MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

LAND APPLICATION OF BIOSOLIDS CONTAINING PFAS

Interim Strategy

March 2021

EGLE, WATER RESOURCES DIVISION

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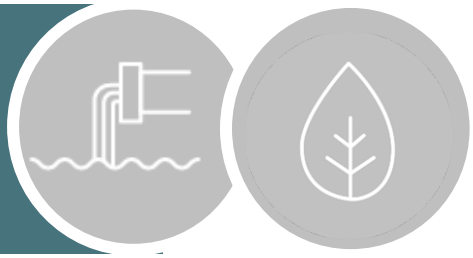

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EXECUTIVE SUMMARY AND GOAL

The intent of this document is to share what has been learned about perfluoroalkyl and polyfluoroalkyl substances (PFAS) in biosolids and to provide an interim strategy for Michigan on the issue. While the U.S. Environmental Protection Agency (USEPA) is working to complete a risk-based evaluation of PFAS in biosolids, the Department of Environment, Great Lakes, and Energy (EGLE) will continue a deliberative, disciplined approach which focuses on identifying and reducing significant sources of PFAS entering wastewater treatment systems and preventing industrially impacted biosolids from being land applied.

While risks are being evaluated, EGLE's goal for wastewater treatment plants (WWTPs) is to continue reducing PFAS concentrations in biosolids to the maximum extent practicable, while achieving or maintaining compliance with Surface Water Quality Standards (WQS) at the WWTP effluent. EGLE will continue sharing our findings with other states and supporting the USEPA's efforts to conduct a risk assessment and develop criteria. Through implementation of this strategy, EGLE strives to prevent further land application of industrially impacted biosolids, mitigate (reduce) risks moving forward, and continue driving PFAS concentrations present in impacted biosolids down as quickly as possible. While EGLE is recommending WWTPs consider implementing this strategy for the Spring 2021 land application season, implementation is required for land applications occurring on or after July 1, 2021.

This is an interim strategy. As new information comes to light, this approach allows EGLE to adapt to evolving science and make adjustments as appropriate moving forward.

BACKGROUND

BIOSOLIDS

Biosolids are nutrient-rich organic materials that remain following the treatment of domestic sewage at a WWTP. Biosolids undergo additional treatment processes to stabilize the materials and kill pathogens prior to being utilized as a soil amendment and conditioner. Biosolids are typically beneficially used on agriculture land, although under certain conditions biosolids can be used on forest lands, reclamation sites, and public use sites. Depending on the treatment process, they come in various forms, such as: liquid, slurry, composted materials, or dried pellets.

The majority of biosolids in Michigan are land applied as a liquid that is injected beneath the ground surface. Liquid biosolids are typically in the range of about 2 to 4 percent total solids (or 96 – 98 percent liquid). Application rates are restricted to the agronomic rates, frequently in the range of about 2.5 to 3.5 dry tons to the acre. Land application of biosolids in this range results in roughly a 300 to 400-fold dilution of biosolids constituents into the soil.

Michigan's Biosolids Program is regulated by EGLE's Water Resources Division (WRD), under the authority of: Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, Public Act 451 of 1994, as amended (NREPA), Michigan's Part 24 Administrative Rules, Land Application of Biosolids (Part 24 Rules), promulgated pursuant to Part 31 of NREPA, and the federal requirements contained in Title 40 of the Code of Federal Regulations, Part 503, Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503).

Biosolids must meet these strict regulations and quality standards. The Part 24 Rules EGLE - Biosolids Laws and Rules Information (michigan.gov) contain numerical limits for metals, pathogen reduction standards, site restrictions, crop harvesting restrictions and monitoring, recordkeeping, and reporting requirements for land applied biosolids.

Prior to development of the federal requirements contained within 40 CFR Part 503 and Michigan's Part 24 Rules, the USEPA conducted a comprehensive risk assessment process to evaluate adverse effects of pollutants that may be present in biosolids. As part of this process, the USEPA initially reviewed 200 preliminary pollutants potentially found in biosolids. They narrowed the list to 50 pollutants to be considered for regulation based on available toxicity and exposure data. The list was then further narrowed based on hazard, and detailed risk assessments were conducted for 31 pollutants. This was a multi-pathway risk assessment designed to protect public health and the environment from reasonably anticipated adverse effects of pollutants that may be present in biosolids. This effort resulted in 40 CFR Part 503, which establishes limits for pollutants to protect public health and the environment. Please see the USEPA's biosolids webpage for additional information.

