

THE IMPACTS OF COAL ASH ON MICHIGAN'S WATER QUALITY



MICHIGAN
ENVIRONMENTAL
COUNCIL

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About Michigan Environmental Council

Michigan Environmental Council is a coalition of more than 70 organizations created in 1980 to lead Michigan's environmental movement in achieving positive change through the political process. We bring a solutions-oriented approach to our work, combining deep environmental and public health policy expertise with decades of experience in working with diverse stakeholders to achieve results. We work closely with our member organizations and partners in environmental, conservation, public health, and faith communities to protect our Great Lakes, promote healthy cities, safeguard our drinking water, and establish clean energy policies for a vibrant, sustainable future.

For More Information

Please contact:

Charlotte Jameson, Program Director —
Legislative Affairs, Energy & Drinking Water

Abigail Wallace, Policy Specialist

Michigan Environmental Council

602 W. Ionia Street

Lansing, MI 48933

517-487-9539

www.environmentalcouncil.org

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EXECUTIVE SUMMARY

In October 2018, Michigan Environmental Council published a report that took an in-depth look at the impact of burning coal on Michigan’s waterways. The report focused on levels of groundwater contamination caused by coal combustion residuals, or coal ash. Coal ash waste is the substance left behind after coal is burned. It contains mercury, lead, arsenic and other toxic heavy metals. This is a continuation of that report, and it analyzes newly released groundwater monitoring data from 2018 and 2019.

Nationally and in Michigan, coal-fired power plants’ toxic heavy metals and other pollutants continue to be a major source of water contamination. Coal plants contaminate ground and surface water with toxins through three primary pathways:

- Combusting coal and fugitive dust from coal piles into the air, which then end up in water bodies.
- Discharging toxic wastewater into water bodies via surface runoff from coal plant sites or direct discharge.
- Leaching toxins into groundwater from unlined wet coal ash waste pits.

In 2018, more than 470 coal-fired electric utilities nationwide generated approximately 102.8 million tons of coal ash¹. While coal ash production has decreased due to recent closures of coal plants, coal ash remains the second largest industrial waste stream in the United States, second only to mine waste. In 2018, nine of Michigan’s coal plants that reported waste generation information to the Energy Information Administration generated over 1.5 million tons of coal ash waste. DTE Energy’s Monroe coal plant accounted for 56% of the coal ash generated annually (See Appendix A).¹

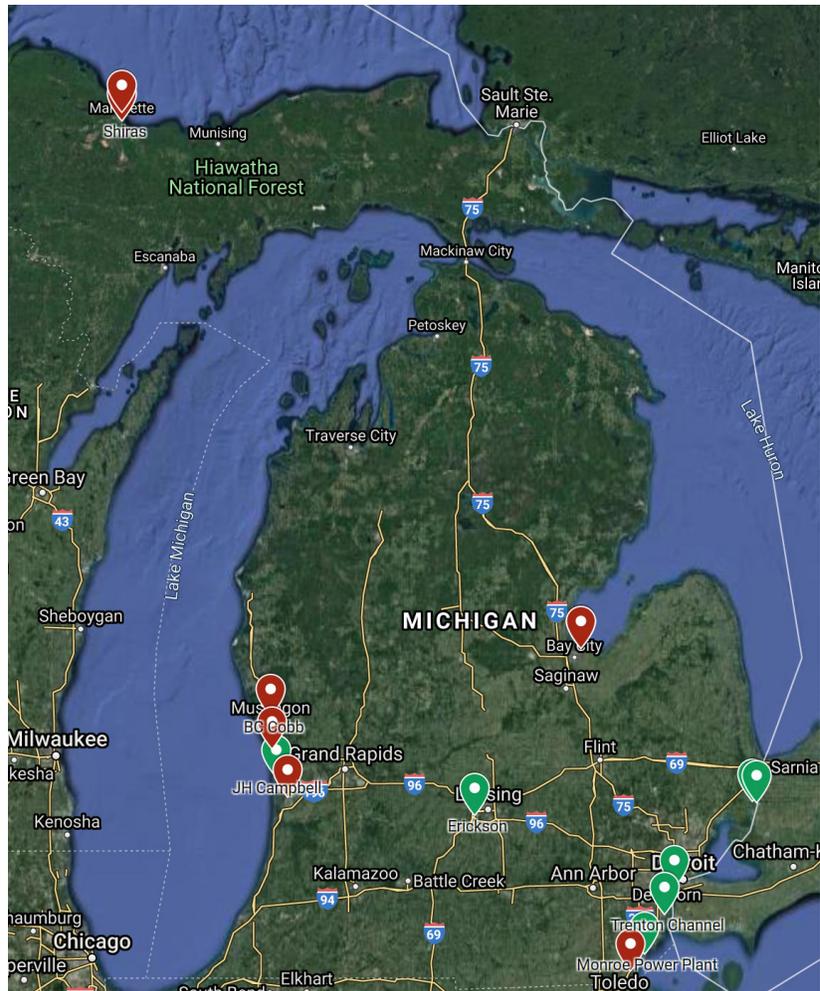
Utilities store dry coal ash waste on-site in landfills and wet coal ash waste in large holding “ponds,” otherwise known as impoundments or pits. The US Environmental Protection Agency (EPA) estimates coal ash is stored in over 310 active landfills and an estimated 735 active

The vast majority of wet coal ash holding “ponds” do not have even simple protective liners in place.

surface impoundments across 47 states.² In Michigan, there are 14 coal ash ponds and landfills that are actively receiving coal ash waste. However, due to the risks that coal ash sites pose, the federal rule still requires utilities to provide groundwater monitoring data and other data for coal ash sites that were in operation in 2015 when the federal rule went into effect. In total, utilities in Michigan maintain websites that host information on 25 coal ash landfills or ponds across the state.³

Because coal ash waste was not regulated on the federal level until 2015, the vast majority of the wet coal ash holding ponds do not even have simple protective liners in place. Most wet coal ash impoundments are dug directly into the ground and are constructed with simple earthen berms. The direct contact between the wet

Coal ash sites in Michigan are primarily located along Great Lakes shorelines and their waterways. Consumers Energy sites JH Campbell and DE Karn and the Holland De Young site are located on the shore and waterways of Lake Michigan in Ottawa County. The Consumers Karn site is on Saginaw Bay in Lake Huron. DTE Energy sites are clustered along Lake Erie's shore and waterways, including Monroe, Trenton Channel, River Rouge, Belle River and St. Clair. The WE Energies Shiras site is on the Lake Superior shore in Marquette.





waste and the ground (and in some cases, groundwater) allows toxic chemicals to leech and infiltrate directly into our groundwater or potentially spill over or break through the berm barriers into nearby waterways.

A review of groundwater monitoring data from 2017 through 2019 shows there is widespread groundwater contamination under the majority of coal ash ponds in Michigan. MEC's 2018 report demonstrated that 77% of coal ash impoundments had documented groundwater contamination above environmental and health standards.⁴ Federal regulations of coal ash require utilities to do heavy metal sampling as part of their background data collection undertaken in 2017. After that, utilities can demonstrate another source is the cause of groundwater contamination and thereby negate the need to do additional rounds of groundwater monitoring for heavy metals. DTE provided heavy metal sampling in 2017 and then completed this alternative source demonstration for the majority of its coal ash impoundments.⁵ This re-

Coal ash is stored in “ponds” often near lakes and rivers we use for recreation and drinking water.

port therefore has no data on heavy metal concentration in groundwater under a number of DTE coal ash impoundments after 2017.

