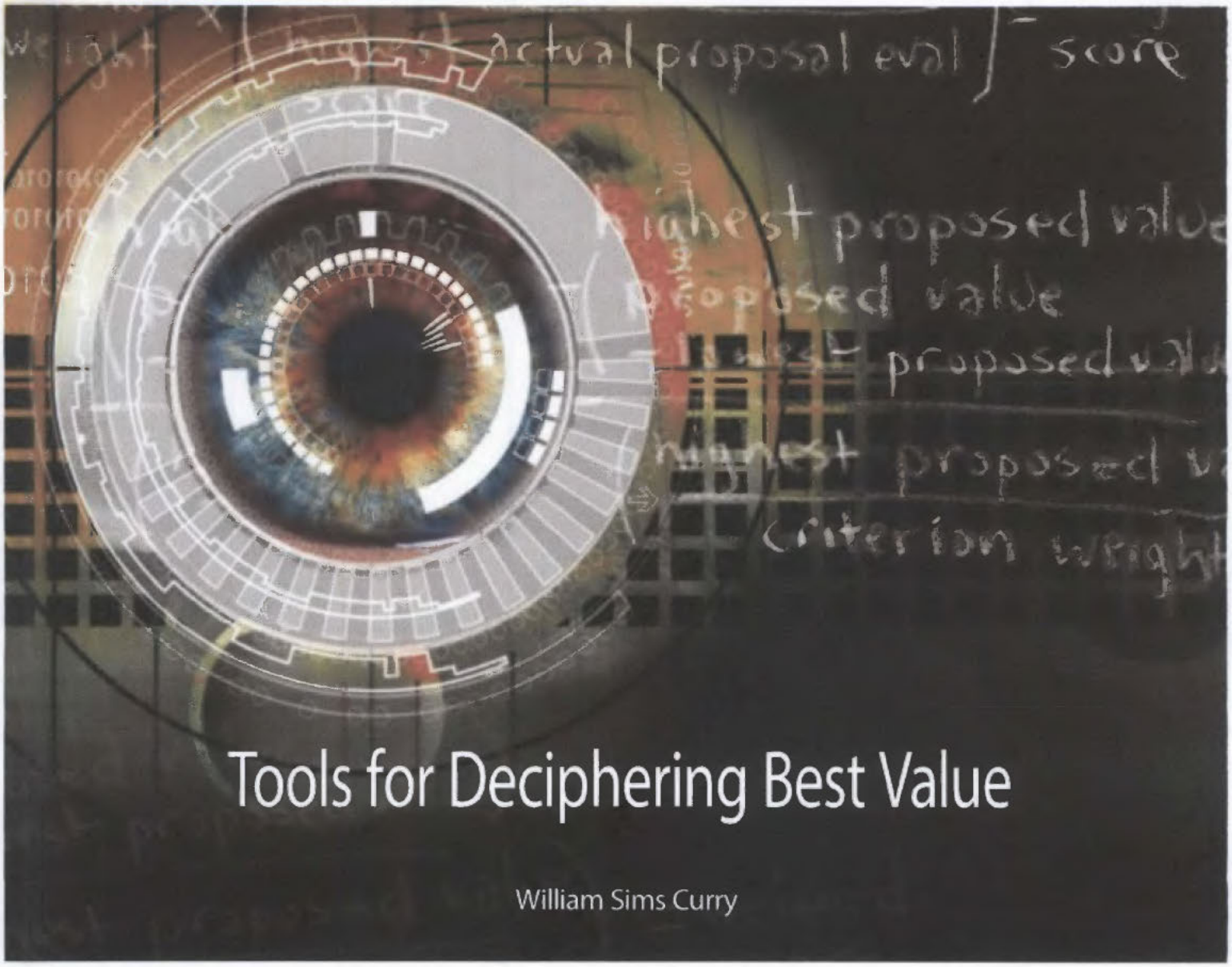
Enclosure:
Curry, William Sims, "Tools for Deciphering Best Value," *Defense Acquisition, Technology and Logistics*, May-June 2017, pp. 39-43

cc: Vice President, Select Senior Advisors, Relevant Cabinet Members, Heads of Federal Agencies, as well as Chairmen, Ranking, Selected Members of Senate and House Armed Services Committees, and other Selected Members of Congress

(530) 899-8436 ■ BCurry@WSC-Consulting.com ■ www.WSC-Consulting.com



Tools for Deciphering Best Value

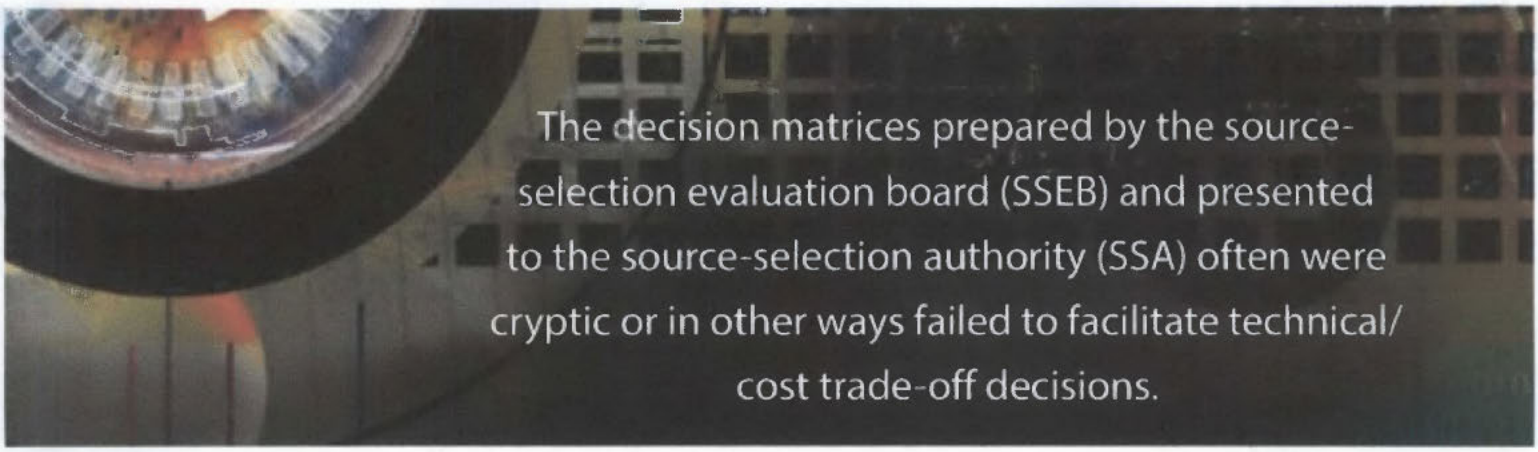
William Sims Curry

The Department of Defense (DoD) finds it difficult to determine when higher technical ratings for contractor proposals justify paying a higher price. The acknowledged difficulty in making such decisions and the magnitude of DoD acquisitions for which trade-off decisions are needed demand resolution of this problem. The October 2010 Government Accountability Office (GAO) report GAO-11-8, Enhanced Training Could Strengthen DOD's Best Value Tradeoff Decisions, emphasized the difficulty:

> According to DOD officials, making sound trade-off decisions, and in particular, deciding whether or not a price differential is warranted, is one of the most difficult aspects of using a best value trade-off process.

The magnitude of technical/cost trade-off decisions is evidenced by the fact that best value process is applicable in roughly 95 percent of DoD's new, competitively awarded contracts valued at $25 million or more as reported in that GAO report.

Curry is president of WSC Consulting in Chico, California. He is the author of second edition of "Government Contracting: Promises and Perils, 2nd Edition," published by Routledge, 2017.



DoD's contractor selection process is described by an April 1, 2016, memorandum on "Department of Defense Source Selection Procedures," from the then Under Secretary of Defense for Acquisition, Technology, and Logistics Frank Kendall. Use of the guidelines in this memorandum in the contractor selection process is mandated by Defense Federal Acquisition Regulation Supplement (DFARS) PGI 215.3—Source Selection. The source-selection procedures in the 2016 memorandum are superior to and provide greater detail than the 2011 memorandum. Unfortunately, however, certain deficiencies in the 2011 memorandum, were carried over in the 2016 memorandum, resulting in cryptic contractor selection decision matrices. This article examines deficiencies in the 2016 memo's method for rating contractor proposals and describing the importance of factors and/or subfactors. And it pursues recommendations for making improvements.

One approach this author used to understand weaknesses in the federal contractor selection practices involved evaluating GAO decisions that sustained protests from Aug. 1, 2010, to July 31, 2012. The GAO's stated reasons for sustaining protests can be considered as weaknesses in the contractor selection process. GAO-sustained protests during 2015 and 2016 were selected randomly to verify the continuation of those weaknesses. All 65 GAO-sustained protests during those 2 years were evaluated. The author noted one pertinent weakness in DoD's contractor selection process that GAO did not mention: The decision matrices prepared by the source-selection evaluation board (SSEB) and presented to the source-selection authority (SSA) often were cryptic or in other ways failed to facilitate technical/cost trade-off decisions. The SSA is sent a narrative of the SSEB's proposal evaluation activities, but the decision matrices offer an overview of that evaluation and provide the SSA with meaningful additional insight.

I believe that the cryptic contractor selection matrices are due to the DoD restriction of numerically indicating the importance of evaluation factors and of numerically rating contractor proposals. The 2016 memo does, however, allow waivers of the prescribed proposal rating method for technical factors and subfactors. The 2016 memo continues the 2011 memo requirement that only relative terms be used to represent the importance of factors and/or subfactors considered in selecting contractors; adjectival or color schemes may be used to score the proposals. Notably, the numerical rating of factors and/or subfactors is permitted by Federal Acquisition Regulations (FAR) Section 15.305(a), and numerical representation of the importance of evaluation factors also is permitted for Armed Forces contracting by 10 U.S. Code §2305.

Other independent research into GAO-reviewed protests identified a way to evaluate proposals that could resolve DoD's technical/cost trade-off dilemma. That 2015 research into the best state and local government contracting practices revealed how to clearly identify best value proposals. The findings involved 15 states, 16 large cities, and three other local agencies and was a follow-up to 2006 research.

Two significant errors were found in the proposal scoring by the majority of the government entities reviewed in the 2015 research. But, after correction of those errors, their approach to selecting contractors was found to be superior to DoD's method of identifying best value proposals. The errors had involved using anomalous formulas for weighing proposal evaluation scores, and the agencies using them were provided with corrected formulas. Although a formal follow-through was not deemed appropriate, a separate research project noted that a significant number of government entities adopted the corrected formulas. With that correction of the formulas, the revamped state and local government proposal evaluation process would greatly benefit DoD's technical/cost trade-off identification of contractors proposing the best values. The approach recommended here, besides better identifying best value, will guard against corruption of the contractor selection process.

Table 1. The Difficulty of Technical/Cost Trade-off Decisions

Competing Contractors	GID	Patricio
Management and Staffing Capability	Marginal	Outstanding
Price	$13,915,920	$18,500,928
Past Performance	Substantial Confidence	Satisfactory Confidence

Two recent examples of contractor selection decision matrices that obscure identification of contractors submitting best value proposals are provided below. The first example (Table 1) comes from GAO's decision in the matter of Patricio Enterprises, Inc.; File B-412740, B-412740.3, and B-412740.4, May 26, 2016. This illustrates the difficulty in making technical/cost trade-off decisions.

The proposed management and staffing capability of Patricio Enterprises was undeniably superior to its competitor, GID. The price proposed by GID and the GID past performance rating favored contract award to GID. The solicitation stated that the evaluation factors (management and staffing capability, price, and past performance) were to be listed in descending order of importance. In making the contractor selection decision, the SSA could justify a statement that the superior management and staffing capability of Patricio outweighed the lower pricing and better past performance of GID. But the SSA could just as easily have stated that GID's lower price and better past performance outweighed Patricio's superior management and staffing capability. The best value proposal was not expressly identified in this decision matrix.

The other recently published decision (Table 2) is from GAO's decision in the matter of Jacobs Technology, Inc. (JTI); File B-413389 and B-413389.2, Oct. 18, 2016. In this example of a sustained protest, the decision matrix illustrated the tendency to obtain tied scores despite discerned differences by the SSEB in the quality of the proposals.

Apart from the proposed and evaluated cost/price, all the ratings reflected in Table 2 are identical. The following narrative excerpted from the GAO decision, however, indicated differences were discerned in the quality of numerous factors:

> An agency source selection advisory council (SSAC) then conducted a comparative assessment of the offerors' proposals. The SSAC found that, notwithstanding the equivalent ratings, AS&D's proposal was superior to that of JTI under the scenario, program management, and phase-in plan subfactors (the offerors were considered equal under the subcontract management subfactor). ... Similarly, the SSAC found, notwithstanding the equal ratings, JTI's past performance to be superior in relevance and quality to that of AS&D.

Table 2. Tendency to Tie Scores Despite Discerned Proposal Quality Differences

	AS&D	JTI
Technical		
Scenario	Outstanding	Outstanding
Program Management	Outstanding	Outstanding
Subcontract Management	**Acceptable**	**Acceptable**
Phase-In Plan	Outstanding	Outstanding
Past Performance	**Substantial Confidence**	**Substantial Confidence**
Proposed Cost/Price	$207,881,101	$208,512,402
Evaluated Cost/Price	$207,881,101	$208,512,402

The tendency to reflect tied scores despite factor quality disparities should be disturbing to those interested in the availability of an effective tool for making intelligent contractor selection decisions.

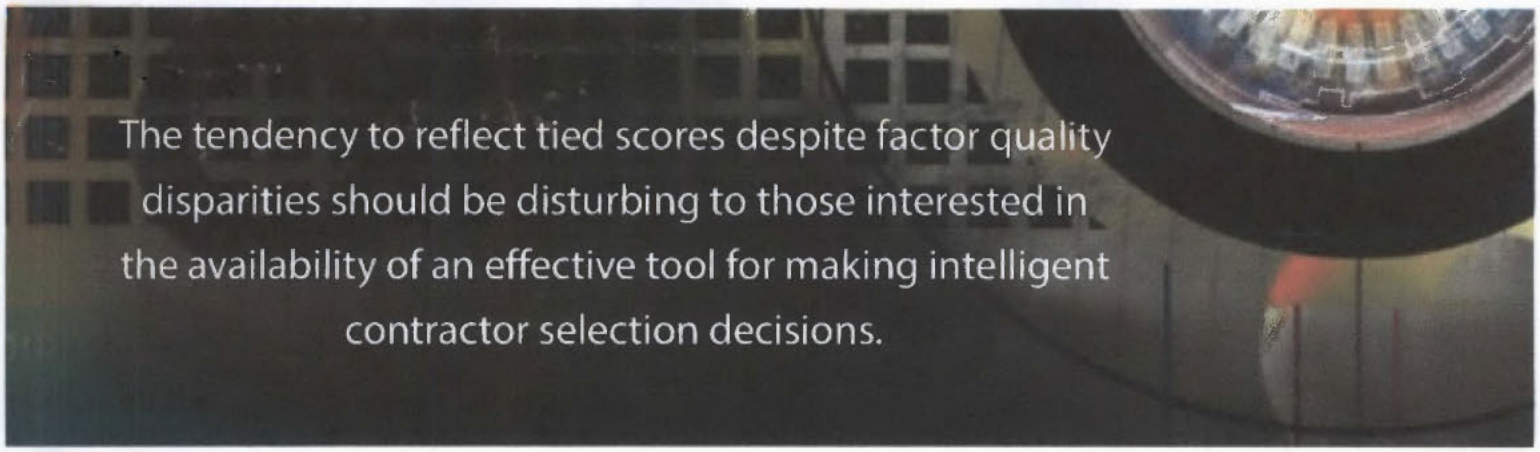
As to the importance of the evaluation factors, the solicitation for the above procurement action stated the following:

> The solicitation established that contract award would be made on a "best value" basis, based on three evaluation factors generally in descending order of importance: technical risk (hereinafter, technical); past performance; and cost/price. ... The technical factor was comprised of four subfactors in descending order of importance: scenario; program management; subcontract management; and phase-in plan. ... The technical and past performance evaluation factors, when combined, were significantly more important than cost/price.

To illustrate a decision matrix decidedly identifying the best value proposal, the author applied his best efforts to assign numerical values to the significance of evaluation factors based

Table 3. Decision Matrix Identifying the Best Value Proposal

	AS&D			JTI	
	Weight	Raw	Weighed	Raw	Weighed
Technical Scenario	**20**	**10**	20.00	9	18.00
Program Management	17	**10**	**17.00**	9	**15.30**
Subcontract Management	14	5	14.00	5	14.00
Phase-in Plan	11	10	11.00	9	**9.90**
Past Performance	23	6	19.71	7	23.00
Proposed/Evaluated Cost/Price	15	$207,881,101	15.00	$208,512,402	14.95
TOTAL WEIGHED SCORE			96.71		95.15



on the relative ranking provided in the Request for Proposals (RFP). Best efforts were also used to assign numerical proposal evaluation scores based on the comparative relationship of factor scores, as described in GAO's decision.

These best- efforts numerical scores are used in the illustration (Table 3) to show how using them can avoid tied scores by permitting evaluators to reflect the quality differences discerned between competing proposals. Numerical representations of the importance of proposal evaluation factors and numerical scoring of proposals permit weighing of proposal evaluation scores and proposed values to facilitate unambiguous identification of the best-value proposal. The formulas used to weigh the proposed values and proposal evaluation scores will be described later in this article.

In the Table 3 example, AD&D, with the highest Total Weighed Score (TWS) of 96.71, is identified as the contractor proposing the best value. This determination is based on the author's best efforts to quantify DoD's statement regarding the factors' relative importance, the contractor's proposed price, and the adjectival proposal evaluation scores. This example, however, merely illustrates the superiority of the TWS approach. The need to use best efforts for the numerical values in Table 3, does not support the argument that the proposal of AD&D should have been awarded the contract. In an actual procurement, numerical weights and the numerical scoring scheme would have been described in the solicitation. The proposal evaluation team also would have assigned numerical scores in reviewing the proposals.

The TWS Approach to evaluating proposals, in addition to distinctly identifying the best-value proposal, provides the needed transparency so that prospective contractors can understand the precise factor weights and proposal scoring. The transparency, moreover, prevents that rare corrupt government official from manipulating the relative value of proposal evaluation factors/subfactors to justify selecting a favored contractor in exchange for a personal benefit. When an RFP numerical representation of the importance of contractor selection factors, that corrupt official will not be able to manipulate factor weights to benefit a favored contractor.

The statement indicating that "technical and past performance evaluation factors, when combined, were significantly more important than cost/price" injects considerable flexibility for concocting and rating contractor selection factors/subfactors. The factor weight for cost/price could have been within the range of 10 to 25 and still have been considered significantly less important than the combined weight of technical and past performance evaluation factors. The statement regarding the relative importance of the nonprice factors and subfactors also permits flexibility in manipulating the relative weights during proposal evaluation to benefit one of the competing contractors.

Formulas for Weighing Proposal Evaluation Scores

The anomalous and correct formulas for weighing proposal evaluation rating raw scores for factors such as technical and past performance are shown below:

Anomalous Formula for Weighing Proposal Evaluation Scores
Criterion Weight x (Actual Proposal Evaluation Score ÷ Highest Possible Proposal Evaluation Score) = Weighed Score

Correct Formula for Weighing Proposal Evaluation Scores
Criterion Weight x (Actual Proposal Evaluation Score ÷ the Highest Actual Proposal Evaluation Score) = Weighed Score

The difference between the anomalous and the correct formula for weighing proposal evaluation scores involves using either the highest possible or the highest actual proposal evaluation score. The necessity of adding the weighed scores for both the proposal evaluation scores and the proposed values requires compatibility between their respective formulas. The formula for weighing proposed value scores must include the highest actual proposed value because there can be no highest possible proposed value. Using the highest possible proposal evaluation score in the formula, therefore, distorts the algorithm for calculating the TWS. Use of the anomalous formula may result in an understatement of the weighed value for proposal evaluation scores.

The problem with an understated weighed value for a proposal evaluation score is illustrated in the following example where the experience and price factors are both weighted as 10. Evaluation of the proposal with the highest score for a

technical factor (experience) results in a score of 85 on a scale of 70-100. When the anomalous formula is used to weigh the score of 85, the result is 8.5. When the lowest price is weighed with the formula for proposed values, the result is 10.0. The weighed score of 8.5 for the highest rated experience factor is clearly understated when compared to the weighed score of 10.0 for the lowest price. When both factors are weighted the same, the highest rated experience factor and the lowest price factor should have identical weighed scores.

Government personnel more concerned with technical performance and less so with price would have a legitimate reason to object to the calculation of weighed scores with the anomalous formula. Technical personnel are likely to object to a weighed score for the lowest price that is higher than the weighed score for the highest-rated technical factor when both factors have equal weights. When applying the correct formula, the lowest price and highest-rated technical factor will have identical scores when the factor weights are equal.

Formulas for Weighing Proposed Values

Formula A and Formula B, below, represent two differing methods that state and local government agencies express the anomalous formula for weighing proposed values.

Anomalous Formula A
Lowest Proposed Value ÷ (Proposed Value ÷ Criterion Weight) = Weighed Score

Anomalous Formula B
(Lowest Proposed Value ÷ Proposed Value) ÷ Criterion Weight = Weighed Score

Correct Formula
(Highest Proposed Value - (Proposed Value - Lowest Proposed Value)) ÷ (Highest Proposed Value ÷ Criterion Weight) = Weighed Score

The purpose of this formula is to weigh proposed values according to the factor weight and convert low proposed values to high weighed scores. This approach is appropriate for factors, such as price, where low values are favorable to the government. Lower proposed values are also favorable to the government for factors such as "weight" for products that will be placed in space orbit. The formula anomaly is characterized by an underrepresentation of midlevel values when three or more contractors compete for a contract. The anomaly is best demonstrated by considering three proposed equidistant prices. In this example, the equidistant prices are $700 million, $800 million and $900 million, with an equal difference of $100 million between the low and midlevel prices as well as between the midlevel and the highest prices. The factor weight in this example is 30. When equidistant proposed prices are weighed and low prices are converted to high scores, the weighed values should also be equidistant. Weighing the above proposed prices with the anomalous formula yields the following results:

Results With Anomalous Formula

Proposed Value	Weighed Score
$700 Million	30.00
$800 Million	26.25
$900 Million	23.33

The weighed scores with the anomalous formula are not equidistant because the difference in the weighed scores for $700 million and $800 million is 3.75 while the difference between the weighed scores for $800 million and $900 million is 2.92.

Results With Correct Formula

Proposed Value	Weighed Score
$700 Million	30.00
$800 Million	26.67
$900 Million	23.33

The weighed scores with the correct formula are equidistant because the difference in the weighed scores for $700 million and $800 million is 3.33 and the difference between the weighed scores for $800 million and $900 million is 3.34. The .01 difference between 3.33 and 3.34 is a rounding error.

When using the anomalous formula to weigh proposed values where low numbers favor the government, the weighed scores for the highest and lowest proposed values will be accurate. The weighed score for the midpoint values, however, will be understated. The TWS will, therefore, be inaccurate if using an anomalous formula thus subjecting the government to the possibility of selecting a contractor other than the one offering the best value.

Conclusion

The author's contention is that the difficulty DoD acknowledges in making technical/cost trade-off decisions results primarily from its restrictions against numerical representations for the importance of factors and subfactors, and against numerical rating of contractor proposals. State and local government agencies often represent the importance of proposal evaluation factors and rate proposals numerically. These government contracting agencies use formulas to weigh the proposal evaluation ratings, as well as the proposed values such as price, to obtain a TWS representing the score for and the importance of each evaluation factor/subfactor. The formula for weighing price, and other proposed values where low values are favorable to the government, also converts low proposed values to high scores. When weighed scores for factors and/or subfactors are totaled, the result is a TWS. The contractor receiving the highest total numerical score is identified as having submitted the best value proposal.

DoD would benefit from use of the TWS contractor selection process that distinctly identifies the contractor offering the best value proposal, simplifies the technical/cost trade-off decision, and inhibits procurement corruption.

The author can be contacted at bcurry@wsc-consulting.com.

FROM:

WSC CONSULTING

WSC Consulting
17 Northwood Commons Pl
CHICO CA 95973-7213

TO:

The Honorable Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Ave, N.W.
WASHINGTON DC 20460

APR 10 2017

ED*

D*

04/10/2017

NUMBER

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Route EPA Mail

To: Pruitt,Scott

Mailstop ARN

Department: 1101A

Sigcon

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EP14F July 2013
OD: 12.5 x 9.5

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March 30, 2017

Dear Mr. Pruitt,

My fervent hope is that as head of the Environmental Protection Agency you would be dedicated to protecting our environment for our children and grandchildren. Your decision not to ban the use of the pesticide chlorpyrifos on fruits and vegetables will have serious long term consequences.

I pray that you will check your moral compass and change directions — our future and our children's + grandchildren's futures are at stake!

Sincerely,

Sara Losse

L Sara Losse
(b) (6)

L

Sara Losse

[redacted] (b) (6)

FCL 2035420

SAINT LOUIS MO 630

30 MAR 2017 PM 9 L

USA FOREVER

. Scott Pruitt
Head of the Environmental
Protection Agency
1200 Pennsylvania Ave. N.W.
Washington, D.C. 20

code:
1101A

APR 10 2017

EXECUTIVE

From:
(b) (6) [redacted]

RECE[illegible]

2017 APR 10 AM 11:26

OFFICE OF THE
EXECUTIVE SECRETARIAT

To:
Scott Pruitt, Administrator
Environmental protection Agency
1101A
1200 Pennsylvania Ave. N.W. Washington, DC 20460

March 30, 2017

Mr. Pruitt,

I support banning the use of the pesticide chlorpyrifos on fruits and vegetables. Your decision represents a course reversal from the Obama administration, which proposed the ban in 2015, based on its scientific findings of neurological harm from exposure to it.

Farmers use chlorpyrifos to kill insects and some plant pests on numerous crops, including some, meant for human consumption. Research in recent years has linked the pesticide to nervous system and brain problems, including lowered brain function in some children exposed to it before birth.

Reverse course and BAN the use of chlorpyrifos!

Lynne Mann

[redacted] (b) (6)

ALBUQUERQUE NM 870

03 APR 2017 PM 2 1

APR 1 0 2017

To: Scott Pruitt
Environmental Protection Agency
1101 A
1200 Pennsylvania Ave N.W.
Washington D.C. 20460

FCL 2035558

20460-

Scott Pruitt
EPA
1200 Pennsylvania Avenue NW
Washington DC 20460

RECEIVED
2017 APR 10 AM 11:57
OFFICE OF THE
EXECUTIVE SECRETARIAT

Re: chlorpyrifos

Dear Scott Pruitt:

The EPA should ban the use of chlorpyrifos in farming. The science shows that this insecticide can cause neurological damage to small children.

The continued use of this pesticide endangers the health and safety of families across the country.

Surely you care about the health and welfare of small children.

Sincerely,

Janine DeBaise [redacted] (b) (6)
(b) (6)

Janine DeBaise
[redacted] (b) (6)

FCL 2035310

SYRACUSE NY 130
05 APR 2017 PM 4 L

APR 10 2017

Scott Pruitt
EPA
1200 Pennsylvania Ave NW
Washington DC 20460

20460-

PETER AND LINDA CATALANO
(b) (6)

RECEIVED
2017 APR 10 AM 11:39
OFFICE OF THE
EXECUTIVE SECRETARIAT

April 1, 2017

Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

RE: Restrict the Use of Pesticides Containing Chlorpyrifos

Dear Mr. Pruitt:

I'm writing to urge the EPA reverse the decision made this past week and to continue to restrict the use of pesticides containing chlorpyrifos. This chemical is proven to have long-term, irreversible effects on children's brain development.

We all need to act together to ensure that our planet's climate future is bright and long-lasting. My wife Linda and I strongly believe that minimizing exposure to harmful chemicals is critical to that future.

Reducing pollution is a moral *and practical* imperative.

Sincerely,

Peter Catalano

"Think not of yourselves, o Chiefs. Think about the impact of your decisions on the next generation and seven generations beyond." *Iroquois Bylaw*

Mrs. Linda Catalano
[redacted] (b) (6)

SAINT LOUIS MO 630
04 APR 2017 PM 6 L

APR 10 2017

FCL 2035431

SCOTT PRUITT, ADMINISTRATOR
E.P.A. (1101A)
1200 PENNSYLVANIA AVE. N.W.
WASHINGTON, DC 20460

20460-

Dear Scott Pruitt and all others to whom this may apply,

This week has started what is only the beginning of years of possible reversals to previous work in environmental justice. Mr. Pruitt has made the decision to allow the use of the chemical chlorpyrifos despite what his own agency has previously stated about its harm to the health of those working around it as well as the environment in which it is used. I would like to voice my concern coming from a place of utmost respect, but rightfully a place of disapproval.

The case of chlorpyrifos is only one scenario, but how many more will come? How much longer will private gain be prioritized at the cost of public health? How much longer can blatant lies be told by the leader of the EPA and his colleagues about the damage they are allowing to take place?

To deny science is to deny cold hard facts. There are very few other sectors of our world where we can prove without a fraction of a doubt what is true and what is not. So I am asking you, Mr. Pruitt, do not deny what is obvious to see. For one should not be allowed to deny something they refuse to confront.

What you don't seem to be acknowledging is that there is much more to the protection of our environment than just air and water. According to the Merriam-Webster Dictionary, the environment is defined as, "the complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival". The interesting part here being the ending, "and ultimately determine its...survival". The environment that surrounds us is not just there for looks and enjoyment of the people, it is there to keep us alive. Choosing not to protect that environment is choosing to hinder the survival of all forms of life across our country and ultimately our world.

This is why we must look at the whole picture. Our ecosystems work in cycles, processes affect one another and intertwine in webs that are more connected than we even know. Air and water are just the beginning.

It is not hard to see just how much damage has already been done to the only habitable planet we have practical access to, a planet we need to be protecting for future generations so they are not forced to face new challenges caused by degrading environmental conditions. My understanding is that the EPA was created with this exact, clear, purpose in place. PROTECT the environment. As a student with a deep passion for environmental justice, I am more concerned than I can put into words about how rapidly we will see the planet degrade because the highest power set to protect the environment is choosing instead to turn the other way.

If you cannot hold true to this simple purpose, then why are you taking the responsibility? I'm asking you to acknowledge that this is not a game of profit for the rest of America, we are not benefiting from these nasty deals like you might be. For us the problems are real and they are affecting our everyday lives. What a privilege that you can afford clean water wherever you go, don't have to wear a face mask when walking in the streets on days of high smog, and don't have to stare the effects of environmental degradation in the face. So continue to live your lavish life. Deny what you want, and turn further from science. But if this is going to continue to be your mindset, then I must ask you to step down from your position of Administrator of the EPA. Go pollute elsewhere and let the rest of America clean up after you. Carry out your work in politics, but do not simply work for an office because of the benefits in the job description. Work where you are passionate for positive change, not destruction. Where your work is applauded by the masses, not protested in the streets. Take your claims about the environment elsewhere, because the American people have science on our side, and we are choosing to listen.

Sara Van Flatten

Sara VanHaken

[redacted]

(b) (6)

DENVER CO 802

03 APR 2017 PM 3 L

1101

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

APR 10 2017

FCL 2035584

20460-

RECEIVED
2017 APR 10 AM 11:41
OFFICE OF THE
EXECUTIVE SECRETARIAT

Scott Pruitt, Administrator

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Mr. Pruitt,

The risks to the public by chlorpyrifos (Lorsban) requires the Environmental Protection Agency (EPA) to be more prudent than your decision to not ban this pesticide. I don't want my grandchildren to suffer from this chemical used by private industry. There have been too many scientific researchers who have found serious problems with chlorpyrifos for you to ignore this caution.

Sincerely,

Bruce H. Ramsay

Bruce H. Ramsay
[redacted] (b) (6)
[redacted]

Cc: Dr. Edward O. Wilson ([redacted] (b) (6)

Mr. Bruce Ramsay
[redacted]

(9) (q)

APR 10 2017

CAPITAL DISTRICT 200/208

03 APR 2017 PM 3 L

SCOTT PRUITT, ADMINISTRATOR
ENVIRONMENTAL PROTECION AGENCY
1200 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, DC 20460

FCL 2035478

20460-

RECEI

2017 APR 10 AM 11:25

OFFICE OF THE
EXECUTIVE SECRETARIAT

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
4 April, 2017

To whom it may concern:

I am writing to protest Scott Pruitt's refusal to ban an already banned pesticide, chlorpyrifos, which his own agency has determined to be harmful to the developing foetal brain, to farm workers and to children. This decision puts the health and safety of hundreds of farm workers and children at risk.

Why is the Administrator of EPA disregarding his own agency's findings? Why does he choose to advance the financial interests of the Dow Chemical, the manufacturer of this dangerous chemical, over the well being and safety of humans. Does he have a financial interest in Dow Chemical?

I am appalled at the disregard and nonchalance of someone who is charged with promoting the health of humans and the environment.

I expect a response to my letter and an explanation for this inadmissible attack on human beings.

Tamara G. Prince

Tamara G. Prince
(b) (6) t

Ms Tamara G Prince
[redacted] (b) (6)

FCL 2035233

CAPITAL DISTRICT 200/206
04 APR 2017 PM 2 L

BREAST CANCER
USA First-Class

Scott Pruitt
EPA
1200 Pennsylvania Ave NW
Washington DC 20460

APR 10 201[redacted]

20460-

April 1, 2017

Scott Pruitt
Office of the Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washinton, DC 20460

RECEIVED
2017 APR 10 AM 11:41
OFFICE OF THE
EXECUTIVE SECRETARIAT

Mr. Pruitt:

I am a US citizen writing to express my surprise and extreme disappointment and disagreement with your decision to risk the cognitive abilities of our children by reversing the recommended ban of chlorpyrifos for agricultural use. The notion that we should continue to use a pesticide linked to autism is outrageous. The studies show linkage, even at low levels, to many neurological problems in exposed children. It's all brain damage.

How could you possibly trust Dow over some of our most competent universities and put our children at such risk? This is a monstrous conflict of interest.

Under the law, if there isn't sufficient science to demonstrate safety, the EPA is obligated to ban the pesticide. I believe you are breaking the law.

Please reverse your decision.

Sincerely,

Phyllis Culp

Phyllis Culp
(b) (6)
[redacted]

SANTA CLARITA CA 913

03 APR 2017 PM 3 L

Phyllis Culp

[redacted] (b) (6)

APR 10 2017

Scott Pruitt
Office of the Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20460

20460-

RECEIVED

2017 APR 10 AM 11:58

OFFICE OF THE
EXECUTIVE SECRETARIAT

(b) (6)

April 3, 2017

Mr. Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Ave. NW
Washington, DC 20460

Dear Mr. Pruitt:

According to the Los Angeles Times, March 31,2017, your agency reversed an Obama administration recommendation to ban a pesticide, chlorpyrifos, which is widely used on food crops. In 2015, the Obama administration announced it would adopt a "zero tolerance" policy for the chemical residue on food.

"By reversing the previous administration's steps to ban one of the most widely used pesticides in the world, we are returning to use sound science in decision making rather than predetermined results" you are quoted as saying.

According to the article, your response came to satisfy the agricultural and chemical companies.

You talked about "using sound science". Really? The chemical is linked to nervous system damage in children. The medical findings aren't sound science? Let's call it what it is…profits over the health of children.

You don't seem to know what science IS from your statement. The change is a threat to health. I assume that science is what you define it as in service to corporate profits.

How can you live with yourself having distorted everything in the rush to please corporations rather than protecting children's health?

Sincerely,

Naomi Serotoff

Naomi Serotoff, MPH
Master of Public Health

Naomi Serotoff

(b) (6)

LOS ANGELES CA 90

03 APR 2017 PM 6 T

APR 10 2017

FCL2029732

Mr. Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC. 20460

Office of Administrator 1101A

Date: Mon Apr 10 17:29:08 EDT 2017
From: Hope.Brian@epamail.epa.gov
To: CMS.OEX@epamail.epa.gov
Subject: FW: inconsequential items prohibitively expensive due to hazardous shipping rating

---

-----Original Message-----
From: Jerome [mailto (b) (6)
Sent: Monday, April 10, 2017 3:40 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: inconsequential items prohibitively expensive due to hazardous shipping rating

Hello Scott

I was planning on buying a quantity of liquid paint markers to conveniently and cleanly paint blazes to mark a National Scenic trail in my area, but the cost for ONE is outrageous (no savings for quantity). I discovered that the actual item price at around $6.36 became almost $16.00 when the freight is added on! And this was the cheapest quote.
My point is when the freight cost is MORE than the product cost due to this 1.3 ounce of encapsulated paint being designated hazardous,that's WRONG; and regulations regarding hazardous materials have to CHANGE.
Jerome Converse

(b) (6)

Mon Apr 10 21:48:41 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Supporting the EPA's mission
To: CMS.OEX@epamail.epa.gov

From: Bob Brainard [mailto:bbrain1@hotmail.com]
Sent: Monday, April 10, 2017 9:40 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: Re: Supporting the EPA's mission

Dear Scott Pruitt,

Disgraceful. That is the only word to describe the EPA's press release of 3/30, where the EPA includes a long list of polluters praising the rollback of environmental protections:

https://www.epa.gov/newsreleases/what-they-are-saying-about-president-trumps-executive-order-energy-independence

Are you kidding me? When the EPA and the nation's polluters are now reading a page from the same book, something is very wrong.

Disgraceful.

Regards,

Bob Brainard

From: Bob Brainard <bbrain1@hotmail.com>
Sent: Thursday, March 30, 2017 10:19:34 AM
To: pruitt.scott@epa.gov
Subject: Supporting the EPA's mission

Dear Scott Pruitt,

Many Americans like myself are concerned that your record of antagonism toward clean water, clean air, and climate change policies put you in direct conflict with the EPA's mission to "protect human health and the environment". Your actions on 3/28, supporting Donald Trump's plans to roll back environmental protections, seriously undermine your credibility as a staunch defender of our environment. I, and many others, question whether you take your responsibilities as EPA administrator seriously.

I would like to request two things of you:

1.) Please educate yourself on the science of climate change. The link between climate change and greenhouse gas emission is a scientific fact that has been established for decades.

2.) Please release an official statement from the Agency reaffirming the EPA's intention to vigorously protect our environment, even in the likely event of adverse pressure from the White House. Please also announce that you intend to fight the proposed 31% reduction in EPA funding.

Americans are counting on you.

Respectfully,

Bob Brainard

April 2, 2017

~~December 19 2014~~

Ricky E. McWhorter

(b) (6)

[redacted]

EPA

Washington, D.C. 20461

Mail Code HT-101-T

pse send your carbon copy of Reply I did not receive it

Cincinnati

Dear Agents,

I viewed an NBC-TV December 15 (Sunday Nightly News) a story about washed up plastic on the coast of some areas of United States shorelines. The news story told that some of it is mistaken by birds as food.

The Butler County Soil + Water Conservation District, a NATURAL Resource Conservation Service of the USDA scopes the Great Miami River in this County, and from the "Miami River" source at Indian Lake all the way to the Ohio River SWCD picks up litter, tires, and other debris along the River on both sides. A tee Shirt + fresh bottled drinking

water are provided.
After titles were claimed and all was named, was it the Coast Gaurd or the Marines job to patrol water lines in the states? In land it is something there is the SWCD with potential of more than selling seeds + plants, but could do alot more if organized and their mission was defined by USDA EPA at the USA government level. An occaision at the county fair is where I first learned of SWCD's Existance and would really like to see thier promise by NRCS to be Known and put in to potential of All it can do. The Coast Gaurd Auxillary of which my father was ALCDR Earl Junior McWhorter did motorboad motorboat inspections for safety, so there is inland Coast Gaurd. In addition to SWCD the Boy Scouts and girl scouts caused the GREEN movement after all, camped on top a garbage dump (closed) in 1971 at the "spring thing" victory + all.

So with these 3 groups in potential to possibly become affiliated with SWCD what can be done with USDA's office of NCRS? All have something good going on, and I was a cub + Boy Scout at the 1971 event in Hamilton. What cleans up beaches? I would may suggest US Army Corps of Army Engineers be contacted and the EPA open up another office to clean beaches.

Note: Watch Rumpke try to do away with recycling bins in an attempt to get more tons by changing to 65 gallon 2 wheel Roll A Way "totes". Do this - order Rumpke that they have to collect the bins any way - damn, they think there they are smart, and this is more important - time is moving - of the essence in Fairfield As I am moving away from this area soon - be in touch with return letter.

[redacted] (b) (6)

CINCINNATI OH 452

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APR 10 2017

E. P. A.

Washington, D.C.

20460

Work

HT-101-T

20460-

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

5/9/2017

Ricky E. McWhorter
(b) (6)

OFFICE OF WATER

Dear Mr. McWhorter,

Thank you for your letter in which you expressed concerns about plastic trash pollution. I've been asked to respond on behalf of the Environmental Protection Agency (EPA).

My letter to you is going to focus on EPA's role on this issue. Your letter addressed programs of the Butler County Soil and Water Conservation District (SWCD), which is overseen by the Natural Resource Conservation Service of the U.S. Department of Agriculture. I cannot comment on those programs because EPA does not get directly involved with SWCDs on the plastic trash issue. I recommend that you work directly with your local officials to address concerns you may have with their recycling programs.

EPA and other Federal agencies like the National Oceanic and Atmospheric Administration and the Department of State are working in many ways to tackle the problem of plastic pollution in oceans and on beaches. EPA has established the Trash Free Waters program (https://www.epa.gov/trash-free-waters). One important role of this program is to help states and communities develop innovative strategies to keep trash from entering waterways. We conduct research, support trash prevention and management programs at the state and municipal level, and develop public/private partnerships to reduce litter and design more environmentally benign products and packaging.

EPA's Sustainable Materials Management program also contributes to our Trash Free Waters agenda by promoting increased recycling and beneficial reuse of recovered materials. You can learn more about those programs at this web page: https://www.epa.gov/smm.

The problem of plastic trash in rivers, lakes, bays, on beaches, and in the ocean is very preventable. When people mishandle trash, it can end up on our streets and then make its way to waterways and the ocean. Rain, wind, and storm water move the trash through the environment very quickly, making it difficult and costly to capture once it is on the ground. Reducing aquatic trash and marine litter means reducing the amount of waste generated on land and disposing of waste properly. I applaud the efforts of citizens like you to get involved in your local community by not littering, recycling as much as you can, and helping others understand that their own actions matter in the fight to keep our waters clean.

Sincerely,

Robert S. Benson
Senior Program Advisor
EPA Trash Free Waters Program

The Administrator

Washington, D. C. 20460

April 6, 2017

PSO Mark Estanislao
EPA Security Officer
1200 Pennsylvania Ave, NW
Washington, DC 20460

PSO Hall,

Thank you for your impressive processing of the Regent Preparatory School and Staff of 75. You have once again demonstrated your professionalism and remarkable patience which was appreciated by the group.

Keep up the superb job!

All the best,

Scott

E. Scott Pruitt

Thank you for all your help!

The Administrator

Washington, D. C. 20460

April 6, 2017

PSO Kumelechu Shengelgn
EPA Security Officer
1200 Pennsylvania Ave, NW
Washington, DC 20460

PSO Shengelgn,

Thank you for your impressive processing of the Regent Preparatory School and Staff of 75. You have once again demonstrated your professionalism and remarkable patience which was appreciated by the group.

Keep up the superb job!

All the best,

Scott

E. Scott Pruitt

Thank you for all your help!

The Administrator

Washington, D. C. 20460

April 6, 2017

PSO Jean Sullivan
EPA Security Officer
1200 Pennsylvania Ave, NW
Washington, DC 20460

PSO Sullivan,

Thank you for your organization skills to make the security process quick and efficient for the 75 Regent Preparatory School and Staff. Your expertise and preparing for the passes and sign in sheet made the event have a smooth transition.

Keep up the superb job!

All the best,

Scott

E. Scott Pruitt

Thank you for all your help!

The Administrator
Washington, D. C. 20460

April 6, 2017

PSO Ricky Lee
EPA Security Officer
1200 Pennsylvania Ave, NW
Washington, DC 20460

PSO Lee,

Thank you for your impressive processing of the Regent Preparatory School and Staff of 75. You have once again demonstrated your professionalism and remarkable patience which was appreciated by the group.

Keep up the superb job!

All the best,

E. Scott Pruitt

Thank you for all your help!

The Administrator

Washington, D. C. 20460

April 6, 2017

PSO Sabrina Lamond
EPA Security Officer
1200 Pennsylvania Ave, NW
Washington DC 20460

PSO Lamond,

Thank you for your impressive processing of the Regent Preparatory School and Staff of 75. You have once again demonstrated your professionalism and remarkable patience which was appreciated by the group.

Keep up the superb job!

All the best,

Scott

E. Scott Pruitt

Thank you for all your help!

The Administrator

Washington, D. C. 20460

April 6, 2017

Sergeant Deborah Walker
EPA Security Officer
1200 Pennsylvania Ave, NW
Washington DC 20460

Sergeant Walker,

Thank you for your impressive processing of the Regent Preparatory School and Staff of 75. You have once again demonstrated your professionalism and remarkable patience which was appreciated by the group.

Keep up the superb job!

All the best,

Scott

E. Scott Pruitt

Thank you for all your help!

The Administrator

Washington, D. C. 20460

April 6, 2017

PSO Shannell Thurston
EPA Security Officer
1200 Pennsylvania Ave, NW
Washington DC 20460

PSO Thurston,

Thank you for your impressive processing of the Regent Preparatory School and Staff of 75. You have once again demonstrated your professionalism and remarkable patience which was appreciated by the group.

Keep up the superb job!

All the best,

E. Scott Pruitt

Wonderful to see you! Over thanks for all the help!

The Administrator

Washington, D. C. 20460

April 10, 2017

Chip Murray
Vice President for Policy and General Counsel
National Alliance of Forest Owners (NAFO)
122 C Street, NW, Suite 630
Washington, DC 20001

Jane Alonso
Vice President for Government Relations
National Alliance of Forest Owners (NAFO)
122 C Street, NW, Suite 630
Washington, DC 20001

Chip and Jane,

It was great meeting with you and the members of NAFO. I very much appreciate the dialogue and look forward to working with you on these important issues.

Please don't hesitate to reach out if you need anything in the future.

All the best,

Scott

E. Scott Pruitt

Great meeting ... Enjoyed the dialogue!

The Administrator

Washington, D. C. 20460

April 10, 2017

William Wehrum
Hunton & Williams LLP
2200 Pennsylvania Ave., NW
Washington, DC 20037

Bill,

Thank you for meeting with me last week. Our conversation was very helpful to me. I very much appreciate the dialogue and look forward to working with you on the important issues we discussed.

Please don't hesitate to reach out to me, Mandy, or Byron if we can assist you in the future.

All the best,

Scott

E. Scott Pruitt

Wonderful to see you!

Andy **OLSON**
STATE REPRESENTATIVE
DISTRICT 15

RECEIVED
2017 APR 11 AM 10:48
OFFICE OF THE
EXECUTIVE SECRETARIAT

April 5, 2017

The Honorable Scott Pruitt
Secretary of the Environmental Protection Agency
Office of the Administrator
1200 Pennsylvania Ave. NW
Washington, DC 20460

RE: EPA Record of Decision for the cleanup of the Portland Harbor Superfund site

Mr. Secretary,

Congratulations upon finally receiving confirmation from the Senate in leading our nation with environmental issues. Having served 29-years with the Oregon State Police and now in my 13th year in the Oregon Legislature, I truly appreciate your background and your leadership. With that said, environmental issues are not my strength, but I feel it's necessary to help correct a wrong.

In August 2016, I submitted a letter addressed to Interim Director Pete Shepherd of the Oregon Department of Environmental Quality (DEQ) sharing my concerns regarding the Superfund cleanup. It was estimated the ten-mile stretch of the Willamette River would cost tax-payers $746 million.

The EPA assumed their plan would reduce risks to human health and the environment to acceptable levels by dredging or capping 291 acres of contaminated sediments and 19,472 lineal feet of contaminated river bank, followed by 23 years of monitored natural recovery. Additionally, their plan included disposal of dredged sediment in an on-site confined disposal facility and upland landfills.

The EPA's own Site Summary states,

> Water and sediment at the Portland Harbor Site are contaminated with many hazardous substances, including polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, pesticides and heavy metals. These compounds have been found to be harmful to people and the environment. Health risks at the site are great enough for cleanup to be needed under the Superfund law. EPA and DEQ are working with potentially responsible parties to clean up contaminated sediment and control sources of contamination.

Office: 900 Court St NE, Salem, OR 97301 - Phone: 503-986-1415 - rep.andyolson@state.or.us
District: P.O. Box 891, Albany, OR 97321 - Phone: 541-967-6576 - rep.andyolson@state.or.us

I recommended to Mr. Shepherd to conduct a three-year research study collecting scientific evidence that supports the true harm to people. The Oregon State University Toxicology and Microbiology department could easily provide that research to ensure the cleanup was in fact necessary.

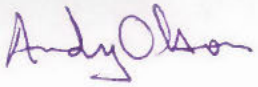
There are several concerns with EPA's Record of Decision. I will name three key ones:

- It is unclear what analysis EPA could have produced since September that evaluates the true costs and benefits of a more aggressive cleanup.
- It is estimated the cost of the earlier Proposed Plan would be close to $1.8 billion, nearly double EPA's estimates at the time. Now, with a more aggressive remedy and adding significantly more dredging, EPA's plan could cost over $2 billion. The cost of implementing EPS's Record of Decision is staggering.
- Support for EPA's proposed plan was already weak among private Potentially Responsible Parties, and the Record of Decision's direction can only promote more delay in getting to the cleanup.

I'm sure there are plenty of businesses impacted by this plan that would be glad to have the opportunity to join in financial support to back a research study. Before the EPA and DEQ decide to spend tax-payer's dollars, why not conduct a three-year research study. Better yet, why not allow the Oregon State University Toxicology and Microbiology department to do the research?

Thanks for listening…I'm glad you're there. Should you have any questions, please call me at 541.619.0976 (cell).

Sincerely,



Andy Olson

Cc: Senator Ron Wyden
Congressman Greg Walden

Andy **OLSON**
HOUSE OF REPRESENTATIVES
900 COURT ST NE
SALEM, OR 97301

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APR 11 2017

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The Honorable Scott Pruitt
Secretary of the Environmental Protection Agency
Office of the Administrator
1200 Pennsylvania Ave. NW
Washington, DC 20460

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF THE
REGIONAL
ADMINISTRATOR

APR 25 2017

The Honorable Andy Olson
Oregon State House of Representatives
900 Court Street NE
Salem, Oregon 97301

Dear Mr. Olson:

Thank you for your letter dated April 5, 2017, to the U.S. Environmental Protection Agency's Administrator Scott Pruitt about the EPA Record of Decision for the cleanup of the Portland Harbor Superfund site. Administrator Pruitt has asked me to respond to you on his behalf.

The Portland Harbor Superfund site is contaminated with many pollutants at concentration levels that pose risks to wildlife and people. We know this based on site-specific human health and ecological risk assessments conducted during the remedial investigation of the site.

The EPA received over 5,300 comment submissions on its proposed plan to clean up the harbor. The majority of those comments showed support for cleanup of the river and a large number of commenters wanted more cleanup and less reliance on monitored natural recovery than what was proposed. Based upon public comments, further evaluation of the risk reduction achieved at the end of cleanup construction, and uncertainty associated with natural recovery, the amount of active cleanup was increased in the final decision. We did not choose the most aggressive cleanup option; more than 80% of the river sediment area will rely on natural recovery and not active cleanup with the final decision.

As you may be aware, the site was listed on the National Priorities List in 2000. The site was extensively sampled, studied, and cleanup alternatives analyzed consistent with Superfund law, regulations, and agency guidance for 16 years. In fact, by 2015, Oregon congressional members in both the house and the senate as well as the Oregon Department of Environmental Quality expressed concern the project was taking too long. Given all the necessary information to make a decision was in hand, we moved forward. The EPA believes that the cleanup process, which begins with remedial design, should proceed rather than three more years of study.

As part of remedial design, additional sampling will be conducted. We will work with potentially responsible parties to develop a sampling plan that will update the information about current concentrations and locations of contaminants. As we proceed through the remedial design, the areas to be cleaned up and the actual cost of the remedy will be further refined. The State of Oregon, City of Portland, Northwest Natural and several other companies have indicated a willingness to conduct the baseline sampling and move cleanup forward.

Again, thank you for your letter to Administrator Pruitt. If you would like further information or discussion, please feel free to contact me or have your staff contact Sean Sheldrake, Remedial Project Manager, at (206) 553-1220 or sheldrake.sean@epa.gov.

Sincerely,

Michelle L. Pirzadeh
Acting Regional Administrator

BAKER & MILLER PLLC

ATTORNEYS and COUNSELLORS

2401 PENNSYLVANIA AVENUE, NW
SUITE 300
WASHINGTON, DC 20037

TELEPHONE (202) 663-7820
FACSIMILE: (202) 663-7849

RECEIVED

2017 APR 11 AM 10: 41

OFFICE OF THE
EXECUTIVE SECRETARIAT

WILLIAM A. MULLINS

(202) 663-7823 (Direct Dial)
E-Mail: wmullins@bakerandmiller.com

March 22, 2017

VIA E-FILING
Cynthia T. Brown
Chief of the Section of Administration
Office of Proceedings
Surface Transportation Board
395 E Street, SW
Washington DC 20423-0001

Re: Norfolk Southern Railway Company – Abandonment Exemption – In Dayton, Montgomery County, Ohio, AB-290 (Sub-No. 390X)

ERRATA

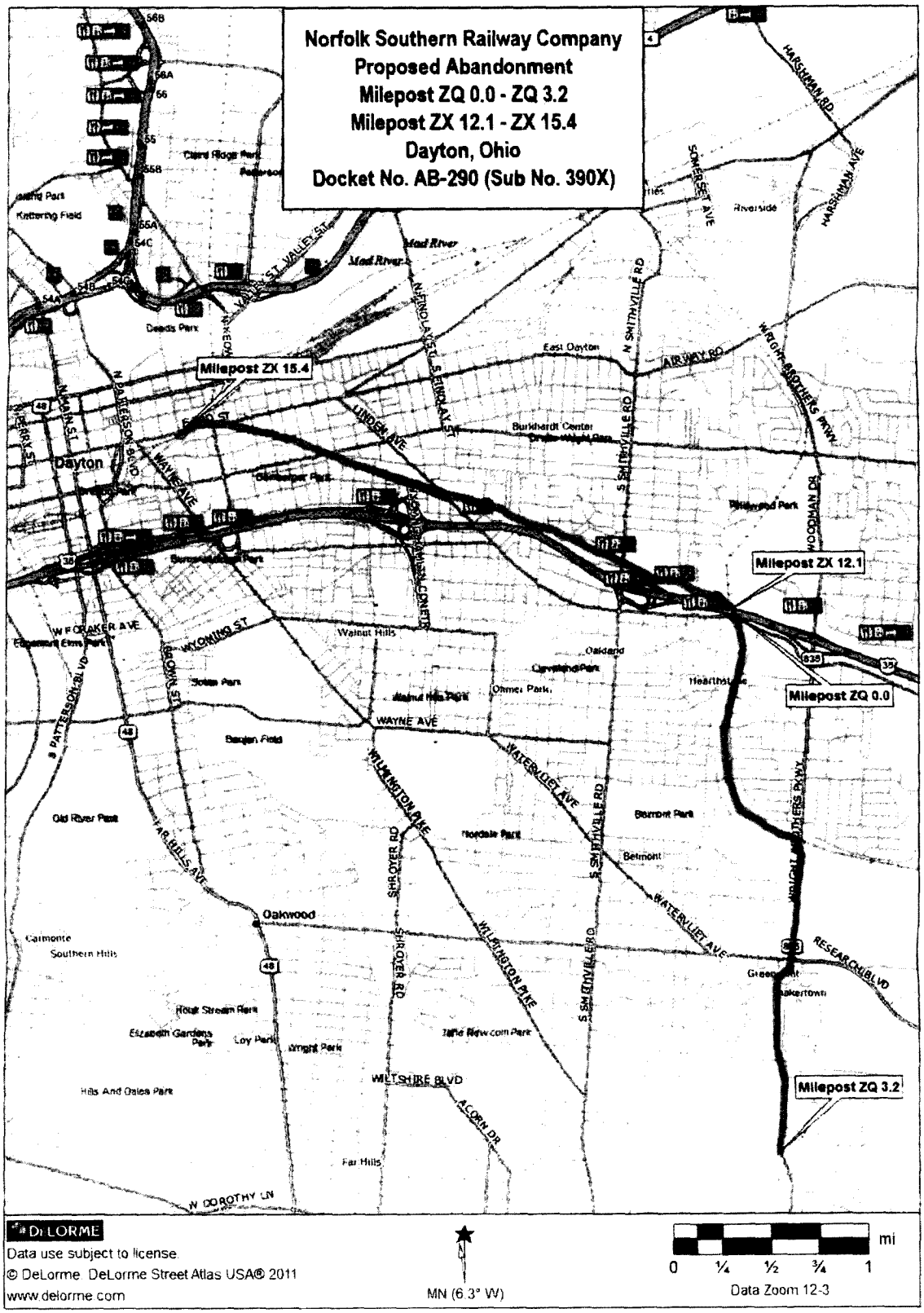
Dear Ms. Brown:

Enclosed for filing in the above-referenced matter is a corrected Exhibit B (map) to the Notice of Exemption ("Notice") filed by Norfolk Southern Railway Company ("NSR") on March 15, 2017. NSR recently discovered that the geographic location in relationship to I-35 depicted on the map was incorrect. Therefore, NSR is filing this errata to provide a replacement map. The changes to the map do not affect any other portions of the Notice and the mileposts of the line are depicted correctly on the map. If there are any questions about this matter, please do not hesitate to contact me directly at (202) 663-7823 or by e-mail at wmullins@bakerandmiller.com.

Respectfully submitted,

William A. Mullins

Enclosure
cc: Parties of Record


Norfolk Southern Railway Company
Proposed Abandonment
Milepost ZQ 0.0 - ZQ 3.2
Milepost ZX 12.1 - ZX 15.4
Dayton, Ohio
Docket No. AB-290 (Sub No. 390X)
Milepost ZX 15.4
Milepost ZX 12.1
Milepost ZQ 0.0
Milepost ZQ 3.2
Dayton
Oakwood
Mad River
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Data use subject to license.
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WASHINGTON, D.C. 20037

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1200 Pennsylvania Ave NW
Mail Code 1101-A
Washington, DC 20460

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ED DECKER

(b) (6)

APRIL 04, 2017

ADMINISTRATOR PRUITT —

WOULD YOU PLEASE SEND ME A 'PERSONALLY' AUTOGRAPHED PHOTO... I WOULD APPRECIATE IT VERY MUCH... GODSPEED...

SINCERELY,

RECEIVED
2017 APR 11 AM 10:38
OFFICE OF THE EXECUTIVE SECRETARIAT

THANK YOU SO MUCH... A STRONG NATION IS A SECURE NATION... AMERICA FIRST!

FROM DENVER

[redacted] (g)(q)

SPRINGFIELD IL 627

06 APR 2017 PM 1 L

USA FOREVER

FCL 2042079

ADMINISTRATOR SCOTT PRUITT
ADMINISTRATOR OF THE EPA
ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF THE ADMINISTRATOR 1101A
1200 PENNSYLVANIA AVENUE, NW
WASHINGTON, DC 20460

APR 11 2017

PERSONAL

PLEASE FORWARD TO ADDRESSEE

E. SCOTT PRUITT
ADMINISTRATOR

May 11, 2017

Mr. Ed Decker
(b) (6)

Dear Mr. Decker:

Thank you for writing to request my autograph.

It is an honor and privilege to lead the U.S. Environmental Protection Agency. Promoting and protecting a strong and healthy environment is one of government's lifeblood priorities, and the EPA is vital to that mission. I look forward to working with the agency's dedicated employees, stakeholders and our state partners on a shared vision to protect our environment for future generations.

I hope you will follow our efforts by visiting www.epa.gov to learn more about the EPA's work and what you can do to help us achieve results for the American people.

Again, thank you for writing and for your interest in the EPA.

Respectfully yours,

E. Scott Pruitt

Enclosure

1200 PENNSYLVANIA AVE. NW • MAIL CODE 1101A • WASHINGTON, DC 20460 • (202) 564-4700 • FAX: (202) 501-1450

This paper is printed with vegetable-oil-based inks and is 100-percent postconsumer recycled material, chlorine-free-processed and recyclable.

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 10 2017

THE ADMINISTRATOR

Governor ——

Thanks for your time today ... I very much appreciate the dialogue and partnership! Hope to see you soon, hopefully in Utah!

Scott

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Office of Governor Matt Mead
Idelman Mansion
2323 Carey Ave.
Cheyenne, WY 82002-0010

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 1 0 2017

THE ADMINISTRATOR

Governor —

Thanks for your time today... I very much appreciate the dialogue and partnership! Hope to see you soon, hopefully in Wyoming!

Scott

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 100% Recycled Paper (40% Postconsumer)

The Office of Governor Gary Herbert
50 North State Street, Suite 200
PO Box 142220
Salt Lake City, Utah 84114-2220

April 5, 2017

Dear Mr. Pruitt

My name is Kimberly Belair from

(b) (6)

I'm writing to urge you to ban the use of chlorpyrifos in farming, a recommendation made by EPA's own scientific experts. The continued use of this pesticide endangers the health and safety of families nationwide

Thank you

K Belair

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EXECUTIVE SECRETARIAT

Kimberly Belaire
(b) (6)

APR 11 2017

CRYSTAL BEACH, FL 34681
APR 6 2017
USPS

FCL 2042149

Scott Pruitt
EPA
1200 Pennsylvania Ave N.W.
Washington, DC 20460

Anastacia Bunte
(b) (6)

April 6, 2017

Scott Pruitt
Administrator of the Environmental Protection Agency
USEPA Headquarters
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
1101A
Washington, DC 20460

Dear Mr. Pruitt,

I am writing today to urge you to ban the use of chlorpyrifos in farming, a recommendation made by the EPA's own scientific experts. The continued use of this pesticide endangers the health and safety of families nationwide.

Thank you for your time.

Sincerely,

Anastacia Bunte

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OFFICE OF THE
EXECUTIVE SECRETARIAT

John Bunte
(b) (6)

FCL 2042091

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APR 11 2017

Scott Pruitt
Administrator of the EPA
USEPA Headquarters
William Jefferson Clinton Bldg.
1200 Pennsylvania Ave. N.W.
Washington DC 20460

20460-A
1101-A

April 7,2017

RECEIVED
2017 APR 11 PM 1:20
OFFICE OF THE
EXECUTIVE SECRETARIAT

Scott Pruit
Secretary of EPA
USEPA Headquarters
1200 Pensylvania Avenue NW
Mail Code 1101A
Washington, DC 20460

Dear Mr. Secretary,
My name is J. Lee Berget from Minnesota. I own 10 acres, and there are 2 ponds on my property. I have been told by neighbors who have lived here for many years that these ponds were manmade by a previous owner.

One of my sons noticed that about 5-6 duck families made their homes in one of the ponds the other pond only had one family usually. He decided that if he made a dam between the 2 ponds he could direct more water into the smaller pond. So, he started bringing in dirt at his expense and was building this dam.

All of a sudden, we get a visit from Collin Schoenecker, from Scott County, and she states he must cease and desist continuing to build the dam. That it is illegal to do anything with marsh land. I said it was my property and she said it doesn't matter. We explained to her what he was doing and she said it didn't matter, that this was part of the marsh land and we could not do anything to this land. See attached copy of Cease and Desist Order. Why should man made ponds fall under the auspices of "marshland"? She said it was still included in the "marshland".

Then we were mailed a Cease and Desist Order. See attached copy of this Order. Then time passed and eventually we were sent a Public Waters Restoration and Replacement Order. This stated work was to be completed by December 1, 2016. Wynn started to dig the dirt up and got out quite a bit, but, then was stopped when it became too wet. He was sliding and making a bigger mess. He couldn't finish it. She came out in January, 2017, and insisted that we needed to get the rest of the dirt out. By this time my son was gone and I told her he wouldn't be back for 2 years. She informed me that we would have to have it done by April 15, 2017. I begged her to let it stand for now. See attached copy of Public Waters Restoration and Replacement Order. This is the first one, there was another, to be done by April 15, 2017, but, I am unable to locate it. But, it looked the same, just change of date.

I don't even know who to call. I can't afford to spend a $1000.00 or more, to dig some dirt out between those ponds. I don't understand what the problem is really. This Order states that "Violation of this Order is a misdemeanor." I'm 76 years old, I have never been charged with a crime in my life.

I pay a great deal of taxes on this property and part of what I pay taxes on are these 2 ponds and the land in between. I understand that you and President Trump are against EPA interfering with private property. I am begging you to intervene in this situation.

I apologize for the horrible delay in getting this letter to you, but, I have several chronic health issues, and in last 7 weeks have had the flu and Shingles (and had vaccines for both). So was unable to sit up to write this.

I congratulate you on finally being confirmed for Secretary of the EPA.

I thank you for your consideration.

J. Lee Berget

J. Lee Berget
(b) (6) [redacted]

DEPARTMENT OF NATURAL RESOURCES

WETLAND CEASE AND DESIST ORDER

Date	Time	Issued To:	Phone Number	CDO#
10/07/2016	2:17 PM	Landowner		F890573628101

First Name	Middle	Last Name
J	Lee	Berget

Address	City	State	Zip Code
(b) (6)			

Violation Information:

County	PWI No.	☐ Airplane Used
Scott County		

Address	City	
(b) (6)	Scott County	MN

(Location Description (T-R-S or PID)
(b) (6)

Violation (Type) Description:
CONTACTED BY LOCAL CODE ENFORCER; MAPS INDICATE FILL PLACED IN WETLAND - CDO

CEASE AND DESIST ORDER (CDO):
The above, and his/her/its agents, contractors, heirs, successors, and assigns, are hereby ordered, pursuant to Minnesota Statutes, Section 103G.2372 or 103G.615, immediately cease and desist any illegal activity adversely affecting groundwater quantity, a wetland, public waters or the illegal gathering, harvesting, planting or transplanting, or destroying of aquatic vegetation or organisms in public waters.

LGU Contact:	Phone No.
	( ) -

Local Government Unit:
Credit River, Township of - 15985 Meadow View Blvd, Prior Lake, MN 55372-2675 (952) 440-5515

Office Name:	Badge:	Officer's Phone:
	573	(612) 559 - 8757

ANY VIOLATION OF THIS ORDER IS A MISDEMEANOR

She gave us this the day she was here.

CEASE AND DESIST INFORMATION SHEET
WCA

You have received a Cease and Desist Order issued under the Minnesota Wetland Conservation Act. The Cease and Desist Order was Minnesota Statutes, Section 103G.2372. Administrative rules pertaining to the Wetland Conservation Act appear in Chapter 8420 of M Rules. The Cease and Desist Order requires you to stop draining, filling, or excavating a wetland*. Failure to comply with either the Desist Order or any subsequent restoration order or replacement order is a misdemeanor.A copy of the Cease and Desist Order will the Local Government Unit listed on the Order. If you believe that the activity is exempt or results in no loss of wetlands, then, if you done so already, you may apply to the Local Government Unit for an exemption or no-loss determination. If the Local Government Ur determines that the activity is exempt or results in no-loss of wetlands, then, provided the local government determination is not re appeal, the Cease and Desist Order will be rescinded. You must apply to the Local Government Unit in writing and submit all requir documentation to support your application. You may use the application form on the opposite side of this sheet; however additiona may be required.If you do not apply to the Local Government Unit for an exemption, no-loss, or replacement plan determination or your application is denied, or if your application is granted but reversed on appeal, then whatever drain, excavation, or fill work has been require restoration according to a restoration plan designed by the local Soil and Water Conservation District. If you disagree with a no-loss, or replacement plan determination made by the Local Government Unit, you may appeal to the Minnesota Board of Water a Resources pursuant to Minnesota Rules 8420.0905. The decisionof the Local Government Unit will become final unless you file a pet appeal in writing within 30 working days after the date on which the decision of the Local Government Unit is mailed. The petition f must include the filing fee and must comply with all other requirements specified in Minnesota Rules 8420.0905. If you have any que about the Cease and Desist Order or the process described above, contact the Local Government Unit or the issuing officer listed on Order. You should also consult an attorney at any time you feel the need for legal advice.

This information sheet provides general background information for wetlands. the statutes and rules pertaining to the protection of wetlands supersede any nformation provided on this sheet. The information provided is done so as a courtesy and is not legal advice; consult an attorney for legal advice.

* Pursuant to Minnesota Rules 8420.0111 Subp. 72: "Wetlands" means lands transitional between terrestrial and aquatic systems wi table is usually at or near the surface or the land is covered by shallow water.

Wetlands must
(1) have a predominance of hydric soils;
(2) be inundated or saturated by surface water or ground water at a frequency and duration sufficient to support a prevalence of bydrophytic vegetation typically adapted for life in saturated soil conditions; and
(3) under normal circumstances, support a prevalence of hydrophytic vegetation

DEPARTMENT OF NATURAL RESOURCES

PUBLIC WATERS CEASE AND DESIST ORDER

Date	Time	Issued To:	Phone Number	CDO#
10/18/2016	8:50 PM	Landowner		F890458629201

First Name	Middle	Last Name
J	Lee	Berget

Address	City	State	Zip Code
(b) (6)			

Violation Information:

County	PWI No.	☐ Airplane Used
Scott County		

Address	City	State	Zip Code
(b) (6)			

(Location Description (T-R-S or PID)
(b) (6)

Violation (Type) Description:
Fill in Public Water

CEASE AND DESIST ORDER (CDO):

The above, and his/her/its agents, contractors, heirs, successors, and assigns, are hereby ordered, pursuant to Minnesota Statutes, Section 103G.2372 or 103G.615, immediately cease and desist any illegal activity adversely affecting groundwater quantity, a wetland, public waters or the illegal gathering, harvesting, planting or transplanting, or destroying of aquatic vegetation or organisms in public waters.

Local Government Unit:	Address:	LGU Contact Phone:
Jennie Skancke	1200 Warner Road, St. Paul, MN 55106	(651) 259 - 5790 Ext.

Office Name:	Badge:	Officer's Phone:
Keith Bertram	458	(320) 352 - 7940

ANY VIOLATION OF THIS ORDER IS A MISDEMEANOR

CEASE AND DESIST INFORMATION SHEET
PUBLIC WATERS/APM

You have received a Cease and Desist Order issued pursuant to Minnesota Statutes, section 103G.2372/section 103G.615 for unauthor affecting public waters. Administrative rules pertaining to the protection of public waters appear in Chapters 6115 and 6280 of Minne The Cease and Desist Order requires you to stop all work and conduct no further work within public waters*. Additionally, you must t immediate action to stabilize the site from imminent erosion, or restore water flow if directed to do so by an enforcement officer. Fa comply with either the Cease and Desist Order or any subsequent restoration order or replacement order is a misdemeanor. A copy o and Desist Order will be sent to the local Department of Natural Resources (DNR) Area Hydrologist listed on the Order. If you believ work you have done is allowed without a permit, or if you have a permit, you should submit documentation showing no need for a p evidence of a valid permit, to the DNR Area Hydrologist. If the DNR Hydrologist determines that the activity is not within public wate not require a permit, or is allowed by a valid permit, the Cease and Desist Order will be rescinded. If you do not have a permit but b work would be allowed with a permit, then, if you have not done so already, you should immediately submit a written project applic to the Area Hydrologist. If you do not submit a project application form within the three weeks of the date of the Cease and Desist O if your application for a DNR permit is denied, then whatever work has been done may require restoration or replacement according designed by the DNR Area Hydrologist. If you disagree with the terms and conditions of any restoration or replacement order, then yo appeal certain decisions to the Commissioner of Natural Resources, pursuant to Minnesota Rule 6115.0255, subpart 5 or 103G.615, su If your written request to appeal a restoration or replacement order is not submitted within thirty days after the date of the restorati replacement order, then the restoration or replacement order becomes final. If you have any questions about the Cease and Desist O or the process described above, contact the DNR Area Hydrologist or the issuing officer listed on the Order.

This information sheet provides general background information for public waters. The statutes and rules pertaining to the protection of public waters supersede any information provided on this sheet. The information provided is done so as a courtesy and is not legal advice; consult an attorney for legal advice.

*Public waters are those waters of the State defined by Minnesota Statute 103G.005 Subdivision 15 and listed on the Public Waters I pursuant to Minnesota Statutes, section 103G.201. For information on the location and boundaries of public waters, contact your lo DNR Waters Division, Area Hydrologist.

This was mailed later

Order Served by

Conservation Officer Signature	Badge #	Printed Name	Date
	458	Keith Bertram	10/20/16

7015 0640 0007 1279 3910

EC:: Scott County SWCD, Collin Schoenecker
Scott County WMO, Paul Nelson
DNR Enforcement, Keith Bertram
DNR Fisheries, Daryl Ellison
DNR Violations Coordinator, John Gleason
DNR Wildlife, Diana Regenscheid
DNR EWR Regional Mgr, Terri Yearwood
DNR EWR District Mgr, Jeanne Daniels

Revised 2/13/2015

MNDNR

PUBLIC WATERS RESTORATION AND REPLACEMENT ORDER

CDO #F890458629201

RPN

Pursuant to Minnesota Statutes, Section 103G.2372 and Minnesota Rules, part 6115.0255, the Commissioner of Natural Resources hereby orders Lee Berget, (b) (6) N (b) (6) y, (b) (6) .

Findings of Fact:

1. On-site investigation on October 13, 2016 by Scott County staff, Collin Schoenecker revealed that fill has been placed within public water wetland #10-13W.
2. The volume of fill has been estimated at 4580 square feet.
3. Scott County property tax data indicates that this parcel is owned by Lee Berget.
4. State rules (*Minnesota Rules* 6115.0190) contain specific standards for placement of fill within public waters.

Order

You shall accomplish restoration by doing the following:

1. Remove all fill from the wetland and place in an upland area. The fill may not be placed in a floodplain, waterway or wetland.
2. Contact DNR Area Hydrologist, Jennie Skancke, if a site visit or more detailed instructions are needed.
3. The restoration must be complete by December 1, 2016.
4. You must obtain any other necessary local, state and federal authorizations for the work being ordered.

This Order is final and binding on you, unless within 30 days of the date on which it was served on you, you appeal the terms and conditions of this restoration order to the commissioner by filing a written request for review. Please mail any such request to: DNR Ecological and Water Resources, Violations Coordinator, 500 Lafayette Rd., St. Paul, MN 55155-4032

Violation of this order is a misdemeanor.

Order Created by

Jennie Skancke

DNR Hydrologist Signature

Jennie Skancke
651-259-5790
Printed Name

10/20/2016
Date

Revised 2/13/2015

Exhibit "A"

That part of the Southwest Quarter of Section 20, Township 114, Range 21, Scott County, Minnesota described as follows:

(b) (6)

[redacted]

This is legal description of our land.

Thank you,
J Lee Berget

J. Lee Berget

[redacted]

(b) (g)

Mr. Scott Pruitt
Secretary of EPA
USEPA Headquarters
1200 Pennsylvania Avenue NW
Mail Code 1101A
Washington, DC 20460

-AL

PRESS FIRMLY TO S

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APR 11 2017

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J. Lee Burgot
19555 Southfork Drive
Prior Lake, MN 55372

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Mr. Scott Pruitt
Secretary of EPA
USEPA Headquarters
1200 Pennsylvania Ave NW
Mail Code 1101A
Washington, DC

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Department: 1101A

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGIONAL ADMINISTRATOR
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 26 2017

REPLY TO THE ATTENTION OF:

WW-16J

J. Lee Berget
(b) (6)

Dear Mr. Berget:

I am writing in response to your April 7, 2017 letter to U.S. Environmental Protection Agency Administrator Pruitt. Your letter indicates that your son brought in soil to construct a dam between two ponds located on your property. He was told by a representative of Scott County to cease building the dam, and you subsequently received a Cease and Desist Order, which you included with your April 7, 2017 letter.

The Cease and Desist Order you received is from the State of Minnesota, Department of Natural Resources (DNR). The State of Minnesota regulates wetlands under its Wetland Conservation Act, which is administered by local units of government with oversight from the Board of Water and Soil Resources. EPA is not involved with this action and does not have any authority over the State of Minnesota's Wetland Conservation Act.

The Cease and Desist Order you received from DNR indicates that if you need more detailed instructions, you may contact DNR Hydrologist, Jennie Skancke, at 651-259 -5790.

Thank you for your letter. I hope this clarification is helpful to you.

Sincerely,

Christopher Korleski
Director, Water Division

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UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Dale Moore
Deputy Executive Director
American Farm Bureau Federation
600 Maryland Ave SW #1000w
Washington, DC 20024

Dale,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Barb Glenn
CEO, ex-officio
National Association of State Departments
of Agriculture
4350 Fairfax Drive #910
Arlington, VA 22203

Barb,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Betsy Ward
President and CEO
USA Rice Federation
2101 Wilson Blvd # 610
Arlington, VA 22201

Betsy,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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THE ADMINISTRATOR

April 10, 2017

Tom Stenzel
President and CEO
United Fresh Produce Association
The George Washington University
1901 Pennsylvania Ave NW #1100
Washington, DC 20006

Tom,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Neil Dierks
CEO
National Pork Producers Council
122 C St NW #875
Washington, DC 20001

Neil,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Chuck Conner
President and CEO
National Council of Farmer Cooperatives
50 F St NW #900
Washington, DC 20001

Chuck,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Gary Adams
President and CEO
National Cotton Council
1521 New Hampshire Ave NW
Washington, DC 20036

Gary,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Chris Novak
CEO (Co-Chair)
National Corn Growers Association
20 F St NW #600
Washington, DC 20001

Chris,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Chandler Goule
CEO
National Association of wheat Growers
415 2nd St NE #300
Washington, DC 20002

Chandler,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Chris Jahn
President
The Fertilizer Institute
Capitol View, 425 3rd St SW #950
Washington, DC 20024

Chris,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Jay Vroom
President and CEO (Co-Chair)
Crop Life America
1156 15th St NW #400
Washington, DC 20005

Jay,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Dana O'Brien
Executive Vice President
Biotechnology Innovation Organization
1201 Maryland Ave SW
Washington, DC 20024

Dana,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Steve Censky
Chief Executive Officer (Co-Chair)
ASA Washington DC Office
Gordley Associates
600 Pennsylvania Ave., SE
Washington, DC 20003

Steve,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance

All the best,

E. Scott Pruitt

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ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

April 10, 2017

Andrew "Andy" LaVigne
President and CEO
American Seed Trade Association
1701 Duke Street, Suite 275
Alexandria, VA 22314

Andy,

It was a pleasure meeting you and members of the Council. I enjoyed the dialogue very much.

Our discussion was extremely helpful to me in learning more about the concerns and issues that impact production agricultural.

We look forward to continuing our relationship with Crop for Life America. Please don't hesitate to contact me or members of my team for further assistance.

All the best,

Scott

E. Scott Pruitt

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Wed Apr 12 08:35:14 EDT 2017
Hope.Brian@epamail.epa.gov
FW: regarding state's ability to regulate environmental issues
To: CMS.OEX@epamail.epa.gov

DRF

From: Karen Schaefer [mailto: (b) (6)
Sent: Tuesday, April 11, 2017 5:03 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: regarding state's ability to regulate environmental issues

Dear Mr. Pruitt.

