Addressing PFAS in Industrial Direct and Industrial Stormwater Discharges

Compliance Strategy

BACKGROUND

Per- and polyfluoroalkyl substances (PFAS) have been classified by the United States Environmental Protection Agency (USEPA) as emerging contaminants on a national level. Many PFAS are persistent, some bioaccumulate in the environment, and several are toxic to mammals and/or birds in laboratory tests. Given that there are nearly fifteen thousand PFAS compounds, the toxicities of most PFAS have not been sufficiently evaluated. The Department of Environment, Great Lakes, and Energy's (EGLE), Water Resources Division (WRD) has established criteria for five PFAS compounds: perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorohexanesulfonic acid (PFHxS), and perfluorononanoic acid (PFNA).

All PFAS compounds are manufactured intentionally, but some can also be generated as byproducts when other fluorinated compounds break down. Many products containing PFAS are used in numerous industrial processes including metal plating, textile production and treatment, and specialty paper production. According to a November 2017 Technical Fact Sheet produced by the USEPA on PFOS and PFOA, manufacturing of PFOS and PFOA in the United States ceased by 2002 and 2015, respectively. Other PFAS chemicals are still widely used today in industrial and consumer products. Industrial and domestic waste containing these compounds can enter the environment through municipal or private waste treatment systems, industrial discharges, stormwater runoff, venting groundwater, or as atmospheric deposition via emissions. In addition, several PFAS are key ingredients in Aqueous Film-Forming Foam (AFFF). These foams have been used extensively in fire suppression training exercises and testing at airports and military bases nationwide as well as in emergency firefighting. In recent years, PFAS have been detected in surface and groundwaters at a variety of industrial sites, including military facilities, municipal airports, metal plating facilities, bulk fuel terminals, paper mills, and landfills. Many PFAS compounds have been detected in surface waters across Michigan, with PFOS being detected in most fish tissue samples from Michigan waters that have been analyzed for PFAS.

The State of Michigan's Part 4, Water Quality Standards (Part 4 Rules), promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), includes a narrative method to develop water quality values protective of human health and aquatic life. On August 2, 2020, the USEPA approved the revision to Michigan's Part 4 Rules, including Rule 57 (R 323.1057), Toxic Substances. As of October 2023, Water Quality Values (WQV) exist for five PFAS: PFOS, PFOA, PFBS, PFHxS, and PFNA. PFOS is considered a bioaccumulative chemical of concern (BCC). For more information about WQVs, see the Rule 57 Water Quality Values webpage.

State of Michigan's PFAS Water Quality Values

PFAS	HNV (drinking) (ng/L) *	HNV (nondrinking) (ng/L)	FCV (ng/L)	AMV (ng/L)	FAV (ng/L)
PFOS	11	12	140,000	780,000	1,600,000
PFOA	66	170	880,000	7,700,000	15,000,000
PFBS	8,300	670,000	24,000,000	120,000,000	240,000,000
PFHxS	59	210	-	-	-
PFNA	19	30	-	-	-

*nanograms per liter (ng/L) is equivalent to parts per trillion (ppt)
(-) Aquatic Life Values for PFHxS and PFNA are currently under development
HNV: Human Noncancer Value
FCV: Final Chronic Value
AMV: Aquatic Maximum Value
FAV: Final Acute Value

