Statewide Study on Landfill Leachate PFOA and PFOS Impact on Water Resource Recovery Facility Influent

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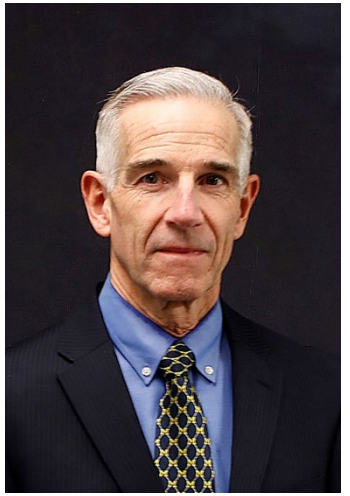
Our Speakers

Richard Burns
Senior Vice President
NTH Consultants, Ltd.



Brad Venman
Senior Toxicologist
NTH Consultants, Ltd.

Introduction

Kevin Kendall
President
Michigan Waste and Recycling Association

Statewide Study on Landfill Leachate PFOA and PFOS Impact on Water Resource Recovery Facility Influent

Regulatory Drivers for the Study

- PFOA & PFOS and why they're important
- Michigan developed surface water criteria (Rule 57) for PFOA & PFOS in 2011 and 2014, respectively, and groundwater cleanup criteria (Part 201) in 2018.
- The study began in response to Michigan's Water Quality Division's Industrial Pretreatment Program (IPP) mandated PFAS testing of dischargers to WRRF
  - NPDES IPP does not allow "pass-through" compounds; program goal is for source elimination / reduction / pretreatment requirements
  - WRRFs with detectable influent/effluent PFAS began looking up-stream for potentially significant discharge sources, including landfill leachate
- US EPA – PFAS not currently regulated under Resource Conservation Recovery Act, Clean Water Act or the Clean Air Act

Regulatory Updates since Study was published

- US EPA published proposed PFAS Action Plan in February 2019
- Michigan has developed proposed rules to establish Maximum Contaminant Levels for seven PFAS chemicals included PFOA & PFOS
  - Rules currently being reviewed by the Joint Committee on Administrative Rules
- Water Resources Division currently in the process of reviewing Rule 57 criteria for PFOA (last updated in 2011)

Project Timeline (Fall 2017 to Present)

FALL 2017
MDEQ (EGLE) Mandate

WINTER 2018
MWRA's Common Interest Agreement

WINTER 2018
EGLE's approval of MWRA's statewide approach

SPRING/SUMMER 2018
Scope Development

NOV. 2018-MAR. 2019
Data collection / evaluation / interpretation

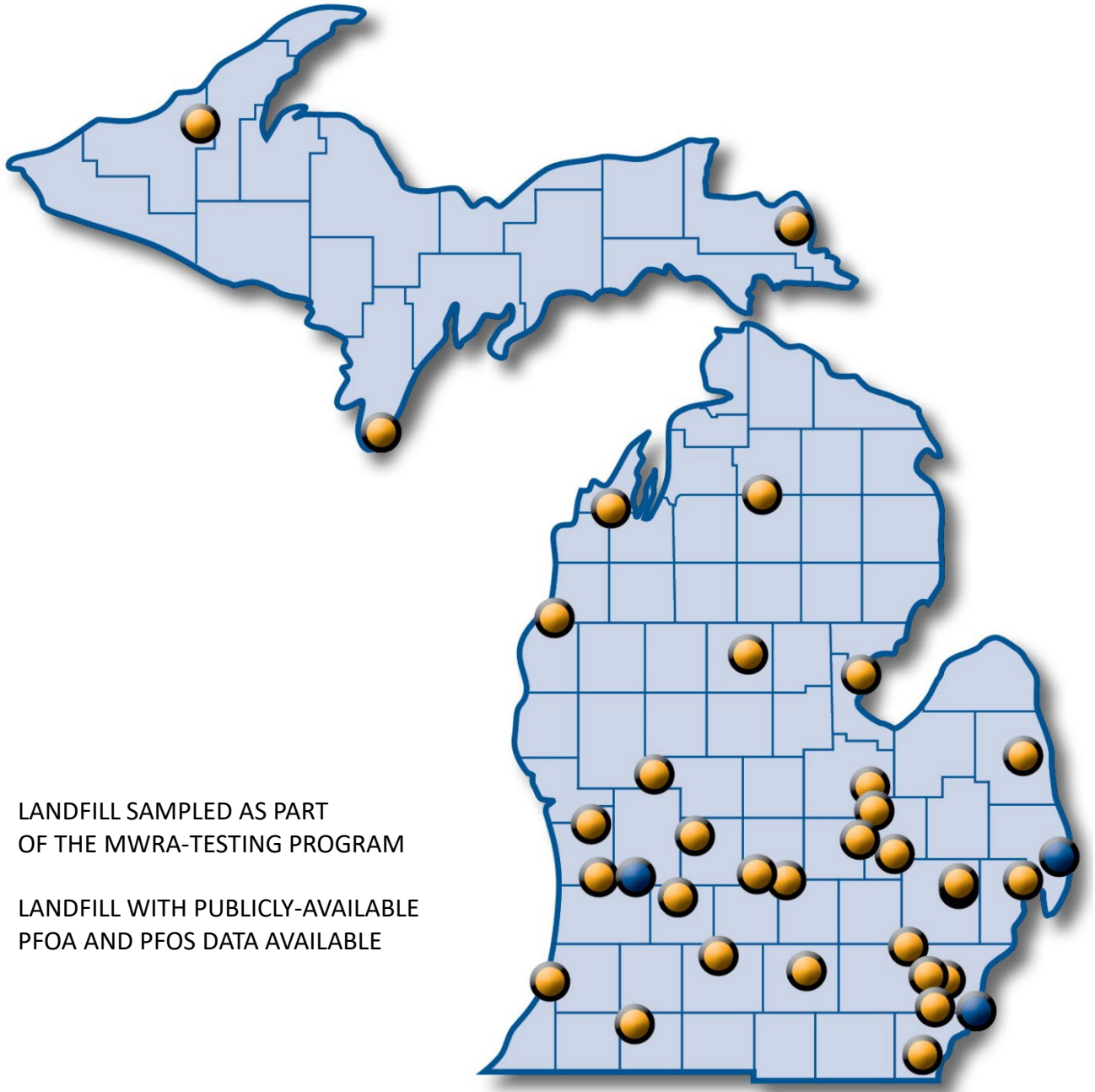
Project expansion from data report to research project