I heard today on NPR that you appear to believe that state environmental regulatory agencies have all the resources they need to maintain federal laws regarding safe drinking water, clean air and other essential natural resource protections.

I am writing today as a member of the media to alert you to at least one major instance where this is not the case.

In the Lake Erie basin, which includes Michigan, Indiana, Ohio, and Pennsylvania, all states where our sitting President won majority votes - plus the Canadian province of Ontario, with whom we have a bi-national water quality treaty with specific goals regarding toxic algae - states and provinces are struggling with toxic algal blooms that threaten safe drinking water. In 2014, Toledo's drinking water was shut down for three days because of these recurring blooms.

GLRI funding has been crucial to that battle, as has satellite imagery funding from NOAA and NASA, along with the cooperation of many other federal agencies, among them the Sea Grant program and the USGS. State agencies alone will never solve this problem.

I would ask you to give a listen to this story, which I produced for NPR , and which aired last month.

http://www.npr.org/2017/03/27/521693429/proposed-budget-cuts-slash-funding-for-great-lakes-clean-up

This is a public health and safety issue, as well as an economic issue, that is not limited to the Great Lakes, but currently extends across some 40-percent of US fresh water lakes - and is actually international in scope. What we can learn about toxic freshwater algae blooms in the US could be crucial to the quality of safe drinking water globally.

Thank you for your time and consideration.

Yours,

Karen Schaefer

--

Karen Schaefer
Freelance Journalist and Independent Radio Producer
(b) (6)
Member, Society of Environmental Journalists since 2003

Member, Association of Independents in Radio (AIR)

Wed Apr 12 09:09:03 EDT 2017
Hope.Brian@epamail.epa.gov
FW: NACD Letter on Federal Agency Jurisdiction of Water Quantity
To: CMS.OEX@epamail.epa.gov

DRF

From: Chris Heck [mailto:chris-heck@nacdnet.org]
Sent: Tuesday, April 11, 2017 2:30 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: RE: NACD Letter on Federal Agency Jurisdiction of Water Quantity

Administrator,

Attached you will find the National Association of Conservation District's letter regarding the Clean Water Act and jurisdiction of water quantity.

Please let me know if you have any questions.

Thanks,
Chris

Chris Heck

Government Affairs Associate

National Association of Conservation Districts

509 Capitol Court, NE, Washington, DC 20002

P: 202.547.6223 | F: 202.547.6450 | www.nacdnet.org

National Association of Conservation Districts

April 11, 2017

Mr. Scott Pruitt
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Ave, N.W.
Washington, D.C. 20460

Dear Administrator:

The National Association of Conservation Districts (NACD) represents America's 3,000 locally-led conservation districts working with millions of landowners and operators to help them manage and protect land and water resources on private and public lands. Established under state law, conservation districts share a single mission: to work cooperatively with federal, state and other local resource management agencies, and private sector interest groups to provide technical, financial, and other assistance to help landowners and operators apply conservation to the landscape at the local level.

For more than 75 years, conservation districts have been leaders in locally-led efforts to ensure a clean and sustainable water supply for the nation. By engaging private landowners, conservation districts provide proactive assistance in putting voluntary conservation practices on the ground. These practices have far-reaching benefits, not the least of which is improved water quality that can mitigate the effects of drought and flooding. With earned trust and a proven ability to form partnerships at the local level, conservation districts are well positioned to play a key role in addressing water quality challenges in local communities. NACD acknowledges the successes of the Clean Water Act (CWA) over its 40-year existence and knows that water is critical for the health and viability of the urban and rural landscapes that conservation districts serve.

This being said, the Clean Water Act's (CWA) authority does not apply to issues of water quantity. NACD opposes the Environmental Protection Agency (EPA) asserting jurisdiction over water quantity from any water source under the CWA and believes any attempt to regulate water quantity with a Waters of the United States (WOTUS) rule would be an expansion of CWA beyond Congress' original intent for the law. NACD is confident the incorporation of local knowledge, heritage, and passion will help ensure a new version of the WOTUS rule is workable at the local level and meets its intended goals.

National Headquarters
509 Capitol Court, NE, Washington, DC 20002
Phone: (202) 547-6223 Fax: (202) 547-6450
www.nacdnet.org

We appreciate your consideration and would welcome the opportunity to provide more information as needed in the future. If you or your staff would like more information or would like to discuss this issue further, please do not hesitate to reach out to our Director of Government Affairs Coleman Garrison (coleman-garrison@nacdnet.org).

Sincerely,

Brent Van Dyke
President

National Headquarters
509 Capitol Court, NE, Washington, DC 20002
Phone: (202) 547-6223 Fax: (202) 547-6450
www.nacdnet.org

E. SCOTT PRUITT
ADMINISTRATOR

May 26, 2017

Mr. Brent Van Dyke
President
National Association of Conservation Districts
509 Capitol Court, NE
Washington, D.C. 20002

Dear Mr. Van Dyke:

Thank you for your letter dated April 11, 2017, to the U.S. Environmental Protection Agency regarding the definition of "waters of the U.S." and water quantity.

On February 28, 2017, the President signed Executive Order 13778: Restoring the Rule of Law, Federalism and Economic Growth by Reviewing the "Waters of the United States." The executive order calls on the EPA Administrator and the Assistant Secretary of the Army for Civil Works to review the final Clean Water Rule and "publish for notice and comment a proposed rule rescinding or revising the rule...." The executive order directs the EPA and the U.S. Army Corps of Engineers to "consider interpreting the term 'navigable waters'" in a manner "consistent with Justice Scalia's opinion" in *Rapanos*. The Scalia standard describes the scope of Clean Water Act jurisdiction to include relatively permanent waters and wetlands with a continuous surface connection to relatively permanent waters.

The EPA and the Army Corps published a *Federal Register* notice on March 6, 2017, announcing the agencies' intention to review and rescind or revise the 2015 Clean Water Rule consistent with Justice Scalia's standard. This notice helps ensure the interested public is aware of the rulemaking process and can be prepared to provide input as rulemaking proceeds. To meet the objectives of the executive order in a clear and expeditious manner, the agencies have decided on a two-step approach. The first step is an initial rulemaking to maintain the legal status quo by recodifying in the Code of Federal Regulations the regulatory approach that is in place now under a court stay and that has been in place for decades. The second step is a rulemaking to revise the definition of waters of the U.S. consistent with direction in the February 28, 2017, executive order. Both steps will follow procedures under the Administrative Procedures Act for public notice and comment on each rulemaking.

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The EPA has initiated federalism consultation on the new definition that will be developed under Step 2 per the EPA's implementation of Executive Order 13132. Additionally, the EPA began consultation with tribal governments on April 20, 2017, regarding the new definition to be developed under Step 2, in accordance with the 2011 EPA Policy on Consultation and Coordination with Indian Tribes.

On May 1, 2017, the EPA and the Army Corps sent a Step 1 draft proposal package for Office of Management and Budget interagency review. Upon completion of that review, the agencies will publish the proposed rule for public notice and comment. In light of these actions, we will include your email in the docket as comment on the rulemaking. Information about these actions can be found on the EPA's website at https://www.epa.gov/cleanwaterrule.

Respectfully yours,

E. Scott Pruitt

Wed Apr 12 09:09:42 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Carbon tax
To: CMS.OEX@epamail.epa.gov

From: Ken Reeves [mailto: (b) (6)
Sent: Tuesday, April 11, 2017 3:35 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: Carbon tax

Dear Mr. Pruitt,

I am writing to support a revenue-neutral tax on carbon dioxide emissions as a way to use the market to lower such emissions, thereby curbing greenhouse gasses and easing global warming. I notice that the new CEO of ExxonMobil, Darren Woods, favors such a tax, as he stated in February: “One option being discussed by policy makers is a national revenue-neutral carbon tax. This would promote greater energy efficiency and the use of today’s lower-carbon options, avoid further burdening the economy, and also provide incentives for markets to develop additional low-carbon energy solutions for the future.”

I agree with the Climate Leadership Council, a group of prominent Republicans that includes George Shultz, James A. Baker III and Henry Paulson. They have proposed taxing carbon emissions — and then returning all the money to Americans by sending everyone a quarterly dividend check.

This organization claims that if the plan is fully implemented, it would alone achieve twice the carbon dioxide reductions of all Obama-era regulations combined, allowing America to meet the high end of its obligations under the Paris climate accord. So the plan would scrap the Clean Power Plan and other regulations it says would become superfluous.

Because it reduces regulation and relies on the market, the idea intrigues conservatives. Nearly half of President Trump's voters support a carbon tax that reduces other taxes by an equal amount.

I look forward to you adding your support to this idea of a revenue-neutral carbon tax.

Sincerely,

Rev. Kenneth Reeves, Ph.D.

EMERGENCY PETITION TO THE EPA ADMINISTRATOR

Scott Pruitt
Administrator, Environmental Protection Agency

I am alarmed by your longstanding hostility to environmental protection and your advocacy on behalf of big polluters. We need a strong EPA to safeguard everything from clean air to children's health, from clean water to our nation's pollinators. America's bedrock laws and shared values have always placed environmental protection *above* corporate self-interest.

That is why I will be closely watching to see whether you act to protect America's bees from neonic pesticides and products, sold by companies like Monsanto and Bayer. Mounting scientific evidence points to neonics as a leading culprit in the devastating collapse of bee colonies. We can't afford to lose more bees — not when one in every three bites of food we take depends on them. I am calling on you to heed the latest science and impose an immediate ban on all uses of neonic pesticides that pose a risk to bees.

You have an obligation to uphold the mission of the EPA *by doing what's best for bees and people* — not what's most profitable for agrochemical companies. If you choose instead to sacrifice bees, I will stand alongside NRDC and hold you accountable under the law in federal court.

Sincerely,

X Lisa M. Molendini
Signature

Ms. Lisa Molendini
(b) (6)

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Ms. Lisa Molendini | FY PA 180

(b) (6)

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Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Ave NW
Washington, DC 20460

APR 07 2017

PIERCE H. NORTON II
President and Chief Executive Officer

SCOTT -

THANKS AGAIN FOR TAKING THE TIME TO MEET WITH DAVE, KATHRYN AND ME YESTERDAY. ACA LOOKS FORWARD TO WORKING CLOSELY WITH YOU AND YOUR STAFF IN THE COMING YEARS ON THE ISSUES THAT AFFECT THE AGENCY. WE WISH YOU NOTHING BUT SUCCESS AS YOU LEAD THE EPA.

PIERCE

ONE Gas, Inc. | 15 East Fifth Street | Tulsa, Oklahoma 74103 | 918-947-7959

TULSA OK 74

FCL 2048491

APR 12 AM 10:47

OFFICE OF THE EXECUTIVE SECRETARIAT

Hon. E. Scott Pruitt
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C.
20460

APR 12 2017

ONE GAS, INC.
15 East Fifth Street | Tulsa, Oklahoma 74103

Putnam Valley, New York 10579
Putnam County, New York

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2017 APR 12 AM 10: 51
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April 3, 2017

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

Dear Sir or Madam,

In Putnam Valley, New York, at the intersection of Bryant Pond Road and Peekskill Hollow Rd., a public sports arena is being contemplated and has so far passed the zoning board without consideration to the hundreds of people and children who will require sanitary bathroom facilities. The land border includes the ***federally protected*** Peekskill Hollow Brook which supplies water to the city of Peekskill, NY, 10566.

The town, county and state environmental agencies have been ineffective in questioning the wisdom of proceeding without due concern for bathroom facilities and leach fields required to install bathrooms to accommodate many in whatever type building is to be erected.

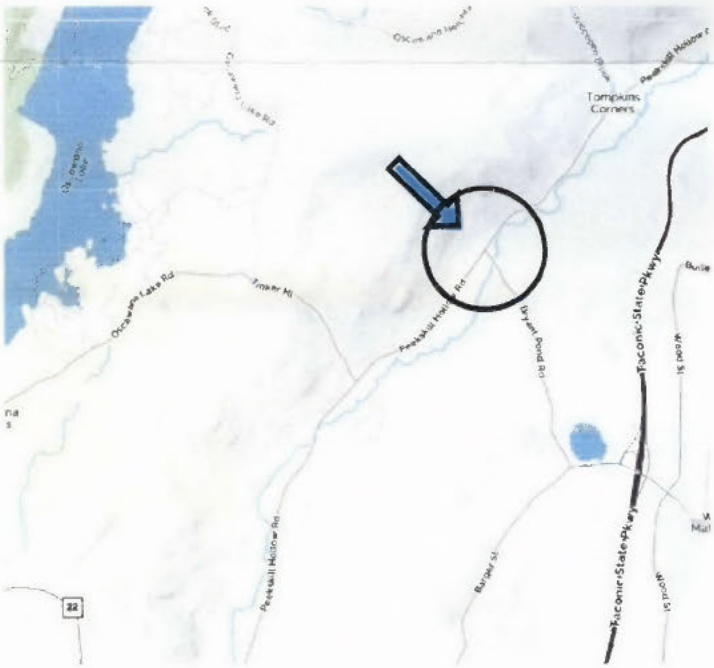
This area is and always has been residentially zoned with 3 acre zoning in recent years. A one time commercial sports venture for potentially hundreds of sports participants and spectators seems an inappropriate use for the property given the **protected waterway**. If this permit is granted, any type of future sports endeavor can be contemplated and it is an environmentally unsuitable area for anything that would bring pollution to the waterway. In the past it was never more than a horse pasture and before that, farming.

What if anything can or should be done?

We appreciate your time and attention to this matter.

Sincerely,

Felix Hazelton
A concerned
Putnam Valley resident



WESTCHESTER NY 105

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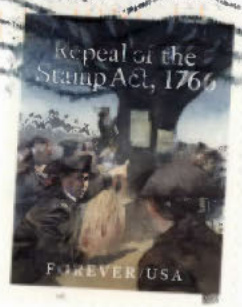

APR 12 2017

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

1101

FCL 2048533

Wed Apr 12 11:46:51 EDT 2017
Hope.Brian@epamail.epa.gov
FW: OIG Report: "EPA Needs to Provide Leadership and Better Guidance to Improve Fish Advisory Risk Communications"
To: CMS.OEX@epamail.epa.gov

DRF – Action Required

From: OIG News
Sent: Wednesday, April 12, 2017 9:30 AM
To: Shapiro, Mike <Shapiro.Mike@epa.gov>; Kavlock, Robert <Kavlock.Robert@epa.gov>
Cc: Pruitt, Scott <Pruitt.Scott@epa.gov>; Nishida, Jane <Nishida.Jane@epa.gov>; Heard, Anne <Heard.Anne@epa.gov>; Kaplan, Robert <kaplan.robert@epa.gov>; Pirzadeh, Michelle <Pirzadeh.Michelle@epa.gov>; Bloom, David <Bloom.David@epa.gov>; Rutherford, Debbie <Rutherford.Deborah@epa.gov>; Deane, Benita <Deane.Benita@epa.gov>; Anthony, Sherri <Anthony.Sherri@epa.gov>; Grzegozewski, Nicholas <Grzegozewski.Nicholas@epa.gov>; Howard, MarkT <Howard.Markt@epa.gov>; Trent, Bobbie <Trent.Bobbie@epa.gov>; Minoli, Kevin <Minoli.Kevin@epa.gov>; Richardson, RobinH <Richardson.RobinH@epa.gov>; Hull, George <Hull.George@epa.gov>; Valentine, Julia <Valentine.Julia@epa.gov>; Best-Wong, Benita <Best-Wong.Benita@epa.gov>; Rodan, Bruce <rodan.bruce@epa.gov>; Robbins, Chris <Robbins.Chris@epa.gov>; Hill, Randy <Hill.Randy@epa.gov>; Lapierre, Kenneth <Lapierre.Kenneth@epa.gov>; Newton, Cheryl <Newton.Cheryl@epa.gov>; Opalski, Dan <Opalski.Dan@epa.gov>; Cuscino, Glen <Cuscino.Glen@epa.gov>; Moore, Steven <Moore.Steven@epa.gov>; Hingeley, Maureen <Hingeley.Maureen@epa.gov>; Cursio, Heather <Cursio.Heather@epa.gov>; Tibbs, Yuolanda <Tibbs.Yuolanda@epa.gov>; Johnson, Kathie <Johnson.Kathie@epa.gov>; Eubanks, Kristy <Eubanks.Kristy@epa.gov>; Levy, Eric <levy.eric@epa.gov>; Williams, Carrie <Williams.Carrie@epa.gov>
Subject: OIG Report: "EPA Needs to Provide Leadership and Better Guidance to Improve Fish Advisory Risk Communications"

Attached is the EPA Office of Inspector General (OIG) report, *EPA Needs to Provide Leadership and Better Guidance to Improve Fish Advisory Risk Communications* (Report No. 17-P-0174). This report will be available to the public on the OIG's website at www.epa.gov/oig.

U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF INSPECTOR GENERAL

Water Quality

EPA Needs to Provide Leadership and Better Guidance to Improve Fish Advisory Risk Communications

Report No. 17-P-0174 **April 12, 2017**

Report Contributors:

Kathlene Butler
Julie Hamann
Johnny Ross
Gerry Snyder

Abbreviations

AWQC	Ambient Water Quality Criterion
CFR	Code of Federal Regulations
CWA	Clean Water Act
EPA	U.S. Environmental Protection Agency
FDA	U.S. Food and Drug Administration
IRIS	Integrated Risk Information System
OIG	Office of Inspector General
ppm	parts per million
RfD	Oral Reference Dose
WQC	Water Quality Criteria
WQS	Water Quality Standards

Cover photo: Fish advisory sign. (EPA photo)

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U.S. Environmental Protection Agency
Office of Inspector General

17-P-0174
April 12, 2017

At a Glance

Why We Did This Review

The U.S. Environmental Protection Agency (EPA), Office of Inspector General (OIG), conducted this review to evaluate the extent the EPA ensures that federal, state and tribal risk communication efforts protect the public from mercury contamination through the consumption of fish. We focused our evaluation on determining how effectively fish consumption advisory information reached consumers so that they could make healthy consumption choices.

Research shows that consuming fish contaminated by mercury can lead to negative health impacts in humans. The Clean Water Act (CWA) establishes a goal of "water quality which provides for the protection and propagation of fish, shellfish and wildlife." The EPA interprets this CWA goal as supporting water quality that provides for the protection of human health related to the consumption of fish.

This report addresses the following EPA goal or cross-agency strategy:

- *Protecting America's waters.*

Send all inquiries to our public affairs office at (202) 566-2391 or visit www.epa.gov oig.

Listing of OIG reports.

EPA Needs to Provide Leadership and Better Guidance to Improve Fish Advisory Risk Communications

What We Found

Without EPA guidance and assistance, subsistence fishers, including tribes, will continue to consume unhealthy amounts of contaminated fish.

Some subsistence fishers, tribes, sport fishers and other groups consume large amounts of contaminated fish without health warnings. Although most states and some tribes have fish advisories in place, this information is often confusing, complex and does not effectively reach those segments of the population. Fish advisories differ from state to state, between states and tribes, and across state and tribal borders, which in some cases leads to multiple advisories with conflicting advice for a single waterbody. In addition, although the EPA's risk communication guidance recommends evaluations of fish advisories, we found that less than half of states, and no tribes, have evaluated the effectiveness of their fish advisories. Under the CWA, the EPA can take a stronger leadership role in working with states and tribes to ensure that effective fish advisory information reaches all such segments of the population.

We also found that the EPA has not assessed methylmercury as proposed in the agency's published Integrated Risk Information System (IRIS) agendas. The EPA included methylmercury on its 2012 IRIS agenda for assessment, and on its 2015 IRIS agenda as a priority for assessment. However, to date, the agency has not commenced the assessment. Currently, the EPA's 2001 reference dose for methylmercury is an agency-supported value that the EPA continues to accept for decision-making. Because of its importance in developing water quality standards, and ultimately fish advisories, the RfD should be accurate to ensure that effective fish advisory information is communicated.

Recommendations and Planned Agency Corrective Actions

We recommend that the EPA's Office of Water provide updated fish advisory guidance to states and tribes, work with states and tribes to develop best practices to evaluate the effectiveness of fish advisories, and develop and implement methods to ensure tribal members receive current fish advisory information. We recommend that the EPA's Office of Research and Development conduct an assessment for methylmercury to determine whether the reference dose requires updating as proposed in the 2012 and 2015 IRIS agendas. After receiving responses to our draft report from the two EPA offices, we met to discuss their comments and our recommendations. Based on the follow-up discussion and supplemental information provided by both offices, we found that their corrective actions and milestone dates meet the intent of our recommendations (Appendix C). All recommendations are resolved.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE INSPECTOR GENERAL

April 12, 2017

MEMORANDUM

SUBJECT: EPA Needs to Provide Leadership and Better Guidance to Improve Fish Advisory Risk Communications
Report No. 17-P-0174

FROM: Arthur A. Elkins Jr.

TO: Michael H. Shapiro, Acting Assistant Administrator
Office of Water

Robert Kavlock, Acting Assistant Administrator
Office of Research and Development

This report on the evaluation of existing public protections for mercury contamination in fish was conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). The project number for this evaluation was OPE-FY15-0061. This report contains findings that describe the problems the OIG has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. Final determinations on matters in this report will be made by EPA managers in accordance with established audit resolution procedures.

Action Required

You are not required to provide a written response to this final report because you provided agreed-to corrective actions and planned completion dates for the report's recommendations. Should you choose to provide a final response, we will post your response on the OIG's public website, along with our memorandum commenting on your response. Your response should be provided as an Adobe PDF file that complies with the accessibility requirements of Section 508 of the Rehabilitation Act of 1973, as amended. The final response should not contain data that you do not want to be released to the public; if your response contains such data, you should identify the data for redaction or removal along with corresponding justification.

We will post this report to our website at www.epa.gov/oig.

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Introduction

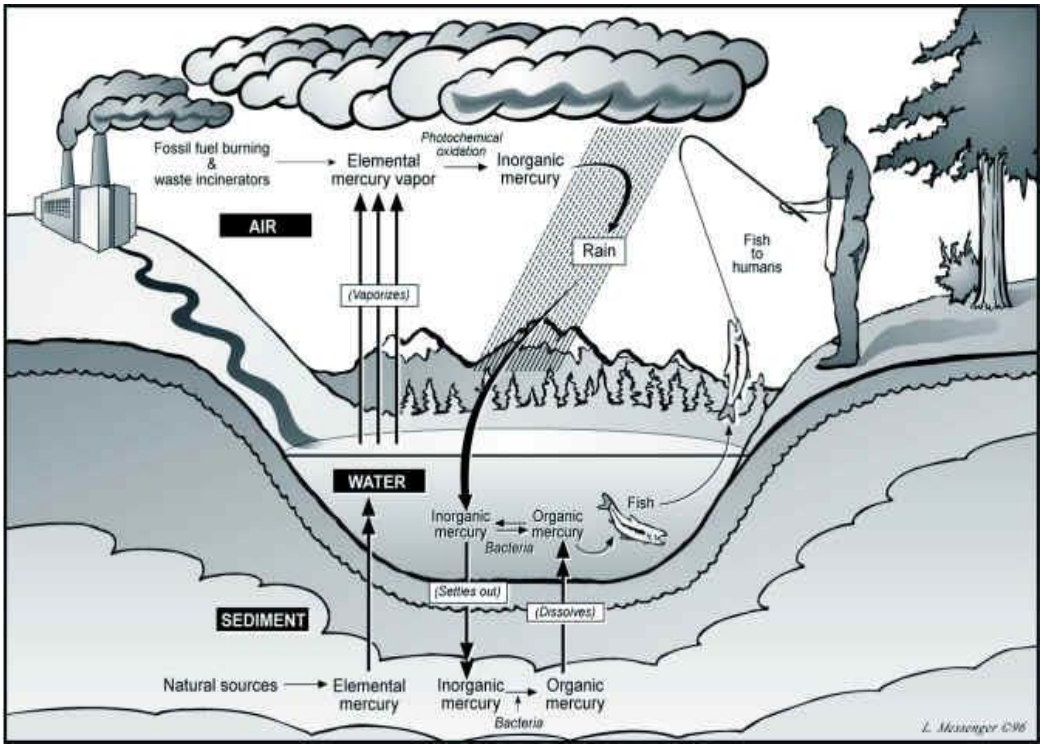
Why We Did This Review

The Office of Inspector General (OIG) for the U.S. Environmental Protection Agency (EPA) conducted this evaluation to determine the extent the EPA ensures that federal, state and tribal risk communication efforts protect the public from mercury contamination through the consumption of fish.

Background

About 80 percent of all fish advisories in the United States focus on mercury contamination. Mercury cycles in the environment as a result of natural and human activities like coal burning and other industrial and manufacturing processes. Most released mercury circulates in the atmosphere and travels thousands of miles from sources of emission. As it cycles between the atmosphere, land and water, mercury transforms into methylmercury and enters the aquatic food web through microscopic plants and animals (Figure 1). This allows methylmercury to accumulate in the food web, becoming most

Figure 1: How mercury cycles through the ecosystem



Source: Utah Department of Environmental Quality.

concentrated in predatory fish (Figure 2). Predatory organisms at the top of the food web (e.g., swordfish, king mackerel, or tuna) generally have higher methylmercury concentrations.

Figure 2: Methylmercury bioaccumulation through the aquatic food web

Source: OIG modification of EPA figure.

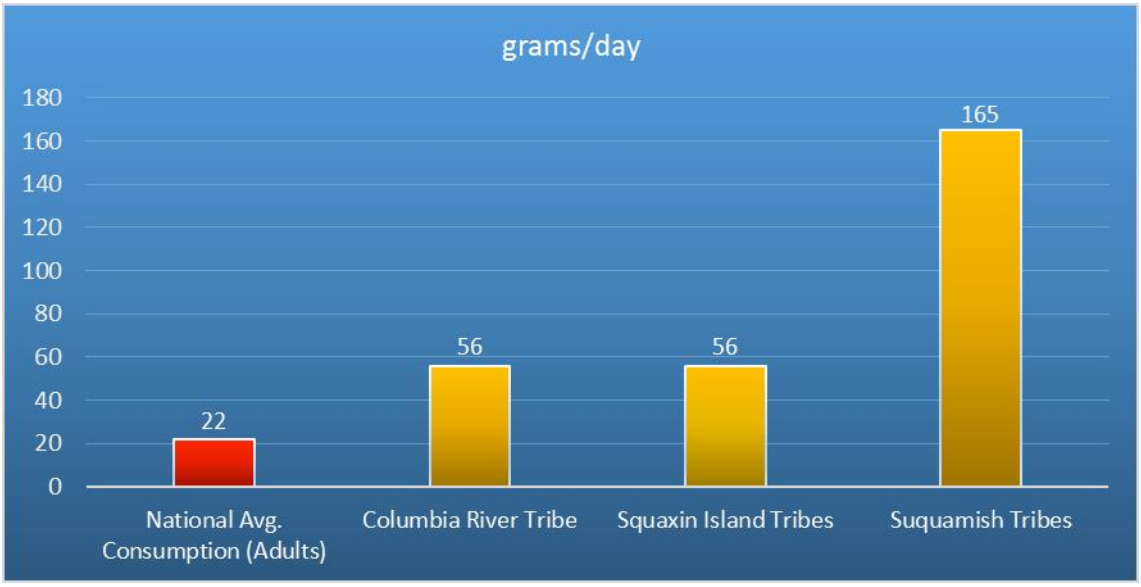
Human Health Effects From Mercury

According to an EPA 2001 fact sheet, titled "Water Quality Criterion for the Protection of Human Health: Methylmercury," humans are exposed to methylmercury primarily through the consumption of contaminated fish. Methylmercury causes a number of adverse health effects in humans and animals. In pregnant women, methylmercury passes through the placenta to the fetus and fetal brain. Research has shown that high-dose exposure to methylmercury in humans results in mental retardation, cerebral palsy, deafness, blindness, and dysarthria in utero; and in sensory and motor impairment in adults. Recent research has uncovered cardiovascular and immunological effects providing more evidence of toxicity from low-dose methylmercury exposure.

Eating fish from restaurants and grocery stores generally does not expose the average consumer to harmful levels of methylmercury from fish. The most frequently consumed commercial fish contain low levels of methylmercury. However, some types of commercially sold fish contain high levels of mercury and should be avoided by women of childbearing age and children. In addition, wild-caught fish from lakes, rivers or other water bodies may contain high levels of methylmercury, depending on the location, species and size of the fish. Further, subsistence fishers who routinely consume wild-caught fish are exposed to higher levels of methylmercury because of their consumption habits. These fishers may consume fish on a daily basis, not only for subsistence, but as a cultural way of life. For example, Figure 3 shows that the Suquamish Tribe consumes more than eight times more fish than the average population on a daily basis.

As a protective measure, federal agencies, states and tribes issue fish consumption advisories that provide information on segments of the population most at risk; what fish to avoid; what fish can be consumed; and the amount and frequency of contaminated fish that should be eaten.

Figure 3: Comparison of daily average U.S. fish consumption rates for three Indian tribes in grams per day



Source: OIG-developed chart based on data from the U.S. Food and Drug Administration and Polissar et al. (2012).

EPA's Role in Developing Fish Advisories

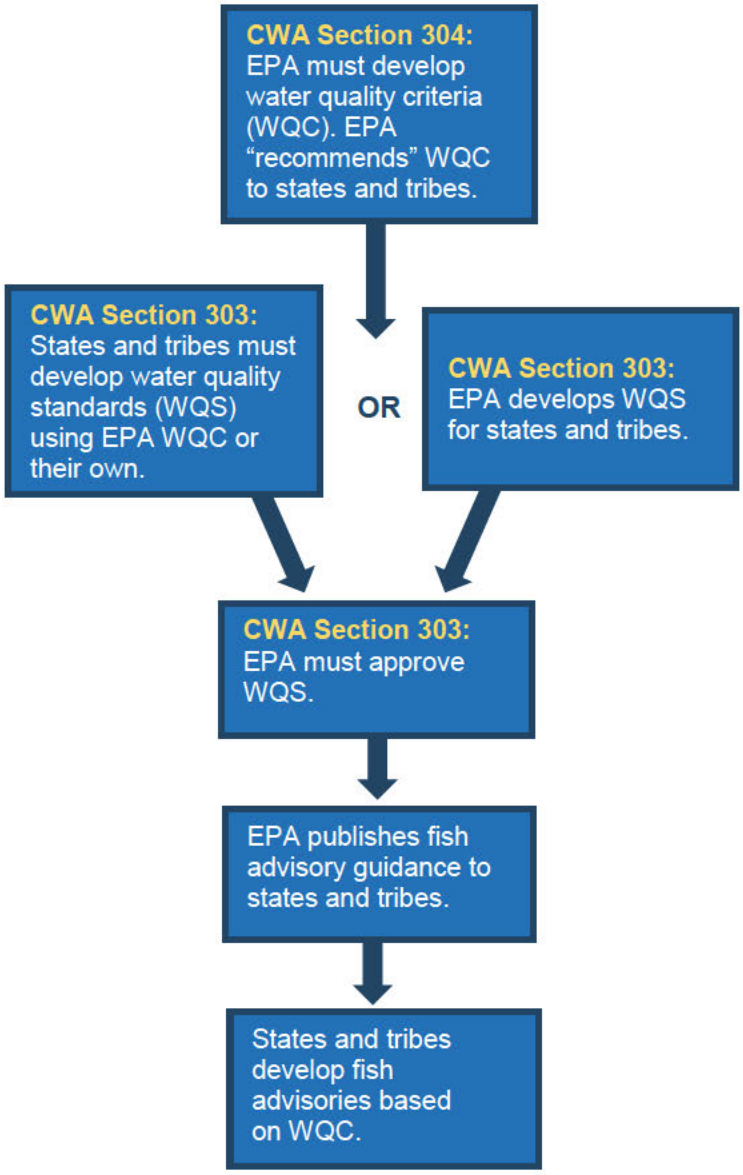
Fish consumption advisories are issued on a national level for commercially marketed fish; and on a local level for fish caught directly from lakes, rivers and other water bodies by individual fishers. The EPA does not have regulatory responsibility for nationally issued fish advisories. This responsibility falls under the purview of the U.S. Food and Drug Administration (FDA). The FDA does, however, collaborate with the EPA when developing national fish advisories.

For locally issued advisories for lakes, rivers and other waterbodies, the EPA, under the Clean Water Act (CWA), shares responsibility and works collectively with states and tribes to establish water quality criteria and standards that lead to fish advisories when warranted. The EPA is responsible for establishing water quality criteria and contaminant toxicity values that states and tribes use to develop fish advisories. The agency also provides national leadership to states and tribes by issuing risk communication and fish advisory guidance. Under the CWA, states and tribes also have certain responsibilities as shown in Figure 4.

Clean Water Act

The CWA defines EPA, state and tribe responsibilities in the development of water quality criteria and water quality standards that lead to fish consumption advisories. One goal of the CWA, as interpreted by the EPA, is "fishable, swimmable" waters. The EPA interprets "fishable" uses to include, at a minimum, designated uses providing for the protection of aquatic communities and human health related to consumption of fish and shellfish.

Figure 4: Clean Water Act requirements leading to fish advisories



Source: OIG analysis of Clean Water Act sections.

CWA Section 304(a) requires the EPA to develop water quality criteria (WQC) for states and tribes to use to develop water quality standards (WQS). EPA regulations found in 40 CFR Part 131.11(a) (1) provide that WQC must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect a waterbody's designated use—such as fishable.

CWA Section 303(c) directs states and tribes to adopt WQS for their waters subject to EPA approval. CWA Section 303(c)(2)(A), and the EPA's implementing regulations at 40 CFR Part 131, require that state and tribe WQS specify appropriate designated uses of the waters (in this case fishable uses), and that WQC protect those uses. Along with other factors, the WQS dictate the need for, and the content of, fish advisories that define the amount and rate of consumption of fish containing methylmercury.

The EPA published a national WQC for methylmercury in 2001. This criterion described the concentration of methylmercury in freshwater and estuarine fish and shellfish tissue that would protect consumers of fish and shellfish among the general population. Because of methylmercury's unique bioaccumulation process in fish tissue, this is the first time the EPA established water quality criterion based on a contaminant in fish tissue rather than the amount of a contaminant in the water column.

Once WQC and WQS are established, states and tribes may use these measures to develop fish consumption advisories. The EPA does not develop and publish fish advisories. Local fish advisories for lakes, rivers and other water bodies are developed and published by states and tribes. However, the EPA does maintain a searchable database of all fish advisories that the public can access through the EPA's internet site.

EPA Responsibilities Under Federal Indian Policy

The U.S. recognizes tribes as sovereign nations. Tribal sovereignty is recognized through the government-to-government relationship that tribes have with the federal government. Like other treaty obligations of the U.S., Indian treaties are considered to be the supreme law of the land, and they are the foundation upon which the federal Indian trust relationship is based. The federal Indian trust responsibility involves a legal obligation under which the U.S. has charged itself with moral obligations of the highest responsibility and trust toward Indian tribes. The trust responsibility establishes the federal government's legal fiduciary obligations to tribes, including the protection of treaty-reserved fishing rights. Although tribes are sovereign nations, the U.S. has a trust responsibility to protect tribal resources and treaty right.

Based on the EPA's Federal Indian Policy published in November 1984, the EPA must recognize tribal governments as sovereign entities with primary authority and responsibility for the reservation populace; retain responsibility for managing programs for reservations until tribal governments are willing and able to assume full responsibility for delegable programs; and encourage communication and cooperation among tribes, states and local governments.

Many tribes have members who are unique subsistence fishers. They consume large amounts of contaminated fish. They also have treaty rights that give them considerable latitude to fish on and off the reservation, and to take large amounts of fish without restrictions. These fishing rights can be exercised irrespective of state-owned/controlled land or state borders.

According to EPA's policy, some treaties explicitly name protected rights and resources. For example, a treaty may reserve or protect the right to hunt, fish or gather a particular animal or plant in specific areas. Similarly, the policy notes that an explicit treaty right to hunt, fish or gather may include an implied right to a certain level of environmental quality to maintain the activity or a guarantee of access to the activity site.

EPA Supports States and Tribes That Develop Fish Advisories

The EPA assists states and tribes by issuing risk communication and fish advisory guidance, and by providing leadership in meeting the challenges of fish contamination. For example, the EPA developed guidance to assist states and tribes with communicating fish consumption advisories in 1995. This fish advisory guidance walks users through a five-part process to develop a robust risk communication program: (1) problem analysis and developing objectives; (2) audience identification and needs; (3) communication strategy design; (4) communication strategy implementation; and (5) evaluation. The EPA also supports state and tribal fish advisory efforts through the periodic National Forum on Contaminants in Fish.

Responsible Offices

The EPA's Office of Water, Office of Science and Technology, develops guidance and conducts advisory and outreach programs designed to assist states and tribes with fish advisory programs. The Office of International and Tribal Affairs leads and coordinates agencywide efforts to strengthen public health and environmental protection in Indian country, with a special emphasis on helping tribes administer their own environmental programs. The EPA's Office of Research and Development supports the agency's mission to protect human health by identifying and characterizing the health hazards of chemicals found in the environment through its Integrated Risk Information System.

Noteworthy Achievements

The EPA hosts the National Forum on Contaminants in Fish to present and discuss the latest science and public health policies pertaining to the health risks and benefits of fish consumption. The EPA has hosted the forum 12 times since 1990. Our review identified the forum as a beneficial gathering that enables state and tribal representatives to learn about new science, exchange best practices, and make contacts for the future. The EPA also maintains a series of web-based advisory and technical resources to further support state and tribal risk communication efforts. These resources include scientific data, a clearinghouse of fish tissue data and fish consumption advisories from states, a list of contacts and partners, and access to past forum proceedings.

Many stakeholders that we interviewed applauded the EPA for hosting the fish forum and stated that they would like to see the EPA continue to host the forum in the future. We found that the forum is effective for communicating the risk of consuming fish contaminated by mercury, and (if possible) we suggest the EPA continue to conduct the forum on a regular basis in the future.

Scope and Methodology

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the evaluation to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our evaluation objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our evaluation objective. We conducted this evaluation from September 2015 to December 12, 2016.

Our evaluation focused on EPA activities that develop a protective WQC, and support state and tribal fish advisories for methylmercury contaminated fish. We

did not evaluate fish consumption advisories for chemicals other than mercury. To answer our objective question, we conducted a literature review on issues relating to the hazards of methylmercury, fish consumption rates, and the issuance and efficacy of state and tribal fish advisories. Based on our literature review, we focused on the authorities and/or activities used by the EPA, states and tribes to implement and manage risk communication to the public. We focused on locations throughout the country that had large or numerous waterbodies used for subsistence, recreational or sport fishing. We also focused on subpopulations or groups most vulnerable to methylmercury in fish because of their greater-than-average fish consumption rates.

We interviewed staff from the EPA and five states regarding their risk communication efforts to inform the public about the hazards of methylmercury, fish consumption rates, and fish advisories. Staff we interviewed at EPA headquarters were from the Office of Water, the Office of Research and Development, and the Office of Tribal and International Affairs. Staff in EPA Regions 4, 5 and 10 were interviewed as well. We also interviewed staff from environmental protection and health departments in Florida, Wisconsin, Oregon, Minnesota and Washington.

In addition, we interviewed members and representatives from the Miccosukee Tribe of Indians, Seminole Tribe of Florida, Squaxin Island Tribe, Confederated Tribes of the Grand Ronde Community of Oregon, and Eastern Band of Cherokee Indians. Subject-matter experts from academia and other stakeholders, such as the Great Lakes Indian Fish and Wildlife Commission, and the Columbia River Inter-Tribal Fish Commission, were also interviewed.

The scope of our work did not include an evaluation of the national fish advisory because it falls under the purview of the FDA, not the EPA. We also did not evaluate the consumption of fish-eating mammals.

Results

Fish advisory information does not effectively reach many subsistence fishers, including tribes and other groups that consume large amounts of wild-caught fish on a regular basis. Risk communication efforts are ineffective in many instances because fish advisory information is conflicting, confusing, too complex and often not followed. In addition, individual states publish different advisory information for the same waterbody, and state fish advisory information does not regularly reach tribes that routinely fish state waters. Consequently, subsistence fishers consume large amounts of contaminated fish without adequate health warnings. Further, the EPA, states and tribes may not be aware of the effectiveness of existing fish advisories, since less than half of states and no tribes have adequately evaluated the effectiveness of fish advisories as outlined in the EPA's 1995 risk communication guidance.

The EPA's 2001 oral reference dose (RfD) for methylmercury has not been assessed as proposed in its published agendas. Based on its Integrated Risk Information System, the EPA included methylmercury on its 2012 agenda for assessment, and on its 2015 agenda as a priority for assessment. However, to date, the agency has not started the assessment. The RfD must be accurate and based on the best available science to support development of protective fish advisories. Without effectively developed and communicated fish advisories, consumers may be exposed to unsafe levels of methylmercury through the consumption of fish.

Advisory Information Does Not Reach Many Subsistence Fishers

Fish advisory information does not reach some groups, such as subsistence fishers (including tribes), sport fishers, and others that consume higher amounts of fish than the average population. For example, the San Francisco Department of Health Services surveyed subsistence fishers in the Bay area and found that 90 percent of the people interviewed ate what they caught, but 42 percent did not have knowledge of active fish advisories for those waters, even though many had fished the same waters for more than 10 years.

Local fisherman at a Florida canal. (EPA OIG photo)

Although research shows that one of the most effective ways to provide fish advisory information to these groups is to post the advisory information at the site where fish are caught, we did not observe any fish advisory information posted at fishing sites we visited. We also found instances where state fish advisory information did not reach tribal members who routinely fish state waters adjacent to the reservations.

Fish Advisory Information Is Not Posted

We visited three reservoirs in North Carolina, a lake in Georgia, three public boat ramps in Florida, and several Columbia River treaty fishing access sites in Oregon and Washington.[1] All of these waterbodies have state-published fish consumption advisories; however, we did not find any fish advisory information at these locations.

Information board at a fishing reservoir has no fish advisory information. (EPA OIG photo)

Research shows that posting fish advisory information at the site where fishers enter the waterbody or where fish are caught are some of the most effective ways to provide fish advisory information to fishers.

For example, in 2010, the EPA conducted a survey on the awareness and effectiveness of the Mississippi Delta fish consumption advisory. The agency found that the majority of survey respondents obtained advisory information from signs posted at the affected waterbody as opposed to other methods of communication, including television news, talk shows or radio.

In a similar report on contaminated fish in San Francisco Bay, fishers stated that one of the best methods for getting fish advisory information to fishers was through posted signs. By posting fish advisory information at the source location where fish are caught, states and tribes can more effectively provide advisory information.

In addition, we identified the use of social media as another promising method for informing subsistence fishers. An organization that develops its social media outreach can issue advisories through Facebook and Twitter. Organizations can then confirm the reach of these posts through analytical tools built into social media platforms.

Some Tribes Do Not Receive State Advisory Information

During an on-site interview, a tribal representative said tribe members routinely take fish from state reservoirs adjacent to the reservation, but many tribe members do not know about state fish advisories for those reservoirs. The tribal representative said the tribe (because of its sovereignty) does not have a governance arrangement with the state, wherein fish advisory information would

[1] We visited the Hiawassee, Santeetlah, and Fontana reservoirs in North Carolina; Lake Allatoona in Georgia; public boat ramps along the Tamiami Trail East in Florida; and the North Bonneville, Cooks, Underwood, and White Salmon treaty fishing access sites along the Columbia River in Washington and Oregon.

be shared, and the tribe does not issue its own advisories for those reservoirs. Tribal leaders said they would welcome the EPA or state officials providing relevant fish advisory information to their chief or community leader, who would then ensure that the information is passed on to every member of the tribe.

In another state, tribal representatives said tribe members routinely consume certain fish species as a traditional food source and cultural norm. However, for most waterbodies, the statewide fish consumption advisory recommends that no one eat *any* of this particular fish species. For example, members of one Florida tribe eat fish contaminated with methylmercury at much higher rates than most Americans. While Florida has issued fish advisories for many of the waters on and near the tribe's reservation, tribe members have not received this advice, and the tribe has not communicated its own fish advisory information to tribe members.

The EPA does provide fish advisory guidance and supporting data for advisories. Through its risk communication and fish advisory guidance, the EPA can help states and tribes identify and address conflicting fish advisories across borders to ensure that clear and meaningful advisory information is provided to fish consumers.

Dilemma Between Two Governments

Treaties grant tribal nations unlimited access to hunt, fish and gather on lands ceded to the U.S. However, fish advisories place a limit on the amount of fish to be consumed and frequency of consumption to avoid adverse health effects. Some tribes we visited expressed a concern that fish advisories limit their treaty rights because the tribes cannot safely consume unlimited amounts of fish.

Tribes suggested that the EPA has a constitutional obligation to honor tribal rights by protecting fish resources granted by treaty. However, the U.S. government cannot control all sources of mercury entering the atmosphere that cycles through the environment and ultimately into fish. Consequently, fish advisories are needed to provide useful health information about the amount and frequency that fish should be consumed.

In situations where state fish consumption information is not reaching tribes, the EPA can take a leadership role and ensure that vital fish advisory information is provided to affected tribes. Moreover, the EPA can better protect the health of subsistence fishers and other groups by identifying the areas where fish consumption is high and fish advisory information is nonexistent.

Advisories Provide Conflicting, Confusing and Complex Advice

Fish consumption advisories sometimes provide conflicting and confusing advisory information from the federal government, and from states that share common waterbodies. Without clear information, consumers may not know which fish they should avoid, how much fish they may safely consume, and whether advisories apply to them specifically or to other groups (e.g., women of child-

bearing age, adolescents, adults, etc.). Because the information that advisories are based on may vary nationally, among states, and between states and tribes, the EPA can take a leadership role by promoting consistency to help reduce confusion.

Conflicting and Confusing Advisory Information

Federal agencies publish fish advisories, dietary guidelines for fish consumption, and varying toxicity levels for safe consumption of fish contaminated with mercury. These agencies serve different missions and deliver different messages to their audiences, but these differing messages create confusion for fish consumers. For example, the FDA issues a national fish advisory; but the advisory only applies to commercially marketed fish, and only addresses pregnant and breastfeeding women, those who might become pregnant, and young children. This national fish advisory is different from local fish advisories issued by states and tribes.

The FDA action level and EPA screening values serve different purposes, but they are often interpreted by the public as the same advice. This leads to confusion. The FDA established an enforcement action level at 1.0 parts per million (ppm) for mercury in fish. The FDA can remove any fish with mercury readings above 1.0 ppm from commercial store shelves. The EPA has developed a screening value of 0.049 ppm for those individuals who eat a great deal of fish—commonly referred to as subsistence fishers. In addition, the EPA has determined that 0.4 ppm is a safe upper limit for mercury in fish when consumption and other sources of exposure are limited. At levels above 0.4 ppm the EPA recommends consumption restrictions.

Comments we received from a scientist, a dietician, and an analyst reflect the confusion they see with advisories that target the fish-consuming public.

- A leading Harvard mercury researcher said: "I feel like confusion is reigning. The federal fish advisories need clarity and conflict avoiding messaging."
- A nationally known dietician said: "I think there is a lot of misinformation out there. I think when it comes to mercury in fish, people simply don't know where to go for information."
- A Senior Analyst with the Environmental Advocacy Group said, "The agency needs to focus on separating out the risks and the benefits of eating fish."

The U.S. Department of Health and Human Services, and the U.S. Department of Agriculture jointly publish the "Dietary Guidelines" that advocate for fish and shellfish consumption because of the health benefits for the general population, and for women who are pregnant or breastfeeding. The Dietary Guidelines encourage choosing fish higher in essential nutrients—such as Omega-3s—but lower in methylmercury.

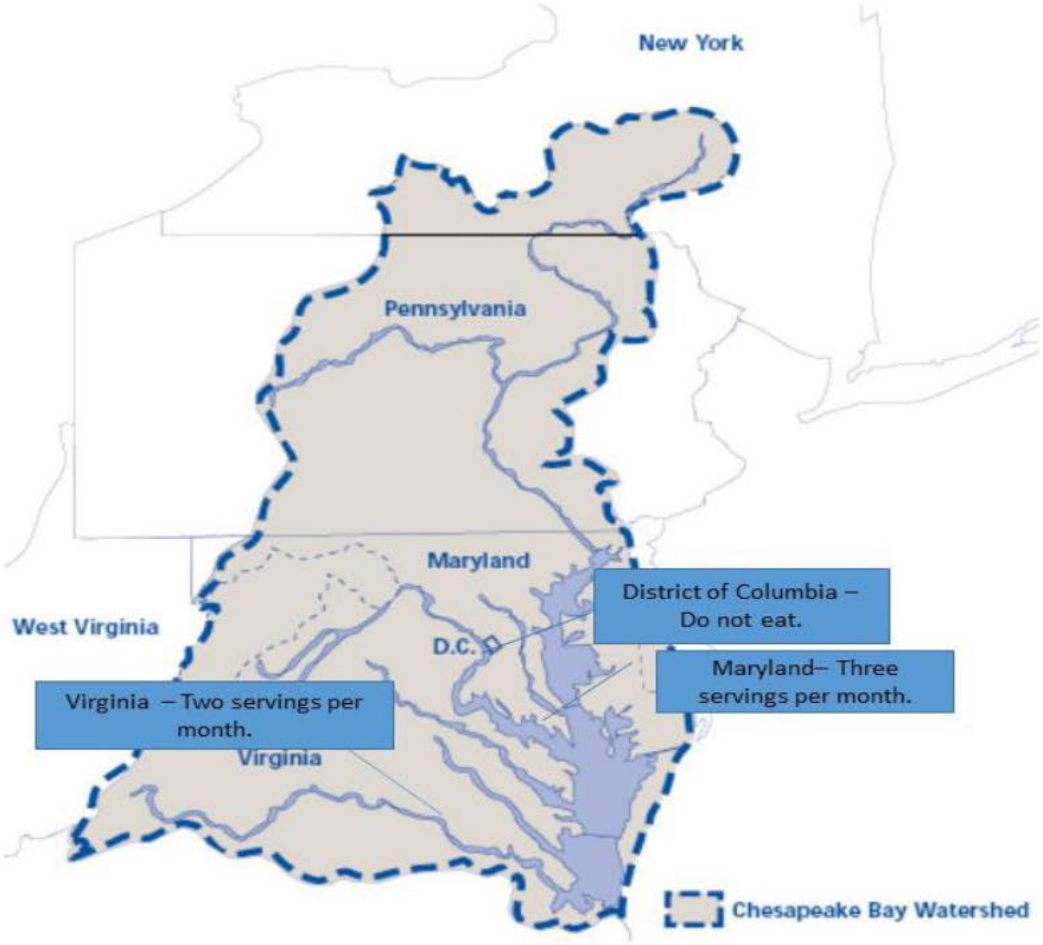
In 2002, the state of Alabama used the FDA's action level of 1.0 ppm for mercury to establish its fish consumption advisory instead of the EPA's recommended maximum level of 0.29 ppm. This meant the state's fish consumption advisory could allow methylmercury levels three times higher than the maximum levels recommended by the EPA. Under the CWA, Alabama should have used the EPA's value of 0.29 ppm or developed their own water quality standard for its fish advisories. Currently, all EPA Region 4 states, including Alabama, use the EPA's methylmercury consumption limits when developing fish advisories.

State-to-State Advisories Conflict

Fish advisories across state lines can conflict and lead to unclear advice. A single waterbody common to different states may have different fish advisories. For example, the fish advisories for polychlorinated biphenyls (PCBs) from Maryland to Virginia urge fishers to limit their consumption of the region's most popular catch—striped bass—because its flesh may contain traces of toxic substances acquired from other fish and the waters in which the fish swim.

Recommendations vary from "do not eat" for striped bass caught in the Washington, D.C., portion of the Chesapeake Bay's tidal rivers, to as many as three servings per month for the same fish caught in the Maryland portion of the Bay. Meanwhile, Virginia advises fishers to eat no more than two servings per month of striped bass caught in that state's end of the Chesapeake Bay. For Washington, D.C., Maryland and Virginia, the difference in consumption advice reflects the testing methods they use. (Figure 5).

Figure 5: Conflicting fish advisories in Maryland, Washington, D.C., and Virginia



Source: OIG developed, and based on the review of selected state and Washington, D.C., fish advisories.

Some Fish Advisories Are Complex and Difficult to Understand

States and tribes publish local fish advisories, but those advisories can be complex and difficult to understand. For example, in the Great Lakes region where 35 federally recognized tribes exist, the Bad River Advisory illustrates the challenge of creating a simple, easy-to-follow guide for fish consumption (Appendix A). The Bad River Advisory contains complicated information that a consumer would need to study and analyze. The advisory includes the following information:

- Two different maps and two different sets of instructions (one for high-risk and the other for low-risk segments of the populations).
- Different advisories for different lakes (dozens in total).
- Lake-by-lake recommendations on the maximum number of walleye meals to consume per month.

- A warning to adjust the number of walleye meals per month, depending on the size of portions consumed.
- A suggestion to bag and label walleye according to portion size and lake of origin before freezing the fish.
- A recommendation to avoid certain other fish species altogether.

For tribes that consume large quantities of self-caught fish, avoiding methylmercury overexposure requires navigating a myriad of complex advisory information. Through its leadership, the EPA can guide states and tribes to examples of clearly communicated fish advisories.

Minimal Information on Advisory Effectiveness

Fisherman preparing his line at the Santeetlah Reservoir in North Carolina. (EPA OIG photo)

The EPA, states and tribes have not consistently evaluated the effectiveness of fish advisory information that reaches targeted audiences. The EPA's 1995 *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories* recommends that states and tribes establish an evaluation component to help them determine whether their fish advisories succeed.[2] This guidance says that states and tribes can use evaluations to help (1) ensure that a health advisory communication program is designed to meet the needs of the target audiences and the objectives of the agency; (2) monitor whether the communication program is being implemented as intended; and (3) assess the extent to which audience needs and agency objectives have been met.

However, the majority of states and tribes do not have an evaluation system in place. Since the EPA issued its initial fish advisory guidance to states and tribes in 1995, the agency found that 24 states and no tribes have evaluated the effectiveness of their advisories on the public's awareness of the hazards associated with consuming fish contaminated by methylmercury.

Evaluations can identify areas where people do not receive the advisories, where advisory information is unclear, or where other factors may be essential to operating an effective risk communication program. Through its leadership and guidance, the EPA should continue to encourage state and tribe evaluation efforts,

[2] The EPA's Office of Water, Office of Science and Technology. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories*, Volume 4: Risk Communication. February 1995.

and provide examples or templates that can be used to establish and operate effective evaluation programs.

Ensuring That Consumption Advice Uses Up-to-Date Science

The EPA's 2001 reference dose for methylmercury is an agency-supported value that remains accepted by EPA for decision-making. However, the current reference dose does not include recent epidemiological studies on mercury health effects. Since the EPA established the current RfD 15 years ago, several new scientific studies relating to the impacts of methylmercury on human health have emerged and added new information to the scientific literature.

We interviewed the research scientist whose work contributed to the EPA's original RfD. He stated that although the present RfD was acceptable because it was based on the best available science in 2001, the RfD is in need of an assessment because additional scientific research has been completed. We also interviewed another research scientist who made several contributions to the EPA's National Fish Forum in 2014. He also indicated the RfD was in need of an assessment and identified 22 additional epidemiological studies related to the impacts of methylmercury on human health—studies that were conducted between 2001 and 2015 (Appendix B). According to these scientists, the studies present up-to-date scientific research on the impacts of methylmercury and may provide relevant information for the development of a revised RfD. Figure 6 illustrates how the RfD is used to calculate the ambient water quality criterion (AWQC).

Based on its Integrated Risk Information System, the EPA included methylmercury on its 2012 agenda for assessment to begin in fiscal year 2014, and on its 2015 agenda as a priority for assessment. However, to date, the agency has not started the assessment.

Because the RfD serves as a primary scientific risk assessment factor for deriving the AWQC, and ultimately determining the content of fish advisories, if the RfD is too high, the resulting water quality standards and fish advisory information may not be protective. On the other hand, if the RfD is too restrictive, limiting fish consumption may also limit the nutritional benefits of fish consumption. Moreover, the EPA's RfD is used by other federal agencies, states, local health departments, tribes and other local entities to determine human health impacts; determine waterbody impairments; and develop local water quality criteria.

Figure 6: Formula that the EPA, states and tribes use to develop ambient water quality criterion

The generalized equations for deriving AWQC based on noncancer effects are:

$$AWQC = RfD \cdot RSC \cdot \left(\frac{BW}{DI + \sum_{i=2}^{n} (FI_i \cdot BAF_i)} \right)$$

AWQC = Ambient Water Quality Criterion (mg/L, or milligrams/Liter)
RfD = Reference dose for noncancer effects (mg/kg-day, or milligram/kilogram-day)
RSC = Relative source contribution factor to account for non-water sources of exposure
BW = Human body weight (default = 70 kg for adults)
DI = Drinking water intake (default = 2 L/day for adults)
FI = Fish intake (defaults = 0.0175 kg/day for general population and sport anglers, and 0.142 kg/day for subsistence fishers)
BAF = Bioaccumulation factor, lipid normalized (L/kg)

Source: EPA Methodology for Deriving Ambient Water Quality Criterion for the Protection of Human Health (2000).

Without effectively developed and communicated fish advisories, consumers may be exposed to unsafe levels of methylmercury through the consumption of fish. The EPA shares the responsibility of protecting public health and the environment from methylmercury contamination with states and tribes. The criteria and standards that the EPA develops and approves should ensure that the CWA's goal of "fishable" waters is obtained, and that fish advisories are based on the best available science and are routinely evaluated to determine their effectiveness.

Conclusion

Based on its mission to protect human health, and its responsibilities under the CWA and EPA's Indian Policy, the EPA should take a leadership role in guiding and working with states and tribes to develop and distribute fish advisories that provide meaningful information that reaches all segments of the public. The EPA can act as a bridge connecting federal agencies, states and tribes to ensure that risk communication efforts are effective in providing the public with relevant information to help make healthy fish consumption choices.

Recommendations

We recommend that the Assistant Administrator for Water:

1. Provide updated guidance to states and tribes on clear and effective risk communication methods for fish advisories, especially for high-risk groups. This guidance could recommend posting fish advisory information at locations where fish are caught; and using up-to-date communication methods that include social media, webinars, emails, newsletters, etc.

2. Working with states and tribes, develop and disseminate best practices they can use to evaluate the effectiveness of fish advisories in providing risk information to subpopulations, such as subsistence fishers, tribes and other high fish-consuming groups.

3. Develop and implement methods to ensure that tribal members receive current fish advisory information.

We recommend that the Assistant Administrator for Research and Development:

4. Conduct an assessment for methylmercury to determine whether the reference dose requires updating, as indicated by the Integrated Risk Information System, and as proposed in the system's 2012 and 2015 agendas.

Agency Response and OIG Evaluation

The EPA provided a consolidated response from Acting Assistant Administrators for the Office of Water, and the Office of Research and Development. We met with agency staff to discuss their comments, and we made changes to the report as appropriate.

The agency agreed with all final report recommendations, and provided acceptable corrective actions and projected completion dates. The full agency response can be found in Appendix C. All recommendations are resolved with corrective actions pending.

Status of Recommendations and Potential Monetary Benefits

RECOMMENDATIONS

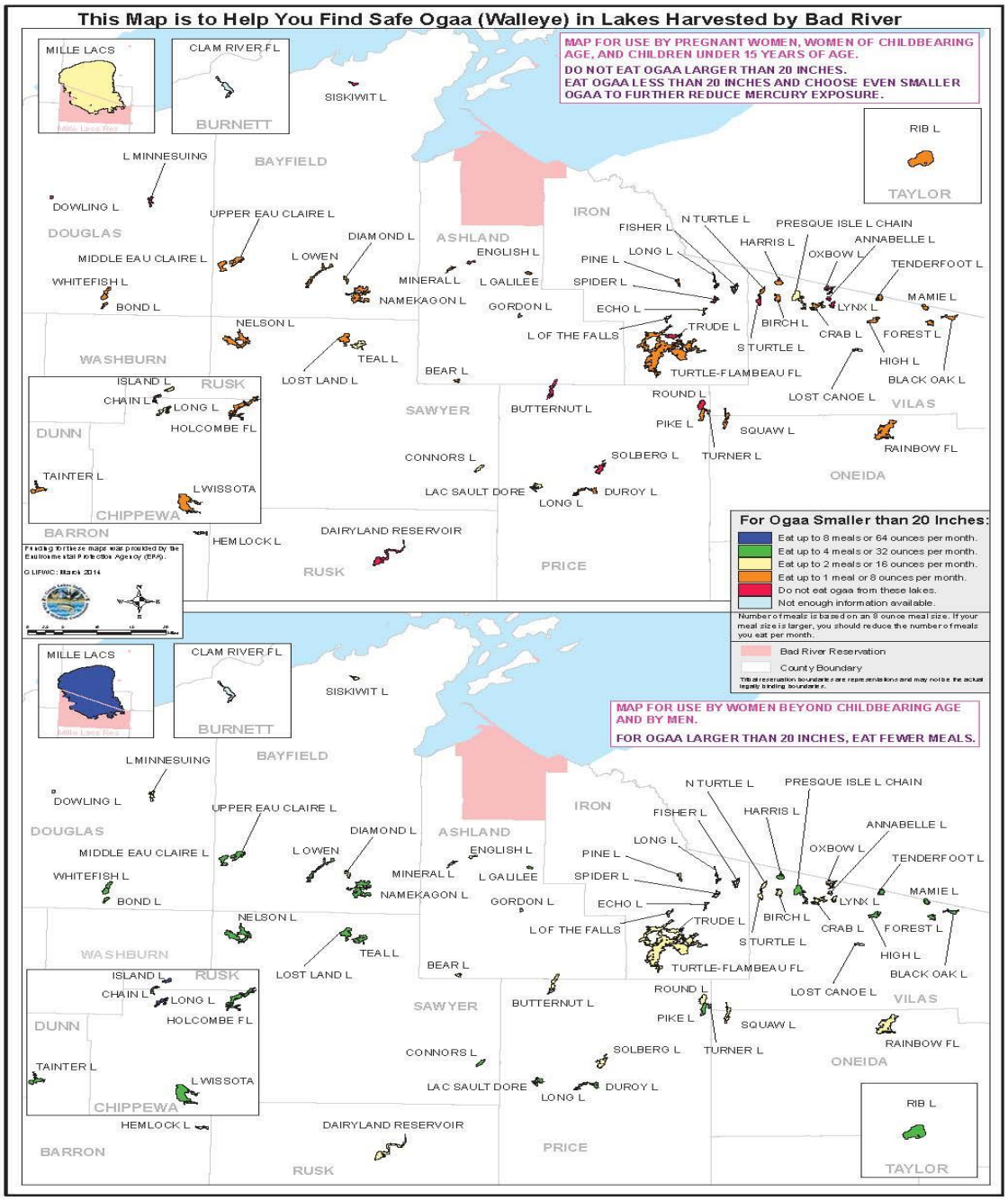
Rec. No.	Page No.	Subject	Status[1]	Action Official	Planned Completion Date	Potential Monetary Benefits (in $000s)
1	17	Provide updated guidance to states and tribes on clear and effective risk communication methods for fish advisories, especially for high-risk groups. This guidance could recommend posting fish advisory information at locations where fish are caught; and using up-to-date communication methods that include social media, webinars, emails, newsletters, etc.	R	Assistant Administrator for Water	Draft 9/30/2018 Final 3/31/2020	
2	17	Working with states and tribes, develop and disseminate best practices they can use to evaluate the effectiveness of fish advisories in providing risk information to subpopulations, such as subsistence fishers, tribes and other high fish-consuming groups.	R	Assistant Administrator for Water	Draft 9/30/2018 Final 3/30/2020	
3	17	Develop and implement methods to ensure that tribal members receive current fish advisory information.	R	Assistant Administrator for Water	09/30/2017	
4	17	Conduct an assessment for methylmercury to determine whether the reference dose requires updating, as indicated by the Integrated Risk Information System, and as proposed in the system's 2012 and 2015 agendas.	R	Assistant Administrator for Research and Development	12/31/2018	

[1] C = Corrective action completed.
R = Recommendation resolved with corrective action pending.
U = Recommendation unresolved with resolution efforts in progress.

Appendix A

Mercury Fish Advisory for Bad River Band of Lake Superior Chippewa Tribe

Page 1 of 2



Recommended Maximum Number of Ogaa Meals per Month for Lakes Harvested by Bad River

SORTING AND LABELING *OGAA* PRIOR TO FREEZING

When Cleaning *Ogaa*:

- Put *ogaa* under 20 inches in bags labeled "under 20 inches."
- Put *ogaa* over 20 inches in bags labeled "over 20 inches."
- Label bags with the lake name.
- Follow the advice below for maximum number of meals per month.

USING THIS CHART TO FIND SAFER *GIIGOONH*

MAXIMUM NUMBER OF MEALS PER MONTH

Advice is for all lakes combined. For example, if you eat four meals in a month from green lakes you should not eat any other meals of *ogaa* in that month.

MEAL SIZE

Meal size is based on 8 ounces. An average 19 inch *ogaa* will have 8 ounces of meat. If your meal size is larger you should eat fewer meals of *ogaa*. If it is smaller you can eat more meals of *ogaa*.

OTHER *GIIGOONH*

Giigoonh such as muskellunge, largemouth bass, smallmouth bass, and northern pike will have more mercury than *giigoonh* such as lake whitefish, herring, bluegill, sunfish, crappie or perch. Try to choose safer *giigoonh*.

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
ANNABELLE L	VILAS	0	2
BEAR L	ASHLAND	1	2
BIRCH L	VILAS	1	2
BLACK OAK L	VILAS	1	4
BOND L	DOUGLAS	1	4
BUTTERNUT L	PRICE	0	2
CHAIN L	RUSK	1	4
CLAM R FL	BURNETT	Not Enough Information	
CONNORS L	SAWYER	2	4
CRAB L	VILAS	1	2
DAIRYLAND RESERVOIR	RUSK	0	2
DIAMOND L	BAYFIELD	1	2
DOWLING L	DOUGLAS	0	2
DUROY L	PRICE	1	4
ECHO L	IRON	1	4
ENGLISH L	ASHLAND	0	2
FISHER L	IRON	Not Enough Information	
FOREST L	VILAS	1	4
GORDON L	ASHLAND	Not Enough Information	
HARRIS L	VILAS	1	4
HEMLOCK L	BARRON	Not Enough Information	
HIGH L	VILAS	1	4
HOLCOMBE FL	CHIPPEWA	1	4
ISLAND L	RUSK	2	8
L GALILEE	ASHLAND	1	4
L MINNESUING	DOUGLAS	0	2
L OF THE FALLS	IRON	Not Enough Information	
L OWEN	BAYFIELD	1	4
L WISSOTA	CHIPPEWA	1	4
LAC SAULT DORE	PRICE	2	4
LONG L	CHIPPEWA	2	8
LONG L	IRON	0	2

LAKE	COUNTY	Women of childbearing age and children less than 15: Maximum number of meals per month	Women beyond childbearing years and men 15 and older: Maximum number of meals per month
LONG L	PRICE	1	4
LOST CANOE L	VILAS	Not Enough Information	
LOST LAND L	SAWYER	1	4
LYNX L	VILAS	0	2
MAMIE L	VILAS	1	4
MIDDLE EAU CLAIRE L	BAYFIELD	1	4
MILLE LACS	MILLE LACS	2	8
MINERAL L	ASHLAND	1	2
N TURTLE L	VILAS	1	2
NAMEKAGON L	BAYFIELD	1	4
NELSON L	SAWYER	1	4
OXBOW L	VILAS	0	2
PIKE L	PRICE	1	4
PINE L	IRON	1	2
PRESQUE ISLE L CHAIN	VILAS	2	4
RAINBOW FL	ONEIDA	1	2
RIB L	TAYLOR	1	4
ROUND L	PRICE	0	2
STURTLE L	VILAS	0	2
SISKIWIT L	BAYFIELD	0	2
SOLBERG L	PRICE	0	2
SPIDER L	IRON	0	2
SQUAW L	VILAS	1	2
TAINTER L	DUNN	1	4
TEAL L	SAWYER	2	4
TENDERFOOT L	VILAS	1	4
TRUDE L	IRON	0	2
TURNER L	PRICE	1	4
TURTLE-FLAMBEAU FL	IRON	1	2
UPPER EAU CLAIRE L	BAYFIELD	1	4
WHITEFISH L	DOUGLAS	1	4

For many native people, *giigoonh* are part of a traditional and healthy diet. If you rely on *giigoonh*, choose safer *giigoonh* with lower levels of mercury by following the advice on this map.

RISKS AND BENEFITS

Risk: Mercury can damage the nervous system, especially the brain. Fetuses and babies are the most at risk because their nervous systems are rapidly developing. Children exposed to unsafe levels while in the womb have been found to experience delayed development in walking and talking, even though the mother was not affected. Mercury cannot be removed by trimming or cooking.

Benefit: Eating even as few as two to three meals of *giigoonh* a month may reduce your risk of death due to heart disease.

If you have questions about finding safer ogaa, call GLIFWC at 1-715-682-6619.
To learn more about mercury in ogaa, visit GLIFWC's website at www.glifwc.org/Mercury/mercury.html

Source: Supreme Court, Brief of *Amici Curiae* National Congress of American Indians, federally recognized Indian Tribes, and Inter-Tribal Fish Commissions in Support of Respondents.

Appendix B

Literature Review of Methylmercury Epidemiological Studies

We reviewed reports from health and environmental publications for information about potential public health and environmental impacts. Many additional studies have been conducted on the effects of eating fish contaminated with mercury since the EPA's methylmercury RfD dose was issued in 2001. Some of these studies are listed below.

- Boucher O, Jacobson SW, Plusquellec P, Dewailly É, Ayotte P, Forget-Dubois N, Jacobson JL, Muckle G. 2012. Prenatal Methylmercury, Postnatal Lead Exposure, and Evidence of Attention Deficit/Hyperactivity Disorder among Inuit Children in Arctic Québec. Environ Health Perspect 120:1456–1461; http://dx.doi.org/10.1289/ehp.1204976
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Agency Response to Draft Report

MEMORANDUM

SUBJECT: Response to Office of Inspector General Draft Report No. OPE-FY15-0061 — EPA Needs to Provide Leadership and Better Guidance to Improve Fish Advisory Risk Communications, dated December 2016

FROM: Michael Shapiro
Acting Assistant Administrator
Office of Water

Robert Kavlock
Acting Assistant Administrator
Office of Research and Development

TO: Carolyn Copper
Assistant Inspector General
Office of Inspector General

Thank you for the opportunity to respond to the issues and recommendations in the subject audit report. Following is a summary of the agency's overall position, along with its position on each of the report recommendations. We have provided high-level intended corrective actions and estimated completion dates to the extent we can. For your consideration, we have included a Technical Comments Attachment to supplement this response.

AGENCY'S OVERALL POSITION

EPA appreciates being provided with the opportunity to share the most current information on fish advisories and efforts to reevaluate the oral reference dose (RfD) for methylmercury. This response includes comments from the Office of Water (Headquarters; Regions 4, 5, 6, and 10; and the Great Lakes National Program Office) and the Office of Research and Development.

EPA generally agrees with the findings in this report, pending suggested changes noted in this memo and in a Technical Comments Attachment that corrects some errors we found during our review and suggests some clarifications. We have concerns with some of the OIG's recommendations and conclusions and believe modifications are needed to improve clarity and avoid a misrepresentation of both the fish advisory and IRIS processes. Adjusting the second, third and fourth recommendations as suggested will result in more meaningful corrective actions and ultimately, better public health protection for those who eat fish.

EPA would like to alert you to an example of recent leadership regarding fish advisory communications. EPA and FDA released their joint national-level fish advisory on January 18, 2017. This easy-to-understand advisory provides information for the high-risk groups of women of child-bearing age and children, and it is consistent with other federal messages, such as those found in the *2015-20 Dietary Guidelines for Americans*. We also appreciate your support for our leadership of the National Forum on Contaminants in Fish and our web-based advisory and technical resources which are included in the "Noteworthy Achievement" section of the report.

We request that you include the entirety of this response as an appendix to the OIG final report.

AGENCY'S RESPONSE TO REPORT RECOMMENDATIONS

Agreements

Recommendation 1: "Provide updated guidance to states and tribes on clear and effective risk communication methods for fish advisories, especially for high-risk groups. This guidance could recommend posting fish advisory information at locations where fish are caught; and using up-to-date communication methods that include social media, webinars, emails, newsletters, etc."

Response: Develop a draft updated version of *Volume 4: Risk Communication* of the *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories*.

Recommendation 2: "Working with states and tribes, develop and disseminate best practices they can use to measure the effectiveness of fish advisories in providing risk information to subpopulations, such as subsistence fishers, tribes and other high fish-consuming groups."

Response: EPA concurs with the end goal of the recommendation – making sure high-risk subpopulations receive information on risks of eating certain fish. EPA understands the benefits of evaluating the effectiveness of fish advisory programs and agrees that working with the states and tribes in that area would benefit the fish advisory programs as well as the fishing population.

Recommendation 3: "Develop and implement methods to ensure that tribal members receive current fish advisory information."

Response: EPA agrees with the goal of tribes receiving fish advisory information and thinks EPA can facilitate that communication.

Recommendation 4: "Conduct an assessment for methylmercury to determine whether the reference dose requires updating, as indicated by the Integrated Risk Information System, and as proposed in the system's 2012 and 2015 agendas."

Response: Following discussion with OIG, we have come to an understanding of OIG's use of the term "assessment" as presented in the existing recommendation. ORD generally concurs with the recommendation pending clarifications to the report language, including OIG conclusions as noted below and in the Technical Comments Attachment.

EPA disagrees with the OIG's conclusion that the EPA's oral RfD for methylmercury is overdue for an update because methylmercury was included as a priority in the 2012 and 2015 multi-year agendas. The OIG correctly reports that methylmercury was included in the 2015 multi-year agenda and was among the 6 chemicals listed as highest priority for evaluation. However, inclusion of a chemical on the multi-year agenda does not indicate a determination of whether any specific toxicity value, such as the RfD, requires updating. Importantly, IRIS has not yet determined that the RfD for methylmercury requires updating. Updating or reassessing a toxicity value within the IRIS assessment development process can be made after scoping (to identify Agency partner needs) and problem formulation (to frame scientific questions in the assessment) are conducted. Only then can a determination be made that the methylmercury RfD should be reassessed to update the reference dose (among other toxicity values).

In addition, EPA does not agree with the OIG determination that since the current RfD for methylmercury does not include recent epidemiological studies on mercury health effects, it is therefore overdue for reassessment. This presumption incorrectly focuses on making a determination whether the RfD requires updating based on the identification of selected scientific literature that post-dates the 2001 IRIS methylmercury RfD. We recognize that the publication of epidemiological studies on mercury health effects has added information to the scientific literature. However, the existence of new literature does not automatically trigger a need for a reassessment, nor does it necessarily discredit an existing IRIS value. Determination of whether new literature provides information that warrants reassessment of the RfD can be made after scoping and problem formulation are conducted.

Accordingly, ORD respectfully requests the OIG conclusions be clarified, as well as state that the IRIS Program has not yet made a determination on whether the RfD requires updating.

Actions and Timeframes to Respond to OIG Recommendations

No.	Recommendation (including proposed revision)	EPA Office	High-Level Intended Corrective Action(s)	Estimated Completion by Quarter and FY
1	Provide updated guidance to states and tribes on clear and effective risk communication methods for fish advisories, especially for high-risk groups. This guidance could recommend posting fish advisory information at locations where fish are caught; and using up-to-date communication methods that include social media, webinars, emails, newsletters, etc.	OW	Develop a draft updated version of *Volume 4: Risk Communication* of the *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories*. Release final version.	Draft: 4th Q FY2018 Final: 2nd Q FY2020
2	Working with states and tribes, develop and disseminate best practices they can use to measure the effectiveness of fish	OW	Develop draft guidance that identifies best practices to measure the	Draft: 4th Q FY2018

No.	Recommendation (including proposed revision)	EPA Office	High-Level Intended Corrective Action(s)	Estimated Completion by Quarter and FY
	advisories in providing risk information to subpopulations, such as subsistence fishers, tribes and other high fish-consuming groups.		effectiveness of fish advisories. Release final version.	 Final: 2nd Q FY2020
3	Develop and implement methods to ensure that tribal members receive current fish advisory information.	OW	Send EPA's fish advisory program newsletter to tribes. Work with Regions and OITA to share current fish advisory information with tribes.	3rd Q FY 2017 4th Q FY 2017
4	Conduct an assessment for methylmercury to determine whether the reference dose requires updating, as indicated by the Integrated Risk Information System, and as proposed in the system's 2012 and 2015 agendas.	ORD	Within the broader IRIS assessment development process, identification of whether a specific toxicity value (such as the reference dose) requires updating is accomplished following scoping and problem formulation. The IRIS Program will complete scoping and problem formulation for methylmercury and determine whether the reference dose needs to be updated.	1st Q FY 2019

CONTACT INFORMATION

If you have any questions regarding this response, please contact Laura Drummond, Audit Follow-up Coordinator of the Office of Water at 202-564-6561 or Drummond.laura@epa.gov or Maureen Hingeley, Audit Follow-up Coordinator of the Office of Research and Development at (202) 564-1306 or Hingeley.maureen@epa.gov .

Attachment

Technical Comments

CC: Arthur Elkins
Charles Sheehan
Benita Best-Wong
Tim Fontaine
Sharon Vazquez
Laura Drummond
Tina Bahadori
Louis D'Amico
Heather Cursio
Maureen Hingeley

Technical Comments Attachment

EPA Comments on the Draft December 2016 OIG Report: *EPA Needs to Provide Leadership and Better Guidance to Improve Fish Advisory Risk Communications*

The following table compiles errors and areas needing clarification found during the Office of Water's review of the draft report. Suggestions provided by the Office of Research and Development follow the table.