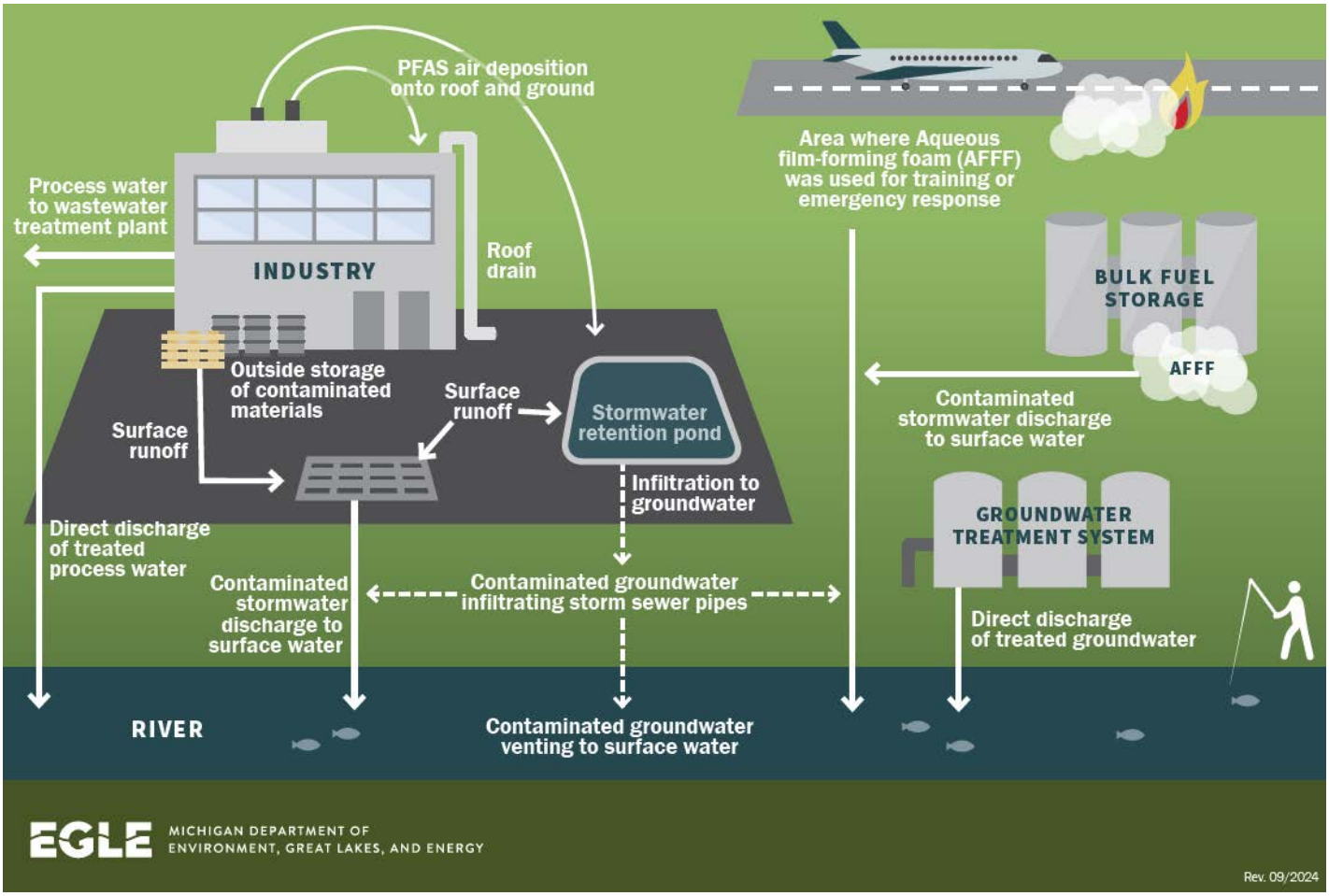
The State of Michigan's Part 8, Water Quality-Based Effluent Limit Development for Toxic Substances (Part 8 Rules), promulgated pursuant to Part 31, Water Resources Protection, of the NREPA, is used to establish toxic substance water quality-based effluent limits (WQBELs) for point source discharges that are protective of the designated uses of the surface waters of the state. In addition, treatment technology-based effluent limitations (TTBELs) may be established in NPDES permits that require a minimum level of treatment of pollutants for point source discharges based on available treatment technologies, while allowing the discharger to use any available control technique to meet the limits.

The WRD regulates wastewater (including stormwater) discharges from industrial facilities to waters of the state under Part 31, Water Resources Protection, of the NREPA. Specifically, discharges to surface waters (rivers, lakes, and streams) are authorized under National Pollutant Discharge Elimination System (NPDES) Permits in accordance with the Part 21, Wastewater Discharge Permits (Part 21 Rules), administrative rules promulgated pursuant to Part 31, Water Resources Protection, of the NREPA. The WRD will prioritize existing permitted industrial discharges as it gathers information regarding the potential for those discharges to exceed applicable criteria and regulations. These compliance efforts will be managed by the Emerging Pollutants Section. Information concerning a facility's potential to discharge PFAS may come from various sources including known or suspected use of PFAS-containing products/materials on-site based on industrial processes and/or through sampling data (soils, groundwater, stormwater, wastewater, and surface water) associated with the facility. This includes the known or suspected release of aqueous film forming foams (AFFF) for training or use in firefighting activities, accidents, or through equipment breakdown/malfunction. Common types of discharges that are covered under this strategy include direct discharges of process wastewater from industrial facilities, contaminated groundwater cleanup discharges, industrial stormwater discharges. Industrial stormwater discharges may include discharges of contaminated runoff as well as

contaminated groundwater infiltrating storm sewers, or a combination of both. Information commonly used in identifying permittees that may be discharging PFAS includes industrial process wastewater data generated from the WRD's Industrial Pretreatment Program (IPP) PFAS Initiative, information submitted as part of the NPDES application process, literature reviews, data collected by EGLE in Compliance Sampling Inspections and source tracking activities, and data provided by permittees.