Two separate reports prepared

March 2019
Report(s) issued to MDEQ/EGLE

Spring 2019 to present
Follow up activities. Discussions between WRRFs, EGLE, MPART, and MWRA

Solid Waste Disposal Facilities Included



LANDFILL SAMPLED AS PART OF THE MWRA-TESTING PROGRAM

LANDFILL WITH PUBLICLY-AVAILABLE PFOA AND PFOS DATA AVAILABLE

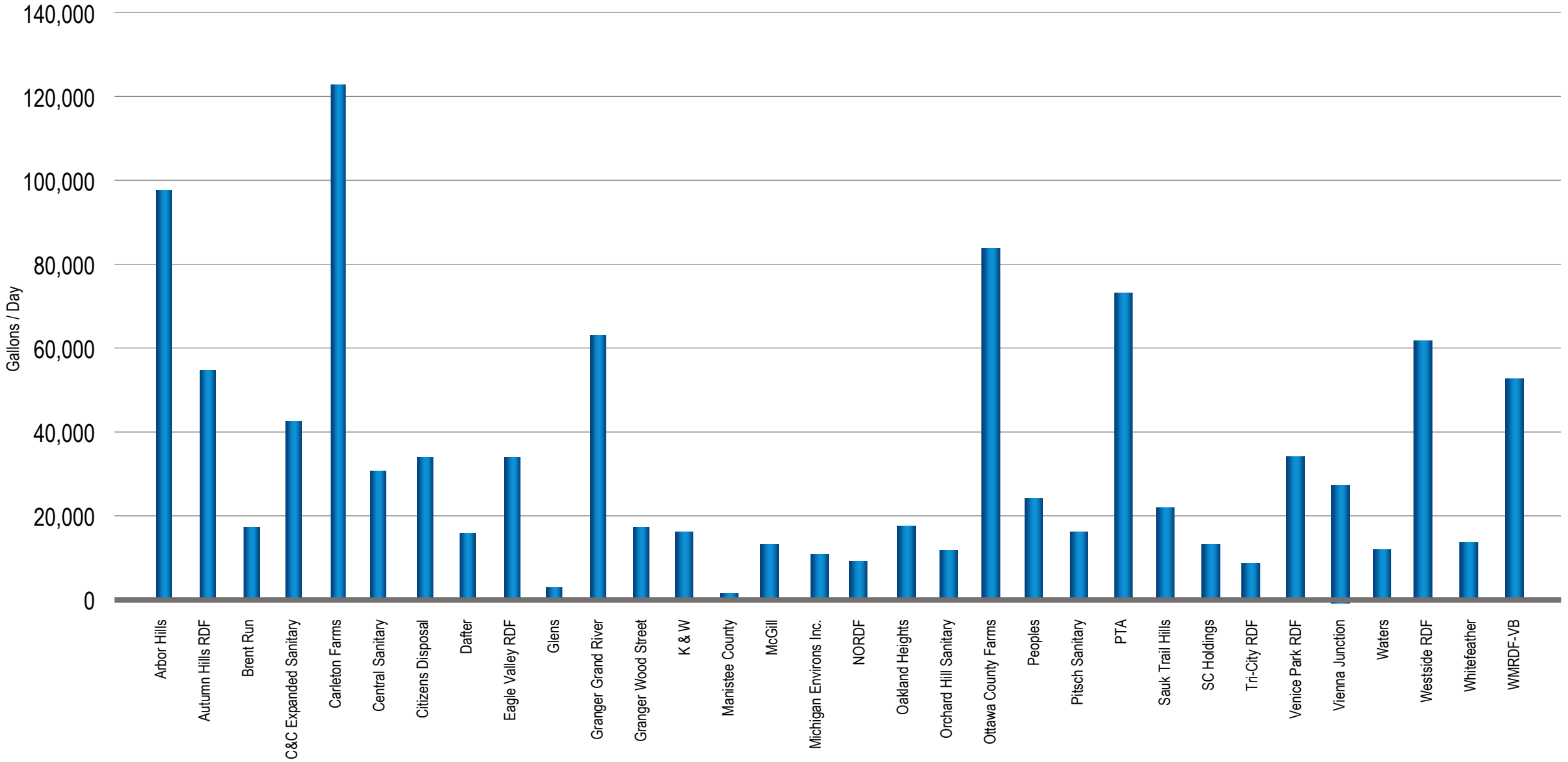
Advanced Disposal Services Arbor Hills Landfill, Inc.
Autumn Hills Recycling and Disposal Facility
Brent Run Landfill
C&C Expanded Sanitary Landfill
C&C Expanded Sanitary Landfill
Carleton Farms Landfill
Central Sanitary Landfill, Inc.
Citizens Disposal
Dafter Sanitary Landfill
Eagle Valley Recycle and Disposal Facility
Glens Sanitary Landfill
Granger Grand River Landfill
Granger Grand River Landfill
K&W Landfill
Manistee County Landfill, Inc.
Michigan Environs Inc.
Northern Oaks
Oakland Heights Development, Inc.
Orchard Hill Sanitary Landfill
Ottawa County Farms Landfill
Peoples Landfill, Inc.
Pine Tree Acres, Inc.
Pitsch Sanitary Landfill
Recycling and Disposal Facility
Republic Services of Pinconning (Whitefeather)
Riverview Land Preserve
Sauk Trail Hills Landfill
SC Holdings
Smith's Creek Landfill
South Kent Landfill
Tri-City Recycling and Disposal Facility
Venice Park Recycling and Disposal Facility
Vienna Junction Industrial Park Sanitary Landfill
Waters Landfill
Westside Recycling and Disposal Facility
Woodland Meadows RDF - Van Buren