Despite the lack of groundwater monitoring data from the majority of DTE's ponds and landfills, it is still very clear that Michigan's groundwater is being contaminated by coal ash. A review of 2018 and 2019 monitoring data shows that of the 15 coal ash disposal sites with publicly available heavy metal groundwater monitoring data, 80% had levels of toxic chemicals like arsenic and lead in the groundwater above state or federal water standards (see Appendix B). Examples of especially concerning groundwater contamination include:

- Consumers' DE Karn bottom ash pond and lined impoundment in Bay County. One monitoring well read arsenic levels at 42 times and 44 times the federal drinking water standard.⁶



The Consumers Energy JH Campbell Power Plant in Ottawa County is located on the shore of Lake Michigan. A bottom ash pond monitoring well read arsenic levels at 5.7 times the federal drinking water standard. PHOTO: Consumers Energy.

- A monitoring well at Marquette's Shiras holding pond. It registered lead levels close to 60 times higher than Michigan's residential and nonresidential drinking water standard.⁷
- Consumers' bottom ash pond at JH Campbell power plant in Ottawa County. A monitoring well read arsenic levels at 5.7 times the federal drinking water standard.⁸
- A DTE River Rouge bottom ash basin. A monitoring well read arsenic levels at 17 times the federal level.⁹

Key Takeaways and Policy Recommendations

While missing monitoring data makes drawing trends and conclusions difficult, it is not impossible. The data lay plain that we have not yet seen a clear improvement in addressing or stopping groundwater contamination from coal ash in Michigan. As coal plants close in Michigan in the coming years, utilities have begun the process of closing waste sites. There is hope that Michigan will see improvements in groundwater contamination going forward given these closures. However, that progress is slow and not assured.

Furthermore, Michigan utilities are closing some coal ash ponds that are leaking and causing groundwater contamination by capping the coal ash and leaving it in place. By not closing the ponds and fully removing the coal ash, those sites will continue to leak and contaminate groundwater for decades to come despite the closure of the coal plant itself.

To fully protect our groundwater, Michigan decision-makers should consider the following policy recommendations:

- Require utilities to report groundwater monitoring data for toxic heavy metals.
- Ensure the Department of Environment, Great Lakes and Energy (EGLE) conducts a thorough review and evaluation of all alternative source demonstrations.
- Ensure corrective action plans and remediation plans that the utilities develop in coordination with EGLE require the full cleanup of groundwater contamina-

Our analysis showed that 80% of coal ash impoundments had documented groundwater contamination above environmental and health standards.

The data lay plain that we have not yet seen a clear improvement in addressing or stopping groundwater contamination from coal ash in Michigan.

tion caused by decades of coal burning and coal ash disposal.

- Initiate administrative actions requiring timely closure and removal of coal ash sites leaking and contaminating groundwater as allowed under Michigan statute.
- Ensure communities most impacted by contamination from coal ash, which are often made up of low-income and BIPOC individuals, benefit the most from cleanup efforts.
- Regulate so-called inactive coal ash ponds and landfills and require utilities to provide documentation on their location and current closure status.
- Require rules around aquifer separation distances account for periods of high water.
- Support policies ensuring Michigan fully transitions to waste-free forms of energy like wind and solar; closes all remaining coal plants by 2030; and has just transition plans in place ensuring the benefits of transition to renewable energy are shared equitably.

The Trump administration also issued three rules weakening the 2015 federal coal ash rule. It is critical that Michigan guards against these federal rollbacks and maintains strong protections by:

- Maintaining the closure timelines for coal ash ponds as enacted in the 2015 federal regulations instead of the delayed timelines proposed by the Trump administration.
- Ensuring that all coal ash disposal sites adequately monitor groundwater.
- Ensuring that loopholes for forced closure of leaking and unlined ponds are not expanded.

Our Great Lakes, rivers, streams and drinking water face significant challenges from contamination. Manufactured toxins like PFAS and green ooze on the highway are rightly grabbing attention, but decision-makers in Michigan should not overlook the huge volume of toxins from coal-fired power plants that are putting our water and the health of Michigan communities at great risk. Michigan's economy and quality of life depend on clean drinking water and healthy Great Lakes.

INTRODUCTION

In 2015, the United States Environmental Protection Agency (EPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR). CCR is a blanket term, used broadly to describe the different types of coal ash: fly ash, bottom ash, boiler slag and flue gas desulfurization sludge.¹⁰ The rule's provisions included location restrictions; design and operating criteria; regular groundwater monitoring and corrective action remediation requirements; and closure and post-closure care requirements. It also required



A dike on a coal ash pond ruptured at the Kingston Fossil Plant in Tennessee, in December 2008, spilling 1.1 billion gallons of toxic sludge across 300 acres. It damaged or destroyed 40 nearby homes, polluted the Emory and Clinch Rivers with coal ash, and cost \$3 billion in clean up and economic impacts. PHOTO: Dot Griffith via Appalachian Voices.

The 2015 EPA rule was the first time the federal government regulated coal ash disposal and handling.

owners and operators of CCR units to maintain a publicly-accessible website of rule compliance information. The 2015 rule was the first time the federal government regulated coal ash disposal and handling.

While many groups have advocated for decades for greater government water and air protections from coal ash waste, the federal rule was largely a reaction to several high-profile coal ash spills and disasters.

In 2008, coal ash was in the public eye when a dike burst at a coal ash pond at the Tennessee Valley Authority's Kingston Fossil Plant. Approximately 5.4 million cubic yards of coal ash slurry spilled, extending 300 acres away from the plant. Homes were damaged and the cleanup took years. The disaster was the largest toxic waste spill in U.S. history and was designated a Superfund cleanup site.¹¹ In 2011, a coal ash spill at We Energies Oak Creek Power Plant in Milwaukee County, Wisconsin led to an unknown quantity of coal ash, dirt and debris spilling into Lake Michigan.¹² In 2014, Duke Energy's Dan River Steam Station in Eden, North Carolina leaked 39,000 tons of ash and 27 million gallons of ash pond water into the nearby Dan River, polluting 70 miles of river in North Carolina and Virginia.¹³

While the 2015 federal coal ash rule contained many significant provisions, key was the requirement for utilities to regularly monitor groundwater and publicly report results. The rule was the first time that utilities across the nation were required to monitor groundwater, and it was the first time advocates had access to comprehensive data on the state of groundwater contamination from coal ash. MEC's 2018 report was based on the first round of Michigan utility monitoring which was conducted in 2017. In this updated report, MEC revisits the monitoring data utilities have reported since and looks at what progress has been made by utilities in addressing groundwater contamination.

HEALTH IMPACTS OF COAL ASH

Coal plant waste and emissions are detrimental to environmental and human health. Coal ash typically contains heavy metals including arsenic, lead, mercury, cadmium, chromium, selenium, aluminum, antimony, barium, beryllium, boron, chlorine, cobalt, manganese, molybdenum, nickel, thallium, vanadium and zinc.¹⁴ If eaten, ingested, or inhaled, these toxins can cause cancer and nervous system impacts such as cognitive deficits, developmental delays and behavioral problems. They can also cause heart damage, lung disease, respiratory distress, kidney disease, reproductive problems, gastrointestinal illness, birth defects and impaired bone growth in children.¹⁵



Living next to a coal ash disposal site can increase your risk of cancer or other diseases.