The USEPA's proposed 40 CFR Part 503 regulations underwent extensive public and agency review and scrutiny. Under the Clean Water Act, Section 405, the USEPA is required to review biosolids regulations biannually to identify additional toxic pollutants that occur in sewage sludge and set regulations for those pollutants if sufficient scientific evidence shows that they may harm human health or the environment. The USEPA is currently in the process of conducting a risk assessment for additional pollutants, including PFAS, that have been identified in biosolids. Michigan will follow the USEPA's activities closely and respond accordingly if additional pollutants are identified for regulation.

Beneficial use of biosolids via land application is consistent with the advancement of the Utility of the Future (Water Resource Recovery Facility) concept, which is cited as one of the recommendations to achieve the goals listed in the Michigan 21st Century Infrastructure Commission Final Report. Sewage sludge from WWTPs that is not beneficially used as a soil amendment is typically disposed of in a landfill or incinerated. Sludges generated from industrial facilities are not considered biosolids.

PFAS

PFAS have been classified by the USEPA as an emerging contaminant on the national level. PFAS are a suite of over 4,000 chemicals historically used in thousands of applications throughout the industrial, food, and textile industries. Historical uses include firefighting foams, food packaging, and cleaning products. It is also used by many industries such as plating, tanneries, or clothing manufacturers, where waterproofing may be required, or a protective film is needed in a manufacturing process. These chemicals are incredibly stable, breaking down very slowly in the environment. Two of the most studied chemicals, perfluorooctanoic acid (PFOA) and perfluorooctanoic sulfonate (PFOS), were voluntarily phased out by industry over the past decade but are still persistent at the locations where they were used and found in the environment.

PFAS IN MUNICIPAL WASTEWATER AND BIOSOLIDS

PFAS have been identified in Municipal WWTPs since the early 2000s during the 3M-sponsored multicity study from Alabama, Tennessee, Georgia, and Florida. PFAS were also later identified in WWTPs from Minnesota, Iowa, California, Illinois, New York, Kentucky, Georgia, and Michigan (Boulanger et al., 2005; Higgins et al., 2005; Schultz et al., 2006; Sinclair and Kannan, 2006; Loganathan et al., 2007; Sepulvado et al., 2011; and Houtz et al., 2016). Some of the most frequently detected PFAS were Perfluoroalky Acids (PFAA), such as PFOA and PFOS.

The carbon-fluorine bond that exists in PFAS is one of the strongest bonds in nature; this bond is tough to break and is resistant to thermal, chemical, and biological degradation. Widespread use of PFAS in consumer products and manufacturing/industrial processes, in conjunction with extreme resistance to degradation, has resulted in the presence of PFAS in municipal wastewater. While WWTPs are not the source of PFAS, they are a central point of collection and serve as a key location to control and potentially mitigate their release into the environment. Effluents discharged from WWTPs to waters of the state and biosolids applied to the land for beneficial reuse have been identified as potential PFAS release pathways into the environment by the Interstate Technology and Regulatory Council (ITRC) (ITRC, 2017). This puts Municipal WWTPs in a key position to control the environmental spread of PFAS and a key participant in protecting both human and environmental health.

PFAS RESPONSE IN MICHIGAN - MPART AND SCIENCE ADVISORY PANEL

The Michigan PFAS Action Response Team (MPART); www.michigan.gov/pfasresponse/, was established to address the threat of PFAS contamination, protect public health, and ensure the safety of Michigan's land, air, and water. This unique multi-agency approach brings together seven state departments responsible for environmental and natural resources protection, agriculture, public health, military installations, airports, and fire departments for a coordinated response.

Under MPART, a Science Advisory Panel (Panel) of experts was established to provide a general understanding of human health risks associated with PFAS in the environment and provide evidence-based recommendations to Michigan. In 2018, the Panel produced the report, Scientific Evidence and Recommendations for Managing PFAS Contamination in Michigan. In the report, among other recommendations, the Panel recommended that State of Michigan:

1. Gather information to understand the extent of PFAS contamination in biosolids and encourage research to assess the fate and transport of PFAS from contaminated biosolids into crop plants and groundwater. Such information will provide guidance regarding when biosolids should not be applied in agriculture (or determine appropriate times between application and planting times) and consider site restrictions, crop harvesting restrictions, monitoring, record-keeping, and reporting requirements where PFAS contamination is a concern.
2. Research should be conducted on the development of techniques to effectively remediate water, landfill leachate, wastewater, and biosolids.
3. Test biosolids (treated sewage sludge that is a beneficial resource, containing essential plant nutrients and organic matter as a fertilizer and soil amendment) that may be land applied for PFAS content.