Leachate Sampling and Laboratory Testing Program

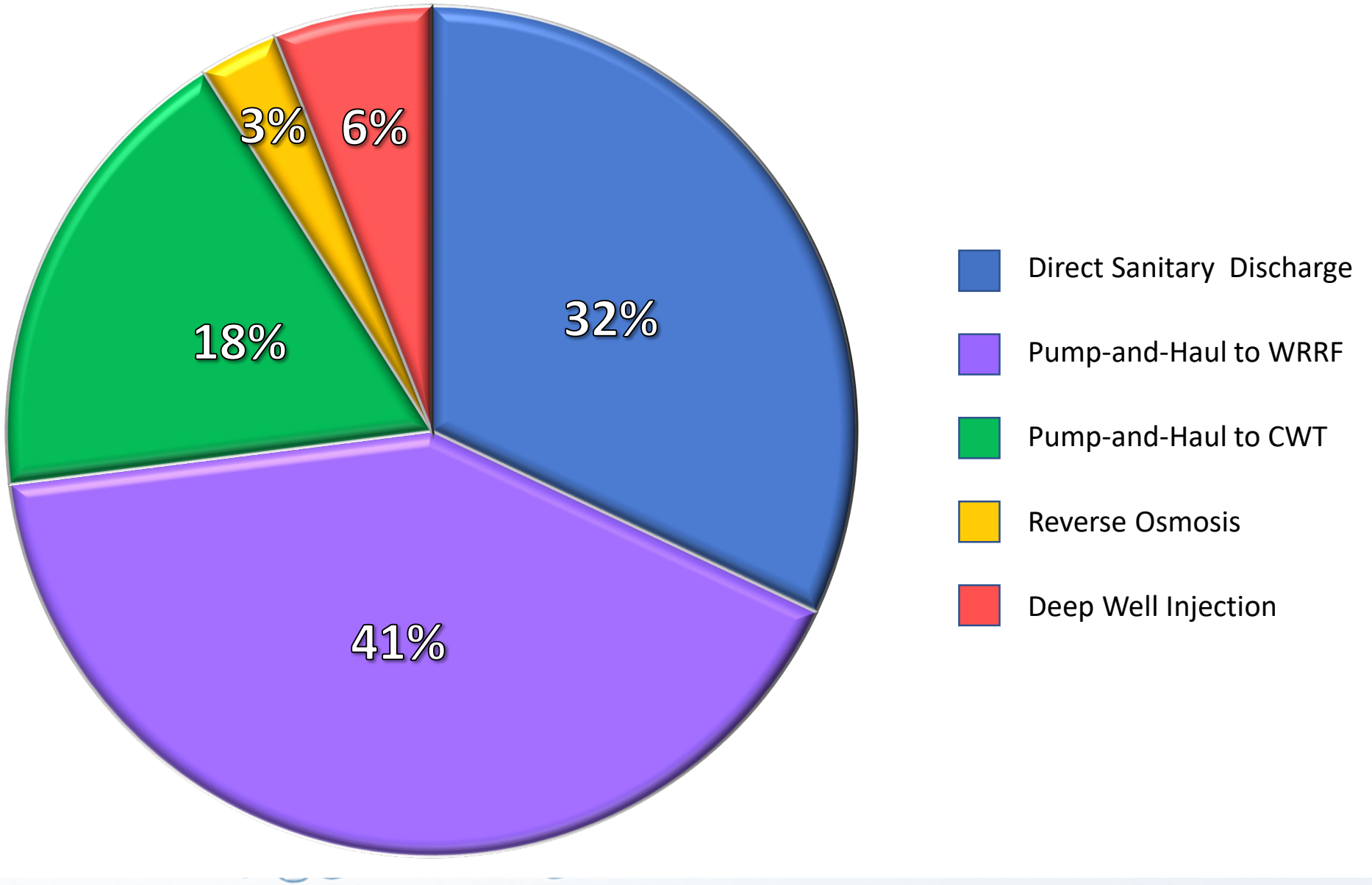
Sample Shipment – Sealed Cooler Prepared for Shipment

- Samples collected using MDEQ/EGLE draft PFAS protocol during late November and December
- Test America- Eurofins (San Francisco) completed analyses per Method 537 (modified)
- All results provided by mid-January 2019 (20-day turn-around)
- Data met quality assurance objectives