Industrial wastewater and industrial stormwater facilities may not discharge into waters of the state a substance that is or may become injurious to the designated uses as defined in Part 31, Water Resources Protection, of the NREPA including the use of groundwater and/or of surface water as a source of drinking water and/or as a fishery. The infographic below depicts various regulated discharges from industrial facilities that could contain PFAS and shows how PFAS in discharges from these facilities may impact Michigan's surface and groundwaters.

PFAS from Industrial Direct and Stormwater Discharges



GOAL

The goal of this Compliance Strategy is to identify and reduce or eliminate discharges from regulated industrial facilities that may cause or contribute to exceedances of Michigan's PFAS WQVs (currently PFOS, PFOA, PFBS, PFNA, and PFHxS) and NPDES Discharge permit requirements. Facilities are encouraged to identify sources contributing to the exceedance and take action to eliminate/remove/control the pollutant at the source as part of a pollutant minimization plan/corrective action plan. If it is determined these source controls will not be sufficient to meet applicable criteria, the facility may need

to consider achieving necessary reductions though inclusion of treatment technology to remove PFAS prior to discharge. EGLE is required under Part 31, Water Resources Protection, of the NREPA to issue permits and/or enter orders that will assure compliance with state criteria and appropriately regulate discharges of substances that may impact the waters of the state. This WRD compliance strategy incorporates PFAS-specific requirements where appropriate into NPDES permits and/or PFAS-specific compliance programs under Administrative Consent Orders (ACO). For industrial facilities where treatment for these contaminants is occurring, an existing NPDES permit may be modified to include monitoring requirements, and/or effluent limitations for applicable PFAS. In other cases, for industrial wastewater and most stormwater discharge facilities where additional corrective actions are required to ensure compliance with applicable criteria, entry into an ACO or similar type of agreement may be offered. These orders will include limits or goals for applicable PFAS criteria, development of a pollutant minimization program and a schedule to meet applicable criteria. The limits and goals are developed in accordance with procedures outlined in rules established under Part 31, Water Resources Protection, of the NREPA for point source discharges that are protective of the designated uses of the surface waters of the state.

APPROACH

The approaches utilized by WRD to address PFAS at industrial direct and industrial stormwater facilities are discussed in greater detail below.

Industrial direct facilities discharge process wastewater to surface waters (either directly or indirectly via separate storm sewer system). These facilities obtain individual NPDES discharge permits or certificates of coverage under general permits to discharge various types of wastewater, including but not limited to industrial process wastewater, non-contact cooling water, hydrostatic pressure test water, fire suppression system test water, groundwater intrusion, contaminated groundwaters, and industrial stormwater.

Industrial facilities that only discharge stormwater, also referred to as industrial stormwater facilities, obtain certificates of coverage under a general NPDES permit to discharge stormwater associated with industrial activity that meets permit conditions to surface waters of the state. Installing treatment for the removal of PFAS in stormwater discharges is normally less efficient than identifying sources of PFAS and implementing modifications to prevent/divert stormwater from becoming contaminated with PFAS. In addition, treatment capacity may not be sufficient to address large storm events, which may lead to additional exceedances of WQVs. Therefore, addressing PFAS contaminants in stormwater may require additional time to identify and understand sources of PFAS and to develop and implement effective corrective actions.

Due to these differences between addressing PFAS contamination in industrial wastewater and industrial stormwater, the feasibility of corrective actions, and the applications for the use of treatment, industrial direct and industrial stormwater facilities utilize two separate approaches to address PFAS in their discharges as detailed in the following sections.

INDUSTRIAL DIRECT DISCHARGES

New industrial direct discharges that contain PFAS will be evaluated for a reasonable potential to exceed applicable PFAS criteria and will need to comply with any applicable Water Quality Based Effluent Limits (WQBELs) as part of their NPDES discharge permit or certificate of coverage. New industrial direct discharges that provide treatment of PFAS to comply with WQBELs may also be subject to Best Professional Judgement, TTBELs. The use of treatment may also require monitoring and reporting of PFAS concentrations at treatment influent, intermediate stages, and effluent locations.

Existing industrial direct discharges are evaluated based on information provided as part of the application for NPDES permit or certificate of coverage reissuance. Depending on responses provided in the application, PFAS effluent sampling results may be required as part of the application submittal. The WRD may also collect PFAS effluent samples as part of a Compliance Sampling Inspection or request PFAS effluent samples be collected from industries with discharges likely to contain PFAS, at sites of known or suspected PFAS contamination, or based on surface water and/or fish contaminant monitoring results.