In addition, a PFAS Land Application Workgroup consisting of department staff from EGLE, Michigan Department of Agriculture and Rural Development (MDARD), and the Michigan Department of Health and Human Services (MDHHS) was formed under MPART in 2018. The workgroup meets regularly with the goals of expanding agency knowledge of PFAS in biosolids to better inform municipal WWTPs, land application contractors, and farmer/landowners regarding land application of biosolids containing PFAS. While EGLE, WRD has regulatory oversight of the Michigan Biosolids Program and is the lead, the MPART Biosolids Work Group has been consulted in the development of the biosolids strategy. For more information on the MPART Biosolids Workgroup, visit: Michigan.gov/PFASLandApplication

PFAS Criteria in Michigan

There are currently no established federal criteria for PFAS under 40 CFR Part 503. The USEPA is in the process of conducting a risk-based evaluation of PFAS in biosolids. While EGLE is supporting these efforts, it is unlikely that criteria will be forthcoming within the next few years.

In Michigan, PFAS criteria have been developed for surface waters, groundwater protection, and municipal drinking water. Michigan has been successful in using these criteria to drive our existing regulatory programs to protect public health and the environment.

Michigan determines the concentration of substances in surface waters that would not be expected to cause adverse effects to human health using the methodology described in Rule 323.1057 of the Part 4 Rules, Water Quality Standards (WQS), promulgated pursuant to Part 31 of NREPA. The WRD has used this methodology to derive Human Non-Cancer Values (HNVs) for PFOA in 2011 and PFOS in 2014 for surface waters that serve both as a drinking water source and for those that do not. PFOS is considered a bioaccumulative chemical of concern, meaning it readily accumulates in living organisms such as people and fish, and as a result, the HNVs for PFOS in surface waters is much lower than that developed for PFOA. This is mainly to protect people who may inadvertently ingest PFAS through fish consumption.

In 2020, Michigan adopted new state drinking water standards to protect from PFAS contamination in municipal drinking water that includes Maximum Contaminant Levels (MCLs) for seven PFAS including PFOS and PFOA. The new drinking water standards also updated Michigan's existing groundwater clean-up criteria under Part 201, Environmental Remediation, of NREPA for PFOS and PFOA and include groundwater clean-up criteria for an additional five analytes (PFNA, PFHxS, PFHxA, PFBS, and HFPO-DA (also known as GenX)). See Attachment A for a summary of PFAS criteria in Michigan. While concentrations of other PFAS chemicals have been detected, PFOS has been found in higher concentrations in wastewater effluent and biosolids relative to its WQS.

To date, PFOS is the PFAS determined to be the main regulatory driver for municipal WWTPs with effluents exceeding the WQS and elevated concentrations in the biosolids/sludge from WWTPs with known significant industrial sources. The short-chain PFAS were more frequently correlated with aqueous WWTP process flows, while long-chain PFAS were strongly associated with solids process flows. This indicates that long-chain PFAS, such as PFOS, are expected to accumulate in the biosolids/sludge.

PFAS Studies/Reports of Municipal Wastewater and Biosolids

In alignment with the Science Advisory Panel recommendations and under the guidance of the PFAS Land Application Workgroup, the WRD has been working extensively to evaluate the presence of PFAS in municipal wastewater and biosolids. The WRD contracted with a consulting firm to conduct a statewide study in the fall of 2018 of 42 municipal WWTPs to evaluate the presence of PFAS in influents, effluents, and associated residuals (sludge/biosolids) generated at the facilities. As part of this initiative, screening of 22 land application sites was conducted to further the understanding of the potential impacts to the environment from land-applied biosolids. A summary report, "*Initiatives to Evaluate the Presence of PFAS in Municipal Wastewater and Associated Residuals (Sludge/Biosolids)*," provides background on this work and an overview of the Michigan's Industrial Pretreatment Program (IPP) PFAS Initiative.

Results of this study align with review of available literature which indicates that PFAS is present at low levels in virtually all WWTP influent, effluent, and biosolids. The study also demonstrates that the municipal facilities with the highest concentration of PFAS in their effluent and biosolids were facilities that received PFAS contaminated discharges from industrial facilities that discharge to the system. In addition, landfill leachate discharged to municipal WWTPs was found to be a potential significant source due to widespread use of PFAS in industrial wastes and consumer products disposed at landfills.

EGLE's WRD has implemented several measures to control PFAS contaminated sources discharging to WWTPs as well as direct discharges to waters of the state. The most significant of these efforts is the ongoing IPP PFAS Initiative launched in February 2018. As a result of that initiative, Municipal WWTPs have identified significant industrial sources of PFOS within their collection systems and have taken action to eliminate/control/minimize sources through implementation of their IPP. This effort has led to dramatic improvement in effluent at numerous WWTPs as well as corresponding declines in concentrations of PFOS in biosolids.