According to the EPA, living next to a coal ash disposal site can increase your risk of cancer or other diseases.¹⁶ People exposed to coal ash are also often exposed to multiple toxins at once. Unfortunately, the health impacts of cumulative exposure to these toxins has not been well researched or documented.

Fugitive dust from coal ash disposal sites can also have severe impacts on the health of the surrounding community and workers hired to clean up coal ash sites. For example, 30 laborers who worked for Jacobs Engineering, the firm that was hired to clean up the aforementioned TVA Kingston Fossil plant spill in 2008, are dead now, and 250 more are sick from exposure to the toxic waste material.¹⁷

A report from Earthjustice and Physicians for Social Responsibility documented the following:

“Fly ash particles (a major component of coal ash) can become lodged in the deepest part of your lungs, where they trigger asthma, inflammation and immunological reactions. Studies link these particulates to the four leading causes of death in the U.S.: heart disease, cancer, respiratory diseases and stroke. In addition, respirable crystalline silica in coal ash can also lodge in the lungs and cause silicosis or scarring of lung tissue, which can result in disabling and sometimes fatal lung disease and cancer. Lastly, the presence of heavy metals in coal ash, such as lead, arsenic and hexavalent chromium, and the radioactivity of some ashes may increase the harm caused by inhalation.”¹⁸

Finally, human health can be compromised by eating fish from waterways that are contaminated by coal pollution toxins. Mercury is one of the main toxins that is found in coal ash waste and is extremely dangerous to humans if ingested. In Michigan, mercury contamination has led to fish advisories and contaminated waterways across the state.

Disproportionate Impacts

Minority and low-income communities are at greatest risk of exposure to coal toxins and shoulder a disproportionate amount of the negative health impacts. This is due both to those communities' closer proximity

to coal plants (since many coal plants were historically sited in communities of color) and greater consumption of fish from contaminated water bodies. Nearly 6 million people live in a 3-mile radius of a coal-fired power plant in the US, and a disproportionate number of those people are low income and people of color.¹⁹ Living so close to coal-burning power plants has proven health consequences. Sulfur dioxide is one of the main pollutants produced by these plants. It causes coughing, wheezing and nasal inflammation. It can also cause or increase the severity of asthma, which is common in communities of color. Black Americans are hospitalized for asthma at three times the rate of white Americans, and the death rate from asthma is 172% higher for Black people than for white people.²⁰

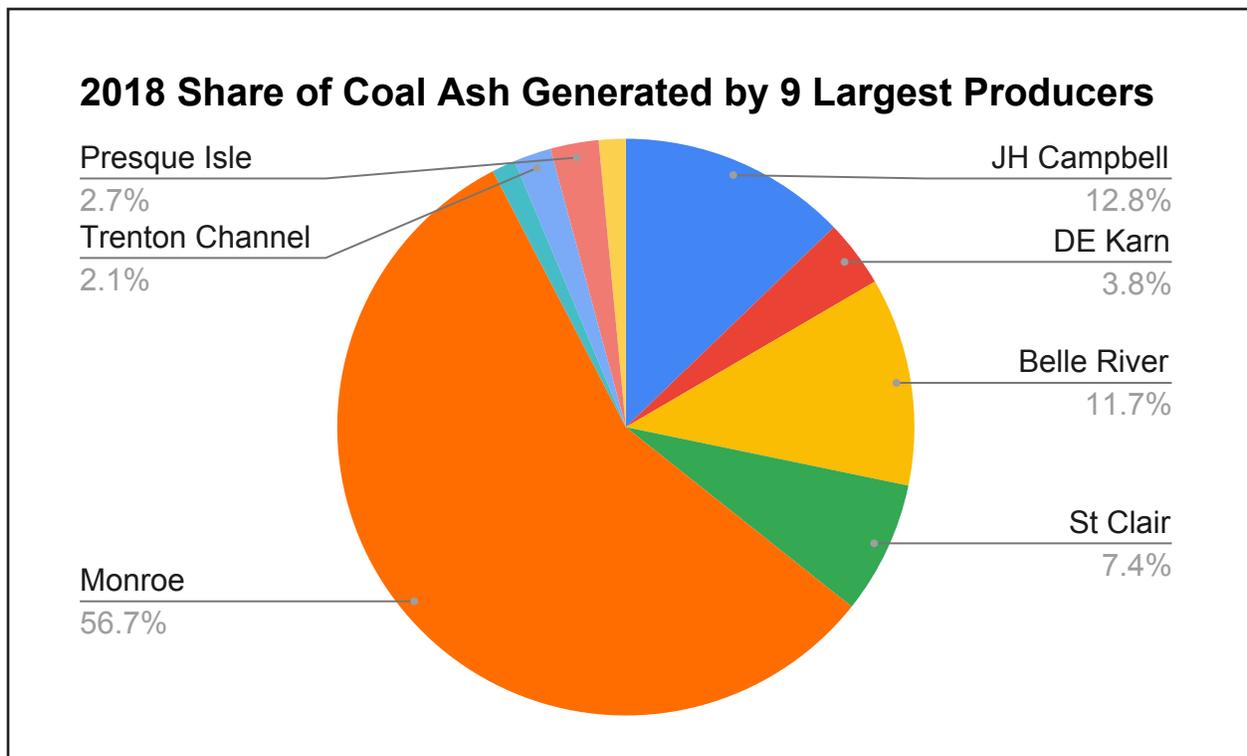


Mercury is one of the main toxins found in coal ash waste. In Michigan, mercury contamination has led to fish advisories and contaminated waterways across the state. PHOTO: Fishing from Belle Isle on the Detroit River by Michigan Municipal League via Flickr.