Page	Suggestion type	Suggestion and Rationale
2	Clarification	In the first sentence in the first paragraph of the *Human Health Effects From Mercur*y section, you may want to specify that the 2001 criterion is for methylmercury. EPA has more than 100 water quality criteria just to protect human health, with 60 more to protect aquatic life.
2	Clarification	In the second paragraph of the *Human Health Effects From Mercury* section, it discusses that the most frequently consumed commercial fish contain low levels of methylmercury, which is true. However, you may want to mention that 7 types of commercially available fish contain high levels of methylmercury, and women of childbearing age and young children should avoid eating them. It is not just wild-caught fish that have high levels of mercury.
2	Clarification	In the second paragraph of the *Human Health Effects From Mercury* section, please clarify that wild-caught fish may contain high levels of methylmercury depending on location, species, and size of the fish since methylmercury tends to be higher in older, larger, predatory species.
2	Correction	We suggest using an EPA source for average fish consumption rates in Figure 3. If that source is used, the Suquamish Tribe consumes 7.5 times more fish than the average population on a daily basis.
3	Correction	In Figure 3, we suggest using an EPA source for average fish consumption rates: *Estimated Fish Consumption Rates for the U.S. Population and Selected Subpopulations (NHANES 2003-2010)*, which can be found at https://www.epa.gov/fish-tech/estimated-fish-consumption-rates-reports. EPA has used a fish consumption rate of 22 grams per day, found in that document and is the freshwater and estuarine (or nearshore) 90th percentile rate for all consumers, in its human health criteria recommendations since 2015.
3	Correction	Non-national advisories are done at both the state and local levels, not just local. It is not uncommon to have state-wide advisories.
3	Correction	Neither EPA nor FDA has a statutory or regulatory requirement to issue a national-level fish advisory. The joint collaboration is a voluntary effort.
3	Clarification	The report indicates that EPA is responsible for local fish advisories. Fish consumption advisories are generally produced by state health departments, which are not the state environmental agencies EPA usually interacts with.
3	Correction	Water quality criteria, whether developed by EPA or the states, are not used to develop fish advisories. Instead, states and tribe use the reference dose for non-carcinogenic compounds like mercury and the cancer potency factor and the maximum acceptable risk level for carcinogenic compounds. The reference dose is used in an equation that calculates maximum allowable consumption

Page	Suggestion type	Suggestion and Rationale
		rates. Please see chapter 3 of *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories: Volume 2 - Risk Assessment and Fish Consumption Limits, Third Edition* for more information.
3-4	Correction	EPA establishes water quality criteria *recommendations*. States and tribes are not required to adopt EPA's recommendations; they can submit criteria for approval that they developed. Because criteria are not used in developing fish advisories, we recommend removing all text referring to water quality criteria and water quality standards, including Figure 4.
3	Correction	EPA's Office of Research and Development derives the contaminant toxicity values in IRIS that are used in fish advisories. Those toxicity values are not developed under the purview of the Clean Water Act.
3	Clarification	We recommend including a citation to CWA § 101(a)(2) when you first mention the goal of "fishable, swimmable" waters.
4	Correction	In Figure 4, EPA develops water quality standards for states and tribes only where the Administer determines they are necessary.
4	Correction	Water quality standards do not dictate the content of or need for fish advisories. While fish advisories and water quality criteria use similar risk assessment tools, a water quality criterion or standard does not trigger a fish advisory. An advisory is the amount of fish that can be safely consumed for a given contaminant level found in fish tissue from a particular waterbody. A water quality criterion is a regulatory value that specifies acceptable levels of a chemical in the nation's waters.
4	Typographic	"Protest" should be "protect."
4	Clarification	While states and tribes may use water quality criteria and water quality standards to develop fish consumption advisories, they are not obligated to and they often identify other action levels to use instead. In addition, water quality criteria are based on exposure from multiple sources whereas fish advisories focus solely on exposure from eating fish.
4	Clarification	EPA has not updated its searchable database of fish advisories since 2011.
5	Clarification	The topic of tribal treaty rights and fish consumption is a little more nuanced than as expressed in the third paragraph in the "EPA Responsibilities Under Federal Indian Policy" section. EPA suggests something like: "Many tribes consume higher amounts of fish and shellfish than the general population. Some tribes hold reserved rights to take fish for subsistence, ceremonial, religious, and commercial purposes, including in waters under state jurisdiction. Their consumption habits may or may not be affected by health warnings about contaminated fish." In addition to contamination, suppression may play a role in impeding treaty rights regarding fish. As noted by the National Environmental Justice Advisory Council in the 2002 publication *Fish Consumption and Environmental Justice*, ''a suppression effect may arise when fish upon which humans rely are no longer available in historical quantities (and kinds), such that humans are unable to catch and consume as much fish as they had or would. Such depleted

Page	Suggestion type	Suggestion and Rationale
		fisheries may result from a variety of affronts, including an aquatic environment that is contaminated, altered (due, among other things, to the presence of dams), overdrawn, and/or overfished. Were the fish not depleted, these people would consume fish at more robust baseline levels. . . . In the Pacific Northwest, for example, compromised aquatic ecosystems mean that fish are no longer available for tribal members to take, as they are entitled to do in exercise of their treaty rights.''
5	Correction	EPA does not have data to back up the statement that tribes "consume large amounts of contaminated fish." The levels of fish contamination vary by location, species of fish, age of the fish, size of the fish, and where it exists on the food chain. Cultural norms may influence consumption of fish species that are typically low in mercury. Tribal consumption of fish may be low because of lifestyle changes from a historical fishing-dependent lifestyle, restrictions to accessing waterways, and other factors that may reduce tribal fish consumption rates.
7	Typographic	The sentence at the top of the page needs a period.
7	Correction	The last paragraph should be corrected to reflect that neither FDA nor EPA have regulatory requirements to conduct the national fish advisory.
7	Typographic	The sentence at the bottom of the page needs a period. In addition, it restates the assertion that the OIG did not evaluate contaminants other than methylmercury, which was stated two paragraphs earlier.
8	Correction	Like the comment on a similar sentence on page 5, EPA does not have data to back up the statement that "subsistence fishers consume large amounts of contaminated fish without health warnings."
8	Clarification	In the first paragraph in the "Results" section, it would be clearer to state that only about half have adequately evaluated the effectiveness of their advisories. We would like the OIG to provide a listing of these states as an appendix to the report.
8	Clarification	While the RfD is important in developing water quality standards, because standards are not used to develop fish advisories, it would be less confusing if the statement "Because of its importance in developing water quality standards" was deleted.
8	Clarification	Is the fisher in the photo truly a subsistence fisher or just a recreational one?
8	Typographic	In the last paragraph, "group" needs an "s".
8-9	Clarification	It would be helpful to identify specific situations where tribes do not receive advisory information. In some areas of the country (e.g., the Pacific Northwest), all of the tribes are very aware of contaminants in the water. However, some tribal members may decide that spiritual, cultural, and economic reasons for eating fish outweigh the risk any contaminants pose.
9	Typographic	In the third paragraph, "effected" should be "affected."
10	Clarification	In the "Tribes Do Not Receive State Advisory Information" section, it would be helpful and more balanced to mention that EPA describes new and revised advisories that are posted by states in its monthly *Fish and Shellfish Program Newsletter*. Currently about one dozen tribes receive the newsletter.

Page	Suggestion type	Suggestion and Rationale
10-12	Clarification	In the "Advisories Provide Conflicting . . . Advice" section, it is entirely appropriate that fish advisories for specific fish and waterbodies should differ from advice regarding consumption of fish on a national scale. Contaminant levels within particular waterbodies differ, and these differences result in different advisories.
11	Clarification	While technically the national-level effort by FDA and EPA is an advisory, the agencies refer to it as "advice" to reduce its likelihood to scare the general public.
11	Correction	The joint FDA-EPA advice is not exclusive to commercial fish. It also mentions locally caught fish and tells people to look for local advisories and what to do if they can't find advisory information.
11	Correction	EPA disagrees that the federal agencies publishing the fish advice, dietary guidelines, and toxicity levels deliver conflicting information. The reason FDA and EPA issue the fish advice jointly is to eliminate potential confusion by the public from potentially conflicting information from agencies with different missions. When USDA and HHS were developing the *Dietary Guidelines 2015-20*, they were in touch with FDA and EPA to make sure that the information in the Dietary Guidelines did not conflict with the joint fish advice and that both products were delivering a consistent message. See https://www.epa.gov/fish-tech/epa-fda-advice-about-eating-fish-and-shellfish.
11	Clarification	EPA does not see the importance of the point regarding FDA's action level and EPA's screening values as it is unlikely the general public knows about these values. More importantly, the public has access to and will easily understand the updated joint FDA-EPA fish advice, of which the most recent version is clear and easy to understand.
11	Correction	There is no federal statute or regulation that requires consumption restrictions for the average consumer if mercury concentrations in fish exceed a certain level.
11	Correction	There is a fundamental misunderstanding about the methylmercury criterion (0.3 ppm) and fish advisories. The report falsely equates the methylmercury criterion with the fish tissue concentration that would generate an advisory. The 2010 implementation guidance for methylmercury explains how and why the criterion differs from a recommended screening value for a fish advisory limit for mercury in sections 5.4.3 and 5.4.4. In section 5.4.2 it states that someone eating fish at the average rate of consumption (17.5 g/d at the time) would not exceed the RfD for methylmercury if the fish tissue concentration were 0.4 mg/kg, not 0.3 ppm as stated in the report.
11	Clarification	A criterion is a regulatory value that does not balance risks and benefits; it is only concerned with preventing unacceptable risk. An advisory may consider benefits and risks when providing consumption advice.
11	Clarification	A screening value is the concentration of a contaminant in fish tissue that is of public health concern and is used as a threshold value against which tissue residue levels can be compared (p. 1-5, *Vol. 2: Risk Assessment and fish Consumption Limits*). The calculation of consumption limits is based upon

Page	Suggestion type	Suggestion and Rationale
		multiple factors – reference dose, body weight, meal size, time period, and contaminant concentration in fish tissue. The table of monthly consumption limits based on methylmercury (p. 4-5, Vol 2) shows that fish with concentrations of 0.049 ppm (a potential screening value for subsistence fishers) can be eaten 16 times per month, or approximately 4 times per week.
12	Correction	The Alabama example is incorrect – according to Region 4, the number should be 0.29 ppm (not 0.029), resulting in a level 3 times higher, not 30. In any case, the example is confusing. According to our guidance, a mercury level of 1 ppm should result in an advisory of 0.5 meals/month or one meal every other month and 0.029 ppm is appropriate for unlimited consumption. Without knowing what consumption limit Alabama set for that 1 ppm concentration, it is difficult to determine if it were inappropriate. In addition, it is unclear why the example is included since states can set their own risk levels and the last sentence implies that Alabama changed their consumption limits and is now consistent with all the other states in EPA Region 4.
12	Clarification	As stated in Section 5.4.2 of the implementation guidance for the methylmercury criterion, "Advisory limits can differ from one state or tribe to another. This inconsistency is due to a host of reasons, some of which speak to the flexibility states and authorized tribes have to use different assumptions (chemical concentrations, exposure scenarios and assumptions) to determine the necessity for issuing an advisory. The nonregulatory nature of fish advisories allows such agencies to choose the risk level deemed appropriate to more accurately reflect local fishing habits or to safely protect certain subpopulations (e.g., subsistence fishers)." Given the range of feasible policy choices that government agencies can make, it would not be surprising to find instances where state advisories differ.
12	Correction	The consumption restriction in Maryland and Virginia for striped bass is due to PCB contamination. The report repeatedly stresses it is focused solely on methylmercury, so EPA questions the inclusion of this example.
12	Correction	The Chesapeake Bay is not a homogeneous body of water and as such is not a good example to use for "conflicting" advisories. Contamination occurs in "hot spots" and different rivers (with differing mercury concentration levels) feed into different sections of the bay, so it would not be unusual to have different consumption rate recommendations in different parts of the bay as shown in Figure 5.
13	Correction	The Florida example is not one where tribe and state advisories disagree; from the way it is written it sounds like it is an example of a tribe not getting fish advisory information. Please consider including a better or clearer example.
13	Clarification	The Florida example is confusing for another reason. An advisory identifies the amount of fish that can be safely consumed given a particular level of contamination. The advisory is not affected by the consumption patterns of different groups that may consume fish from the waterbody. If one group eats fish at a rate higher than the advisory, it has unacceptable risk. If another group

Page	Suggestion type	Suggestion and Rationale
		eats fish at a lower rate than the advisory, then its risks is acceptable. The advisory does not change based on potential audiences.
15	Correction	24 evaluations, almost half of U.S. states, is not "few states or tribes." As stated earlier, EPA requests a list of those states in an appendix to the final report.
15	Clarification	EPA regions and program offices actively engage and collaborate with state and tribal fish advisory programs. For example, the Great Lakes National Program Office has funded activities that assess the efficiency of fish consumption messaging to different populations within the Great Lakes basin. In addition, GLNPO is funding a "point in time" survey which will assess knowledge and understanding of fish advisories across the basin. Region 10 has some success stories where effective advisories have and are being developed, for example at the Palos Verdes Superfund site (http://journals.sagepub.com/doi/abs/10.1080/15245000903528381) and the lower Duwamish Waterway (http://www.kingcounty.gov/depts/dnrp/newsroom/newsreleases/2014/September/09-30-Duwamish-Fisher-Survey.aspx).
15	Clarification	As a result of the EPA 2008-9 survey on the effectiveness of the Mississippi Delta fish advisory, which may be what the IG report is referring to in "EPA examined this question in 2010", Mississippi used the survey results to improve their outreach campaigns in the Delta.
15-16	Correction	As noted previously, the water quality criterion for methylmercury is not used in developing fish advisories, so suggest removing Figure 6 and the sentence referencing it on page 15. Similarly, please remove "ultimately" in the paragraph after Figure 6 to unlink the AWQC and fish advisories. To reduce confusion, you could delete all references to water quality criteria and standards in that paragraph.
16	Correction	Because fish advisories do not rely on water quality criteria, it would be more relevant to the report to include the equations used in fish advisories. See Equation 3-3 in EPA's *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories: Volume 2 - Risk Assessment and Fish Consumption Limits, Third Edition*.
16	Clarification	If a health department wishes to balance the benefits of fish consumption with risk, it may do so as a risk management decision so any perceived leniency or restrictiveness of the RfD could be compensated for in the advisory.

Technical Comments from the Office of Research and Development

At A Glance

"We also found that the EPA's 2001 oral reference dose (RfD) for methylmercury is overdue for review. Through its Integrated Risk Information System (IRIS), the EPA has recognized the need to revise its 2001 RfD for methylmercury, and the agency proposed a revision in 2012 and again in 2015." (What We Found)

These sentences are not accurate. Addition of a chemical to the IRIS agenda does not constitute starting the assessment. Projected start dates are subject to change depending on Agency resources and priorities, and should not be used to determine whether an assessment has begun development, or if an assessment is overdue. Inclusion of a chemical on the agenda does not indicate whether any specific toxicity value has been identified as needed to be revised.

Suggested Revision: ORD suggests replacing these two sentences with: "EPA included methylmercury on its 2012 and 2015 agendas for the Integrated Risk Information System (IRIS) Program. Although the EPA's 2001 RfD for methylmercury is an agency-supported value that remains accepted by EPA for decision-making…"

"We recommend that the EPA's Office of Research and Development conduct an assessment for methylmercury to determine whether the reference dose requires updating as proposed in the 2012 and 2015 IRIS agendas." (Recommendations)

As discussed earlier in the memorandum, the recommendation should be clarified to indicate when in the assessment development process the determination is made whether a specific toxicity value (in this case, the RfD) may be impacted by new literature and a reassessment is warranted.

Suggested Revision: ORD suggests replacing this sentence with "We recommend that the EPA's Office of Research and Development conduct scoping and problem formulation to determine whether a reassessment to update the reference dose is required, consistent with methylmercury's inclusion in the IRIS Program's 2012 and 2015 agendas."

Report

Page 7: The Scope and Methodology section should be clarified to indicate that it did not include an evaluation of the IRIS assessment development process, or the process for developing the IRIS 2015 multi-year agenda, which was developed with extensive involvement of the program and regional offices to reflect their priority needs.

Suggested Revision: ORD suggests adding language to Scope and Methodology section that includes: "the scope of our work did not include an evaluation of the IRIS assessment development process, or the process for developing the IRIS 2015 multi-year agenda."

Page 8: The report states: "The EPA's 2001 oral reference dose (RFD) for methylmercury is overdue for review. Through its Integrated Risk Information System (IRIS) process, the EPA has recognized that a revision of the methylmercury RfD is due, but to date the revision process has not started." As noted earlier, the IRIS assessment for methylmercury is not overdue. Addition of a chemical to the IRIS agenda does not constitute starting the assessment. Projected start dates are subject to change depending on Agency resources and priorities, and should not be used to determine whether an assessment has begun development, or if an assessment is overdue. Inclusion of a chemical on the agenda does not indicate whether any specific toxicity value has been identified as needed to be revised.

Suggested Revision: ORD suggests replacing these two sentences with: "The publication of epidemiological studies on mercury health effects has added information to the scientific literature. ORD should determine whether this and other new literature would warrant a reassessment to update the 2001 oral reference dose (RfD) for methylmercury."

Page 15: The report includes a section titled *"Consumption Advice Is Not Based on Up-to-Date Science"* which is misleading and could be interpreted as undermining the current RfD. The availability of new literature published after the 2001 RfD does not indicate that the value or the science is outdated, nor does it automatically trigger a need for a reassessment or discredit an existing IRIS value. This misrepresents the scientific approaches used to develop toxicity values such as RfDs. Determination of whether new literature provides information that warrants reassessment of the RfD can be made after scoping and problem formulation are conducted.
Suggested Revision: ORD suggests revising this title as follows: "Ensuring Up-to-Date Science for Consumption Advice."
Page 15: The OIG evaluation's scope including OIG interviews with two scientists did not include a comprehensive evaluation of the methylmercury literature. As noted in the report, the scientists indicate their studies *"**may** [emphasis added] provide relevant information for the development of a revised RfD."* The existence of new literature does not automatically trigger a need for a reassessment, nor does it discredit an existing IRIS value.

Suggested Revision: ORD requests that additional text be included that clarifies the limitations and uncertainties in the analysis of selected references for methylmercury.

Page 15: In the report, OIG states, *"Through its IRIS process, the EPA recognized that a revision of the methylmercury RfD is due. In 2012, the EPA included methylmercury on its IRIS agenda for revision by the end of fiscal year 2014, but this did not occur."* As noted previously, inclusion of a chemical on the IRIS agenda does not constitute a determination that a specific toxicity value need to be updated. Additionally, projected start dates are subject to change depending on the Agency's resources and priorities, and should not be used to determine whether an assessment has begun development, or if an assessment is overdue.

Suggested Revision: ORD suggests revising these sentences as follows: "Through its IRIS process, EPA prioritized initiating a number of assessments, including methylmercury, as indicated by the IRIS 2015 agenda."

Page 21: Bullet 1 is an incomplete citation.

Suggested Revision: Boucher O, Jacobson SW, Plusquellec P, Dewailly É, Ayotte P, Forget-Dubois N, Jacobson JL, Muckle G. 2012. Prenatal Methylmercury, Postnatal Lead Exposure, and Evidence of Attention Deficit/Hyperactivity Disorder among Inuit Children in Arctic Québec. Environ Health Perspect 120:1456–1461; http://dx.doi.org/10.1289/ehp.1204976

Page 21: Bullet 3 is a citation for a conference presentation. Presentations and posters are not peer reviewed, and would not inform the development of an IRIS assessment.

Suggested Revision: Please remove citation.

Page 21: Bullet 6 is an incomplete citation.

Suggested Revision: Jedrychowski W, Jankowski J, Flak E, Skarupa A, Mroz E, Sochacka-Tatara E, Lisowska-Miszczyk I, Szpanowska-Wohn A, Rauh V, Skolicki Z, Kaim I, Perera F. 2006. Effects of prenatal exposure to mercury on cognitive and psychomotor function in one-year-old infants: epidemiologic cohort study in Poland. Ann Epidemiol. 16(6): 439-47.

Page 21: Bullet 8 includes two references, one incomplete.

Suggested Revision: Tai F. Fok, Hugh S. Lam, Pak C. Ng, Alexander S.K. Yip, Ngai C. Sin, Iris H.S. Chan, Goldie J.S. Gu, Hung K. So, Eric M.C. Wong, Christopher W.K. Lam. 2007. Fetal methylmercury exposure as measured by cord blood mercury concentrations in a mother–infant cohort in Hong Kong. Environ. Int. 33(1) 84-92.

Page 21: Bullet 9 is an incomplete citation.

Suggested Revision: Lederman, S. A., Jones, R. L., Caldwell, K. L., Rauh, V., Sheets, S. E., Tang, D., … Perera, F. P. (2008). Relation between Cord Blood Mercury Levels and Early Child Development in a World Trade Center Cohort. Environmental Health Perspectives, 116(8), 1085–1091. http://doi.org/10.1289/ehp.10831.

Page 22: Bullet 1 is an incomplete citation.

Suggested Revision: Katsuyuki Murata, Pál Weihe, Esben Budtz-Jørgensen, Poul J Jørgensen, Philippe Grandjean. 2004. Delayed brainstem auditory evoked potential latencies in 14-year-old children exposed to methylmercury. J. Pediatrics. 144(2) 177-183.

Page 22: Bullet 3 is an incomplete citation.

Suggested Revision: Oken, E., Guthrie, L. B., Bloomingdale, A., Platek, D. N., Price, S., Haines, J., … Wright, R. O. (2013). A pilot randomized controlled trial to promote healthful fish consumption during pregnancy: The Food for Thought Study. *Nutrition Journal*, *12*, 33. http://doi.org/10.1186/1475-2891-12-33.

Page 22: Bullet 4 is an incomplete citation.

Suggested Revision: Oken, E., Radesky, J. S., Wright, R. O., Bellinger, D. C., Amarasiriwardena, C. J., Kleinman, K. P., … Gillman, M. W. (2008). Maternal fish intake during pregnancy, blood mercury, and child cognition at age 3 years in a US cohort. American Journal of Epidemiology, 167(10), 1171–1181. http://doi.org/10.1093/aje/kwn034.

Page 22: Bullet 5 is an incomplete citation.

Suggested Revision: Oken, E., Wright, R. O., Kleinman, K. P., Bellinger, D., Amarasiriwardena, C. J., Hu, H., … Gillman, M. W. (2005). Maternal Fish Consumption, Hair Mercury, and Infant

Cognition in a U.S. Cohort. Environmental Health Perspectives, 113(10), 1376–1380. http://doi.org/10.1289/ehp.8041.

Page 22: Bullet 6 is an incomplete citation.

Suggested Revision: Orenstein ST, Thurston SW, Bellinger DC, Schwartz JD, Amarasiriwardena CJ, Altshul LM, Korrick SA. 2014. Prenatal organochlorine and methylmercury exposure and memory and learning in school-age children in communities near the New Bedford Harbor Superfund Site, Massachusetts. Environ Health Perspect 122:1253–1259; http://dx.doi.org/10.1289/ehp.1307804.

Page 22: Bullet 7 is an incomplete citation.

Suggested Revision: Sagiv, S. K., Thurston, S. W., Bellinger, D. C., Amarasiriwardena, C., & Korrick, S. A. (2012). Prenatal exposure to mercury and fish consumption during pregnancy and ADHD-related behavior in children. Archives of Pediatrics & Adolescent Medicine, 166(12), 1123–1131. http://doi.org/10.1001/archpediatrics.2012.1286.

Page 22: Bullet 9 is an incomplete citation. Only the authors are listed and not the data source.

Suggested Revision: Identify the appropriate source.

Page 22: Bullet 10 has a typo.

Suggested Revision: Should be “93-99,” not “93e99.”

Appendix D

Distribution

The Administrator
Assistant Administrator for Water
Assistant Administrator for Research and Development
Assistant Administrator for International and Tribal Affairs
Regional Administrator, Region 4
Regional Administrator, Region 5
Regional Administrator, Region 10
Agency Follow-Up Official (the CFO)
Agency Follow-Up Coordinator
General Counsel
Associate Administrator for Congressional and Intergovernmental Relations
Associate Administrator for Public Affairs
Principal Deputy Assistant Administrator, Office of Water
Associate Director for Science, Office of Research and Development
Principal Deputy Assistant Administrator, Office of International and Tribal Affairs
Deputy Assistant Administrator for Management, Office of Research and Development
Deputy Regional Administrator, Region 4
Deputy Regional Administrator, Region 5
Deputy Regional Administrator, Region 10
Audit Follow-Up Coordinator, Office of the Administrator
Audit Follow-Up Coordinator, Office of Water
Audit Follow-Up Coordinator, Office of Research and Development
Audit Follow-Up Coordinator, Office of International and Tribal Affairs
Audit Follow-Up Coordinator, Region 4
Audit Follow-Up Coordinator, Region 5
Audit Follow-Up Coordinator, Region 10

Wed Apr 12 11:47:45 EDT 2017
Hope.Brian@epamail.epa.gov
FW: NCBA and PLC thank President Trump for WOTUS Executive Order
To: CMS.OEX@epamail.epa.gov

DRF

From: Scott Yager [mailto:syager@beef.org]
Sent: Wednesday, April 12, 2017 9:27 AM
To: (b) (6)
Cc: Pruitt, Scott <Pruitt.Scott@epa.gov>; Greenwalt, Sarah <greenwalt.sarah@epa.gov>
Subject: NCBA and PLC thank President Trump for WOTUS Executive Order

Michael and Ray,

Please find attached NCBA and PLC's letter to President Trump applauding his Executive Order to rescind and/or revise the 2015 WOTUS Rule. This continues to be an extremely important issue to our country's cattle producers and we look forward to engaging with Administrator Pruitt to develop a new rule that works for cattle producers, protects water quality, and follows the rule of law.

Scott Yager

Environmental Counsel

National Cattlemen's Beef Association

1275 Pennsylvania Ave, NW Suite 801

Washington DC, 20004

202-879-9102

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National Cattlemen's Beef Association
Cattlemen • Leadership • Solutions

PUBLIC LANDS COUNCIL

April 12, 2017

The Honorable Donald J. Trump
President of the United States
1600 Pennsylvania Avenue, NW
Washington, D.C. 20500

Dear Mr. President:

On behalf of American cattle producers, thank you for signing Executive Order 13778: Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the Waters of the United States Rule. Because of your leadership, the Environmental Protection Agency (EPA) is on track to undo an overly burdensome and unclear regulation that would impact many agricultural producers across the country.

The National Cattlemen s Beef Association (NCBA) is the cattle industry s largest and oldest national trade association, representing American cattle producers who provide much of the nation s food supply and manage a large part of America s private property. The Public Lands Council (PLC) is the national organization dedicated to the representation of nearly 22,000 ranchers who operate on federal lands.

Your Executive Order was an essential first step, providing clear direction to EPA to rescind and or revise the WOTUS Rule. And until formal regulatory action is taken to withdraw the WOTUS Rule, this overreaching Obama-era regulation remains the rule of the land. Complete withdrawal that follows the requirements of the Administrative Procedure Act is necessary to ensure continued protection of American agriculture. Following the withdrawal of the WOTUS Rule, the EPA must create a new rule that clarifies the extent of jurisdiction under the Clean Water Act. This new rule should protect our nation s waters, follow the rule of law, and provide clarity to America s farmers and ranchers.

Thank you for working hard to protect one of America s most vital food-producing professions. By signing the executive order, you have taken a strong measure to safeguard the success of cattle producers and rural America. With your leadership, America s farmers and ranchers can continue working hard every day to produce the world s best beef. NCBA and PLC look forward to working with your Administration on this important issue.

Sincerely,

Craig Uden
President
National Cattlemen s Beef Association

David Eliason
President
Public Lands Council

cc: The Honorable Scott Pruitt, Administrator, United States Environmental Protection Agency

The Honorable Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, D.C. 20460

Dear Mr. Pruitt,

As someone who cares deeply about animal welfare and safety, I urge the Environmental Protection Agency to do everything it can to replace animal tests. It is encouraging that innovative alternative test methods offer an efficient and humane substitute. Please implement programs to spare animals from wasteful, unnecessary, painful testing.

Please do this for innocent animals!

Signature: Sandra D. Baker Date: April 6, 2017

Sandra Baker, 255 Stratford Ln, Xenia OH 45385-8961

American Heart Association
B
Supporter

Sandra Baker
[redacted] (b) (6)

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The Honorable Scott Pruitt, Administrator
Environmental Protection Agency
1200 Pennsylvania Ave, NW
Washington, D.C. 20460

20460-

April 3, 2017

(b) (6) [redacted]
[redacted]

RECEIVED
2017 APR 10 AM 11:35
OFFICE OF THE
EXECUTIVE SECRETARIAT

The Honorable Scott Pruitt
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Re: Keystone XL Pipeline

Dear Administrator Pruitt:

The purpose of this letter is to express concerns regarding the proposed implementation of the Keystone XL Pipeline to transport oil from the Canadian Province of Alberta through the United States. The impacts of the XL Pipeline go beyond U.S. territory into a neighboring country, and I respectfully submit the following comments.

In broad terms, my concerns focus on the regulatory review process for the Keystone XL Pipeline and Draft Supplemental Environmental Impact Statement (DSEIS) filed by the U.S. Department of State in 2013; public participation and transparency in that process, especially as it relates to affected indigenous groups; and, North American climate change strategies.

With respect to the regulatory review process, the Department of State's DSEIS was deemed inadequate by acting EPA Administrator Bob Perciasepe because it segmented the proposed project by stopping its assessment at the U.S. border with Canada, and does not consider the totality of the potential environmental impacts. As you know, the requirements of the National Environmental Policy Act (NEPA) require federal agencies to assess the environmental interconnectedness and cumulative impacts of any proposed action. Public criticism of the DSEIS has focused on its lack of information on the effects of the proposed actions of extracting and transporting crude oil from the tar sand deposits in Alberta, including, but not limited to: the removal of boreal forests, elimination of habitat for threatened migratory birds, pollution of air and water resources, and greatly increased emissions of carbon dioxide and other green house gases which will contribute to climate change.

This situation is frustrating, insofar as Article 10 (7) of the North American Agreement on Environmental Cooperation (NAAEC) requires the Commission on Environmental Cooperation and its Council members to develop recommendations

regarding the Transboundary Environmental Impact Assessment (TEIA) of proposed projects. Yet, almost twenty years after signing the agreement, there is no protocol to evaluate a project with the potential for such significant adverse impacts as the Keystone XL Pipeline.

Another major concern relates to mechanisms that ensure public participation and transparency in that process, especially as it relates to affected indigenous groups and their special relationship to the affected lands and waters. A recent regulation requires the EPA to take into account Traditional Ecological Knowledge (TEK) when considering the impacts of this type of project.

Finally, the extraction and transport of crude oil from the Alberta tar sands will be a major contributor of carbon dioxide and other green house gases. I wish to draw your attention to the March 2013 report by President Obama's Council of Advisors on Science and Technology (PCAST), and two pertinent recommendations:

> **"(2) continue efforts to decarbonize the economy, with emphasis on the electricity sector;...**
> **(5) take additional steps to establish U.S. leadership on climate change internationally;...**
> - **Explore the possibility of a new North American climate agreement."...**

Insofar as Canada and Mexico are our largest trade and energy partners, the current debate over the Keystone XL Pipeline provides an opportunity for the U.S. to lead a continent-wide effort to create a market-based approach to emissions trading as a means to confront global climate change. A North American climate agreement would have important environmental and socio-economic benefits as well as to catalyze other countries to follow. A similar mechanism was recently proposed by the conservative Climate Leadership Council which would provide a carbon dividend to the public.

While I appreciate your stated opinion that many environmental issues should be addressed at the state level, an integrated approach with standard regulations to energy infrastructure and a carbon market across North America would be better than the state by state, or province by province currently extant. The business community would welcome the certainty of such an approach.

On a related topic, if a carbon emissions severance fee were set in place, the revenues generated by that fee could be directed into President Trump's proposed infrastructure

investment and form the base of support for much needed improvements to airports, highways, waterways, and other public works projects.

Recommendations:

- ***Define protocols for Transboundary Environmental Impact Assessments, especially if the NAFTA is renegotiated. Use the on-going review of the proposed Keystone XL Pipeline project as a test case for a TEIA mechanism.***
- ***Invite the input from the CEC Roster of Traditional Ecological Knowledge experts, re: potential impacts of the XL Pipeline on indigenous lands, waters and other cultural resources.***
- ***Initiate discussions toward the development a North American continent-wide, market-based framework for a North American emissions trading regime that can include emissions of carbon dioxide, sulfur dioxide and nitrogen oxides.***

In closing, I wish to express my appreciation for your consideration of these issues.

Cordially,

Brian L. Houseal

Houseal has worked on North American environmental issues since the initiation of NAFTA, assisting in the negotiations for the North American Agreement on Environmental Cooperation, consulting to the Commission on Environmental Cooperation, and serving a Chair of the EPA National Advisory Committee on North American environmental issues.

(b)(6)

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APR 10 2017

FCL 2035460

The Honorable Scott Pruitt
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

20460-

March 24, 2017

Dear Secretary Tillerson:

No, the Keystone and Dakota Pipelines are not necessary for any reason. We have been getting along just fine without them, thank you, but you would not know that since you do not leave your warm, secure, Greedy Entitled White Male bubble. So, since Greed is your native tongue, let's deal.

The lease to run the Keystone pipeline through Nebraska will cost $200 billion a year minimum with a 2% annual increase due to cost-of-living adjustment. The citizens of Nebraska get $100 billion divided evenly among those minimum 18 years old with one year or more permanent residency (some exclusions apply); $100 billion will be placed in the Nebraska Environmental Protection Fund. This is non-negotiable. Further discussion involves a state tax on companies which benefit from the pipeline. There is discussion in Nebraska to claim sales tax from internet purchases, so taxing companies that benefit but do not have a brick and mortar presence is not unprecedented.

It is not a question of 'if' the pipeline will fail, but when and these funds would protect the citizens who will bear the brunt of said failure. Do you remember the Exxon Valdez? Or perhaps the Gulf Oil Spill? Hello.....Hello??

These monies are necessary to offset the following:

1. To recoup the taxes that are being taken from residents to fund the rampant carnage of criminal activity in the Sanctuary City of Washington, DC.
2. To pay for bottled water due to degradation of the water supply.
3. To pay for increased food prices due to degradation of the food supply.
4. To pay for increased utility costs due to degradation of the environment resulting in higher utility bills.
5. To afford to live in a bubble just like you.

The state of Alaska has an oil wealth royalty payment fund for their citizens so an agreement such as the one to be created for Nebraska is also not unprecedented. However, the payment agreement has to be more due to the aforementioned degradation of the environment brought forth by your continued short term, reactive, monopolistic promotion of non-renewable carbon based fuels (OMG, that's oil! & coal!) leaves all our futures in doubt.

So, I see your Greed, and raise you; let the games begin.

Karen L. Vaughan

Karen Vaughan
(b) (6)

State Rights, Amendment 10 - you know a little bit about this, moving backwards - what a policy.

Cc:

Governor, Nebraska
NE US Senators BSasse, DFischer
ATransCanada
US President???
Omaha World Herald, NE

Senators, Nebraska State Legislature
NE US Reps. ASmith, DBacon, JFortenberry
350.org
EPA
Lincoln Journal Star, NE

(b) (6)

NORTH PLATTE NE 691

05 APR 2017 PM 1 T

APR 1 0 2017

FCL 2035260

EPA
Destructor Scott Pruitt
1200 Pennsylvania Ave NW
Washington, DC 20460

1/0/A

Wed Apr 12 15:05:33 EDT 2017
Hope.Brian@epamail.epa.gov
FW: yuhasz Brothers LLC
To: CMS.OEX@epamail.epa.gov

From: Danny Aulizia [mailto:danny@colebrookelevator.com]
Sent: Wednesday, April 12, 2017 2:50 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: yuhasz Brothers LLC

Please read attachment

TOM Yuhasz

T.Y.G.B. & J.Y, Inc. dba Colebrook Elevator

Yuhasz Bros, LLC

American Organic-Plus, Inc.

8549 State Route 46 S

Orwell, Ohio 44076

(440)422-3353 office

danny@colebrookelevator.com

Dear Mr.Scott Pruitt

We are a family-owned farm that has purchased a 1004 acre property in 2016 for a price of 3.7 million dollars. Yuhasz Brother has been farming since 1974 to the present. Yuhasz Brothers purchase this land to farm. So prior to purchase of the land NCRS present on the land. NRCS ask Yuhasz Brothers to provide pictures of tiling on land. Yuhasz Brothers took pictures and NCRS physically visited the property and viewed exposed tile on the property.

Now comes NRCS, EPA and Army Corp. due to regulations EPA has sent us a letter cease and desists of any farming on this property. As I stated this property was purchased for farming and certain portions of the property were historically wetlands, however much of the property was historically farmland.

Yuhasz Brothers seeks to plant crops this spring and to conduct farming. If we are not able to farm the farm land we will be in a position to loose this property due to regulations. Yuhasz Brothers have pictures of tiling historical photos from 1938- to present of land being farmed. The violation on this property was prior to Yuhasz Brothers taking ownership of property. I hope to hear your thoughts on these matters.

Please Contact Yuhasz Brothers at (440)-422-3353 or email danny@colebrookelevator.com

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 2 1 2017

REPLY TO THE ATTENTION OF
WW-16J

Mr. Tom Yuhasz
c/o Mr. Danny Aulizia
Colebrook Elevator
8549 State Route 46 South
Orwell, Ohio 44076

Dear Mr. Yuhasz:

This letter responds to your email correspondence to U.S. Environmental Protection Agency Administrator Scott Pruitt, received on April 12, 2017. As described in the attachment to your email message, Yuhasz Brothers, LLC purchased the 1004-acre site in 2016, with the intent to farm the property. The Cease and Desist Order you received was from the U.S. Army Corps of Engineers (Corps), not from the EPA. The Corps determined that fill material had been discharged into federally jurisdictional wetlands and streams at the site without the required authorization. The Cease and Desist Order did not prohibit you from farming non-wetland portions of the site. Instead, it ordered you "to cease any additional filling in areas that are within Department of the Army jurisdiction without proper authorization."

EPA understands your desire to plant crops and farm the site this spring. To accommodate your attorney's request for EPA to provide guidance on what we consider jurisdictional wetlands, representatives of EPA, the Corps, and Ohio EPA conducted an inspection of the site during the week of April 3, 2017. You and your consultant, EnviroScience, accompanied EPA during this inspection. As discussed with you during the site inspection, Corps authorization is not required for you to farm in non-wetland areas. We look forward to continued discussion on options available for you to farm your property while ensuring that the requirements of the Clean Water Act (CWA) are met.

Please contact Andrea Schaller if you have technical questions at (312) 886-0746 or schaller.andrea@epa.gov. Your attorney may contact Christopher Grubb with legal questions at (312) 886-7187 or grubb.christopher@epa.gov.

Sincerely,

Christopher Korleski
Director, Water Division

cc: Jonathan Winer, Winer Legal Services, LLC

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Wed Apr 12 15:06:57 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Thank you for the meeting
To: CMS.OEX@epamail.epa.gov

DRF

From: Toby Luther [mailto:tluther@lrtco.com]
Sent: Wednesday, April 12, 2017 2:29 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: Thank you for the meeting

Administrator Pruitt,

I wanted to thank you for taking the time last week to meet with a group of us from the National Alliance of Forest Owners. We were very encouraged by the meeting and I wanted to personally express how happy I am to have you at the helm of the EPA. I look forward to your leadership. As a reminder, I run a family owned (I am non-family CEO) timber company with approximately 135,000 acres in Southwest Oregon. Please do not hesitate to contact me should you have any concerns or anything I might be of assistance on.

Best,

Toby

Toby A. Luther

President/CEO

Lone Rock Resources

541.673.0141, ext. 402

541.430.3121 (cell)

tluther@lrtco.com

Assistant: Tracey Cagle

tcagle@lrtco.com

Tel: 541.673.0141, ext. 320

Wed Apr 12 17:28:38 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Study in Support of UWAG's Petition to Reconsider and Administratively Stay the ELG Rule
To: CMS.OEX@epamail.epa.gov; Threet.Derek@epamail.epa.gov

DRF

From: Terrell, Susan [mailto:sterrell@hunton.com] **On Behalf Of** Johnson, Harry M. ("Pete")
Sent: Wednesday, April 12, 2017 4:04 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Cc: Shapiro, Mike <Shapiro.Mike@epa.gov>; Jessica.O'Donnell@usdoj.gov; Minoli, Kevin <Minoli.Kevin@epa.gov>; OW-Docket <OW-Docket@epa.gov>
Subject: Study in Support of UWAG's Petition to Reconsider and Administratively Stay the ELG Rule

Attached is supplemental information we are submitting in support of UWAG's petition to reconsider and administratively stay the ELG Rule.

Please do not hesitate to contact me or Kristy Bullet (202-955-1547; kbulleit@hunton.com) if you have any questions.

Pete

Harry M. Johnson, III
Partner
pjohnson@hunton.com
p 804.788.8784

Hunton & Will

********** ATTACHMENT REMOVED **********

This message contained an attachment which the administrator has caused to be removed.

********** ATTACHMENT REMOVED **********

Attachment name: [image001.jpg]
Attachment type: [image/jpeg]

HUNTON & WILLIAMS

HUNTON & WILLIAMS LLP
RIVERFRONT PLAZA, EAST TOWER
951 EAST BYRD STREET
RICHMOND, VIRGINIA 23219-4074

TEL 804 • 788 • 8200
FAX 804 • 788 • 8218

HARRY M. JOHNSON, III
DIRECT DIAL: 804 • 788 • 8784
EMAIL: pjohnson@hunton.com

FILE NO: 29142.070312

April 12, 2017

By U.S. Mail and E-mail

Docket No. EPA-HQ-OW-2009-0819

The Honorable E. Scott Pruitt
Administrator
United States Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

Supplemental Information in Support of the Utility Water Act Group's Petition for Rulemaking to Reconsider and Administratively Stay the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category; Final Rule, 80 Fed. Reg. 67,838 (Nov. 3, 2015)

Dear Administrator Pruitt:

Enclosed please find a study by the Electric Power Research Institute entitled *Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal.* We are submitting this study in support of the Utility Water Act Group's Petition for Rulemaking to Reconsider and Administratively Stay the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category; Final Rule, 80 Fed. Reg. 67,838 (Nov. 3, 2015).

As discussed in our Petition, this study examined the performance of a biological treatment pilot system for flue gas desulfurization wastewater (FGDW) installed at a power plant burning 100% Powder River Basin (PRB) coal. See Petition, pp. 48-49. The results of the study support UWAG's contention that the model FGDW biological treatment used by EPA as a basis for limits within the ELG rule is not demonstrated for FGDW generated by plants burning subbituminous coals such as PRB. The enclosed study, to our knowledge, is the only study of biological treatment at a facility burning 100% PRB coal. The study shows

HUNTON& WILLIAMS

the pilot was unsuccessful in attaining consistent compliance with the rule's monthly average selenium limit for FGDW. For most of the pilot study—despite significant adjustments to ordinary operations, including a 50/50 dilution of the FGDW prior to treatment—the pilot results indicate a failure to meet the selenium limit.

A copy of this study has also been electronically mailed to the Office of Water Docket Center for filing in Docket No. EPA-HQ-OW-2009-0819.

Additionally, we will be submitting a supplemental filing in support of our Petition tomorrow.

Please contact me if you have any questions about the study or the Petition.

Sincerely,

Harry M. Johnson, III

Enclosure

cc by hand delivery and e-mail:
Mr. Michael H. Shapiro

cc by e-mail:
Jessica O'Donnell, Esq.
Kevin S. Minoli, Esq.
EPA Docket Center

ELECTRIC POWER RESEARCH INSTITUTE

Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal

Pilot Demonstration with the ABMet Technology

2017 TECHNICAL REPORT

Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal

Pilot Demonstration with the ABMet Technology

3002006089

Final Report, March 2017

EPRI Project Manager
J. Preece

ELECTRIC POWER RESEARCH INSTITUTE
3420 Hillview Avenue, Palo Alto, California 94304-1338 ▪ PO Box 10412, Palo Alto, California 94303-0813 ▪ USA
800.313.3774 ▪ 650.855.2121 ▪ askepri@epri.com ▪ www.epri.com

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CH2M Hill

NOTE

For further information about EPRI, call the EPRI Customer Assistance Center at 800.313.3774 or e-mail askepri@epri.com.

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ACKNOWLEDGMENTS

The following organizations, under contract to the Electric Power Research Institute (EPRI), prepared this report:

CH2M Hill
6600 Peachtree Dunwoody Road, Bldg. 400
Atlanta, GA 30328

Principal Investigators
J. Siczka
S. Graziano
B. Bratt
K. Munirathinam
K. Doup

The Electric Power Research Institute (EPRI) also contributed to the preparation of this report.

Principal Investigator
J. Preece

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Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal: Pilot Demonstration with the ABMet Technology. EPRI, Palo Alto, CA: 2017. 3002006089.

PRODUCT DESCRIPTION

This report documents a pilot demonstration conducted to evaluate treatment of wet flue gas desulfurization (FGD) wastewater at a power plant burning Powder River Basin (PRB) coal. FGD wastewater at PRB sites tends to have very high concentrations of total dissolved solids (TDS), calcium, magnesium, sulfate, nitrate, selenium, and various metals. The low chlorine content of PRB coal enables high cycles of concentration in the FGD absorber because absorber cycles are generally limited on chloride concentration due to specific metallurgy requirements. The resulting wastewater is typically challenging to treat due to the high TDS and high hardness scaling potential.

Background

The U.S. Environmental Protection Agency's (EPA's) revision of effluent limitations guidelines (ELGs) in 2015 has resulted in new requirements for FGD wastewater. Under the rule, EPA established limits based on physical/chemical (P/C) and biological treatment technologies with numeric limits on total arsenic, total mercury, total selenium, and nitrate/nitrite as nitrogen. Limited data are currently available on the treatment of FGD wastewater from PRB coal plants using biological treatment technologies.

Objectives

A pilot system was operated to evaluate and study processes in treating FGD wastewater, using pilot effluent water quality targets associated with the monthly average limits from the U.S. EPA 2015 ELGs. Target concentrations for arsenic, mercury, selenium, and nitrate/nitrite as nitrogen from the pilot system treated effluent were established as 50% of the 2015 ELG monthly average limits to account for initial blending with service water. Analytical and field data were collected to study performance of biological treatment systems on FGD wastewater at a PRB coal site.

Approach

For this demonstration, GE Water & Process Technologies (GE) provided and operated a pilot treatment system consisting of a membrane bioreactor (MBR) process, for nitrification and denitrification, and the Advanced Biological Metals Removal (ABMet) system for denitrification and selenium reduction. The pilot systems were evaluated using a small continuous portion of effluent from the host plant's full-scale P/C treatment system. After initial evaluations of the P/C effluent, GE determined the scaling potential was too high and would create issues in the small pilot equipment. GE also determined that the TDS was too high to support efficient bacteria growth and performance for reducing ammonia, nitrates, and selenium to the demonstration targets. The result of the initial evaluation was a decision to blend the P/C treatment effluent with plant service water (untreated water from Lake Michigan) in equal proportion, and send the combined stream to the pilot system.

Results

The ABMet pilot was initially operated with a total empty bed contact time (EBCT) of 18.8 hours vs. GE's commercial system target of 8 hours. Upon achieving acclimation, GE increased the flow rate through the treatment system to more closely simulate full-scale conditions. After the initial change, the total EBCT for the ABMet pilot was 12.4 hours and remained unchanged due to performance degradation that followed. The pilot system met the effluent targets for the first 3.5 weeks but performance quickly degraded after the flow rate was increased. It is suspected that inhibitory compounds affecting bacteria performance may be present in the FGD wastewater; however, despite various attempts to reduce inhibitory compounds, no resolution was achieved. The ABMet system produced effluent selenium concentrations three times higher than the 6 µg/L target (between 15 and 21 µg/L total selenium). A combination of factors may have resulted in the loss of selenium reduction performance, including:

- Oxidants – Data are limited on specific oxidation compounds present in FGD wastewater and how they may impact biological treatment. Surrogate data on ORP, COD, and BOD were monitored, but do not provide sufficient clarity or causality.
- Non-biodegradable organics – Based on data collected during the test (COD and nitrogen-compound concentrations), it is plausible that organic species were present that are potentially inhibitory to the ABMet bacteria.
- Nitrogen species removal (ammonia, nitrate, nitrite, and organic nitrogen) – This was the first known test using MBR for pretreatment of FGD wastewater and the first known test using a separate denitrification step before ABMet.
- Sulfate-reducing bacteria (SRB) – SRB are known to exist at ABMet conditions due to low ORP conditions and are evident by the presence of sulfide production. It is plausible that the high concentration of sulfates in the site's FGD wastewater, along with the nutrients used, encouraged SRB to suppress selenium-reducing bacteria growth.

Analytical issues with total and dissolved selenium measurements were identified during the project. In some samples, values for total selenium reported low, giving false indications of water quality. Suggested studies to evaluate analytical interferences are presented. Following data validation, the analytical results show that the pilot did not meet the effluent targets for 13 weeks, and the ABMet system was never operated at full-scale conditions.

Applications, Value, and Use

The methods used in this study may provide value for similar biological treatment technology evaluations. Due to site-specific conditions, each site should conduct its own evaluations.

Keywords

Flue gas desulfurization
Wastewater treatment
Selenium removal
ABMet
Effluent Limitation Guidelines
Biological treatment

ELECTRIC POWER RESEARCH INSTITUTE

EXECUTIVE SUMMARY

Deliverable Number: 3002006089

Product Type: Technical Report

Product Title: Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal: Pilot Demonstration with the ABMet Technology

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PRIMARY AUDIENCE: Power plant operators, chemists, and engineers and environmental managers

KEY RESEARCH QUESTION

The main objectives of the pilot system were to evaluate and study processes in treating FGD wastewater, using pilot effluent water quality targets associated with the monthly average limits from the U.S. Environmental Protection Agency (EPA) 2015 effluent limitations guidelines (ELGs). This project investigated selenium removal using EPA's selected best available technology (BAT) in order to help plants consistently meet ELG limits, and specifically for plants burning Powder River Basin (PRB) coals.

RESEARCH OVERVIEW

Effluent from the host site's full-scale physical/chemical treatment system was collected and blended with service water (originating from Lake Michigan and untreated) at a 1:1 ratio and supplied to a pilot system designed and operated by GE Water & Process Technologies. Prior to beginning the pilot evaluation, GE determined that dilution of the full-scale physical/chemical treatment system effluent is required in order to minimize the potential negative impacts of scaling, high TDS concentrations, and toxicity in the processes. The pilot system consisted of a membrane biological reactor (MBR) process with two anoxic zones, an aerobic zone with GE's ZeeWeed 500D membranes, and a final anoxic stage. The MBR process was designed mainly to reduce nitrate/nitrite concentrations prior to the Advanced Biological Metals Removal (ABMet) process. The pilot ABMet system consisted of two attached growth, packed-bed biofilters in series, each containing granular activated carbon (GAC) media. Laboratory analyses were conducted on many sample streams in the pilot process, and data were analyzed with process operating data collected throughout the pilot evaluation.

KEY FINDINGS

- The pilot test did not consistently demonstrate that the MBR/ABMet combination of technologies adequately treats selenium to meet the 2015 ELGs limits.
- 100% dilution of FGD wastewater from the effluent of the host site's full-scale physical/chemical treatment system was required for the MBR/ABMet pilot system.
- Complete denitrification (reduction of nitrate nitrogen to nitrogen gas) was achievable in the pretreatment MBR.
- Selenium, present mainly in dissolved form, was significantly reduced by the pretreatment MBR (approximately 75% on average for the entire demonstration).
- Analytical issues with total and dissolved selenium measurements were identified during the project.
- Following data validation, the analytical results show that the pilot did not meet the effluent targets for 13 weeks, and the ABMet system was never operated at full-scale conditions.

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EXECUTIVE SUMMARY

WHY THIS MATTERS

This study provided the opportunity for EPRI and its members to evaluate selenium removal in an especially challenging FGD wastewater at a power plant burning PRB coal. The results, learnings, and analytical data from the study will continue to support ongoing research related to biological treatment of FGD wastewater.

HOW TO APPLY RESULTS

Due to site-specific conditions that do not translate to every application, each site should conduct its own evaluations related to FGD wastewater treatment. The methods used in this project may provide guidance for users to apply similar approaches when evaluating biological treatment technologies.

LEARNING AND ENGAGEMENT OPPORTUNITIES

Related projects are:

- *Wet Flue Gas Desulfurization Wastewater Physical/Chemical Treatment Guidelines.* EPRI, Palo Alto, CA: 2016. 3002008515.
- *EPRI Technical Manual: Guidance for Assessing Wastewater Impacts of FGD Scrubbers.* EPRI, Palo Alto, CA: 2006. 1013313.
- *Flue Gas Desulfurization (FGD) Wastewater Characterization and Management: Preliminary Summary: 2007 Update.* EPRI, Palo Alto, CA, 2008. 1014073.
- *Case Studies to Evaluate FGD Wastewater Physical/Chemical Treatment Performance.* EPRI, Palo Alto, CA: 2013. 3002001202.
- *Flue Gas Desulfurization (FGD) Wastewater Chemical Precipitation Treatment Performance Characterization Study.* EPRI, Palo Alto, CA, 2015. 3002006251.
- *Pilot Evaluation of the ABMet Technology for Flue Gas Desulphurization Wastewater Treatment.* EPRI, Palo Alto, CA: 2014. 3002004550.

EPRI CONTACTS: Jeffery Preece, Technical Leader, jpreece@epri.com

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Electric Power Research Institute
3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com
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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
<	less than or fewer than
µg/L	microgram per liter
µm	micrometer
µS/cm	microSiemen per centimeter
BOD	biochemical oxygen demand
COD	chemical oxygen demand
DO	dissolved oxygen
DOC	dissolved organic carbon
EBCT	empty bed contact time
ELG	Effluent Limitations Guidelines
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute, Inc.
FGD	flue gas desulfurization
GAC	granular activated carbon
GPD	gallons per day
GPM	gallons per minute
HRT	hydraulic retention time
Inf/EQ	influent equalization
MBR	membrane biological reactor
mg/L	milligram per liter
mg-N/L	milligram of nitrogen per liter
MLSS	mixed liquor suspended solids
mS/cm	microSiemen per centimeter
mV	millivolt

N	nitrogen
NA	not applicable
ng/L	nanogram per liter
NO_3/NO_2-N	nitrate/nitrite nitrogen
O&G	oil and grease
ORP	oxidation reduction potential
PAC	powdered activated carbon
P4	Pleasant Prairie Power Plant
Phys/Chem	physical/chemical
RAS	return activated sludge
Se	selenium
Se(IV)	selenite
Se(VI)	selenate
SeCN	selenocyanate
SeMe	selenomethionine
SRT	solids retention time
S.U.	standard unit
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TMP	transmembrane pressure
TOC	total organic carbon
TSS	total suspended solids
WQBEL	water quality-based effluent limit
ZVI	zero-valent iron

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1
INTRODUCTION

Project Understanding

The U.S. Environmental Protection Agency (EPA) sets technology-based standards, termed effluent limitations guidelines (ELGs), by industry category based on various levels of technology performance, the most stringent of which is the Best Available Technology Economically Achievable (BAT). EPA revised the ELGs for the steam electric industry in 2015 to include BAT limits for flue gas desulfurization (FGD) wastewater.

The BAT limits set by EPA for FGD wastewater are based on physical/chemical and biological treatment technologies with numeric limits on total arsenic, total mercury, total selenium, and nitrate/nitrites as N. The ELGs also include Best Practicable Control Technology (BPT) limits for total suspended solids and oil & grease. EPA's ELG limits for FGD wastewater are shown in Table 1-1. Additionally, water quality-based effluent limits (WQBELs) in some states are necessitating removal of selenium and other trace metals from FGD wastewater.

Table 1-1
ELG Limits on FGD Wastewater

Parameter	Units of Measure	Monthly Average Limit	Daily Maximum Limit
Arsenic, total	µg/L	8	11
Mercury, total	ng/L	356	788
Selenium, total	µg/L	12	23
Nitrate/Nitrite as N	mg/L	4.4	17.0
Total Suspended Solids (TSS)	mg/L	30	100
Oil and Grease	mg/L	15	20

µg/L = microgram per liter
mg/L = milligram per liter
ng/L = nanogram per liter

The primary objective of this project was to investigate and study selenium removal using EPA's selected BAT to help plants consistently meet ELG limits, specifically for plants burning Powder River Basin (PRB) coals. The ELGs also include mercury, arsenic, and nitrate/nitrite limits; studying their removal was a secondary project goal.

This study provided the opportunity for the Electric Power Research Institute, Inc. (EPRI) and its members to help evaluate selenium removal in an especially challenging FGD wastewater at We Energies Pleasant Prairie Power Plant (P4). The main properties of this wastewater that make treatment challenging are scaling tendency due to high sulfate and calcium concentrations; concentrations of dissolved/ionic species such as halogens, which are much higher than other FGD wastewaters from sites burning non-PRB coals; and nitrate/nitrite-nitrogen and total Kjeldahl nitrogen[1] (TKN) concentrations, both of which are also much higher than other FGD wastewaters. Hence, pretreatment for reducing suspended solids, dilution of dissolved solids and a nitrification/denitrification step were included ahead of the selenium removal unit for the P4 pilot, adding to the operational complexity of the pilot system.

P4 burns 100% subbituminous coal from the Powder River Basin, and has a low FGD blowdown rate for its power capacity (40 GPM), allowing the concentrations of ammonia, nitrates/nitrites, sulfates, arsenic, mercury, and selenium to reach very high levels. To EPRI's knowledge, this was the first time that biological treatment has been attempted on a wastewater stream from a plant that burns 100% subbituminous coal.

Pilot Objectives

The main objectives of the pilot system were to evaluate and study processes in treating FGD wastewater, with pilot effluent water quality targets equal to those listed in Table 1-2, and to validate the operating parameters for the membrane biological reactor (MBR) nitrification/denitrification pretreatment step and the Advanced Biological Metals Removal (ABMet) systems. Given the many potential changes and variations in chemistry that are inherent to FGD wastewater, the study attempted to maintain consistent selenium removal performance. When the performance changed, conditions were documented and process changes were made to recover performance.

[1] Other than uptake for cell synthesis, a selenium treatment system does not remove TKN. Therefore, if a discharge limit for ammonia nitrogen or total nitrogen is included in the permit, a TKN removal step will be required. Because ammonia removal was part of the pilot effluent water quality objectives, the reduction/removal of TKN was monitored.

Table 1-2
Effluent Water Quality Objectives

Parameter	Effluent Target[2]	Pilot Effluent Target[3]
Selenium[1]	<12 µg/L	<6 µg/L
Mercury[1]	<356 ng/L	<178 ng/L
Arsenic[1]	<8 µg/L	<4 µg/L
Nitrate/Nitrite Nitrogen[1] (NO_3/NO_2-N)	<4.4 mg/L	<2.2 mg/L
Total Suspended Solids (TSS)	<30 mg/L	<15 mg/L
Oil and Grease (O&G)	<15 mg/L	<7.5 mg/L
Ammonia	1.9 to 30 mg/L	0.45 to 15 mg/L
Phosphorus	<0.6 mg/L	<0.3 mg/L

Notes:
[1] Regulated pollutants (2015 ELG Final Rule)
[2] 2015 ELGs BAT Monthly Average Limits
[3] 50% of the ELG BAT Monthly Average Limits to account for dilution to reduce high TDS and scale potential
< = less than/fewer than
µg/L = microgram per liter
mg/L = milligram per liter
ng/L = nanogram per liter

2
BACKGROUND

Selenium removal from wastewater is particularly challenging because of its complicated chemistry. Selenium removal typically requires multiple treatment processes, and the species of selenium can vary throughout the different unit processes that target selenium removal. Other constituents in the wastewater may also interfere with the selenium removal processes. As FGD wastewater is a highly complex wastewater (high concentrations of many ions), there are many potential constituents that can affect treatment. Examples include oxyanions like sulfate, halogens like chloride, and nutrients like nitrogen species. Additionally, variations in coal sources, coal composition, plant operations, scrubber operations and other air emission control technologies, and other factors can cause the wastewater composition to vary. Even after successful treatment of selenium, treatment system residuals and byproducts containing selenium must be managed and disposed of properly. This section describes the treatment technologies used for the pilot demonstration.

P4 Existing Full-Scale Wastewater Treatment Plant Description

The full-scale P4 wastewater treatment plant was designed to treat 75 GPM of wastewater with a total suspended solids (TSS) content of less than 1.5%. An overview of the existing physical/chemical system is provided in Figure 2-1. After equalization, wastewater flows to Reaction Tank 1 where pH is adjusted from approximately 5.6 to 8.5 S.U. by adding hydrated lime to the wastewater. Effluent from Reaction Tank 1 flows by gravity to a primary clarifier where polymer is added to aid in solids removal. Primary effluent flows to Reaction Tank 2 where METCLEAR MR2405 (commonly referred to as an organosulfide) is added for mercury precipitation. Effluent from Reaction Tank 2 flows by gravity to Reaction Tank 3 where ferric chloride is added for coagulation and for iron co-precipitation. Effluent from Reaction Tank 3 passes to a flash mix tank where polymer is added, and then to a flocculation tank, followed by a parallel plate clarifier (secondary clarifier). The plant was equipped with an upflow sand filter, but its use has been discontinued due to problems with scaling of sand, recurring fouling issues in the filters, and because it had limited effectiveness in removing mercury below the level achieved by secondary clarification alone. Optional cartridge filters can be installed after the final effluent tanks, when necessary, to filter to 0.45 microns for removal of suspended particles which may contain large amounts of mercury. Sludge is pressed in plate and frame filter presses and combined with coal combustion residuals (CCR) before being landfilled on plant property.

The average operating flow rate for the system is currently 40 GPM. Operations staff run the primary clarifier continuously when the treatment plant is in operation. The secondary clarifier mainly runs throughout the five-day work week and is shut down on weekends for cleaning (to remove scale). The two effluent discharge tanks hold approximately 10,000 gallons each and are used for storage during the weekend cleaning activities.

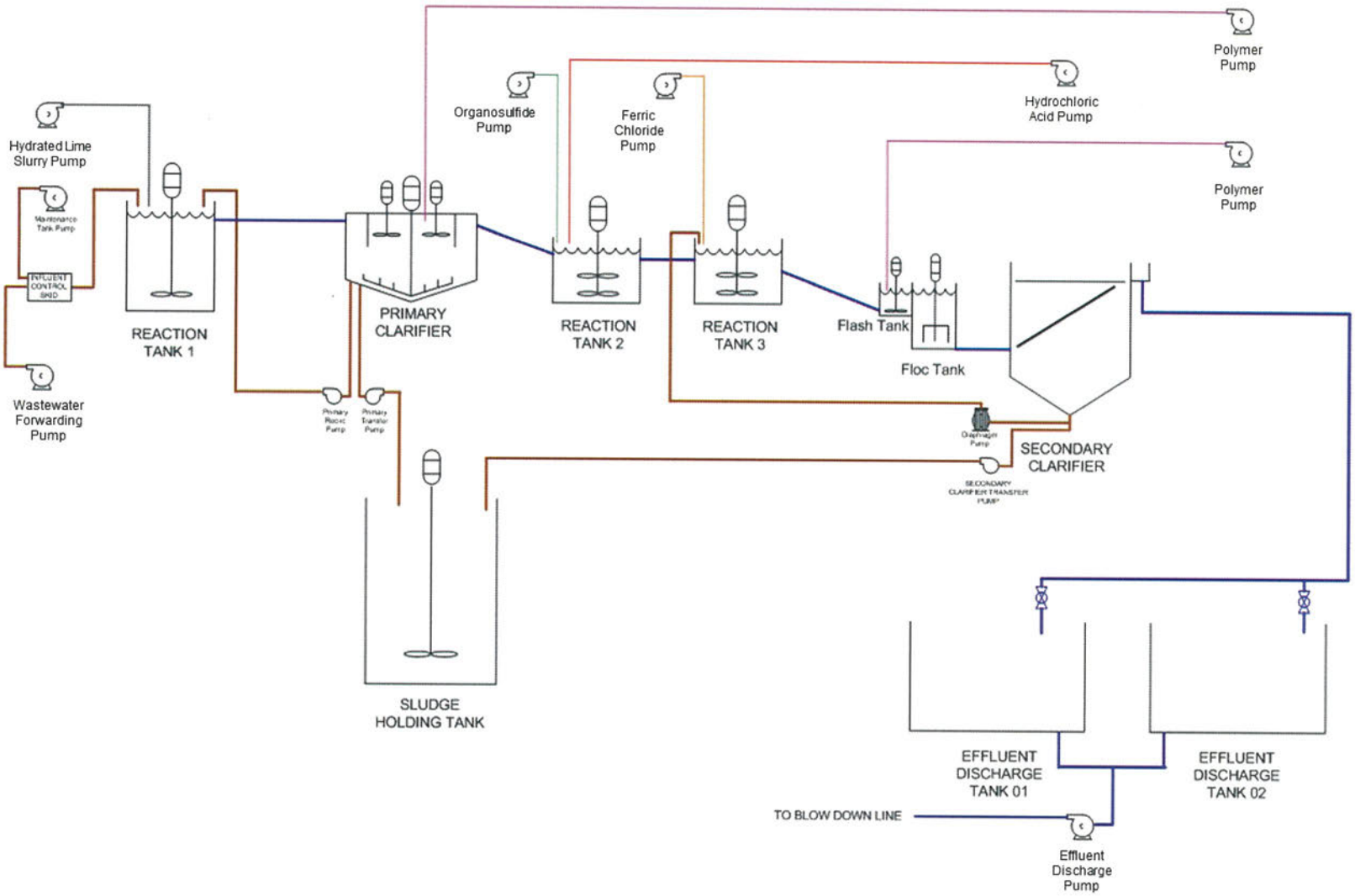

Figure 2-1
P4 FGD wastewater treatment plant process flow diagram
Courtesy of We Energies

Treating Wet Flue Gas Desulfurization Wastewater

Some technologies have been implemented full-scale at FGD wastewater treatment facilities in the United States to remove particulate (generally >0.45 μm) and/or dissolved/soluble selenium from the wastewater stream. Additional processes have been tested on a pilot scale on FGD or other selenium-containing streams. These technologies fall into two main categories:

- Physical/chemical treatment technologies, in which various configurations are possible:
  - Solids settling (is tank-based or in a settling pond; generally removes some particulate selenium, but is likely not sufficient to meet new ELG limits as much of the selenium tends to be in the soluble fraction)
  - Zero valent iron (ZVI) contact (uses complex redox and adsorption reactions to remove soluble forms of selenium)
  - Filtration (removes particulate selenium using media or ultrafiltration membranes; reverse osmosis membrane filtration can potentially remove all forms of selenium, including soluble forms)
- Biological treatment:
  - Fixed-film anaerobic/anoxic (where there are low levels of dissolved oxygen [DO]) reactor-based biological treatment; generally removes various selenium species, including selenate and selenite
  - Passive treatment by surface-flow aerobic wetlands and anaerobic subsurface, vertical flow wetlands (which are generally similar in function to fixed-film systems) have been demonstrated to remove various selenium species
  - Suspended growth anaerobic/anoxic systems (have recently been pilot tested in membrane biological reactors [MBRs] and moving bed biofilm reactors [MBBRs] to remove various selenium species using mechanisms similar to the established fixed-film systems)

The pilot system evaluated by EPRI at P4 is based on active biological treatment for selenium removal, which included anoxic/aerobic MBR for nitrogen pretreatment and the GE ABMet primarily for selenium removal, tested on P4's full-scale chemical precipitation system effluent.

Summary of Treatment Systems and Equipment

The P4 pilot included the following treatment systems:

- ZeeWeed 500D MBR Pilot
- ABMet Pilot

ZeeWeed 500D Membrane Biological Reactor

In anoxic/anaerobic biological treatment, nitrate must be removed from the wastewater in order to create conditions conducive to the biological reduction of selenate and selenite to insoluble elemental selenium. Nitrate removal occurs via denitrification where nitrate/nitrite nitrogen is

ultimately reduced to nitrogen gas, but at ORP conditions higher than where reduction of senate and selenite occurs. Unfortunately, removing high concentrations of nitrate using downflow reactors, such as those in ABMet, leads to plugging caused by high bacterial solids growth and the need for more frequent backwashes. Also, because ABMet operates at low oxidation reduction potential (ORP), some ammonia-nitrogen may be formed when high nitrate is present in the influent. Additional reactors may be required to achieve the conditions needed to facilitate effective selenium reduction when high nitrate levels are present in the influent; however, site-specific evaluations must be conducted to determine the exact process suitable for treatment. Therefore, nitrate removal is key to successfully treating selenium in FGD wastewater using any of the established treatment technologies. In this P4 wastewater, the TKN concentration is also high requiring ammonia-nitrogen oxidation to nitrate-nitrogen (nitrification). Therefore, an MBR was included in the pilot system as a pretreatment nitrification/denitrification step to remove both the nitrates in the influent and nitrates generated from the nitrification process.

An MBR is a combination of suspended growth activated sludge and membranes, with the latter performing the liquid/solids separation function. The membranes provide a positive barrier resulting in permeate with negligible TSS concentration. The ZeeWeed 500 module is designed to reject particles greater than 0.04 microns. Treated water is drawn through membrane by vacuum, enters the hollow fibers of the membrane, and is then pumped out of membrane. The redox conditions in stages within the activated sludge system can be manipulated to achieve target reactions (for example, carbon oxidation, nitrification, and denitrification). Target reactions can also convert dissolved species into insoluble constituents and result in rejection by the membranes.

A diagram of the ZeeWeed membrane fiber and ZeeWeed 500 module is provided in Figure 2-2.

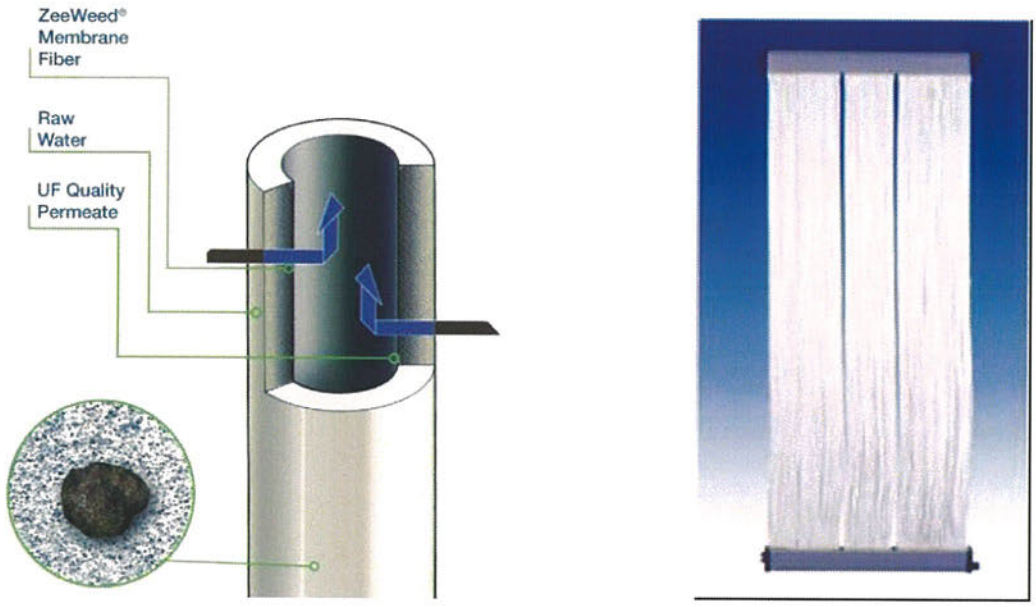

Figure 2-2
ZeeWeed membrane fiber and ZeeWeed 500 module
Courtesy of GE Water & Process Technologies

Membrane permeability is maintained through multiple approaches. During normal operation, continuous air scouring from the bottom of the module is used to remove accumulated solids, containing biological activity and biomass, on the membrane surface. Mixed liquor in the membrane tank is recirculated back to the biological reactors to maintain solids distribution throughout the system. Solids are wasted from the membrane tank based on the targeted solids retention time (SRT). Treatment of the wasted solids is generally a separate process that includes dewatering and disposal of the sludge.

Maintenance of the membranes includes backwashing, maintenance cleanings, and recovery clean-in-place (CIP) activities, all of which can be implemented on a set frequency or based on transmembrane pressure (TMP - calculated by the difference between the membrane influent and effluent pressures). Because the ZeeWeed 500 system is designed to maintain a constant flux, an increase in TMP indicates membrane fouling. Detailed descriptions of each cleaning option are as follows:

- A backwash is performed by reversing the flow through the membrane (also called "back pulse") for a short time period using permeate (clean water produced by the membrane during normal operation) from the inside of the membrane to the outside where the suspended solids are held. For this study, aeration was also used during the backwashes.
- A maintenance cleaning using aeration and chemical cleaning solutions to remove more challenging material from the membrane surface that can lead to fouling. Cleaning solutions may include sodium hypochlorite, citric acid, and other traditional products used to restore membranes. These chemicals are generally recirculated, in separate batches, through the membrane system for a length of time (on the order of 15 minutes) depending on conditions.
- The recovery CIP process is generally conducted only one or two times per year. The process is more aggressive than maintenance cleanings with higher concentrations of chemicals and longer contact times for each batch. Defining the recovery CIP process requires an understanding of treatment and membrane conditions.

ABMet

The ABMet system is an attached growth downflow carbon filter. It was developed by Applied Biosciences and is currently marketed by GE Water & Process Technologies. The ABMet system uses microbes cultured in bioreactor granular activated carbon (GAC) beds that create anoxic/anaerobic conditions for selenate and selenite reduction to insoluble elemental selenium particles. The GAC material acts as a physical media for fixed biofilm development. A diagram of the ABMet biofilter is presented in Figure 2-3.

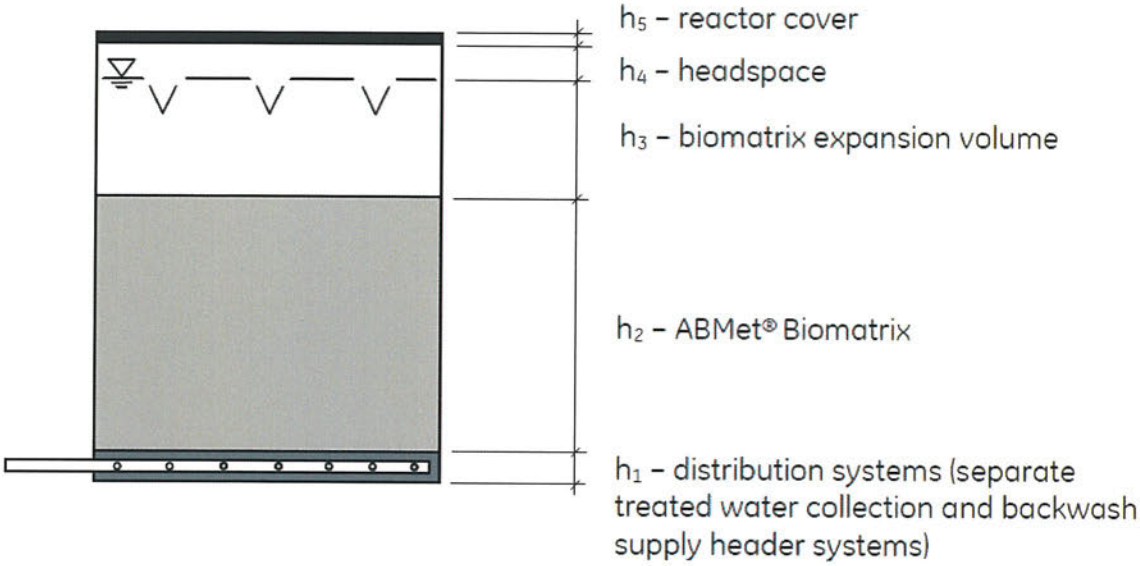

Figure 2-3
ABMet biofilter cross-section
Courtesy of GE Water & Process Technologies

The ABMet process uses certain heterotrophic facultative bacteria, which, in addition to reducing nitrate to nitrogen gas, reduce selenate and selenite to elemental selenium. Elemental selenium then exists as insoluble solids along with bacterial solids in the filter bed. An image of the ABMet selenium reducing bacteria and elemental selenium particles is presented in Figure 2-4.

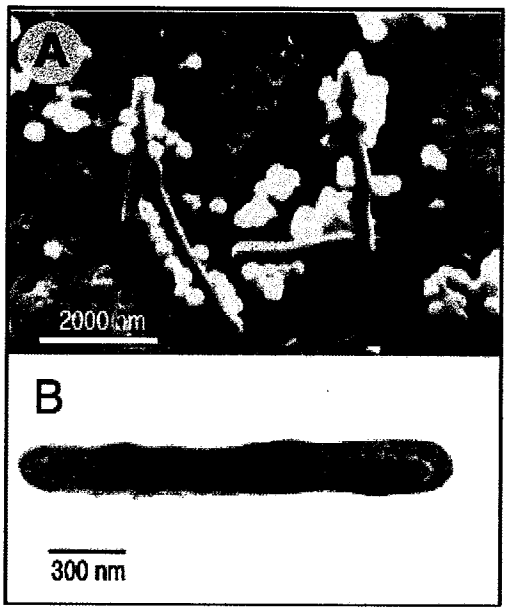

Figure 2-4
ABMet selenium reducing bacteria with selenium particles
Courtesy of GE Water & Process Technologies

The microbes are selected as a site-specific inoculum for the bioreactors. These bacteria are mesophilic bacteria requiring the wastewater temperature to be typically between 50 degrees Fahrenheit (°F) and 100°F (10 degrees Celsius [°C] and 38°C) and pH between 6 and 7 S.U. These microbes use oxygen (O_2) and the oxygen in the nitrate (NO_3^-), selenate (SeO_4^{2-}), and selenite (SeO_3^{2-}) oxyanions as an electron acceptor for their respiration and an organic carbon (electron donor) source to meet their food/energy requirements. Biochemical reactions for the reduction of nitrate/nitrite and selenate/selenite (excluding biomass production) are presented below.

$$NO_3^- + organic\ carbon \rightarrow NO_2^- + organic\ carbon \rightarrow N_2 + CO_2 + H_2O$$

$$2SeO_4^{2-} + organic\ carbon \rightarrow 2SeO_3^{2-} + organic\ carbon \rightarrow SeO + CO_2 + H_2O$$

The carbon source can be either organic compounds present in the wastewater, typically expressed as chemical oxygen demand (COD), or an organic compound from an external source (such as methanol, acetic acid, ethanol, molasses, or corn syrup). The ABMet system typically uses a molasses-based nutrient supplement (supplied by GE), which also is a source of phosphate for the bacteria, however acetic acid was used for this study as a carbon source for both nitrate and selenium reduction processes. Nutrient addition can also impact pH of the system, where too much nutrient may cause an increase in production of organic acids and CO_2 (both produced by bacteria) that lower the pH.

Biological reduction converts the selenate or selenite ions into elemental selenium, which exists as a particle and is enmeshed and attached to the biofilm within the reactor. The reactors are backwashed periodically to prevent excess biomass and solids buildup and resulting hydraulic head loss, and the waste stream is then treated by dewatering the solids and disposing of the sludge with concentrated selenium. The system is also routinely degassed (similar to backwash, but for a shorter time period) to remove accumulated gases (such as carbon dioxide and nitrogen) from the filter bed to reduce hydraulic head loss. The effluent water from the ABMet unit may be aerated in a polishing aeration tank to increase the DO and to aerobically treat any excess soluble degradable COD-contributing organics, if required.

Monitoring of pH and ORP is performed to control the chemical dosing and ensure selenate and selenite reduction. ORP is an indicator of biological activity in the ABMet system, where lower ORP correlates to anaerobic conditions created by biological activity in reducing oxygen, nitrate/nitrite, and selenium. Once nitrate and nitrite are fully utilized as electron acceptors, selenate, selenite, and sulfate will be used as the primary electron acceptor with remaining biodegradable COD by a different population of heterotrophic microbes. These sulfate-reducing microbe species are generally naturally occurring and their presence/biological activity results in the formation of hydrogen sulfide[2].The sulfate-reducing bacteria may overgrow and outcompete selenate and selenite reducing bacteria for electron donors at high sulfate concentrations. The electron donor (organic carbon) for the ABMet system must also be carefully monitored and controlled to avoid providing too much carbon source for the sulfur-reducing microorganisms. Allowable total sulfide concentrations in the ABMet effluent should be defined during pilot testing for specific applications to minimize competition from sulfate-reducing bacteria.