Industrial discharges that could be PFAS sources to WWTPs include:

- Electroplating and Metals Finishing (chrome plating)
- Landfills
- Centralized Waste Management Facilities
- Airfields – Commercial, Private, and Military
- Department of Defense Facilities
- Fire Department Training Facilities
- Industrial Laundries
- Petroleum or Petrochemical
- Chemical Manufacturers
- Plastics Manufacturers
- Textile and Leather Facilities
- Paint Manufacturers
- Pulp and Paper Facilities

Table 1: Substantial PFOS Reduction at WWTPs with Exceedances (EGLE, 2020)

Municipal WWTP	Recent PFOS Effluent* (ng/L)	PFOS Reduction (highest to most recent)	Actions Taken to Reduce PFOS
WWTP #14	10	97 percent	Treatment (GAC) at source (1)
WWTP #49	4.8	96 percent	Treatment (GAC/Resin) at source (1)
WWTP #50	<5.67	99 percent	Treatment (GAC) at source (1)
WWTP #53	4.84	90 percent	Treatment (GAC) at sources (2), change water supply
WWTP #54	9.1	96 percent	Eliminated leak of PFOS-containing firefighting foam
WWTP #57	8.2	99 percent	Treatment (GAC) at source (1)
WWTP #92	32	99 percent	Treatment (GAC) at source (1)

*Data received as of December 31, 2020

Additional information on this effort can be found in the summary report *"Initiatives to Evaluate the Presence of PFAS in Municipal Wastewater and Associated Residuals (Sludge/Biosolids)."*

Although the fate and transport of PFAS in wastewater systems and at land applications sites is still not fully understood, the IPP PFAS Initiative and studies of PFAS in biosolids in Michigan has increased knowledge and demonstrated the effectiveness of source control at reducing concentrations at WWTPs and in biosolids. Additional studies, including studies in Michigan and planned studies in other states such as Wisconsin and Minnesota, are necessary to further refine our understanding of the behavior of these chemicals. Pathways of concern include surface water, ground water, dermal contact, and crop uptake. These pathways will all be part of the USEPA Risk Assessment.