COAL ASH GENERATION

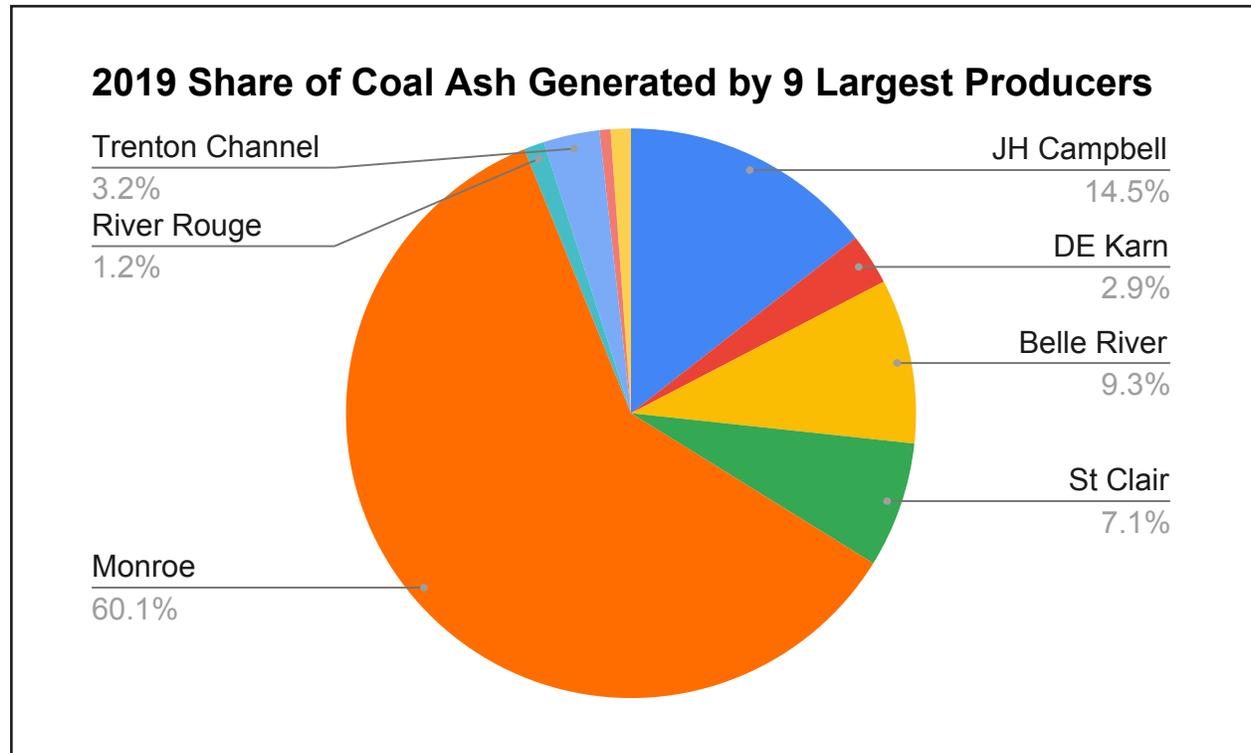
In the U.S., coal ash is the second largest form of industrial waste. According to the EPA, more than 470 coal-fired electric utilities burned over 800 million tons of coal and generated approximately 110 million tons of coal ash in 2012.²¹

Electric generation in Michigan is still dependent upon coal, although utilities are starting the process of transitioning away from this source of energy. In 2019, coal still fueled the largest share of Michigan's electricity generation: about 32%. DTE Energy in particular is still heavily reliant on coal generation, with 58.56% of its energy coming from coal-fired plants.²²



Data from Energy Information Administration, "Power Plant Operations Report." Chart includes Erickson (1.5%) and River Rouge (1.3%). For the amount of coal ash generated in tons, see Appendix A.

Since the 2018 report by MEC, two more coal-fired power plants have shut their doors in Michigan. JB Sims Power Plant in Grand Haven ceased operations in February 2020 and will source 100% of its former power through the Michigan Public Power Agency and is exploring the possibility of building small-scale natural gas fired generation on Harbor Island.²³ Presque Isle Power Plant in Marquette was replaced in March 2019 with two new gas-fired plants.²⁴ In 2016, the 13 largest coal plants in Michigan generated 1,439,200 tons of coal ash waste, with the Monroe power plant generating over half. That trend continued into 2018 and 2019, with Monroe Power Plant continuing to be the largest source of coal ash generated in Michigan.²⁵



Data from Energy Information Administration, "Power Plant Operations Report." Chart includes Erickson (1.2%) and Presque Isle (0.6%). For the amount of coal ash generated in tons, see Appendix A.

GROUNDWATER CONTAMINATION FROM COAL ASH IN MICHIGAN

Two coal ash ponds at the Harbor Island JB Sims power plant in Grand Haven flooded in July 2020 due to high water levels.

For decades, utilities routinely dumped toxic coal ash into unlined ponds dug into the ground on coal plant sites. Some utilities even construct the waste ponds directly in water bodies. For example, the holding pond at the Shiras coal plant in Marquette was constructed of five cells bound on the north and south by ripped shoreline and separated from Lake Superior by sheet pile walls. DTE's Monroe bottom ash pond was constructed in Lake Erie by taking a low area of the lake and building up an earthen dyke to separate the holding pond from the lake.²⁷

The absence of protective impervious liners to separate the coal ash waste from the ground and groundwater and the proximity of the waste ponds to water bodies and the water table resulted in the widespread leaching of toxins into groundwater and into nearby lakes and rivers.

Additionally, Michigan saw record-high water levels throughout the Great Lakes which eroded coastal shoreline, inundated inland water bodies and landscapes, and raised the water table. For inland communities, higher water levels threatened critical infrastructure like private wells and septic systems. While it is relatively easy to observe changes in surface water levels due to increased precipitation, the same cannot be said for shallow and deep groundwater. Michigan, like most states, lacks the data and modeling capacity to fully understand the connections between precipitation, surface water and groundwater.

Absent this, and as climate change continues to fuel intensifying precipitation events, utilities and the state should caution the placement of coal ash ponds and impoundments given the uncertainty and risk. In fact, the Harbor Island JB Sims power plant in Grand Haven



DTE's Monroe bottom ash pond was constructed in Lake Erie by taking a low area of the lake and building up an earthen dyke to separate the holding pond from the lake. PHOTO: Ted Auch, FracTracker Alliance, 2020.

saw two of its three coal ash ponds flooded in July 2020 due to high water levels.²⁸ The federal CCR rule requires a one-time documentation from utilities that there is a separation between the uppermost part of an aquifer and the lowest depth of a coal ash impoundment. If that separation distance is insufficient or non-existent, utilities must move to close those coal ash impoundments. However, in the rule that is a one-time demonstration, and it does not account for instances where highwater raises the water table, potentially bringing the coal ash impoundment directly or more closely into contact with groundwater.

GROUNDWATER MONITORING RESULTS

In 2017, utilities, as required by federal law, collected and published groundwater monitoring data around coal ash ponds for the first time. That data showed that about 95% of the 1,400 coal ash waste sites across the country have contaminated groundwater.²⁹ MEC's previous coal ash report showed that 77% (17 of 22) of coal ash landfills or ponds in Michigan with publicly available groundwater monitoring data had levels of toxic chemicals like arsenic and lead in the groundwater above state or federal water standards.³⁰ While clear documentation of the widespread groundwater contamination caused by leaking coal ash ponds is concerning, the 2017 monitoring data also showed examples of extremely high levels of that contamination at particular sites. At Consumers' Karn bottom ash pond in Essexville, one monitoring well read arsenic levels at 52 times the federal drinking water standard. Samples from three out of five down-gradient wells at Consumers' JH Campbell bottom ash ponds in Ottawa County exceeded the EPA's maximum contaminant level for arsenic in drinking water by up to 4.5 times. Another monitoring well at DTE's Belle River Plant diversion basin registered lead levels close to six times higher than the cleanup standard for lead in Michigan.³¹

Unfortunately, 2017 is the last year readings on toxic heavy metals are available for all but two of DTE's coal ash waste sites. Almost all other utilities in Michigan could not complete alternative source demonstrations and therefore were required to monitor for heavy metals in metals in 2018 and 2019.