Solids generated from backwashing (which contain selenium) can generally be recycled upstream to the physical/chemical treatment system (if used) for removal or be treated separately. The resulting dewatered solids are typically tested using the toxicity characteristic leaching procedure (TCLP) to verify nonhazardous classification for disposal, but standards and requirements should be referenced for each site. Solids can generally be processed using solids dewatering equipment such as a plate-and-frame filter press with other solids.

[2] Hydrogen sulfide is an odorous gas that is detectable at low concentrations (around 1 part per million [ppm]) and can be a human health issue at sufficient concentrations (the U.S. Department of Labor maintains exposure limits under the Occupational Safety and Health Administration standards).

3
PILOT DEMONSTRATION DESIGN

Pilot System Design

Effluent from P4's full-scale physical/chemical treatment system (that is, hydrated lime addition, primary solids removal, trace metals precipitation, and secondary solids removal) was collected and blended with service water (originating from Lake Michigan and untreated) at a 1:1 ratio in the 500-gallon pilot equalization tank. GE designed and operated the pilot system and determined that dilution of the full-scale physical/chemical effluent to minimize the potential impacts of scaling, high TDS concentration, and toxicity was required. For purposes of ELG compliance, however, this sort of dilution would require application of more stringent (i.e., lower) ELGs for constituents. Therefore, treatment without dilution would be preferable to the extent it is feasible. Blended wastewater from the equalization tank provided influent to the nitrification/denitrification pretreatment membrane biological reactor (MBR) system. Effluent from the pretreatment MBR system was collected in a feed tank for the two-stage ABMet system.

An overview of the P4 Pilot system is provided on Figure 3-1.

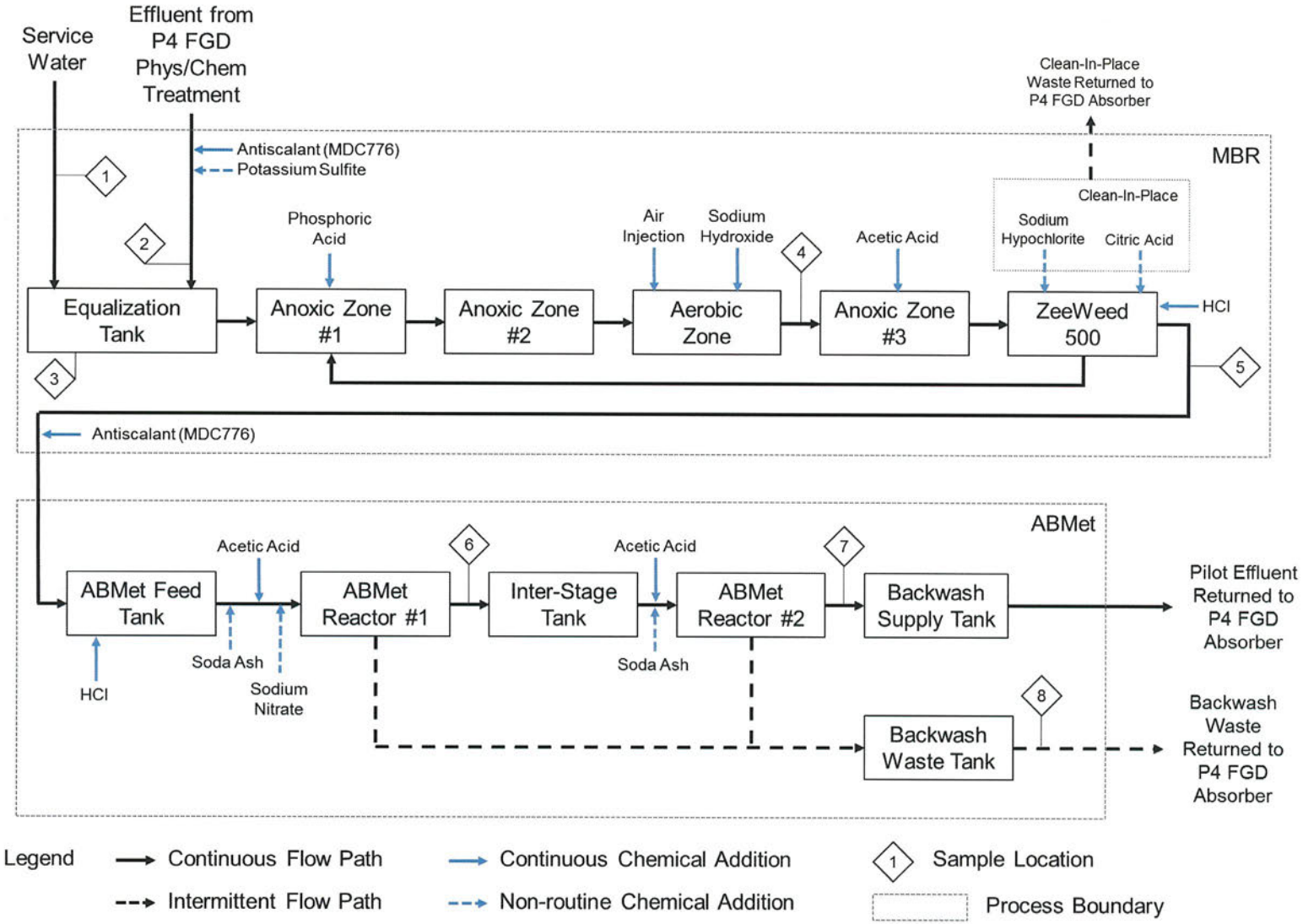

Figure 3-1
Pilot process block flow diagram

Equalization Tank

The 500-gallon equalization tank was provided for blending of P4's full-scale physical/chemical effluent and service water from Lake Michigan (untreated) at a 1:1 volume ratio. A combination of hand valves, flow meters, and flow control valves was used to balance the flows and achieve the targeted 1:1 volume ratio. The blended water from the equalization tank was pumped via submersible pump to anoxic zone #1 in the pretreatment MBR system.

While initial provisions were made to feed different types of chemicals, only antiscalant (MDC776) and potassium sulfite were added to the EQ Tank during testing.

- Antiscalant (MDC776) – To mitigate scaling of calcium, sulfate, phosphate, and other precipitating species. A dosage of 5 mg/L was maintained throughout the study.
- Potassium sulfite – For removal of potential oxidants for mitigating negative impacts to biological activity that may inhibit selenium reduction. Addition began on January 5, 2016, near the end of Condition 2 through Condition 3.

Pretreatment Membrane Biological Reactor

The pretreatment MBR pilot system was seeded with 2,500 gallons of municipal mixed liquor from the Kenosha Wastewater Treatment Plant located in Kenosha, WI. The seeding occurred on October 20, 2015 and the acclimation period, after seeding, lasted four weeks. The system consisted of four zones (anoxic #1, anoxic #2, aerobic, and anoxic #3) followed by the membrane tank, which are described in Table 3-1.

Table 3-1
Pilot MBR System Description

Item	Volume (gallons)	Chemical Addition	Description
Anoxic zone #1	100 [working volume]	Phosphoric acid – macronutrient for bacteria; began in Condition 2 due to switch in acetic acid source from a blended product (which contains phosphorus, but the concentration was deemed too high) to an 80% product (20% balance is water). Target phosphorus concentration was ≤3 mg/L in MBR permeate and ≤ 0.5 mg/L in the ABMet effluent.	• Received blended water from equalization tank and mixed liquor recirculation from the membrane tank • Mixing provided via mechanical mixer
Anoxic zone #2	100 [working volume]	None	• Received water from anoxic zone #1 • Mixing provided via mechanical mixer
Aerobic zone	1,000 [working volume]	• Ferric chloride – To reduce phosphorus that had been added by the acetic acid blended product, used only during 2-day period in Condition 3; originally intended for soluble arsenic precipitation if it had been needed (but soluble arsenic was not present at concentrations higher than the target value). The blended acetic acid product contained excess phosphorus which may have led to the precipitation of material that created issues with excess solids building in the ABMet biofilter during testing. Scaling and excess solids were ultimately controlled by adjusting the phosphorous content in the nutrient. • Sodium hydroxide – to increase pH	• Received water from anoxic zone #2 • Continuous aeration provided by a blower and fine bubble diffusers
Anoxic zone #3	1,000 [working volume]	• Acetic acid – carbon source for denitrification and partial selenate/ selenite reduction; blended type used during Condition 1; change to 80% acetic acid made in Condition 2. Switched made due to high concentration of phosphorus in blended product.	• Received water from aerobic zone • Mixing provided via mixing pump
ZeeWeed Membrane tank	270	• Sodium hypochlorite – membrane cleaning • Citric acid – membrane cleaning • Hydrochloric acid – to decrease pH (beginning in Condition 2)	Three ZeeWeed modules provided, but only one was placed in service

The blended water was pumped from the equalization tank to anoxic zone #1, which had an underflow to anoxic zone #2. The water then overflowed to the aerobic tank. The aerobic tank was fitted with 10 fine bubble diffusers to achieve the desired dissolved oxygen (DO) concentration of 2 to 4 mg/L. Also, pH monitoring, with a control set point of 6 - 7[3] S.U., was provided in the aerobic tank. Level controls within the aerobic tank controlled the flow to anoxic zone #3. A mixing pump and eductors were provided in anoxic zone #3 for mixing and allowed for the water to be pumped to the membrane tank.

The membrane tank consisted of three 370 ft^2 ZeeWeed 500 membranes, which is a scaled-down version of a full-scale membrane system. Only one membrane, located in the middle module, was in service for this pilot; the other two membranes/modules were plugged and not placed into service. This configuration allowed for normal operation of the air diffuser system that is located inside the membrane tank. Suction drives the treated water through the hollow fibers of the membrane using an outside-in configuration. Membranes were cleaned with constant air scouring along with periodic chemical cleans. For a full-scale system, all waste streams would be evaluated for treatment, potentially by recycle to the physical/chemical process upstream. Overflow from the membrane tank was recirculated to anoxic tank #1.

The main objectives of the pretreatment MBR were as follows:

- Nitrify influent TKN/ammonia nitrogen – oxidation of ammonia nitrogen to nitrate nitrogen
- Denitrify influent and produce nitrate nitrogen – reduce nitrate/nitrite nitrogen to nitrogen gas
- Produce an effluent with very low TSS suitable for treatment in the downstream ABMet system
- Remove insoluble selenium in influent and produced in the MBR anoxic tank

Permeate from the pretreatment MBR was collected in the ABMet system's feed tank. A picture of the MBR pilot equipment is shown in Figure 3-2.

[3] The pilot MBR pH control set point of 6 - 7 S.U. was established by GE. CH2M suggested that a slightly higher control range of 6.8 - 7.5 S.U. would minimize impacts on nitrification. Actual operating range, as discussed in Section 4, was 6.8 - 7.2 S.U.

Figure 3-2
ZeeWeed 500 MBR pilot
Courtesy of GE Water & Process Technologies

ABMet

The ABMet pilot system consisted of two reactor stages (each with 1,270 L of GAC), feed and inter-stage tanks, a backwash system, and chemical feed systems, which are described in Table 3-2. The ABMet reactors were seeded with GE's bacteria on November 20, 2015, and placed into forward flow on November 23.

Table 3-2
Pilot ABMet System Description

Item	Volume (gallons)	Chemical Addition	Description
ABMet feed tank		• Hydrochloric acid – to decrease pH (beginning in Condition 2) • Soda ash – to increase alkalinity (Condition 2 only) • Antiscalant, MDC776 (Began at Condition 2)	Received pretreatment MBR permeate
ABMet stage 1	335	• Acetic acid – carbon source for denitrification and selenate/ selenite reduction; used blended version that contained nutrients (ammonium and phosphorus) starting in Condition 2 • Sodium nitrate – nitrate (electron acceptor) source to enhance denitrification, but added only mid-way through Condition 4	Received pretreatment MBR permeate from the ABMet feed tank
ABMet inter-stage tank		Soda ash – to increase alkalinity (Condition 2 only)	Received ABMet stage 1 effluent

Table 3-2 (continued)
Pilot ABMet System Description

Item	Volume (gallons)	Chemical Addition	Description
ABMet stage 2	335	Acetic acid – carbon source for denitrification and selenate/selenite reduction; used blended product (containing acetic acid, ammonium, and phosphorus) during Condition 1 and 80% acetic acid product (20% water) during Conditions 2, 3, and 4.	Received ABMet stage 1 effluent from the ABMet inter-stage tank
ABMet effluent tank		None	Received ABMet stage 2 effluent
Backwash supply tank	3,000	None	Received ABMet stage 2 effluent from the ABMet effluent tank to degas and backwash the ABMet filters
Backwash waste tank	800	None	Received backwash waste from ABMet stage 1 and ABMet stage 2

Permeate from the pretreatment MBR was collected in the ABMet feed tank from where it was pumped to the top of the ABMet stage 1 reactor. Effluent from the ABMet stage 1 was collected in an inter-stage tank from where it was pumped to the top of the ABMet stage 2 reactor. Effluent from the ABMet stage 2 was collected in an effluent tank and then pumped to the backwash supply tank that allowed the effluent to overflow from the system to the effluent where all waste was returned to the P4 FGD Absorber.

The GAC media in each ABMet stage reactor provided surface area for bacteria to grow and develop a biofilm. Nutrient addition, pH control, and alkalinity adjustment were provided for each ABMet stage to provide a suitable/optimized environment for selenium reduction.

The main objectives of the ABMet system operation were as follows:

- Denitrify any remaining influent nitrate nitrogen and reduce nitrate/nitrite nitrogen to nitrogen gas.
- Reduce soluble selenium species (selenate and selenite) to particulate, elemental selenium and remove it from the wastewater.

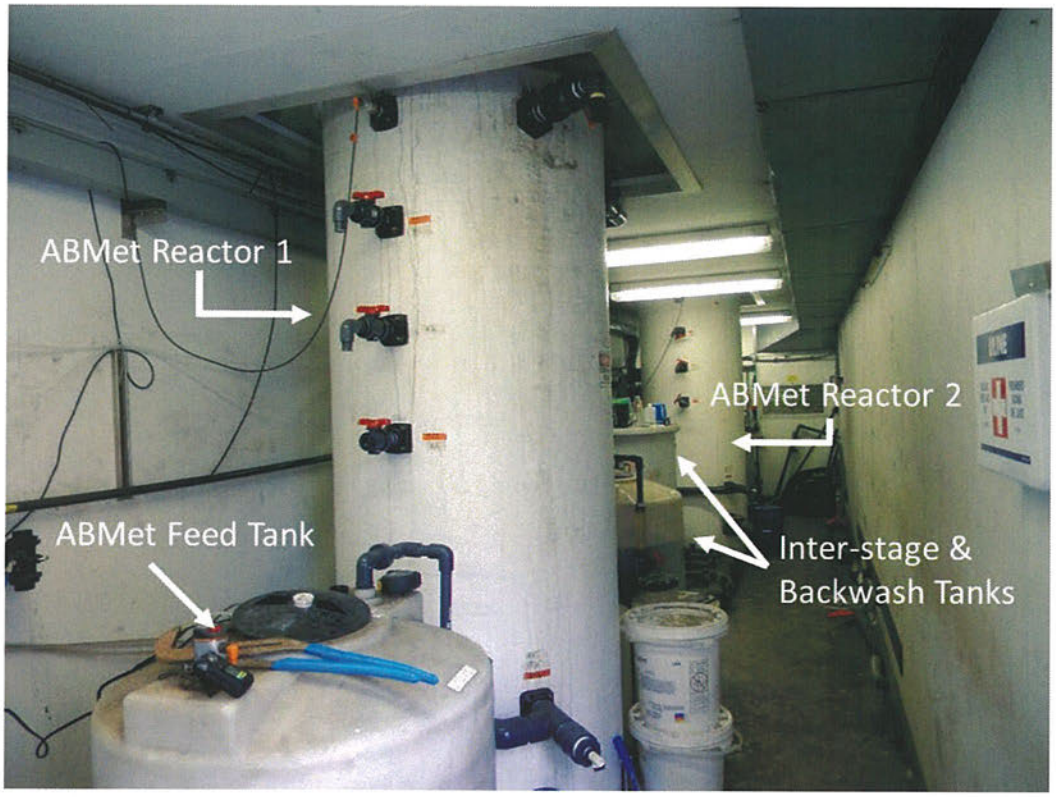

Figure 3-3
ABMet pilot equipment

Pilot Schedule and Conditions

Operating data for the MBR and ABMet systems have been divided into the following four conditions:

- Condition 1 – Startup and Acclimation (October 26, 2015 to December 16, 2015) – period where bacteria are growing and becoming established in the treatment system.
- Condition 2 – Initial Operation (December 17, 2015 to January 10, 2016) – operational period defined by GE's original test plan.
- Condition 3 – Increased Flow/Reduced HRT (January 11, 2016 to February 13, 2016) – operational period intended to more closely simulate full-scale HRT/EBCT conditions.
- Condition 4 – Process Adjustments (February 14, 2016 to March 3, 2016) – period where GE responded to decreased selenium removal performance of the ABMet.

Increasing the flow rate under Condition 3 was a conscious decision made by the project team in an effort to simulate full-scale conditions (i.e., to match HRT/EBCT for each process technology). Due to factors that resulted in poor selenium removal performance, of which increased flow rate is not believed to be a sole-contributor, additional process changes were made during Condition 4 in attempt to return the pilot systems back to original selenium removal performance (which had been meeting the effluent/treatment targets).

- The project team was able to extend the duration of the pilot demonstration past its original end date, but testing concluded when the P4 units entered an outage and were not able to supply FGD wastewater. For two weeks prior to pilot shutting down, the ABMet system was operated by feeding blended physical/chemical treatment effluent from the storage tanks with ABMet effluent; the MBR did not operate during this time.
- Details on the process conditions, adjustments, and performance changes are provided in the following sections.

Field and Laboratory Analytical Plans

Field and laboratory analyses were conducted to control system operation and optimize performance. Field analyses were conducted by GE throughout the demonstration on the MBR and ABMet pilot systems. A summary of field parameters and frequency of the analyses are provided in Table 3-3.

Table 3-3
Field Analyses

Parameter	Minimum Frequency (per week)
Chemical tank levels (inches)	3
pH (S.U.) by handheld meter	5
Dissolved oxygen (mg/L) by handheld meter	5
Conductivity (μS/cm) by handheld meter	5
ORP (mV) by inline meter	5
Nitrate/nitrate (mg of N/L) by HACH test kit	5
Temperature (°F)	5
Raw Water Totalizer (gallons)	5
Service Water Totalizer (gallons)	5
Anoxic zone #1 level (inches)	5
Anoxic zone #2 level (inches)	5
Anoxic zone #3 level (inches)	5

Laboratory analyses were conducted by We Energies' corporate lab, TestAmerica Laboratories, Inc., and Brooks Applied Labs for analytical chemistry evaluations. Parameters analyzed by each lab are summarized in Table 3-4, Table 3-5, and Table 3-6. Turnaround times for parameter results varied with each lab, but were generally one to two weeks with the exception of selenium by We Energies which was within three days. Samples were shipped to We Energies' lab and TestAmerica same-day and all samples requiring dissolved parameter analysis were filtered by the labs. Samples sent to Brooks Applied were on 24-hour delivery shipping. Samples analyzed

by We Energies and TestAmerica were taken every Monday, Tuesday, and Thursday during Conditions 1 and 2 and only Tuesday and Thursday during Condition 3. The entire analytical plan, which identifies the sample locations and frequencies, is provided in Appendix A.

Table 3-4
We Energies Lab Analyses

Parameter	Analytical Method
Aluminum, total and filtered	EPA 200.7
Arsenic, total and filtered	EPA 200.8 DRC-O2
Boron, total and filtered	EPA 200.7
Cadmium, total and filtered	EPA 200.7 / EPA 200.8
Calcium, total and filtered	EPA 200.7
Cobalt, total and filtered	EPA 200.7
Copper, total and filtered	EPA 200.7 / EPA 200.8
Iron, total and filtered	EPA 200.7
Lead, total and filtered	EPA 200.7 / EPA 200.8
Magnesium, total and filtered	EPA 200.7
Manganese, total and filtered	EPA 200.7
Mercury low-level, total and filtered	EPA 1631E
Mercury low-level, 0.45 µm	EPA 1631E
Molybdenum, total and filtered	EPA 200.7
Molybdenum, filtered	EPA 200.7
Nickel, total and filtered	EPA 200.7
Selenium, total and filtered	EPA 200.8 DRC-NH3
Silver, total and filtered	EPA 200.7
Sodium, total and filtered	EPA 200.7
Thallium, total and filtered	EPA 200.8
Tin, total and filtered	EPA 200.7
Zinc, total and filtered	EPA 1638 DRC

Table 3-5
TestAmerica Lab Analyses

Parameter	Analytical Method
Alkalinity	SM2320B
Ammonia	SM4500
Bicarbonate	SM2320B
BOD	SM5210B
Carbonate	SM2320B
Chlorides, filtered	SM4500
COD	SM5220C
Conductivity, µS/cm	SM2510B
Fluoride, total	SM4500
Nitrate/Nitrate (N)	SM4500
Phosphorus, total	SM4500
Sulfate, filtered	SM4500
Sulfide	SM4500
TDS	SM2540C
TKN	SM4500
TOC	SM5310C
TSS	SM2540D

Table 3-6
Brooks Applied Lab Analyses

Parameter	Analytical Method
Arsenic, total and filtered	EPA 200.8/6060
Arsenic Speciation, filtered[1]	EPA 200.8/6060
Selenium, total and filtered	EPA 200.8/6060
Selenium Speciation, filtered[1]	EPA 200.8/6060

[1]Speciation analyses only conducted on pilot influent and effluent samples

4
RESULTS AND DISCUSSION

This section presents the results associated with the P4 pilot study. Raw data from the pilot study are presented in Appendix C.

During the pilot study, influent water quality/chemistry was considered typical for the site (no major upsets/excursions or abnormal conditions occurred in any process upstream of the pilot system). The P4 wastewater treatment system was offline for two weeks in mid-November 2015 (during the MBR and ABMet acclimation period in Condition 1) due to mechanical issues, but stored effluent water provided consistent flow and chemistry to the pilot. In mid-February 2016, the P4 system shut down again through the beginning of March, but stored water (with consistent chemistry) was provided to the pilot. The demonstration ended March 3, 2016. There were many performance changes in the pilot MBR and ABMet processes throughout the demonstration. These changes are documented and described to the best of the project team's capabilities.

Pilot Influent Water Quality

Table 4-1 presents a summary of the blended pilot influent water quality (50 percent full-scale physical/chemical treatment effluent and 50 percent service water from Lake Michigan [untreated] by volume). The blended pilot influent total selenium concentration averaged 1,175 µg/L with a range of 770 to 2,500 µg/L. The blended pilot influent dissolved selenium concentration averaged 1,093 µg/L. Comparisons between each data set revealed most of the blended influent selenium was in the soluble form. Nitrate/nitrite nitrogen averaged 98 milligrams of nitrogen per liter (mg-N/L), with a range of 65 to 160 mg-N/L. Ammonia averaged 52 mg/L with a range of 10 to 180 mg/L[4]. The ranges indicate variability in the full-scale physical/chemical effluent, which was observed over the course of the pilot study. The variability could be explained in part by the site's normal maintenance process of shutting down the physical/chemical system every week for manual cleaning of the components. During this time, the concentrations of components build in the absorbers and a new "batch" of water is delivered to the system every Monday morning.

[4] The higher concentrations of ammonia may be attributed to selective catalytic reduction (SCR) layers approaching end of life at P4, causing higher ammonia injection rates to be used for meeting NO_X removal requirements which subsequently increases the ammonia concentration in the FGD wastewater. SCR catalyst life decays naturally over many years until replacement is needed. The replacement is generally scheduled with a steam generator/boiler outage.

Table 4-1
Blended Pilot Influent Water Quality

Parameter	Units	Pilot Influent – All Operating Conditions		
		Minimum	Maximum	Average
Total Selenium	µg/L	770	2,500	1,175
Dissolved Selenium	µg/L	710	1,900	1,093
NO_2/NO_3-N	mg/L	65	160	98
Total Mercury	ng/L	20	240	72
Dissolved Mercury	ng/L	6.9	29	13.5
Total Arsenic	µg/L	0.45	8.10	4.67
Dissolved Arsenic	µg/L	0.45	8.50	4.68
pH[1]	S.U.	6.6	7.7	
Total Calcium	mg/L	400	830	479
Dissolved Calcium	mg/L	400	840	471
Total Magnesium	mg/L	1,600	3,100	2,039
Dissolved Magnesium	mg/L	1,600	3,100	2,023
Ammonia	mg/L	10	180	52
Conductivity	µS/cm	11,000	22,000	13,378
COD	mg/L	360	1,600	596
BOD	mg/L	1.00	2.60	1.8
TOC	mg/L	5.1	77.0	28.1
Chloride	mg/L	2,300	3,200	2,690
Fluoride	mg/L	18.0	43.0	24.0
Sulfate	mg/L	6,200	11,000	7,805
Ortho-Phosphate	mg/L	<0.027	0.74	0.10
Total Phosphorus	mg/L	0.027	0.750	0.093
Total Kjeldahl Nitrogen (TKN)	mg/L	42	220	101
Sulfide	mg/L	<0.22	1.70	0.15
TSS	mg/L	4	31	12
TDS	mg/L	12,000	25,000	16,452
Total Alkalinity	mg/L	78	120	103
Bicarbonate Alkalinity	mg/L	78	120	103
Carbonate Alkalinity	mg/L	<3.9	<3.9	<3.9

Notes:
Blended Influent: 50 percent full-scale physical/chemical treatment effluent and 50 percent service water from Lake Michigan (untreated)
[1]Analysis performed onsite
BOD = biochemical oxygen demand
µS/cm = microSiemen per centimeter
S.U. = standard units
TDS = total dissolved solids
TOC = total organic carbon

Variability (the difference between minimum and maximum concentration values) was also observed in arsenic and mercury throughout the study. The data indicate pilot feed water contained arsenic mostly in the soluble form whereas mercury was mostly in the particulate form. The TDS ranged from 12,000 to 25,000 mg/L during the pilot study.

The following sections discuss the pilot study results, including operational parameters and effluent water quality for each operating condition.

Membrane Biological Reactor

Operating Parameters

MBR operational parameters are discussed in this section. As previously mentioned, the P4 full-scale physical/chemical treatment effluent was blended with service water from Lake Michigan at a 1:1 ratio in the pilot's equalization tank. This blended stream served as influent to the pilot system and was pumped to the MBR anoxic zone #1.

After the initial seeding with biomass from the local municipal wastewater treatment plant, the mixed liquor was recirculated through the MBR for two days with 300 gallons of blended pilot feed water. The system was placed in forward flow through the MBR after these two days and acclimation continued for four weeks. Table 4-2 compares the MBR operational parameters at the four test conditions. The flow rate to the MBR averaged approximately 1 GPM during Conditions 1 and 2 and 1.5 to 1.6 GPM in Conditions 3 and 4. This resulted in combined HRT in the bioreactor zones decreasing from approximately 35 hours during Conditions 1 and 2 to approximately 23 hours during Conditions 3 and 4. The increase in flow rate and subsequent reduction in HRT was part of the initial pilot test plan. Operating at the lower flow rate initially was intended to allow for adequate acclimation of the biomass and the plan was to increase the flow rate after acclimation in order to simulate full-scale conditions.

Table 4-2
MBR Operational Parameters

Condition Description	Startup and Acclimation	Initial Operation	Increased Flow/ Reduced HRT	Process Adjustments
Condition Number	**1**	**2**	**3**	**4**
Parameter/Dates	**10/26/15 to 12/16/15**	**12/17/15 to 1/10/16**	**1/11/16 to 2/13/16**	**2/14/16 to 3/3/16**
Influent Flow Rate				
Average	1.05 GPM	1.01 GPM	1.54 GPM	1.6 GPM
Range	1 to 2.6 GPM	1 to 1.25 GPM	1.25 to 1.6 GPM	1.6 GPM
MBR pH Control Set Point	6.8 to 7.2	6.8 to 7.2	6.8 to 7.2	6.8 to 7.2
MBR HRT Anoxic Zone #1	1.6 hours	1.7 hours	1.1 hours	1.0 hour
MBR HRT Anoxic Zone #2	1.6 hours	1.7 hours	1.1 hours	1.0 hour
MBR HRT Aerobic Zone	15.9 hours	16.5 hours	10.8 hours	10.4 hours
MBR HRT Anoxic Zone #3	15.9 hours	16.5 hours	10.8 hours	10.4 hours
ZeeWeed 500 Flux	10 GFD (first 3 weeks) 5.8 GFD	5.8 GFD	5.8 GFD	5.8 GFD
ZeeWeed 500 Backwash Flux	20 GFD	20 GFD	20 GFD	20 GFD
MBR Aeration Rate	12 SCFM	12 SCFM	12 SCFM	12 SCFM

Table 4-2 (continued)
MBR Operational Parameters

Condition Description	Startup and Acclimation	Initial Operation	Increased Flow/ Reduced HRT	Process Adjustments
Condition Number	**1**	**2**	**3**	**4**
Parameter/Dates	**10/26/15 to 12/16/15**	**12/17/15 to 1/10/16**	**1/11/16 to 2/13/16**	**2/14/16 to 3/3/16**
MBR MLSS				
Average	5,760 mg/L	3,950 mg/L	2,690 mg/L	4,183 mg/L
Range	3,400 to 6,500 mg/L	3,700 to 4,200 mg/L	1,000 to 6,500 mg/L	2,900 to 5,800 mg/L
RAS Flow Rate	6 to 8 GPM	6 to 8 GPM	6 to 8 GPM	6 to 8 GPM
Sludge Wasting Rate	none	none	80 GPD	none
MBR DO Anoxic Zone #1				
Average	0.93 mg/L	2.55 mg/L	3.37 mg/L	0.12 mg/L
Range	0.11 to 2.4 mg/L	1.74 to 3.90 mg/L	1.12 to 6.23 mg/L	0.02 to 0.49 mg/L
MBR DO Anoxic Zone #2				
Average	0.23 mg/L	0.29 mg/L	1.34 mg/L	0.02 mg/L
Range	0.01 to 2.06 mg/L	0 to 2.49 mg/L	0 to 5.53 mg/L	0 to 0.2 mg/L
MBR DO Aerobic Zone				
Average	3.20 mg/L	3.19 mg/L	4.02 mg/L	2.84 mg/L
Range	0.86 to 5.90 mg/L	1.7 to 4.93 mg/L	0.17 to 9.00 mg/L	0.43 to 5.22 mg/L
MBR DO Anoxic Zone #3				
Average	0.14 mg/L	0.02 mg/L	0.02 mg/L	0.01 mg/L
Range	0 to 0.56 mg/L	0 to 0.05 mg/L	0 to 0.13 mg/L	0 to 0.04 mg/L
MBR ORP Anoxic Zone #3				
Average	-387 mV	-423 mV	-331 mV	-354 mV
Range	-143 to -489 mV	-376 to -477 mV	-58 to -427 mV	-83 to -416 mV
Number of Membranes in Service	1	1	1	1
Chemical Doses				
Hydrochloric Acid (to ZeeWeed Tank)	950 mg/L	950 mg/L	400 mg/L	400 mg/L
Sodium Hydroxide (to Aerobic Zone)	350 mg/L	350 mg/L	350 mg/L	none
COD Added via Acetic Acid to Anoxic Zone #3				
Average Added	897 mg/L	618 mg/L	447 mg/L	643 mg/L
Range	563 to 1,464 mg/L	452 to 807 mg/L	227 to 565 mg/L	630 to 756 mg/L
Ferric Chloride (to Aerobic Zone)	60 mg/L (2 days only)	none	none	none
Phosphoric Acid (to Anoxic Zone #1)	none	5 mg/L	5 mg/L	5 mg/L
Potassium Sulfite (to Equalization Tank)	none	none	25 to 200 mg/L	none

Notes:

GFD = gallons per square feet per day

SCFM = standard cubic feet per minute

GPD = gallons per day

GPM = gallons per minute

mV = millivolt

RAS = return activated sludge (the flow from ZeeWeed tank to MBR Anoxic Zone #1)

On average, the DO was maintained above 2.8 mg/L (2-4 mg/L target) in the aerobic zone and was less than 0.1 mg/L (<0.5 mg/L target) in anoxic zone #3 during Conditions 2, 3, and 4. The ORP in anoxic zone #3 averaged less than -330 mV during all four conditions. These values were within GE's target range.

As noted in Table 3-1, the acetic acid product used to supply nutrients for the biological process was changed during the study. The blended acetic acid product was first used during Condition 1, and contains an organic carbon source (acetic acid), ammonium, and phosphorus (the latter two are nutrients). Due to the higher than anticipated phosphorus concentration (20 times higher) in the blended acetic acid, the carbon source was switched to an 80 percent solution of unblended acetic acid (the balance 20 percent is water) for Conditions 2, 3, and 4 to limit excess phosphorus in the final effluent. The excess phosphorous led to precipitation of excess solids which, if left untreated, could cause prolific scaling in the process equipment. To prevent scaling with the blended nutrient product, ferric chloride was added to the aerobic zone for two days until the nutrient product was changed. Afterward the acetic acid source was changed, ferric chloride dosing was stopped. Phosphoric acid was fed after the acetic acid product was changed to achieve less than 3 mg/L in the MBR permeate. The reduction in COD added by the nutrient from Conditions 1 to 2 to 3 (noted in Table 4-2) coincides with the project team's attempts to increase nitrate/nitrite concentration in the MBR permeate in attempt to improve ABMet selenium reduction. Additional discussion is provided in the ABMet section.

The ZeeWeed membrane flux was initially set to 10 GFD with an operating cycle time[5] of 10 minutes and resting mode duration of 30 seconds. During the first three weeks of operation in the acclimation period, the ZeeWeed TMP averaged less than 1 PSI. It was also during this time that the acetic acid feed point was inadvertently placed at the aerobic zone instead of the anoxic zone #3. Once the feed point was moved, an increase in TMP was observed and the membrane flux set point was reduced to 5.8 GFD. A second spike in TMP occurred gradually from December 12 through 24, 2015. Once the TMP reached 8 PSI, the system was placed in automatic standby and from December 24 through 28, the MBR and ABMet systems were offline due to the high MBR TMP. A recovery clean was completed on December 27 and 28; the recovery clean included soaking the membranes in a 1,000 mg/L solution of sodium hypochlorite, followed by soaking in a 2,000 mg/L solution of citric acid. The system was placed back into operation on December 28 and the maintenance cleaning schedule was adjusted for a citric acid cleaning every other day.

The MBR process accumulates solids that come from biomass production and naturally by precipitation of various chemical species in the wastewater. The MBR solids, referred to as mixed liquor suspended solids (MLSS), were purged from the system beginning in early January 2016 at 80 GPD. The MLSS purge rate was set to 20 gallons every 6 hours to avoid reducing flow to the ABMet. Discharge of MLSS ended in mid-February due to low MLSS concentrations and decreased selenium reduction performance (additional details are provided in the next section).

[5] Cycle time refers to the changing of the membrane operating mode from filtration to resting. In filtration mode, a vacuum is maintained to pull water through the membrane and produce treated effluent. In resting mode, no vacuum is applied to the membranes and the air scour is maintained to help remove solids. [1]

Treated Water Characteristics

This section discusses the characteristics of the MBR pilot treated effluent (permeate). The MBR process was operated to remove ammonia, nitrates, and selenium while being monitored for potential impacts from chemical scaling and high TDS. Membrane performance and optimization of the HRT and SRT were monitored throughout the study.

Table 4-3 summarizes the treated effluent water quality based on samples collected during each operating condition. Figures 4-1, 4-2, 4-3, 4-4, and 4-5 present MBR influent and effluent COD and phosphorus; ammonia and total Kjeldahl nitrogen (TKN); nitrate/nitrite nitrogen; selenium; and mercury, respectively.

As seen in Table 4-3, the MBR effluent phosphorus concentration was higher during Condition 1; however, as Figure 4-1 shows, the influent phosphorus concentration was consistent for the pilot study. The increased MBR effluent phosphorus concentration during Condition 1 was due to the higher-than-planned-for phosphorus content of the nutrient balanced acetic acid blend being added. Once the acetic acid was switched to the 80 percent solution in the first week of December 2015 (near the beginning of Condition 2), the MBR effluent phosphorus concentration decreased.

Table 4-3
MBR Treated Effluent (Permeate) Water Quality[1]

Parameter	Units	Condition 1			Condition 2			Condition 3			Condition 4		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
Total Selenium	µg/L	120	350	200	110	260	173	170	590	337	170	460	231
Dissolved Selenium	µg/L	120	340	190	120	260	167	170	600	330	160	460	233
NO_2/NO_3-N	mg/L	0.19	160	35	0.12	0.24	0.15	0.13	21	4.0	0.09	0.18	0.13
Total Mercury	ng/L	1.44	3.94	2.46	1.60	3.68	2.58	1.01	5.67	2.67	1.93	1.94	1.94
Dissolved Mercury	ng/L	1.10	3.33	2.02	0.23	3.06	1.96	0.64	2.97	1.92	0.66	0.90	0.78
Total Arsenic	µg/L	3.7	5.1	4.7	4	5	4	--	--	--	--	--	--
Dissolved Arsenic	µg/L	3.6	5.0	4.5	4	5	4	--	--	--	--	--	--
Total Calcium	mg/L	440	520	476	420	530	456	440	490	454	460	470	465
Dissolved Calcium	mg/L	450	510	476	420	540	460	430	480	457	460	470	465
Total Magnesium	mg/L	1,900	2,500	2,107	1,700	2,100	1,840	--	--	--	--	--	--
Dissolved Magnesium	mg/L	2,000	2,500	2,138	1,700	2,100	1,840	--	--	--	--	--	--
Total Sodium	mg/L	--	--	--	420	420	420	410	500	476	500	500	500
Ammonia	mg/L	0.31	13.0	3.75	4	14	9	0.23	12.0	5.09	1.3	110	37
Conductivity	µS/cm	13,000	16,000	13,923	11,000	14,000	12,429	11,000	13,000	12,500	12,000	13,000	12,200
COD	mg/L	260	640	501	370	570	513	370	550	433	370	570	455

Table 4-3 (continued)
MBR Treated Effluent (Permeate) Water Quality[1]

Parameter	Units	Condition 1			Condition 2			Condition 3			Condition 4		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
BOD	mg/L	--	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TOC	mg/L	--	--	--	14	14	14	6	69	37	2.5	3.8	3.0
Fluoride	mg/L	21	25	23	22	27	24	22	25	24	25	27	26
Sulfate	mg/L	--	--	--	6,700	6,900	6,800	6,000	9,100	7,100	6,300	7,900	6,917
Ortho-Phosphate	mg/L	13	36	19	1.2	1.2	1.2	--	--	--	--	--	--
Total Phosphorus	mg/L	2	25	14	1.2	6.5	3.9	0.86	4.30	2.64	0.03	3.00	2.06
TKN	mg/L	32	94	67	73	100	81	59	78	69	53	96	71
Sulfide	mg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
TSS	mg/L	--	--	--	4	4	4	2	6	4	3	6	5
TDS	mg/L	14,000	20,000	17,286	12,000	16,000	14,714	13,000	16,000	14,600	14,000	16,000	14,600
Total Alkalinity	mg/L	200	200	200	100	110	105	40	180	116	220	270	240
Bicarbonate Alkalinity	mg/L	200	200	200	100	110	105	40	180	116	220	270	240
Carbonate Alkalinity	mg/L	--	--	--	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9

Notes:
[1] Average soluble concentrations were higher than total for some results due to analytical imprecision.
µS/cm = microSiemen per centimeter
Avg. = average
Max = maximum
Min = minimum
-- = no data

Figure 4-1 also shows that the MBR influent and effluent COD concentrations were similar. Given this, and the readily biodegradable nature of acetic acid, the data suggest that the influent COD was non-biodegradable. Also, from Table 4-3, it is evident that all the COD added through acetic acid was consumed in the MBR since the MBR effluent BOD and TOC concentrations were very low (higher BOD and TOC would indicate potential for additional biological activity in the oxidation of organic matter and the amount of carbon in organic material, respectively). This also raises the question whether all the COD in the influent reported is contributed by analytical interference or some other oxygen-demanding constituents, as opposed to organic carbon. It could also suggest that the organic compounds present were not fully oxidized in TOC tests (thus TOC readings would be lower than actual concentrations). The theory on analytical interference is drawn from low TOC concentrations reported during period of higher COD concentration measurements.

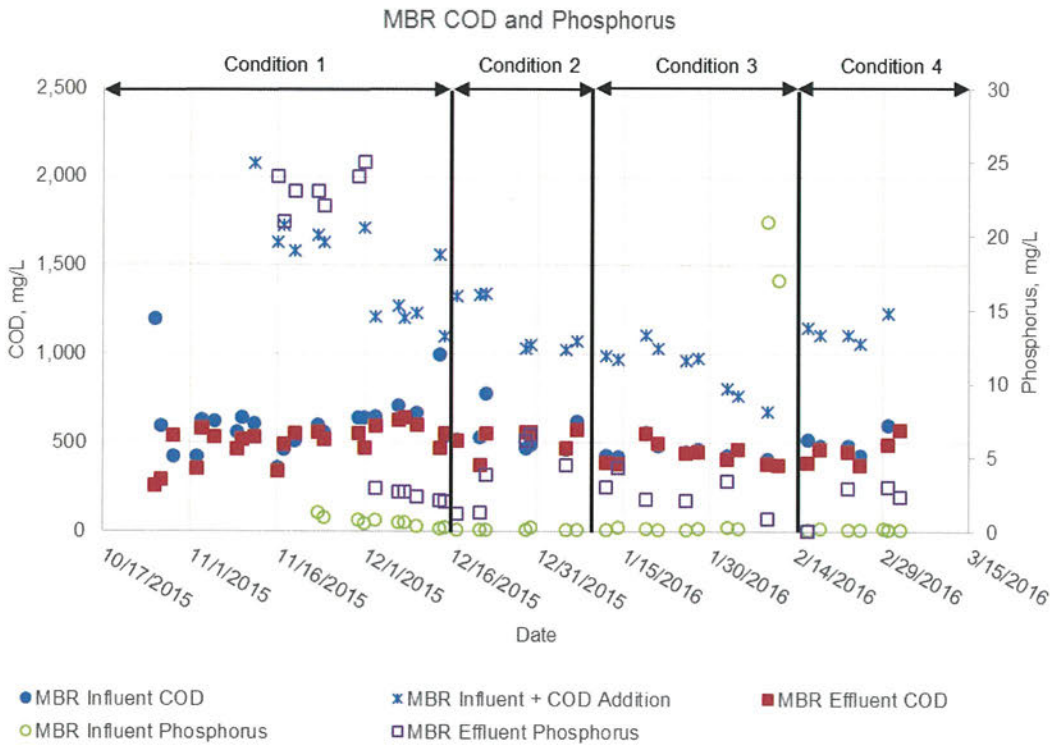

Figure 4-1
MBR influent and effluent COD and phosphorus

The data in Figure 4-2 show complete nitrification during October and November 2015. During this time, the influent ammonia concentration was high (ranging from 50 to 130 mg/L). Towards the end of Condition 1 and into Conditions 2 and 3, the influent ammonia concentration decreased to 10 to 20 mg/L, and nitrification appeared to stall (as seen by an increase in MBR effluent ammonia concentration).

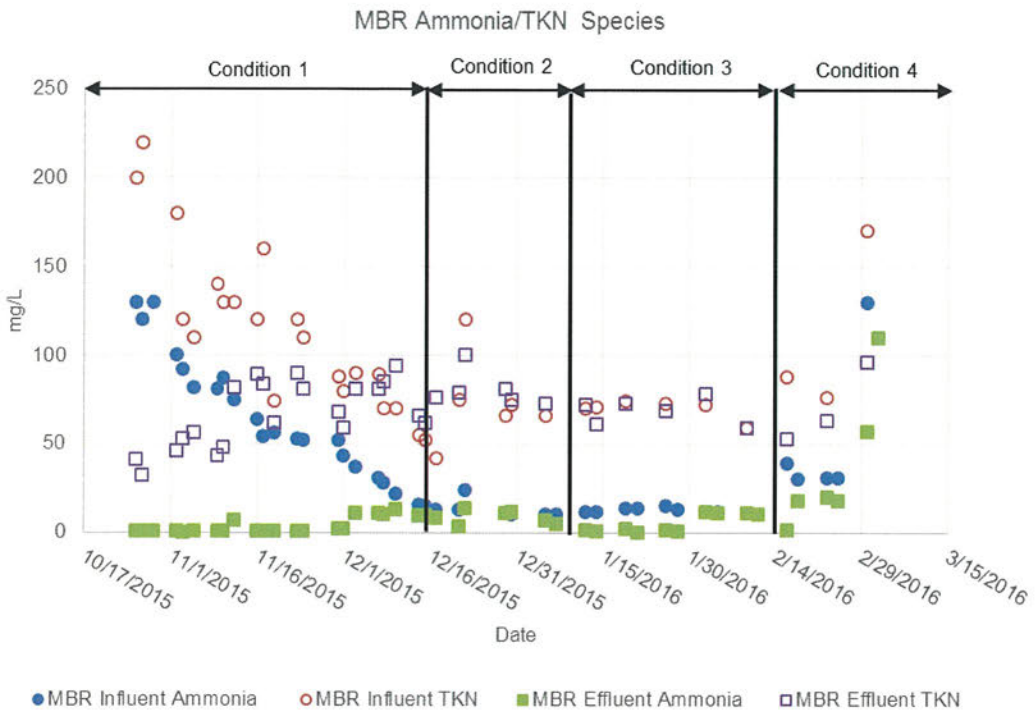

Figure 4-2
MBR influent and effluent ammonia and TKN

Also during this time, it was noticed that the pilot feed water alkalinity was lower than at the beginning of the demonstration and higher ammonia concentrations were coming from the P4 boiler units and creating higher pH values.

The generation of MLSS in the MBR varied throughout the pilot study. Wasting solids (MLSS) from the MBR was initiated during the middle of Condition 2 on December 28, 2015, at a rate of 80 GPD and was stopped in the middle of Condition 3 on January 30, 2016. This resulted in decreased MLSS concentrations during Conditions 2 and 3 from approximately 6,000 mg/L down to approximately 3,000 mg/L and an increase in MLSS concentration during Condition 4 to approximately 4,200 mg/L. These changes were not the cause of the loss of nitrification as the loss of complete nitrification occurred on November 30, 2015, one month prior to initiating the solids wasting. These changes do not appear to have impacted denitrification as full reduction of nitrate-nitrogen to nitrogen gas occurred throughout the pilot study. During Condition 4, the influent ammonia concentration started to increase with a corresponding increase in MBR effluent ammonia concentration, further indicating that nitrification had been lost. The reason(s) for losing the nitrification in the MBR could not be identified, but suspected to be caused by toxic or inhibitory compounds in the water.

In order to understand if toxicity/inhibitory compounds were contributing to the loss in nitrification, potassium sulfite was dosed to the Equalization Tank starting January 5, 2016, at a rate of 50 mg/L (to achieve 25 mg/L after dilution with service water). Higher dosages were added throughout Condition 3. The potassium sulfite was added to reduce potential oxidants that may have been contributing to the loss in nitrification performance. There were also concerns that the reduction in nitrification performance indicated the presence of inhibitory or toxic compounds that could have potentially also affected the ABMet bacteria and selenium reduction performance.

Nitrification performance did not noticeably improve when dosing potassium sulfite and dosing was discontinued on January 27. In an attempt to rule out the effectiveness of potassium sulfite versus the presence/impact of inhibitory compounds, 20 kg of powdered activated carbon (PAC) was added to MBR on February 6, 2016. The PAC should have absorbed inhibitory compounds present in the water; however, MBR nitrification performance did not improve with PAC addition.

Another observation from Figure 4-2 is that the blended influent contained recalcitrant TKN concentrations averaging 65 to 81 mg/L during all four conditions. TKN is comprised of ammonia and organic-nitrogen and the high concentrations in the MBR effluent suggest that a significant portion of the organic nitrogen fraction of the influent TKN was in a non-biodegradable form.

Nitrate/Nitrite

One of the main goals of the pretreatment MBR was to remove (denitrify) the nitrate/nitrite-nitrogen present in the influent and produced via nitrification in the aerobic zone. The average effluent nitrate/nitrite-nitrogen concentration during Condition 1 was 35 mg/L, indicating incomplete denitrification. This was due to the acetic acid dosing point inadvertently being installed in the aerobic zone of the MBR, which resulted in poor denitrification caused by anoxic zone #3 being carbon limited. After three weeks of poor denitrification, this situation was discovered and the acetic acid dosing point was relocated to the planned location (i.e., anoxic zone #3) on November 11, 2015.

As can be seen in Figure 4-3, once the acetic acid dosing point was relocated, complete denitrification occurred. Complete denitrification continued in the MBR throughout the remainder of the pilot study (other than a 2-week period towards the end of Condition 3, when the acetic acid dose was reduced intentionally to allow nitrate-nitrogen to pass through the pretreatment MBR to the ABMet system). Although nitrification was lost during Conditions 3 through 4, nitrate-nitrogen removal (denitrification) was never a problem in the MBR. For some unknown reason, more sensitive nitrifying bacteria were inhibited but the heterotrophic denitrifying bacteria were not inhibited.

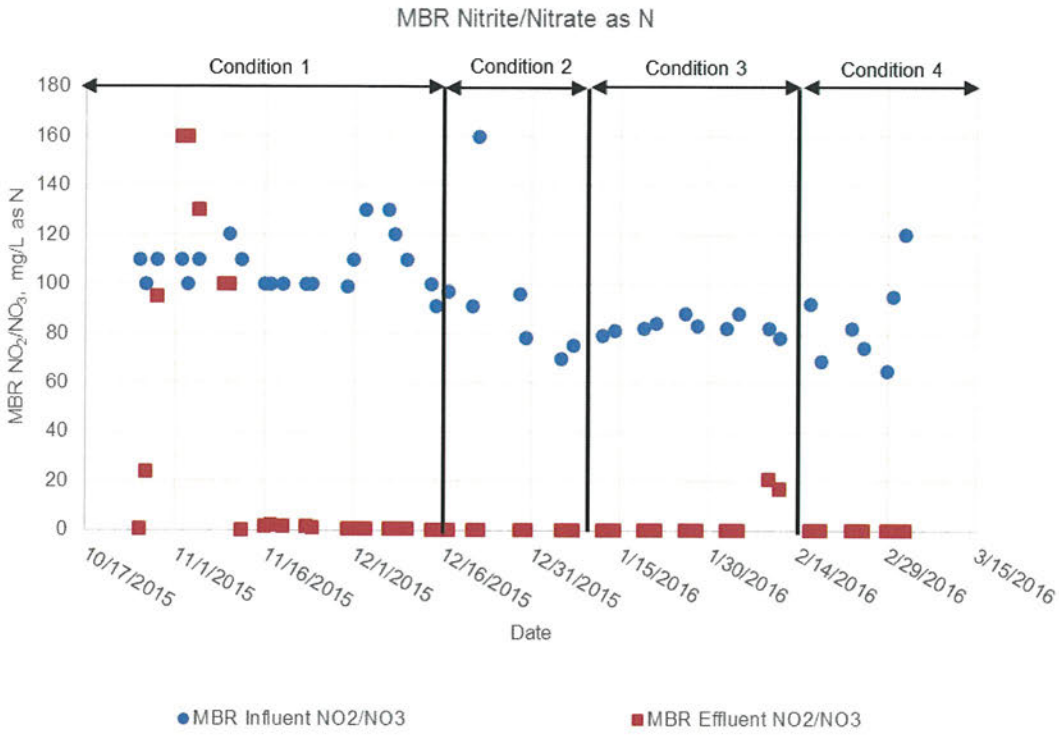

Figure 4-3
MBR influent and effluent nitrate/nitrite as nitrogen

Selenium

As seen in Figure 4-4, significant selenium reduction occurred in the pretreatment MBR. The overall average influent total selenium concentration was 1,175 µg/L, and the overall average effluent total selenium concentration was 250 µg/L. On average throughout all conditions, approximately 75 percent reduction in selenium concentration was observed. This is attributed to maintaining a very low ORP (approximately -350 mV) in the anoxic zone #3 with high acetic acid dosage. This ORP is comparable to that maintained in the ABMet reactors. Another observation from Figure 4-4 is that almost all of the influent selenium was soluble, which indicates that removal across the pretreatment MBR was by biological reduction to elemental selenium (which exists in particulate form) followed by filtration via the ultrafiltration membrane.

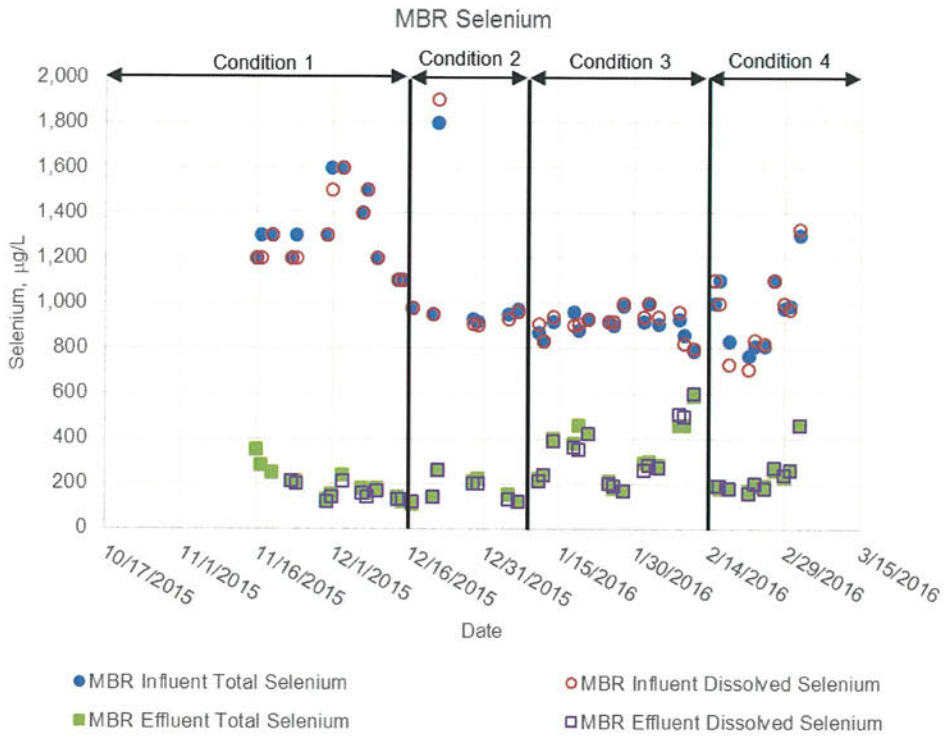

Figure 4-4
MBR influent and effluent selenium

On January 11, 2016, the MBR flow rate was increased from 1 GPM to 1.6 GPM. Prior to making this change, the MBR effluent was sampled and the selenium result was higher than previous results (220 µg/L vs. 120 µg/L from January 7). Acetic acid (nutrient) feed was increased proportionally with the feed rate and no changes in ORP were observed; there were no immediate indications as to why the effluent selenium concentrations began to increase.

Higher selenium concentration results continued until midway through Condition 3, when they decreased but again increased until the start of Condition 4. The increase in effluent selenium at the beginning of Condition 3 is not likely to be caused solely by the increased flow rate since the change occurred after the initial sample was taken that provided the indication. Selenium concentration results from the ABMet 1 and 2 reactor effluents were also higher that day (with no changes observed in either ORP or pH); again, emphasizing the increased flow rate was not the sole contributor.

Mercury

As seen in Figure 4-5, significant mercury reduction also occurred in the pretreatment MBR. The average influent total mercury concentration to the pretreatment MBR was approximately 72 ng/L, and the average effluent was 3 ng/L. The pretreatment MBR stage achieved approximately 96 percent reduction of mercury throughout the pilot study. This is likely due to mercury entering the MBR in mostly particulate form (see Table 4-1), the particulate mercury being removed by the ultrafiltration membrane, and potentially due to some of the soluble mercury precipitating to a particulate with sulfide generated under low ORP in the anoxic zone #3.

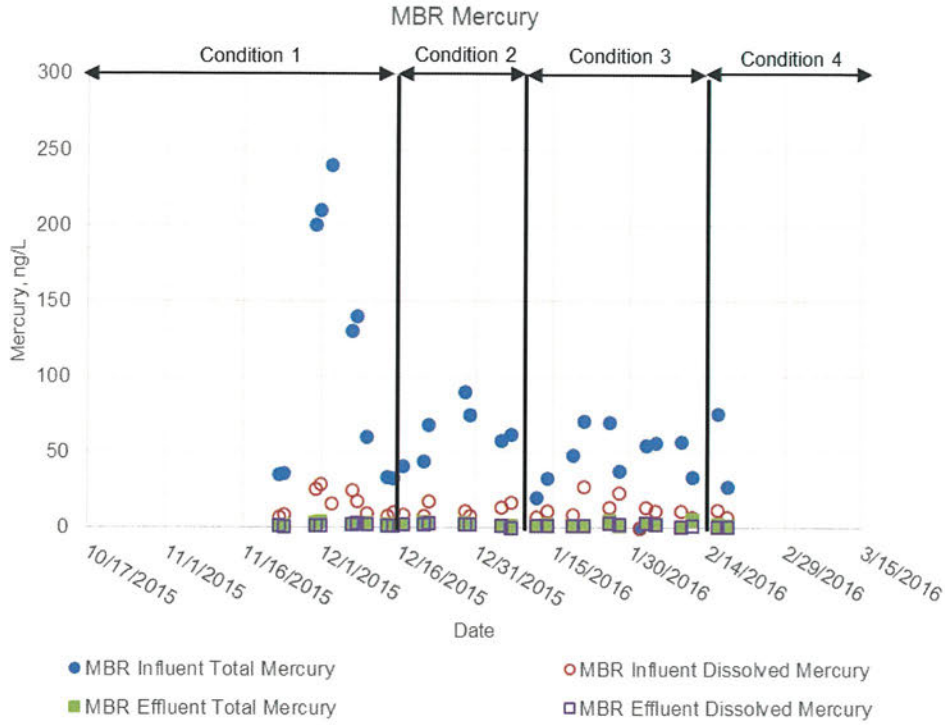

Figure 4-5
MBR influent and effluent mercury

Arsenic

Several weeks' worth of arsenic data were collected, which indicated no removal of arsenic in the pretreatment MBR. Average influent and effluent concentrations were both approximately 4.6 µg/L. This is indicative of the arsenic entering the MBR in mostly dissolved form, and not precipitating to a particulate form in the MBR (see Table 4-1).

ABMet

Operating Parameters

ABMet operational parameters are discussed in this section. The MBR effluent (permeate) was collected in the ABMet feed tank. From the feed tank, the water was pumped to the ABMet Stage 1. Table 4-4 compares the ABMet operational parameters at the four test conditions.

Table 4-4
ABMet Operational Parameters

Condition Description	Startup and Acclimation	Initial Operation	Increased Flow/ Reduced HRT	Process Adjustments
Condition Number	**1**	**2**	**3**	**4**
Parameter/Dates	**10/26/15 to 12/16/15**	**12/17/15 to 1/10/16**	**1/11/16 to 2/13/16**	**2/14/16 to 3/3/16**
ABMet Stage 1 Flow Average	0.5 GPM	0.6 GPM	0.9 GPM	0.9 GPM
ABMet Stage 1 EBCT	11.2 hours	9.4 hours	6.2 hours	6.2 hours
ABMet Stage 2 Flow Average	0.5 GPM	0.6 GPM	0.9 GPM	0.9 GPM
ABMet Stage 2 EBCT	11.2 hours	9.4 hours	6.2 hours	6.2 hours
ABMet Influent ORP				
Average	183 mV	91 mV	94 mV	368 mV
Range	110 to 263 mV	52 to 151 mV	34 to 224 mV	261 to 454 mV
ABMet Effluent ORP[1]				
Average	-125 mV	-184 mV	-365 mV	-350 mV
Range	-500 to 106 mV	-364 to 295 mV	-419 to -310 mV	-412 to -318 mV
Backwash Flow Rate	80 GPM	80 GPM	80 GPM	80 GPM
Degas Flow Rates	100 GPM	100 GPM	100 GPM	100 GPM
Feed Tank HRT	4 hours	4 hours	4 hours	4 hours
Chemical Doses				
Antiscalant, MDC776 (MBR Permeate to ABMet Feed Tank)	none	5 mg/L	5 mg/L	5 mg/L

[1] ORP data varied significantly, including positive values, potentially due to analytical error with the inline probes.
EBCT = empty bed contact time, calculated as total boundary volume occupied by the GAC media divided by the flow rate passing through the vessel

The average flow rate to the ABMet system during Condition 1 was 0.5 GPM, which corresponds to a total empty bed contact time (EBCT) of approximately 22.4 hours (11.2 hours for each stage). During Condition 2, the average flow rate increased to 0.6 GPM (due to mechanical issues, not intentionally increased), which corresponds to a total EBCT of approximately 18.8 hours. During Conditions 3 and 4, an intentional increase in flow rate to 0.9 GPM occurred. This corresponds to an average total EBCT of 12.4 hours. The project originally intended to increase flow rates to achieve EBCT closer to GE's target design of approximately 4 hours per reactor (8 hours total).

The average ORP in the ABMet effluent during each condition ranged from -125 to -365 mV, with the lowest average values of -365 and -350 mV occurring during Conditions 3 and 4, respectively. These correspond to increased acetic acid dosing during Conditions 3 and 4 and were within GE's target range of -250 to -400mV. The average ORP values during Conditions 1 and 2 may be artificially elevated due to several reported positive values that may have resulted from analytical error and/or issues with the inline measurement probes. A plot of inline ORP data from the MBR permeate (ABMet feed), ABMet stage 1 effluent, and ABMet stage 2 effluent are presented in Figure 4-6. Spikes in ORP from the ABMet locations are primarily associated with backwash and degas events. The ABMet system was taken offline from December 24 through 28 due to high TMP in the MBR system which required a cleaning. Both stages returned to <0 mV approximately one day after startup.

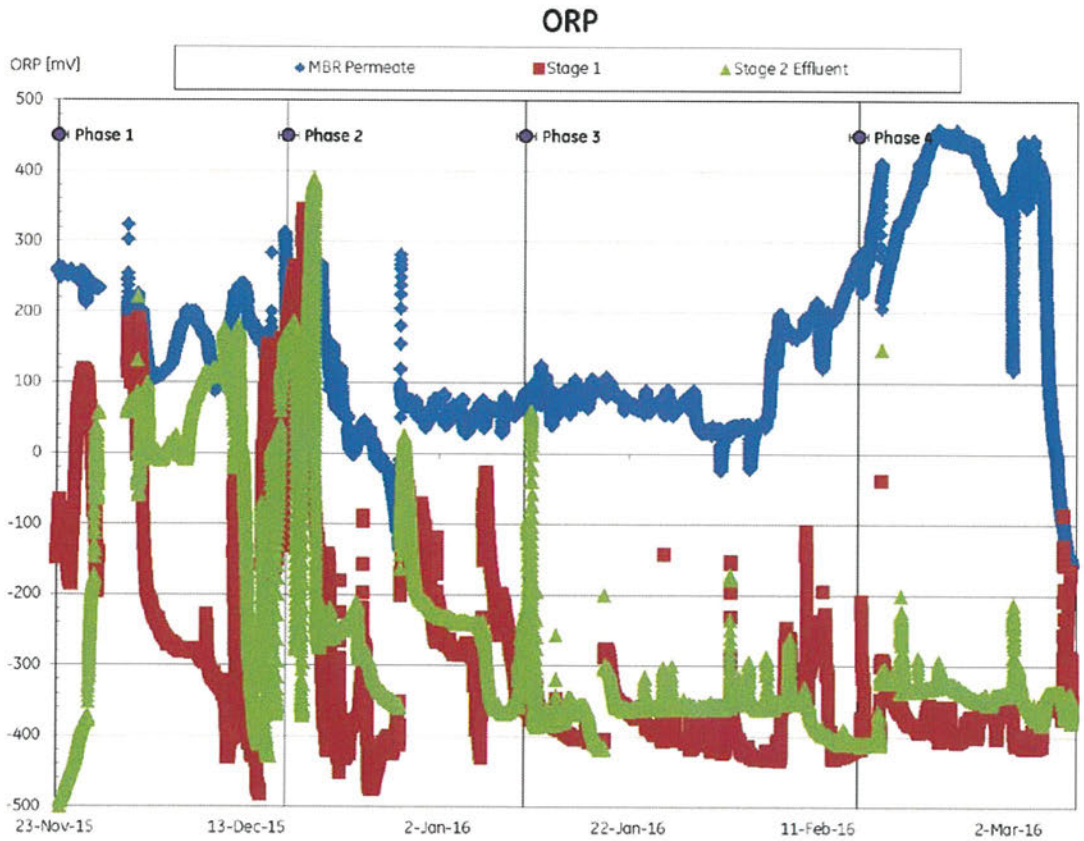

Figure 4-6
ABMet inline ORP trends
Courtesy of GE Water & Process Technologies

Four different nutrients were trialed for the ABMet pilot system. The initial nutrient was a blend of acetic acid, ammonium, and phosphorus (the same blend used initially for the MBR pilot). Due to formation of excess solids on the top of each ABMet reactor, a second nutrient containing 80% acetic acid (20% water) replaced the blended product. Three inches of carbon-containing excess solids were removed from each reactor. The third was a diluted blend of the first blended

product, made up of 50% pure acetic acid and 50% blended product. During the final phase of operation, molasses was added to the nutrient mix of pure acetic acid and blended product. A summary of the nutrient dosages and resulting COD concentration ranges are provided in Table 4-5.

Table 4-5
ABMet Nutrient Dosages

Condition Description	Startup and Acclimation	Initial Operation	Increased Flow/ Reduced HRT	Process Adjustments
Condition Number	**1**	**2**	**3**	**4**
Parameter/Dates	**10/26/15 to 12/16/15**	**12/17/15 to 1/10/16**	**1/11/16 to 2/13/16**	**2/14/16 to 3/3/16**
Nutrient	Blended acetic acid product containing acetic acid, ammonium, and phosphorus		50/50 mix of pure acetic acid (80%) and blended product	Molasses and 50/50 mix of pure acetic acid and blended product
Acetic Acid (COD) - ABMet Stage 1				
Average	28 mg/L	100 mg/L	76 mg/L	112 mg/L
Range	28 mg/L	87 to 175 mg/L	69 to 90 mg/L	90 to 134 mg/L
Acetic Acid (COD) - ABMet Stage 2				
Average	none	28 mg/L	37 mg/L	36 mg/L
Range	none	28 mg/L	28 to 70 mg/L	34 to 40 mg/L

The ABMet reactor head loss trends in Figure 4-7 provide indications of backwash and degas frequencies throughout the demonstration. Head loss is the water level above the media where a higher head loss is associated with an increased hydraulic resistance through the carbon media (and is indication of increased water level). For ABMet systems, increased head loss can indicate a need to backwash and/or degas the filters due to increased biomass and other solids or gases, respectively. Starting the week of January 11, 2016, degassing frequency was based on a schedule of once every Tuesday and Thursday (after water samples were taken). The length of each degassing event was originally set to 30 seconds, but was changed in mid-February to 90 seconds. According to GE, 90 seconds is more representative of full-scale systems.

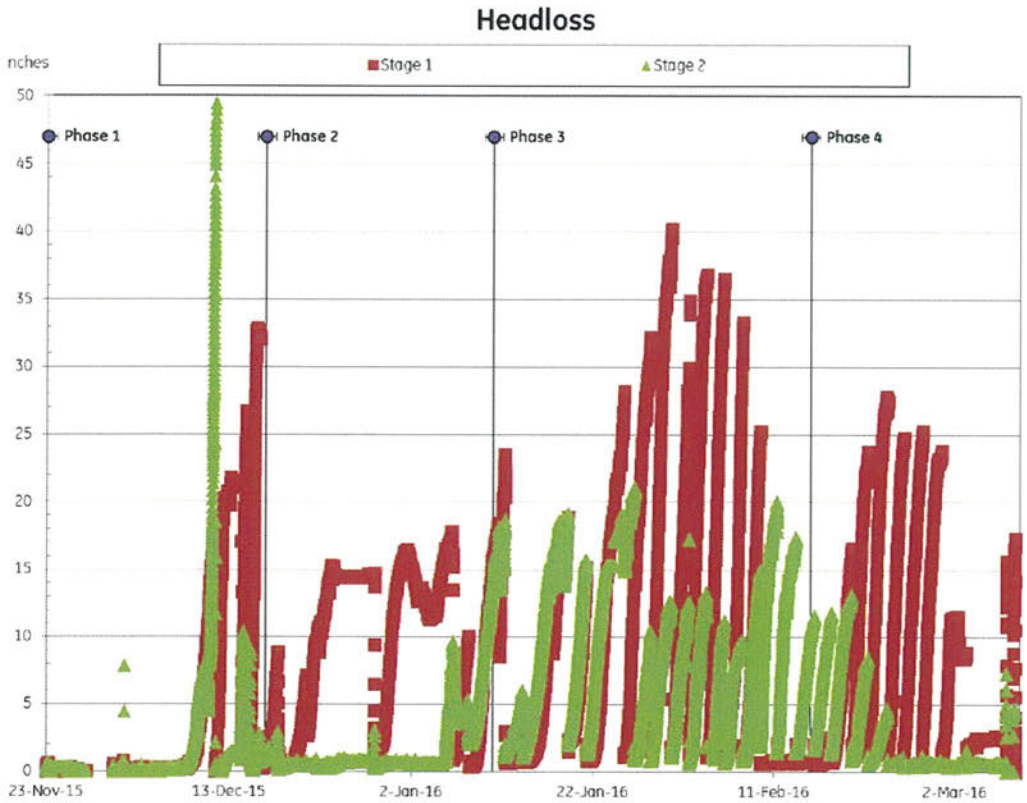

Figure 4-7
ABMet headloss trends
Courtesy of GE Water & Process Technologies

One backwash was completed for each ABMet stage during the demonstration. Stage 1 backwash occurred on January 25 and stage 2 occurred on January 26. Analytical results from samples taken at the Backwash Waste Tank after two backwash events are provided in Table 4-6. Note the selenium values are reported in mg/L as opposed to µg/L.

Table 4-6
ABMet Backwash Analysis

Sample Location and Date	Total selenium (mg/L)	Dissolved selenium (mg/L)	NO_2/NO_3 (mg-N/L)	Total Suspended Solids (mg/L)
ABMet Stage 1 1/25/2016	78	57	0.060	8.0[1]
ABMet Stage 2 1/26/2016	53	51	<0.045	7.5[1]

[1]According to GE, solids in backwash were lower than expected, which may be due to sampling error.

Treated Water Characteristics

This section discusses the characteristics of the ABMet pilot effluent. Table 4-7 summarizes the effluent water quality based on samples collected during each operating condition. Figures 4-8, 4-9, 4-10, 4-11, 4-12, and 4-13 present ABMet influent and effluent COD and phosphorus; ammonia and TKN; nitrate/nitrite nitrogen; selenium; mercury; and arsenic, respectively.

Table 4-7
ABMet Stage 2 Effluent Water Quality[1]

Parameter	Units	Condition 1			Condition 2			Condition 3			Condition 4		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
Total Selenium	µg/L	7	110	36	3	6	5	15	62	36	14	39	21
Dissolved Selenium	µg/L	5	76	27	3	7	5	15	56	37	11	26	17
Se(IV)[2]	µg/L	--	--	--	--	--	--	0.29	51.8	13	0.8	4.6	3.8
Se(VI)[2]	µg/L	--	--	--	--	--	--	<0.25	11.5	5.7	<0.25	<0.25	<0.25
MeSe[2]	µg/L	--	--	--	--	--	--	<0.25	1.3	0.9	<0.25	<0.25	<0.25
SeCN[2]	µg/L	--	--	--	--	--	--	0.52	69.7[3]	18	2.1	10.8	7.2
NO_2/NO_3-N	mg/L	<0.045	0.14	0.06	<0.045	0.13	0.081	<0.045	0.060	0.036	<0.045	0.081	0.046
Total Mercury	ng/L	0.50	4.57	1.45	0.41	2.25	1.21	0.37	1.20	0.84	0.53	1.16	0.85
Dissolved Mercury	ng/L	<0.31	3.16	0.73	0.23	0.59	0.42	0.45	1.20	0.76	0.68	0.90	0.79
Total Arsenic	µg/L	1.1	4.0	2.0	<0.36	1.8	0.9	<0.36	0.76	0.54	0.82	0.82	0.82
Dissolved Arsenic	µg/L	1.2	3.6	2.0	<0.36	2.0	0.9	0.38	0.76	0.61	0.82	0.82	0.82
Total Calcium	mg/L	430	580	477	410	500	451	430	480	452	460	500	480
Dissolved Calcium	mg/L	420	590	477	400	520	460	440	470	455	460	500	480
Total Magnesium	mg/L	1,900	2,400	2,150	1,600	1,900	1,743	1,800	2,100	1,950	1,900	2,100	2,000
Dissolved Magnesium	mg/L	1,900	2,400	2,140	1,600	2,000	1,786	1,800	2,100	1,950	1,900	2,100	2,000
Ammonia	mg/L	11	86	49	5	6	5	0.3	22	6.4	0.47	98	31

Table 4-7 (continued)
ABMet Stage 2 Effluent Water Quality[1]

Parameter	Units	Condition 1			Condition 2			Condition 3			Condition 4		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
Conductivity	µS/cm	14,000	16,000	14,500	11,000	14,000	12,250	11,000	13,000	12,500	12,000	14,000	12,400
COD	mg/L	290	1,600	674	150	540	383	260	370	335	340	600	427
BOD	mg/L	--	--	--	54	54	54	4.6	46	22.3	26	74	49
TOC	mg/L	--	--	--	19	19	19	2.0	12	8.3	0.73	0.93	0.86
Chloride	mg/L	--	--	--	2,700	2,700	2,700	2,600	3,300	2,940	2,700	2,900	2,800
Fluoride	mg/L	16	24	21	23	24	24	23	25	24	26	28	26
Sulfate	mg/L	--	--	--	6,500	7,000	6,750	6,300	8,300	6,860	5,600	8,200	6,817
Total Phosphorus	mg/L	0.59	3.5	2.2	2	2	2	1.3	5.4	4.1	0.75	7.90	5.36
TKN	mg/L	53	150	72	48	83	62	45	69	56	45	72	58
Sulfide	mg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	30	18	25	58	36
TSS	mg/L	12	44	28	11	18	13	4.0	8.0	6.1	3.0	21	8.3
TDS	mg/L	15,000	18,000	16,750	4,900	19,000	12,725	13,000	16,000	14,800	14,000	17,000	15,200
Total Alkalinity	mg/L	--	--	--	79	160	120	130	200	167	190	420	300
Bicarbonate Alkalinity	mg/L	--	--	--	79	160	120	130	200	167	190	420	300
Carbonate Alkalinity	mg/L	--	--	--	<3.9	<3.9	<3.0	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9

[1] Average soluble concentrations were higher than total for some results, due to analytical imprecision
[2] Analyzed at Brooks Applied Labs: Se(IV) – selenite; Se(VI) – selenate; MeSe – selenomethionine; SeCN – selenocyanate
[3] SeCN concentration max value during Condition 3 appears to be biased high when compared to total and dissolved selenium maximum concentrations

Figure 4-8 shows that there was little removal of influent COD by the ABMet as the ABMet influent and effluent COD concentrations were similar; this trend was also observed in the pretreatment MBR system. The data again suggest that the influent COD was contributed by analytical interference or some other oxygen-demanding constituent, as opposed to organic carbon. The average ABMet influent and effluent COD concentrations for all conditions together were approximately 482 and 465 mg/L, respectively, during the pilot test.

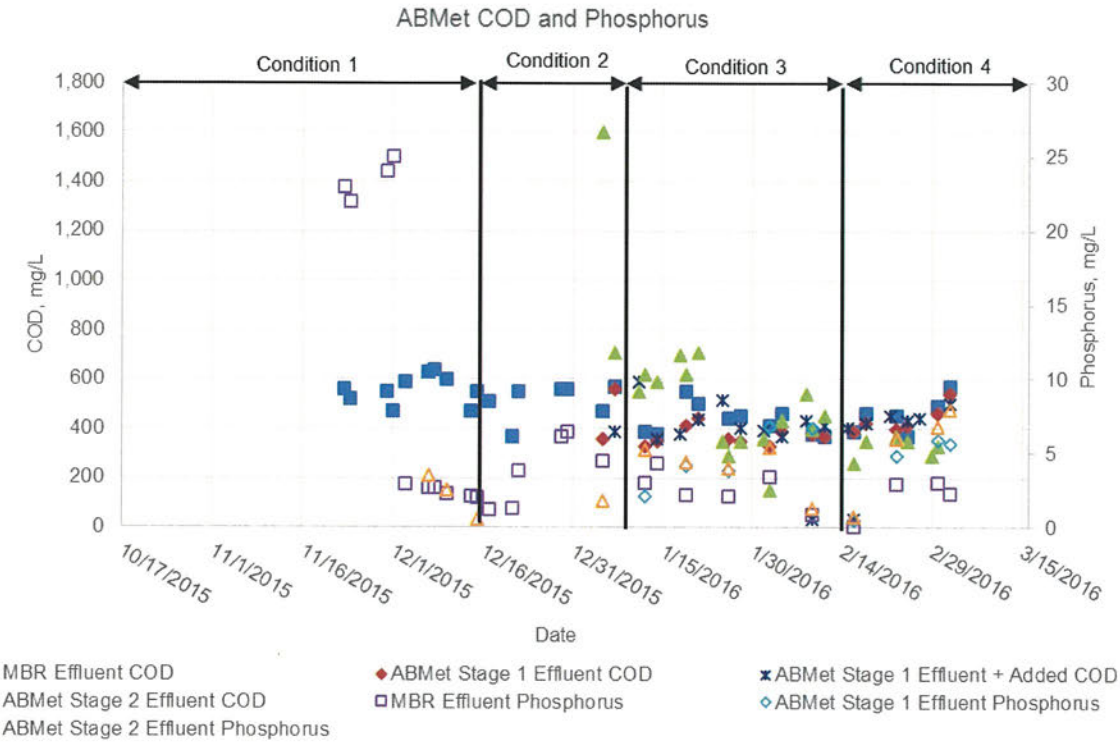

Figure 4-8
ABMet influent and effluent COD and phosphorus

A slight increase in phosphorus concentration in the ABMet can be seen at times in Figure 4-8 (presented on the secondary y-axis). This was due to the fact that the nutrient blended acetic acid (containing phosphorus) was used as a carbon source for the ABMet throughout the pilot study. Optimization of effluent phosphorus concentration was not an objective of this study. The phosphorus concentration could be reduced by separating the carbon source from the phosphorus source.