Leachate Volumes Per MWRA Landfill



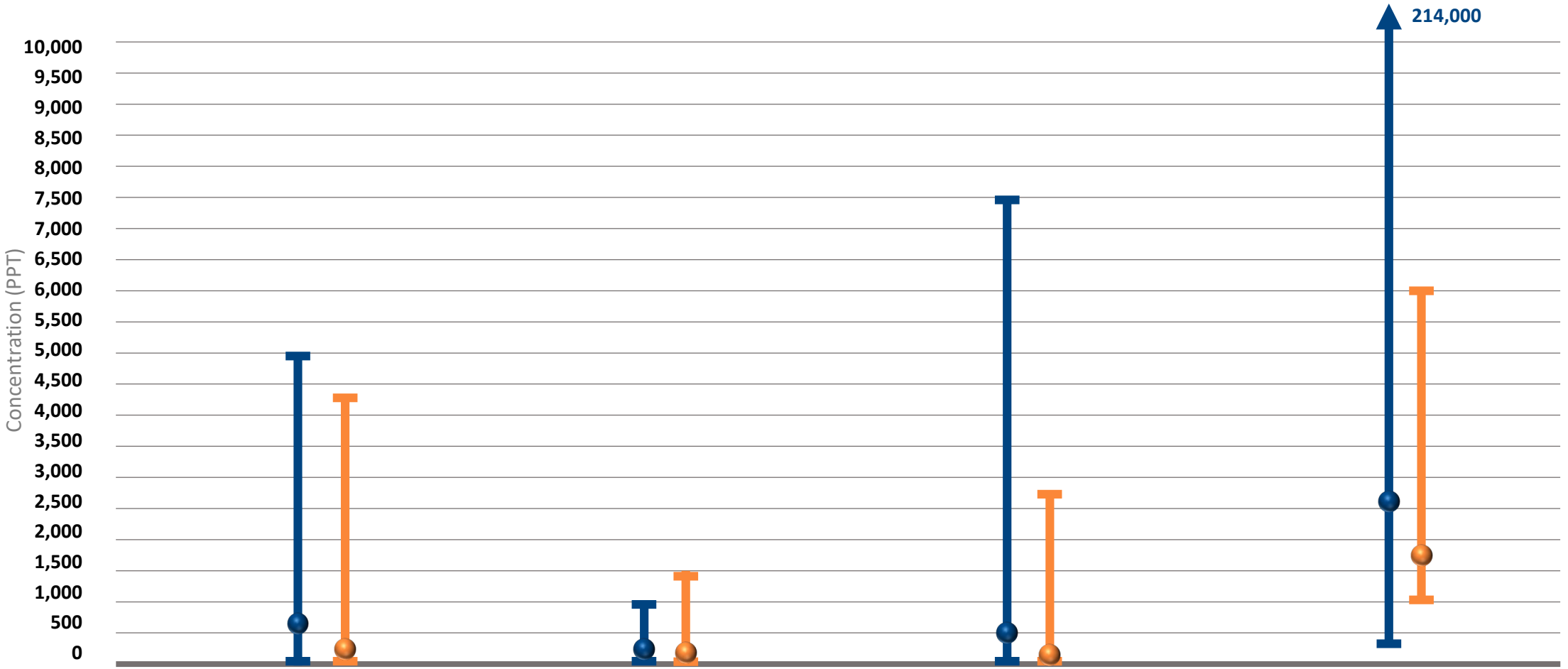
Leachate Disposal Methods



WATER RESOURCE RECOVERY FACILITY (WRRF) SUMMARY

Summary of WRRF PFOA/PFOS With Influent Data Evaluated in This Study			
WRRFs with PFOA/PFOS data that manage MWRA-member landfill leachate	Total WRRFs with PFOA/PFOS data that manage leachate from other active Type II Landfills	WRRFs with PFOA/PFOS data that do not manage Leachate from active Type II Landfills	Total WRRFs with PFOA/PFOS data included in this Study
11	7	16	34

WORLD-WIDE LEACHATE PFOA & PFOS CONCENTRATIONS



N. America

PFOA	PFOS
Max: 5,000	Max: 4,400
Med: 688	Med: 214
Min: 150	Min: 25

Europe

PFOA	PFOS
Max: 1,000	Max: 1,500
Med: 253	Med: 211
Min: 0	Min: 0

Australia

PFOA	PFOS
Max: 7,500	Max: 2,700
Med: 525	Med: 126
Min: 17	Min: 0

China

PFOA	PFOS
Max: 214,000	Max: 6,020
Med: 2,660	Med: 1,740
Min: 281	Min: 1,150

STATEWIDE PFOA AND PFOS
TYPE II ACTIVE LANDFILL LEACHATE CONCENTRATIONS (abbreviated)

Landfill Designation	Average Leachate Volume GPD	PFOA (ppt)	PFOS (ppt)	"PFOA Daily Mass (lb/day)"	"PFOS Daily Mass (lb/day)"
Arbor Hills Landfill	98,400	3200	220	0.0026	0.00018
Autumn Hills RDF	54,800	1300	380	0.0006	0.00017
Brent Run Landfill	16,400	540	110	0.0001	0.00002
C&C Expanded Sanitary Landfill	42,000	1300	450	0.0004	0.00015
Carleton Farms Landfill	123,300	1800	250	0.0018	0.00026
Central Sanitary Landfill	30,100	2500	470	0.0006	0.00012
Citizen's Disposal Inc.	32,900	1100	180	0.0003	0.00005
Dafter Sanitary Landfill	16,500	680	130	0.0001	0.00002
Eagle Valley RDF	32,900	490	170	0.0001	0.00005
Glens Sanitary Landfill	3,800	770	210	0.00002	0.00001
Summary Statistics	minimum maximum median average n	16 3200 1000 1186 39	9 960 220 287 39	0.000016 0.003 0.0001 0.0004 33	0.000007 0.0004 0.00005 0.0001 33