Despite the lack of comprehensive data, MEC's research shows the trend in groundwater contamination from coal ash waste has not substantially improved. A review of 2018 and 2019 monitoring data shows that of the 15 coal ash disposal sites with publicly available heavy metal groundwater monitoring data, 80% had levels of

toxic chemicals like arsenic and lead in the groundwater above state or federal water standard (see Appendix B). Examples of especially concerning groundwater contamination include:

- Consumers' DE Karn bottom ash pond and a lined impoundment in Bay County, where one monitoring well read arsenic levels at 42 times and 44 times the federal drinking water standard.³²
- A monitoring well at Marquette's Shiras power plant holding pond, registering lead levels close to 60 times higher than Michigan's residential and nonresidential drinking water standard.³³
- Consumers' bottom ash pond at JH Campbell power plant in West Olive, MI, where a monitoring well read arsenic levels at 5.7 times the federal drinking water standard and exceedances of cobalt, lithium, mercury, molybdenum, selenium and thallium.³⁴
- A DTE River Rouge bottom ash basin where a monitoring well read arsenic levels at 17 times the federal level.³⁵
- James De Young's bottom ash impoundment in Holland, where monitoring wells read arsenic levels 5.6 times higher than the EPA's maximum contaminant levels and lead levels 6.75 times higher than Michigan's residential drinking water standard.³⁶

Data Gaps

Federal regulations of coal ash require utilities to sample heavy metal as part of their background data collection undertaken in 2017. After that utilities can complete an alternative source demonstration (ASD) and show that another source is the cause of groundwater contamination. Once an ASD is completed, the federal rule does not require utilities to conduct groundwater monitoring for heavy metals. DTE provided heavy metal sampling in 2017 as part of its background monitoring and then completed ASDs for the majority of its coal ash impoundments, indicating the company's coal ash units are located in areas with thick, glacially compacted clay deposits below them.³⁷ This report therefore has no data on heavy metal concentration in groundwater after 2017 for coal ash sites at Trenton Channel, Belle

Michigan decision-makers should ensure utilities are monitoring for heavy metal contamination and providing data to the public so Michiganders have full knowledge of sites that are or could be contaminating water.



The DTE Trenton Channel Power Plant, with coal piles in the foreground, is located on the Trenton Channel of the Detroit River. PHOTO: Ted Auch, FracTracker Alliance, 2020.

River, St. Clair and all but one site at Monroe. Furthermore, no heavy metal monitoring data was available from Lansing Board of Water and Light's Erickson plant impoundment system.

It is noteworthy that in many cases where an ASD is conducted, coal ash waste disposal could still be the "alternative" cause of the water contamination. For example, inactive coal ash landfills at the power plant may be contributing to the groundwater contamination and could therefore be called an "alternative source." EPA categorized inactive coal ash sites as those no longer receiving waste but are located at sites of still operating power plants. Also, legacy ponds at power plants no longer producing energy were also exempt from the 2015 federal monitoring requirements, but many of these former ponds are located right next to active ponds and

are likely also leaking or the sources of legacy pollution. Legacy ponds no longer received coal ash waste as of 2015 are located at a plant that has stopped generating electricity prior to 2015. Data collected by the Environmental Integrity Project from 2010 through 2013 show that many of these inactive legacy sites are “leaking large quantities of toxins that are contaminating Michigan groundwater.”³⁸

The lack of comprehensive groundwater monitoring data is a clear example of a failing of federal regulations and inhibits Michiganders’ rights to know about levels of toxic contaminants in groundwater. Michigan decision-makers should ensure utilities are publicly reporting heavy metal monitoring data and providing data and location information on legacy and inactive coal ash ponds and landfills so Michiganders have full knowledge of sites that are or could be contaminating water.

Trump Administration Rollbacks of Coal Ash Protections

In 2015, the Obama administration finalized a new rule intended to protect water and air quality from coal ash. Previous to this rule, coal ash was considered exempt under the Resource Conservation and Recovery Act, which sets minimum standards for the management of hazardous and non-hazardous solid waste.³⁹

While this rule was a step in the right direction, it failed in several respects to fully protect ground and surface water from toxic coal ash contamination. Environmental groups challenged it in court, arguing many provisions were not protective enough of water quality. In 2018, the DC Court of Appeals agreed with environmentalists: the rule was inadequate. In particular, the Court called into question a provision allowing unlined ponds to continue receiving coal ash waste indefinitely until high levels of groundwater contamination were detected. Furthermore, the Court struck down a portion of the rule allowing ponds with a two-foot thick, compacted clay underlayment be classified as “lined” and therefore stay open, stating that the EPA ignored the risk of leakage from these ponds. The Court also struck down a provision of the rule that exempts inactive ponds at power plants that are no longer producing energy from regulation.⁴⁰

The lack of comprehensive groundwater monitoring data is a clear example of a failing of federal regulations.

Despite clear indications from the Court, the rule did not go far enough. The Trump administration continued to weaken the 2015 rule. It released Part A revisions to the coal ash regulations, which were published in July 2020. They pushed back the closure timeline for coal ash ponds to April 11, 2021 and allowed utilities to continue dumping toxic waste into ponds even after exceeding groundwater protection standards. The revisions also altered the alternative closure provisions granting certain facilities additional time to develop alternative capacity to manage their waste streams before they stopped receiving waste and initiated closure of their surface impoundments. Utilities can now demonstrate lack of capacity for coal ash and non-coal ash waste streams, which was not permissible under the 2015 rule, thus making the loophole around mandatory closure easier to obtain. Utilities will now be able to operate unlined ponds for 4.5 years longer than allowed under the 2015 rule. After ceasing disposal in the pond, utilities can also delay final closure until 2038 for coal ash ponds greater than 40 acres and until 2030 for ponds that are less than 40 acres. The rule also allows only 15 to 30 days for public comments on EPA approvals of extension, thereby severely restricting the public from the process.⁴¹

The rule does make a much-needed change, as ordered by the DC Court of Appeals, to the annual groundwater monitoring and corrective action report requirements, including a new requirement to summarize the monitoring results in the executive summary. The rule also revises the coal ash website requirements to ensure relevant facility information required by the regulations is easily available to the public.⁴²

Unfortunately, the Trump Administration didn't stop there. Trump's EPA continued to attack and try to weaken coal combustion residual rules with the release of its Part B rollbacks in October 2020, which allowed coal ash pits to remain open if the EPA determines that specific toxic chemicals are not yet contaminating groundwater at levels above federal standards and utilities claim the soil under them is impermeable.⁴³

However, one of the Executive Orders President Biden issued on his first day in office requires the EPA to review all four of the Trump era's coal ash rollbacks. Continued changes to federal rules are likely.

COAL ASH POLICY RECOMMENDATIONS

In 2018, Michigan enacted a state law to regulate coal ash disposal. The law largely codified the 2015 federal coal ash rules and gave the Michigan Department of Environment, Great Lakes, and Energy (EGLE) an enforcement and oversight role which the agency had previously not had over coal ash disposal.

The Michigan Legislature should revisit the law in light of the efforts to weaken the federal coal ash rules and in light of the data gaps documented by this report in groundwater monitoring.

Specifically, Michigan decision-makers should:

- Require utilities to report groundwater monitoring data for toxic heavy metals.
- Ensure the Department of Environment, Great Lakes and Energy (EGLE) conducts a thorough review and evaluation of all alternative source demonstrations.
- Ensure corrective action plans and remediation plans that the utilities develop in coordination with EGLE require the full cleanup of groundwater contamination caused by decades of coal burning and coal ash disposal.
- Initiate administrative actions requiring timely closure and removal of coal ash sites leaking and contaminating groundwater as allowed under Michigan statute.
- Ensure communities most impacted by contamination from coal ash, which are often made up of low-income and BIPOC individuals, benefit the most from cleanup efforts.
- Regulate so-called inactive coal ash ponds and landfills and require utilities to provide documentation on their location and current closure status.
- Require rules around aquifer separation distances account for periods of high water.