Nitrate/Nitrite

As seen in Figure 4-9, TKN and ammonia were not significantly impacted in the ABMet. The presence of nitrate/nitrite nitrogen in the ABMet influent only occurred during Condition 1 (when the acetic acid was being added to the wrong zone in the pretreatment MBR) and for a few weeks during Condition 3 (when nitrate/nitrite nitrogen was intentionally being maintained in the MBR effluent to provide the ABMet with electron donors) (Figure 4-10).

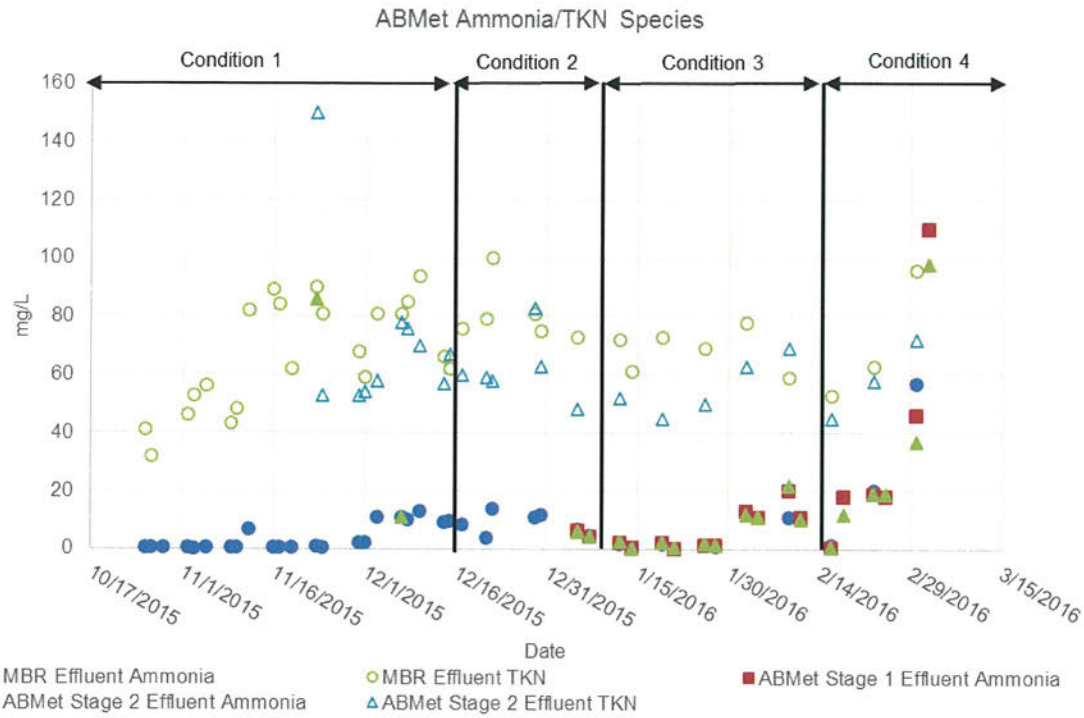

Figure 4-9
ABMet influent and effluent ammonia and TKN

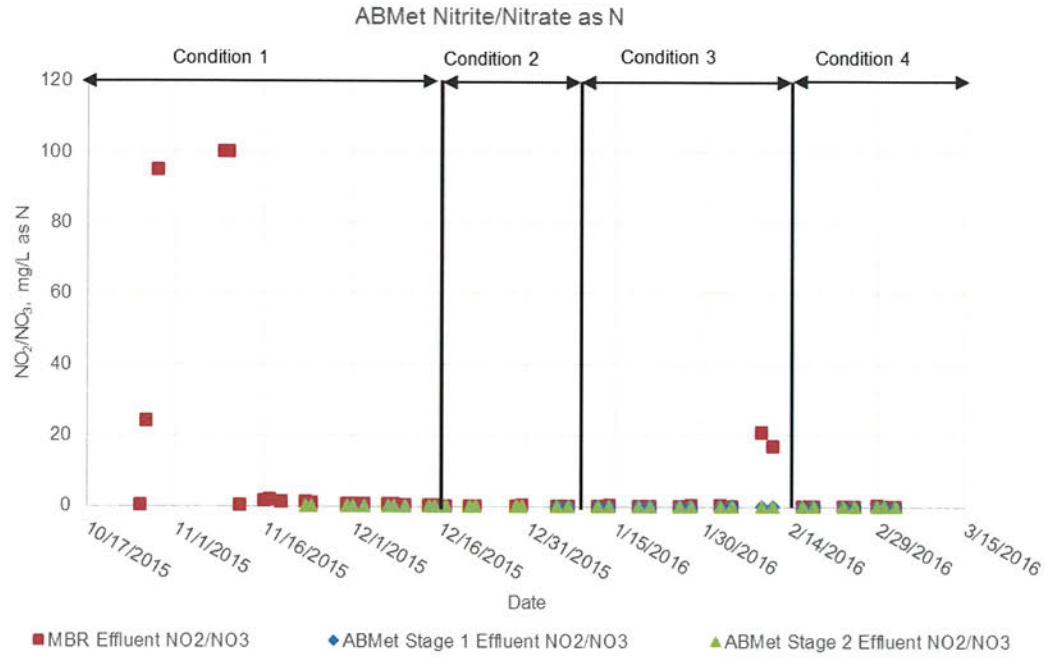

Figure 4-10
ABMet influent and effluent nitrate/nitrite as nitrogen

Selenium

Selenium removal in the ABMet varied throughout the pilot study, as seen in Figure 4-11.

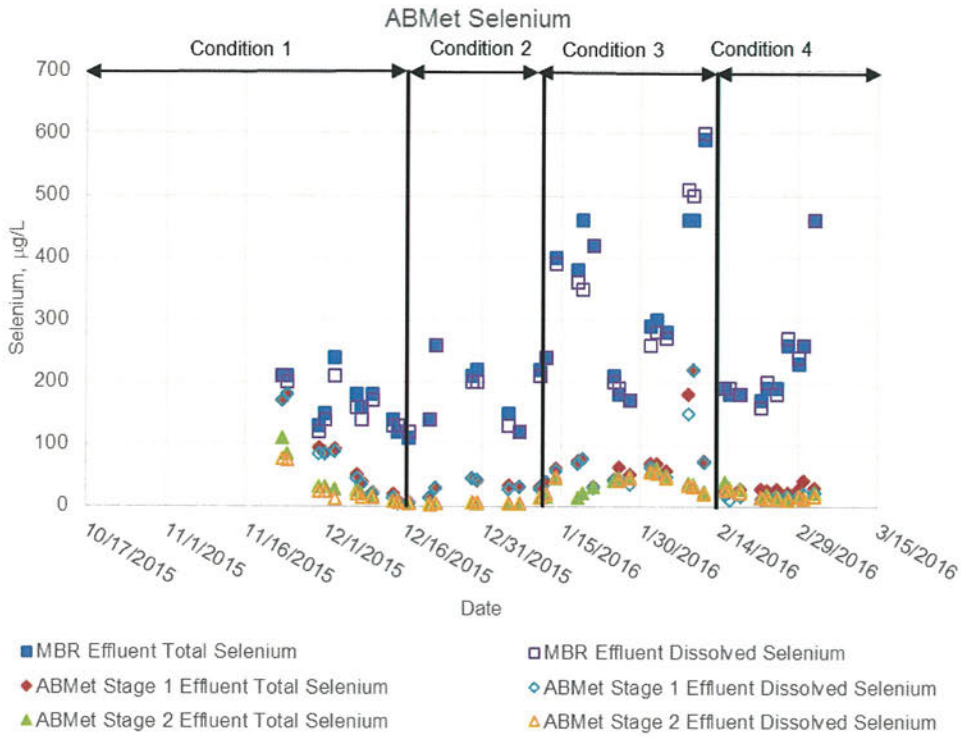

Figure 4-11
ABMet influent and effluent selenium

During Condition 1, improved performance is observed as the system is acclimating and the bacteria are being established. The best performance occurred during Condition 2, when the influent average total selenium concentration to Stage 1 was 173 µg/L and the effluent average total selenium concentration from Stage 2 was 5 µg/L. This is the only condition where the target effluent total selenium goal of 6 µg/L (half of the ELG limit due to 1:1 dilution) was achieved.

Selenium reduction during Condition 3 declined as the average ABMet effluent total selenium concentration increased from 6 to 36 µg/L. From Table 4-7, it can be seen that the predominant selenium species in the ABMet effluent during Condition 3 were selenite and selenocyanate. Unfortunately, selenium speciation data were not available in the MBR effluent. As described in the section on the MBR operating performance, the initial increase in effluent selenium from the ABMet coincided with flow rate increases (HRT and EBCT decreases) in the MBR and ABMet systems. However, the samples with the resulting higher selenium concentrations were taken prior to changing the flow rates that same day. On January 7, total selenium in the final ABMet effluent was 5.0 µg/L while on January 11, the same day flow rates were increased, total selenium was 15 µg/L. Given the strong performance of both systems leading up to this time, there were no indications that increasing the flow rate would have dramatic impacts on performance. Had the selenium result from January 11 been available, the project team may have decided to forgo increasing flow rates until the underlying issue(s) could be addressed.

Complicating the matter even further, results for total selenium from the ABMet effluent (stage two reactor effluent) from January 18, 19, and 21 failed We Energies' lab QA/QC checks. In these samples, the matrix spike recovery values were on the low end of the acceptable range, indicating the presence of analytical interferences. All matrix spike recoveries up to this point had been within the method control limits and the lab did not change anything in the sample preparation or analysis protocol. These were the first sets of results that failed matrix spike QC and We Energies' lab staff performed various tests in attempt to provide accurate analyses. On January 18, the We Energies lab staff who collected the samples noted a strong sulfide odor that had not been present in prior samples. The same odor was present in this sample for the duration of the test. This issue resulted in total selenium values being reported much lower than values later determined to be actual. Total selenium concentration results from these dates were originally reported as 13 µg/L, 11 µg/L, and 8.2 µg/L vs. 15 µg/L, 22 µg/L, and 31 µg/L reported after oxidizing the samples in the sample bottles using hydrogen peroxide. At the time, these lower values falsely indicated the ABMet had recovered from the unconfirmed upset and was tracking back to total selenium concentration of 6 µg/L or less. The project team decided not to alter the current pilot conditions until the accuracy of analytical results improved. By the time the analytical interferences had been overcome, the pilot system had been outside of the performance targets for three weeks. Comparisons of reported vs. verified selenium concentrations are provided in Table 4-8 and additional information on We Energies' evaluations is presented in Appendix B.

Table 4-8
Comparison of ABMet Effluent Selenium Concentrations During Period of Matrix Spike Recovery Failures

Sample Date	Total selenium initially reported (µg/L)	Dissolved selenium initially reported (µg/L)	Total selenium reported after improving matrix spike recovery (µg/L)	Dissolved selenium reported after improving matrix spike recovery (µg/L)
1/18/2016	13	12	15	Not measured
1/19/2016	11	10	22	
1/21/2016	8.2	7.7	31	

The sulfide odor that became present in samples taken after January 18 correspond to higher sulfide concentrations in the ABMet effluent (see Figure 4-12). The presence of sulfide is expected as bacteria naturally reduce sulfate to hydrogen sulfide gas. The decline in selenium reduction performance suggests that sulfate-reducing bacteria were present and may have become too predominant in the 2nd stage reactor.

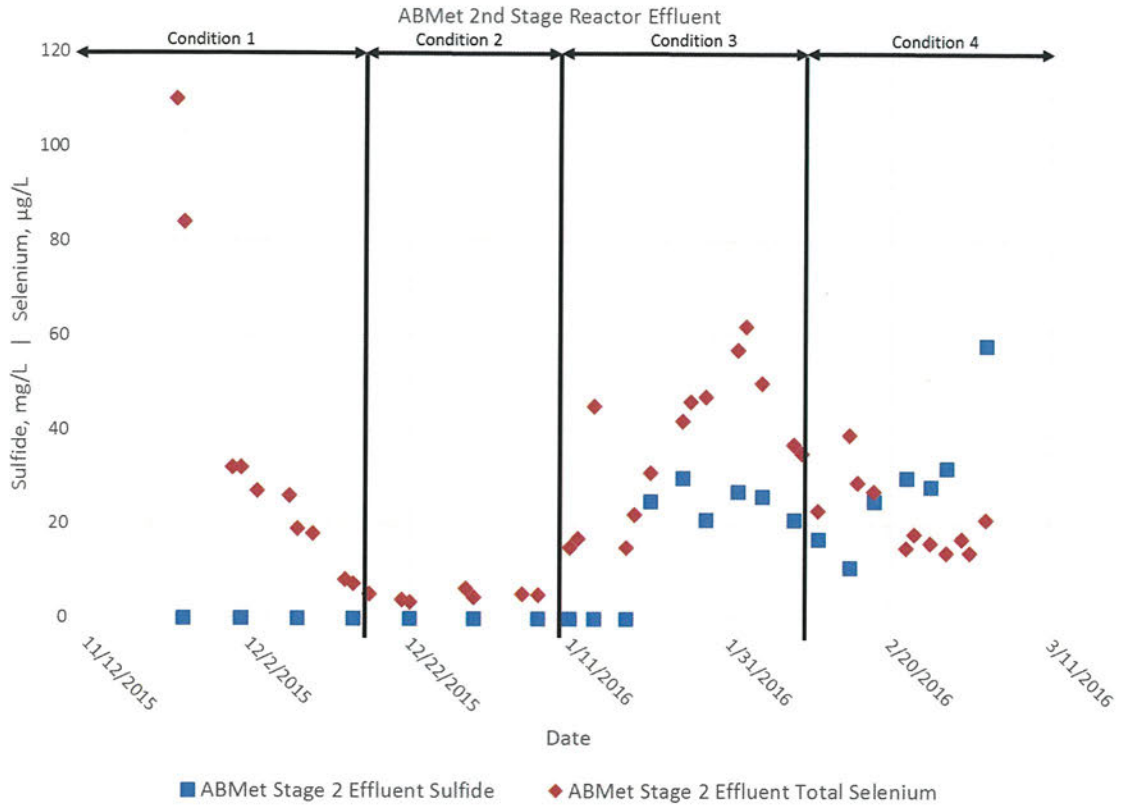

Figure 4-12
ABMet effluent sulfide and selenium

During Condition 3, several activities were done in attempt to improve performance in the ABMet. Reducing the ABMet flow rate was not implemented because the flow rate change was not believed to be a major contributing factor to the loss of selenium reduction performance.

The following actions were taken to improve ABMet performance.

- Potassium sulfite had been added to the Equalization Tank in an attempt to target oxidants potentially impacting the MBR nitrifying bacteria. Reducing oxidants was expected to also improve ABMet bacteria performance.
- 20 kilograms of PAC were added to the MBR in an attempt to adsorb any potential inhibitor compounds. Again, this was already part of the MBR plan in case the potassium sulfite addition not improved nitrification in the MBR.
- Nitrate was allowed to pass through the MBR to the ABMet, by reducing the acetic acid feed to the MBR, to provide more electron acceptors.

While performance did improve slightly in Condition 4 (where the average ABMet effluent total selenium decreased from 36 µg/L to 21 µg/L), the performance observed during Condition 2 and achievement of the effluent total selenium goal of 6 µg/L were not attained during Condition 4. Given the number of variables that may have impacted performance in the ABMet that occurred relatively close together, it is difficult to definitively say why performance decreased, as it may have been any one of, or a combination of, the variables and the trial concluded before complete recovery of performance occurred. Total and dissolved selenium concentration values from the ABMet stage 1 and stage 2 reactors are provided in Figure 4-13.

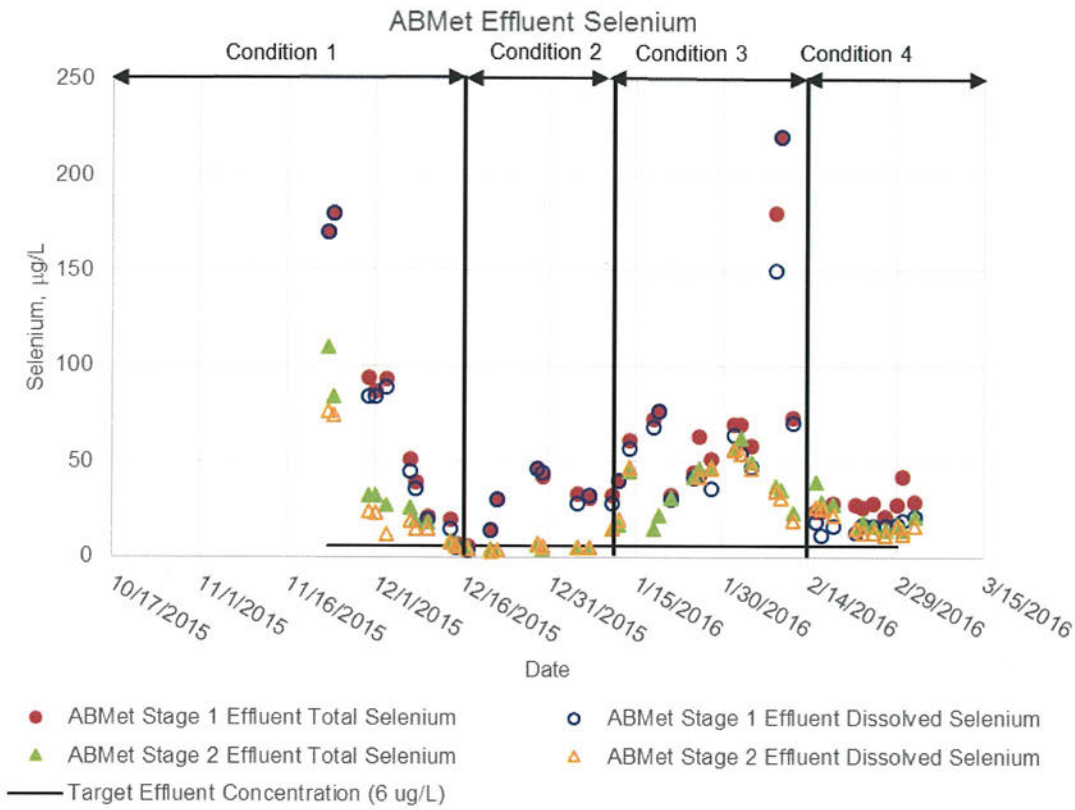

Figure 4-13
ABMet effluent selenium

As noted in discussion of Figure 4-1 (graph of MBR influent and effluent COD and phosphorus), influent and effluent COD concentrations were similar, suggesting that the influent COD was non-biodegradable. Jar tests with Fenton reagent were conducted on site to preliminarily investigate the feasibility of Advanced Oxidation Processes (AOPs) to partially oxidize these non-biodegradable organics in wastewater [2]. However, the jar tests were inconclusive due to high levels of inorganic scavengers, such as nitrate, sulfate, and chloride, and the limited time available. Simple onsite analytical tests were performed for COD, NO_3-N, NH_4-N, and pH on samples that had AOP (Fenton process) reactions as well as control samples. The results of this testing did not show any clear trends, and were likely not very accurate as they were performed using field test methods and were not performed in a controlled lab environment.

Mercury

Further reduction of mercury was observed in the ABMet data and can be seen in Figure 4-14. Mercury was reduced from an average of 2.5 ng/L in the MBR effluent to 1.1 ng/L in the ABMet effluent. These averages are consistent with performance over the entire length of the demonstration. The influent to the pilot system was compliant with the effluent mercury goal of 178 ng/L (half of the monthly ELG limit due to 1:1 dilution).

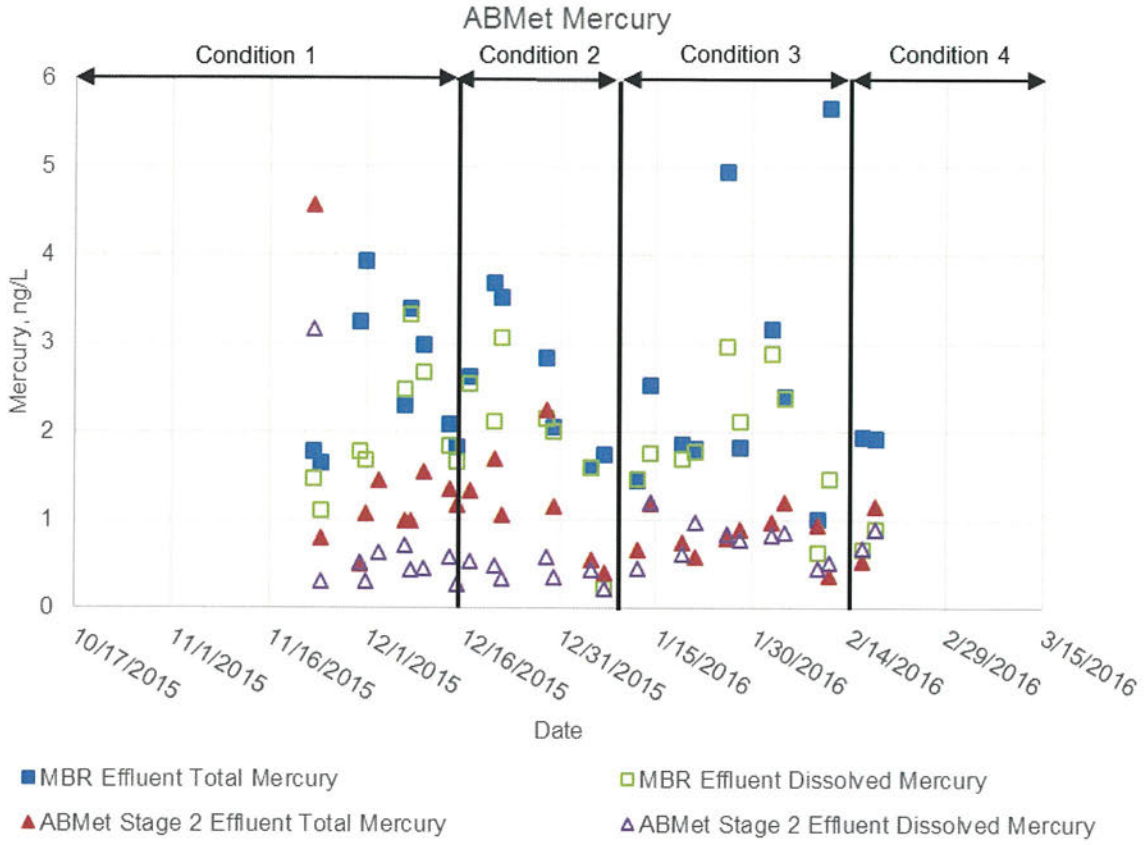

Figure 4-14
ABMet influent and effluent mercury

Arsenic

As described above, arsenic was not removed in the MBR; however, as seen in Figure 4-15, removal of arsenic in the ABMet did occur. The average ABMet influent arsenic concentration was 4.6 µg/L, and the average effluent over the entire demonstration was 1.4 µg/L, which is an average reduction of approximately 70 percent. During Conditions 3 and 4, the average total arsenic in the effluent was 0.67 µg/L (despite the loss of performance in selenium reduction during this time). This is significant given the effluent arsenic goal of 4 µg/L due to the dilution with service water.

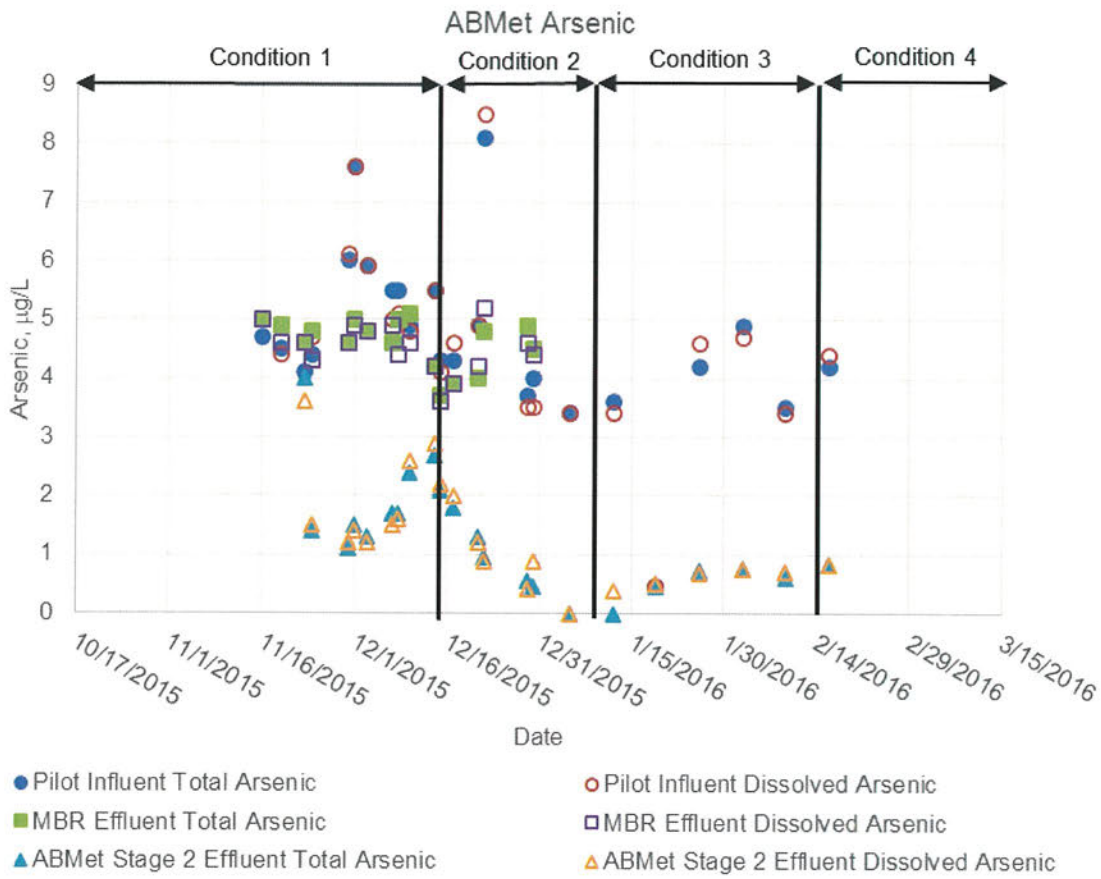

Figure 4-15
ABMet influent and effluent arsenic

5
SUMMARY AND CONCLUSIONS

Pilot Summary

A pilot demonstration of the GE MBR and ABMet processes ran from October 26, 2015 to March 3, 2016 (19 weeks). Results from the demonstration are described under four conditions that summarize performance changes observed. These conditions are summarized below.

- Condition 1 – Startup and Acclimation (October 26, 2015 to December 16, 2015) – period where bacteria are growing and becoming established in the treatment system.
- Condition 2 – Initial Operation (December 17, 2015 to January 10, 2016) – operational period defined by GE's original test plan.
- Condition 3 – Increased Flow/Reduced HRT (January 11, 2016 to February 13, 2016) – operational period intended to more closely simulate full-scale HRT/EBCT conditions.
- Condition 4 – Process Adjustments (February 14, 2016 to March 3, 2016) – period where GE responded to decreased selenium removal performance of the ABMet.

Other than one complete system shutdown from December 24 through December 28 to perform a recovery cleaning on the MBR membranes, the system ran consistently through the duration of the demonstration.

The full-scale FGD wastewater treatment process at P4 has an average operating flow rate of 40 GPM and is typically operated five days per week to allow for equipment cleanings (scale removal from the secondary clarifier plates) on the weekends. The two P4 boilers burn Powder River Basin coal which allows their FGD systems to reach high cycles of concentration and therefore generates wastewater with high TDS and significant scaling potential. The FGD wastewater treatment process consists of a chemical precipitation system that includes hydrated lime addition; primary clarification; organosulfide, ferric chloride, and flocculation polymer addition; and secondary clarification. Two effluent discharge tanks after the secondary clarifier hold approximately 10,000 gallons each. The pilot system in this demonstration received water from the discharge tanks which was blended with plant service water (untreated water from Lake Michigan) in a small equalization tank prior to the MBR process.

GE Water & Process Technologies supplied and operated the ZeeWeed 500D MBR and ABMet pilot systems. We Energies maintained operation of the physical/chemical treatment system. After initial evaluations of the FGD wastewater, GE determined that blending with service water (50/50 by volume) was required to minimize the impacts of scaling and TDS on the pilot systems and bacteria performance. Removing scale-forming compounds (calcium, magnesium, and sulfate) with chemical softening would have required an impractical amount of chemicals (approximately 1,300 lbs./day) and produced high quantities of sludge (approximately 2,000 lbs./day).

The MBR process consisted of pre-anoxic, aerobic, and post-anoxic zones (to target denitrification [in the anoxic zones] and nitrification [in the aerobic zone]) and the ZeeWeed 500 membrane unit to filter biomass and other solids prior to the ABMet pilot. Permeate from the MBR was treated by two ABMet reactors in series.

The MBR pilot was operated at 1 GPM (combined HRT of 35 hours) during Conditions 1 and 2 and at 1.6 GPM during Conditions 3 and 4 (combined HRT of 23 hours). The increase in flow rate was intentionally made by the project team to simulate full-scale conditions. Due to ABMet performance issues, the full-scale conditions for MBR HRT were not implemented. The MBR pilot ran consistently with only one shut down early in the demonstration for a membrane recovery cleaning. Following this cleaning, citric acid maintenance cleans were conducted every other day.

Acetic acid products were used to supply nutrients (in the form of COD, ammonium, and phosphorus) to the MBR pilot. During Condition 1, a blended acetic acid product containing ammonium and phosphorus was used but resulted in excess solids scale formation. To mitigate this issue in Conditions 2 through 4, an 80% acetic acid (20% water) product was used in conjunction with a separate phosphoric acid product.

The ABMet pilot was operated at 0.5 GPM (combined EBCT of 22.4 hours) during Condition 1, 0.6 GPM (combined EBCT of 18.8 hours) during Condition 2, and 0.9 GPM (combined EBCT of 12.4 hours) during Conditions 3 and 4. The increase in flow rate during Condition 2 was not intentional, but the increase in Conditions 3 and 4 were made by the project team in order to more closely simulate GE's commercial EBCT target of 4 to 4.5 hours per reactor (8 to 9 hours total). Due to ABMet performance issues, the full-scale conditions for ABMet EBCT were not implemented. Each stage of the ABMet pilot underwent only one backwash during the demonstration. Starting in Condition 3, degassing was conducted twice per week.

As with the MBR process, acetic acid products were used to supply COD and nutrients to the ABMet reactors. For Conditions 1 and 2, the blended acetic acid product was used. A 50/50 mix of blended product and pure (80%) acetic acid product was used in Condition 3. Molasses was added to this mix in Condition 4.

A summary of pilot influent, MBR effluent, and ABMet effluent water qualities for Conditions 2, 3, and 4 is provided in Table 5-1. The pilot evaluation failed to demonstrate that the ABMet system (with the feed water diluted by 50% and supplemented with the MBR ZeeWeed system) can meet the ELG limits on this water source. Limited information are available to explain the exact issue(s) related to the loss of selenium reduction performance and several variables were identified during the demonstration which may have impacted selenium removal performance.

Table 5-1
Summary of pilot results

Parameter	Units	Pilot Influent			MBR Effluent			ABMet Effluent			Pilot Objectives	
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	ELG monthly avg. limit	Target based on 100% dilution
Condition 2												
Total Selenium	µg/L	920	1800	1071	110	260	173	3	6	5	12	6
Dissolved Selenium	µg/L	900	1900	1071	120	260	167	3	7	5	-	-
NO_2/NO_3-N	mg/L	70	160	95	0.12	0.24	0.15	<0.045	0.13	0.081	4.4	2.2
Total Mercury	ng/L	41	90	63	1.60	3.68	2.58	0.41	2.25	1.21	356	178
Dissolved Mercury	ng/L	8.1	18	12.2	0.23	3.06	1.96	0.23	0.59	0.42	-	-
Total Arsenic	µg/L	3.4	8.1	4.7	4	5	4	<0.36	1.8	0.9	8	4
Dissolved Arsenic	µg/L	3.4	8.1	4.7	4	5	4	<0.36	2.0	0.9	-	-
Condition 3												
Total Selenium	µg/L	790	1000	910	170	590	337	15	62	36	12	6
Dissolved Selenium	µg/L	800	1000	915	170	600	330	15	56	37	-	-
NO_2/NO_3-N	mg/L	78	88	83	0.13	21	4.0	<0.045	0.060	0.036	4.4	2.2
Total Mercury	ng/L	20	71	48	1.01	5.67	2.67	0.37	1.20	0.84	356	178
Dissolved Mercury	ng/L	7	27	13	0.64	2.97	1.92	0.45	1.20	0.76	-	-
Total Arsenic	µg/L	0.45	4.9	3.3	no data	no data	no data	<0.36	0.76	0.54	8	4
Dissolved Arsenic	µg/L	0.45	4.7	3.3	no data	no data	no data	0.38	0.76	0.61	-	-
Condition 4												
Total Selenium	µg/L	770	1100	932	170	460	231	14	39	21	12	6
Dissolved Selenium	µg/L	710	1100	919	160	460	233	11	26	17	-	-
NO_2/NO_3-N	mg/L	65	95	80	0.09	0.18	0.13	<0.045	0.081	0.046	4.4	2.2
Total Mercury	ng/L	27	76	52	1.93	1.94	1.94	0.53	1.16	0.85	356	178
Dissolved Mercury	ng/L	7.4	12	9.7	0.66	0.90	0.78	0.68	0.90	0.79	-	-
Total Arsenic	µg/L	no data	no data	no data	no data	no data	no data	0.82	0.82	0.82	8	4
Dissolved Arsenic	µg/L	no data	no data	no data	no data	no data	no data	0.82	0.82	0.82	-	-

MBR Conclusions

- The increased MBR effluent phosphorus concentration during Condition 1 was due to the higher-than-planned-for phosphorus content of the nutrient balanced acetic acid blend being added.
- Influent and effluent BOD and TOC concentrations were low, indicating that all of the acetic acid added was degraded and this suggests that the influent and effluent COD concentrations of approximately 600 mg/L may be caused by analytical interference or some other oxygen-demanding constituents as opposed to organic carbon.
- Complete denitrification (reduction of nitrate nitrogen to nitrogen gas) was achievable in the pretreatment MBR.
- Although nitrification was lost during Conditions 3 and 4, nitrate-nitrogen removal (denitrification) was never a problem in the MBR. For some unknown reason, more sensitive nitrifying bacteria were inhibited while the heterotrophic denitrifying bacteria were not inhibited.
- Selenium, present mainly in dissolved form, was significantly reduced by the pretreatment MBR (approximately 75 percent on average for the entire demonstration).
- Mercury, present mainly in particulate/insoluble form, was significantly reduced by the pretreatment MBR (approximately 96 percent on average for the entire demonstration).
- Arsenic, present mainly in dissolved form, was not removed in the pretreatment MBR.

ABMet Conclusions

- To EPRI's knowledge, this is the first pilot to attempt to treat FGD wastewater from a power plant burning 100% subbituminous coal.
- The pilot test did not consistently demonstrate that the MBR/ABMet combination of technologies adequately treats selenium to meet the 2015 ELGs limits.
- The flow rate to the ABMet was increased on January 11, 2016 from an average of 0.6 GPM to an average of 0.9 GPM. This resulted in the combined EBCT in the ABMet decreasing from 18.8 to 12.4 hours. GE's target of approximately 8 hours for full-scale applications was a goal for the pilot demonstration but was never achieved.
- The flow rate was also increased to the MBR on January 11, 2016 from 1 to 1.5 GPM, which decreased the anoxic HRT from 20 to 13 hours. After this flow rate change (during Condition 3), the average MBR effluent total selenium increased by a factor of 2, doubling the selenium load on the downstream ABMet. However, analytical results taken prior to the flow rate increase were already showing an increase in ABMet effluent selenium. This information was not yet available to the project team when the decision was made to increase flow rates.

- Another variable that may have impacted performance is the complete denitrification that was achieved in the pretreatment MBR. The low nitrate-N available to the ABMet may have resulted in the desired heterotrophic bacteria capable of reducing nitrate/nitrite and selenate/selenite being displaced by sulfate-reducing bacteria in the absence of nitrate-nitrogen as electron acceptor (ABMet average effluent sulfide increased from non-detect to 18 mg/L from Condition 2 to Condition 3 and increased sulfide odors were observed by onsite personnel). The high cycles of concentration associated with the P4 absorbers results in sulfate concentrations approximately five to seven times higher than FGD wastewater from units that burn eastern bituminous coals [3].
- The presence of sulfate-reducing bacteria, indicated by the high concentration of hydrogen sulfide (H_2S) in the second reactor effluent, may also have influenced the loss of selenium reduction. The high COD available to the ABMet from dosing acetic acid may have resulted in the desired bacteria, capable of reducing selenate/selenite, being outcompeted by sulfate-reducing bacteria in the presence of the highly reducing conditions.
- Different nutrient product combinations were used in the demonstration (blended acetic acid containing ammonium and phosphorus, 80% acetic acid (20% water), an even mixture of the previous two products, an even mixture of the first two products and also molasses). Nutrient dosages were maintained based on COD concentrations, pH, and ORP and were within specifications throughout the demonstration. During Condition 4, GE began adding molasses in an attempt to mitigate excessive sulfate-reducing bacteria growth, but by the end of the demonstration (which ended due to a lack of FGD wastewater/pilot feed water supply) the target for selenium reduction had not been re-achieved. Acetic acid products may not provide benefits over molasses for selenium reduction (which is used at GE's commercial ABMet systems treating FGD wastewater for selenium), but there is insufficient information at this time to confirm this possibility.
- Significant arsenic reduction (approximately 70 percent on average for the entire demonstration) occurred in the ABMet. The effluent goal of 4 μg/L was achieved. This is notable, as other EPRI research has shown that for those few plants that have significant dissolved arsenic in their FGD wastewater, little removal is achieved by the physical/chemical treatment system [4].

Recommendations for Additional Research

As previously identified, many variables may have contributed to the loss of performance in the MBR nitrification process and the ABMet selenium reduction process. The following recommendations for additional research are made based on the results of this pilot demonstration.

- Future studies should aim to identify compounds present in FGD wastewater that may be inhibitory or toxic to bacteria used for nitrification, denitrification, and metals reduction. EPRI suspects that oxidants naturally present in FGD wastewater are one potential source of inhibitory effects, but their identity and control have not been fully defined [5]. Further studies to remove non-biodegradable organics in FGD wastewater are recommended. This demonstration tested the use of potassium sulfite, powder activated carbon, and advanced oxidation processes (Fenton reactions), but results are inconclusive.
- The impacts of TDS on bacteria performance should be studied in a controlled environment. Testing should evaluate how increasing FGD wastewater TDS concentration could inhibit reduction of metals or slow down biochemical reactions. Variability in FGD wastewater chemistry is a consistent challenge and potential upsets to treatment technologies are a risk for regulatory compliance. For this demonstration, dilution of P4's chemical precipitation treatment effluent reduced the TDS from an average of 32,300 mg/L to 18,600 mg/L. The dilution was also required to mitigate the high scaling potential of this wastewater. Dilution may not be an option for every site.
- The potential impacts of chemical scale formation in biological treatment FGD wastewater applications should be considered in future demonstrations. For this demonstration, dilution was used as a means to mitigate scale formation in the pilot systems, but dilution may not be an option for every site. General guidance for chemical softening are provided in the Wet Flue Gas Desulfurization Wastewater Physical/Chemical Treatment Guidelines [6].
- The pilot MBR process demonstrated strong performance in reducing nitrate/nitrite prior to the ABMet, but with the potential for competing sulfate-reducing bacteria to negatively influence selenium reduction, it is suggested that nitrate/nitrite reduction as a pretreatment step be more closely evaluated. At this time, there is no clear guidance or rule of thumb for denitrification prior to selenium reduction for a specific range of influent nitrate/nitrite. Future studies that evaluate denitrification as a pretreatment step could consider bypassing a portion of the feed stream directly to the selenium reduction step because controlling denitrification to a target effluent concentration (such as 5 to 10 mg-N/L) may not be feasible or practical. Future studies should also evaluate if sulfate concentrations are also related to the loss of selenium reduction performance due to the influence of sulfate-reducing bacteria.
- Three different nutrients were fed throughout the study. The use of the acetic acid products was a departure from GE's current commercial systems treating FGD wastewater and use molasses. The balance of COD, nitrogen, and phosphorus is important for maintaining bacteria performance in reducing metals. Future studies should focus on the control and application of nutrient products related to nitrification, denitrification, and selenium reduction performance for FGD wastewater.

- The analytical interferences observed in the ABMet pilot effluent (stage two reactor effluent) should be further studied to determine ways to improve accuracy for total selenium analysis. It is hypothesized that the highly reducing conditions of the water resulted in selenium remaining in a reduced valence state (insoluble) and reporting higher than actually present. There have been instances from other tests (see Appendix B) where insoluble selenium was adsorbed to sample bottles and led to total selenium results reporting lower than actually present and confirmed by dissolved species analyses.
- FGD wastewater is impacted by upstream air emission control equipment, boiler operation, fuel selection, and many other factors. Changes in chemistry and flow rates are common for many sites and the wide range of conditions could impact performance of wastewater treatment systems. Coordination with FGD and upstream operations should be considered for any FGD wastewater treatment application, including biological treatment. However, there are limits to what can be achieved by coordination with upstream systems. The final treatment system should be robust enough to handle system variability in a balanced and coordinated approach. Additionally, physical/chemical treatment systems upstream of biological treatment can have an impact on the reliability of selenium reduction and are an integral part of the treatment process.
- Limited data are publicly available on the operation and performance of biological treatment systems for FGD wastewater. The 2015 U.S. EPA Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category may result in many new commercial systems over the next two to seven years. Continued research is needed to ensure power plant operators have the information they need to design, operate, and maintain treatment systems.

6
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A
SAMPLING AND LABORATORY ANALYTICAL PLAN

Table A-1
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Condition 1										
Ammonia	TestAmerica	SM4500	2/month	2/month	3/week		3/week			
Arsenic, total	We Energies	EPA 200.8 DRC-O2	2/month	2/month	1/week		1/week		1/week	
Arsenic, filtered	We Energies	EPA 200.8 DRC-O2	2/month	2/month	1/week		1/week		1/week	
Calcium, total	We Energies	EPA 200.7	2/month	2/month	3/week		3/week	3/week	1/week	
Calcium, filtered	We Energies	EPA 200.7	2/month	2/month	3/week		3/week	3/week	1/week	
Conductivity, µS/cm	TestAmerica	SM2510B	2/month	2/month	3/week		3/week	3/week	1/week	
COD	TestAmerica	SM5220C	2/month	2/month	3/week		3/week		3/week	
Fluoride, total	TestAmerica	SM4500	2/month	2/month	3/week		3/week	3/week	1/week	
Magnesium, total	We Energies	EPA 200.7	2/month	2/month	3/week		3/week	3/week	3/week	
Magnesium, filtered	We Energies	EPA 200.7	2/month	2/month	3/week		3/week	3/week	3/week	
Nitrate/Nitrate (N)	TestAmerica	SM4500	2/month	2/month	3/week		3/week		3/week	
Phosphorus, total	TestAmerica	SM4500	2/month	2/month	3/week		3/week			
Selenium, total	We Energies	EPA 200.7* / 200.8 DRC-NH3	2/month	2/month	3/week		1/week	1/week	1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Condition 1 (continued)										
Selenium, filtered	We Energies	EPA 200.7* / 200.8 DRC-NH3	2/month	2/month	3/week		1/week	1/week	1/week	
Sulfite	We Energies	On-site; analyze immediately		2/month	3/week		3/week		1/week	
Sulfide	TestAmerica	SM4500		2/month	3/week		3/week	3/week	1/week	
TDS	TestAmerica	SM2540C	2/month	2/month	3/week		3/week	3/week	1/week	
TKN	TestAmerica	SM4500		2/month	3/week		3/week		3/week	
TSS	TestAmerica	SM2540D		2/month	3/week	3/week			1/week	
Conditions 2, 3 and 4										
Alkalinity	TestAmerica	SM2320B	1/month	1/month	2/week		2/week	2/week	2/week	
Aluminum, total	We Energies	EPA 200.7		1/month	1/week				1/week	
Aluminum, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Ammonia	TestAmerica	SM4500	1/month	1/month	2/week		2/week	2/week	2/week	
Arsenic, total	We Energies	EPA 200.8 DRC-O2	1/month	1/month	1/week				1/week	
Arsenic, filtered	We Energies	EPA 200.8 DRC-O2	1/month	1/month	1/week				1/week	
Bicarbonate	TestAmerica	SM2320B		1/month	2/week		2/week	2/week	2/week	
BOD	TestAmerica	SM5210B	1/month	1/month	1/week		1/week	1/week	1/week	
Boron, total	We Energies	EPA 200.7		1/month	1/week				1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
Boron, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Cadmium, total	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Cadmium, filtered	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Calcium, total	We Energies	EPA 200.7	1/month	1/month	2/week		2/week	2/week	2/week	
Calcium, filtered	We Energies	EPA 200.7	1/month	1/month	2/week		2/week	2/week	2/week	
Carbonate	TestAmerica	SM2320B		1/month	1/week		1/week	1/week	1/week	
Chlorides, filtered	TestAmerica	SM4500	1/month	1/month	1/week				1/week	
Cobalt	We Energies	EPA 200.7		1/month	1/week				1/week	
COD	TestAmerica	SM5220C	1/month	1/month	2/week		2/week	2/week	2/week	
Conductivity, µS/cm	TestAmerica	SM2510B	1/month	1/month	2/week		2/week	2/week	2/week	
Copper, total	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Copper, filtered	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Fluoride, total	TestAmerica	SM4500	1/month	1/month	2/week		2/week	2/week	2/week	
Iron, total	We Energies	EPA 200.7		1/month	1/week				1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
Iron, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Lead, total	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Lead, filtered	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Magnesium, total	We Energies	EPA 200.7	1/month	1/month	2/week				2/week	
Magnesium, filtered	We Energies	EPA 200.7	1/month	1/month	2/week				2/week	
Manganese, total	We Energies	EPA 200.7		1/month	1/week				1/week	
Manganese, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Mercury low-level, total	We Energies	EPA 1631E	1/month	1/month	2/week		2/week		2/week	
Mercury low-level, 0.45 µm	We Energies	EPA 1631E	1/month	1/month	2/week		2/week		2/week	
Molybdenum, total	We Energies	EPA 200.7		1/month	1/week				1/week	
Molybdenum, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Nickel, total	We Energies	EPA 200.7		1/month	1/week				1/week	
Nickel, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
Nitrate/Nitrate (N)	TestAmerica	SM4500	1/month	1/month	2/week		2/week	2/week	2/week	Each Occurrence
Phosphorus, total	TestAmerica	SM4500	1/month	1/month	1/week		1/week	1/week	1/week	
Selenium, total	We Energies	EPA 200.8 DRC-NH3	1/month	1/month	2/week		2/week	2/week	2/week	Each Occurrence
Selenium, filtered	We Energies	EPA 200.8 DRC-NH3	1/month	1/month	2/week		2/week	2/week	2/week	Each Occurrence
Silver	We Energies	EPA 200.7		1/month	1/week				1/week	
Sodium, total	We Energies	EPA 200.7		1/month	1/week		1/week		1/week	
Sodium, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Sulfate, filtered	TestAmerica	SM4500	1/month	1/month	2/week		2/week	2/week	2/week	
Sulfite	We Energies	Onsite; analyze immediately		1/month	1/week				1/week	
Sulfide	TestAmerica	SM4500		1/month	2/week		2/week	2/week	2/week	
TDS	TestAmerica	SM2540C	1/month	1/month	2/week		2/week	2/week	2/week	
Thallium	We Energies	EPA 200.8		1/month	1/week				1/week	
Tin	We Energies	EPA 200.7		1/month	1/week				1/week	
TKN	TestAmerica	SM4500		1/month	1/week		1/week		1/week	
TOC	TestAmerica	SM5310C	1/month	1/month	1/week		1/week	1/week	1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
TSS	TestAmerica	SM2540D		1/month	2/week	2/week	2/week	2/week	2/week	Each Occurrence
Zinc, total	We Energies	EPA 1638 DRC		1/month	1/week				1/week	
Zinc, filtered	We Energies	EPA 1638 DRC		1/month	1/week				1/week	
Arsenic, total	Brooks Rand	EPA 200.8/6060			1/month				1/month	
Arsenic, filtered	Brooks Rand	EPA 200.8/6060			1/month				1/month	
Arsenic Speciation, filtered	Brooks Rand	EPA 200.8/6060			1/month				1/month	
Mercury low-level, total	Brooks Rand	EPA 1631E DRC			1/month		1/month		1/month	
Mercury low-level, 0.45 µm	Brooks Rand	EPA 1631E DRC			1/month		1/month		1/month	
Mercury low-level, 0.1 µm	Brooks Rand	EPA 1631E DRC			1/month		1/month		1/month	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
Selenium, total	Brooks Rand	EPA 200.8/6060			1/month		1/month	1/month	1/month	
Selenium, filtered	Brooks Rand	EPA 200.8/6060			1/month		1/month	1/month	1/month	
Selenium Speciation, filtered	Brooks Rand	EPA 200.8/6060			3/month				1/week	

Notes:
Inf/EQ = influent equalization
Phys/Chem = physical/chemical

B
ANALTYICAL QA/QC DISCUSSION

Results for total selenium from the ABMet effluent (stage two reactor effluent) from January 18, 19, and 21 failed We Energies' lab QA/QC checks. In these samples, the matrix spike recovery values were on the low end of the acceptable range. Low matrix spike recovery could indicate selenium is adhering to the container walls or precipitating out of solution. All matrix spike recoveries up to this point had been within the method control limits and the lab did not change anything in the sample preparation or analysis protocol. These were the first sets of results that failed matrix spike QC and We Energies' lab staff performed various tests in attempt to provide accurate analyses. On January 18, the We Energies lab staff who collected the samples noted a strong sulfide odor that had not been present in prior samples. The same odor was present in this sample for the duration of the test.

Samples collected at the site for dissolved and total arsenic and selenium at We Energies' lab were not preserved in the field. The lab filtered a portion of the non-preserved sample for dissolved metals analysis and then acidified the filtered sample with nitric acid to achieve pH less than 2 s.u. The acidified samples were well shaken prior to pouring off the aliquot for totals metals digestion[6]. It was hypothesized that the low ORP in the ABMet stage two reactor effluent contributed to selenium remaining in a reduced valence state (insoluble). To test this hypothesis, the lab added 30% hydrogen peroxide and re-analyzed the samples. Select data comparing various sample preparation methods are presented in Table B-1. Analyses following peroxide addition resulted in matrix spike recovery improvements and total selenium concentrations reported higher than initial analyses. It is noted that EPA Method 200.7 does not include the addition of peroxide or other oxidants to improve accuracy.

[6] To accomplish the quick turnaround time requests, the lab kept digestion time to two to three hours in the hotblock.

Table B-1
ABMet Second Stage Reactor Effluent Selenium Analysis Using Hydroxide Preparation Method

Date	Tot. Se (µg/L)	Dis. Se (µg/L)	Dilution	MS/MSD mean % recovery	Spike Level (µg/L)	Analysis Comments
1/18/2016	13	12	10	16	40	EPA 200.2 digestion: 1mL HNO^3 + 0.25 mL HCl
	15	15	10	14	40	re-analysis for confirmation
	27	no data	10	116	5	10x dilution direct from sample bottle + 5 µg/L bench spike
	15	no data	10	N/A	N/A	Re-digested with 3mL/50mL 30% H_2O_2
1/19/2016	11	10	10	6	40	EPA 200.2 digestion: 1mL HNO_3 + 0.25 mL HCl
	-	-	10	104	N/A	5 µg/L post-digest (bench) spike
	9.4	no data	50	N/A	N/A	1:5 serial dilution of 10x digestate
	10	no data	10	7	N/A	alternate digestion - capped
	26	no data	10	105	5	10x dilution direct from sample bottle + 5 µg/L bench spike
1/21/2016	8.2	7.7	10	11	40	EPA 200.2 digestion: 1mL HNO_3 + 0.25 mL HCl
	19	no data	10	32	40	digested at 10x dilution
	26	no data	25	32	40	digested at 25x dilution
	31	no data	10	120	80	Re-digested with 3mL/50mL 30% H_2O_2
1/25/2016	42	-	10	106	40	Modified EPA 200.2 digestion: 2mL 30% H_2O_2 + 1mL HNO_3 + 0.25 mL HCl
	11	9.0	10	19	40	non-H_2O_2 treated

MS = matrix spike
MSD = matrix spike duplicate

Samples taken during Condition 3 of the demonstration were sent to Brooks Applied Labs in Bothell, WA for speciation analysis. The lab used EPA 200.8 and a closed-vessel, polytetrafluoroethylene (e.g., Teflon™) bomb oven digestion. Sample analysis was performed by triple quadrupole mass spectrometry (ICP-QQQ-MS) to report total and dissolved selenium. Speciation analyses were conducted for selenite (Se(IV)), selenate (Se(VI)), selenomethionine (MeSe (IV)), selenocyanate (SeCN), and selenosulfate ($SeSO_3$). These data are presented in

Table B-2. With a high level of analytical accuracy, the speciated selenium products should add up to the dissolved selenium value for each sample. While minor variation may be expected, the January 28 sample had significant variance – total reported as 17 μg/L, dissolved reported as 9.28 μg/L, the sum of reported dissolved species is 135 μg/L. The current theory for this condition is that selenium adsorbs to the sample bottle, causing the analysis for total selenium to report lower than dissolved. The lab attempted to digest the sample in the sample bottle using 10% nitric acid, but the results were the same. The selenium may have already adsorbed to the bottle and the effect was irreversible.

EPRI has begun additional studies to evaluate methods to improve analytical results from FGD wastewater biological treatment effluent. These studies are considering sample container use, preparation techniques, and analytical methods.

Table B-2
ABMet Effluent Selenium Speciation Results

	Brooks Applied Lab									We Energies Lab	
Date	**Tot. Se**	**Dis. Se**	**Dis. Se(IV)**	**Dis. Se(VI)**	**Dis. MeSe (IV)**	**Dis. SeCN**	**Dis. $SeSO_3$**	**Dis. Unknown Se**	**Sum of Dis. Species**	**Tot. Se**	**Dis. Se**
1/12/16	16.6	16.3	1.79 B	1.56 B	0.250 U	7.27	1.10 B	0.00 U	11.7	17	20
1/14/16	32.6	35.9	4.41	11.5	0.385 B	no data	2.21 B	0.465	19	45	47
1/19/16	25.5	25.5	7.61	4.77	0.250 U	7.46	2.53	3.1	25.5	22	no data
1/21/16	30.2	15.9	5.89	0.250 U	0.250 U	14.7	2.53 U	4.60	25.2	31	no data
1/26/16	30.4	27.6	10.8	0.965	0.497 B	11.9	2.50 U	1.52	25.7	46	42
1/28/16	17.0	9.28	51.8	0.965 U	1.32	69.7	3.82	8.71	135.4	47	46
2/2/16	23.3	12.5	8.16	0.965 U	0.588 B	20.1	2.50 U	1.12	30	62	54
2/4/16	22.6	9.69	5.94	0.965 U	0.638 B	17.2	2.50 U	1.11	24.9	50	46
2/9/16	12.6	13.0	9.47	0.250 U	0.398	11.4	2.50 U	1.02	22.3	35	31
2/11/16	8.48 B	6.28 U	1.18 B	0.250 U	0.154 B	5.24	0.275 B	1.63	8.5	23	19
2/16/16	14.2	9.26 B	4.55	0.250 U	0.250 U	10.8	2.73	1.69	19.8	29	25
2/18/16	18.0	4.88 B	3.01	0.250 U	0.250 U	8.01	2.53 U	1.46	12.5	27	22
2/23/16	8.80	5.23	2.06 B	0.250 U	0.250 U	2.10 B	2.04 B	0.551	6.8	18	13
2/25/16	10.3	3.79 B	0.828 B	0.250 U	0.250 U	2.65	0.222 U	0.814	4.3	16	13

Note: all data reported as µg/L
U = not detected
B = analyte is found in the associated blank, as well as in the sample

C
RAW DATA

Raw data from the pilot study are provided in the attachment.

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Electric Power Research Institute
3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com

HUNTON & WILLIAMS

HUNTON & WILLIAMS LLP
RIVERFRONT PLAZA, EAST TOWER
951 EAST BYRD STREET
RICHMOND, VIRGINIA 23219-4074

TEL 804 • 788 • 8200
FAX 804 • 788 • 8218

HARRY M. JOHNSON, III
DIRECT DIAL: 804 • 788 • 8784
EMAIL: pjohnson@hunton.com

FILE NO: 29142.070312

April 12, 2017

By U.S. Mail and E-mail

Docket No. EPA-HQ-OW-2009-0819

The Honorable E. Scott Pruitt
Administrator
United States Environmental Protection Agency
William Jefferson Clinton Building
1200 Pennsylvania Avenue, N. W.
Mail Code: 1101A
Washington, DC 20460

Supplemental Information in Support of the Utility Water Act Group's Petition for Rulemaking to Reconsider and Administratively Stay the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category; Final Rule, 80 Fed. Reg. 67,838 (Nov. 3, 2015)

Dear Administrator Pruitt:

Enclosed please find a study by the Electric Power Research Institute entitled *Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal.* We are submitting this study in support of the Utility Water Act Group's Petition for Rulemaking to Reconsider and Administratively Stay the Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category; Final Rule, 80 Fed. Reg. 67,838 (Nov. 3, 2015).

As discussed in our Petition, this study examined the performance of a biological treatment pilot system for flue gas desulfurization wastewater (FGDW) installed at a power plant burning 100% Powder River Basin (PRB) coal. See Petition, pp. 48-49. The results of the study support UWAG's contention that the model FGDW biological treatment used by EPA as a basis for limits within the ELG rule is not demonstrated for FGDW generated by plants burning subbituminous coals such as PRB. The enclosed study, to our knowledge, is the only study of biological treatment at a facility burning 100% PRB coal. The study shows

HUNTON & WILLIAMS

the pilot was unsuccessful in attaining consistent compliance with the rule's monthly average selenium limit for FGDW. For most of the pilot study—despite significant adjustments to ordinary operations, including a 50/50 dilution of the FGDW prior to treatment—the pilot results indicate a failure to meet the selenium limit.

A copy of this study has also been electronically mailed to the Office of Water Docket Center for filing in Docket No. EPA-HQ-OW-2009-0819.

Additionally, we will be submitting a supplemental filing in support of our Petition tomorrow.

Please contact me if you have any questions about the study or the Petition.

Sincerely,

Harry M. Johnson, III

Enclosure

cc by hand delivery and e-mail:
Mr. Michael H. Shapiro

cc by e-mail:
Jessica O'Donnell, Esq.
Kevin S. Minoli, Esq.
EPA Docket Center

ELECTRIC POWER RESEARCH INSTITUTE

Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal

Pilot Demonstration with the ABMet Technology

2017 TECHNICAL REPORT

Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal

Pilot Demonstration with the ABMet Technology

3002006089

Final Report, March 2017

EPRI Project Manager
J. Preece

ELECTRIC POWER RESEARCH INSTITUTE
3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 • USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com

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The following organizations, under contract to the Electric Power Research Institute (EPRI), prepared this report:

CH2M Hill
6600 Peachtree Dunwoody Road, Bldg. 400
Atlanta, GA 30328

Principal Investigators
J. Siczka
S. Graziano
B. Bratt
K. Munirathinam
K. Doup

The Electric Power Research Institute (EPRI) also contributed to the preparation of this report.

Principal Investigator
J. Preece

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Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal: Pilot Demonstration with the ABMet Technology. EPRI, Palo Alto, CA: 2017. 3002006089.

PRODUCT DESCRIPTION

This report documents a pilot demonstration conducted to evaluate treatment of wet flue gas desulfurization (FGD) wastewater at a power plant burning Powder River Basin (PRB) coal. FGD wastewater at PRB sites tends to have very high concentrations of total dissolved solids (TDS), calcium, magnesium, sulfate, nitrate, selenium, and various metals. The low chlorine content of PRB coal enables high cycles of concentration in the FGD absorber because absorber cycles are generally limited on chloride concentration due to specific metallurgy requirements. The resulting wastewater is typically challenging to treat due to the high TDS and high hardness scaling potential.

Background

The U.S. Environmental Protection Agency's (EPA's) revision of effluent limitations guidelines (ELGs) in 2015 has resulted in new requirements for FGD wastewater. Under the rule, EPA established limits based on physical/chemical (P/C) and biological treatment technologies with numeric limits on total arsenic, total mercury, total selenium, and nitrate/nitrite as nitrogen. Limited data are currently available on the treatment of FGD wastewater from PRB coal plants using biological treatment technologies.

Objectives

A pilot system was operated to evaluate and study processes in treating FGD wastewater, using pilot effluent water quality targets associated with the monthly average limits from the U.S. EPA 2015 ELGs. Target concentrations for arsenic, mercury, selenium, and nitrate/nitrite as nitrogen from the pilot system treated effluent were established as 50% of the 2015 ELG monthly average limits to account for initial blending with service water. Analytical and field data were collected to study performance of biological treatment systems on FGD wastewater at a PRB coal site.

Approach

For this demonstration, GE Water & Process Technologies (GE) provided and operated a pilot treatment system consisting of a membrane bioreactor (MBR) process, for nitrification and denitrification, and the Advanced Biological Metals Removal (ABMet) system for denitrification and selenium reduction. The pilot systems were evaluated using a small continuous portion of effluent from the host plant's full-scale P/C treatment system. After initial evaluations of the P/C effluent, GE determined the scaling potential was too high and would create issues in the small pilot equipment. GE also determined that the TDS was too high to support efficient bacteria growth and performance for reducing ammonia, nitrates, and selenium to the demonstration targets. The result of the initial evaluation was a decision to blend the P/C treatment effluent with plant service water (untreated water from Lake Michigan) in equal proportion, and send the combined stream to the pilot system.

Results

The ABMet pilot was initially operated with a total empty bed contact time (EBCT) of 18.8 hours vs. GE's commercial system target of 8 hours. Upon achieving acclimation, GE increased the flow rate through the treatment system to more closely simulate full-scale conditions. After the initial change, the total EBCT for the ABMet pilot was 12.4 hours and remained unchanged due to performance degradation that followed. The pilot system met the effluent targets for the first 3.5 weeks but performance quickly degraded after the flow rate was increased. It is suspected that inhibitory compounds affecting bacteria performance may be present in the FGD wastewater; however, despite various attempts to reduce inhibitory compounds, no resolution was achieved. The ABMet system produced effluent selenium concentrations three times higher than the 6 µg/L target (between 15 and 21 µg/L total selenium). A combination of factors may have resulted in the loss of selenium reduction performance, including:

- Oxidants – Data are limited on specific oxidation compounds present in FGD wastewater and how they may impact biological treatment. Surrogate data on ORP, COD, and BOD were monitored, but do not provide sufficient clarity or causality.
- Non-biodegradable organics – Based on data collected during the test (COD and nitrogen-compound concentrations), it is plausible that organic species were present that are potentially inhibitory to the ABMet bacteria.
- Nitrogen species removal (ammonia, nitrate, nitrite, and organic nitrogen) – This was the first known test using MBR for pretreatment of FGD wastewater and the first known test using a separate denitrification step before ABMet.
- Sulfate-reducing bacteria (SRB) – SRB are known to exist at ABMet conditions due to low ORP conditions and are evident by the presence of sulfide production. It is plausible that the high concentration of sulfates in the site's FGD wastewater, along with the nutrients used, encouraged SRB to suppress selenium-reducing bacteria growth.

Analytical issues with total and dissolved selenium measurements were identified during the project. In some samples, values for total selenium reported low, giving false indications of water quality. Suggested studies to evaluate analytical interferences are presented. Following data validation, the analytical results show that the pilot did not meet the effluent targets for 13 weeks, and the ABMet system was never operated at full-scale conditions.

Applications, Value, and Use

The methods used in this study may provide value for similar biological treatment technology evaluations. Due to site-specific conditions, each site should conduct its own evaluations.

Keywords

Flue gas desulfurization
Wastewater treatment
Selenium removal
ABMet
Effluent Limitation Guidelines
Biological treatment

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EXECUTIVE SUMMARY

Deliverable Number: 3002006089

Product Type: Technical Report

Product Title: Biological Treatment of Flue Gas Desulfurization Wastewater at a Power Plant Burning Powder River Basin Coal: Pilot Demonstration with the ABMet Technology

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PRIMARY AUDIENCE: Power plant operators, chemists, and engineers and environmental managers

KEY RESEARCH QUESTION

The main objectives of the pilot system were to evaluate and study processes in treating FGD wastewater, using pilot effluent water quality targets associated with the monthly average limits from the U.S. Environmental Protection Agency (EPA) 2015 effluent limitations guidelines (ELGs). This project investigated selenium removal using EPA's selected best available technology (BAT) in order to help plants consistently meet ELG limits, and specifically for plants burning Powder River Basin (PRB) coals.

RESEARCH OVERVIEW

Effluent from the host site's full-scale physical/chemical treatment system was collected and blended with service water (originating from Lake Michigan and untreated) at a 1:1 ratio and supplied to a pilot system designed and operated by GE Water & Process Technologies. Prior to beginning the pilot evaluation, GE determined that dilution of the full-scale physical/chemical treatment system effluent is required in order to minimize the potential negative impacts of scaling, high TDS concentrations, and toxicity in the processes. The pilot system consisted of a membrane biological reactor (MBR) process with two anoxic zones, an aerobic zone with GE's ZeeWeed 500D membranes, and a final anoxic stage. The MBR process was designed mainly to reduce nitrate/nitrite concentrations prior to the Advanced Biological Metals Removal (ABMet) process. The pilot ABMet system consisted of two attached growth, packed-bed biofilters in series, each containing granular activated carbon (GAC) media. Laboratory analyses were conducted on many sample streams in the pilot process, and data were analyzed with process operating data collected throughout the pilot evaluation.

KEY FINDINGS

- The pilot test did not consistently demonstrate that the MBR/ABMet combination of technologies adequately treats selenium to meet the 2015 ELGs limits.
- 100% dilution of FGD wastewater from the effluent of the host site's full-scale physical/chemical treatment system was required for the MBR/ABMet pilot system.
- Complete denitrification (reduction of nitrate nitrogen to nitrogen gas) was achievable in the pretreatment MBR.
- Selenium, present mainly in dissolved form, was significantly reduced by the pretreatment MBR (approximately 75% on average for the entire demonstration).
- Analytical issues with total and dissolved selenium measurements were identified during the project.
- Following data validation, the analytical results show that the pilot did not meet the effluent targets for 13 weeks, and the ABMet system was never operated at full-scale conditions.

ELECTRIC POWER RESEARCH INSTITUTE

EXECUTIVE SUMMARY

WHY THIS MATTERS

This study provided the opportunity for EPRI and its members to evaluate selenium removal in an especially challenging FGD wastewater at a power plant burning PRB coal. The results, learnings, and analytical data from the study will continue to support ongoing research related to biological treatment of FGD wastewater.

HOW TO APPLY RESULTS

Due to site-specific conditions that do not translate to every application, each site should conduct its own evaluations related to FGD wastewater treatment. The methods used in this project may provide guidance for users to apply similar approaches when evaluating biological treatment technologies.

LEARNING AND ENGAGEMENT OPPORTUNITIES

Related projects are:

- *Wet Flue Gas Desulfurization Wastewater Physical/Chemical Treatment Guidelines*. EPRI, Palo Alto, CA: 2016. 3002008515.
- *EPRI Technical Manual: Guidance for Assessing Wastewater Impacts of FGD Scrubbers*. EPRI, Palo Alto, CA: 2006. 1013313.
- *Flue Gas Desulfurization (FGD) Wastewater Characterization and Management: Preliminary Summary: 2007 Update*. EPRI, Palo Alto, CA, 2008. 1014073.
- *Case Studies to Evaluate FGD Wastewater Physical/Chemical Treatment Performance*. EPRI, Palo Alto, CA: 2013. 3002001202.
- *Flue Gas Desulfurization (FGD) Wastewater Chemical Precipitation Treatment Performance Characterization Study*. EPRI, Palo Alto, CA, 2015. 3002006251.
- *Pilot Evaluation of the ABMet Technology for Flue Gas Desulphurization Wastewater Treatment*. EPRI, Palo Alto, CA: 2014. 3002004550.

EPRI CONTACTS: Jeffery Preece, Technical Leader, jpreece@epri.com

PROGRAM: Water Management Technology, P185

Electric Power Research Institute
3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com
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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
<	less than or fewer than
µg/L	microgram per liter
µm	micrometer
µS/cm	microSiemen per centimeter
BOD	biochemical oxygen demand
COD	chemical oxygen demand
DO	dissolved oxygen
DOC	dissolved organic carbon
EBCT	empty bed contact time
ELG	Effluent Limitations Guidelines
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute, Inc.
FGD	flue gas desulfurization
GAC	granular activated carbon
GPD	gallons per day
GPM	gallons per minute
HRT	hydraulic retention time
Inf/EQ	influent equalization
MBR	membrane biological reactor
mg/L	milligram per liter
mg-N/L	milligram of nitrogen per liter
MLSS	mixed liquor suspended solids
mS/cm	microSiemen per centimeter
mV	millivolt

N	nitrogen
NA	not applicable
ng/L	nanogram per liter
NO_3/NO_2-N	nitrate/nitrite nitrogen
O&G	oil and grease
ORP	oxidation reduction potential
PAC	powdered activated carbon
P4	Pleasant Prairie Power Plant
Phys/Chem	physical/chemical
RAS	return activated sludge
Se	selenium
Se(IV)	selenite
Se(VI)	selenate
SeCN	selenocyanate
SeMe	selenomethionine
SRT	solids retention time
S.U.	standard unit
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TMP	transmembrane pressure
TOC	total organic carbon
TSS	total suspended solids
WQBEL	water quality-based effluent limit
ZVI	zero-valent iron

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1
INTRODUCTION

Project Understanding

The U.S. Environmental Protection Agency (EPA) sets technology-based standards, termed effluent limitations guidelines (ELGs), by industry category based on various levels of technology performance, the most stringent of which is the Best Available Technology Economically Achievable (BAT). EPA revised the ELGs for the steam electric industry in 2015 to include BAT limits for flue gas desulfurization (FGD) wastewater.

The BAT limits set by EPA for FGD wastewater are based on physical/chemical and biological treatment technologies with numeric limits on total arsenic, total mercury, total selenium, and nitrate/nitrites as N. The ELGs also include Best Practicable Control Technology (BPT) limits for total suspended solids and oil & grease. EPA's ELG limits for FGD wastewater are shown in Table 1-1. Additionally, water quality-based effluent limits (WQBELs) in some states are necessitating removal of selenium and other trace metals from FGD wastewater.

Table 1-1
ELG Limits on FGD Wastewater

Parameter	Units of Measure	Monthly Average Limit	Daily Maximum Limit
Arsenic, total	µg/L	8	11
Mercury, total	ng/L	356	788
Selenium, total	µg/L	12	23
Nitrate/Nitrite as N	mg/L	4.4	17.0
Total Suspended Solids (TSS)	mg/L	30	100
Oil and Grease	mg/L	15	20

µg/L = microgram per liter
mg/L = milligram per liter
ng/L = nanogram per liter

The primary objective of this project was to investigate and study selenium removal using EPA's selected BAT to help plants consistently meet ELG limits, specifically for plants burning Powder River Basin (PRB) coals. The ELGs also include mercury, arsenic, and nitrate/nitrite limits; studying their removal was a secondary project goal.

This study provided the opportunity for the Electric Power Research Institute, Inc. (EPRI) and its members to help evaluate selenium removal in an especially challenging FGD wastewater at We Energies Pleasant Prairie Power Plant (P4). The main properties of this wastewater that make treatment challenging are scaling tendency due to high sulfate and calcium concentrations; concentrations of dissolved/ionic species such as halogens, which are much higher than other FGD wastewaters from sites burning non-PRB coals; and nitrate/nitrite-nitrogen and total Kjeldahl nitrogen[1] (TKN) concentrations, both of which are also much higher than other FGD wastewaters. Hence, pretreatment for reducing suspended solids, dilution of dissolved solids and a nitrification/denitrification step were included ahead of the selenium removal unit for the P4 pilot, adding to the operational complexity of the pilot system.

P4 burns 100% subbituminous coal from the Powder River Basin, and has a low FGD blowdown rate for its power capacity (40 GPM), allowing the concentrations of ammonia, nitrates/nitrites, sulfates, arsenic, mercury, and selenium to reach very high levels. To EPRI's knowledge, this was the first time that biological treatment has been attempted on a wastewater stream from a plant that burns 100% subbituminous coal.

Pilot Objectives

The main objectives of the pilot system were to evaluate and study processes in treating FGD wastewater, with pilot effluent water quality targets equal to those listed in Table 1-2, and to validate the operating parameters for the membrane biological reactor (MBR) nitrification/denitrification pretreatment step and the Advanced Biological Metals Removal (ABMet) systems. Given the many potential changes and variations in chemistry that are inherent to FGD wastewater, the study attempted to maintain consistent selenium removal performance. When the performance changed, conditions were documented and process changes were made to recover performance.

[1] Other than uptake for cell synthesis, a selenium treatment system does not remove TKN. Therefore, if a discharge limit for ammonia nitrogen or total nitrogen is included in the permit, a TKN removal step will be required. Because ammonia removal was part of the pilot effluent water quality objectives, the reduction/removal of TKN was monitored.

Table 1-2
Effluent Water Quality Objectives

Parameter	Effluent Target[2]	Pilot Effluent Target[3]
Selenium[1]	<12 µg/L	<6 µg/L
Mercury[1]	<356 ng/L	<178 ng/L
Arsenic[1]	<8 µg/L	<4 µg/L
Nitrate/Nitrite Nitrogen[1] (NO_3/NO_2-N)	<4.4 mg/L	<2.2 mg/L
Total Suspended Solids (TSS)	<30 mg/L	<15 mg/L
Oil and Grease (O&G)	<15 mg/L	<7.5 mg/L
Ammonia	1.9 to 30 mg/L	0.45 to 15 mg/L
Phosphorus	<0.6 mg/L	<0.3 mg/L

Notes:
[1] Regulated pollutants (2015 ELG Final Rule)
[2] 2015 ELGs BAT Monthly Average Limits
[3] 50% of the ELG BAT Monthly Average Limits to account for dilution to reduce high TDS and scale potential
< = less than/fewer than
µg/L = microgram per liter
mg/L = milligram per liter
ng/L = nanogram per liter

2
BACKGROUND

Selenium removal from wastewater is particularly challenging because of its complicated chemistry. Selenium removal typically requires multiple treatment processes, and the species of selenium can vary throughout the different unit processes that target selenium removal. Other constituents in the wastewater may also interfere with the selenium removal processes. As FGD wastewater is a highly complex wastewater (high concentrations of many ions), there are many potential constituents that can affect treatment. Examples include oxyanions like sulfate, halogens like chloride, and nutrients like nitrogen species. Additionally, variations in coal sources, coal composition, plant operations, scrubber operations and other air emission control technologies, and other factors can cause the wastewater composition to vary. Even after successful treatment of selenium, treatment system residuals and byproducts containing selenium must be managed and disposed of properly. This section describes the treatment technologies used for the pilot demonstration.

P4 Existing Full-Scale Wastewater Treatment Plant Description

The full-scale P4 wastewater treatment plant was designed to treat 75 GPM of wastewater with a total suspended solids (TSS) content of less than 1.5%. An overview of the existing physical/chemical system is provided in Figure 2-1. After equalization, wastewater flows to Reaction Tank 1 where pH is adjusted from approximately 5.6 to 8.5 S.U. by adding hydrated lime to the wastewater. Effluent from Reaction Tank 1 flows by gravity to a primary clarifier where polymer is added to aid in solids removal. Primary effluent flows to Reaction Tank 2 where METCLEAR MR2405 (commonly referred to as an organosulfide) is added for mercury precipitation. Effluent from Reaction Tank 2 flows by gravity to Reaction Tank 3 where ferric chloride is added for coagulation and for iron co-precipitation. Effluent from Reaction Tank 3 passes to a flash mix tank where polymer is added, and then to a flocculation tank, followed by a parallel plate clarifier (secondary clarifier). The plant was equipped with an upflow sand filter, but its use has been discontinued due to problems with scaling of sand, recurring fouling issues in the filters, and because it had limited effectiveness in removing mercury below the level achieved by secondary clarification alone. Optional cartridge filters can be installed after the final effluent tanks, when necessary, to filter to 0.45 microns for removal of suspended particles which may contain large amounts of mercury. Sludge is pressed in plate and frame filter presses and combined with coal combustion residuals (CCR) before being landfilled on plant property.

The average operating flow rate for the system is currently 40 GPM. Operations staff run the primary clarifier continuously when the treatment plant is in operation. The secondary clarifier mainly runs throughout the five-day work week and is shut down on weekends for cleaning (to remove scale). The two effluent discharge tanks hold approximately 10,000 gallons each and are used for storage during the weekend cleaning activities.