Michigan Compared to Other Regions

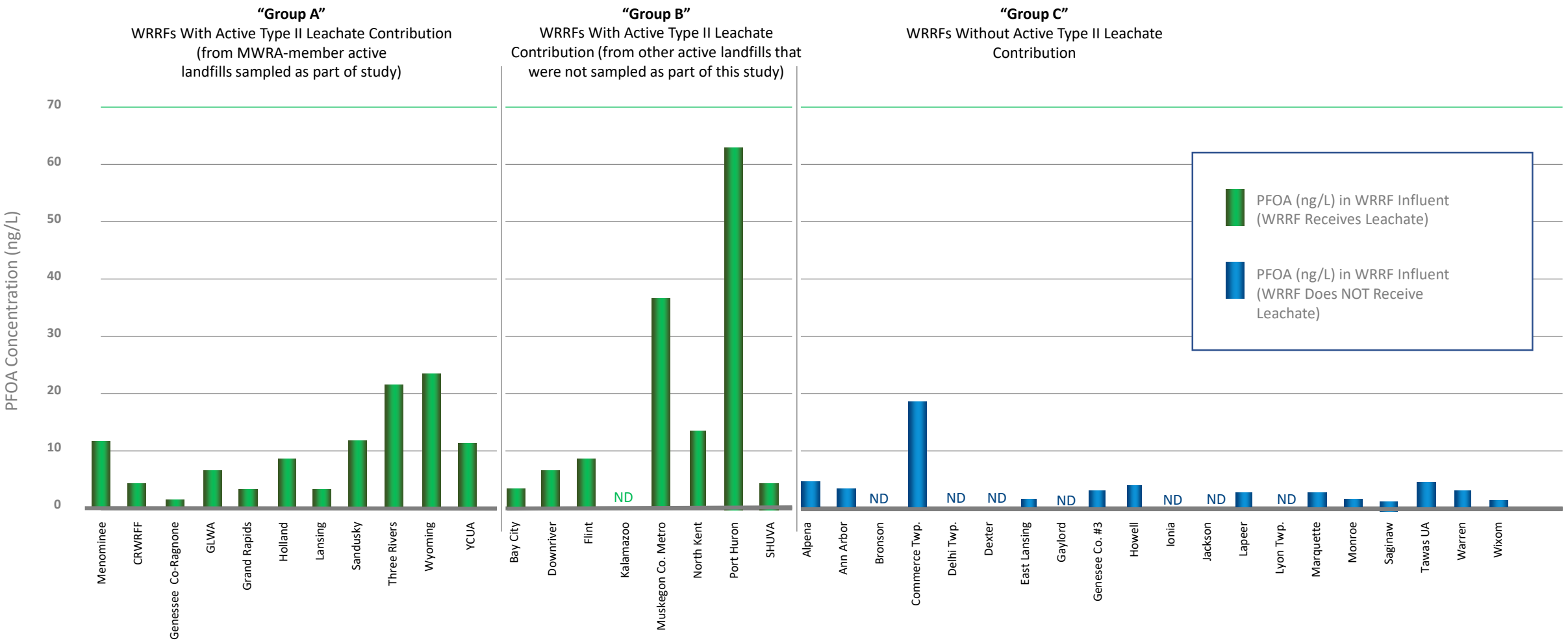
Region	PFOA (ppt)	PFOS (ppt)
Michigan	16 to 3,200	9 to 960
United States	30 to 5,000	3 to 800
Europe	ND to 1,000	ND to 1,500
Australia	17 to7,500	13 to 2,700
China	281 to 214,000	1,150 to 6,020
Worldwide Range	**ND to 214,000**	**ND to 6,020**