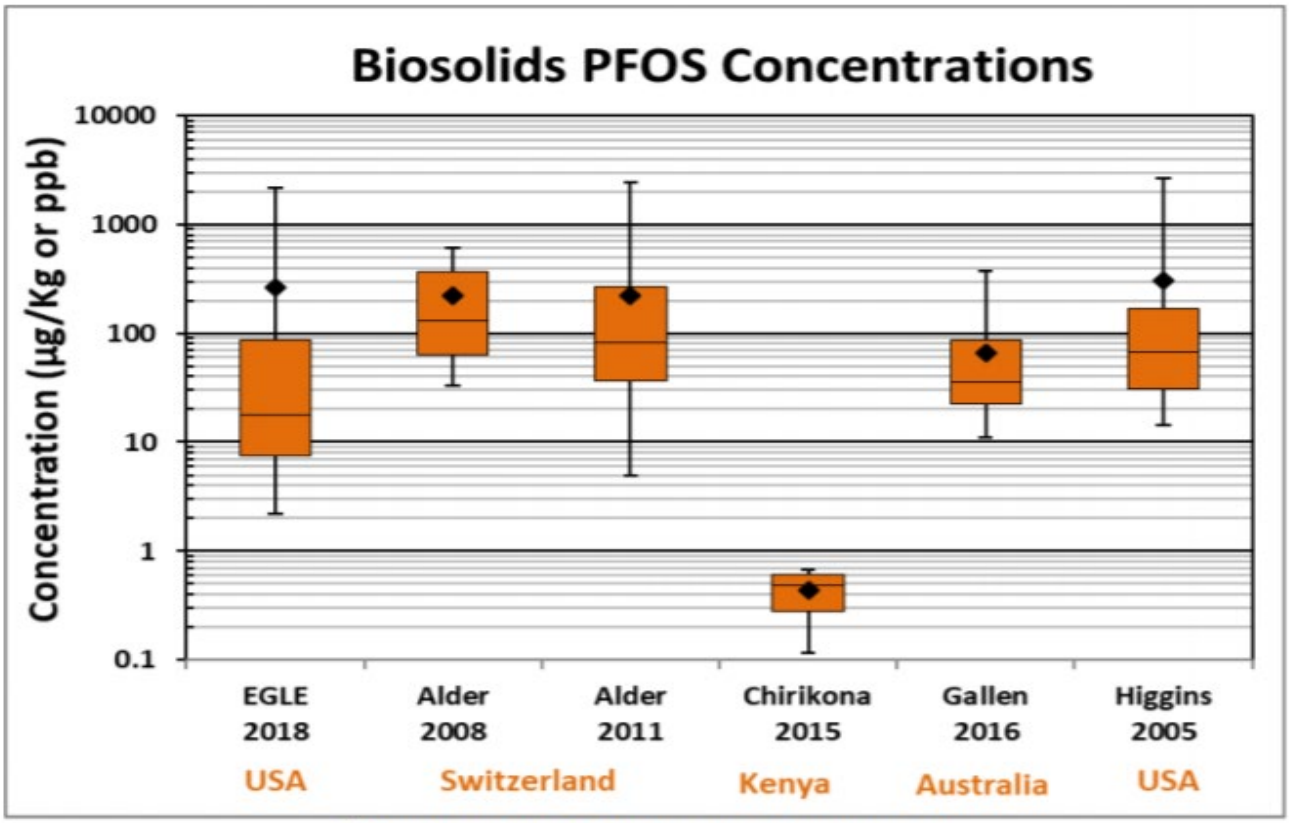
APPROACH

WHAT WE HAVE LEARNED ABOUT PFAS IN BIOSOLIDS

EGLE Study of 42 WWTPs

EGLE conducted a study of biosolids at 42 municipal WWTPs. The results of this study show the median concentration of PFOS in biosolids from a cross section of WWTPs in Michigan was 11 micrograms per kilogram(µg/kg), and the average concentration was 18 µg/kg for those determined to not be industrially impacted. In addition, review of available literature on PFOS in biosolids suggests that concentrations found in Michigan are consistent with, or lower than, those previously documented in the United States and the world (see Figure 1).

Figure 1. PFOS Biosolids Concentrations in Michigan and Published Literature*



*Provided by AECOM Technical Services, Inc.

To date, through implementation of the IPP PFAS Initiative and the statewide study, EGLE initially identified 6 WWTPs with biosolids/sludge that were classified as being industrially impacted based on PFOS concentrations in the residuals. Each of these WWTPs also had elevated concentrations of PFOS in their effluent. In this use, the term "industrially impacted" describes residuals that have PFOS concentrations above 150 µg/kg and where the WWTP has identified a significant industrial source(s) of PFOS to their system.

The selection of 150 µg/kg as the threshold for sludge to be considered industrially impacted was based on a number of factors, including concentrations found within available literature, as well as an analysis of data from this study indicating a natural "break-point" in the data above that level. In general terms, the concentrations observed at five of the six WWTPs identified as having industrially impacted biosolids were substantially higher (orders of magnitude in most instances, e.g., 20 – 100 times greater) than others observed. The industrially impacted threshold number is not a risk-based number, and as more information about fate and transport of these chemicals becomes available, including the field study results, this level will be reevaluated, as necessary.