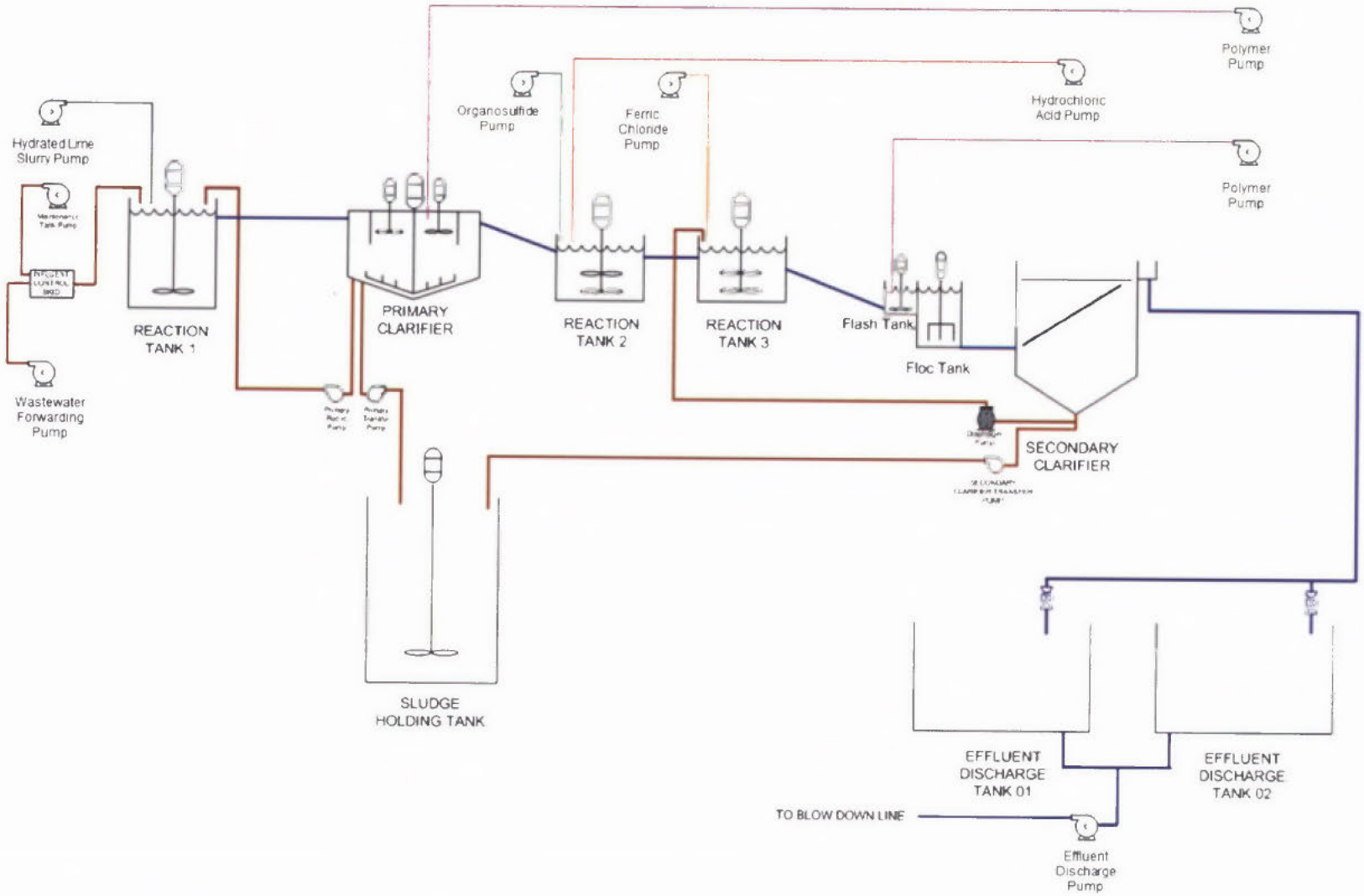

Figure 2-1
P4 FGD wastewater treatment plant process flow diagram
Courtesy of We Energies

Treating Wet Flue Gas Desulfurization Wastewater

Some technologies have been implemented full-scale at FGD wastewater treatment facilities in the United States to remove particulate (generally >0.45 μm) and/or dissolved/soluble selenium from the wastewater stream. Additional processes have been tested on a pilot scale on FGD or other selenium-containing streams. These technologies fall into two main categories:

- Physical/chemical treatment technologies, in which various configurations are possible:
  - Solids settling (is tank-based or in a settling pond; generally removes some particulate selenium, but is likely not sufficient to meet new ELG limits as much of the selenium tends to be in the soluble fraction)
  - Zero valent iron (ZVI) contact (uses complex redox and adsorption reactions to remove soluble forms of selenium)
  - Filtration (removes particulate selenium using media or ultrafiltration membranes; reverse osmosis membrane filtration can potentially remove all forms of selenium, including soluble forms)
- Biological treatment:
  - Fixed-film anaerobic/anoxic (where there are low levels of dissolved oxygen [DO]) reactor-based biological treatment; generally removes various selenium species, including selenate and selenite
  - Passive treatment by surface-flow aerobic wetlands and anaerobic subsurface, vertical flow wetlands (which are generally similar in function to fixed-film systems) have been demonstrated to remove various selenium species
  - Suspended growth anaerobic/anoxic systems (have recently been pilot tested in membrane biological reactors [MBRs] and moving bed biofilm reactors [MBBRs] to remove various selenium species using mechanisms similar to the established fixed-film systems)

The pilot system evaluated by EPRI at P4 is based on active biological treatment for selenium removal, which included anoxic/aerobic MBR for nitrogen pretreatment and the GE ABMet primarily for selenium removal, tested on P4's full-scale chemical precipitation system effluent.

Summary of Treatment Systems and Equipment

The P4 pilot included the following treatment systems:

- ZeeWeed 500D MBR Pilot
- ABMet Pilot

ZeeWeed 500D Membrane Biological Reactor

In anoxic/anaerobic biological treatment, nitrate must be removed from the wastewater in order to create conditions conducive to the biological reduction of selenate and selenite to insoluble elemental selenium. Nitrate removal occurs via denitrification where nitrate/nitrite nitrogen is

ultimately reduced to nitrogen gas, but at ORP conditions higher than where reduction of senate and selenite occurs. Unfortunately, removing high concentrations of nitrate using downflow reactors, such as those in ABMet, leads to plugging caused by high bacterial solids growth and the need for more frequent backwashes. Also, because ABMet operates at low oxidation reduction potential (ORP), some ammonia-nitrogen may be formed when high nitrate is present in the influent. Additional reactors may be required to achieve the conditions needed to facilitate effective selenium reduction when high nitrate levels are present in the influent; however, site-specific evaluations must be conducted to determine the exact process suitable for treatment. Therefore, nitrate removal is key to successfully treating selenium in FGD wastewater using any of the established treatment technologies. In this P4 wastewater, the TKN concentration is also high requiring ammonia-nitrogen oxidation to nitrate-nitrogen (nitrification). Therefore, an MBR was included in the pilot system as a pretreatment nitrification/denitrification step to remove both the nitrates in the influent and nitrates generated from the nitrification process.

An MBR is a combination of suspended growth activated sludge and membranes, with the latter performing the liquid/solids separation function. The membranes provide a positive barrier resulting in permeate with negligible TSS concentration. The ZeeWeed 500 module is designed to reject particles greater than 0.04 microns. Treated water is drawn through membrane by vacuum, enters the hollow fibers of the membrane, and is then pumped out of membrane. The redox conditions in stages within the activated sludge system can be manipulated to achieve target reactions (for example, carbon oxidation, nitrification, and denitrification). Target reactions can also convert dissolved species into insoluble constituents and result in rejection by the membranes.

A diagram of the ZeeWeed membrane fiber and ZeeWeed 500 module is provided in Figure 2-2.

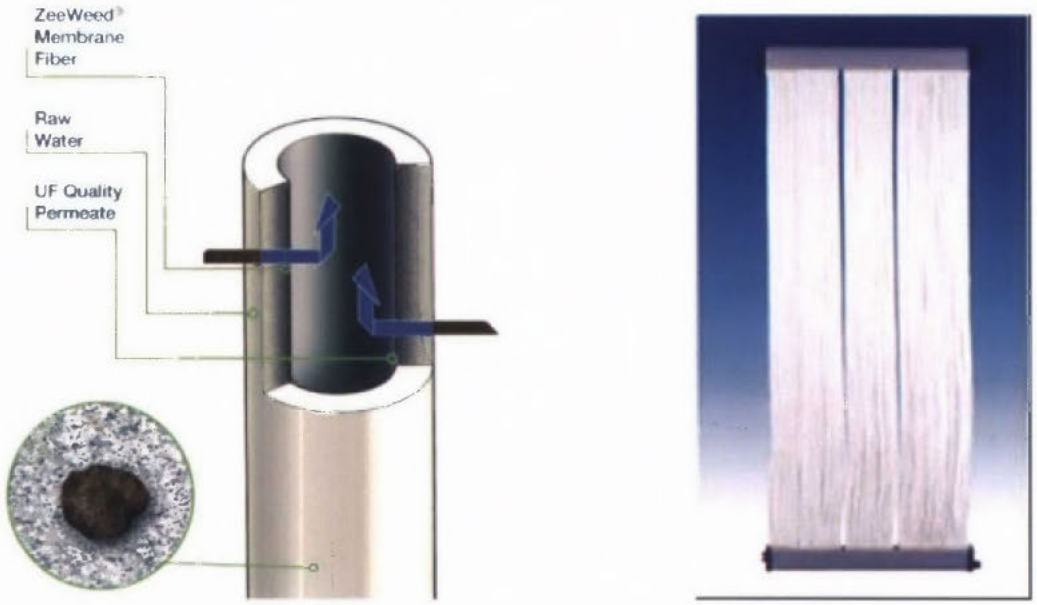

Figure 2-2
ZeeWeed membrane fiber and ZeeWeed 500 module
Courtesy of GE Water & Process Technologies

Membrane permeability is maintained through multiple approaches. During normal operation, continuous air scouring from the bottom of the module is used to remove accumulated solids, containing biological activity and biomass, on the membrane surface. Mixed liquor in the membrane tank is recirculated back to the biological reactors to maintain solids distribution throughout the system. Solids are wasted from the membrane tank based on the targeted solids retention time (SRT). Treatment of the wasted solids is generally a separate process that includes dewatering and disposal of the sludge.

Maintenance of the membranes includes backwashing, maintenance cleanings, and recovery clean-in-place (CIP) activities, all of which can be implemented on a set frequency or based on transmembrane pressure (TMP - calculated by the difference between the membrane influent and effluent pressures). Because the ZeeWeed 500 system is designed to maintain a constant flux, an increase in TMP indicates membrane fouling. Detailed descriptions of each cleaning option are as follows:

- A backwash is performed by reversing the flow through the membrane (also called "back pulse") for a short time period using permeate (clean water produced by the membrane during normal operation) from the inside of the membrane to the outside where the suspended solids are held. For this study, aeration was also used during the backwashes.
- A maintenance cleaning using aeration and chemical cleaning solutions to remove more challenging material from the membrane surface that can lead to fouling. Cleaning solutions may include sodium hypochlorite, citric acid, and other traditional products used to restore membranes. These chemicals are generally recirculated, in separate batches, through the membrane system for a length of time (on the order of 15 minutes) depending on conditions.
- The recovery CIP process is generally conducted only one or two times per year. The process is more aggressive than maintenance cleanings with higher concentrations of chemicals and longer contact times for each batch. Defining the recovery CIP process requires an understanding of treatment and membrane conditions.

ABMet

The ABMet system is an attached growth downflow carbon filter. It was developed by Applied Biosciences and is currently marketed by GE Water & Process Technologies. The ABMet system uses microbes cultured in bioreactor granular activated carbon (GAC) beds that create anoxic/anaerobic conditions for selenate and selenite reduction to insoluble elemental selenium particles. The GAC material acts as a physical media for fixed biofilm development. A diagram of the ABMet biofilter is presented in Figure 2-3.

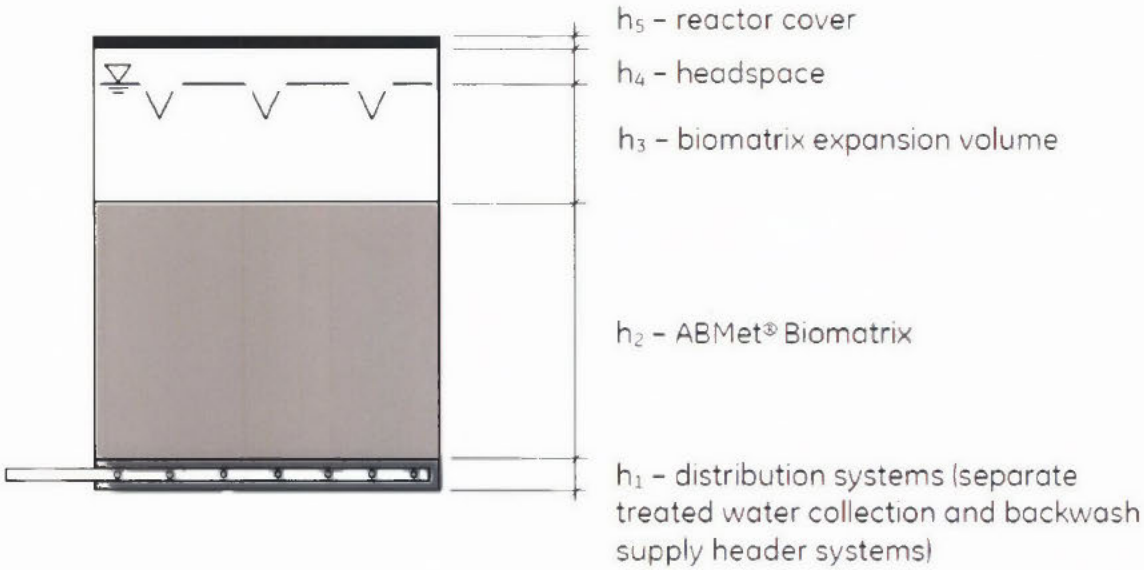

Figure 2-3
ABMet biofilter cross-section
Courtesy of GE Water & Process Technologies

The ABMet process uses certain heterotrophic facultative bacteria, which, in addition to reducing nitrate to nitrogen gas, reduce selenate and selenite to elemental selenium. Elemental selenium then exists as insoluble solids along with bacterial solids in the filter bed. An image of the ABMet selenium reducing bacteria and elemental selenium particles is presented in Figure 2-4.

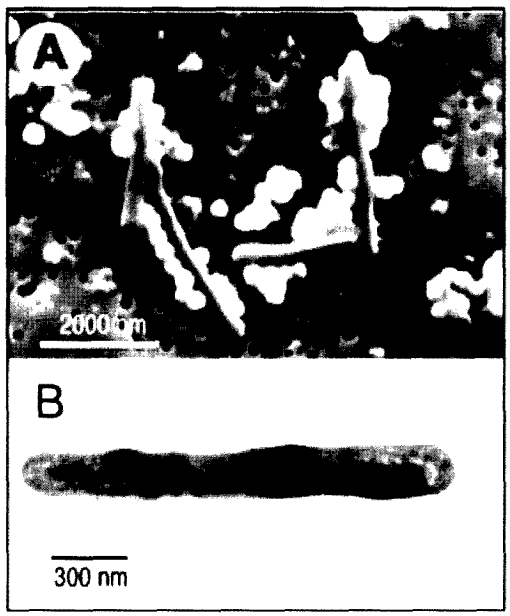

Figure 2-4
ABMet selenium reducing bacteria with selenium particles
Courtesy of GE Water & Process Technologies

The microbes are selected as a site-specific inoculum for the bioreactors. These bacteria are mesophilic bacteria requiring the wastewater temperature to be typically between 50 degrees Fahrenheit (°F) and 100°F (10 degrees Celsius [°C] and 38°C) and pH between 6 and 7 S.U. These microbes use oxygen (O_2) and the oxygen in the nitrate (NO_3^-), selenate (SeO_4^{2-}), and selenite (SeO_3^{2-}) oxyanions as an electron acceptor for their respiration and an organic carbon (electron donor) source to meet their food/energy requirements. Biochemical reactions for the reduction of nitrate/nitrite and selenate/selenite (excluding biomass production) are presented below.

$$NO_3^- + organic\ carbon \rightarrow NO_2^- + organic\ carbon \rightarrow N_2 + CO_2 + H_2O$$

$$2SeO_4^{2-} + organic\ carbon \rightarrow 2SeO_3^{2-} + organic\ carbon \rightarrow SeO + CO_2 + H_2O$$

The carbon source can be either organic compounds present in the wastewater, typically expressed as chemical oxygen demand (COD), or an organic compound from an external source (such as methanol, acetic acid, ethanol, molasses, or corn syrup). The ABMet system typically uses a molasses-based nutrient supplement (supplied by GE), which also is a source of phosphate for the bacteria, however acetic acid was used for this study as a carbon source for both nitrate and selenium reduction processes. Nutrient addition can also impact pH of the system, where too much nutrient may cause an increase in production of organic acids and CO_2 (both produced by bacteria) that lower the pH.

Biological reduction converts the selenate or selenite ions into elemental selenium, which exists as a particle and is enmeshed and attached to the biofilm within the reactor. The reactors are backwashed periodically to prevent excess biomass and solids buildup and resulting hydraulic head loss, and the waste stream is then treated by dewatering the solids and disposing of the sludge with concentrated selenium. The system is also routinely degassed (similar to backwash, but for a shorter time period) to remove accumulated gases (such as carbon dioxide and nitrogen) from the filter bed to reduce hydraulic head loss. The effluent water from the ABMet unit may be aerated in a polishing aeration tank to increase the DO and to aerobically treat any excess soluble degradable COD-contributing organics, if required.

Monitoring of pH and ORP is performed to control the chemical dosing and ensure selenate and selenite reduction. ORP is an indicator of biological activity in the ABMet system, where lower ORP correlates to anaerobic conditions created by biological activity in reducing oxygen, nitrate/nitrite, and selenium. Once nitrate and nitrite are fully utilized as electron acceptors, selenate, selenite, and sulfate will be used as the primary electron acceptor with remaining biodegradable COD by a different population of heterotrophic microbes. These sulfate-reducing microbe species are generally naturally occurring and their presence/biological activity results in the formation of hydrogen sulfide[2].The sulfate-reducing bacteria may overgrow and outcompete selenate and selenite reducing bacteria for electron donors at high sulfate concentrations. The electron donor (organic carbon) for the ABMet system must also be carefully monitored and controlled to avoid providing too much carbon source for the sulfur-reducing microorganisms. Allowable total sulfide concentrations in the ABMet effluent should be defined during pilot testing for specific applications to minimize competition from sulfate-reducing bacteria.

Solids generated from backwashing (which contain selenium) can generally be recycled upstream to the physical/chemical treatment system (if used) for removal or be treated separately. The resulting dewatered solids are typically tested using the toxicity characteristic leaching procedure (TCLP) to verify nonhazardous classification for disposal, but standards and requirements should be referenced for each site. Solids can generally be processed using solids dewatering equipment such as a plate-and-frame filter press with other solids.

[2] Hydrogen sulfide is an odorous gas that is detectable at low concentrations (around 1 part per million [ppm]) and can be a human health issue at sufficient concentrations (the U.S. Department of Labor maintains exposure limits under the Occupational Safety and Health Administration standards).

3
PILOT DEMONSTRATION DESIGN

Pilot System Design

Effluent from P4's full-scale physical/chemical treatment system (that is, hydrated lime addition, primary solids removal, trace metals precipitation, and secondary solids removal) was collected and blended with service water (originating from Lake Michigan and untreated) at a 1:1 ratio in the 500-gallon pilot equalization tank. GE designed and operated the pilot system and determined that dilution of the full-scale physical/chemical effluent to minimize the potential impacts of scaling, high TDS concentration, and toxicity was required. For purposes of ELG compliance, however, this sort of dilution would require application of more stringent (i.e., lower) ELGs for constituents. Therefore, treatment without dilution would be preferable to the extent it is feasible. Blended wastewater from the equalization tank provided influent to the nitrification/denitrification pretreatment membrane biological reactor (MBR) system. Effluent from the pretreatment MBR system was collected in a feed tank for the two-stage ABMet system.

An overview of the P4 Pilot system is provided on Figure 3-1.

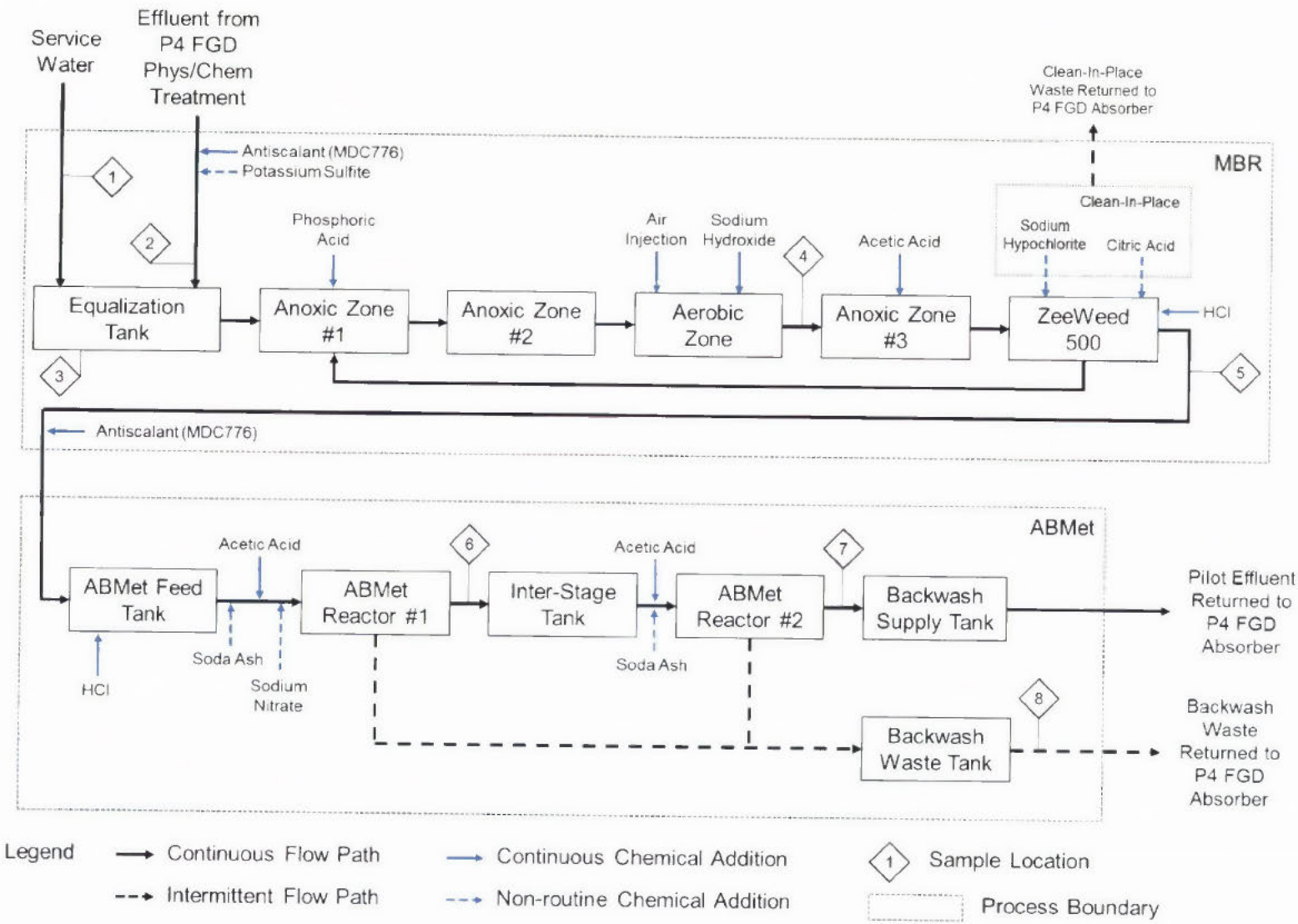

Figure 3-1
Pilot process block flow diagram

Equalization Tank

The 500-gallon equalization tank was provided for blending of P4's full-scale physical/chemical effluent and service water from Lake Michigan (untreated) at a 1:1 volume ratio. A combination of hand valves, flow meters, and flow control valves was used to balance the flows and achieve the targeted 1:1 volume ratio. The blended water from the equalization tank was pumped via submersible pump to anoxic zone #1 in the pretreatment MBR system.

While initial provisions were made to feed different types of chemicals, only antiscalant (MDC776) and potassium sulfite were added to the EQ Tank during testing.

- Antiscalant (MDC776) – To mitigate scaling of calcium, sulfate, phosphate, and other precipitating species. A dosage of 5 mg/L was maintained throughout the study.
- Potassium sulfite – For removal of potential oxidants for mitigating negative impacts to biological activity that may inhibit selenium reduction. Addition began on January 5, 2016, near the end of Condition 2 through Condition 3.

Pretreatment Membrane Biological Reactor

The pretreatment MBR pilot system was seeded with 2,500 gallons of municipal mixed liquor from the Kenosha Wastewater Treatment Plant located in Kenosha, WI. The seeding occurred on October 20, 2015 and the acclimation period, after seeding, lasted four weeks. The system consisted of four zones (anoxic #1, anoxic #2, aerobic, and anoxic #3) followed by the membrane tank, which are described in Table 3-1.

Table 3-1
Pilot MBR System Description

Item	Volume (gallons)	Chemical Addition	Description
Anoxic zone #1	100 [working volume]	Phosphoric acid – macronutrient for bacteria; began in Condition 2 due to switch in acetic acid source from a blended product (which contains phosphorus, but the concentration was deemed too high) to an 80% product (20% balance is water). Target phosphorus concentration was ≤3 mg/L in MBR permeate and ≤ 0.5 mg/L in the ABMet effluent.	• Received blended water from equalization tank and mixed liquor recirculation from the membrane tank • Mixing provided via mechanical mixer
Anoxic zone #2	100 [working volume]	None	• Received water from anoxic zone #1 • Mixing provided via mechanical mixer
Aerobic zone	1,000 [working volume]	• Ferric chloride – To reduce phosphorus that had been added by the acetic acid blended product, used only during 2-day period in Condition 3; originally intended for soluble arsenic precipitation if it had been needed (but soluble arsenic was not present at concentrations higher than the target value). The blended acetic acid product contained excess phosphorus which may have led to the precipitation of material that created issues with excess solids building in the ABMet biofilter during testing. Scaling and excess solids were ultimately controlled by adjusting the phosphorous content in the nutrient. • Sodium hydroxide – to increase pH	• Received water from anoxic zone #2 • Continuous aeration provided by a blower and fine bubble diffusers
Anoxic zone #3	1,000 [working volume]	• Acetic acid – carbon source for denitrification and partial selenate/ selenite reduction; blended type used during Condition 1; change to 80% acetic acid made in Condition 2. Switched made due to high concentration of phosphorus in blended product.	• Received water from aerobic zone • Mixing provided via mixing pump
ZeeWeed Membrane tank	270	• Sodium hypochlorite – membrane cleaning • Citric acid – membrane cleaning • Hydrochloric acid – to decrease pH (beginning in Condition 2)	Three ZeeWeed modules provided, but only one was placed in service

The blended water was pumped from the equalization tank to anoxic zone #1, which had an underflow to anoxic zone #2. The water then overflowed to the aerobic tank. The aerobic tank was fitted with 10 fine bubble diffusers to achieve the desired dissolved oxygen (DO) concentration of 2 to 4 mg/L. Also, pH monitoring, with a control set point of 6 - 7[3] S.U., was provided in the aerobic tank. Level controls within the aerobic tank controlled the flow to anoxic zone #3. A mixing pump and eductors were provided in anoxic zone #3 for mixing and allowed for the water to be pumped to the membrane tank.

The membrane tank consisted of three 370 ft^2 ZeeWeed 500 membranes, which is a scaled-down version of a full-scale membrane system. Only one membrane, located in the middle module, was in service for this pilot; the other two membranes/modules were plugged and not placed into service. This configuration allowed for normal operation of the air diffuser system that is located inside the membrane tank. Suction drives the treated water through the hollow fibers of the membrane using an outside-in configuration. Membranes were cleaned with constant air scouring along with periodic chemical cleans. For a full-scale system, all waste streams would be evaluated for treatment, potentially by recycle to the physical/chemical process upstream. Overflow from the membrane tank was recirculated to anoxic tank #1.

The main objectives of the pretreatment MBR were as follows:

- Nitrify influent TKN/ammonia nitrogen – oxidation of ammonia nitrogen to nitrate nitrogen
- Denitrify influent and produce nitrate nitrogen – reduce nitrate/nitrite nitrogen to nitrogen gas
- Produce an effluent with very low TSS suitable for treatment in the downstream ABMet system
- Remove insoluble selenium in influent and produced in the MBR anoxic tank

Permeate from the pretreatment MBR was collected in the ABMet system's feed tank. A picture of the MBR pilot equipment is shown in Figure 3-2.

[3] The pilot MBR pH control set point of 6 - 7 S.U. was established by GE. CH2M suggested that a slightly higher control range of 6.8 - 7.5 S.U. would minimize impacts on nitrification. Actual operating range, as discussed in Section 4, was 6.8 - 7.2 S.U.

Figure 3-2
ZeeWeed 500 MBR pilot
Courtesy of GE Water & Process Technologies

ABMet

The ABMet pilot system consisted of two reactor stages (each with 1,270 L of GAC), feed and inter-stage tanks, a backwash system, and chemical feed systems, which are described in Table 3-2. The ABMet reactors were seeded with GE's bacteria on November 20, 2015, and placed into forward flow on November 23.

Table 3-2
Pilot ABMet System Description

Item	Volume (gallons)	Chemical Addition	Description
ABMet feed tank		• Hydrochloric acid – to decrease pH (beginning in Condition 2) • Soda ash – to increase alkalinity (Condition 2 only) • Antiscalant, MDC776 (Began at Condition 2)	Received pretreatment MBR permeate
ABMet stage 1	335	• Acetic acid – carbon source for denitrification and selenate/ selenite reduction; used blended version that contained nutrients (ammonium and phosphorus) starting in Condition 2 • Sodium nitrate – nitrate (electron acceptor) source to enhance denitrification, but added only mid-way through Condition 4	Received pretreatment MBR permeate from the ABMet feed tank
ABMet inter-stage tank		Soda ash – to increase alkalinity (Condition 2 only)	Received ABMet stage 1 effluent

Table 3-2 (continued)
Pilot ABMet System Description

Item	Volume (gallons)	Chemical Addition	Description
ABMet stage 2	335	Acetic acid – carbon source for denitrification and selenate/selenite reduction; used blended product (containing acetic acid, ammonium, and phosphorus) during Condition 1 and 80% acetic acid product (20% water) during Conditions 2, 3, and 4.	Received ABMet stage 1 effluent from the ABMet inter-stage tank
ABMet effluent tank		None	Received ABMet stage 2 effluent
Backwash supply tank	3,000	None	Received ABMet stage 2 effluent from the ABMet effluent tank to degas and backwash the ABMet filters
Backwash waste tank	800	None	Received backwash waste from ABMet stage 1 and ABMet stage 2

Permeate from the pretreatment MBR was collected in the ABMet feed tank from where it was pumped to the top of the ABMet stage 1 reactor. Effluent from the ABMet stage 1 was collected in an inter-stage tank from where it was pumped to the top of the ABMet stage 2 reactor. Effluent from the ABMet stage 2 was collected in an effluent tank and then pumped to the backwash supply tank that allowed the effluent to overflow from the system to the effluent where all waste was returned to the P4 FGD Absorber.

The GAC media in each ABMet stage reactor provided surface area for bacteria to grow and develop a biofilm. Nutrient addition, pH control, and alkalinity adjustment were provided for each ABMet stage to provide a suitable/optimized environment for selenium reduction.

The main objectives of the ABMet system operation were as follows:

- Denitrify any remaining influent nitrate nitrogen and reduce nitrate/nitrite nitrogen to nitrogen gas.
- Reduce soluble selenium species (selenate and selenite) to particulate, elemental selenium and remove it from the wastewater.

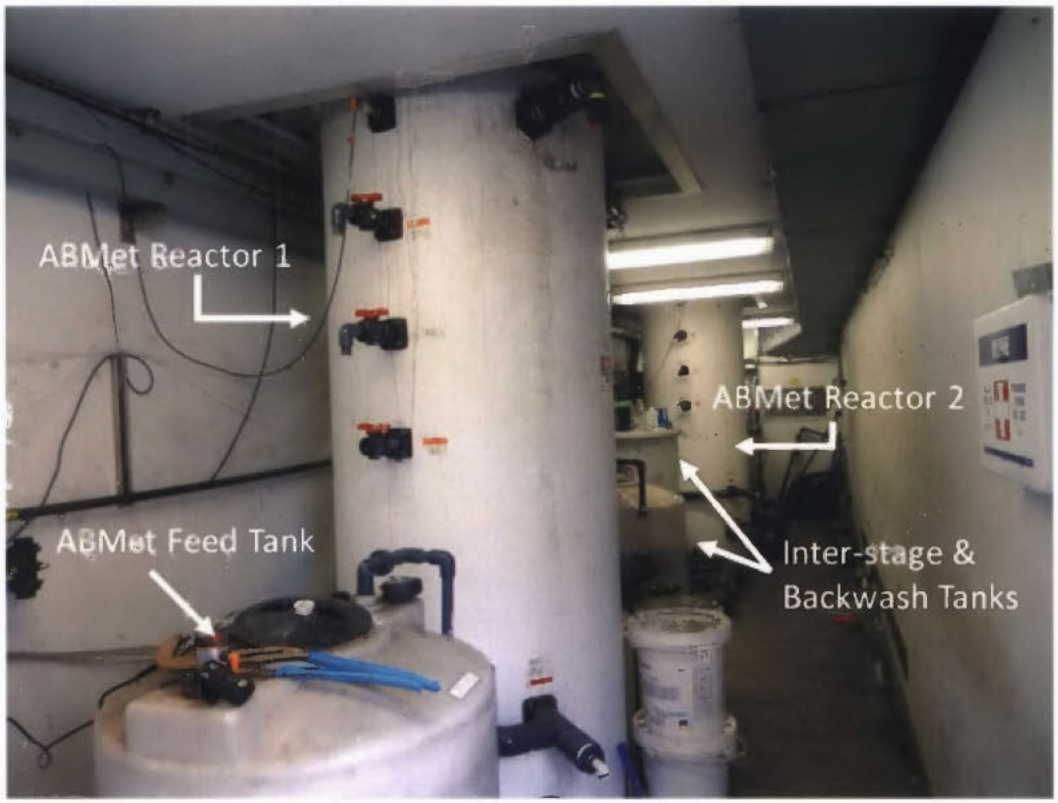

Figure 3-3
ABMet pilot equipment

Pilot Schedule and Conditions

Operating data for the MBR and ABMet systems have been divided into the following four conditions:

- Condition 1 – Startup and Acclimation (October 26, 2015 to December 16, 2015) – period where bacteria are growing and becoming established in the treatment system.
- Condition 2 – Initial Operation (December 17, 2015 to January 10, 2016) – operational period defined by GE's original test plan.
- Condition 3 – Increased Flow/Reduced HRT (January 11, 2016 to February 13, 2016) – operational period intended to more closely simulate full-scale HRT/EBCT conditions.
- Condition 4 – Process Adjustments (February 14, 2016 to March 3, 2016) – period where GE responded to decreased selenium removal performance of the ABMet.

Increasing the flow rate under Condition 3 was a conscious decision made by the project team in an effort to simulate full-scale conditions (i.e., to match HRT/EBCT for each process technology). Due to factors that resulted in poor selenium removal performance, of which increased flow rate is not believed to be a sole-contributor, additional process changes were made during Condition 4 in attempt to return the pilot systems back to original selenium removal performance (which had been meeting the effluent/treatment targets).

- The project team was able to extend the duration of the pilot demonstration past its original end date, but testing concluded when the P4 units entered an outage and were not able to supply FGD wastewater. For two weeks prior to pilot shutting down, the ABMet system was operated by feeding blended physical/chemical treatment effluent from the storage tanks with ABMet effluent; the MBR did not operate during this time.
- Details on the process conditions, adjustments, and performance changes are provided in the following sections.

Field and Laboratory Analytical Plans

Field and laboratory analyses were conducted to control system operation and optimize performance. Field analyses were conducted by GE throughout the demonstration on the MBR and ABMet pilot systems. A summary of field parameters and frequency of the analyses are provided in Table 3-3.

Table 3-3
Field Analyses

Parameter	Minimum Frequency (per week)
Chemical tank levels (inches)	3
pH (S.U.) by handheld meter	5
Dissolved oxygen (mg/L) by handheld meter	5
Conductivity (μS/cm) by handheld meter	5
ORP (mV) by inline meter	5
Nitrate/nitrate (mg of N/L) by HACH test kit	5
Temperature (°F)	5
Raw Water Totalizer (gallons)	5
Service Water Totalizer (gallons)	5
Anoxic zone #1 level (inches)	5
Anoxic zone #2 level (inches)	5
Anoxic zone #3 level (inches)	5

Laboratory analyses were conducted by We Energies' corporate lab, TestAmerica Laboratories, Inc., and Brooks Applied Labs for analytical chemistry evaluations. Parameters analyzed by each lab are summarized in Table 3-4, Table 3-5, and Table 3-6. Turnaround times for parameter results varied with each lab, but were generally one to two weeks with the exception of selenium by We Energies which was within three days. Samples were shipped to We Energies' lab and TestAmerica same-day and all samples requiring dissolved parameter analysis were filtered by the labs. Samples sent to Brooks Applied were on 24-hour delivery shipping. Samples analyzed

by We Energies and TestAmerica were taken every Monday, Tuesday, and Thursday during Conditions 1 and 2 and only Tuesday and Thursday during Condition 3. The entire analytical plan, which identifies the sample locations and frequencies, is provided in Appendix A.

Table 3-4
We Energies Lab Analyses

Parameter	Analytical Method
Aluminum, total and filtered	EPA 200.7
Arsenic, total and filtered	EPA 200.8 DRC-O2
Boron, total and filtered	EPA 200.7
Cadmium, total and filtered	EPA 200.7 / EPA 200.8
Calcium, total and filtered	EPA 200.7
Cobalt, total and filtered	EPA 200.7
Copper, total and filtered	EPA 200.7 / EPA 200.8
Iron, total and filtered	EPA 200.7
Lead, total and filtered	EPA 200.7 / EPA 200.8
Magnesium, total and filtered	EPA 200.7
Manganese, total and filtered	EPA 200.7
Mercury low-level, total and filtered	EPA 1631E
Mercury low-level, 0.45 µm	EPA 1631E
Molybdenum, total and filtered	EPA 200.7
Molybdenum, filtered	EPA 200.7
Nickel, total and filtered	EPA 200.7
Selenium, total and filtered	EPA 200.8 DRC-NH3
Silver, total and filtered	EPA 200.7
Sodium, total and filtered	EPA 200.7
Thallium, total and filtered	EPA 200.8
Tin, total and filtered	EPA 200.7
Zinc, total and filtered	EPA 1638 DRC

Table 3-5
TestAmerica Lab Analyses

Parameter	Analytical Method
Alkalinity	SM2320B
Ammonia	SM4500
Bicarbonate	SM2320B
BOD	SM5210B
Carbonate	SM2320B
Chlorides, filtered	SM4500
COD	SM5220C
Conductivity, µS/cm	SM2510B
Fluoride, total	SM4500
Nitrate/Nitrate (N)	SM4500
Phosphorus, total	SM4500
Sulfate, filtered	SM4500
Sulfide	SM4500
TDS	SM2540C
TKN	SM4500
TOC	SM5310C
TSS	SM2540D

Table 3-6
Brooks Applied Lab Analyses

Parameter	Analytical Method
Arsenic, total and filtered	EPA 200.8/6060
Arsenic Speciation, filtered[1]	EPA 200.8/6060
Selenium, total and filtered	EPA 200.8/6060
Selenium Speciation, filtered[1]	EPA 200.8/6060

[1]Speciation analyses only conducted on pilot influent and effluent samples

4
RESULTS AND DISCUSSION

This section presents the results associated with the P4 pilot study. Raw data from the pilot study are presented in Appendix C.

During the pilot study, influent water quality/chemistry was considered typical for the site (no major upsets/excursions or abnormal conditions occurred in any process upstream of the pilot system). The P4 wastewater treatment system was offline for two weeks in mid-November 2015 (during the MBR and ABMet acclimation period in Condition 1) due to mechanical issues, but stored effluent water provided consistent flow and chemistry to the pilot. In mid-February 2016, the P4 system shut down again through the beginning of March, but stored water (with consistent chemistry) was provided to the pilot. The demonstration ended March 3, 2016. There were many performance changes in the pilot MBR and ABMet processes throughout the demonstration. These changes are documented and described to the best of the project team's capabilities.

Pilot Influent Water Quality

Table 4-1 presents a summary of the blended pilot influent water quality (50 percent full-scale physical/chemical treatment effluent and 50 percent service water from Lake Michigan [untreated] by volume). The blended pilot influent total selenium concentration averaged 1,175 µg/L with a range of 770 to 2,500 µg/L. The blended pilot influent dissolved selenium concentration averaged 1,093 µg/L. Comparisons between each data set revealed most of the blended influent selenium was in the soluble form. Nitrate/nitrite nitrogen averaged 98 milligrams of nitrogen per liter (mg-N/L), with a range of 65 to 160 mg-N/L. Ammonia averaged 52 mg/L with a range of 10 to 180 mg/L[4]. The ranges indicate variability in the full-scale physical/chemical effluent, which was observed over the course of the pilot study. The variability could be explained in part by the site's normal maintenance process of shutting down the physical/chemical system every week for manual cleaning of the components. During this time, the concentrations of components build in the absorbers and a new "batch" of water is delivered to the system every Monday morning.

[4] The higher concentrations of ammonia may be attributed to selective catalytic reduction (SCR) layers approaching end of life at P4, causing higher ammonia injection rates to be used for meeting NO_x removal requirements which subsequently increases the ammonia concentration in the FGD wastewater. SCR catalyst life decays naturally over many years until replacement is needed. The replacement is generally scheduled with a steam generator/boiler outage.

Table 4-1
Blended Pilot Influent Water Quality

Parameter	Units	Pilot Influent – All Operating Conditions		
		Minimum	Maximum	Average
Total Selenium	µg/L	770	2,500	1,175
Dissolved Selenium	µg/L	710	1,900	1,093
NO_2/NO_3-N	mg/L	65	160	98
Total Mercury	ng/L	20	240	72
Dissolved Mercury	ng/L	6.9	29	13.5
Total Arsenic	µg/L	0.45	8.10	4.67
Dissolved Arsenic	µg/L	0.45	8.50	4.68
pH[1]	S.U.	6.6	7.7	
Total Calcium	mg/L	400	830	479
Dissolved Calcium	mg/L	400	840	471
Total Magnesium	mg/L	1,600	3,100	2,039
Dissolved Magnesium	mg/L	1,600	3,100	2,023
Ammonia	mg/L	10	180	52
Conductivity	µS/cm	11,000	22,000	13,378
COD	mg/L	360	1,600	596
BOD	mg/L	1.00	2.60	1.8
TOC	mg/L	5.1	77.0	28.1
Chloride	mg/L	2,300	3,200	2,690
Fluoride	mg/L	18.0	43.0	24.0
Sulfate	mg/L	6,200	11,000	7,805
Ortho-Phosphate	mg/L	<0.027	0.74	0.10
Total Phosphorus	mg/L	0.027	0.750	0.093
Total Kjeldahl Nitrogen (TKN)	mg/L	42	220	101
Sulfide	mg/L	<0.22	1.70	0.15
TSS	mg/L	4	31	12
TDS	mg/L	12,000	25,000	16,452
Total Alkalinity	mg/L	78	120	103
Bicarbonate Alkalinity	mg/L	78	120	103
Carbonate Alkalinity	mg/L	<3.9	<3.9	<3.9

Notes:
Blended Influent: 50 percent full-scale physical/chemical treatment effluent and 50 percent service water from Lake Michigan (untreated)
[1]Analysis performed onsite
BOD = biochemical oxygen demand
µS/cm = microSiemen per centimeter
S.U. = standard units
TDS = total dissolved solids
TOC = total organic carbon

Variability (the difference between minimum and maximum concentration values) was also observed in arsenic and mercury throughout the study. The data indicate pilot feed water contained arsenic mostly in the soluble form whereas mercury was mostly in the particulate form. The TDS ranged from 12,000 to 25,000 mg/L during the pilot study.

The following sections discuss the pilot study results, including operational parameters and effluent water quality for each operating condition.

Membrane Biological Reactor

Operating Parameters

MBR operational parameters are discussed in this section. As previously mentioned, the P4 full-scale physical/chemical treatment effluent was blended with service water from Lake Michigan at a 1:1 ratio in the pilot's equalization tank. This blended stream served as influent to the pilot system and was pumped to the MBR anoxic zone #1.

After the initial seeding with biomass from the local municipal wastewater treatment plant, the mixed liquor was recirculated through the MBR for two days with 300 gallons of blended pilot feed water. The system was placed in forward flow through the MBR after these two days and acclimation continued for four weeks. Table 4-2 compares the MBR operational parameters at the four test conditions. The flow rate to the MBR averaged approximately 1 GPM during Conditions 1 and 2 and 1.5 to 1.6 GPM in Conditions 3 and 4. This resulted in combined HRT in the bioreactor zones decreasing from approximately 35 hours during Conditions 1 and 2 to approximately 23 hours during Conditions 3 and 4. The increase in flow rate and subsequent reduction in HRT was part of the initial pilot test plan. Operating at the lower flow rate initially was intended to allow for adequate acclimation of the biomass and the plan was to increase the flow rate after acclimation in order to simulate full-scale conditions.

Table 4-2
MBR Operational Parameters

Condition Description	Startup and Acclimation	Initial Operation	Increased Flow/ Reduced HRT	Process Adjustments
Condition Number	**1**	**2**	**3**	**4**
Parameter/Dates	**10/26/15 to 12/16/15**	**12/17/15 to 1/10/16**	**1/11/16 to 2/13/16**	**2/14/16 to 3/3/16**
Influent Flow Rate				
Average	1.05 GPM	1.01 GPM	1.54 GPM	1.6 GPM
Range	1 to 2.6 GPM	1 to 1.25 GPM	1.25 to 1.6 GPM	1.6 GPM
MBR pH Control Set Point	6.8 to 7.2	6.8 to 7.2	6.8 to 7.2	6.8 to 7.2
MBR HRT Anoxic Zone #1	1.6 hours	1.7 hours	1.1 hours	1.0 hour
MBR HRT Anoxic Zone #2	1.6 hours	1.7 hours	1.1 hours	1.0 hour
MBR HRT Aerobic Zone	15.9 hours	16.5 hours	10.8 hours	10.4 hours
MBR HRT Anoxic Zone #3	15.9 hours	16.5 hours	10.8 hours	10.4 hours
ZeeWeed 500 Flux	10 GFD (first 3 weeks) 5.8 GFD	5.8 GFD	5.8 GFD	5.8 GFD
ZeeWeed 500 Backwash Flux	20 GFD	20 GFD	20 GFD	20 GFD
MBR Aeration Rate	12 SCFM	12 SCFM	12 SCFM	12 SCFM

Table 4-2 (continued)
MBR Operational Parameters

Condition Description	Startup and Acclimation	Initial Operation	Increased Flow/ Reduced HRT	Process Adjustments
Condition Number	**1**	**2**	**3**	**4**
Parameter/Dates	**10/26/15 to 12/16/15**	**12/17/15 to 1/10/16**	**1/11/16 to 2/13/16**	**2/14/16 to 3/3/16**
MBR MLSS				
Average	5,760 mg/L	3,950 mg/L	2,690 mg/L	4,183 mg/L
Range	3,400 to 6,500 mg/L	3,700 to 4,200 mg/L	1,000 to 6,500 mg/L	2,900 to 5,800 mg/L
RAS Flow Rate	6 to 8 GPM	6 to 8 GPM	6 to 8 GPM	6 to 8 GPM
Sludge Wasting Rate	none	none	80 GPD	none
MBR DO Anoxic Zone #1				
Average	0.93 mg/L	2.55 mg/L	3.37 mg/L	0.12 mg/L
Range	0.11 to 2.4 mg/L	1.74 to 3.90 mg/L	1.12 to 6.23 mg/L	0.02 to 0.49 mg/L
MBR DO Anoxic Zone #2				
Average	0.23 mg/L	0.29 mg/L	1.34 mg/L	0.02 mg/L
Range	0.01 to 2.06 mg/L	0 to 2.49 mg/L	0 to 5.53 mg/L	0 to 0.2 mg/L
MBR DO Aerobic Zone				
Average	3.20 mg/L	3.19 mg/L	4.02 mg/L	2.84 mg/L
Range	0.86 to 5.90 mg/L	1.7 to 4.93 mg/L	0.17 to 9.00 mg/L	0.43 to 5.22 mg/L
MBR DO Anoxic Zone #3				
Average	0.14 mg/L	0.02 mg/L	0.02 mg/L	0.01 mg/L
Range	0 to 0.56 mg/L	0 to 0.05 mg/L	0 to 0.13 mg/L	0 to 0.04 mg/L
MBR ORP Anoxic Zone #3				
Average	-387 mV	-423 mV	-331 mV	-354 mV
Range	-143 to -489 mV	-376 to -477 mV	-58 to -427 mV	-83 to -416 mV
Number of Membranes in Service	1	1	1	1
Chemical Doses				
Hydrochloric Acid (to ZeeWeed Tank)	950 mg/L	950 mg/L	400 mg/L	400 mg/L
Sodium Hydroxide (to Aerobic Zone)	350 mg/L	350 mg/L	350 mg/L	none
COD Added via Acetic Acid to Anoxic Zone #3				
Average Added	897 mg/L	618 mg/L	447 mg/L	643 mg/L
Range	563 to 1,464 mg/L	452 to 807 mg/L	227 to 565 mg/L	630 to 756 mg/L
Ferric Chloride (to Aerobic Zone)	60 mg/L (2 days only)	none	none	none
Phosphoric Acid (to Anoxic Zone #1)	none	5 mg/L	5 mg/L	5 mg/L
Potassium Sulfite (to Equalization Tank)	none	none	25 to 200 mg/L	none

Notes:

GFD = gallons per square feet per day

SCFM = standard cubic feet per minute

GPD = gallons per day

GPM = gallons per minute

mV = millivolt

RAS = return activated sludge (the flow from ZeeWeed tank to MBR Anoxic Zone #1)

On average, the DO was maintained above 2.8 mg/L (2-4 mg/L target) in the aerobic zone and was less than 0.1 mg/L (<0.5 mg/L target) in anoxic zone #3 during Conditions 2, 3, and 4. The ORP in anoxic zone #3 averaged less than -330 mV during all four conditions. These values were within GE's target range.

As noted in Table 3-1, the acetic acid product used to supply nutrients for the biological process was changed during the study. The blended acetic acid product was first used during Condition 1, and contains an organic carbon source (acetic acid), ammonium, and phosphorus (the latter two are nutrients). Due to the higher than anticipated phosphorus concentration (20 times higher) in the blended acetic acid, the carbon source was switched to an 80 percent solution of unblended acetic acid (the balance 20 percent is water) for Conditions 2, 3, and 4 to limit excess phosphorus in the final effluent. The excess phosphorous led to precipitation of excess solids which, if left untreated, could cause prolific scaling in the process equipment. To prevent scaling with the blended nutrient product, ferric chloride was added to the aerobic zone for two days until the nutrient product was changed. Afterward the acetic acid source was changed, ferric chloride dosing was stopped. Phosphoric acid was fed after the acetic acid product was changed to achieve less than 3 mg/L in the MBR permeate. The reduction in COD added by the nutrient from Conditions 1 to 2 to 3 (noted in Table 4-2) coincides with the project team's attempts to increase nitrate/nitrite concentration in the MBR permeate in attempt to improve ABMet selenium reduction. Additional discussion is provided in the ABMet section.

The ZeeWeed membrane flux was initially set to 10 GFD with an operating cycle time[5] of 10 minutes and resting mode duration of 30 seconds. During the first three weeks of operation in the acclimation period, the ZeeWeed TMP averaged less than 1 PSI. It was also during this time that the acetic acid feed point was inadvertently placed at the aerobic zone instead of the anoxic zone #3. Once the feed point was moved, an increase in TMP was observed and the membrane flux set point was reduced to 5.8 GFD. A second spike in TMP occurred gradually from December 12 through 24, 2015. Once the TMP reached 8 PSI, the system was placed in automatic standby and from December 24 through 28, the MBR and ABMet systems were offline due to the high MBR TMP. A recovery clean was completed on December 27 and 28; the recovery clean included soaking the membranes in a 1,000 mg/L solution of sodium hypochlorite, followed by soaking in a 2,000 mg/L solution of citric acid. The system was placed back into operation on December 28 and the maintenance cleaning schedule was adjusted for a citric acid cleaning every other day.

The MBR process accumulates solids that come from biomass production and naturally by precipitation of various chemical species in the wastewater. The MBR solids, referred to as mixed liquor suspended solids (MLSS), were purged from the system beginning in early January 2016 at 80 GPD. The MLSS purge rate was set to 20 gallons every 6 hours to avoid reducing flow to the ABMet. Discharge of MLSS ended in mid-February due to low MLSS concentrations and decreased selenium reduction performance (additional details are provided in the next section).

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[5] Cycle time refers to the changing of the membrane operating mode from filtration to resting. In filtration mode, a vacuum is maintained to pull water through the membrane and produce treated effluent. In resting mode, no vacuum is applied to the membranes and the air scour is maintained to help remove solids. [1]

Treated Water Characteristics

This section discusses the characteristics of the MBR pilot treated effluent (permeate). The MBR process was operated to remove ammonia, nitrates, and selenium while being monitored for potential impacts from chemical scaling and high TDS. Membrane performance and optimization of the HRT and SRT were monitored throughout the study.

Table 4-3 summarizes the treated effluent water quality based on samples collected during each operating condition. Figures 4-1, 4-2, 4-3, 4-4, and 4-5 present MBR influent and effluent COD and phosphorus; ammonia and total Kjeldahl nitrogen (TKN); nitrate/nitrite nitrogen; selenium; and mercury, respectively.

As seen in Table 4-3, the MBR effluent phosphorus concentration was higher during Condition 1; however, as Figure 4-1 shows, the influent phosphorus concentration was consistent for the pilot study. The increased MBR effluent phosphorus concentration during Condition 1 was due to the higher-than-planned-for phosphorus content of the nutrient balanced acetic acid blend being added. Once the acetic acid was switched to the 80 percent solution in the first week of December 2015 (near the beginning of Condition 2), the MBR effluent phosphorus concentration decreased.

Table 4-3
MBR Treated Effluent (Permeate) Water Quality[1]

Parameter	Units	Condition 1			Condition 2			Condition 3			Condition 4		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
Total Selenium	µg/L	120	350	200	110	260	173	170	590	337	170	460	231
Dissolved Selenium	µg/L	120	340	190	120	260	167	170	600	330	160	460	233
NO_2/NO_3-N	mg/L	0.19	160	35	0.12	0.24	0.15	0.13	21	4.0	0.09	0.18	0.13
Total Mercury	ng/L	1.44	3.94	2.46	1.60	3.68	2.58	1.01	5.67	2.67	1.93	1.94	1.94
Dissolved Mercury	ng/L	1.10	3.33	2.02	0.23	3.06	1.96	0.64	2.97	1.92	0.66	0.90	0.78
Total Arsenic	µg/L	3.7	5.1	4.7	4	5	4	--	--	--	--	--	--
Dissolved Arsenic	µg/L	3.6	5.0	4.5	4	5	4	--	--	--	--	--	--
Total Calcium	mg/L	440	520	476	420	530	456	440	490	454	460	470	465
Dissolved Calcium	mg/L	450	510	476	420	540	460	430	480	457	460	470	465
Total Magnesium	mg/L	1,900	2,500	2,107	1,700	2,100	1,840	--	--	--	--	--	--
Dissolved Magnesium	mg/L	2,000	2,500	2,138	1,700	2,100	1,840	--	--	--	--	--	--
Total Sodium	mg/L	--	--	--	420	420	420	410	500	476	500	500	500
Ammonia	mg/L	0.31	13.0	3.75	4	14	9	0.23	12.0	5.09	1.3	110	37
Conductivity	µS/cm	13,000	16,000	13,923	11,000	14,000	12,429	11,000	13,000	12,500	12,000	13,000	12,200
COD	mg/L	260	640	501	370	570	513	370	550	433	370	570	455

Table 4-3 (continued)
MBR Treated Effluent (Permeate) Water Quality[1]

Parameter	Units	Condition 1			Condition 2			Condition 3			Condition 4		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
BOD	mg/L	--	--	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TOC	mg/L	--	--	--	14	14	14	6	69	37	2.5	3.8	3.0
Fluoride	mg/L	21	25	23	22	27	24	22	25	24	25	27	26
Sulfate	mg/L	--	--	--	6,700	6,900	6,800	6,000	9,100	7,100	6,300	7,900	6,917
Ortho-Phosphate	mg/L	13	36	19	1.2	1.2	1.2	--	--	--	--	--	--
Total Phosphorus	mg/L	2	25	14	1.2	6.5	3.9	0.86	4.30	2.64	0.03	3.00	2.06
TKN	mg/L	32	94	67	73	100	81	59	78	69	53	96	71
Sulfide	mg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
TSS	mg/L	--	--	--	4	4	4	2	6	4	3	6	5
TDS	mg/L	14,000	20,000	17,286	12,000	16,000	14,714	13,000	16,000	14,600	14,000	16,000	14,600
Total Alkalinity	mg/L	200	200	200	100	110	105	40	180	116	220	270	240
Bicarbonate Alkalinity	mg/L	200	200	200	100	110	105	40	180	116	220	270	240
Carbonate Alkalinity	mg/L	--	--	--	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9

Notes:
[1] Average soluble concentrations were higher than total for some results due to analytical imprecision.
µS/cm = microSiemen per centimeter
Avg. = average
Max = maximum
Min = minimum
-- = no data

Figure 4-1 also shows that the MBR influent and effluent COD concentrations were similar. Given this, and the readily biodegradable nature of acetic acid, the data suggest that the influent COD was non-biodegradable. Also, from Table 4-3, it is evident that all the COD added through acetic acid was consumed in the MBR since the MBR effluent BOD and TOC concentrations were very low (higher BOD and TOC would indicate potential for additional biological activity in the oxidation of organic matter and the amount of carbon in organic material, respectively). This also raises the question whether all the COD in the influent reported is contributed by analytical interference or some other oxygen-demanding constituents, as opposed to organic carbon. It could also suggest that the organic compounds present were not fully oxidized in TOC tests (thus TOC readings would be lower than actual concentrations). The theory on analytical interference is drawn from low TOC concentrations reported during period of higher COD concentration measurements.

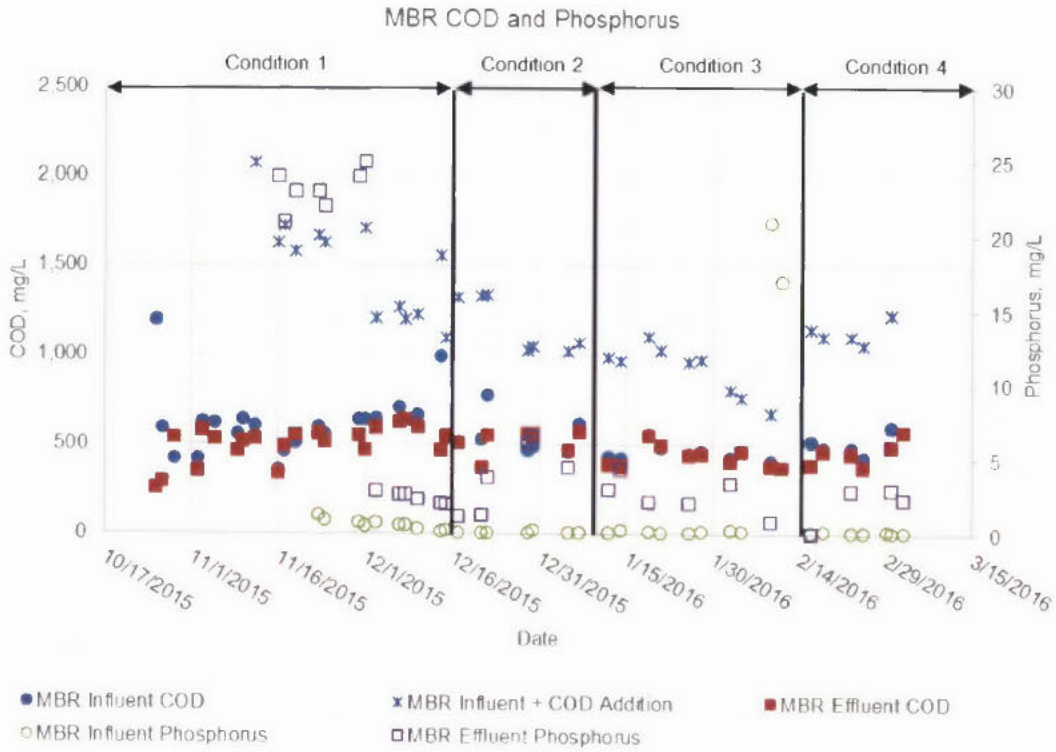

Figure 4-1
MBR influent and effluent COD and phosphorus

The data in Figure 4-2 show complete nitrification during October and November 2015. During this time, the influent ammonia concentration was high (ranging from 50 to 130 mg/L). Towards the end of Condition 1 and into Conditions 2 and 3, the influent ammonia concentration decreased to 10 to 20 mg/L, and nitrification appeared to stall (as seen by an increase in MBR effluent ammonia concentration).

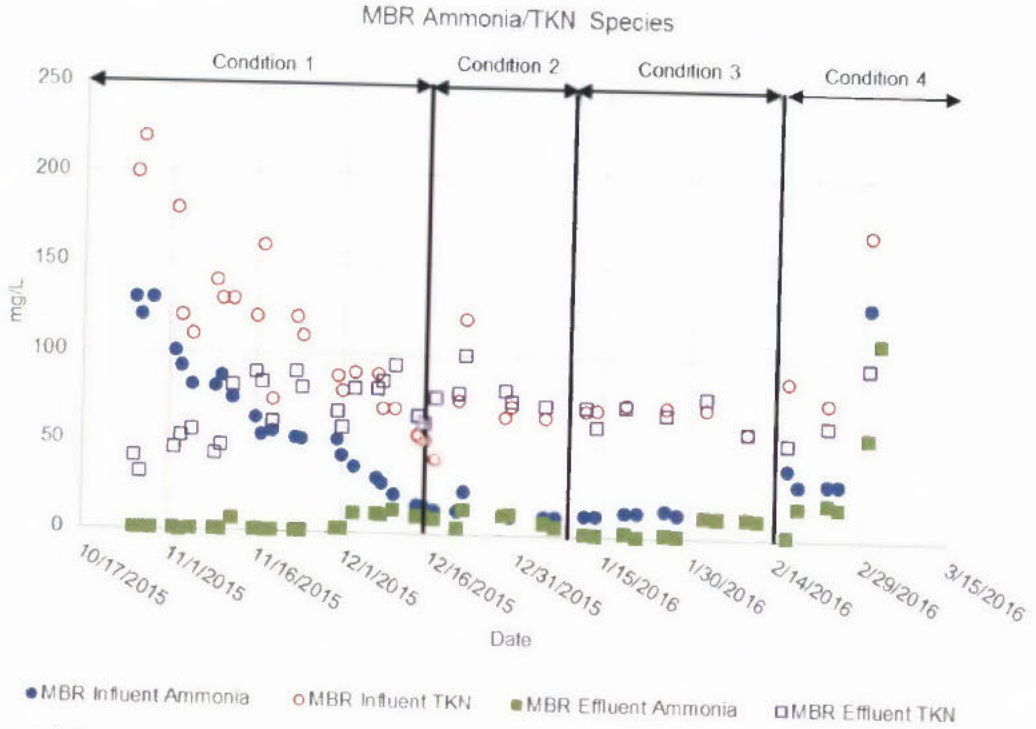

Figure 4-2
MBR influent and effluent ammonia and TKN

Also during this time, it was noticed that the pilot feed water alkalinity was lower than at the beginning of the demonstration and higher ammonia concentrations were coming from the P4 boiler units and creating higher pH values.

The generation of MLSS in the MBR varied throughout the pilot study. Wasting solids (MLSS) from the MBR was initiated during the middle of Condition 2 on December 28, 2015, at a rate of 80 GPD and was stopped in the middle of Condition 3 on January 30, 2016. This resulted in decreased MLSS concentrations during Conditions 2 and 3 from approximately 6,000 mg/L down to approximately 3,000 mg/L and an increase in MLSS concentration during Condition 4 to approximately 4,200 mg/L. These changes were not the cause of the loss of nitrification as the loss of complete nitrification occurred on November 30, 2015, one month prior to initiating the solids wasting. These changes do not appear to have impacted denitrification as full reduction of nitrate-nitrogen to nitrogen gas occurred throughout the pilot study. During Condition 4, the influent ammonia concentration started to increase with a corresponding increase in MBR effluent ammonia concentration, further indicating that nitrification had been lost. The reason(s) for losing the nitrification in the MBR could not be identified, but suspected to be caused by toxic or inhibitory compounds in the water.

In order to understand if toxicity/inhibitory compounds were contributing to the loss in nitrification, potassium sulfite was dosed to the Equalization Tank starting January 5, 2016, at a rate of 50 mg/L (to achieve 25 mg/L after dilution with service water). Higher dosages were added throughout Condition 3. The potassium sulfite was added to reduce potential oxidants that may have been contributing to the loss in nitrification performance. There were also concerns that the reduction in nitrification performance indicated the presence of inhibitory or toxic compounds that could have potentially also affected the ABMet bacteria and selenium reduction performance.

Nitrification performance did not noticeably improve when dosing potassium sulfite and dosing was discontinued on January 27. In an attempt to rule out the effectiveness of potassium sulfite versus the presence/impact of inhibitory compounds, 20 kg of powdered activated carbon (PAC) was added to MBR on February 6, 2016. The PAC should have absorbed inhibitory compounds present in the water; however, MBR nitrification performance did not improve with PAC addition.

Another observation from Figure 4-2 is that the blended influent contained recalcitrant TKN concentrations averaging 65 to 81 mg/L during all four conditions. TKN is comprised of ammonia and organic-nitrogen and the high concentrations in the MBR effluent suggest that a significant portion of the organic nitrogen fraction of the influent TKN was in a non-biodegradable form.

Nitrate/Nitrite

One of the main goals of the pretreatment MBR was to remove (denitrify) the nitrate/nitrite-nitrogen present in the influent and produced via nitrification in the aerobic zone. The average effluent nitrate/nitrite-nitrogen concentration during Condition 1 was 35 mg/L, indicating incomplete denitrification. This was due to the acetic acid dosing point inadvertently being installed in the aerobic zone of the MBR, which resulted in poor denitrification caused by anoxic zone #3 being carbon limited. After three weeks of poor denitrification, this situation was discovered and the acetic acid dosing point was relocated to the planned location (i.e., anoxic zone #3) on November 11, 2015.

As can be seen in Figure 4-3, once the acetic acid dosing point was relocated, complete denitrification occurred. Complete denitrification continued in the MBR throughout the remainder of the pilot study (other than a 2-week period towards the end of Condition 3, when the acetic acid dose was reduced intentionally to allow nitrate-nitrogen to pass through the pretreatment MBR to the ABMet system). Although nitrification was lost during Conditions 3 through 4, nitrate-nitrogen removal (denitrification) was never a problem in the MBR. For some unknown reason, more sensitive nitrifying bacteria were inhibited but the heterotrophic denitrifying bacteria were not inhibited.

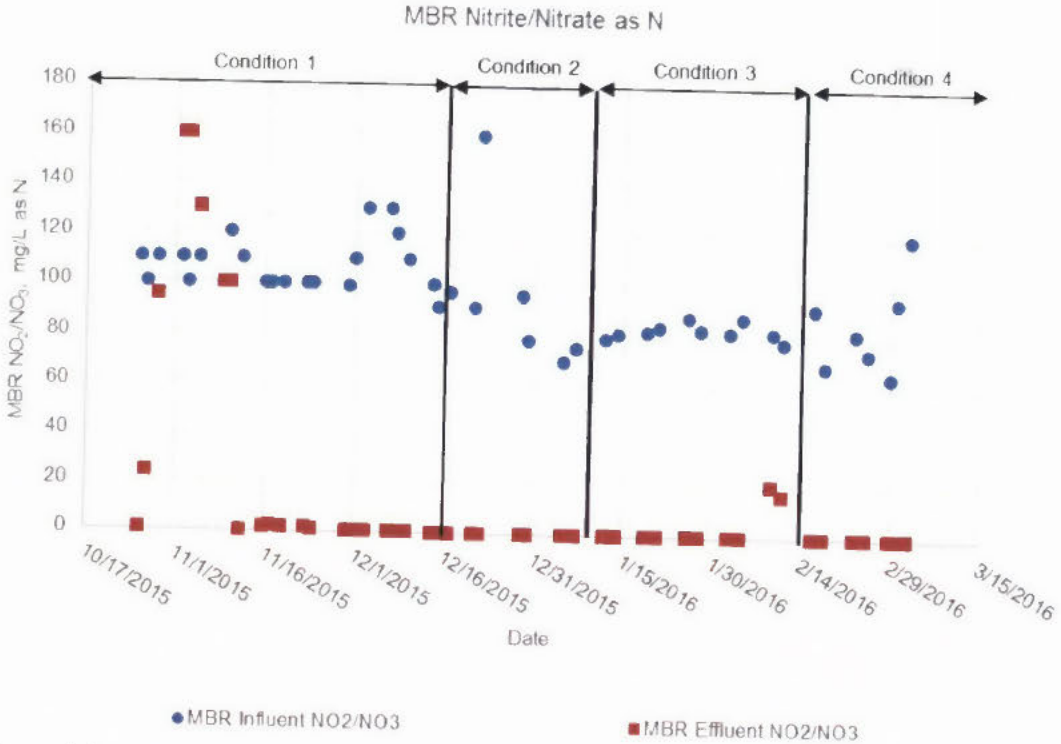

Figure 4-3
MBR influent and effluent nitrate/nitrite as nitrogen

Selenium

As seen in Figure 4-4, significant selenium reduction occurred in the pretreatment MBR. The overall average influent total selenium concentration was 1,175 µg/L, and the overall average effluent total selenium concentration was 250 µg/L. On average throughout all conditions, approximately 75 percent reduction in selenium concentration was observed. This is attributed to maintaining a very low ORP (approximately -350 mV) in the anoxic zone #3 with high acetic acid dosage. This ORP is comparable to that maintained in the ABMet reactors. Another observation from Figure 4-4 is that almost all of the influent selenium was soluble, which indicates that removal across the pretreatment MBR was by biological reduction to elemental selenium (which exists in particulate form) followed by filtration via the ultrafiltration membrane.

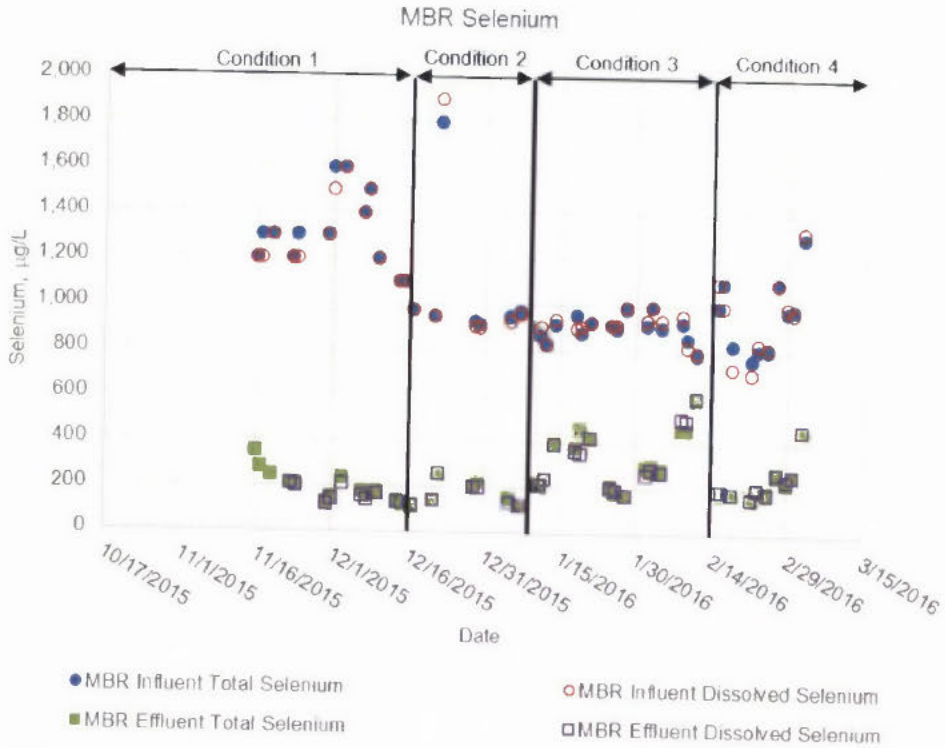

Figure 4-4
MBR influent and effluent selenium

On January 11, 2016, the MBR flow rate was increased from 1 GPM to 1.6 GPM. Prior to making this change, the MBR effluent was sampled and the selenium result was higher than previous results (220 µg/L vs. 120 µg/L from January 7). Acetic acid (nutrient) feed was increased proportionally with the feed rate and no changes in ORP were observed; there were no immediate indications as to why the effluent selenium concentrations began to increase.

Higher selenium concentration results continued until midway through Condition 3, when they decreased but again increased until the start of Condition 4. The increase in effluent selenium at the beginning of Condition 3 is not likely to be caused solely by the increased flow rate since the change occurred after the initial sample was taken that provided the indication. Selenium concentration results from the ABMet 1 and 2 reactor effluents were also higher that day (with no changes observed in either ORP or pH); again, emphasizing the increased flow rate was not the sole contributor.

Mercury

As seen in Figure 4-5, significant mercury reduction also occurred in the pretreatment MBR. The average influent total mercury concentration to the pretreatment MBR was approximately 72 ng/L, and the average effluent was 3 ng/L. The pretreatment MBR stage achieved approximately 96 percent reduction of mercury throughout the pilot study. This is likely due to mercury entering the MBR in mostly particulate form (see Table 4-1), the particulate mercury being removed by the ultrafiltration membrane, and potentially due to some of the soluble mercury precipitating to a particulate with sulfide generated under low ORP in the anoxic zone #3.

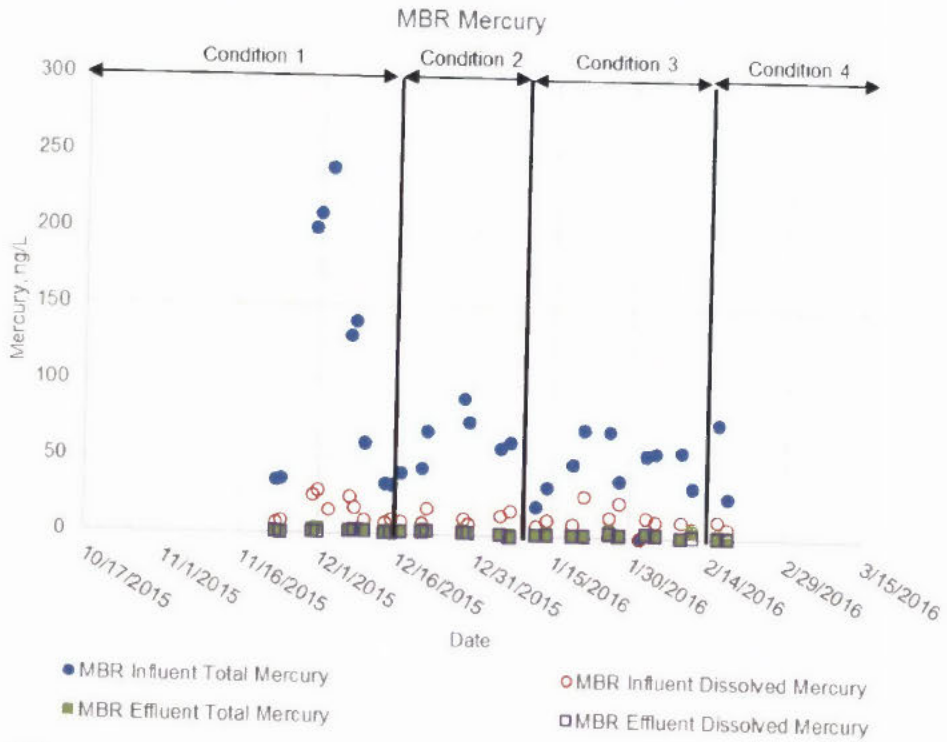

Figure 4-5
MBR influent and effluent mercury

Arsenic

Several weeks' worth of arsenic data were collected, which indicated no removal of arsenic in the pretreatment MBR. Average influent and effluent concentrations were both approximately 4.6 µg/L. This is indicative of the arsenic entering the MBR in mostly dissolved form, and not precipitating to a particulate form in the MBR (see Table 4-1).

ABMet

Operating Parameters

ABMet operational parameters are discussed in this section. The MBR effluent (permeate) was collected in the ABMet feed tank. From the feed tank, the water was pumped to the ABMet Stage 1. Table 4-4 compares the ABMet operational parameters at the four test conditions.

Table 4-4
ABMet Operational Parameters

Condition Description	Startup and Acclimation	Initial Operation	Increased Flow/ Reduced HRT	Process Adjustments
Condition Number	**1**	**2**	**3**	**4**
Parameter/Dates	**10/26/15 to 12/16/15**	**12/17/15 to 1/10/16**	**1/11/16 to 2/13/16**	**2/14/16 to 3/3/16**
ABMet Stage 1 Flow Average	0.5 GPM	0.6 GPM	0.9 GPM	0.9 GPM
ABMet Stage 1 EBCT	11.2 hours	9.4 hours	6.2 hours	6.2 hours
ABMet Stage 2 Flow Average	0.5 GPM	0.6 GPM	0.9 GPM	0.9 GPM
ABMet Stage 2 EBCT	11.2 hours	9.4 hours	6.2 hours	6.2 hours
ABMet Influent ORP				
Average	183 mV	91 mV	94 mV	368 mV
Range	110 to 263 mV	52 to 151 mV	34 to 224 mV	261 to 454 mV
ABMet Effluent ORP[1]				
Average	-125 mV	-184 mV	-365 mV	-350 mV
Range	-500 to 106 mV	-364 to 295 mV	-419 to -310 mV	-412 to -318 mV
Backwash Flow Rate	80 GPM	80 GPM	80 GPM	80 GPM
Degas Flow Rates	100 GPM	100 GPM	100 GPM	100 GPM
Feed Tank HRT	4 hours	4 hours	4 hours	4 hours
Chemical Doses				
Antiscalant, MDC776 (MBR Permeate to ABMet Feed Tank)	none	5 mg/L	5 mg/L	5 mg/L

[1] ORP data varied significantly, including positive values, potentially due to analytical error with the inline probes.
EBCT = empty bed contact time, calculated as total boundary volume occupied by the GAC media divided by the flow rate passing through the vessel

The average flow rate to the ABMet system during Condition 1 was 0.5 GPM, which corresponds to a total empty bed contact time (EBCT) of approximately 22.4 hours (11.2 hours for each stage). During Condition 2, the average flow rate increased to 0.6 GPM (due to mechanical issues, not intentionally increased), which corresponds to a total EBCT of approximately 18.8 hours. During Conditions 3 and 4, an intentional increase in flow rate to 0.9 GPM occurred. This corresponds to an average total EBCT of 12.4 hours. The project originally intended to increase flow rates to achieve EBCT closer to GE's target design of approximately 4 hours per reactor (8 hours total).

The average ORP in the ABMet effluent during each condition ranged from -125 to -365 mV, with the lowest average values of -365 and -350 mV occurring during Conditions 3 and 4, respectively. These correspond to increased acetic acid dosing during Conditions 3 and 4 and were within GE's target range of -250 to -400mV. The average ORP values during Conditions 1 and 2 may be artificially elevated due to several reported positive values that may have resulted from analytical error and/or issues with the inline measurement probes. A plot of inline ORP data from the MBR permeate (ABMet feed), ABMet stage 1 effluent, and ABMet stage 2 effluent are presented in Figure 4-6. Spikes in ORP from the ABMet locations are primarily associated with backwash and degas events. The ABMet system was taken offline from December 24 through 28 due to high TMP in the MBR system which required a cleaning. Both stages returned to <0 mV approximately one day after startup.