- Support policies ensuring Michigan fully transitions to waste-free forms of energy like wind and solar; closes all remaining coal plants by 2030; and has just transition plans in place ensuring the benefits of transition to renewable energy are shared equitably.

The Trump administration also issued three rules weakening the 2015 federal coal ash rule. It is critical that Michigan guards against these federal rollbacks and maintains strong protections by:

- Maintaining the closure timelines for coal ash ponds as enacted in the 2015 federal regulations instead of the delayed timelines proposed by the Trump administration.
- Ensuring that all coal ash disposal sites adequately monitor groundwater.
- Ensuring that loopholes for forced closure of leaking and unlined ponds are not expanded.

Coal ash waste is a dangerous material that has been treated lightly by the EPA and federal government for far too long. A comparison of MEC's 2018 report and this report show a continuing trend of coal ash landfills and ponds contaminating the groundwater and streams around them with toxic chemicals like arsenic and lead. Lawmakers should take steps to ensure that leaking ponds are not contaminating Michigan's communities and citizens.

DTE Energy has scheduled to close the Belle River Power Plant in 2023, but its coal ash diversion basin, bottom ash basins and landfill—all within close proximity to the St. Clair River—are not estimated to close until 2030-2034.



NOTES

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Appendix A

Coal Ash Generated by Coal Plants in Michigan (2018 and 2019)

| Plant Name | Location | Owner | 2018 Coal Residual Annual Amount Generated (Thousand Tons) | 2019 Coal Residual Annual Amount Generated (Thousand Tons) |
|-----------------|-------------|-------------|--|--|
| JH Campbell | West Olive | Consumers | 199.1 | 204.1 |
| DE Karn | Essexville | Consumers | 58.6 | 41.1 |
| Belle River | East China | DTE | 181.4 | 132 |
| St Clair | East China | DTE | 115.6 | 100.8 |
| Monroe | Monroe | DTE | 880.5 | 880.5 |
| River Rouge | River Rouge | DTE | 20.6 | 16.5 |
| Trenton Channel | Trenton | DTE | 32.5 | 44.9 |
| Erickson | Lansing | LBWL | 23.5 | 16.2 |
| Presque Isle | Marquette | WE Energies | 42.0 | 8.8 |
| Total | - | - | 1553.8 | 1412.9 |

Data compiled by Michigan Environmental Council from Energy Information Administration, "Power Plant Operations Report," (Form 2018 EIA-923 and Form 2019 EIA-923), 8/26/2020 <https://www.eia.gov/electricity/data/eia923/>

Appendix B

Ground Water Monitoring Results By Coal Ash Unit (2019)

Methodology: MEC compiled the following results from EPA-required annual groundwater monitoring data reported by the utilities in the state. The EPA's final Coal Combustion Residuals rule requires two-stage groundwater monitoring. The first stage monitors for nontoxic 'Appendix III' constituents, which indicate if materials are leaking from the unit. If exceedances are detected, the utility is required to test samples for an expanded set of constituents that the EPA has determined are dangerous to human and environmental health.

| Constituent | Unit | EPA MCL | MI Residential* | MI Non-Residential* | MI GSI [^] |
|------------------------|-------|--------------------|------------------|---------------------|---------------------|
| Appendix III | | | | | |
| Boron | ug/L | NC | 500 | 500 | 7,200 |
| Calcium | mg/L | NC | NC | NC | 500 |
| Chloride | mg/L | 250** | 250 | 250 | 500 |
| Fluoride | ug/L | 4,000 | NC | NC | NC |
| Sulfate | mg/L | 250** | 250 | 250 | 500 |
| Total Dissolved Solids | mg/L | 500** | 500 | 500 | 500 |
| pH, Field | SU | 6.5 - 8.5** | 6.5 - 8.5 | 6.5 - 8.5 | 6.5 - 9.0 |
| Appendix IV | | | | | |
| Antimony | ug/L | 6 | 6.0 | 6.0 | 130 |
| Arsenic | ug/L | 10 | 10 | 10 | 10 |
| Barium | ug/L | 2,000 | 2,000 | 2,000 | 820 |
| Beryllium | ug/L | 4 | 4.0 | 4.0 | 18 |
| Cadmium | ug/L | 5 | 5.0 | 5.0 | 3.5 |
| Chromium | ug/L | 100 | 100 | 100 | 11 |
| Cobalt | ug/L | NC | 40 | 100 | 100 |
| Fluoride | ug/L | 4,000 | NC | NC | NC |
| Lead | ug/L | NC | 4.0 | 4.0 | 39 |
| Lithium | ug/L | NC | 170 | 350 | 440 |
| Mercury | ug/L | 2 | 2.0 | 2.0 | 0.20# |
| Molybdenum | ug/L | NC | 73 | 210 | 3,200 |
| Radium-226 | pCi/L | NC | NC | NC | NC |
| Radium-228 | pCi/L | NC | NC | NC | NC |
| Radium-226/228 | pCi/L | 5 | NC | NC | NC |
| Selenium | ug/L | 50 | 50 | 50 | 5.0 |
| Thallium | ug/L | 2 | 2.0 | 2.0 | 3.7 |

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

NC - no criteria.

* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013.

** - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR), April 2012.

[^] - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO₃/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote [H].

- If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and MDEQ policy and procedure 09-014 dated June 20, 2012.

JH Campbell (West Olive, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|--|---|-----------------------------------|---------------------------------------|---|
| Unit 1-2 Bottom Ash Pond | Boron | MI residential and non | 3500/500=7 times the limit | Initiated closure in 2018. |
| | Sulfate | EPA MCL, MI residential and non | 280/250=1.12 times the limit | |
| | Total Dissolved Solids (TDS) | all | 800/500=1.6 times the limit | |
| | pH | all | pH: high of 9.0 low of 6.0 | |
| | Arsenic | all | 57/10=5.7 times the limit | |
| | Cobalt | MI residential | 43/40=1.075 times the limit | |
| | Lithium | MI residential | 240/170=1.4 times the limit | |
| | Mercury | MI GSI | .25/2=1.25 times the limit | |
| | Molybdenum | MI residential and non | 900/210=4.29 times the limit | |
| | Selenium | all | 140/50=2.8 times the limit | |
| Thallium | EPA MCL, MI residential and non | 2.9/2=1.45 times the limit | | |
| Unit 3 North and South Bottom Ash Pond | Boron | MI residential and nonresidential | 4200/500=8.4 times the limit | Initiated closure in 2017. CCR was capped in place. |
| | Sulfate | all | 450/250=1.8 times the limit | |
| | Total Dissolved Solids (TDS) | all | 810/500=1.62 times the limit | |
| | Molybdenum | MI residential | 140/73=1.92 times the limit | |
| | Selenium | MI GSI | 31/5=6.2 times the limit | |