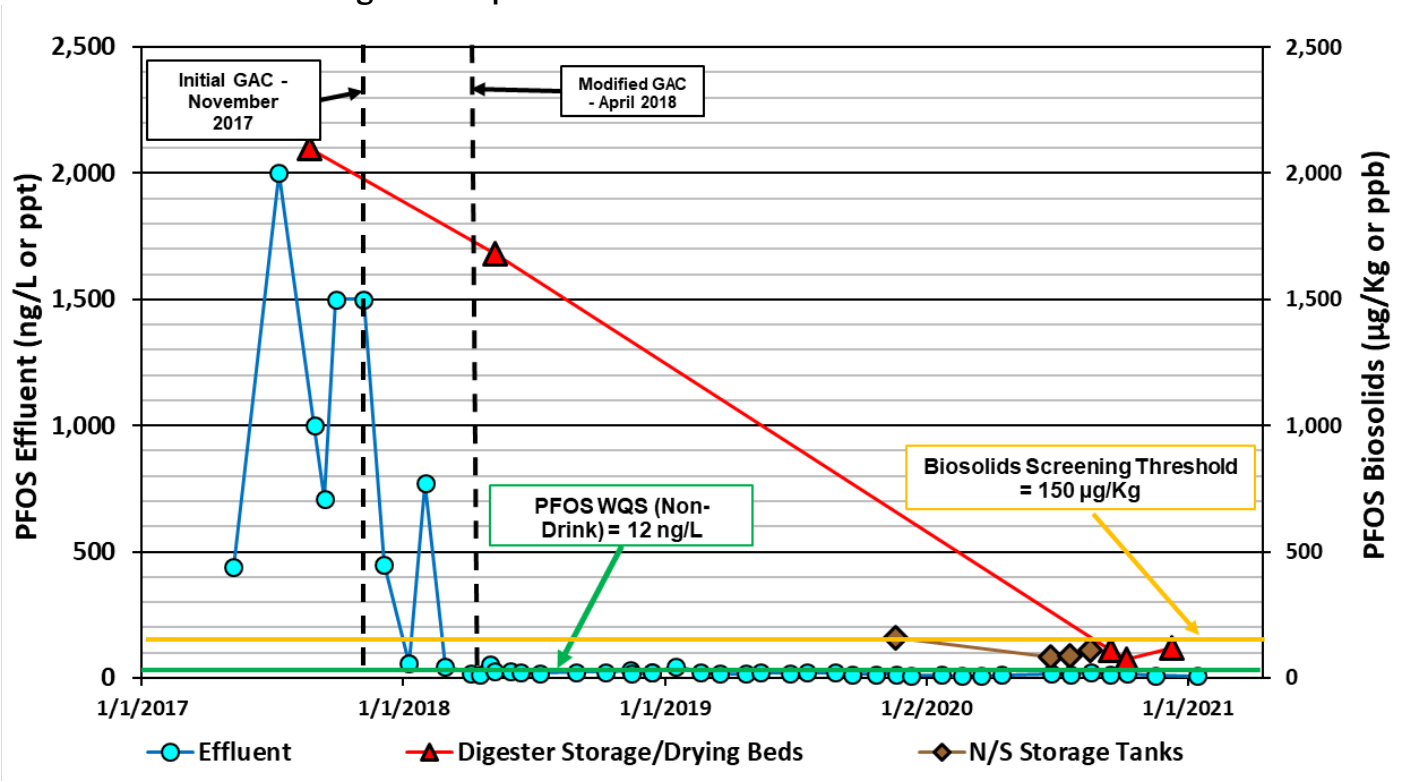
Until a risk-based evaluation is completed, EGLE will continue efforts to reduce PFAS entering wastewater systems, with the goal to continue reduce PFAS in biosolids to concentrations typical of non-industrially impacted biosolids. While there is no definitive background or anthropogenic concentration of PFOS in biosolids, for the purposes of this strategy, EGLE is using the concentration of 20 µg/kg of PFOS to be typical of non-industrially impacted biosolids. This concentration is a qualitative number based on average concentrations identified during the study of the 42 Michigan WWTPs. Facilities with concentrations above 20 µg/kg are more likely to have significant sources of PFOS (i.e. greater than 12 ng/l) that could potentially be reduced. As more source controls are implemented and awareness of PFAS increases, EGLE expects to see continued reductions of PFAS in biosolids and WWTP effluent.

Concentrations in biosolids at facilities whose biosolids were deemed industrially impacted ranged from 360 µg/kg to 6500 µg/kg and were usually closely associated with a significant industrial source of PFOS to their WWTP. Two of the facilities identified were already sending their sludge to a landfill for disposal, and EGLE confirmed the continuation of that disposal method with the WWTP going forward. The remaining four WWTPs had active biosolids land application programs, which EGLE suspended while the facilities worked to address the industrial sources of PFAS to their WWTPs. All six facilities are implementing the IPP PFAS Initiative, which requires reduction of PFOS at the source. There are five of the WWTPs that have already addressed their primary source of PFOS through enforcement of their IPP, which led to installation of granular activated carbon (GAC) treatment by their industrial users or elimination of the source. There is already evidence of dramatic reduction of PFOS concentrations in biosolids following installation of treatment at industrial users for WWTPs whose biosolids were deemed industrially impacted.

Lapeer WWTP is an example of an IPP that has required action by its primary source of PFOS within their system and where PFOS concentrations in their biosolids and effluent have greatly declined as a result (see Lapeer Effluent and Biosolids Concentrations Figure 2). Similar reductions have been noted at other WWTPs initially identified as having industrially impacted biosolids. As awareness of these chemicals rise and enforcement of prohibitions of use and control measures continue into the future, the concentrations of PFOS should continue to decline in all media, including WWTP effluent and biosolids.

The graph below depicts the reductions in effluent and biosolids PFOS concentrations following source reduction efforts at the Lapeer WWTP. The blue line represents effluent concentrations which corresponds with concentrations in parts per trillion (ppt) on the left side of the chart. The red and brown lines depict the biosolids concentrations which represents concentrations in parts per billion (ppb) shown on the right side of the chart. The horizontal dotted line depicts the time treatment was installed on the WWTP's industrial source.