Current EGLE/EPA PFOA & PFOS Criteria

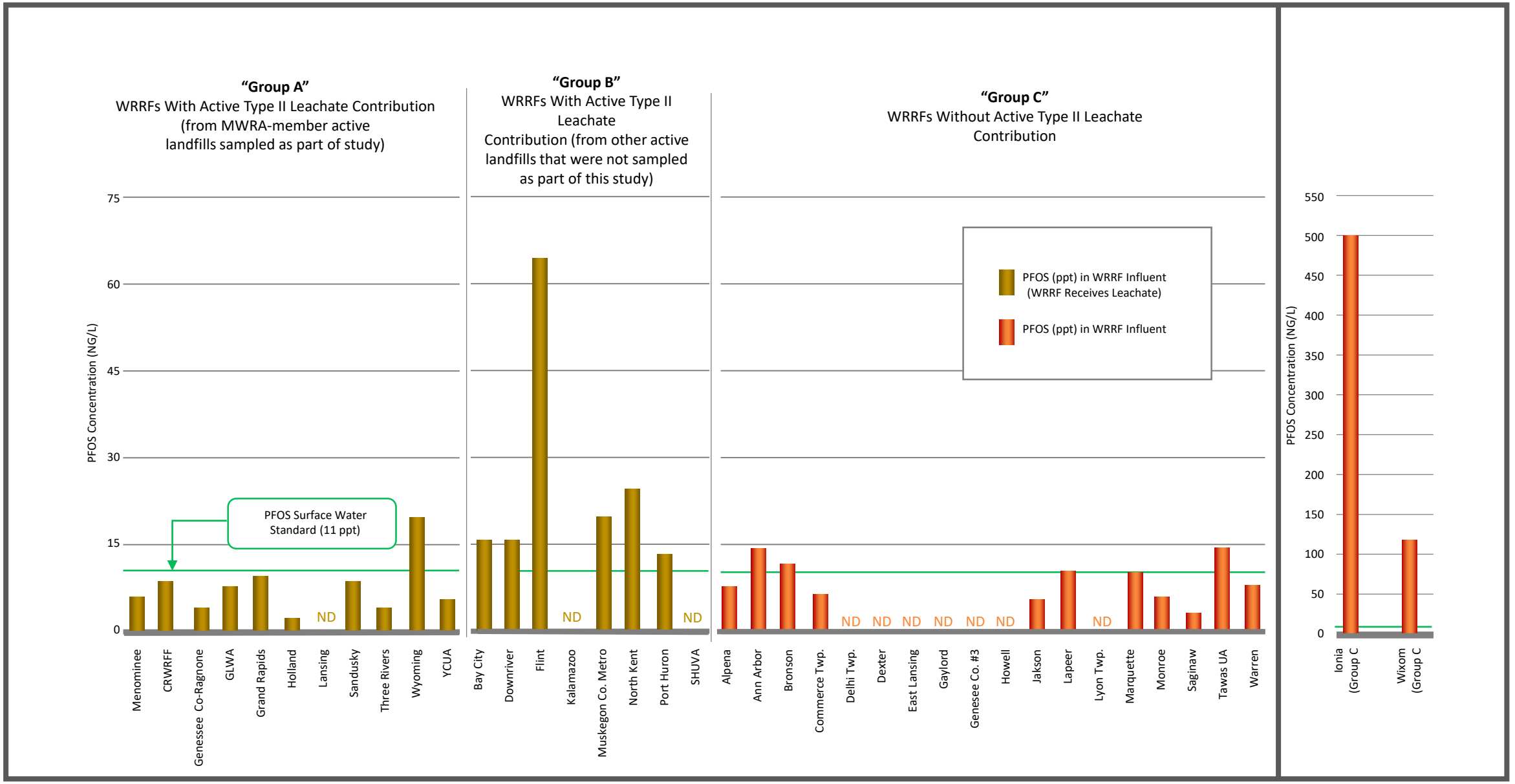
Chemicals	Human Non-Cancer Value (Non-Drinking Water)	Human Non-Cancer Value (Drinking Water)
PFOS	12 ppt	11 ppt
PFOA	12,000 ppt	420 ppt

Note: USEPA Health Advisory (HA) = 70 ppt (PFOA+PFOS)

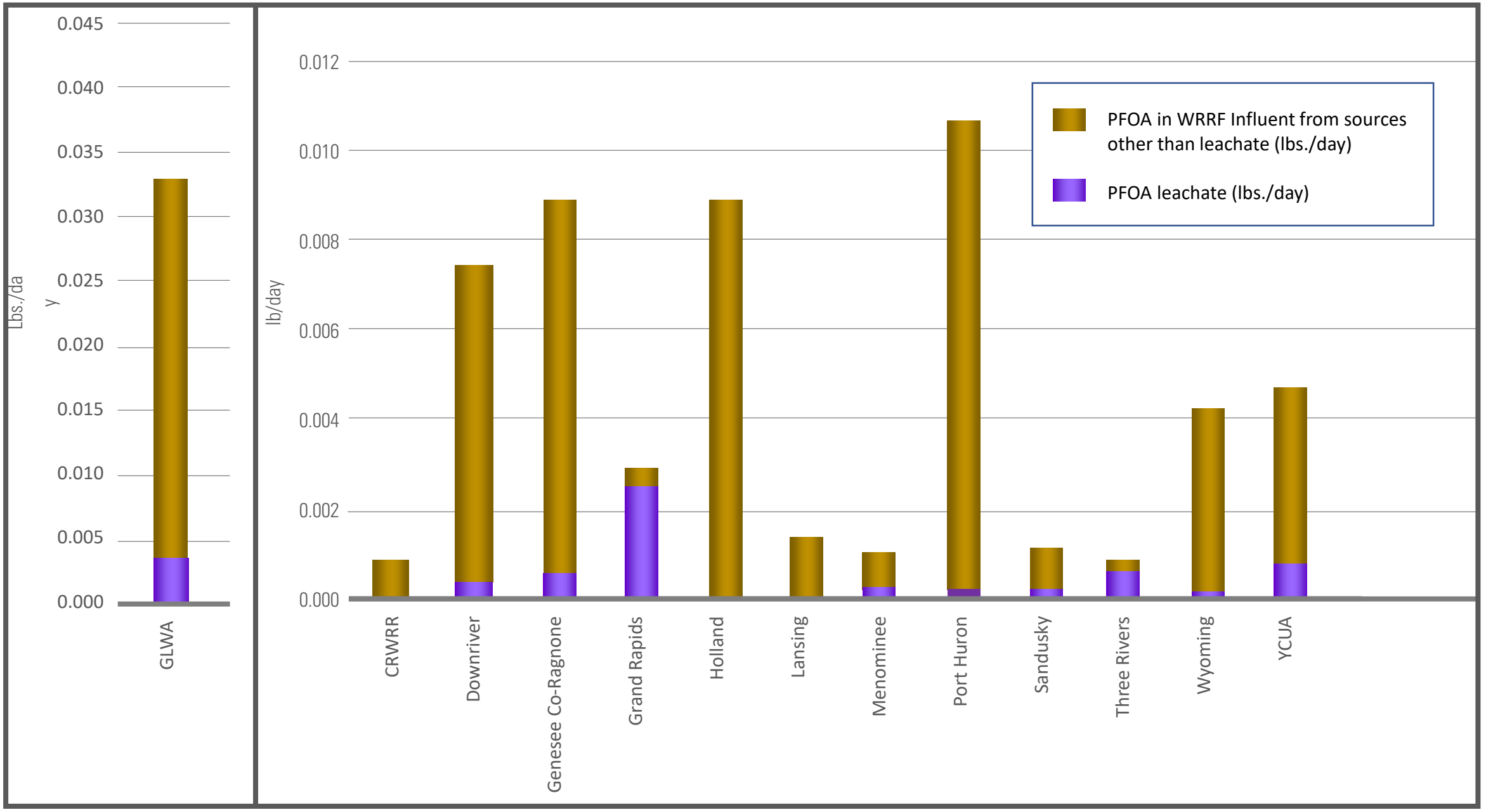
WRRF Overall Influent PFOA Concentrations