JH Campbell (West Olive, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|------------------|---|--|---------------------------------------|--|
| Pond A | Boron | MI residential and nonresidential | 2800/500=5.6 times the limit | Closure confirmation in October 2019. Pond A at JH Campbell was closed with CCR in place and capped with a final cover system over the CCR surface impoundment area. |
| | Total Dissolved Solids (TDS) | all | 550/500=1.1 times the limit | |
| | pH | EPA MCL, MI residential and nonresidential | 8.8/8.5=1.04 times the limit | |
| | Arsenic | all | 44/10=4.4 times the limit | |
| | Chromium | all | 370/100=3.7 times the limit | |
| | Selenium | all | 210/50=2.4 times the limit | |
| Dry Ash Landfill | Total Dissolved Solids (TDS) | all | 540/500=1.08 times the limit | Closure estimated by 2040 when the plant closes. The Dry Ash Landfill will be closed with CCR in place and capped with a final cover system. |
| | pH | all | 6.5/6=1.08 times the limit | |
| | Chromium | all | 290/100=2.9 times the limit | |
| | Selenium | MI GSI | 16.5.0=3.2 times the limit | |

DE Karn (Essexville, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|-------------------|---|---------------------------------------|---------------------------------------|---|
| Bottom Ash Pond | Boron | MI residential and non | 2200/500=4.4 times the limit | Closure is estimated by 2022. The Bottom Ash Pond at DE Karn will be closed by removing and decontaminating all areas affected by releases from the CCR unit. |
| | Chloride | all | 410/250=1.64 times the limit | |
| | Sulfate | EPA MCL, MI residential and non | 320/250=1.28 times the limit | |
| | Total Dissolved Solids (TDS) | all | 1300/500=2.6 times the limit | |
| | Arsenic | all | 420/10=42 times the limit | |
| Lined Impoundment | Boron | MI residential and non | 2500/500=5 times the limit | Closure estimated by 2032. The Lined Impoundment at DE Karn will be closed by removing and decontaminating all areas affected by releases from the CCR unit. |
| | Chloride | MI GSI | 120/50=2.4 times the limit | |
| | Sulfate | MI residential and non | 350/250=1.4 times the limit | |
| | Total Dissolved Solids (TDS) | all | 890/500=1.78 times the limit | |
| | pH | all | 9.1/8.5=1.07 times the limit | |
| | Antimony | all | 13/6=2.17 times the limit | |
| | Arsenic | all | 440/10= 44 times the limit | |
| | Molybdenum | MI residential and non, MI GSI | 640/210=3.05 times the limit | |

JC Weadock (Essexville, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|-----------------|--|---------------------------------|---------------------------------------|---|
| Bottom Ash Pond | Boron | MI residential and non | 1400/500=2.8 times the limit | Closure estimated by 2022. The Bottom Ash Pond at JC Weadock will be closed by removing and decontaminating all areas affected by releases from the CCR unit. |
| | Calcium | MI GSI | 520/500=1.04 times the limit | |
| | Chloride | all | 1600/250=6.4 times the limit | |
| | Sulfate | all | 1600/250=6.4 times the limit | |
| | Total Dissolved Solids (TDS) | all | 3400/500=6.8 times the limit | |
| | pH | all | 5.4, lower limit is 6.5 | |
| | Arsenic | all | 34/10=3.4 times the limit | |
| | Beryllium | EPA MCL, MI residential and non | 4.3/4=1.075 times the limit | |
| Landfill | Boron | MI residential and non | 2900/500=5.8 times the limit | Closure estimated by 2030. CCR material will be capped in place and the area will be revegetated. |
| | Chloride | MI GSI | 150/50=3 times the limit | |
| | Sulfate | all | 960/250=3.84 times the limit | |
| | Total Dissolved Solids (TDS) | all | 2100/500=4.2 times the limit | |
| | Arsenic | all | 76/10=7.6 times the limit | |
| | Chromium | MI GSI | 19/11=1.73 times the limit | |
| | Lead | MI residential and non | 5.6/4=1.4 times the limit | |
| | Molybdenum | MI GSI and MI residential | 190/73=2.6 times the limit | |

BC Cobb (Muskegon, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|-------------------------------|--|--------------------------------|--|---|
| Ponds 0-8 and Bottom Ash Pond | Boron | MI GSI, MI residential and non | 13000/500=26 times the MI residential and nonresidential limit, and 1.8 times the MI GSI limit | Charah Solutions, through its subsidiary Muskegon Environmental Redevelopment Group, LLC (MERG) has taken ownership of the ash ponds to execute the closure by removal of CCR at Consumers Energy's former B.C. Cobb Generating Facility site. As owner, MERG, LLC will maintain the current RCRA documents on their website at: https://merg-ccrule.com while Consumers Energy will retain these archive documents as required by RCRA regulation. |
| | Chloride | all | 250/250 | |
| | Sulfate | all | 1200/250=4.8 times the limit | |
| | Total Dissolved Solids (TDS) | all | 1900/500=3.8 times the limit | |
| | pH | all | high of 11.3, low of 6.4 | |
| | Barium | MI GSI | 960/690=1.4 times the limit | |
| | Molybdenum | MI residential | 120/73=1.6 times the limit | |
| | Radium 226-228 | EPA MCL | 5.46/5=1.09 times the limit | |
| Selenium | MI GSI | 5.2/5=1.04 times the limit | | |

JR Whiting (Erie, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|--------------|--|---------------------------------|---------------------------------------|--|
| Pond 1+2 | Sulfate | EPA MCL, MI residential and non | 470/250=1.88 times the limit | Ponds 1+2 were closed in March 2020 with CCR in place and capped with a final cover system over the CCR surface impoundment area. Prior to construction of the final cover, Ponds 1 and 2 will be dewatered by actively pumping the ponds' contents downstream in a manner that maintains permitted effluent limits. |
| | Total Dissolved Solids (TDS) | all | 1200/500=2.4 times the limit | |
| | No data for heavy metals | N/A | N/A | |

JR Whiting (Erie, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|--------------|---|---------------------------------|---------------------------------------|--|
| Pond 6 | Sulfate | EPA MCL, MI residential and non | 500/250=2 times the limit | Closed in December 2017. The pond was closed with CCR in place and capped with a final cover system over the CCR surface impoundment area. |
| | Total Dissolved Solids (TDS) | all | 920/500=1.84 times the limit | |
| | No data for heavy metals | N/A | N/A | |

Belle River (St. Clair County, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|---------------------|---|------------------------------|---------------------------------------|--|
| Diversion Basin | Boron | MI residential and non | 2000/500= 4 times the limit | Closure is estimated by 2034. The Ash Pond will be dewatered to facilitate CCR removal and decontamination of the unit. |
| | Chloride | all | 1800/500=3.6 times the limit | |
| | Total Dissolved Solids (TDS) | all | 3000/500=6 times the limit | |
| | No data for heavy metals | N/A | N/A | |
| Bottom Ash Basins | Boron | MI residential and non | 1600/500=3.2 times the limit | Closure estimated by 2034. CCR will be excavated and removed. |
| | Chloride | MI residential and non | 1000/500= 2 times the limit | |
| | Total Dissolved Solids (TDS) | all | 1800/500=3.6 times the limit | |
| | No data for heavy metals | N/A | N/A | |
| Range Road Landfill | Boron | MI residential and non | 1300/500=2.6 times the limit | Closure is estimated by 2030. The Landfill will be closed in-place. The final cover will be sloped to promote drainage and the storm-water runoff will be discharged through the existing NPDES permitted outfall. |
| | Chloride | all (divided by lower limit) | 3200/250=12.8 times the limit | |
| | Total Dissolved Solids (TDS) | all | 5700/500=11.4 times the limit | |
| | No data for heavy metals | N/A | N/A | |