Figure 2: Lapeer Effluent and Biosolids Concentrations



Evaluation of Land Application Sites

EGLE performed an evaluation of agricultural fields with land-applied biosolids from 8 WWTPs. The initial selection of agricultural fields was based on total PFAS and PFOS concentrations in effluent and biosolids from WWTPs. Selected were 11 agricultural fields associated with 5 WWTPs that had lower PFAS concentrations in their effluents and biosolids and 11 agricultural fields associated with 3 WWTPs that had some of the highest PFAS concentrations. The selection of the agricultural fields was biased toward higher mass of biosolids applied per acre. Since biosolids are generally applied uniformly across an area of application, the selection of sample locations was also biased toward areas of the fields where higher PFAS concentrations were expected (i.e., downgradient, low lying areas). Screening of soils, surface water, tile drains, and ponded water was conducted at all fields (where present). In addition, groundwater monitoring wells were installed at fields from four WWTPs, including three WWTPs with higher impacted biosolids and one with lower impacted biosolids.

PFAS was observed in various environmental matrices such as soil, groundwater, surface water, tile drains, and perched or ponded water. Overall, higher PFAS concentrations were identified in the agricultural fields associated with WWTPs with higher concentrations of PFOS in biosolids. Although some PFAS were detected at fields that received biosolids from non-industrially impacted WWTPs, concentrations were significantly lower than fields accepting industrially impacted biosolids. It also should be noted that screening found low concentrations of PFAS in some agricultural fields associated with industrially impacted WWTPs. Additional information, including summary field reports, will be provided as part of a detailed report expected in 2021.

Statewide Soil Study

EGLE is conducting a statewide study of soils to help provide context for the distribution of PFAS in the wider environment. The objective of this work is to collect soil samples for PFAS analysis to further the understanding of the nature and extent of potential PFAS impact from various sources in multiple soil types, geographies, and land uses at locations across the State of Michigan. This work will provide important context to the discussion of PFAS on agricultural land as well as other land use types.

INTERIM STRATEGY FOR LAND APPLICATION OF BIOSOLIDS

EGLE's strategy to use WQS to drive the implementation of PFAS source controls at WWTPs with IPP requirements in their National Pollutant Discharge Elimination System (NPDES) permits has proven to be effective. Through this approach, WWTPs have experienced significant reduction in PFOS concentrations in both effluent and biosolids. Further improvements are anticipated as control programs continue to be implemented and refined. EGLE is also committed to ensuring that industrially impacted biosolids are not land applied and to evaluate historical land application scenarios that may present unacceptable risks to public health.

Until a fully vetted, risk-based evaluation is completed for PFAS in biosolids, EGLE is implementing the following strategy/requirements to guide WWTPs and landowners/farmers who make decisions on land applying biosolids with detectable concentrations of PFAS.

The implementation of these measures is part of a strategy to mitigate risk to public health and the environment from potential adverse effects of an emerging pollutant, PFAS. These additional requirements are considered a modification to approved Residuals Management Programs (RMPs) and made in accordance with provisions outlined within the Michigan's Part 24 Administrative Rules, specifically Rule 2404(1) and language contained within existing discharge permits.

The primary components of the biosolids strategy are as follows:

- **Effective Date** - While EGLE is recommending that WWTPs consider implementing this strategy for the Spring 2021 land application season, implementation is required for land applications occurring on or after July 1, 2021.
- **PFAS Biosolids Sampling** - PFAS analysis of biosolids will be required prior to land application. Sample frequency is determined by the size of the WWTP and whether an IPP is required.
- **PFAS Source Identification and Reduction** - PFAS analytical results of biosolids (and in many cases WWTP effluent) will dictate the level of source identification and reduction efforts.
- **Landowner and Farmer Communication** - Having an open dialogue with the landowner and farmer about PFAS in biosolids and source reduction efforts underway will be a critical step in moving forward. EGLE will require that analytical result information and additional educational resources and information specific to PFAS in biosolids work done in Michigan be made available.

BIOSOLIDS PFAS SAMPLING AND NOTIFICATION REQUIREMENTS

Pre-application sampling of biosolids by WWTPs is a key part of the strategy. Expanding the sampling and analysis for PFAS in biosolids at WWTPs will contribute to future evaluation of biosolids containing PFAS. Furthermore, it will help assure industrially impacted biosolids are not land applied. Guidance on sampling biosolids for PFAS analysis can be found in the Biosolids and Sludge PFAS Sampling Guidance document. Results of PFAS biosolids analysis shall be submitted to WRD through MiWaters at a minimum of two weeks prior to initial land application.

Required PFAS Sampling Prior to Land Application

One Sample Per Year – All USEPA Majors/All IPPs that intend to land apply biosolids in Michigan shall collect and analyze a minimum of one representative biosolids sample for PFAS analysis in each year they intend to land apply prior to land application.

One Sample Each Permit Cycle (five years) – All other WWTPs that intend to land apply biosolids in Michigan shall collect a minimum of one representative biosolids sample analyzed for PFAS prior to land application. Thereafter, upon permit reissuance, WWTPs shall collect one representative sample for PFAS prior to the initial land application that occurs within the permit cycle (every five years). One-time Residual Management Program (RMP) approvals such as land application of biosolids removed from Wastewater Stabilization Lagoons shall include a minimum of one representative sample for PFAS analysis.