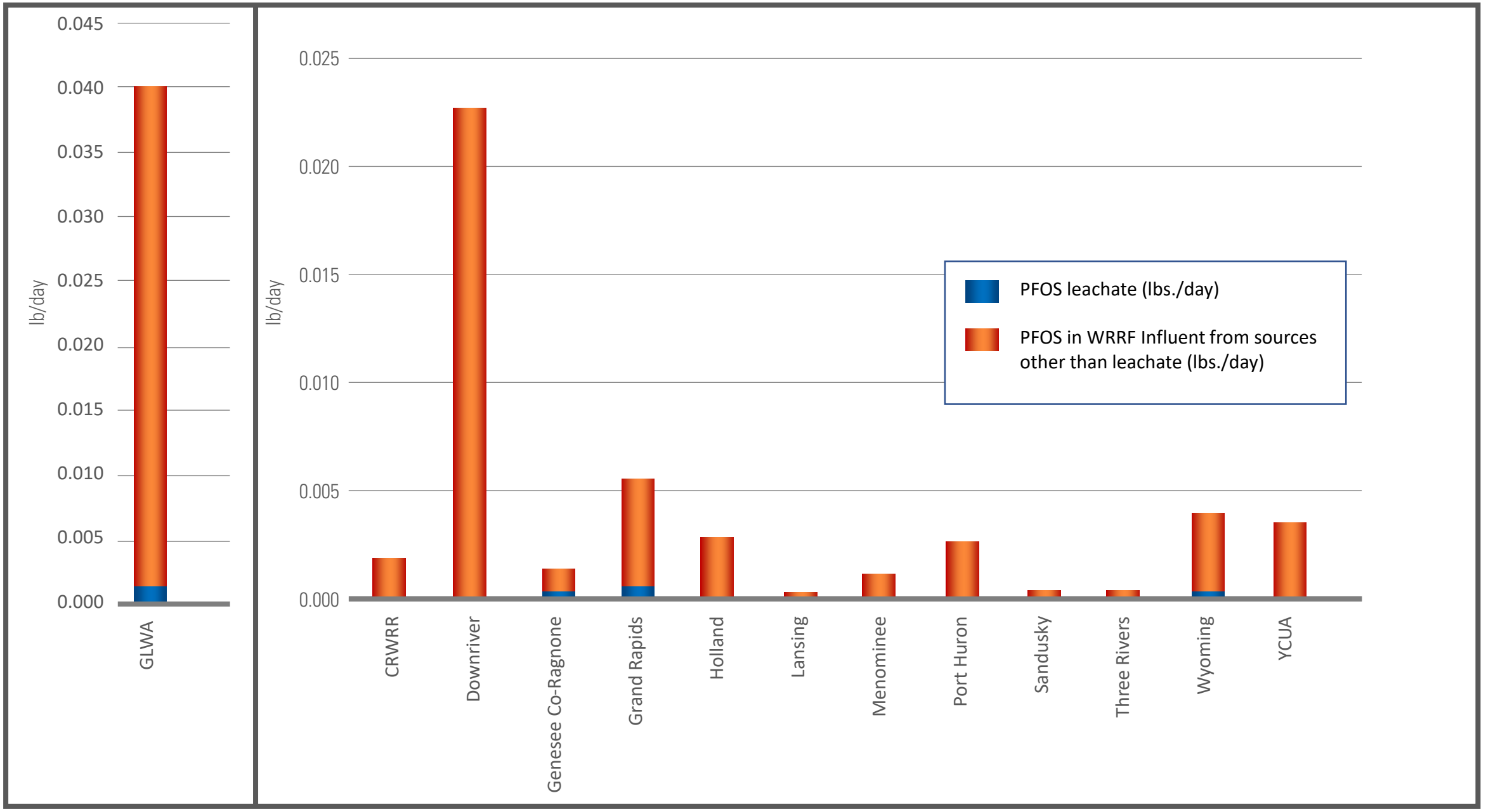
WRRF Overall Influent PFOS Concentrations