Existing industrial direct discharges found to contain PFAS exceeding WQVs in the effluent that were previously unknown is not a violation of the NPDES permit but is rather considered new effluent information.

If PFAS with established WQVs are identified in effluent below the associated WQV, and the number of samples collected or monitoring period is limited, additional effluent sampling and reporting utilizing appropriate sampling and analytical methods will be required to determine whether there is reasonable potential for an exceedance to occur. If existing treatment is provided that is also capable of treating PFAS, PFAS sampling of treatment influent will also be required.

If PFAS with established WQVs are detected and exceed or are determined to have reasonable potential to exceed the associated WQV, the WRD's approach will be to utilize entry into an ACO to prevent pollution EGLE considers to be unreasonable and against the public interest. The WRD will also require permittees to begin PFAS effluent sampling and reporting utilizing appropriate sampling and analytical methods.

The ACO will establish a path/process to comply with the applicable PFAS standards with a mutually agreed upon compliance plan and schedule. If a permittee chooses not to enter an ACO, the WRD may revoke and reissue the existing permit/certificate of coverage to include applicable monitoring and compliance schedules for compliance with applicable criteria or terminate the permit/certificate of coverage after notice and opportunity for hearing. If terminated, any discharge by the permittee would be an unauthorized discharge and a violation of Part 31 of the NREPA. The WRD would then pursue enforcement in accordance with Part 31 of the NREPA.

If the source(s) of PFAS in the effluent are unknown, the ACO will require the completion of a Short-Term Wastewater Characterization Study to identify sources of PFAS and their contribution to effluent concentrations. Obtaining additional PFAS results within the industrial facility is important for identifying PFAS sources, evaluating treatment and other reduction approaches, and establishing the compliance plan and schedule for the ACO.

The ACO will require the submittal, approval, and completion of a Corrective Action Plan (CAP) that contains a schedule of actions the permittee will take to eliminate, reduce, control, and minimize sources of PFAS, and if necessary, evaluate, obtain, and install additional treatment. Potential corrective actions may include, but are not limited to:

- Cleaning or replacement of collection system or production system, including pipes, tanks, racks, vats, air handling return lines and equipment, or product storage and handling areas.
- Product substitution depending on the presence of PFOS, PFOA, PFBS, PFNA, or PFHxS and precursor analytes.
- Elimination of external sources such as recycled feedstock, etc.
- Elimination/isolation of impacted and non-impacted flows (separate the discharges or reduce flow that may require treatment).
- Installation of appropriately scaled treatment.
- Cessation of the discharge through rerouting to larger system or transporting to a treatment facility (central waste treatment facility) or other disposal option.

Once the CAP activities are completed, PFAS monitoring will be conducted to certify performance of the project. Where PFAS treatment is provided, this may include certifying performance of the treatment to meet applicable TTBELs. Once certified, the discharge will need to maintain compliance with any applicable PFAS WQBELs and TTBELs.

INDUSTRIAL STORMWATER DISCHARGES

Industrial stormwater regulations apply to a wide range of industrial facilities. A phased approach to conduct screening for PFAS in discharges from regulated industrial facilities began in 2019. This approach focuses on prioritized facilities with a known use of PFAS-containing products and where elevated concentrations of PFAS and other pollutants of concern (based on the facility's industrial activities) in stormwater are suspected. Facility prioritization began with sanitary sewer wastewater sampling through the IPP PFAS Initiative. Prioritization now includes many additional factors including information related to PFAS use associated with the industrial activity; downstream surface water and/or fish tissue sample results; known groundwater or soil contamination; and AFFF storage, use, or training. Prioritized facilities are required to conduct a PFAS Short-Term Stormwater Characterization Study (STSWCS) where three samples of both dry (where applicable) and wet weather flow are collected from all stormwater discharge points. Industrial stormwater permits include language prohibiting any discharge of pollutants in exceedance of a WQV or other applicable criteria. Therefore, if results from the PFAS STSWCS indicate that a discharge exceeds applicable criteria, then the WRD will initiate a progressive compliance and enforcement process, and the facility will be required to implement actions to reduce concentrations of PFAS and other pollutants as applicable in their stormwater discharges. For most facilities, this process includes entry into an ACO, or similar control document as described above.