Analytical Results/Source Investigation and Control

- **PFOS at or above 150 µg/kg.**
  - Biosolids exceeding 150 µg/kg PFOS are deemed Industrially Impacted and cannot be land applied.
  - Immediately notify EGLE, WRD staff.
  - Sample effluent and investigate potential sources to develop a source reduction program, if they have not already done so under the IPP PFAS Initiative.
  - Arrange alternative treatment or disposal of solids.

- **PFOS at or above 50 µg/kg but below 150 µg/kg.**
  - Immediately notify EGLE, WRD staff.
  - Sample effluent and investigate potential sources to develop a source reduction program, if they have not already done so under the IPP PFAS Initiative.
  - To reduce overall loading to the site, reduce land application rates to no more than 1.5 dry tons per acre (or submit an alternative risk mitigation strategy).

- **PFOS below 50 µg/kg.**
  - If results are over 20 µg/kg PFOS (based on the averages derived from the Summary Report: Statewide Biosolids and WWTP Study and other available data), consider investigating sources and sampling the WWTP effluent for PFAS. Guidance can be obtained from the WRD IPP PFAS staff.

Communication to Landowners/Farmers

Prior to land application at a site, provide the PFOS analytical results to the landowner and farmer (if different) via hard copy or electronic mail. Also provide EGLE biosolids staff contact information and the additional PFAS-related resources provided in the PFAS Landowner/Farmer section of the PFAS Land Application Workgroup webpage.

Additional requirements including other PFAS analytes, sampling frequency, limits, and notification requirements may be amended as new information becomes available. In order to prepare for full implementation, EGLE WRD recommends that these same protocols be implemented prior to that time, but they are not required.

NEXT STEPS

In addition to implementing the measures discussed within this Interim Strategy for the land application of biosolids containing PFAS, EGLE has identified the following next steps that will be implemented in the future as we expand implementation of the strategy.

- Continue implementing the recommendations of the MPART Science Advisory Panel.
- Engage the PFAS Land Application Workgroup stakeholders on implementation of the Biosolids Strategy.
- Continue supporting the USEPA's effort to conduct a robust risk-based evaluation of PFAS in Biosolids.
- Collaborate with other states on strategies dealing with PFAS in biosolids.
- Review available documentation to identify historical land application sites associated with previous use of PFOS and PFOA.
- Continue to implement IPP PFAS Initiative at WWTPs and PFAS control strategies at non-IPP municipal NPDES and Groundwater discharges.
- Continue the evaluation PFAS in biosolids including additional testing at WWTPs and land application sites as funding allows.
- Continue working with MPART workgroups to evaluate the fate and transport of PFAS in the environment.

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Attachment A
MICHIGAN PFAS CRITERIA SUMMARY

Drinking Water - Safe Drinking Water Act (Act 399)

Compound	Concentration (PPT)	Standard	Established Date
PFOA (Perfluorooctanoic acid)	8	MCL*	Aug 2020
PFOS	16	MCL	Aug 2020
PFNA (perfluorononanoate)	6	MCL	Aug 2020
PFHxS (perfluorohexanesulfonate)	51	MCL	Aug 2020
PFBS (perfluorobutane sulfonate)	420	MCL	Aug 2020
PFHxA (perfluorohexanoate)	400,000	MCL	Aug 2020
GenX (Hexafluoropropylene oxide dimer acid)	370	MCL	Aug 2020

***MCL = Maximum Contaminant Levels for Public Water Supplies

Surface Water – Part 31

Compound	Concentration (PPT)	Standard	Established Date
PFOA (Drinking Water Source)	420	WQS	May 2011
PFOA	12,000	WQS	May 2011
PFOS (Drinking Water Source)	11	WQS	Mar 2014
PFOS	12	WQS	Mar 2014

***WQS = Water Quality Standards

Groundwater - Part 201

Compound	Concentration (PPT)	Standard	Established Date
PFOA	8	DW*	Dec 2020
PFOS	16	DW	Dec 2020
PFNA	6	DW	Dec 2020
PFHxS	51	DW	Dec 2020
PFBS	420	DW	Dec 2020
PFHxA	400,000	DW	Dec 2020
GenX	370	DW	Dec 2020
PFOA (DW Source)	420	GSI**	May 2011
PFOA	12,000	GSI	May 2011
PFOS (DW Source)	11	GSI	Mar 2014
PFOS	12	GSI	Mar 2014

*DW = Drinking water cleanup criteria
**GSI – Groundwater-Surface Water Interface