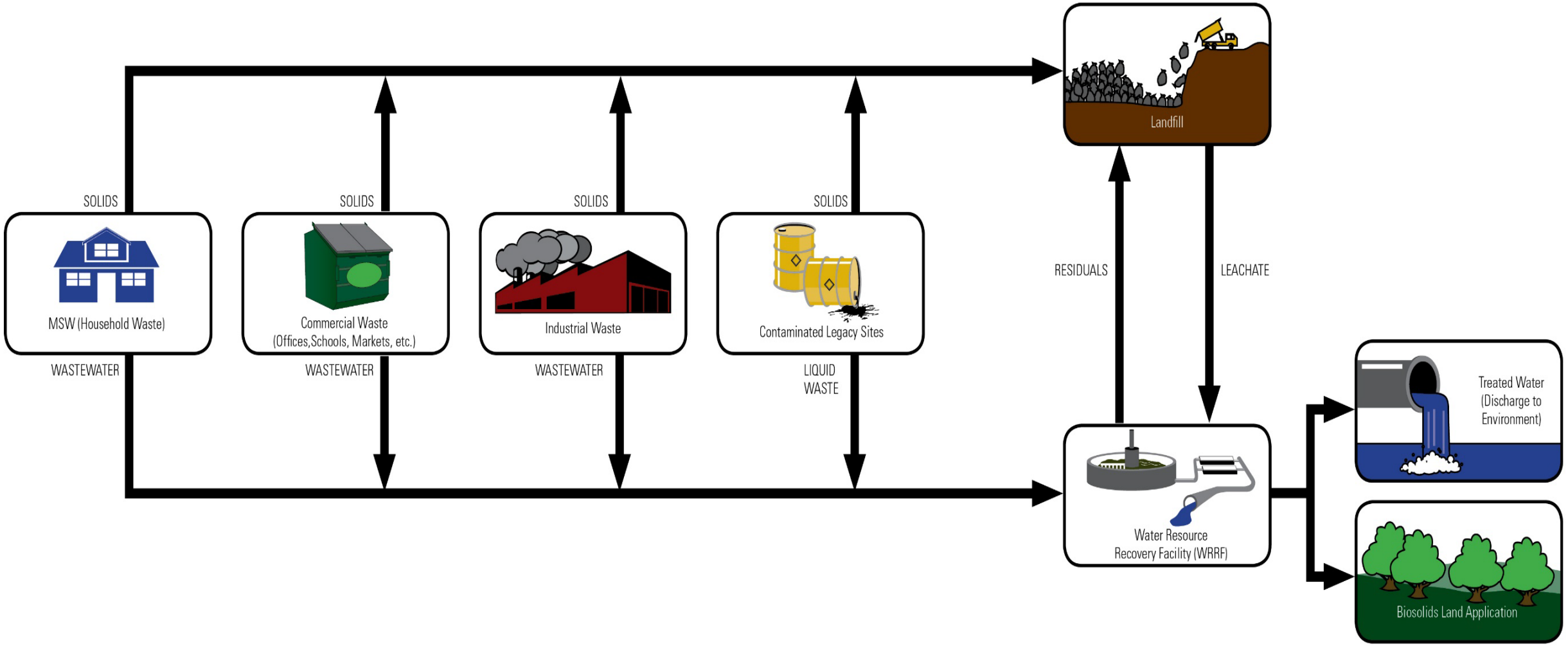
PFOA Mass: Influent Leachate vs. Overall WRRF Influent



PFOS Mass: Influent Leachate vs. Overall WRRF Influent



PFAS "CYCLING" WITHIN THE "WASTE ECONOMY" & ENVIRONMENT



OVERALL SUMMARY

- Unsurprisingly, PFOA and PFOS detected in all landfill leachate included in this study
- Michigan/USA landfill leachate PFOA and PFOS concentrations similar to other Western countries and much lower than China
- All state-wide WRRF influent PFOA concentrations were below EGLE's 420 ppt DW WQS
- Approximately two-thirds of WRRF influent PFOS concentrations were below Michigan's 11 ppt DW WQS

OVERALL SUMMARY (continued)

- 35 landfills discharge 1 MGD approximately 0.013 lbs. (PFOA+PFOS)/day
- 34 WRRFs discharge 1.4 BGD, contributing at least 0.15 lbs./day (PFOA+PFOS) to environment daily.
- Landfill leachate appears a relatively minor source of PFOA & PFOS to WRRF influent statewide
- Total PFAS mass balance and fate-and-transport not fully-understood
- Eliminating PFAS is a societal problem; all stakeholders need to be part of the solution to reduce and eventually eliminate these compounds from Michigan's environment.

Post-Publication Activity Updates

- Both technical and summary reports posted to the MWRA website
- MWRA/EGLE/MPART/MWEA subcommittee meetings to develop “next steps” focused on source reduction for leachate and biosolids
- Media interaction (radio and press articles); public reaction minimal
- Many facilities are developing Best Management Practices (BMPs) as requested by their local WRRF; others have switched to DIW disposal
- EGLE-mandated groundwater testing at active landfills with older unlined cells
- On-going MPART Treatment Roundtable Meetings: all currently-used treatment systems produce concentrated residuals; disposal options limited
- ERRC recently-approved DW MCLs will likely impact other PA 451 facilities (e.g., Part 115 and Part 201).

Thank you!

Summary Report
https://bit.ly/PFASSumReport

Technical Report
https://bit.ly/PFASTechReport