In 2024, the WRD began offering eligible industrial stormwater facilities entry into a General Administrative Consent Order (GACO) to address exceedances of PFAS in stormwater discharges. Due to the variability of storm events, the variety of scenarios that may be present at these facilities, and the complicated nature of addressing PFAS in stormwater, the control document (ACO, GACO, etc.) will

include a pollutant minimization program to address PFAS (including other applicable pollutants) at the site with effluent goals that must be achieved by a specific date. Failure to achieve these goals will require additional corrective actions.

Example Administrative Consent Order Compliance Framework

For industrial stormwater discharges, the components of the compliance program are the same for ACOs and the GACO, though site-specific considerations may be incorporated into an ACO. The compliance program includes a Source Investigation and Identification Plan (if needed), a Pollutant Minimization Program (PMP), ongoing monitoring, a Project Performance Certification (PPC), and the potential for a PMP Status Report and Updated PMP. ACOs may incorporate a STSWCS at the start of the compliance program if needed. A timeline for each of these components will be outlined in the order, and the facility will submit documents to the MiEnviro Portal throughout the process.

Source Investigation and Identification Plan (SIIP)

The purpose of the Source Investigation and Identification Plan is to identify and delineate contributing areas of PFAS and other pollutants of concern to best prepare and inform the development and implementation of the Pollutant Minimization Program. Source identification and isolation of potential source areas, including internal sampling and process evaluation, can help exclude non-PFAS source areas and concentrate on areas that are contributing PFAS to the discharge. This could involve evaluation of process flows within a manufacturing plant or across a catchment area that may have a stormwater collection system.

Pollutant Minimization Program (PMP)

The following is a list of potential corrective actions that could be included in a PMP:

- Removing contaminated material, surfaces, or equipment.
- Moving contaminated equipment under cover to avoid exposure to stormwater.
- Cleaning of surfaces, equipment, pipes, tanks, etc.
- Replacement of products containing PFOS, PFOA, PFBS, PFNA, or PFHxS and precursor analytes.
- Resurfacing impacted impervious or permeable surfaces.
- Lining pipes or other conveyances of stormwater and/or wastewater and installing sewer bulkheads.
- Replacement of roof membranes and surfaces, piping, and equipment.
- Installation of treatment technologies to remove pollutants prior to the discharge to the waters of the state.

Ongoing Monitoring

Throughout the order, sampling is conducted at all discharge points, typically quarterly, to monitor pollutant concentrations and the impacts of the ongoing pollutant minimization program efforts. These samples are collected during wet weather and, if applicable, dry weather conditions. Ongoing sampling begins upon entry into an order and occurs until the facility successfully demonstrates compliance with the effluent goals at any/all discharge point(s). Additionally, after meeting specific requirements, there are opportunities to submit requests for reduced monitoring frequency.

Project Performance Certification

The Project Performance Certification (PPC) is similar to the ongoing monitoring requirements, except the PPC begins when the facility attempts to demonstrate compliance with the effluent goals at any/all discharge points prior to completion of the GACO/ACO. If the facility successfully demonstrates compliance with the effluent goals at any/all discharge point(s), they will have successfully achieved the effluent goal requirements of the order, pending any changes to the drainage area of the discharge point(s) that may impact the pollutant discharge concentrations. In which case, the facility may be required to demonstrate compliance following the changes.

PMP Status Report and Updated PMP

If the facility is not able to certify compliance with the effluent goals during the PPC, they shall submit a PMP status report and updated PMP with an implementation schedule not to exceed one year to achieve compliance with any remaining effluent goals at any remaining discharge point(s). The PMP status report should include an explanation of the implemented corrective actions taken and evaluation of potential sources of pollutants not already identified, including any supporting documentation (e.g., maps, sample data, new information). The updated PMP and implementation schedule shall include proposed corrective actions in an effort to achieve compliance with the effluent goals in the same manner as the original PMP. This process shall continue until compliance with the effluent goals is achieved or the WRD makes the determination to incorporate these requirements into another control document, such as a permit.

CONCLUSION

PFAS are pollutants that are required to be addressed when they are being discharged into waters of the state above applicable criteria. As an emerging pollutant, effective best management practices and treatment technologies to address PFAS are still evolving. As such, the WRD's approach to addressing PFAS in industrial discharges is through implementation of the appropriate control document, either an NPDES permit or entry into an order. The ultimate objective is to bring discharges into compliance with applicable criteria within a reasonable time based on priority dictated by individual circumstances at each facility. Requirements for PFAS sampling will be incorporated into future application requirements for industrial permits, where applicable. Through implementation of this strategy, the WRD will ensure that facilities with regulated discharges that exceed PFAS criteria have an appropriate control document in place to achieve compliance with federal and state regulations.