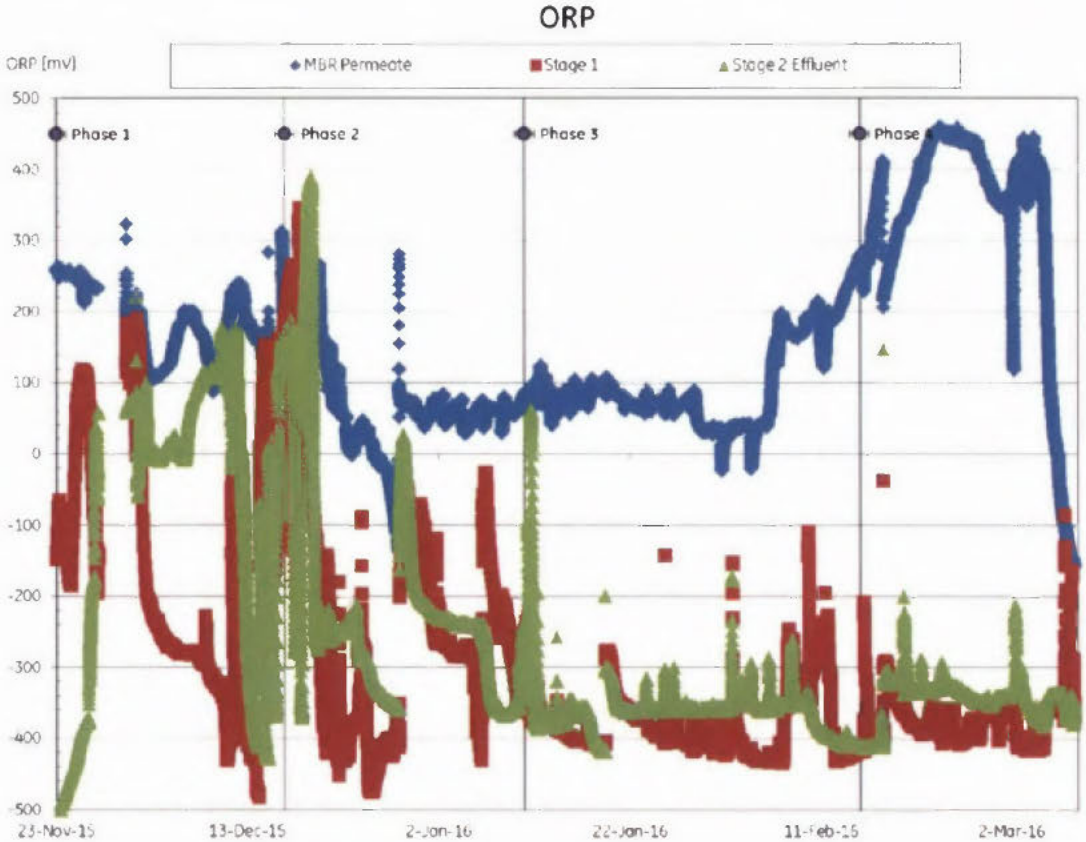

Figure 4-6
ABMet inline ORP trends
Courtesy of GE Water & Process Technologies

Four different nutrients were trialed for the ABMet pilot system. The initial nutrient was a blend of acetic acid, ammonium, and phosphorus (the same blend used initially for the MBR pilot). Due to formation of excess solids on the top of each ABMet reactor, a second nutrient containing 80% acetic acid (20% water) replaced the blended product. Three inches of carbon-containing excess solids were removed from each reactor. The third was a diluted blend of the first blended

product, made up of 50% pure acetic acid and 50% blended product. During the final phase of operation, molasses was added to the nutrient mix of pure acetic acid and blended product. A summary of the nutrient dosages and resulting COD concentration ranges are provided in Table 4-5.

Table 4-5
ABMet Nutrient Dosages

Condition Description	Startup and Acclimation	Initial Operation	Increased Flow/ Reduced HRT	Process Adjustments
Condition Number	**1**	**2**	**3**	**4**
Parameter/Dates	**10/26/15 to 12/16/15**	**12/17/15 to 1/10/16**	**1/11/16 to 2/13/16**	**2/14/16 to 3/3/16**
Nutrient	Blended acetic acid product containing acetic acid, ammonium, and phosphorus		50/50 mix of pure acetic acid (80%) and blended product	Molasses and 50/50 mix of pure acetic acid and blended product
Acetic Acid (COD) - ABMet Stage 1				
Average	28 mg/L	100 mg/L	76 mg/L	112 mg/L
Range	28 mg/L	87 to 175 mg/L	69 to 90 mg/L	90 to 134 mg/L
Acetic Acid (COD) - ABMet Stage 2				
Average	none	28 mg/L	37 mg/L	36 mg/L
Range	none	28 mg/L	28 to 70 mg/L	34 to 40 mg/L

The ABMet reactor head loss trends in Figure 4-7 provide indications of backwash and degas frequencies throughout the demonstration. Head loss is the water level above the media where a higher head loss is associated with an increased hydraulic resistance through the carbon media (and is indication of increased water level). For ABMet systems, increased head loss can indicate a need to backwash and/or degas the filters due to increased biomass and other solids or gases, respectively. Starting the week of January 11, 2016, degassing frequency was based on a schedule of once every Tuesday and Thursday (after water samples were taken). The length of each degassing event was originally set to 30 seconds, but was changed in mid-February to 90 seconds. According to GE, 90 seconds is more representative of full-scale systems.

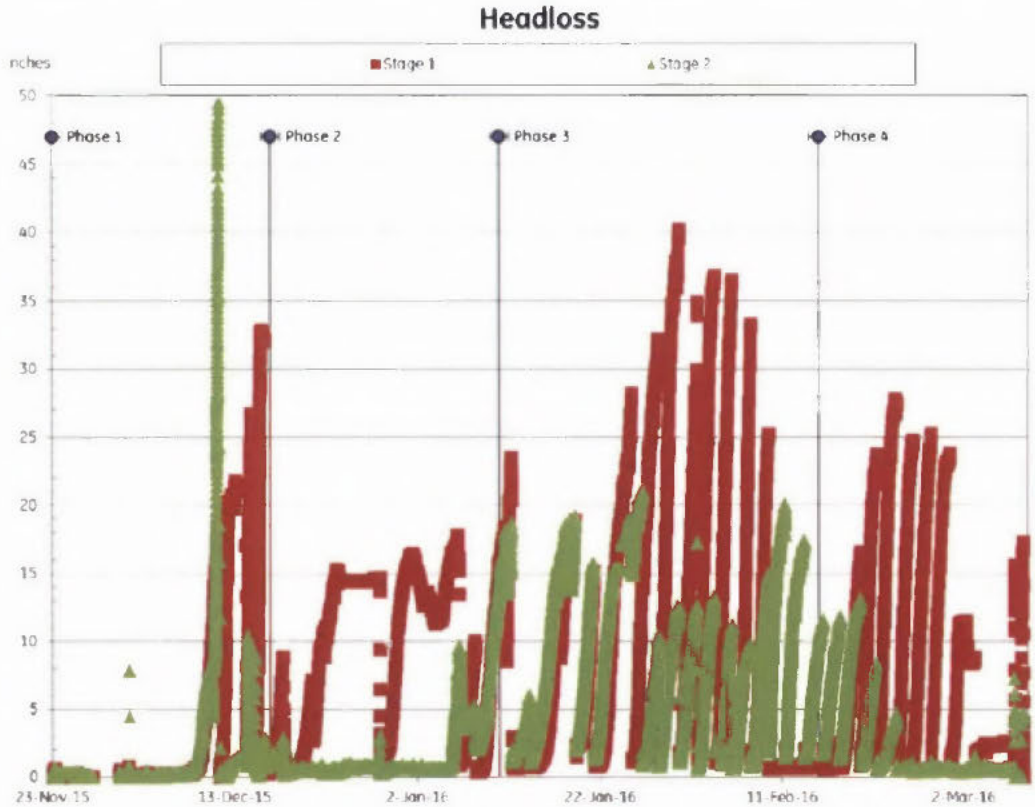

Figure 4-7
ABMet headloss trends
Courtesy of GE Water & Process Technologies

One backwash was completed for each ABMet stage during the demonstration. Stage 1 backwash occurred on January 25 and stage 2 occurred on January 26. Analytical results from samples taken at the Backwash Waste Tank after two backwash events are provided in Table 4-6. Note the selenium values are reported in mg/L as opposed to µg/L.

Table 4-6
ABMet Backwash Analysis

Sample Location and Date	Total selenium (mg/L)	Dissolved selenium (mg/L)	NO_2/NO_3 (mg-N/L)	Total Suspended Solids (mg/L)
ABMet Stage 1 1/25/2016	78	57	0.060	8.0[1]
ABMet Stage 2 1/26/2016	53	51	<0.045	7.5[1]

[1]According to GE, solids in backwash were lower than expected, which may be due to sampling error.

Treated Water Characteristics

This section discusses the characteristics of the ABMet pilot effluent. Table 4-7 summarizes the effluent water quality based on samples collected during each operating condition. Figures 4-8, 4-9, 4-10, 4-11, 4-12, and 4-13 present ABMet influent and effluent COD and phosphorus; ammonia and TKN; nitrate/nitrite nitrogen; selenium; mercury; and arsenic, respectively.

Table 4-7
ABMet Stage 2 Effluent Water Quality[1]

Parameter	Units	Condition 1			Condition 2			Condition 3			Condition 4		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
Total Selenium	µg/L	7	110	36	3	6	5	15	62	36	14	39	21
Dissolved Selenium	µg/L	5	76	27	3	7	5	15	56	37	11	26	17
Se(IV)[2]	µg/L	--	--	--	--	--	--	0.29	51.8	13	0.8	4.6	3.8
Se(VI)[2]	µg/L	--	--	--	--	--	--	<0.25	11.5	5.7	<0.25	<0.25	<0.25
MeSe[2]	µg/L	--	--	--	--	--	--	<0.25	1.3	0.9	<0.25	<0.25	<0.25
SeCN[2]	µg/L	--	--	--	--	--	--	0.52	69.7[3]	18	2.1	10.8	7.2
NO_2/NO_3-N	mg/L	<0.045	0.14	0.06	<0.045	0.13	0.081	<0.045	0.060	0.036	<0.045	0.081	0.046
Total Mercury	ng/L	0.50	4.57	1.45	0.41	2.25	1.21	0.37	1.20	0.84	0.53	1.16	0.85
Dissolved Mercury	ng/L	<0.31	3.16	0.73	0.23	0.59	0.42	0.45	1.20	0.76	0.68	0.90	0.79
Total Arsenic	µg/L	1.1	4.0	2.0	<0.36	1.8	0.9	<0.36	0.76	0.54	0.82	0.82	0.82
Dissolved Arsenic	µg/L	1.2	3.6	2.0	<0.36	2.0	0.9	0.38	0.76	0.61	0.82	0.82	0.82
Total Calcium	mg/L	430	580	477	410	500	451	430	480	452	460	500	480
Dissolved Calcium	mg/L	420	590	477	400	520	460	440	470	455	460	500	480
Total Magnesium	mg/L	1,900	2,400	2,150	1,600	1,900	1,743	1,800	2,100	1,950	1,900	2,100	2,000
Dissolved Magnesium	mg/L	1,900	2,400	2,140	1,600	2,000	1,786	1,800	2,100	1,950	1,900	2,100	2,000
Ammonia	mg/L	11	86	49	5	6	5	0.3	22	6.4	0.47	98	31

Table 4-7 (continued)
ABMet Stage 2 Effluent Water Quality[1]

Parameter	Units	Condition 1			Condition 2			Condition 3			Condition 4		
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.
Conductivity	µS/cm	14,000	16,000	14,500	11,000	14,000	12,250	11,000	13,000	12,500	12,000	14,000	12,400
COD	mg/L	290	1,600	674	150	540	383	260	370	335	340	600	427
BOD	mg/L	--	--	--	54	54	54	4.6	46	22.3	26	74	49
TOC	mg/L	--	--	--	19	19	19	2.0	12	8.3	0.73	0.93	0.86
Chloride	mg/L	--	--	--	2,700	2,700	2,700	2,600	3,300	2,940	2,700	2,900	2,800
Fluoride	mg/L	16	24	21	23	24	24	23	25	24	26	28	26
Sulfate	mg/L	--	--	--	6,500	7,000	6,750	6,300	8,300	6,860	5,600	8,200	6,817
Total Phosphorus	mg/L	0.59	3.5	2.2	2	2	2	1.3	5.4	4.1	0.75	7.90	5.36
TKN	mg/L	53	150	72	48	83	62	45	69	56	45	72	58
Sulfide	mg/L	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	30	18	25	58	36
TSS	mg/L	12	44	28	11	18	13	4.0	8.0	6.1	3.0	21	8.3
TDS	mg/L	15,000	18,000	16,750	4,900	19,000	12,725	13,000	16,000	14,800	14,000	17,000	15,200
Total Alkalinity	mg/L	--	--	--	79	160	120	130	200	167	190	420	300
Bicarbonate Alkalinity	mg/L	--	--	--	79	160	120	130	200	167	190	420	300
Carbonate Alkalinity	mg/L	--	--	--	<3.9	<3.9	<3.0	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9

[1] Average soluble concentrations were higher than total for some results, due to analytical imprecision
[2] Analyzed at Brooks Applied Labs: Se(IV) – selenite; Se(VI) – selenate; MeSe – selenomethionine; SeCN – selenocyanate
[3] SeCN concentration max value during Condition 3 appears to be biased high when compared to total and dissolved selenium maximum concentrations

Figure 4-8 shows that there was little removal of influent COD by the ABMet as the ABMet influent and effluent COD concentrations were similar; this trend was also observed in the pretreatment MBR system. The data again suggest that the influent COD was contributed by analytical interference or some other oxygen-demanding constituent, as opposed to organic carbon. The average ABMet influent and effluent COD concentrations for all conditions together were approximately 482 and 465 mg/L, respectively, during the pilot test.

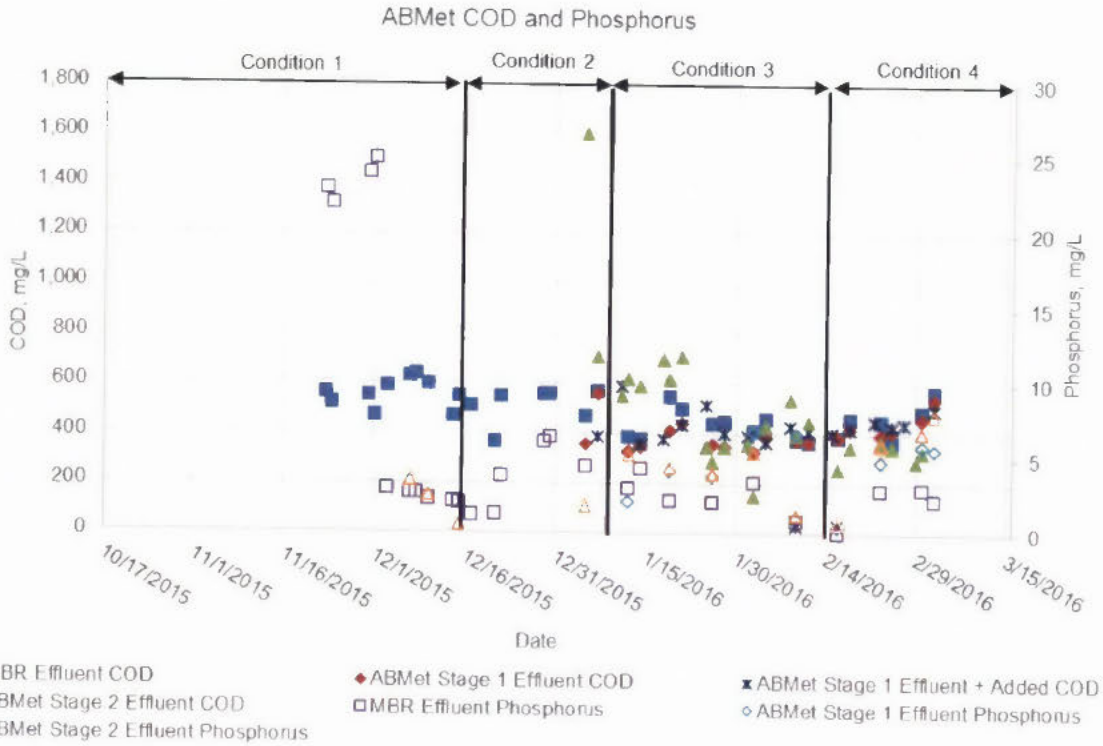

Figure 4-8
ABMet influent and effluent COD and phosphorus

A slight increase in phosphorus concentration in the ABMet can be seen at times in Figure 4-8 (presented on the secondary y-axis). This was due to the fact that the nutrient blended acetic acid (containing phosphorus) was used as a carbon source for the ABMet throughout the pilot study. Optimization of effluent phosphorus concentration was not an objective of this study. The phosphorus concentration could be reduced by separating the carbon source from the phosphorus source.

Nitrate/Nitrite

As seen in Figure 4-9, TKN and ammonia were not significantly impacted in the ABMet. The presence of nitrate/nitrite nitrogen in the ABMet influent only occurred during Condition 1 (when the acetic acid was being added to the wrong zone in the pretreatment MBR) and for a few weeks during Condition 3 (when nitrate/nitrite nitrogen was intentionally being maintained in the MBR effluent to provide the ABMet with electron donors) (Figure 4-10).

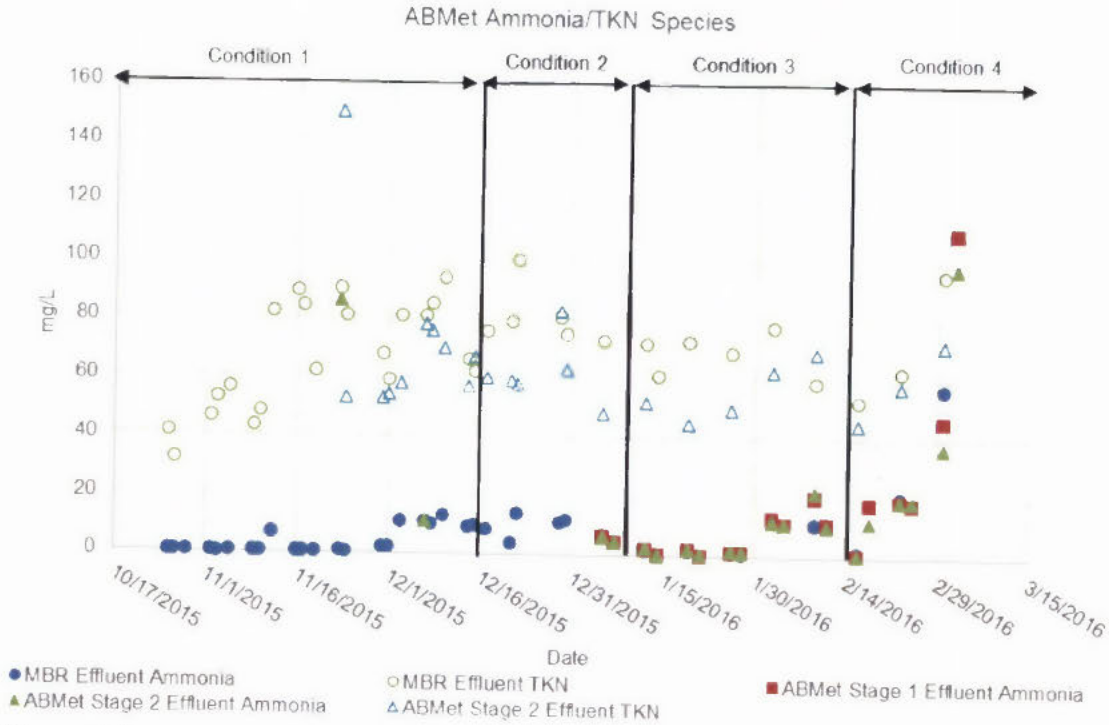

Figure 4-9
ABMet influent and effluent ammonia and TKN

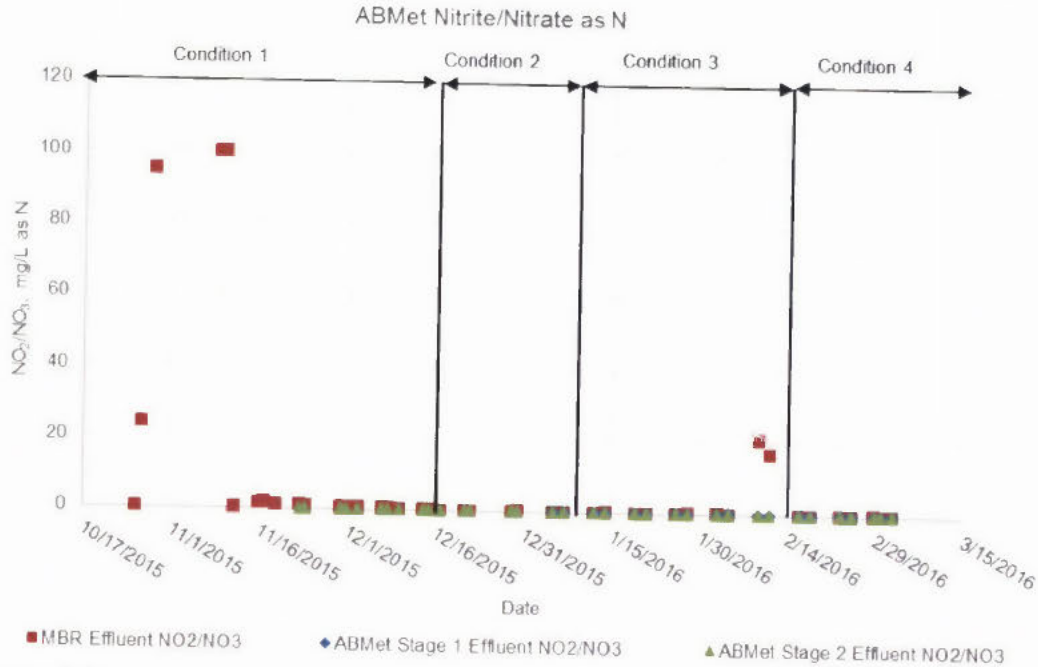

Figure 4-10
ABMet influent and effluent nitrate/nitrite as nitrogen

Selenium

Selenium removal in the ABMet varied throughout the pilot study, as seen in Figure 4-11.

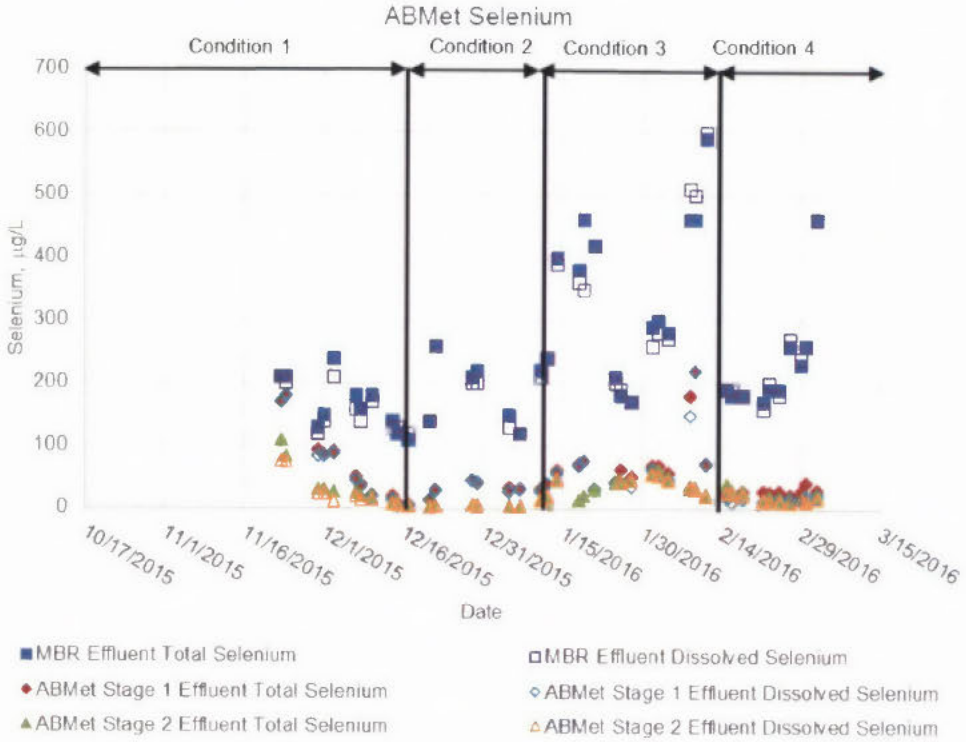

Figure 4-11
ABMet influent and effluent selenium

During Condition 1, improved performance is observed as the system is acclimating and the bacteria are being established. The best performance occurred during Condition 2, when the influent average total selenium concentration to Stage 1 was 173 µg/L and the effluent average total selenium concentration from Stage 2 was 5 µg/L. This is the only condition where the target effluent total selenium goal of 6 µg/L (half of the ELG limit due to 1:1 dilution) was achieved.

Selenium reduction during Condition 3 declined as the average ABMet effluent total selenium concentration increased from 6 to 36 µg/L. From Table 4-7, it can be seen that the predominant selenium species in the ABMet effluent during Condition 3 were selenite and selenocyanate. Unfortunately, selenium speciation data were not available in the MBR effluent. As described in the section on the MBR operating performance, the initial increase in effluent selenium from the ABMet coincided with flow rate increases (HRT and EBCT decreases) in the MBR and ABMet systems. However, the samples with the resulting higher selenium concentrations were taken prior to changing the flow rates that same day. On January 7, total selenium in the final ABMet effluent was 5.0 µg/L while on January 11, the same day flow rates were increased, total selenium was 15 µg/L. Given the strong performance of both systems leading up to this time, there were no indications that increasing the flow rate would have dramatic impacts on performance. Had the selenium result from January 11 been available, the project team may have decided to forgo increasing flow rates until the underlying issue(s) could be addressed.

Complicating the matter even further, results for total selenium from the ABMet effluent (stage two reactor effluent) from January 18, 19, and 21 failed We Energies' lab QA/QC checks. In these samples, the matrix spike recovery values were on the low end of the acceptable range, indicating the presence of analytical interferences. All matrix spike recoveries up to this point had been within the method control limits and the lab did not change anything in the sample preparation or analysis protocol. These were the first sets of results that failed matrix spike QC and We Energies' lab staff performed various tests in attempt to provide accurate analyses. On January 18, the We Energies lab staff who collected the samples noted a strong sulfide odor that had not been present in prior samples. The same odor was present in this sample for the duration of the test. This issue resulted in total selenium values being reported much lower than values later determined to be actual. Total selenium concentration results from these dates were originally reported as 13 µg/L, 11 µg/L, and 8.2 µg/L vs. 15 µg/L, 22 µg/L, and 31 µg/L reported after oxidizing the samples in the sample bottles using hydrogen peroxide. At the time, these lower values falsely indicated the ABMet had recovered from the unconfirmed upset and was tracking back to total selenium concentration of 6 µg/L or less. The project team decided not to alter the current pilot conditions until the accuracy of analytical results improved. By the time the analytical interferences had been overcome, the pilot system had been outside of the performance targets for three weeks. Comparisons of reported vs. verified selenium concentrations are provided in Table 4-8 and additional information on We Energies' evaluations is presented in Appendix B.

Table 4-8
Comparison of ABMet Effluent Selenium Concentrations During Period of Matrix Spike Recovery Failures

Sample Date	Total selenium initially reported (µg/L)	Dissolved selenium initially reported (µg/L)	Total selenium reported after improving matrix spike recovery (µg/L)	Dissolved selenium reported after improving matrix spike recovery (µg/L)
1/18/2016	13	12	15	Not measured
1/19/2016	11	10	22	
1/21/2016	8.2	7.7	31	

The sulfide odor that became present in samples taken after January 18 correspond to higher sulfide concentrations in the ABMet effluent (see Figure 4-12). The presence of sulfide is expected as bacteria naturally reduce sulfate to hydrogen sulfide gas. The decline in selenium reduction performance suggests that sulfate-reducing bacteria were present and may have become too predominant in the 2nd stage reactor.

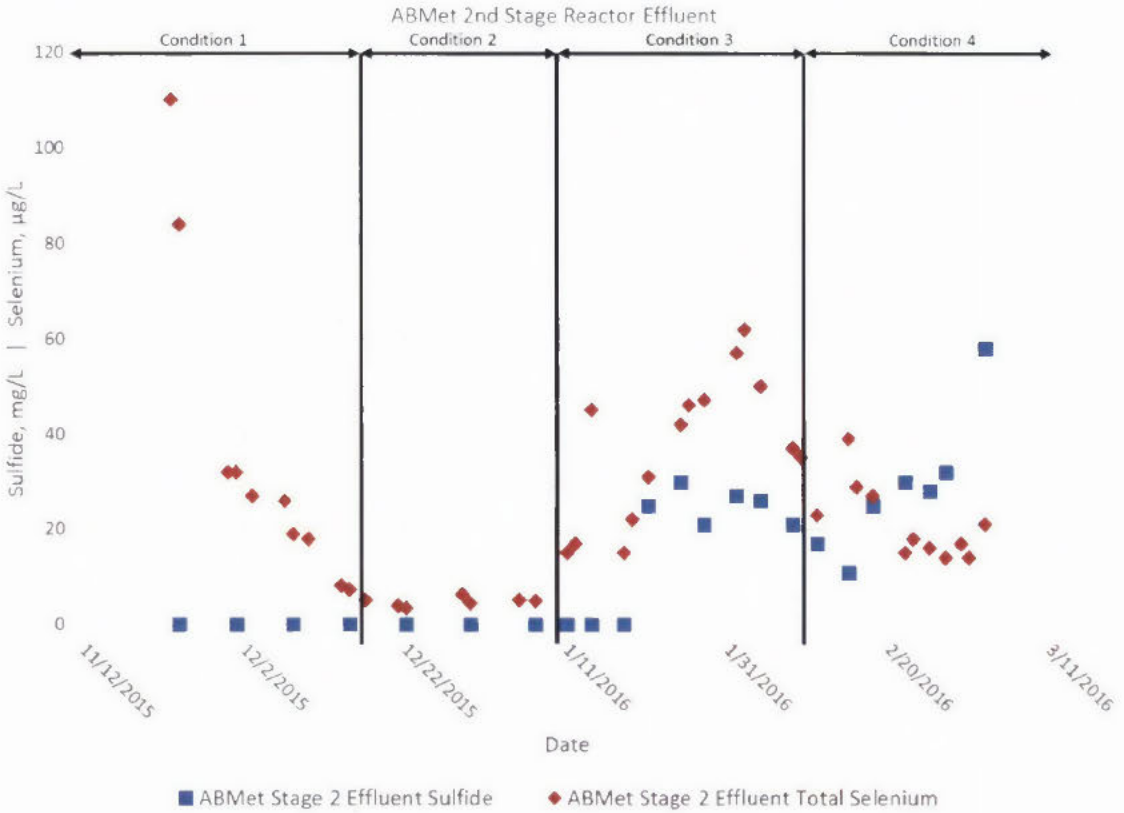

Figure 4-12
ABMet effluent sulfide and selenium

During Condition 3, several activities were done in attempt to improve performance in the ABMet. Reducing the ABMet flow rate was not implemented because the flow rate change was not believed to be a major contributing factor to the loss of selenium reduction performance.

The following actions were taken to improve ABMet performance.

- Potassium sulfite had been added to the Equalization Tank in an attempt to target oxidants potentially impacting the MBR nitrifying bacteria. Reducing oxidants was expected to also improve ABMet bacteria performance.
- 20 kilograms of PAC were added to the MBR in an attempt to adsorb any potential inhibitor compounds. Again, this was already part of the MBR plan in case the potassium sulfite addition not improved nitrification in the MBR.
- Nitrate was allowed to pass through the MBR to the ABMet, by reducing the acetic acid feed to the MBR, to provide more electron acceptors.

While performance did improve slightly in Condition 4 (where the average ABMet effluent total selenium decreased from 36 µg/L to 21 µg/L), the performance observed during Condition 2 and achievement of the effluent total selenium goal of 6 µg/L were not attained during Condition 4. Given the number of variables that may have impacted performance in the ABMet that occurred relatively close together, it is difficult to definitively say why performance decreased, as it may have been any one of, or a combination of, the variables and the trial concluded before complete recovery of performance occurred. Total and dissolved selenium concentration values from the ABMet stage 1 and stage 2 reactors are provided in Figure 4-13.

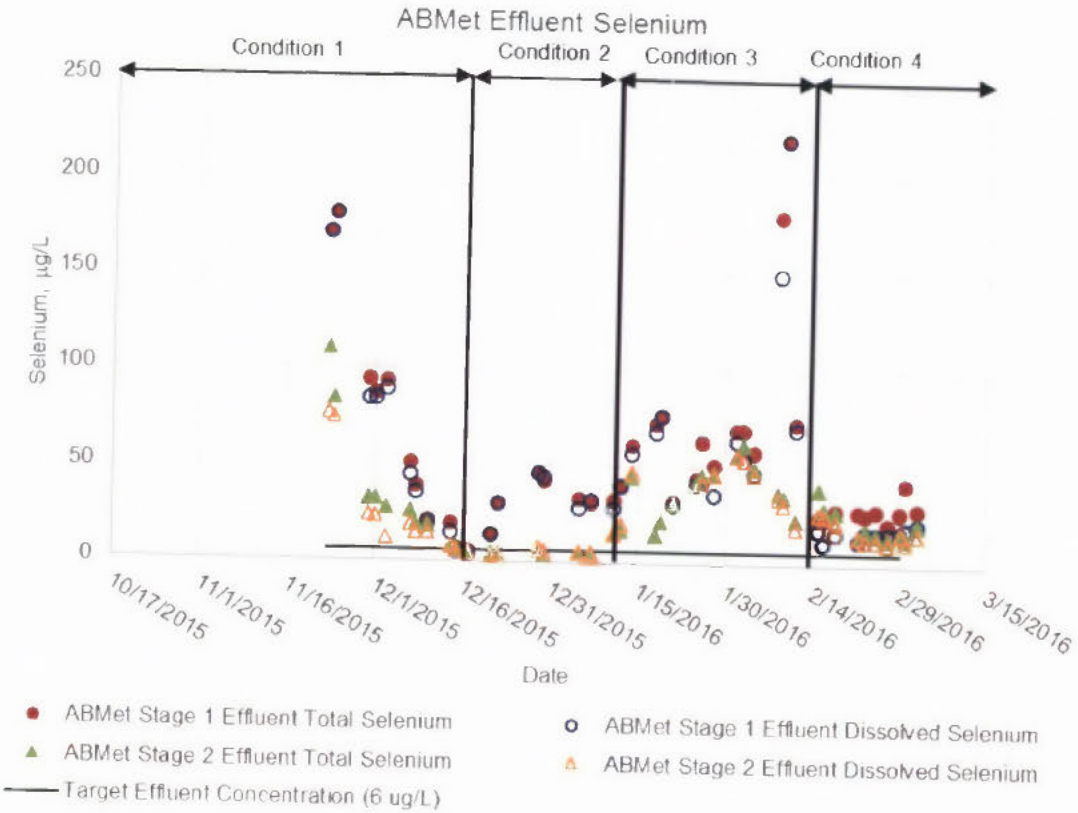

Figure 4-13
ABMet effluent selenium

As noted in discussion of Figure 4-1 (graph of MBR influent and effluent COD and phosphorus), influent and effluent COD concentrations were similar, suggesting that the influent COD was non-biodegradable. Jar tests with Fenton reagent were conducted on site to preliminarily investigate the feasibility of Advanced Oxidation Processes (AOPs) to partially oxidize these non-biodegradable organics in wastewater [2]. However, the jar tests were inconclusive due to high levels of inorganic scavengers, such as nitrate, sulfate, and chloride, and the limited time available. Simple onsite analytical tests were performed for COD, NO_3-N, NH_4-N, and pH on samples that had AOP (Fenton process) reactions as well as control samples. The results of this testing did not show any clear trends, and were likely not very accurate as they were performed using field test methods and were not performed in a controlled lab environment.

Mercury

Further reduction of mercury was observed in the ABMet data and can be seen in Figure 4-14. Mercury was reduced from an average of 2.5 ng/L in the MBR effluent to 1.1 ng/L in the ABMet effluent. These averages are consistent with performance over the entire length of the demonstration. The influent to the pilot system was compliant with the effluent mercury goal of 178 ng/L (half of the monthly ELG limit due to 1:1 dilution).

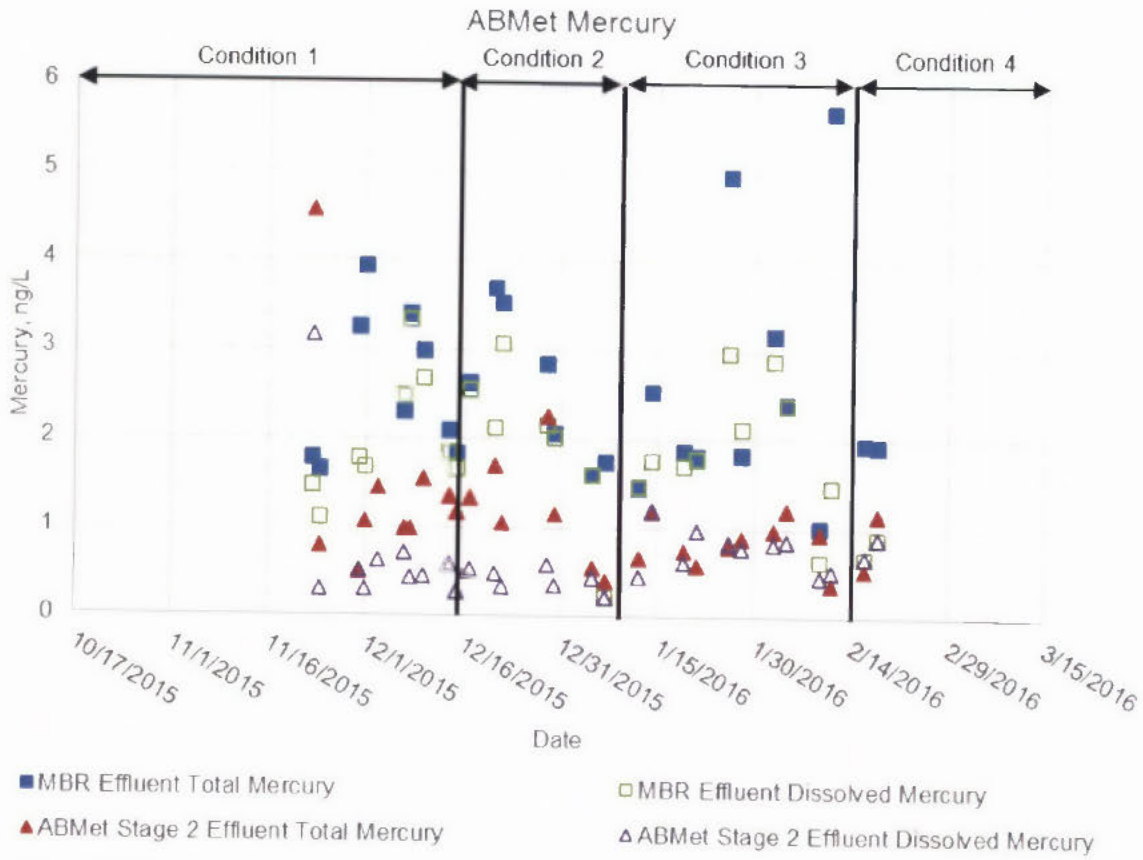

Figure 4-14
ABMet influent and effluent mercury

Arsenic

As described above, arsenic was not removed in the MBR; however, as seen in Figure 4-15, removal of arsenic in the ABMet did occur. The average ABMet influent arsenic concentration was 4.6 µg/L, and the average effluent over the entire demonstration was 1.4 µg/L, which is an average reduction of approximately 70 percent. During Conditions 3 and 4, the average total arsenic in the effluent was 0.67 µg/L (despite the loss of performance in selenium reduction during this time). This is significant given the effluent arsenic goal of 4 µg/L due to the dilution with service water.

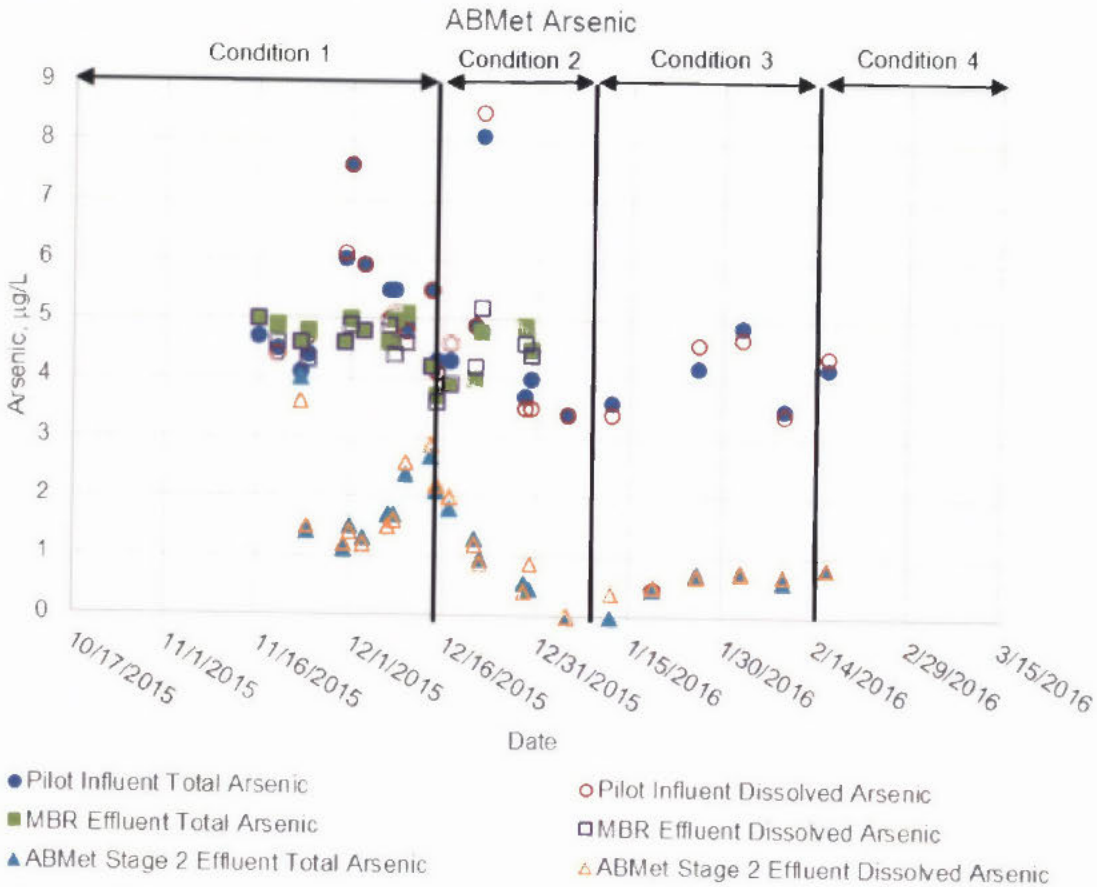

Figure 4-15
ABMet influent and effluent arsenic

5
SUMMARY AND CONCLUSIONS

Pilot Summary

A pilot demonstration of the GE MBR and ABMet processes ran from October 26, 2015 to March 3, 2016 (19 weeks). Results from the demonstration are described under four conditions that summarize performance changes observed. These conditions are summarized below.

- Condition 1 – Startup and Acclimation (October 26, 2015 to December 16, 2015) – period where bacteria are growing and becoming established in the treatment system.
- Condition 2 – Initial Operation (December 17, 2015 to January 10, 2016) – operational period defined by GE's original test plan.
- Condition 3 – Increased Flow/Reduced HRT (January 11, 2016 to February 13, 2016) – operational period intended to more closely simulate full-scale HRT/EBCT conditions.
- Condition 4 – Process Adjustments (February 14, 2016 to March 3, 2016) – period where GE responded to decreased selenium removal performance of the ABMet.

Other than one complete system shutdown from December 24 through December 28 to perform a recovery cleaning on the MBR membranes, the system ran consistently through the duration of the demonstration.

The full-scale FGD wastewater treatment process at P4 has an average operating flow rate of 40 GPM and is typically operated five days per week to allow for equipment cleanings (scale removal from the secondary clarifier plates) on the weekends. The two P4 boilers burn Powder River Basin coal which allows their FGD systems to reach high cycles of concentration and therefore generates wastewater with high TDS and significant scaling potential. The FGD wastewater treatment process consists of a chemical precipitation system that includes hydrated lime addition; primary clarification; organosulfide, ferric chloride, and flocculation polymer addition; and secondary clarification. Two effluent discharge tanks after the secondary clarifier hold approximately 10,000 gallons each. The pilot system in this demonstration received water from the discharge tanks which was blended with plant service water (untreated water from Lake Michigan) in a small equalization tank prior to the MBR process.

GE Water & Process Technologies supplied and operated the ZeeWeed 500D MBR and ABMet pilot systems. We Energies maintained operation of the physical/chemical treatment system. After initial evaluations of the FGD wastewater, GE determined that blending with service water (50/50 by volume) was required to minimize the impacts of scaling and TDS on the pilot systems and bacteria performance. Removing scale-forming compounds (calcium, magnesium, and sulfate) with chemical softening would have required an impractical amount of chemicals (approximately 1,300 lbs./day) and produced high quantities of sludge (approximately 2,000 lbs./day).

The MBR process consisted of pre-anoxic, aerobic, and post-anoxic zones (to target denitrification [in the anoxic zones] and nitrification [in the aerobic zone]) and the ZeeWeed 500 membrane unit to filter biomass and other solids prior to the ABMet pilot. Permeate from the MBR was treated by two ABMet reactors in series.

The MBR pilot was operated at 1 GPM (combined HRT of 35 hours) during Conditions 1 and 2 and at 1.6 GPM during Conditions 3 and 4 (combined HRT of 23 hours). The increase in flow rate was intentionally made by the project team to simulate full-scale conditions. Due to ABMet performance issues, the full-scale conditions for MBR HRT were not implemented. The MBR pilot ran consistently with only one shut down early in the demonstration for a membrane recovery cleaning. Following this cleaning, citric acid maintenance cleans were conducted every other day.

Acetic acid products were used to supply nutrients (in the form of COD, ammonium, and phosphorus) to the MBR pilot. During Condition 1, a blended acetic acid product containing ammonium and phosphorus was used but resulted in excess solids scale formation. To mitigate this issue in Conditions 2 through 4, an 80% acetic acid (20% water) product was used in conjunction with a separate phosphoric acid product.

The ABMet pilot was operated at 0.5 GPM (combined EBCT of 22.4 hours) during Condition 1, 0.6 GPM (combined EBCT of 18.8 hours) during Condition 2, and 0.9 GPM (combined EBCT of 12.4 hours) during Conditions 3 and 4. The increase in flow rate during Condition 2 was not intentional, but the increase in Conditions 3 and 4 were made by the project team in order to more closely simulate GE's commercial EBCT target of 4 to 4.5 hours per reactor (8 to 9 hours total). Due to ABMet performance issues, the full-scale conditions for ABMet EBCT were not implemented. Each stage of the ABMet pilot underwent only one backwash during the demonstration. Starting in Condition 3, degassing was conducted twice per week.

As with the MBR process, acetic acid products were used to supply COD and nutrients to the ABMet reactors. For Conditions 1 and 2, the blended acetic acid product was used. A 50/50 mix of blended product and pure (80%) acetic acid product was used in Condition 3. Molasses was added to this mix in Condition 4.

A summary of pilot influent, MBR effluent, and ABMet effluent water qualities for Conditions 2, 3, and 4 is provided in Table 5-1. The pilot evaluation failed to demonstrate that the ABMet system (with the feed water diluted by 50% and supplemented with the MBR ZeeWeed system) can meet the ELG limits on this water source. Limited information are available to explain the exact issue(s) related to the loss of selenium reduction performance and several variables were identified during the demonstration which may have impacted selenium removal performance.

Table 5-1
Summary of pilot results

Parameter	Units	Pilot Influent			MBR Effluent			ABMet Effluent			Pilot Objectives	
		Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	ELG monthly avg. limit	Target based on 100% dilution
Condition 2												
Total Selenium	µg/L	920	1800	1071	110	260	173	3	6	5	12	6
Dissolved Selenium	µg/L	900	1900	1071	120	260	167	3	7	5	-	-
NO_2/NO_3-N	mg/L	70	160	95	0.12	0.24	0.15	<0.045	0.13	0.081	4.4	2.2
Total Mercury	ng/L	41	90	63	1.60	3.68	2.58	0.41	2.25	1.21	356	178
Dissolved Mercury	ng/L	8.1	18	12.2	0.23	3.06	1.96	0.23	0.59	0.42	-	-
Total Arsenic	µg/L	3.4	8.1	4.7	4	5	4	<0.36	1.8	0.9	8	4
Dissolved Arsenic	µg/L	3.4	8.1	4.7	4	5	4	<0.36	2.0	0.9	-	-
Condition 3												
Total Selenium	µg/L	790	1000	910	170	590	337	15	62	36	12	6
Dissolved Selenium	µg/L	800	1000	915	170	600	330	15	56	37	-	-
NO_2/NO_3-N	mg/L	78	88	83	0.13	21	4.0	<0.045	0.060	0.036	4.4	2.2
Total Mercury	ng/L	20	71	48	1.01	5.67	2.67	0.37	1.20	0.84	356	178
Dissolved Mercury	ng/L	7	27	13	0.64	2.97	1.92	0.45	1.20	0.76	-	-
Total Arsenic	µg/L	0.45	4.9	3.3	no data	no data	no data	<0.36	0.76	0.54	8	4
Dissolved Arsenic	µg/L	0.45	4.7	3.3	no data	no data	no data	0.38	0.76	0.61	-	-
Condition 4												
Total Selenium	µg/L	770	1100	932	170	460	231	14	39	21	12	6
Dissolved Selenium	µg/L	710	1100	919	160	460	233	11	26	17	-	-
NO_2/NO_3-N	mg/L	65	95	80	0.09	0.18	0.13	<0.045	0.081	0.046	4.4	2.2
Total Mercury	ng/L	27	76	52	1.93	1.94	1.94	0.53	1.16	0.85	356	178
Dissolved Mercury	ng/L	7.4	12	9.7	0.66	0.90	0.78	0.68	0.90	0.79	-	-
Total Arsenic	µg/L	no data	no data	no data	no data	no data	no data	0.82	0.82	0.82	8	4
Dissolved Arsenic	µg/L	no data	no data	no data	no data	no data	no data	0.82	0.82	0.82	-	-

MBR Conclusions

- The increased MBR effluent phosphorus concentration during Condition 1 was due to the higher-than-planned-for phosphorus content of the nutrient balanced acetic acid blend being added.
- Influent and effluent BOD and TOC concentrations were low, indicating that all of the acetic acid added was degraded and this suggests that the influent and effluent COD concentrations of approximately 600 mg/L may be caused by analytical interference or some other oxygen-demanding constituents as opposed to organic carbon.
- Complete denitrification (reduction of nitrate nitrogen to nitrogen gas) was achievable in the pretreatment MBR.
- Although nitrification was lost during Conditions 3 and 4, nitrate-nitrogen removal (denitrification) was never a problem in the MBR. For some unknown reason, more sensitive nitrifying bacteria were inhibited while the heterotrophic denitrifying bacteria were not inhibited.
- Selenium, present mainly in dissolved form, was significantly reduced by the pretreatment MBR (approximately 75 percent on average for the entire demonstration).
- Mercury, present mainly in particulate/insoluble form, was significantly reduced by the pretreatment MBR (approximately 96 percent on average for the entire demonstration).
- Arsenic, present mainly in dissolved form, was not removed in the pretreatment MBR.

ABMet Conclusions

- To EPRI's knowledge, this is the first pilot to attempt to treat FGD wastewater from a power plant burning 100% subbituminous coal.
- The pilot test did not consistently demonstrate that the MBR/ABMet combination of technologies adequately treats selenium to meet the 2015 ELGs limits.
- The flow rate to the ABMet was increased on January 11, 2016 from an average of 0.6 GPM to an average of 0.9 GPM. This resulted in the combined EBCT in the ABMet decreasing from 18.8 to 12.4 hours. GE's target of approximately 8 hours for full-scale applications was a goal for the pilot demonstration but was never achieved.
- The flow rate was also increased to the MBR on January 11, 2016 from 1 to 1.5 GPM, which decreased the anoxic HRT from 20 to 13 hours. After this flow rate change (during Condition 3), the average MBR effluent total selenium increased by a factor of 2, doubling the selenium load on the downstream ABMet. However, analytical results taken prior to the flow rate increase were already showing an increase in ABMet effluent selenium. This information was not yet available to the project team when the decision was made to increase flow rates.

- Another variable that may have impacted performance is the complete denitrification that was achieved in the pretreatment MBR. The low nitrate-N available to the ABMet may have resulted in the desired heterotrophic bacteria capable of reducing nitrate/nitrite and selenate/selenite being displaced by sulfate-reducing bacteria in the absence of nitrate-nitrogen as electron acceptor (ABMet average effluent sulfide increased from non-detect to 18 mg/L from Condition 2 to Condition 3 and increased sulfide odors were observed by onsite personnel). The high cycles of concentration associated with the P4 absorbers results in sulfate concentrations approximately five to seven times higher than FGD wastewater from units that burn eastern bituminous coals [3].
- The presence of sulfate-reducing bacteria, indicated by the high concentration of hydrogen sulfide (H_2S) in the second reactor effluent, may also have influenced the loss of selenium reduction. The high COD available to the ABMet from dosing acetic acid may have resulted in the desired bacteria, capable of reducing selenate/selenite, being outcompeted by sulfate-reducing bacteria in the presence of the highly reducing conditions.
- Different nutrient product combinations were used in the demonstration (blended acetic acid containing ammonium and phosphorus, 80% acetic acid (20% water), an even mixture of the previous two products, an even mixture of the first two products and also molasses). Nutrient dosages were maintained based on COD concentrations, pH, and ORP and were within specifications throughout the demonstration. During Condition 4, GE began adding molasses in an attempt to mitigate excessive sulfate-reducing bacteria growth, but by the end of the demonstration (which ended due to a lack of FGD wastewater/pilot feed water supply) the target for selenium reduction had not been re-achieved. Acetic acid products may not provide benefits over molasses for selenium reduction (which is used at GE's commercial ABMet systems treating FGD wastewater for selenium), but there is insufficient information at this time to confirm this possibility.
- Significant arsenic reduction (approximately 70 percent on average for the entire demonstration) occurred in the ABMet. The effluent goal of 4 μg/L was achieved. This is notable, as other EPRI research has shown that for those few plants that have significant dissolved arsenic in their FGD wastewater, little removal is achieved by the physical/chemical treatment system [4].

Recommendations for Additional Research

As previously identified, many variables may have contributed to the loss of performance in the MBR nitrification process and the ABMet selenium reduction process. The following recommendations for additional research are made based on the results of this pilot demonstration.

- Future studies should aim to identify compounds present in FGD wastewater that may be inhibitory or toxic to bacteria used for nitrification, denitrification, and metals reduction. EPRI suspects that oxidants naturally present in FGD wastewater are one potential source of inhibitory effects, but their identity and control have not been fully defined [5]. Further studies to remove non-biodegradable organics in FGD wastewater are recommended. This demonstration tested the use of potassium sulfite, powder activated carbon, and advanced oxidation processes (Fenton reactions), but results are inconclusive.
- The impacts of TDS on bacteria performance should be studied in a controlled environment. Testing should evaluate how increasing FGD wastewater TDS concentration could inhibit reduction of metals or slow down biochemical reactions. Variability in FGD wastewater chemistry is a consistent challenge and potential upsets to treatment technologies are a risk for regulatory compliance. For this demonstration, dilution of P4's chemical precipitation treatment effluent reduced the TDS from an average of 32,300 mg/L to 18,600 mg/L. The dilution was also required to mitigate the high scaling potential of this wastewater. Dilution may not be an option for every site.
- The potential impacts of chemical scale formation in biological treatment FGD wastewater applications should be considered in future demonstrations. For this demonstration, dilution was used as a means to mitigate scale formation in the pilot systems, but dilution may not be an option for every site. General guidance for chemical softening are provided in the Wet Flue Gas Desulfurization Wastewater Physical/Chemical Treatment Guidelines [6].
- The pilot MBR process demonstrated strong performance in reducing nitrate/nitrite prior to the ABMet, but with the potential for competing sulfate-reducing bacteria to negatively influence selenium reduction, it is suggested that nitrate/nitrite reduction as a pretreatment step be more closely evaluated. At this time, there is no clear guidance or rule of thumb for denitrification prior to selenium reduction for a specific range of influent nitrate/nitrite. Future studies that evaluate denitrification as a pretreatment step could consider bypassing a portion of the feed stream directly to the selenium reduction step because controlling denitrification to a target effluent concentration (such as 5 to 10 mg-N/L) may not be feasible or practical. Future studies should also evaluate if sulfate concentrations are also related to the loss of selenium reduction performance due to the influence of sulfate-reducing bacteria.
- Three different nutrients were fed throughout the study. The use of the acetic acid products was a departure from GE's current commercial systems treating FGD wastewater and use molasses. The balance of COD, nitrogen, and phosphorus is important for maintaining bacteria performance in reducing metals. Future studies should focus on the control and application of nutrient products related to nitrification, denitrification, and selenium reduction performance for FGD wastewater.

- The analytical interferences observed in the ABMet pilot effluent (stage two reactor effluent) should be further studied to determine ways to improve accuracy for total selenium analysis. It is hypothesized that the highly reducing conditions of the water resulted in selenium remaining in a reduced valence state (insoluble) and reporting higher than actually present. There have been instances from other tests (see Appendix B) where insoluble selenium was adsorbed to sample bottles and led to total selenium results reporting lower than actually present and confirmed by dissolved species analyses.
- FGD wastewater is impacted by upstream air emission control equipment, boiler operation, fuel selection, and many other factors. Changes in chemistry and flow rates are common for many sites and the wide range of conditions could impact performance of wastewater treatment systems. Coordination with FGD and upstream operations should be considered for any FGD wastewater treatment application, including biological treatment. However, there are limits to what can be achieved by coordination with upstream systems. The final treatment system should be robust enough to handle system variability in a balanced and coordinated approach. Additionally, physical/chemical treatment systems upstream of biological treatment can have an impact on the reliability of selenium reduction and are an integral part of the treatment process.
- Limited data are publicly available on the operation and performance of biological treatment systems for FGD wastewater. The 2015 U.S. EPA Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category may result in many new commercial systems over the next two to seven years. Continued research is needed to ensure power plant operators have the information they need to design, operate, and maintain treatment systems.

6
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A
SAMPLING AND LABORATORY ANALYTICAL PLAN

Table A-1
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Condition 1										
Ammonia	TestAmerica	SM4500	2/month	2/month	3/week		3/week			
Arsenic, total	We Energies	EPA 200.8 DRC-O2	2/month	2/month	1/week		1/week		1/week	
Arsenic, filtered	We Energies	EPA 200.8 DRC-O2	2/month	2/month	1/week		1/week		1/week	
Calcium, total	We Energies	EPA 200.7	2/month	2/month	3/week		3/week	3/week	1/week	
Calcium, filtered	We Energies	EPA 200.7	2/month	2/month	3/week		3/week	3/week	1/week	
Conductivity, µS/cm	TestAmerica	SM2510B	2/month	2/month	3/week		3/week	3/week	1/week	
COD	TestAmerica	SM5220C	2/month	2/month	3/week		3/week		3/week	
Fluoride, total	TestAmerica	SM4500	2/month	2/month	3/week		3/week	3/week	1/week	
Magnesium, total	We Energies	EPA 200.7	2/month	2/month	3/week		3/week	3/week	3/week	
Magnesium, filtered	We Energies	EPA 200.7	2/month	2/month	3/week		3/week	3/week	3/week	
Nitrate/Nitrate (N)	TestAmerica	SM4500	2/month	2/month	3/week		3/week		3/week	
Phosphorus, total	TestAmerica	SM4500	2/month	2/month	3/week		3/week			
Selenium, total	We Energies	EPA 200.7* / 200.8 DRC-NH3	2/month	2/month	3/week		1/week	1/week	1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Condition 1 (continued)										
Selenium, filtered	We Energies	EPA 200.7* / 200.8 DRC-NH3	2/month	2/month	3/week		1/week	1/week	1/week	
Sulfite	We Energies	On-site; analyze immediately		2/month	3/week		3/week		1/week	
Sulfide	TestAmerica	SM4500		2/month	3/week		3/week	3/week	1/week	
TDS	TestAmerica	SM2540C	2/month	2/month	3/week		3/week	3/week	1/week	
TKN	TestAmerica	SM4500		2/month	3/week		3/week		3/week	
TSS	TestAmerica	SM2540D		2/month	3/week	3/week			1/week	
Conditions 2, 3 and 4										
Alkalinity	TestAmerica	SM2320B	1/month	1/month	2/week		2/week	2/week	2/week	
Aluminum, total	We Energies	EPA 200.7		1/month	1/week				1/week	
Aluminum, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Ammonia	TestAmerica	SM4500	1/month	1/month	2/week		2/week	2/week	2/week	
Arsenic, total	We Energies	EPA 200.8 DRC-O2	1/month	1/month	1/week				1/week	
Arsenic, filtered	We Energies	EPA 200.8 DRC-O2	1/month	1/month	1/week				1/week	
Bicarbonate	TestAmerica	SM2320B		1/month	2/week		2/week	2/week	2/week	
BOD	TestAmerica	SM5210B	1/month	1/month	1/week		1/week	1/week	1/week	
Boron, total	We Energies	EPA 200.7		1/month	1/week				1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
Boron, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Cadmium, total	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Cadmium, filtered	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Calcium, total	We Energies	EPA 200.7	1/month	1/month	2/week		2/week	2/week	2/week	
Calcium, filtered	We Energies	EPA 200.7	1/month	1/month	2/week		2/week	2/week	2/week	
Carbonate	TestAmerica	SM2320B		1/month	1/week		1/week	1/week	1/week	
Chlorides, filtered	TestAmerica	SM4500	1/month	1/month	1/week				1/week	
Cobalt	We Energies	EPA 200.7		1/month	1/week				1/week	
COD	TestAmerica	SM5220C	1/month	1/month	2/week		2/week	2/week	2/week	
Conductivity, µS/cm	TestAmerica	SM2510B	1/month	1/month	2/week		2/week	2/week	2/week	
Copper, total	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Copper, filtered	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Fluoride, total	TestAmerica	SM4500	1/month	1/month	2/week		2/week	2/week	2/week	
Iron, total	We Energies	EPA 200.7		1/month	1/week				1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
Iron, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Lead, total	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Lead, filtered	We Energies	EPA 200.7 / EPA 200.8		1/month	1/week				1/week	
Magnesium, total	We Energies	EPA 200.7	1/month	1/month	2/week				2/week	
Magnesium, filtered	We Energies	EPA 200.7	1/month	1/month	2/week				2/week	
Manganese, total	We Energies	EPA 200.7		1/month	1/week				1/week	
Manganese, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Mercury low-level, total	We Energies	EPA 1631E	1/month	1/month	2/week		2/week		2/week	
Mercury low-level, 0.45 µm	We Energies	EPA 1631E	1/month	1/month	2/week		2/week		2/week	
Molybdenum, total	We Energies	EPA 200.7		1/month	1/week				1/week	
Molybdenum, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Nickel, total	We Energies	EPA 200.7		1/month	1/week				1/week	
Nickel, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
Nitrate/Nitrate (N)	TestAmerica	SM4500	1/month	1/month	2/week		2/week	2/week	2/week	Each Occurrence
Phosphorus, total	TestAmerica	SM4500	1/month	1/month	1/week		1/week	1/week	1/week	
Selenium, total	We Energies	EPA 200.8 DRC-NH3	1/month	1/month	2/week		2/week	2/week	2/week	Each Occurrence
Selenium, filtered	We Energies	EPA 200.8 DRC-NH3	1/month	1/month	2/week		2/week	2/week	2/week	Each Occurrence
Silver	We Energies	EPA 200.7		1/month	1/week				1/week	
Sodium, total	We Energies	EPA 200.7		1/month	1/week		1/week		1/week	
Sodium, filtered	We Energies	EPA 200.7		1/month	1/week				1/week	
Sulfate, filtered	TestAmerica	SM4500	1/month	1/month	2/week		2/week	2/week	2/week	
Sulfite	We Energies	Onsite; analyze immediately		1/month	1/week				1/week	
Sulfide	TestAmerica	SM4500		1/month	2/week		2/week	2/week	2/week	
TDS	TestAmerica	SM2540C	1/month	1/month	2/week		2/week	2/week	2/week	
Thallium	We Energies	EPA 200.8		1/month	1/week				1/week	
Tin	We Energies	EPA 200.7		1/month	1/week				1/week	
TKN	TestAmerica	SM4500		1/month	1/week		1/week		1/week	
TOC	TestAmerica	SM5310C	1/month	1/month	1/week		1/week	1/week	1/week	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
TSS	TestAmerica	SM2540D		1/month	2/week	2/week	2/week	2/week	2/week	Each Occurrence
Zinc, total	We Energies	EPA 1638 DRC		1/month	1/week				1/week	
Zinc, filtered	We Energies	EPA 1638 DRC		1/month	1/week				1/week	
Arsenic, total	Brooks Rand	EPA 200.8/6060			1/month				1/month	
Arsenic, filtered	Brooks Rand	EPA 200.8/6060			1/month				1/month	
Arsenic Speciation, filtered	Brooks Rand	EPA 200.8/6060			1/month				1/month	
Mercury low-level, total	Brooks Rand	EPA 1631E DRC			1/month		1/month		1/month	
Mercury low-level, 0.45 µm	Brooks Rand	EPA 1631E DRC			1/month		1/month		1/month	
Mercury low-level, 0.1 µm	Brooks Rand	EPA 1631E DRC			1/month		1/month		1/month	

Table A-1 (continued)
Analytical Plan – Frequency of Samples

Parameter	Laboratory	Method	Service Water (S1)	Phys/Chem Effluent (S2)	Inf/EQ Tank Effluent (S3)	MBR Mix Liquor (S4)	MBR Effluent (S5)	ABMet 1st Stage Effluent (S6)	ABMet 2nd Stage Effluent (S7)	ABMet Backwash (S8)
Conditions 2, 3 and 4 (continued)										
Selenium, total	Brooks Rand	EPA 200.8/6060			1/month		1/month	1/month	1/month	
Selenium, filtered	Brooks Rand	EPA 200.8/6060			1/month		1/month	1/month	1/month	
Selenium Speciation, filtered	Brooks Rand	EPA 200.8/6060			3/month				1/week	

Notes:
Inf/EQ = influent equalization
Phys/Chem = physical/chemical

B
ANALTYICAL QA/QC DISCUSSION

Results for total selenium from the ABMet effluent (stage two reactor effluent) from January 18, 19, and 21 failed We Energies' lab QA/QC checks. In these samples, the matrix spike recovery values were on the low end of the acceptable range. Low matrix spike recovery could indicate selenium is adhering to the container walls or precipitating out of solution. All matrix spike recoveries up to this point had been within the method control limits and the lab did not change anything in the sample preparation or analysis protocol. These were the first sets of results that failed matrix spike QC and We Energies' lab staff performed various tests in attempt to provide accurate analyses. On January 18, the We Energies lab staff who collected the samples noted a strong sulfide odor that had not been present in prior samples. The same odor was present in this sample for the duration of the test.

Samples collected at the site for dissolved and total arsenic and selenium at We Energies' lab were not preserved in the field. The lab filtered a portion of the non-preserved sample for dissolved metals analysis and then acidified the filtered sample with nitric acid to achieve pH less than 2 s.u. The acidified samples were well shaken prior to pouring off the aliquot for totals metals digestion[6]. It was hypothesized that the low ORP in the ABMet stage two reactor effluent contributed to selenium remaining in a reduced valence state (insoluble). To test this hypothesis, the lab added 30% hydrogen peroxide and re-analyzed the samples. Select data comparing various sample preparation methods are presented in Table B-1. Analyses following peroxide addition resulted in matrix spike recovery improvements and total selenium concentrations reported higher than initial analyses. It is noted that EPA Method 200.7 does not include the addition of peroxide or other oxidants to improve accuracy.

[6] To accomplish the quick turnaround time requests, the lab kept digestion time to two to three hours in the hotblock.

Table B-1
ABMet Second Stage Reactor Effluent Selenium Analysis Using Hydroxide Preparation Method

Date	Tot. Se (µg/L)	Dis. Se (µg/L)	Dilution	MS/MSD mean % recovery	Spike Level (µg/L)	Analysis Comments
1/18/2016	13	12	10	16	40	EPA 200.2 digestion: 1mL HNO^3 + 0.25 mL HCl
	15	15	10	14	40	re-analysis for confirmation
	27	no data	10	116	5	10x dilution direct from sample bottle + 5 µg/L bench spike
	15	no data	10	N/A	N/A	Re-digested with 3mL/50mL 30% H_2O_2
1/19/2016	11	10	10	6	40	EPA 200.2 digestion: 1mL HNO_3 + 0.25 mL HCl
	-	-	10	104	N/A	5 µg/L post-digest (bench) spike
	9.4	no data	50	N/A	N/A	1:5 serial dilution of 10x digestate
	10	no data	10	7	N/A	alternate digestion - capped
	26	no data	10	105	5	10x dilution direct from sample bottle + 5 µg/L bench spike
1/21/2016	8.2	7.7	10	11	40	EPA 200.2 digestion: 1mL HNO_3 + 0.25 mL HCl
	19	no data	10	32	40	digested at 10x dilution
	26	no data	25	32	40	digested at 25x dilution
	31	no data	10	120	80	Re-digested with 3mL/50mL 30% H_2O_2
1/25/2016	42	-	10	106	40	Modified EPA 200.2 digestion: 2mL 30% H_2O_2 + 1mL HNO_3 + 0.25 mL HCl
	11	9.0	10	19	40	non-H_2O_2 treated

MS = matrix spike
MSD = matrix spike duplicate

Samples taken during Condition 3 of the demonstration were sent to Brooks Applied Labs in Bothell, WA for speciation analysis. The lab used EPA 200.8 and a closed-vessel, polytetrafluoroethylene (e.g., Teflon™) bomb oven digestion. Sample analysis was performed by triple quadrupole mass spectrometry (ICP-QQQ-MS) to report total and dissolved selenium. Speciation analyses were conducted for selenite (Se(IV)), selenate (Se(VI)), selenomethionine (MeSe (IV)), selenocyanate (SeCN), and selenosulfate ($SeSO_3$). These data are presented in

Table B-2. With a high level of analytical accuracy, the speciated selenium products should add up to the dissolved selenium value for each sample. While minor variation may be expected, the January 28 sample had significant variance – total reported as 17 µg/L, dissolved reported as 9.28 µg/L, the sum of reported dissolved species is 135 µg/L. The current theory for this condition is that selenium adsorbs to the sample bottle, causing the analysis for total selenium to report lower than dissolved. The lab attempted to digest the sample in the sample bottle using 10% nitric acid, but the results were the same. The selenium may have already adsorbed to the bottle and the effect was irreversible.

EPRI has begun additional studies to evaluate methods to improve analytical results from FGD wastewater biological treatment effluent. These studies are considering sample container use, preparation techniques, and analytical methods.

Table B-2
ABMet Effluent Selenium Speciation Results

	Brooks Applied Lab									We Energies Lab	
Date	Tot. Se	Dis. Se	Dis. Se(IV)	Dis. Se(VI)	Dis. MeSe (IV)	Dis. SeCN	Dis. $SeSO_3$	Dis. Unknown Se	Sum of Dis. Species	Tot. Se	Dis. Se
1/12/16	16.6	16.3	1.79 B	1.56 B	0.250 U	7.27	1.10 B	0.00 U	11.7	17	20
1/14/16	32.6	35.9	4.41	11.5	0.385 B	no data	2.21 B	0.465	19	45	47
1/19/16	25.5	25.5	7.61	4.77	0.250 U	7.46	2.53	3.1	25.5	22	no data
1/21/16	30.2	15.9	5.89	0.250 U	0.250 U	14.7	2.53 U	4.60	25.2	31	no data
1/26/16	30.4	27.6	10.8	0.965	0.497 B	11.9	2.50 U	1.52	25.7	46	42
1/28/16	17.0	9.28	51.8	0.965 U	1.32	69.7	3.82	8.71	135.4	47	46
2/2/16	23.3	12.5	8.16	0.965 U	0.588 B	20.1	2.50 U	1.12	30	62	54
2/4/16	22.6	9.69	5.94	0.965 U	0.638 B	17.2	2.50 U	1.11	24.9	50	46
2/9/16	12.6	13.0	9.47	0.250 U	0.398	11.4	2.50 U	1.02	22.3	35	31
2/11/16	8.48 B	6.28 U	1.18 B	0.250 U	0.154 B	5.24	0.275 B	1.63	8.5	23	19
2/16/16	14.2	9.26 B	4.55	0.250 U	0.250 U	10.8	2.73	1.69	19.8	29	25
2/18/16	18.0	4.88 B	3.01	0.250 U	0.250 U	8.01	2.53 U	1.46	12.5	27	22
2/23/16	8.80	5.23	2.06 B	0.250 U	0.250 U	2.10 B	2.04 B	0.551	6.8	18	13
2/25/16	10.3	3.79 B	0.828 B	0.250 U	0.250 U	2.65	0.222 U	0.814	4.3	16	13

Note: all data reported as µg/L
U = not detected
B = analyte is found in the associated blank, as well as in the sample

C
RAW DATA

Raw data from the pilot study are provided in the attachment.

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Water Management Technology

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The Honorable E. Scott Pruitt
Administrator
United States Environmental Protection Agency
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

April 12, 2017

THE ADMINISTRATOR

Mr. Harry M. Johnson
Hunton & Williams, LLP
Riverfront Plaza, East Tower
951 East Byrd Street
Richmond, Virginia 23129-4074

Mr. Major Clark
Mr. Kevin Bromberg
U.S. Small Business Administration
Office of Advocacy
409 3rd Street, SW, 7th Floor
Washington, D.C. 20416

Re: Petitions for Agency Reconsideration and Stay of Effluent Guidelines for the Steam Electric Point Source Category

Dear Mr. Johnson, Mr. Clark and Mr. Bromberg:

This letter concerns petitions from the Utility Water Action Group dated March 24, 2017, and the U.S. Small Business Administration dated April 5, 2017, to the U.S. Environmental Protection Agency requesting reconsideration and an administrative stay of provisions of the EPA's final rule titled "Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category," 80 FR 67838 (November 3, 2015).

After considering your petitions, I have decided that it is appropriate and in the public interest to reconsider the rule. The EPA is acting promptly to issue an administrative stay of the compliance dates in the rule that have not yet passed pending judicial review, pursuant to Section 705 of the Administrative Procedure Act. This stay will be effective upon publication in the Federal Register. The EPA also intends to request that the U.S. Court of Appeals for the Fifth Circuit stay the pending litigation on the rule for 120 days (until September 12, 2017), by which time the agency intends to inform the Court of the portions of the rule, if any, that it seeks to have remanded to the agency for further rulemaking, after careful consideration of the merits in your petitions. Also, because an administrative stay lasts only during the pendency of judicial review, the EPA intends to conduct notice and comment rulemaking during the reconsideration period to stay or

amend the compliance deadlines for the rule. This letter does not address the merits of, or suggest a concession of error on, any issue raised in the petitions.

As part of the reconsideration process, should the EPA conduct a rulemaking to amend the rule or any part of it, the EPA expects to provide an opportunity for notice and comment.

If you have questions regarding the reconsideration process, please contact Sarah Greenwalt at (202) 564-1722. If you have any questions or wish to discuss the litigation, please have your counsel direct inquiries to Jessica O'Donnell at (202) 305-0851.

Respectfully yours,

E. Scott Pruitt

Thu Apr 13 09:10:11 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Magnolia Waco Properties, LLC, d/b/a Magnolia Homes [IWOV-AR_DMS.FID2282605]
To: CMS.OEX@epamail.epa.gov

From: John Surma [mailto:John.Surma@arlaw.com]
Sent: Wednesday, April 12, 2017 10:13 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Cc: Suzanne Byrne <Suzanne.Byrne@arlaw.com>
Subject: RE: Magnolia Waco Properties, LLC, d/b/a Magnolia Homes [IWOV-AR_DMS.FID2282605]

Administrator Pruitt:

I am writing to follow-up on the correspondence sent you via the email below and the situation our client, Magnolia Waco Properties, LLC, d/b/a Magnolia Homes faces with the EPA relative to the RRP Rule. The EPA representatives we have been dealing with have indicated that EPA management is interested in resolving the matter "in a timely manner" and have proposed that the settlement involve a cash payment of $80,000, plus the projects our client estimates will entail out-of-pocket expenditures of at least $125,000.

As indicated in the past, our client and we are interested solely in our client being treated in a manner that is fair and consistent with how others have been treated, which is far less harshly than what the EPA proposes relative to our client. We would appreciate you reviewing this matter with your staff and ensuring that our client is, in fact, treated in a manner consistent with how others who were alleged to be in violation of these rules were treated.

I am out of the office on an inspection in Baton Rouge for another client, but should be in the office most of next week if you or anyone else with the EPA would like to discuss the situation our client faces. Thank you.

John

From: John Surma
Sent: Thursday, March 09, 2017 4:42 PM
To: pruitt.scott@epa.gov
Cc: Suzanne Byrne; Stephen Lewis
Subject: Magnolia Waco Properties, LLC, d/b/a Magnolia Homes [IWOV-AR_DMS.FID2282605]

Administrator Pruitt:

Please see the attached correspondence concerning our client, Magnolia Waco Properties, LLC, d/b/a Magnolia Homes (the construction company owned by Chip and Joanna Gaines of *Fixer Upper*). Please feel free to call or write with any questions or concerns. Thank you.

John

John Surma
Special Counsel
Admitted in Texas and Wisconsin
ADAMS AND REESE LLP
1221 McKinney Street, Suite 4400 | Houston, TX 77010
main 713.652.5151 | **direct** 713.308.0148 |
efax 713.308.4084 | **fax** 713.652.5152
john.surma@arlaw.com
websitebiovCardmap

Minister of Environment and Climate Change

Ministre de l'Environnement et du Changement climatique

The Honourable L'honorable
Catherine McKenna

Dear Scott,

It was great to meet up with you in Washington. Looking forward to working together!

All the best,

Catherine

Minister of the Environment

CANADA

Ministre de l'Environnement

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Mr. Scott Pruitt, Administrator
Environmental Protection Agency
Mail code: 1101A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
U.S.A.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

April 27, 2017

THE ADMINISTRATOR

The Honorable Catherine McKenna
Minister of Environment and Climate Change
200 Sacre-Coeur, 2nd Floor
Fontaine Building
Gatineau, Quebec K1A 0H3
CANADA

Dear Minister McKenna:

Thank you for your kind note. I, too, look forward to working together in the coming months and seeing you soon in Charlottetown, PEI.

Thank you for taking the time to meet with me during your visit to Washington.

Respectfully yours,

E. Scott Pruitt

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MADISON COUNTY COMMISSION

#1 Courthouse Square

Fredericktown, MO 63645

Tom Stephens, First District Robert (Bob) Mooney, Presiding Larry Kemp, Second District

April 10, 2017

Mr. Scott Pruitt, Administrator

U. S. Environmental Protection Agency

William Jefferson Clinton Building

1200 Pennsylvania Avenue, N.W.

Mail Code: 1101A

Washington, D.C. 20460

2017 APR 13 AM 10: 46
OFFICE OF THE
EXECUTIVE SECRETARIAT

Dear Administrator Pruitt:

Enclosed herewith is a Joint Resolution passed by the cities of Fredericktown and Marquand and the Madison County, Missouri Commission adopting a Comprehensive Strategy for Managing Lead Contamination in Madison County, Missouri. As outlined in the Strategy, Madison County has made significant progress during the last fourteen years since the entire County was placed on the National Priority List in 2003, but much remains to be done. The health and welfare of our citizens and future generations should not be compromised by allowing lead and other heavy metals contamination at current levels.