St. Clair (St. Clair County, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|------------------------------|---|------------------------------|---------------------------------------|--|
| E+W Bottom Ash Im-poundments | Boron | MI residential and non | 2400/500=4.8 times the limit | Closure estimated by 2025. CCR material will be removed by dewatering and excavating the im-poundments. |
| | Chloride | all (divided by lower limit) | 2800/250=11.2 times the limit | |
| | Total Dissolved Solids (TDS) | all | 3900/500=7.8 times the limit | |
| | No data for heavy metals | N/A | N/A | |
| Scrubber Ash Im-poundments | Just installed monitoring wells - no data yet | N/A | N/A | Closure was completed in May of 2019. CCR material was removed by excavation of the Scrubber Basins. The underlying and surrounding soils were excavated a limited amount. |

Monroe (Monroe, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|------------------------|--|---------------------------------|---------------------------------------|--|
| Bottom Ash Impoundment | Boron | MI residential and non | 2400/500=4.8 times the limit | Closure estimated by 2025. The bottom ash impoundment will be dewatered then the CCR material will be excavated and removed. |
| | Chloride | EPA MCL, MI residential and non | 310/250=1.24 times the limit | |
| | Sulfate | all (divided by lower limit) | 1600/250=6.4 times the limit | |
| | Total Dissolved Solids (TDS) | all | 2100/500=4.2 times the limit | |
| | No data for heavy metals | N/A | N/A | |
| Fly Ash Impoundment | Calcium | MI GSI | 520/500=1.04 times the limit | Closure estimated by 2028. The CCR material will be capped in place, but a portion near the weir may be removed. |
| | Sulfate | all (divided by lower limit) | 1600/250=6.4 times the limit | |
| | Total Dissolved Solids (TDS) | all | 2500/500=5 times the limit | |
| | No data for heavy metals | N/A | N/A | |
| Landfill | Calcium | MI residential and non | 520/500=1.04 times the limit | Closure estimated by 2034. The CCR material in the landfill will be capped in place. |
| | Sulfate | all (divided by lower limit) | 1600/250=6.4 times the limit | |
| | Total Dissolved Solids (TDS) | all | 2500/500=5 times the limit | |
| | No data for heavy metals | N/A | N/A | |

River Rouge (River Rouge, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|------------------|---|------------------------------|---------------------------------------|---|
| Bottom Ash Basin | Boron | MI residential and non | 1900/500=3.8 times the limit | BAB closure will be initiated by August 31, 2020. Currently have a groundwater pump system in place near the basin to prevent contaminants from travelling offsite. |
| | Chloride | all (divided by lower limit) | 2300/250=9.2 times the limit | |
| | Sulfate | all (divided by lower limit) | 1200/250=4.8 times the limit | |
| | Total Dissolved Solids (TDS) | all | 5300/500=10.6 times the limit | |
| | Arsenic | all | 170/10=17 times the limit | |
| | Lithium | GWPS | 62/40=1.55 times the limit | |

Trenton Channel (Trenton, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|------------------------|---|------------------------------|---------------------------------------|---|
| Sibley Quarry Landfill | Boron | MI residential and non | 2400/500=4.8 times the limit | The CCR material will be closed in-place. The final cover will be sloped to promote drainage and the stormwater runoff will be discharged through the existing NPDES permitted outfall. Closure operations will involve: (i) regrade fill to create acceptable grades for closure and (ii) install final cover. The existing quarry bedrock side walls which laterally contain the CCR material will remain intact and the final cover system will tie-in to these features. Plan is closure by 2040. |
| | Calcium | MI GSI | 1400/500=3.8 times the limit | |
| | Chloride | all (divided by lower limit) | 21000/250=84 times the limit | |
| | Sulfate | all (divided by lower limit) | 3300/250=13.2 times the limit | |
| | Total Dissolved Solids (TDS) | all | 40000/500=80 times the limit | |
| | No data for heavy metals | N/A | N/A | |

JB Sims (Grand Haven, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|--|--|----------------------------|---------------------------------------|---|
| Unit 1/2 Ash Impoundments | Boron | | | The Plant is scheduled to cease operations in February/ March 2020 and the CCR impoundments removed by the end of 2020. |
| | Calcium | | | |
| | Sulfate | | | |
| | Total Dissolved Solids (TDS) | | | |
| | Arsenic | | | |
| Unit 3 East and West Bottom Ash Impoundments | Boron | | | The Plant is scheduled to cease operations in February/ March 2020 and the CCR impoundments removed by the end of 2020. |
| | Calcium | | | |
| | Fluoride | | | |
| | Chloride | | | |
| | Total Dissolved Solids (TDS) | | | |
| | Lithium | | | |
| | Barium | | | |

Shiras (Marquette, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|--------------|--|---------------------------------|---------------------------------------|--|
| Holding Pond | Chloride | EPA MCL, MI residential and non | 466/250=1.9 times the limit | CCR material will be removed and the area will be cleaned and dewatered. The closure plan implementation will commence during the second quarter of 2020 and will be completed within 6 months of commencing activities. |
| | Total Dissolved Solids (TDS) | all | 2300/500=4.6 times the limit | |
| | Iron | EPA MCL | 1800/300=6 times the limit | |
| | Lead | all | 240/4=60 times the limit | |

Presque Isle (Marquette, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|----------------|--|----------------------------|---------------------------------------|--|
| Ash Landfill 3 | pH | all | 5.1/6.6=1.27 times the lower limit | Closure was initiated 5/20/19, and CCR was sealed in place. The estimate of the inventory of CCR disposed in the landfill is 672,150 cubic yards and the total final cover area is 12.1 acres. |

James De Young (Holland, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|------------------------|--|---------------------------------|---------------------------------------|--|
| Bottom Ash Impoundment | Boron | MI residential and non | 1500/500=3 times the limit | Beginning in May of 2017, Holland BPW began removal of coal and CCR materials from the Property. Removal of the coal and CCR materials along with restoration of the Property was completed in June of 2018. |
| | Chloride | all (divided by lower limit) | 580/250=2.32 times the limit | |
| | Fluoride | EPA MCL | 5000/4000= 1.25 times the limit | |
| | pH | EPA MCL, MI residential and non | 8.85/8.5=1.04 times the limit | |
| | Sulfate | all (divided by lower limit) | 1300/250=5.2 times the limit | |
| | Total Dissolved Solids (TDS) | all | 2200/500=4.4 times the limit | |
| | Arsenic | all | 56/10=5.6 times the limit | |
| | Lead | MI residential and non | 27/4=6.75 times the limit | |

Erickson (Lansing, MI)

| Type of Unit | Exceedence in Indicator Constituent or Heavy Metal Constituent | Which Standard is Violated | % Over Exceedence (observed/standard) | Closure Plan |
|--------------------|---|----------------------------|---------------------------------------|---|
| Impoundment System | No data available, monitoring wells just installed | N/A | N/A | Plant is scheduled for closure in 2025 at which point LBWL intends to close the impoundment system by removing and decontaminating areas affected by releases from CCR (clean closure). |