During your recent speech to the National Conference of Mayors, you made a request to hear success stories of Brownfield and Superfund projects. The citizens of Madison County consider the Madison County Mines Superfund Site remediation a success so far. As described in the Comprehensive Strategy, the contaminated residential soil remediation, public education efforts and target population blood-lead testing has resulted in a substantial decrease in EBL's when compared to the State-wide average. Our goal is to see this at or below the State average.

One of our primary concerns is the contamination of the Fredericktown City Lake, the sole water source for the City of Fredericktown and the Fredericktown Public School District. As elaborated in the Strategy document, USEPA sampling and testing of lake sediments indicated extensive distribution of mine waste with lead concentrations at levels well above the Probable

Effects Concentration and the majority of samples were above the Severe Effects Level established by a consensus of biological researchers. Although the filtered samples of raw water obtained from the City Lake indicate removal of dissolved lead below the 15 µg/L maximum contaminate goal, we do not want to experience problems similar to those experienced in Flint, Michigan.

Please take time to review the enclosed Comprehensive Strategy document and we think you will see that the successes of the past efforts by USEPA Region 7 have been a major contributing factor to the progress we see today, but again, much remains to be done.

Sincerely,

Robert Mooney

Robert Mooney, Presiding Commissioner

C: Senator Roy Blunt, Congressman Jason Smith, Governor Eric Greitens w/enclosures

JOINT RESOLUTION ADOPTING A COMPREHENSIVE STRATEGY FOR MANAGING LEAD CONTAMINATION IN MADISON COUNTY, MISSOURI AND SOLICITING THE CONTINUED SUPPORT OF THE UNITED STATES ENIRONMENTAL PROTECTION AGENCY TOWARDS THE COMMON OBJECTIVES STATED THEREIN

WHEREAS, the cities of Fredericktown, Missouri joins Marquand, Missouri by Resolution duly passed by the respective Boards of Aldermen and Madison County by Commissioner's Resolution endorsing the attached Comprehensive Strategy for Managing Lead Contamination in Madison County, Missouri; and

WHEREAS, the Cities and County find that vulnerability to many potential hazards to human health and the environment are posed by lead and other heavy metals contamination and these hazards are shared by residents of Fredericktown, Marquand and the unincorporated portions of Madison County; and

WHEREAS, the Cities and County further finds that the common goal of the Comprehensive Strategy can best be achieved through the collaborative efforts of the U. S. Environmental Protection Agency working with various Local, State and Federal Agencies sharing combined resources; and

WHEREAS, the contemplated actions more fully described in the attached Comprehensive Strategy cannot be implemented without the continued financial and technical support of the U. S. Environmental Protection Agency;

THEREFORE, BE IT RESOLVED that the Cities of Fredericktown and Marquand and the Madison County Commission do hereby solicit and petition the U. S. Environmental Protection Agency to adequately fund the continued assistance by the Region 7 Office to attain the objectives set forth in Remedial Action Plans for the Madison County Mines Superfund Site.

WHEREUPON, this resolution having been read in full on the 5TH day of APRIL, 2017, the County Commission voted as follows:

3 ayes 0 nays 0 abstentions 0 absent

ADOPTED AND APPROVED this 5TH day of APRIL 2017, by the County Commission of Madison County, Missouri.

Robert Mooney

Robert Mooney

Presiding Commissioner, Madison County

Donal L. Firebaugh

Donal Firebaugh

Attest: Madison County Clerk

RESOLUTION 2017-02

RESOLUTION

A JOINT RESOLUTION ADOPTING A COMPREHENSIVE STRATEGY FOR MANAGING LEAD CONTAMINATION IN MADISON COUNTY, MISSOURI AND SOLICITING THE CONTINUED SUPPORT OF THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY TOWARDS THE COMMON OBJECTIVES STATED THEREIN

WHEREAS, the City of Fredericktown, Missouri joins the City of Marquand, Missouri and Madison County in endorsing the attached Comprehensive Strategy for Managing Lead Contamination in Madison County, Missouri; and

WHEREAS, the City of Fredericktown finds that vulnerability to many potential hazards to human health and the environment are posed by lead and other heavy metals contamination and these hazards are shared by residents of Fredericktown, Marquand and the unincorporated portions of Madison County; and

WHEREAS, the City of Fredericktown further finds that the common goal of the Comprehensive Strategy can best be achieved through the collaborative efforts of the U.S. Environmental Protection Agency working with various Local, State and Federal Agencies sharing combined resources; and

WHEREAS, the contemplated actions more fully described in the attached Comprehensive Strategy cannot be implemented without the continued financial and technical support of the U.S. Environmental Protection Agency;

THEREFORE, BE IT RESOLVED that the City of Fredericktown joins the City of Marquand and the Madison County Commission to hereby solicit and petition the U.S. Environmental Protection Agency to adequately fund the continued assistance by the Region 7 Office to attain the objective set forth in Remedial Action Plans for the Madison County Mines Superfund Site.

WHEREUPON, this resolution having been read in full on the 27th day of March, 2017 the Board of Aldermen voted as follows:

6 ayes -0- nays -0- abstentions -0- absent

ADPOPTED AND APPROVED this 27th day of March, 2017, by the Board of Aldermen of the City of Fredericktown, Missouri.

ATTEST:

Barbara Stevens

Barbara Stevens, City Clerk

CITY OF FREDERICKTOWN

Kelly Korokis

Kelly Korokis, Mayor

JOINT RESOLUTION ADOPTING A COMPREHENSIVE STRATEGY FOR MANAGING LEAD CONTAMINATION IN MADISON COUNTY, MISSOURI AND SOLICITING THE CONTINUED SUPPORT OF THE UNITED STATES ENIRONMENTAL PROTECTION AGENCY TOWARDS THE COMMON OBJECTIVES STATED THEREIN

WHEREAS, the City of Marquand, Missouri joins the City of Fredericktown, Missouri by Resolution duly passed by the respective Boards of Aldermen and Madison County by Commissioner's Resolution endorsing the attached Comprehensive Strategy for Managing Lead Contamination in Madison County, Missouri; and

WHEREAS, the Cities and County find that vulnerability to many potential hazards to human health and the environment are posed by lead and other heavy metals contamination and these hazards are shared by residents of Fredericktown, Marquand and the unincorporated portions of Madison County; and

WHEREAS, the Cities and County further finds that the common goal of the Comprehensive Strategy can best be achieved through the collaborative efforts of the U. S. Environmental Protection Agency working with various Local, State and Federal Agencies sharing combined resources; and

WHEREAS, the contemplated actions more fully described in the attached Comprehensive Strategy cannot be implemented without the continued financial and technical support of the U. S. Environmental Protection Agency;

THEREFORE, BE IT RESOLVED that the Cities of Fredericktown and Marquand and the Madison County Commission do hereby solicit and petition the U. S. Environmental Protection Agency to adequately fund the continued assistance by the Region 7 Office to attain the objectives set forth in Remedial Action Plans for the Madison County Mines Superfund Site.

WHEREUPON, this resolution having been read in full on the 6 day of April, 2017, the Board of Aldermen voted as follows:

4 ayes 0 nays 0 abstentions 0 absent

ADOPTED AND APPROVED this 6 day of April, 2017 by the Board of Aldermen of the City of Marquand, Missouri.

CITY OF MARQUAND

Dennis Ward, Mayor

ATTEST:

Amanda Flock, City Clerk

Comprehensive Strategy for Managing Lead Contamination in Madison County, Missouri

For almost 20 years, Madison County, Missouri has been actively collaborating with the U. S. Environmental Protection Agency (EPA) Region 7, the Missouri Department of Health and Senior Services (DHSS), Agency for Toxic Substances and Disease Registry (ATSDR), Missouri Department of Natural Resources (MoDNR) and other agencies to address the issues of lead contamination in Madison County. Much has been accomplished through this cooperative inter-agency action and the devoted work of the Madison County Health Department.

During 1998, the testing of 15% of the Madison County target population (children between the ages of 6 months to 72 months) indicated elevated blood levels of lead (EBL) for 12% of the target population. The County Health Department kept pushing to get more parents to participate by having target age children tested. In 2001 with 36% of the target population tested, the results indicated that an astonishing 13% of those tested had EBL's greater than 9 mcg/dl. Through inter-agency action and local participation, less than 2% of the current target population tested in 2013 is elevated compared to a State-wide average of 1%.

The success of Madison County's lead poison prevention program is largely due to the leadership of EPA Region 7. Starting in the early 1700's, Madison County was a leader in lead production for more than 100 years. Even though development of larger lead deposits in St. Francois County during the 1860's dominated in Southeast Missouri, Madison County continued as a significant lead mining area until closure of the Madison Mine in 1961. EPA recognized that the positive economic benefits of lead production are now tempered by negative impacts to human health and the environment caused by mining-related contamination. Lead contamination was documented by EPA at residential properties, public lands, ambient air, and in streams and rivers throughout much of Madison County. Shortly after EPA's PRP Characterization Summary in 2000, the Madison County Health Department made a request for EPA assistance that resulted in the entire county site being listed to the National Priority List in September 2003. A Feasibility Study was completed by EPA in 2005 and the Final Baseline Human Health Risk Assessment was completed in July 2007 with Remedial Action start for Residential Soils in February 2009. Residential soil testing and removal actions are ongoing and two abandoned mine sites are being remediated in 2017 (OU4 and OU5), but much remains to be done.

Past mining and related activities in Madison County have resulted in widespread contamination throughout the county. After almost 300 years since the first mining occurred at Mine LaMotte, mine waste consisting primarily of chat (tailings) has been used as a construction material. The once large piles of mining and milling wastes were gradually distributed throughout the county by erosion and human activity creating heavy metals contamination to area soils, waters and biota. Arsenic, lead, cobalt, nickel and zinc are toxic at sufficiently high concentrations and contamination by these metals not only poses a threat to human health, but has resulted in a variety of injuries to natural resources. Although the full extent of these injuries has not yet been evaluated, there is a clear need to restore, rehabilitate and/or acquire the equivalent of the injured resources and the services they provide. To better understand and manage the extent of the mine waste and its hazards, Madison County has been broken down into 7 operational units.

The residential soils removal activities consisting of excavating, hauling and disposal (OU3) were limited to areas within 100 feet of each participating residential structure. Realizing that contaminated soils extend beyond this zone and seeing an ongoing need to protect the environment from recontamination, EPA encouraged institutional controls. The extent of residential soil remediation was initially concentrated in the incorporated cities and villages of Madison County consisting of Fredericktown, Marquand, Cobalt Village and Junction City, but due to the widespread distribution of mine waste throughout the county, an ongoing program was initiated in 2010 with the development and implementation of a Voluntary Institutional Controls Plan (VICP). The Madison County Voluntary Institutional Controls Plan was developed and supported under a cooperative agreement between EPA and DHSS. EPA Funding was provided to the Madison County Health Department as a pilot project for the Madison County Mines Superfund Site. The VICP is unique from all other institutional controls plans which focus on lead contamination. Its unique quality is its voluntary nature. Like other control plans, Madison County's plan outlines specific controls based on EPA, MoDNR and DHSS regulations/policies and "best practices." But, unlike other lead contamination plans, this VICP provides education as one of its primary institutional controls.

The Madison County Voluntary Institutional Controls Plan was launched in 2014 distributing educational materials to the residents of the county and conducting lead health/safety classes for school children. Although there had been efforts to educate the public prior to the VICP, the current plan is much more comprehensive including the recommended best practices, pamphlets, instructions for disposal/hauling of contaminated materials, etc.

The residents of Madison County understand that lead and other heavy metals have been and will continue to be a part of our lives. However, we also see the many benefits of living in this area. We live within the St. Francois Mountains with an abundance of natural beauty including the streams and rivers flowing out of the mountains. We live with farming of livestock, grain, and produce in our fertile fields and valleys. The Mark Twain National Forest occupies much of Madison County and a substantial timber industry also employs many residents of the county. It is the objective of Madison County, with the assistance of EPA and other participating state and federal agencies to make our county a safer, healthier place to live while maintaining and improving our natural environment.

As stated earlier, much remains to be done. The two largest mining complexes, Mine La Motte (OU1) and the Madison Mine (OU2) aka Anschutz Subsite, contain large volumes of mine waste needing remediation. The Madison Wide residential cleanup (OU3) has more than 600 residential and recreational properties that need to have soil testing for possible remediation. Detailed characterization of the Little St. Francis River Watershed (OU7) was authorized in late 2015 and a watershed master plan is being developed with the assistance of a cooperative agreement from EPA Region 7.

Operable Unit 7 (OU7) consists of approximately 139 square miles of the Little St. Francis River watershed with an emphasis on the 23(+/-) linear miles of streambed that is listed on the State of Missouri's 303(d) list of impaired waters. Also included are the following tributaries impacted by historic mining: Mill Creek, Saline Creek, Goose Creek, Village Creek, Shay's Branch, Slime Creek, Sweetwater Branch and Logtown Branch. In order to better characterize the extent of the impairment and determine remediation and restoration alternatives, EPA and Madison County has been sampling and testing stream sediments and water. The most significant study was performed by EPA Region 7 during late May and early June 2016 on the Fredericktown City Lake which was constructed in 1954 by

impounding the Little St. Francis River at its northwest city limits. The City Lake serves as Fredericktown's sole source of drinking water with surface water treatment facilities that are currently being upgraded to meet current Safe Drinking Water Standards. After accumulating sediment for more than 62 years with a large part of the sediment consisting of mine waste, the city and county had significant concerns about water quality and our ability to keep our drinking water safe. EPA sampled and tested lake sediment from 26 locations in the lake. A total of 71 sediment samples were retrieved and analyzed from various depths at each location. Fifty (50) of the samples exceeded the 400 mg/kg lead level currently used as a limit for determining residential soil remediation. Sixty-four (64) sediment samples exceeded the consensus based Severe Effect Level for lead of 250 mg/kg and all of the 71 samples exceeded the Probable Effect Concentration of 128 mg/kg established by biological researchers. Pore water concentrations and surface water concentrations of raw lake water indicated levels of concern of greater than 15 µg/L. Fortunately the dissolved lead in the raw water is being removed by the current treatment process and an enhanced filtration system is currently under construction at the City's Water Treatment Plant.

Regarding OU7, a Technical Advisory committee (TAC) consisting of representatives of local citizens and agencies, as well as various Federal and State agencies, have been meeting quarterly to engage and interact on the impacts that heavy metal contamination is having on watershed biota and natural resources in addition to human health concerns. Results of testing described in the preceding paragraph have undergone agency review by TAC members and actions are being taken to determine the extent of natural resource damages. The Fish and Wildlife Service, on behalf of the U.S. Department of Interior (DOI) and the State of Missouri through MoDNR acting as Trustees for natural resources in the Madison county Mine Site are assessing whether the resources and their services have been injured as a result of releases of hazardous substances. The Trustees are evaluating injuries to our natural resources through the Natural resource Damage Assessment and Restoration (NRDAR) process. The Trustees have completed the assessment planning and the assessment activities are currently being done to determine the extent of natural resource damages. Madison County is hopeful that much of the damaged natural resources can be restored through the NRDAR process.

After all OU's have been remediated in accordance with the Record of Decision (ROD), an expansion of the Madison County VICP is needed to include guidance so that the waters, public use areas and residential land do not get re-contaminated. This will provide a single county wide plan and will reflect the unique needs of our county, yet incorporate Federal and State regulations. The current Madison County VICP includes specific methods of excavating soil, pavement and other materials, depending on the condition of the material being excavated relative to lead content. Transportation of these materials and the repository destination are also included as "Best Practices" based on current Federal and State regulations. The VICP is implemented through the Madison County Health Department, with no oversight authority, but with the capability to assist property owners, contractors and other entities in understanding soil and water conditions and how to use the best practices. The health department utilizes the EPA's "Samples and/or Remediated Properties Database for Madison County" to assist property owners in a variety of ways in understanding risks associated to their planned soil disturbance project. By utilizing the One Call database, the health department is able to identify all or most soil disturbance projects in the county.

Madison County Commission
#1 Courthouse Square
Fredericktown, MO 63645

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APR 13 2017

US Environmental Protection Agency
Mr. Scott Pruitt
William Jefferson Clinton Building
1200 Pennsylvania Avenue NW
Mail Code: 1101A
Washington, DC 20460

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

OFFICE OF THE
REGIONAL ADMINISTRATOR

APR 26 2017

The Honorable Robert Mooney
Presiding Commissioner
Madison County Commission
#1 Courthouse Square
Fredericktown, Missouri 63645

Dear Mr. Mooney:

Thank you for your recent letter of support to Administrator Pruitt and the joint resolutions from the county and the cities of Fredericktown and Marquand, Missouri. Those joint resolutions affirm the ongoing commitment by the county and cities to collaborative efforts with the U.S. Environmental Protection Agency and various local, state and federal agencies to address human health and environmental hazards posed by lead and other heavy metal contaminants throughout Madison County. I am responding to your letter on behalf of Administrator Pruitt. The EPA agrees that, while much progress has been made at the Madison County Mines Superfund Site over the years, much work remains to protect the citizens and natural resources of Madison County and address the environmental legacy of hundreds of years of mining in Missouri's Old Lead Belt.

The EPA remains committed to its current approach to remediate lead contamination in Madison County, including emphasis on residential yard cleanup to reduce exposure risks posed to children and residents; the consolidation and capping of contaminated source material at historical mining and ore processing sites; and the removal or containment of wastes affecting streams, rivers and other outstanding natural resources in the county. To date, the EPA has completed soil cleanups at more than 1,700 residential properties that include other high-risk properties such as schools, daycares and playgrounds for an estimated total volume of 580,000 cubic yards. More than 250,000 cubic yards and over 30 acres of chat, tailings and other source area mine wastes have been remediated around tailings piles and in creeks, floodplains and other downstream locations, with that total rapidly growing under current remedial actions for the Conrad Tailings, Catherine Mines and Skaggs Tailings projects. Many of these projects have employed small businesses with set-asides that include Native American- and Service Disabled Veteran-owned businesses, and have included local hiring and purchasing incentives to enhance the economy of your communities. We are working to continue these efforts with a new residential cleanup contract later this year and other prospective cleanups in the county.

Among the keys to the success of these efforts in reducing the measured incidence of elevated blood levels in the children of Madison County have been the health education outreach efforts, blood lead

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testing program, and the implementation of the Madison County Voluntary Institutional Controls Program to ensure proper handling and disposal of lead contamination and to prevent human exposure through the combined efforts of the Madison County Health Department and the Missouri Department of Health and Human Services. These combined programs supplement and protect our investment in cleanup in the county.

With respect to the metals-contaminated sediments in the Fredericktown City Lake, we are sensitive to the community's concerns and continue to work toward a long-term solution to ensure contaminated sediment in the lake does not adversely impact your water supply. Recent efforts include the 2016 sediment and water quality assessment by the EPA; ongoing work to identify and address upstream sources; the combined contributions of the Little St. Francis Watershed Master Plan Development and Technical Advisory Committee; the development of a new soil disposal repository nearby to serve the ongoing EPA actions and the public's need; and our new initiative to develop a watershed flow and sedimentation model with our Office of Research and Development which will eventually support a protective remedy addressing contaminated sediments throughout the watershed.

The EPA remains committed to protecting human health and the environment in Madison County. We sincerely appreciate and look forward to maintaining our strong relationship and working partnerships with the cities of Fredericktown and Marquand, Madison County, and the state of Missouri.

Sincerely,

Karen A. Flournoy

for Edward H. Chu
Acting Regional Administrator

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OFFICE OF THE
EXECUTIVE SECRETARIAT

Richard Poeton
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April 7, 2017

Dear Administrator Pruitt,

I am a retired USEPA scientist, writing to offer my advice as you assume leadership of the EPA.

I worked at a regional office (Seattle) and during that time I encountered several different Regional Administrators. To a person, regardless of political inclination, they all told the same story at the end of their tenure: They had expected to find environmental zealots determined to thwart industry, and found instead dedicated (underpaid) government employees working hard to do the right thing according to the law and to protect people and the environment. I hope that will be your experience as well.

The second thing I would like to say is that in my experience, both personally and professionally, people like the EPA and support its purpose. In company boardrooms there may be a tendency to view EPA as the enemy, probably because the adversarial legal system in the US encourages that perception. It is true that nobody likes being told they have to clean up lead paint, or can't use certain types of gasoline, but in general people believe they deserve clean air, clean water and the cleanup of the messes left by industry.

At EPA I was a specialist in radiation protection (a "Certified Health Physicist"). So lastly, I would like to suggest that if you were looking for a way to streamline regulations and guidance within EPA, you could do worse than taking a close look at the EPA Superfund (OSWER) radiation policies. I have attached a detailed analysis of the technical and policy issues with the OSWER radiation guidance. For the sake of brevity, I will summarize as follows:

The Air and Radiation programs are some of the longest-established in the EPA. There is much known about the harmful effects of radiation and within EPA the scientific experts on this subject are all within Air and Radiation. The language and science of radiation is distinct from other types of hazards and has its own basis for determining what is safe and what is not. These work just fine when applied to even the most hazardous sites managed by Department of Energy and the Nuclear Regulatory Commission.

The Superfund law created a framework for cleanup of legacy contamination of all kinds, including radiation. Instead of relying on the established framework and capabilities of the Air and Radiation Office, however, the Superfund Program years ago set about creating its own separate body of "guidance" and policy that attempted to supplant long-established radiation protection principles. Because Superfund had significant budgetary influence they were able to

do this, in spite of the fact that Superfund has no technically-qualified radiation experts on staff. In effect the Superfund program used the "rulemaking by policy" approach to radiation protection under Superfund. The result is a set of Superfund radiation requirements that are often incomprehensible, even to experienced radiation scientists. All you need to do is query "Superfund Radiation Guidance" to get a sample of how arcane and bureaucratic some of this material is. Often it is in direct contradiction with the radiation protection standards set by state radiation control programs. This insistence by Superfund that radiation issues be interpreted through their regulatory prism has created predictable problems with determining acceptable cleanup levels for radiation when it comes to Homeland Security and at various cleanup sites around the country.

Superfund does not need its own parallel body of radiation protection standards and criteria. I would recommend that the responsibility for radiation policies and guidance be returned to the experts at Air and Radiation, and that the Superfund radiation requirements be made consistent with Air and Radiation standards, not the other way around.

These thoughts are entirely my own, and thank you for the opportunity to express them. Working at EPA was a great privilege for me, and I have nothing but admiration for the staff and scientists there.

Richard Poeton
Certified Health Physicist
USEPA (Retired)

Attachment: Issues and Recommendations for EPA Radiation Programs and Superfund/OSWER

EPA is the primary federal agency charged with protecting the public from harmful effects of radiation. At EPA radiation expertise is found primarily in the Office of Radiation and Indoor Air. Other federal authorities such as NRC and DOE have extensive regulatory and advisory programs to protect the public from harmful effects of radiation. National and international advisory groups such as the Congressionally-chartered NCRP and the international ICRP seek to establish uniform and protective frameworks for both occupational and public radiation protection. Yet OSWER radiation guidance specifically excludes the methods and advice of these groups as not being adequate to protect people from radiation exposure.

The policy perspectives of OSWER regarding radiation have effectively isolated CERCLA radiation criteria from the rest of the US radiation authorities and well as those in the rest of the world. Within EPA this can be seen in the difficulty of updating Federal Radiation Guidance for the General Public. OSWER policy positions regarding this update have vetoed the use of criteria other than those of CERCLA, even though this guidance would necessarily apply outside CERCLA contexts. In effect, all other radiation protection efforts in the US and the world follow one paradigm except for OSWER which has developed guidance that isolates it from everyone else. Efforts to harmonize the two approaches have not been successful.

In relationships with the public, this disharmony is of particular concern. Efforts by agencies, including other parts of EPA, to develop or change radiation criteria are routinely challenged as "not as good as CERCLA", or "loosening standards" or "not protective".

After years of policy debate between OSWER and, frankly, the rest of the world when it comes to radiation protection, the NCRP examined the two approaches to cleanup in NCRP Report No. 146 (Approaches to Risk Management in Remediation of Radioactively Contaminated Sites, 2004). The NCRP concluded that either approach (CERCLA or traditional dose-based radiation protection) effectively achieves the same results from the practical standpoint of protecting the public and that the only significant differences were policy related. Although that was more than ten years ago, OSWER has yet to update its guidance to consider the NCRP findings.

OSWER guidance seeks to treat radiation as any other contaminant. But ask anyone and they will tell you that radiation is not "just another contaminant". There are entire academic curricula devoted to the study of radiation. It carries a unique dread in the public mind. Unlike most contaminants, radiation has a substantial and ubiquitous background component which must be accounted for in practical cleanup efforts. The risks associated with the naturally-occurring radiation background alone exceed the CERCLA "risk-range" virtually everywhere. The range of background radiation levels varies over an order of magnitude around the country. Although CERCLA clearly states that risk criteria are intended to address "incremental excess risk" from releases (applying to the site-related impacts), OSWER policy is to interpret "incremental" to mean "total, including background" (applying to both site-related impacts and ambient levels).

The OSWER radiation guidance has high public visibility, but in terms of transparency it only serves to muddy the water. It is routinely misused as a basis for arguing against the application of

radiation protection concepts even in non-CERCLA contexts. Recent examples have included OSWER criticism of the Department of Homeland Security Guidance on cleanup of terrorist radiological events. The OSWER radiation guidance is often used to argue that the only standards that perfectly mirror CERCLA risk criteria and guidance can be considered acceptable even for non-CERCLA contexts. The legalistic rationale provided is that to countenance other standards in other contexts would somehow weaken CERCLA compliance.

The consequence of this guidance, its visibility, and its rigid misapplication, is the mistaken perception among the public that there is only one acceptable answer when it comes to radiation, and that answer is the CERCLA "risk range". The facts, as are obvious from even a cursory examination of EPA radiation standards, and of normal background levels around the country, are otherwise. All radiation criteria depend on context. The fundamental assumption behind all EPA radiation decisions and guidance is that there is no safe level, and that therefore there can be no one-size-fits-all criterion for what is acceptable when it comes to radiation. In the radiation business this is expressed by the concept of "ALARA" (as low as reasonably achievable).

The body of OSWER radiation guidance should be completely reviewed from the perspective of what is now known about radiation protection, and based on practical experience over the last 10-20 years. A specific objective should be to bring CERCLA radiation guidance into harmony with other radiation protection guidance at EPA and in the US. A guiding document for this effort should be NCRP Report No. 146 (October 15, 2004) "Approaches to Risk Management in Remediation of Radioactively Contaminated Sites". This document identifies both commonalities and opportunities for harmonization between the CERCLA approach to radiation protection, and the "dose-based" approach universally used elsewhere. Specific areas to address include:

-Based on NCRP 146, OSWER guidance should re-examine the use of radiation dose as an appropriate metric in CERCLA contexts.
-Re-evaluate the "not protective" policy regarding non-EPA (e.g. NRC, DOE) radiation cleanups based on the level of protection actually achieved.
-Clarify OSWER guidance on background to make it clear that CERCLA "incremental risk" means what it says and does not include background.
-Rationalize the application of ALARA principles with those of CERCLA.
-Clarify that protectiveness as a concept is context-specific, and that CERCLA protectiveness criteria may not be appropriate elsewhere.

Clarifying that CERCLA risks only apply to CERCLA contexts and being transparent about what is meant by "risk" would be important follow-up efforts.

Sound policy needs to be based on good science. In revising the OSWER radiation guidance and considering restructuring OSWER programs regarding radiation, OSWER should take maximum advantage of the radiation health physics expertise within EPA, notably in ORIA. These are the people with the best understanding of the science and application of radiation protection principles. There is no reason CERCLA criteria need to be inconsistent with, or divorce themselves from, standard radiation protection principles.

R. Poeton

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Scott Pruitt, Administrator
US EPA, Mail Code 1101A
1200 Pennsylvania Ave NW
Washington DC 20460

APR 13 2017

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

NOW THE
OFFICE OF LAND AND
EMERGENCY MANAGEMENT

JUN 02 2017

Richard Poeton
(b) (6)

Dear Mr. Poeton:

Thank you for your April 7, 2017, letter to U.S. Environmental Protection Agency (EPA) Administrator Scott Pruitt regarding the Superfund program's radiation policies. I am responding to your letter on behalf of the Administrator.

Your letter's primary point is that EPA should revise its Superfund radiation policies such that they rely upon "the established framework and capabilities of the Air and Radiation Office" rather than a Superfund-specific framework. The Superfund program's radiation policies reflect the program's statutory (Comprehensive Environmental Response, Compensation and Liability Act [CERCLA]) and regulatory (National Oil and Hazardous Substances Pollution National Contingency Plan [NCP]) provisions, which require Superfund cleanups to appropriately protect human health and the environment from all contaminants while accounting for the differences between radionuclides and chemicals. For this reason, the Superfund approach for addressing radionuclides is not identical to that of other EPA programs (e.g., the Office of Indoor Air and Radiation [ORIA]) nor to that of other federal agencies (e.g., the Nuclear Regulatory Commission [NRC]), which utilize other statutes, such as the Atomic Energy Act. EPA developed Superfund-specific guidance to help ensure that Superfund radiation cleanups are conducted in a fashion consistent with CERCLA and the NCP.

In addition to the specific statutory and regulatory framework governing Superfund radiation policies, the 1999 National Academy of Science (NAS) report, *Evaluation of Guidelines for Exposures to Technologically Enhanced Naturally Occurring Radioactive Materials* explains, for example, that differences between EPA and NRC in determining acceptable risk from radionuclides is a matter of judgment (risk management policy) and not science. In addition, while the Superfund approach for addressing radiation is not identical to that in ORIA, the programs share a scientific basis for conducting work to protect against radiation hazards. Finally, the models EPA issued for risk and dose assessment are based on sound science and both internal and external reviews.

Various national and international stakeholders are addressing radiation risk. EPA has a robust working relationship with many of them including the NRC, the Department of Energy, the Interstate Technology Regulatory Council, and foreign and international agencies. EPA works cooperatively with these entities to advance radiation protection while recognizing the parties' unique scope and authorities.

Finally, the National Council on Radiation Protection and Measurements' analysis of EPA's and NRC's current regulatory guidance and practice for radioactively contaminated site remediation concluded that both organizations' practices can protect public health with site-specific cleanup levels.

Thank you again for your letter. An attached staff report provides additional detailed information. Please contact Stuart Walker, the Office of Superfund Remediation and Technology Innovation radiation expert at walker.stuart@epa.gov or 703-603-8748 if you have additional questions.

Sincerely,

James E. Woolford
Director
Office of Superfund Remediation and
Technology Innovation

Enclosure

Additional Information

(prepared by EPA staff)

Statutory and Regulatory Language Specifying Protectiveness

CERCLA remedial actions have to meet the statute's definition of protective. (See NCP 300.430 - # 1 remedy selection criteria and required in CERCLA Section 121). As discussed in the NCP, the agency made a policy choice to follow the 10^{-4} to 10^{-6} risk range to define CERCLA's protectiveness for carcinogens.

Please note that the Office of Land and Emergency Management's (OLEM, formerly the Office of Solid Waste and Emergency Response) policy for the remedial program, which states that the cancer risk range determines protectiveness for radionuclides and that dose limits above the risk range are not protective, is consistent with how other EPA offices have viewed radionuclides across a variety of statutes and situations. We have attached a pdf file "EPA statements on high dose limits" which provides a sampling of these EPA views.

Below are statutory and regulatory excerpts (Section 121 of CERCLA and 300.430 of the NCP) that state remedial actions must be protective of human health and that, in the case of carcinogens, this means attaining the 10^{-4} to 10^{-6} cancer risk range.

SEC. 121. CLEANUP STANDARDS.[1]

(a) SELECTION OF REMEDIAL ACTION.—The President shall select appropriate remedial actions determined to be necessary to be

The President shall select a remedial action that is protective of human health and the environment, that is cost effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. If the President selects a remedial action not appropriate for a preference under this subsection, the President shall publish an explanation as to why a remedial action involving such reductions was not selected.

(d) DEGREE OF CLEANUP.—(1) Remedial actions selected under this section or otherwise required or agreed to by the President

under this Act shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant, or contaminant.

§ 300.430 Remedial investigation/ feasibility study and selection of remedy.

(a) *General*—(1) *Introduction.* The purpose of the remedy selection process is to implement remedies that eliminate, reduce, or control risks to human health and the environment. Remedial actions

(2) For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6} using information on the relationship between dose and response. The 10^{-6} risk level shall be used as the point of departure for determining remediation goals for alternatives when ARARs are not available or are not sufficiently protective because of the presence of

(i) The criteria noted in paragraph (c)(9)(iii) of this section are used to select a remedy. These criteria are categorized into three groups.

(A) *Threshold criteria.* Overall protection of human health and the environment and compliance with ARARs (unless a specific ARAR is waived) are threshold requirements that each alternative must meet in order to be eligible for selection.

Role of U.S. Environmental Protection Agency Guidance

EPA's guidance documents neither impose mandatory standards nor represent "rulemaking by policy." Their purpose is to provide guidance and direction to EPA activities. The Office of Management and Budget (OMB) reinforced the role of guidance documents in the context of EPA's CERCLA cleanup levels for radioactive contamination in 1997 when responding to a query from U.S. Senators Frank Murkowski, Pete Domenici and Don Nickles regarding EPA's 1997 directive, "Establishment of

Cleanup Levels for CERCLA Sites with Radioactive Contamination." Excerpts from the Senators' November 21, 1997, letter and OMB's November 21, 1997, response (provided by Sally Katzen, who was OMB's Administrator of the Office of Information and Regulatory Affairs at the time of the correspondence) follow:

Below is a quote from the incoming letter signed by three Senators.

> In what appears to be a substitute for the formal rulemaking, EPA has recently issued guidance for its Superfund Program indicating that standards such as that promulgated by NRC may not be sufficient for use at remediation sites, and more stringent Preliminary Remediation Goals should be used (OSWER No. 9200.4-23). As you can imagine, this guidance could significantly increase cleanup costs at sites managed by the Department of Energy, and may profoundly affect budget requirements for the Federal government and, ultimately, the taxpayer.
>
> This guidance would appear to come under the definition of a rule, as that term is broadly defined and understood under the Administrative Procedures Act (5 U.S.C. 551). Thus, it fits the definition of a rule as that term is also defined in the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA). That statute placed certain requirements on Federal agencies for notification to Congress when rules were promulgated. Knowing that there has been no Congressional notification.

Below is a quote from the OMB response letter.

> the agency promulgating the regulation. On receiving your letter, I asked my staff to ascertain whether EPA had determined that the guidance in question is or is not a *rule* as defined in the Congressional Review statute. I have been advised that EPA does not consider the guidance to be a rule because it does not have the force and effect of law, but simply provides advice to the EPA Regions. Indeed, EPA states that the guidance is not a legally binding document; its use can be challenged at each individual site and once challenged, the guidance has no standing and will be set aside in favor of the merits of the particular case.
>
> Because EPA states that this guidance does not have the force and effect of law and is not a rulemaking, the circulation of this document is consistent with the provisions of Executive Order No. 12866. If you have further questions, please do not hesitate to contact me.

National Academy of Scientists Assessment of Superfund's Risk-Based Approach

In its 1999 report, *Evaluation of Guidelines for Exposures to Technologically Enhanced Naturally Occurring Radioactive Materials*, NAS made the following statements:

> This committee offers the following comments on the issue of a limit on acceptable risk and, therefore, acceptable dose. First, the determination of an acceptable risk for any exposure situation clearly is entirely a matter of judgment (risk-management policy) which presumably reflects societal values. Inasmuch as EPA and the Nuclear Regulatory Commission have used essentially the same assumptions about the risks posed by radiation exposure in establishing radiation standards, it is clear that the determination of a limit on acceptable dose for any exposure situation also is entirely a matter of judgment. Therefore, any differences between the views of EPA and the Nuclear Regulatory Commission on an acceptable dose have no scientific or technical basis.

On page 222

Differences Between Environmental Protection Agency and Nuclear Regulatory Commission Approaches to Risk Assessment

> The Nuclear Regulatory Commission's approach to estimating risk posed by chronic radiation exposure of the public normally is based on ICRP recommendations on estimating doses per unit exposure and the risk per unit dose. The Nuclear Regulatory Commission estimates lifetime risks on the basis of estimates of annual doses that are the sum of the annual dose equivalent to the whole body from external exposure and the 50-y committed effective dose equivalent (ICRP 1977) from ingestion and inhalation of radionuclides. Lifetime risk is estimated by multiplying the annual effective dose equivalent from external and internal exposure by the assumed exposure time (for example, 70 y) and the nominal risk of fatal cancers caused by uniform whole-body irradiation of 5×10^{-2} per sievert (ICRP 1991). It is important to note that ICRP's nominal risk factor takes into account the age dependence of radiation risk in the whole population, which is based on data on the atomic-bomb survivors (ICRP 1991).
>
> EPA has developed a methodologically more rigorous approach to assessing risk posed by chronic lifetime exposure to radionuclides, which is particularly important for internal exposure and differs in several respects from the simple approach described above.

On page 225

Comments On Differences Between Environmental Protection Agency and Nuclear Regulatory Commission Approaches to Risk Assessment

This committee offers the following comments on EPA's approach to risk assessment for chronic lifetime exposure of the public, especially internal exposure, as it differs from the approach normally used by the Nuclear Regulatory Commission for similar exposure situations.

First, EPA's approach should provide more realistic estimates of risk than the approach used by the Nuclear Regulatory Commission. All the factors described in the previous section—the use of organ-specific risks for many organs instead of risks based on the effective dose equivalent and a nominal risk from uniform whole-body irradiation, the use of updated biokinetic models in estimating dose from ingrowth of decay products in the body, the use of organ-specific RBEs for alpha particles, and the use of age-specific dose rates from internal exposure in conjunction with age-specific cancer risks—should result in more realistic estimates of risks associated with chronic lifetime exposure.

Oak Ridge National Laboratory Involvement in the U.S. Environmental Protection Agency's Superfund Approach to Estimating Radiation Risks

EPA's Office of Superfund Remediation and Technology Innovation (OSRTI) has an interagency agreement with the Department of Energy's Oak Ridge National Laboratory (ORNL) to develop the Superfund preliminary remediation goals (PRGs) and dose compliance concentration (DCC) calculators for CERCLA assessments, as well as risk and dose assessment tools, including developing geometrically challenging exposure factors. The Center for Radiation Protection Knowledge, which is part of ORNL's Environmental Sciences Division, manages this work. K. Z. Morgan, director of ORNL's Health Physics Division and an early recipient of the Swedish Royal Academy Gold Medal for Radiation Protection, started the ORNL Dosimetry Research Program in the 1950s. Since 1979, Keith Eckerman, recipient of the most recent (12th) Swedish Royal Academy Gold Medal, has led this program.

Since its inception, the ORNL Dosimetry Research Program has provided the national and international scientific communities with models and data required to estimate doses and risks from exposure to radionuclides and establish exposure guidelines for radionuclides. To learn more about CRPK and its relationship to the Dosimetry Research Program, you may go to this website: https://www.ornl.gov/crpk .

Below are some of the ORNL technical manuals specifically developed for the Superfund six PRG and DCC calculators:

Area Correction Factors for Contaminated Soil for Use in Risk and Dose Assessment Model.
https://epa-prgs.ornl.gov/radionuclides/ACF_FINAL.pdf

Gamma Shielding Factors for Soil Covered Contamination for Use in Risk and Dose Assessment Models
https://epa-prgs.ornl.gov/radionuclides/GSF_FINAL.pdf

Biota Modeling in EPA's Preliminary Remediation Goal and Dose Compliance Concentration Calculators for Use in EPA Superfund Risk Assessment: Explanation of Intake Rate Derivation, Transfer Factor Compilation, and Mass Loading Factor Sources
https://epa-prgs.ornl.gov/radionuclides/20161130_Biota_TM_KLM_Final_printable_version.pdf

Dose Rates in Contaminated Rooms of Various Sizes
https://epa-bprg.ornl.gov/documents/Contaminated_Room_Dose_Rate_03_01_07.pdf

External Scientific Reviews of the Office of Land and Emergency Management's Risk and Dose Assessment Tools

EPA's models for risk and dose assessment have undergone a series of external reviews, in addition to EPA internal reviews. EPA used guidance descriptions for each of these types of external review categories, one of which can be found in the EPA document "Guidance on the Development, Evaluation, and Application of Environmental Models."

We have listed out each review EPA conducted of the six PRG and DCC calculators, which the Superfund program developed for risk and dose assessment, and have placed them into categories as described in the EPA document.

EPA Guidance Description of Model Review Categories

Peer Review

Page 23 provides a description of the purpose of "peer review":

Peer review provides the main mechanism for independent evaluation and review of environmental models used by the Agency. Peer review provides an independent, expert review of the evaluation in Section 4.1; therefore, its purpose is two-fold:

- To evaluate whether the assumptions, methods, and conclusions derived from environmental models are based on sound scientific principles.
- To check the scientific appropriateness of a model for informing a specific regulatory decision. (The latter objective is particularly important for secondary applications of existing models.)

Page 23 provides further description on documenting charge questions to peer reviewers:

Peer review charge questions and corresponding records for peer reviewers to answer those questions should be incorporated into the quality assurance project plan, developed during assessment planning

Page 25 discusses possible mechanisms for conducting a peer review:

results to decision making. Mechanisms for accomplishing external peer review include (but are not limited to):

- Using an ad hoc panel of scientists.[3]
- Using an established external peer review mechanism such as the SAB
- Holding a technical workshop.[4]

When conducting an "independent external" scientific peer review of the three PRG calculators model or document, OSRTI has used a peer review contractor to conduct the peer review process (e.g., select the peer reviewers, provide charge questions, summarize the peer review comments in a chart). OSRTI staff may provide comments on potential peer reviewers and charge questions. Later, OSRTI, with ORNL support, has developed responses to the peer review comments. EPA has made all of this material available online.

OSRTI has also had more focused external "not independent" external peer reviews on early drafts of various PRG/DCC calculators. OSRTI requested and received review by the Army Corps of Engineers Center for Excellence under an interagency agreement. EPA has also made this material available online.

We have made distinction between these two types of external peer reviews (independent and not independent) in the email below.

The guidance also discusses how there may be internal peer review or other types of internal comments (e.g., workgroups). Each of the PRG/DCC calculators went through multiple rounds of internal EPA review but due to the form of these comments, which EPA does not make publically available, they are not discussed further.

Verification

Page 42 and 48 provides EPA definition of "verification":

Code verification: Examination of the algorithms and numerical technique in the computer code to ascertain that they truly represent the conceptual model and that there are no inherent numerical problems with obtaining a solution (Beck et al. 1994).

Verification (code): Examination of the algorithms and numerical technique in the computer code to ascertain that they truly represent the conceptual model and that there are no inherent numerical problems with obtaining a solution (Beck et al 1994).

Page 14 discusses that an independent verification may be useful. EPA guidance makes a distinction between multiple code verification by code developers and a potential independent testing of code, which is why the EPA's PRG/DCC websites make a distinction between internal and external verification.

Model coding translates the mathematical equations that constitute the model framework into functioning computer code. Code verification ascertains that the computer code has no inherent numerical problems with obtaining a solution. Code verification tests whether the code performs according to its design specifications. It should include an examination of the numerical technique in the computer code for consistency with the conceptual model and governing equations (Beck et al. 1994). Independent testing of the code once it is fully developed can be useful as an additional check of integrity and quality.

Benchmark

Page 34 provides a list of model evaluation methods discussed in an NAS document providing a description of benchmark analysis.

Benchmarking against other models. Comparison of model results with other similar models.

U.S. Environmental Protection Agency and U.S. Department of Energy Reviews by Categories

Peer Review

EPA Independent External Peer Reviews

PRG calculator (material listed for the October 30, 2014 to January 15, 2015 review)
https://epa-prgs.ornl.gov/radionuclides/prg_peer_review.html
BPRG (material listed for the April to June, 2006 review)
https://epa-bprg.ornl.gov/bprg_peer_review.html
SPRG (material listed for the January 16 to February 27, 2008 review)
https://epa-sprg.ornl.gov/sprg_peer_review.html

EPA External Peer Reviews (not independent)

PRG (material listed for July 29, 2004 review)
https://epa-prgs.ornl.gov/radionuclides/prg_peer_review.html
BPRG (material listed for November 2, 2004 review and June 1, 2004 review)
https://epa-bprg.ornl.gov/bprg_peer_review.html
SPRG (material listed for September 20, 2007 review and July 25, 2007 review)
https://epa-sprg.ornl.gov/sprg_peer_review.html
BDCC (material listed for April 17, 2008 review and February 20, 2008 review)
https://epa-bdcc.ornl.gov/bdcc_peer_review.html

Verification

EPA Independent External Verification Reviews

PRG calculator (April 24, 2015 to September 30, 2015)
https://epa-prgs.ornl.gov/radionuclides/PRGReviewCompletePackage_Sept2015.pdf
BPRG (October 16, 2015 – December 22, 2015)
https://epa-bprg.ornl.gov/documents/BPRGExternalVerificationStudyAll.pdf
BDCC (March 17, 2016 - May 31, 2016)
https://epa-bdcc.ornl.gov/BDCCExternalVerificationStudyAll.pdf

Benchmark

EPA Benchmark Model Comparisons

Simulating Radionuclide Fate and Transport in the Unsaturated Zone: Evaluation and Sensitivity Analyses of Select Computer Models (July 2002)
http://semspub.epa.gov/work/11/176294.pdf
(this is for more sophisticated soil to groundwater models that could be used as site-specific replacements for the PRG and DCC calculator soil to groundwater scenario.)

NCRP Report No. 146: Approaches to Risk Management in Remediation of Radioactively Contaminated Sites (October 2004)
http://ncrponline.org/publications/reports/ncrp-reports-146/
(this report examines EPA Superfund and NRC Decommissioning programs approach to radiation site cleanup. Section 3.3.3 is a "Comparison of EPA Preliminary Remediation Goals with NRC Screening Levels." It is part of a larger Section 3.3 "Methods of Site Characterization and Dose or Risk Assessment.")

U.S. Environmental Protection Agency Cross-Program Coordination on Superfund Radiation Approach

The Superfund program's risk-based approach for radionuclides reflects a long history of ORIA support. Below are excerpts from the *1993 Health Effects Assessment Summary Tables User Guide* (March 1993, EPA 540-R-93-058) discussing radionuclide slope factors (see pages 36):

INTENDED USERS AND APPLICATIONS

HEAST users include individuals from the EPA, other Federal agencies, States and contractors who are responsible for the identification, characterization and remediation of sites contaminated with radioactive materials. Radionuclide slope factors are calculated by EPA's Office of Radiation and Indoor Air (ORIA) to assist HEAST users with risk-related evaluations and decision-making at various stages of the remediation process. During site assessment, for example, slope factors are used in EPA's Hazard Ranking System (HRS) to assign toxicity factor values to radionuclides to calculate site scores. During the remedial investigation and feasibility study (RI/FS), slope factors are used to determine baseline site risk, to develop preliminary remediation goals, and to evaluate cleanup alternatives. For further examples on the application of radionuclide slope factors in risk evaluations, users are referred to the following EPA documents:

- Hazard Ranking System (HRS), *Federal Register* (55 FR 515320), December 1990.
- *Risk Assessment Guidance for Superfund; Volume I – Human Health Evaluation Manual* (RAGS/HHEM), Part A, Baseline Risk Assessment (EPA/540/1-89/002).
- RAGS/HHEM Part B, Development of Risk-Based Preliminary Remediation Goals (OSWER Directive 9285.7-01B). [NTIS order number: PB 92-963333.]
- RAGS/HHEM Part C, Risk Evaluation of Remedial Alternatives (OSWER Directive 9285.7-01C). [NTIS order number: PB 92-963334.]

The Superfund and radiation programs have worked together on a number of guidance documents pertaining to addressing radioactive contamination at Superfund sites. These

documents have been jointly signed at either the office director level or the assistant administrative level. For example:

1. Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination (August 1997)
   http://semspub.epa.gov/src/document/HQ/176331

2. Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation Goals for CERCLA Sites (February 1998)
   http://semspub.epa.gov/src/document/HQ/175266

3. Radiation Risk Assessment At CERCLA Sites: Q & A (December 1999)
   http://semspub.epa.gov/src/document/HQ/175420

4. Remediation Goals for Radioactively Contaminated CERCLA Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR Part 40 Appendix A, I, Criterion 6(6) (April 2000)
   http://semspub.epa.gov/src/document/HQ/176323

5. Soil Screening Guidance for Radionuclides: User Guide (October 2000)
   http://semspub.epa.gov/src/document/HQ/175428

6. Soil Screening Guidance for Radionuclides: Technical Background Document (October 2000)
   http://semspub.epa.gov/src/document/HQ/175427

7. Use of Uranium Drinking Water Standards under 40 CFR 141 and 40 CFR 192 as Remediation Goals for Groundwater at CERCLA sites (November 2001)
   http://semspub.epa.gov/src/document/HQ/176295

8. Distribution of OSWER of Radionuclide Preliminary Remediation Goals (PRGs) for Superfund Electronic Calculator (February 2002)
   http://semspub.epa.gov/src/document/HQ/176330

Superfund Remedial Program Coordination with States and Other Organizations on Guidance and Training to Address Radioactive Contamination

EPA's OSRTI staff have worked with the Environmental Council of the States' Interstate Technology and Regulatory Council (ITRC) radiation team on several guidance documents and training classes. ITRC is a public-private coalition working to reduce barriers to the use of innovative environmental technologies that reduce compliance costs and maximize cleanup efficacy. ITRC produces documents and training that broaden and deepen technical knowledge and expedite quality regulatory decision making while protecting human health and the environment. ITRC achieves its mission through its technical teams, which are composed of environmental professionals, including state and federal environmental regulators, federal agency representatives, industry experts, community stakeholders, and academia. ITRC teams are led by state environmental agency staff.

The ITRC documents addressing radiation issues that OSRTI staff helped develop are:

1. Determining Cleanup Goals at Radioactively Contaminated Sites: Case Studies (April 2002)
   http://www.itrcweb.org/GuidanceDocuments/RAD-2.pdf

2. Real-Time Measurement of Radionuclides in Soil: Technology and Case Studies (February 2006)
   http://www.itrcweb.org/GuidanceDocuments/RAD_4Web.pdf

3. Decontamination and Decommissioning of Radiologically Contaminated Facilities (January 2008)
   http://www.itrcweb.org/GuidanceDocuments/RAD5.pdf

4. A Decision Framework for Applying Monitored Natural Attenuation Processes to Metals and Radionuclides in Groundwater (December 2010)
   http://www.itrcweb.org/GuidanceDocuments/APMR1.pdf

The ITRC radiation remediation online training course modules listed below contain contributions from Superfund remedial program staff; for some modules, EPA staff delivered the training:

1. Radiation Risk Assessment: Updates and Tools. Module 3, "Use of Radiation PRG Calculator: Explain how to use EPA's new Risk-based PRG- and ARAR Dose-calculators for radionuclides" was presented by an OSRTI staffer. Module 4, "Case Study Application for PRG Calculator: Demonstrate site-specific challenges in application of tools" provides a demonstration of using an OSRTI tool.

https://clu-in.org/conf/itrc/rads_051507/

2. Radiation Site Cleanup: CERCLA Requirements and Guidance. Modules 2 and 3, "EPA CERCLA Radiation Requirements and Guidance: Explain EPA remedy selection policy, in particular those guidance documents and tools that address radioactively contaminated sites" are both presented by OSRTI staff and focus on regulations and guidance developed by OSRTI.
https://clu-in.org/conf/itrc/radscleanup_060507/

3. Decontamination and Decommissioning of Radiologically-Contaminated Facilities. Module 3, "Preliminary Remediation Goal (PRG) Calculators" was presented by EPA staff and focuses on OSRTI risk assessment tools for buildings and streets/sidewalks.
https://clu-in.org/conf/itrc/radsdd_030410/

4. Real-Time Measurement of Radionuclides in Soil.
https://clu-in.org/conf/itrc/radsrealtime_102808/

5. A Decision Framework for Applying Attenuation Processes to Metals and Radionuclides.
https://clu-in.org/conf/itrc/apmr_101311/

U.S. Environmental Protection Agency and Nuclear Regulatory Commission Coordination at Contaminated Sites

In 2002 EPA and the NRC signed a memorandum of understanding (MOU) to identify the two agencies' interactions during NRC-licensed sites' decommissioning and decontamination and the ways in which those interactions occur. Except for Section VI, which addresses corrective action under the Resource Conservation and Recovery Act, this MOU is limited to the coordination between EPA, when acting under CERCLA authority, and NRC, when an NRC-licensed facility is undergoing decommissioning, or when a facility has completed decommissioning, and the NRC has terminated its license. EPA believes that the MOU's implementation will help eliminate confusion about dual regulation during NRC-licensed sites' cleanup and reuse.

The MOU EPA and NRC signed may be found here:
http://semspub.epa.gov/src/document/HQ/176321.

You may also find copies of each of the consultation letters between EPA and NRC for the site where consultation under the MOU has occurred. These letters may be found at this website under the subsection "MOU with NRC":
https://www.epa.gov/superfund/radiation-superfund-sites

Superfund Remedial Program Coordination with Foreign and International Agencies on Solving Issues of Radioactively Contaminated Sites

OSRTI has a good working relationship with foreign countries and organizations. During our 14 annual/bi-annual meetings with regional radiation staff, we have had visitors from agencies in Australia, Canada, France, Iraq, Japan, Norway, Russia, and the United Kingdom, as well as the International Atomic Energy Agency (IAEA). These interactions have led to one EPA regional staff member completing a six-month detail with the United Kingdom Environment Agency to help develop procedures for addressing radioactive contamination. In addition, the interaction has also led to regional staff members participating in IAEA workgroups and providing Japan with information on US cleanups that may help with post-Fukushima remediation efforts. These interactions have also resulted in OSRTI staff participating in IAEA and Organisation (OECD) for Economic Co-operation and Development workgroups and presenting at multiple conferences at the request of IAEA, North Atlantic Treaty Organization and foreign governments.

OSRTI staff also provided extensive input on two recent OECD guidance document development efforts, which included providing significant text describing Superfund's approach to addressing radionuclides.

1. Nuclear Site Remediation and Restoration during Decommissioning of Nuclear Installations
   http://www.oecd-nea.org/rwm/pubs/2014/7192-cpd-report.pdf

2. Strategic Considerations for the Sustainable Remediation of Nuclear Installations
   http://www.oecd-nea.org/rwm/pubs/2016/7290-strategic-considerations.pdf

National Council on Radiation Protection and Measurement Report 146

NRC funded the 2004 NRCP report, No. 146 "Approaches to Risk Management in Remediation of Radioactively Contaminated Sites." The report's purpose and scope is found on page 4 of the report:

Purpose and Scope of Study

The National Council on Radiation Protection and Measurements (NCRP) was asked by NRC to perform an analysis of current regulatory guidance and practice used by NRC and EPA in remediation of radioactively contaminated sites. Specifically tasks were:

- identify and summarize current regulatory guidance and practice on remediation of radioactively contaminated sites used by NRC under the LTR and by EPA under CERCLA and NCP, including a review of models and tools used to assess regulatory compliance;
- identify, examine and summarize the historical basis for current guidance and practices of the two agencies;
- identify, analyze and summarize the significant differences and commonalities in current guidance and practices of the two agencies; and
- identify, examine and summarize the implications of current guidance and practices of the two agencies as they relate to such issues as public perception, uncertainty, measurability, and dose and risk estimates.

The ultimate objective of such an analysis is to evaluate whether guidance and practice of NRC and EPA can be harmonized to provide reasonably consistent approaches to decision making in remediation of radioactively contaminated sites.

EPA and NRC discussed the report during its development and upon its completion, and it has informed subsequent staff discussions about various technical issues. The report was not developed with an expectation that it would lead either agency to revamp its program; further, the report does not include a recommendation for either to do so. We have also reviewed the presentation on the report given by its Chairman Dan Strom to EPA staff at the National Superfund Radiation meeting on February 28, 2007. Below is the slide summarizing the report's conclusions.

Thu Apr 13 12:39:17 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Minnesota Comments on Vehicle GHG Standards
To: CMS.OEX@epamail.epa.gov

DRF

From: Clarizio, Michele (MPCA) [mailto:michele.clarizio@state.mn.us]
Sent: Thursday, April 13, 2017 9:48 AM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>; Lyons, Troy <lyons.troy@epa.gov>
Subject: Minnesota Comments on Vehicle GHG Standards

Good morning,

The attached correspondence is being sent on behalf of Commissioner John Linc Stine, Minnesota Pollution Control Agency, and Commissioner Charles Zelle, Minnesota Department of Transportation.

Michele Clarizio | Executive Aide to the Commissioner

Minnesota Pollution Control Agency (MPCA)

520 Lafayette Road | St. Paul, MN | 55155
Voice (651) 757-2023 Fax (651) 296-6334

michele.clarizio@state.mn.us | www.pca.state.mn.us

April 12, 2017

SENT VIA U.S. MAIL AND EMAIL

Mr. Scott Pruitt, Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue N.W.
Mail Code 1101A
Washington, D.C. 20460

RE: Intention to Reconsider the Mid-Term Evaluation of Greenhouse Gas Emissions Standards for Model Year 2022-2025 Light-Duty Vehicles

Dear Administrator Pruitt:

We are writing on behalf of the Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Transportation (MnDOT) about your recent "Notice of Intention to Reconsider the Final Determination of the Mid-Term Evaluation of Greenhouse Gas Emissions Standards for Model Year (MY) 2022-2025 Light Duty Vehicles," published in the Federal Register on March 22, 2017 (82 FR 14671). We strongly urge you to maintain the U.S. Environmental Protection Agency's (EPA's) January 12, 2017, "Final Determination of the Appropriateness of the MY 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards" (Mid-term Evaluation).

The MY 2022-2025 standards are integral to meeting both Minnesota's and the United States' greenhouse gas (GHG) emission reduction goals and commitments. The United States has made an international commitment to reduce its GHG emissions as part of the Paris Agreement, which entered into force on November 4, 2016. As part of a bi-partisan effort in 2007, Minnesota adopted the Next Generation Energy Act that codifies energy efficiency and GHG emissions targets. The federal vehicle GHG emission standards are a key part of the cooperative federalism established by the Clean Air Act that we rely on to achieve these statutory targets and protect the health of Minnesotans.

The United States automobile industry has long been a global leader in advancing new technologies that make vehicles cleaner and more efficient. These advancements have improved air quality across the country and saved consumers money at the gas pump. Maintaining the MY 2022-2025 standards as finalized in January 2017 will boost our economy, reduce harmful air pollutants, and ensure the United States continues to lead in the globally competitive automobile industry.

Background

In 2012, the EPA and National Highway Traffic Safety Administration (NHTSA) issued joint GHG emissions and fuel economy standards for MY 2017-2025 light-duty vehicles. At that time, EPA committed to conducting a mid-term review of the 2022-2025 standards by April 2018 to ensure the standards were achievable and determine if they should be more or less stringent

The MY 2022-2025 standards were intended to help drive the United State automobile industry towards technological advancements that allow us to remain the global leader in vehicle technology. This is partly why the 2012 rulemaking establishing the MY 2017-2025 light-duty GHG standards was endorsed by

automobile manufacturers. Since 2012, on average, the industry has met or exceeded those standards. In 2016, EPA, NHTSA, and the California Air Resources Board released a Draft Technical Assessment Report which found that automakers continue to meet current model year standards, that the MY 2022-2025 standards are technically achievable, and that the standards would save drivers money. In November of 2016, EPA released its Proposed Determination to maintain the standards. Throughout the Mid-term Evaluation, the public was given an opportunity to provide comment. After this significant analysis and public engagement, on January 12, 2017, EPA completed its mid-term review and issued a final determination to maintain the emissions standards as set in 2012.

The EPA's efforts to reduce vehicle GHG emissions and increase fuel economy are integral to the work of the MPCA and MnDOT. Nationwide, the transportation sector is the largest emitter of GHGs. Here in Minnesota, transportation is currently the second largest source of GHG emissions. However, planned improvements to further reduce GHG emissions from the state's electric generation sector mean that transportation will soon claim the number one spot in Minnesota, as well.

Greenhouse gas and air quality goals

Our state is already seeing the effects of climate change, including rising temperatures and increased flooding. Minnesota is committed to reducing our contributions to this international problem, but we cannot do so alone and need EPA partnership to drive improvements in the equipment used throughout the country.

The MY 2022-2025 standards will also significantly reduce other vehicle-related pollutants in Minnesota, where nearly a quarter of all air pollution emissions come from transportation. Reductions of vehicle-related pollutants are critical for our state to continue attaining the health-based ozone and fine particulate matter National Ambient Air Quality Standards. At this point, we need EPA's help to meet new air quality standards and protect Minnesotans from the harmful effects of air pollution.

Environmental justice

Vehicle emissions are of particular concern for achieving environmental justice, as busy roadways often pass through low-income communities and communities of color. Our research shows that higher concentrations of harmful air pollutants occur within 300 meters of busy roadways. Our most vulnerable populations often suffer a disproportionate burden of health impacts from vehicle emissions already and this disproportionate impact would be increased by loosening the MY 2022-2025 standards. These same vulnerable populations are also the most burdened by the cost of fuel and would benefit from greater fuel efficiency that would come with the MY 2022-2025 standards. When families spend less on fuel, they have more resources available for other necessities and invest in their communities.

California waiver

We also urge you to continue to grant California's Clean Air Act section 209 waiver, which allows that state to establish and enforce its own GHG emissions standards for vehicles. This waiver recognizes California's right to develop the standards needed to address its environmental challenges. The case for granting California's waiver has been well established over decades. Revoking the waiver would contradict the statutory criteria for granting or denying the waiver and would undermine California's state rights. The MPCA also supports the right of states under section 177 of the Clean Air Act to adopt and enforce California's standards. This critical states' rights issue provides a mechanism for states to go beyond the federal standards when we determine it is necessary to achieve air quality standards, state laws and regulations, and public health goals.

In addition, California's standards and other states' adoption of those standards are key drivers of the development of electric vehicle models in the United States. Minnesota, and other states like us that have not adopted California's standards, are benefitting from the advancement of electric vehicle technology and the increased number of model options due to the market demand created by these standards.

Conclusions

We again urge you to maintain the MY 2022-2025 light-duty vehicle standards as finalized on January 12, 2017. As demonstrated through the Mid-term Evaluation, these standards are integral to reducing GHG emissions, help protect our most vulnerable communities from the harmful effects of air pollution, and benefit our economy by reducing fuel costs and leaving more resources in the pockets of our working families.

The MPCA and MnDOT appreciate your consideration of these comments. If you have any questions regarding the above comments, please contact J. David Thornton with the MPCA at 651-757-2018 or j.david.thornton@state.mn.us.

Sincerely,

John Linc Stine
Commissioner
Minnesota Pollution Control Agency

Charles A. Zelle
Commissioner
Minnesota Department of Transportation

JLS/CAZ/AJS:ds

MINNESOTA

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April 12, 2017

Mr. Scott Pruitt, Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue N.W.
Mail Code 1101A
Washington, D.C. 20460

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The MPCA and MnDOT appreciate your consideration of these comments. If you have any questions regarding the above comments, please contact J. David Thornton with the MPCA at 651-757-2018 or j.david.thornton@state.mn.us.

Sincerely,

John Linc Stine
Commissioner
Minnesota Pollution Control Agency

Charles A. Zelle
Commissioner
Minnesota Department of Transportation

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U.S. Environmental Protection Agency
1200 Pennsylvania Avenue N.W.
Mail Code 1101A
Washington, D.C. 20460

APR 24 2017

CLA-LMP 20460

E. Scott Pruitt
Administrator

June 19, 2017

Mr. John Linc Stine
Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155-4194

Dear Commissioner Stine:

Thank you for writing to share your thoughts about the Midterm Evaluation Final Determination for Model Year 2022-2025 greenhouse gas standards issued by the U.S. Environmental Protection Agency on January 12, 2017.

On March 22, 2017, the EPA and the U.S. Department of Transportation published a Federal Register notice announcing the EPA's intention to reconsider the Final Determination. In accordance with the schedule set forth in the EPA's regulations, the EPA will make a new Final Determination regarding the appropriateness of the MY 2022-2025 greenhouse gas standards no later than April 1, 2018. The Federal Register notice and other information regarding the Midterm Evaluation is available at https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle-greenhouse-gas-ghg.

Again, thank you for writing.

Respectfully yours,

E. Scott Pruitt

1200 Pennsylvania Ave. NW • Mail Code 1101A • Washington, DC 20460 • (202) 564-4700 • Fax: (202) 501-1450

This paper is printed with vegetable-oil-based inks and is 100-percent postconsumer recycled material, chlorine-free-processed and recyclable.

E. Scott Pruitt
Administrator

June 19, 2017

Mr. Charles A. Zelle
Commissioner
Minnesota Department of Transportation
395 John Ireland Boulevard
St. Paul, Minnesota 55155-4194

Dear Commissioner Zelle:

Thank you for writing to share your thoughts about the Midterm Evaluation Final Determination for Model Year 2022-2025 greenhouse gas standards issued by the U.S. Environmental Protection Agency on January 12, 2017.

On March 22, 2017, the EPA and the U.S. Department of Transportation published a Federal Register notice announcing the EPA's intention to reconsider the Final Determination. In accordance with the schedule set forth in the EPA's regulations, the EPA will make a new Final Determination regarding the appropriateness of the MY 2022-2025 greenhouse gas standards no later than April 1, 2018. The Federal Register notice and other information regarding the Midterm Evaluation is available at https://www.epa.gov/regulations-emissions-vehicles-and-engines/midterm-evaluation-light-duty-vehicle-greenhouse-gas-ghg.

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Respectfully yours,

E. Scott Pruitt

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This paper is printed with vegetable-oil-based inks and is 100-percent postconsumer recycled material, chlorine-free-processed and recyclable.

Thu Apr 13 12:40:46 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Illinois River TMDL
To: CMS.OEX@epamail.epa.gov

DRF

From: Save the Illinois River [mailto:info@illinoisriver.org]
Sent: Thursday, April 13, 2017 12:19 PM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Cc: (b) (6) Shellie Chard <Shellie.Chard@deq.ok.gov>; scott.thompson@deq.ok.gov
Subject: Illinois River TMDL

Mr. Pruitt...

Everyone is waiting on EPA to complete the TMDLs for the Illinois River and Tenkiller Lake. This was to have been completed years ago and failure to finish the studies may be damaging the economy of our region. Wastewater treatment plant permits are on hold and have been for ten years.

Attached is a copy of a letter our organizations presented April 12 to Scott Thompson, ODEQ director. I'm also sending it to EPA Region 6.

I trust that you are indeed in favor of clean water and clean air and that you will consider good science in protecting our natural resources. There is very good science behind Oklahoma's efforts to protect scenic rivers and Tenkiller Lake.

Sincerely,

Ed Brocksmith

Save the Illinois River, Inc.

CONSERVATION COALITION OF OKLAHOMA

BOARD OF DIRECTORS

Ron Suttles
BOARD CHAIR

Steven Bender
VICE CHAIR

Philip J. Hoey
TREASURER

Mike Fuhr

Krystina Phillips

Dr. Patrick Bell

FOUNDING MEMBER ORGANIZATIONS

Oklahoma Nature Conservancy

Quail Forever, 89ers Chapter

Whole Creation Community

Land Legacy

National Wildlife Federation

Tulsa Flyfishers Trout Unlimited

April 10, 2017

Scott Thompson, Director
Oklahoma Department of Environmental Quality:

For nearly two decades, the State of Oklahoma has identified the Illinois River, Barren Fork, Flint Creek and Lake Tenkiller as water quality impaired. These important waters are or are fed by state designated Scenic Rivers and have been placed in the very highest priority category for protected waters and development of Total Daily Maximum Load (TMDL) determinations (See Addendum). These TMDL's are required to address the source of impairments caused by excess nutrients in general and phosphorus in particular. Oklahoma has completed numerous water quality studies on its own, at public expense, as precursors to creating TMDLs for the waters in this basin. The problem is, no TMDLs have been proposed.

A step in the right direction was taken when the United States EPA announced in late 2009 that they would take the lead in addressing this admittedly difficult problem that involves two states and several tribal nations. In their initial letter announcing the project, EPA pledged to develop a "scientifically robust model of the Illinois River watershed" within 12 to 18 months. Further, EPA stated that the effort was expected to lead to the development of one or more TMDLs and that "EPA will take the lead in developing such TMDL(s)".

It has now been almost a decade since that letter was written and it is increasingly troubling that progress on development of the necessary TMDLs seems to have stalled. The last public meeting to provide a project update was in November 2013 and there have been no postings on the project website since the modeling was declared complete in September 2015. Given that Oklahoma has been unable to complete and implement these TMDLs, and take this next important step to control the causes of impairment for these waters, it is vital that EPA complete all necessary TMDLs for the Illinois River and Lake Tenkiller without further delay.

We strongly urge the Oklahoma Department of Environmental Quality and other state agencies and officials, to press EPA to complete the TMDL process as soon as possible and to override any attempts by political entities and affected special interest groups to delay or stop the TMDLs. Under the Clean Water Act, completion of TMDLs for impaired waters is not discretionary. EPA and the State are bound by the Act to complete this process.

WWW.OKLAHOMACONSERVATION.ORG
info@oklahomaconservation.org | P.O. Box 2571, Oklahoma City, OK 73101

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OF OKLAHOMA

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FOUNDING MEMBER ORGANIZATIONS

Oklahoma Nature Conservancy

Quail Forever, 89ers Chapter

Whole Creation Community

Land Legacy

National Wildlife Federation

Tulsa Flyfishers Trout Unlimited

We believe the recent scientific study of scenic river phosphorus levels and algae growth by Baylor University clearly supports Oklahoma's 0.037 mg/L numerical phosphorus limit. EPA and all other entities involved in this issue must recognize this study and use it in support of meaningful TMDLs for the Illinois and Lake Tenkiller. Arkansas, by signing the agreement with Oklahoma, is deemed to have accepted this approved standard.

Members of our organizations worked for adoption of this important water quality rule for our finest streams and to protect Lake Tenkiller. We believe that after nearly two decades of debate, accommodating rule extensions and multiple, extensive studies, that it is finally time to enforce the 0.037 mg/L limit and hold point source and nonpoint source polluters accountable by adopting and enforcing TMDLs to address these problems.

We await your response and look forward to learning of your plans to get this project back on track and finally complete the restoration of these aquatic resource treasures which are so important to the people of Oklahoma.

This letter is being submitted on behalf of the Conservation Coalition of Oklahoma and the organizations reflected below.

Sincerely,

Ron Suttles

Ron Suttles
Board Chair
Conservation Coalition of Oklahoma

Save the Illinois River (STIR)

Denise Dixon-Jayne

Greater Tenkiller Area Association

John H Ellis

Oklahomans for Responsible Water Policy (ORWP)

Richard E. Brown
Chairman

Trout Unlimited

Pat Daly

Sierra Club – Oklahoma Chapter

Mike Wenthe

CC: OWRB; OSE; EPA

WWW.OKLAHOMACONSERVATION.ORG
info@oklahomaconservation.org | P.O. Box 2571, Oklahoma City, OK 73101

From: Wooster, Richard
To: Johnson, LaGayla; Brown, Lashunda; Weber, Gina
Subject: Clearing AX-17-000-7518 Brocksmith - TMDL for the Illinois River and Lake Tenkiller DIRECT REPLY
Date: Wednesday, April 26, 2017 3:17:04 PM
Importance: High

Hey team – See below for the email Bill Honker sent to Ed Brocksmith this afternoon which closes out the subject control. Let me know if you have any questions.

richard

Richard A. Wooster
Chief, Assessment, Listing and TMDL Section
(214) 665-6473

From: Honker, William
Sent: Wednesday, April 26, 2017 2:14 PM
To: Save the Illinois River <info@illinoisriver.org>
Cc: Shellie Chard <Shellie.Chard@deq.ok.gov>; scott.thompson@deq.ok.gov; Ed Fite <efite@grda.com>; Shanon Phillips <shanon.phillips@conservation.ok.gov>; Gray, David <gray.david@epa.gov>; Shapiro, Mike <Shapiro.Mike@epa.gov>; 'julie.cunningham@owrb.ok.gov' <julie.cunningham@owrb.ok.gov>
Subject: RE: TMDL letter to ODEQ

Mr. Brocksmith:

Thank you for your email providing me a copy of the April 10, 2017, letter from the Conservation Coalition of Oklahoma to Oklahoma Department of Environmental Quality Director Scott Thompson. EPA appreciates your continued interest in restoring water quality in the Illinois River and Lake Tenkiller and we remain fully committed to working with our state and tribal partners to achieve water quality standards in both Arkansas and Oklahoma. We are continuing to work with agencies in both states as well as with the Cherokee Nation to achieve that shared goal.

While our efforts to develop scientifically robust and defensible models of the watershed and lake have taken longer than we initially anticipated, we have made substantial improvements in the calibration of our water quality models. Our recent progress is significant and reflects the full engagement with a technical workgroup, which included technical staff from not only EPA Region 6, but also from the Cherokee Nation; the Oklahoma Department of Environmental Quality; the Oklahoma Water Resources Board; the Oklahoma Conservation Commission; the Oklahoma Department of Agriculture, Food, and Forestry; the Arkansas Department of Environmental Quality; the Arkansas Natural Resources Commission; and, the University of Arkansas Water Resources Center. As the result of six face-to-face meetings of technical staff from these organizations over the past year, we have been able to work through and address many state and tribal concerns which

would have impacted the ultimate utility of our models for decision-making.

As part of the last meeting of our technical workgroup, we discussed the members' desire to provide management updates within their respective organizations and to schedule informational meetings with affected stakeholders and the public at large. Such meetings will provide an opportunity for EPA and our partners to discuss the status of our efforts and receive questions/comments which the technical workgroup should consider before finalizing our watershed model. While we have not yet finalized the timing for the public meetings, our intention remains to conduct an afternoon informational session structured for a more-technical audience (e.g., consultants, water quality practitioners, etc.) followed by an evening session tailored to a broader spectrum of potential attendees. Once set, the date and times for these meetings will be publicly announced well in advance, and the technical workgroup will accept written comments for at least 30 days after the meetings.

We will ensure that you receive prompt notice of the meetings when scheduled. Meanwhile, should you have any additional questions or concerns, please feel free to contact Richard Wooster, Chief of the Region 6 Assessment, Listing and TMDL Section. Richard may be reached at wooster.richard@epa.gov or by phone at (b) (6) Again, thank you for your help in addressing water quality impairments in the Illinois River Watershed.

Bill

William K. Honker, P.E.
Director, Water Division
EPA Region 6
1445 Ross Ave., Suite 1200
Dallas, TX 75202
214-665-3187

From: Save the Illinois River [mailto:info@illinoisriver.org]
Sent: Thursday, April 13, 2017 6:32 PM
To: Honker, William <honker.william@epa.gov>
Cc: Denise Deason-Toyne <ddtoyne@gmail.com>; Bob Kellogg <okbob@cox.net>; Shellie Chard <Shellie.Chard@deq.ok.gov>; scott.thompson@deq.ok.gov; Ed Fite <efite@grda.com>; Shanon Phillips <shanon.phillips@conservation.ok.gov>; Ron Suttles <ronsuttles@aol.com>; Pat Daly <pat@cimtel.net>; Derichsweiler, Mark <mderichsweiler@cox.net>; jhellis@sequoyahfuels.com
Subject: TMDL letter to ODEQ

Mr. Honker...

Groups recently met with Oklahoma Department of Environmental Quality Director Scott Thompson to discuss the EPA TMDLs for the Illinois River and Tenkiller Lake. These TMDLs appear to be stalled and we wish to see them completed so that Oklahoma's water quality

standards can be enforced. Attached is a letter we prepared for ODEQ, Oklahoma Secretary of Environment and EPA.

Wastewater treatment plant permits have been on hold during the TMDLs development and cities such as Tahlequah, Oklahoma don't know what limits to build for. The economy of our region may be jeopardized by the fact the TMDL process is taking an unreasonable about of time to complete.

Sincerely,
Ed Brocksmith
Save the Illinois River, Inc. (STIR)

(b) (6)
www.illinoisriver.org

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Daniel Yergin
Vice Chairman, IHS Markit
1150 Connecticut Ave NW
Suite 400
DC 20036

THE ADMINISTRATOR

Dear Dan —

Wonderful to spend time with you yesterday ... I appreciated your connecting me the recommendation to connect with Steven Koonin, which we already have. Thank you for the referral! I look forward to connecting again soon.

Sincerely,

Scott

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UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Jack Welch
11985 Lost Tree Way
W. Palm Beach FL

THE ADMINISTRATOR

Dear Jack —

Great to meet you yesterday... Please know I appreciated your very kind and encouraging words. I am thankful for your leadership & behalf of our Country, and I do hope to see you again soon.

Sincerely,
Scott

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UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

Lawrence Fish
Blackrock
55 E. 52nd St
NYC 10055

THE ADMINISTRATOR

Dear Larry —

Great to meet you yesterday...
Please know I appreciated your remarks and feedback and — excited about the opportunities before us with the President's leadership!
I look forward to seeing you again soon.

Sincerely,

Scott

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Thu Apr 13 12:52:43 EDT 2017
Hope.Brian@epamail.epa.gov
FW: Reductions are a great idea and hopefully will target correctly programs and staff
To: CMS.OEX@epamail.epa.gov

DRF

From: mark townsend [mailto:t (b) (6)]
Sent: Thursday, April 13, 2017 9:29 AM
To: Pruitt, Scott <Pruitt.Scott@epa.gov>
Subject: Reductions are a great idea and hopefully will target correctly programs and staff

as a retired manager at EPA I have been threatened by staff myself and believe you need protection and I believe that EPA is filled with dead wood staff and dead wood programs.

The PARs rating scores for staff is an absolute failure at the fully successful level. Many of those staff merely float about the office and if a manager is lucky do not cause problems. I had eight grievances against me when I retired at that time I had staff doing no work. This was the approach offered to me as a mid level manager by at least 8 SES staffers. Do not rock the boat was the guidance offered time and again.

Sadly, I do not think you will be able to target and selectively nuke poor or non-performers. Your pool of Satisfactory performers is likely 20 -30 stuffed with fluff.

Programs you could and should target are those which have completed their regulatory tasks and now focus on creating new work (lower the thresholds... do more research). TSCA and RADON and OEI are over staffed and repeating same work over and over again. I am sure you are aware of this and hope you focus on those efforts seeking one more significant digit for the sake of research. Even ORD should not be a research program but only a small staff to offer technical reviews of other organizations products.

Most Toxic chemicals have been studies to death. Exposures are broad and not exact. And risk should be determined at the source and not nationally.

I am interested in your efforts to tighten up EPA

RIFFs are sadly generic and do not selectively target dead wood. they target youngest or first in first out. I hope you can find a better mechanism.

Oh and your CADRE of SES staffers is filled with friends and family and you should be careful whom you listen too.

Mark W Townsend

MBA Public Policy

MS Veterinary Microbiology

Ret BC EPA TSCA Existing Chemicals

Screening and Review