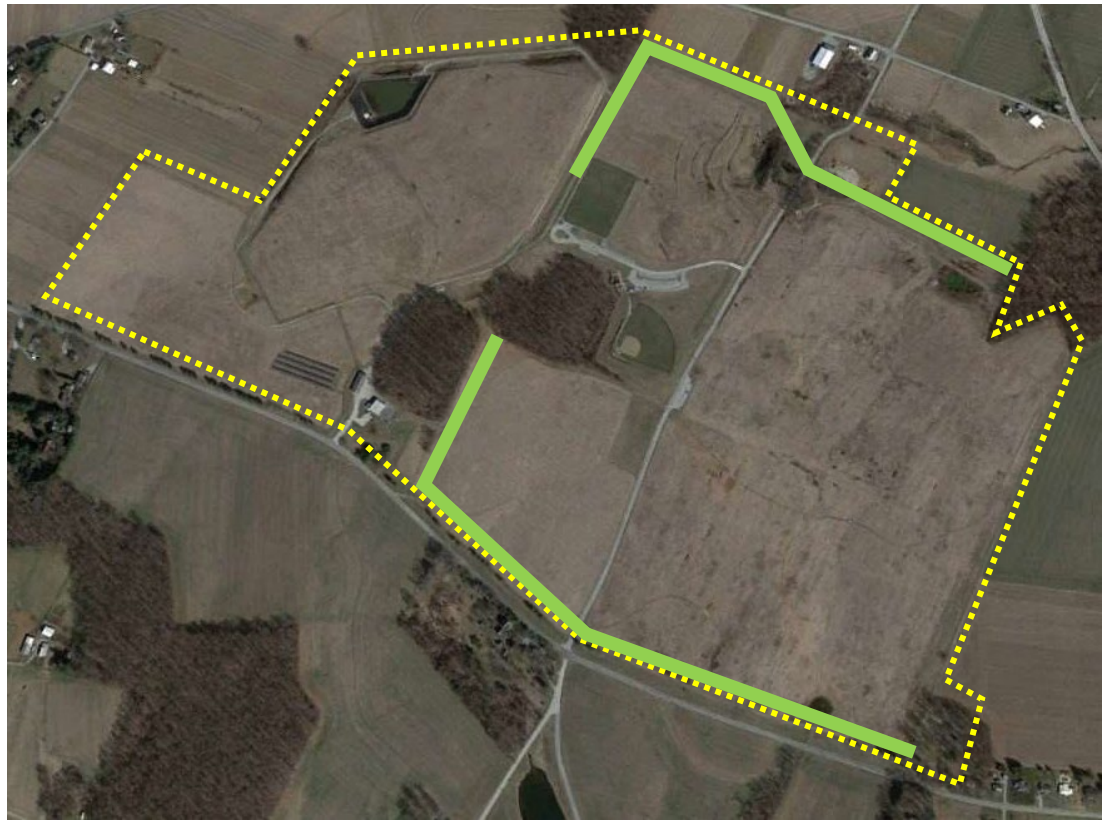
ICMGP 2024

CAPE TOWN • SOUTH AFRICA • 21 - 26 JULY

Caleb Fontenot

Use of MercLok™ P-640 to Reduce Mercury Concentrations in Effluent From Wastewater Treatment Systems

Water Treatment Case Study



- Groundwater/leachate collected via two recovery systems (10 wells per system)
- Groundwater/leachate impacted with organics and mercury (Hg)
- Water is treated with an air stripper to remove the organics
  - Hg concentrations remain above the discharge limit (50 ng/L)

- Requirements:
  - Efficient Hg removal prior to the air stripper (compatibility with organic loading)
  - Minimal operation and maintenance
  - Cost effective

MercLok Solution

MercLok P-640 is a *powdered amendment* **providing an** *easily adaptable* **and** *efficient* **form factor for use in** *mercury remediation*.

Albemarle's *versatile* **remediation amendment technology** *rapidly captures* **and** *sequesters* **multiple species of** *mercury*.

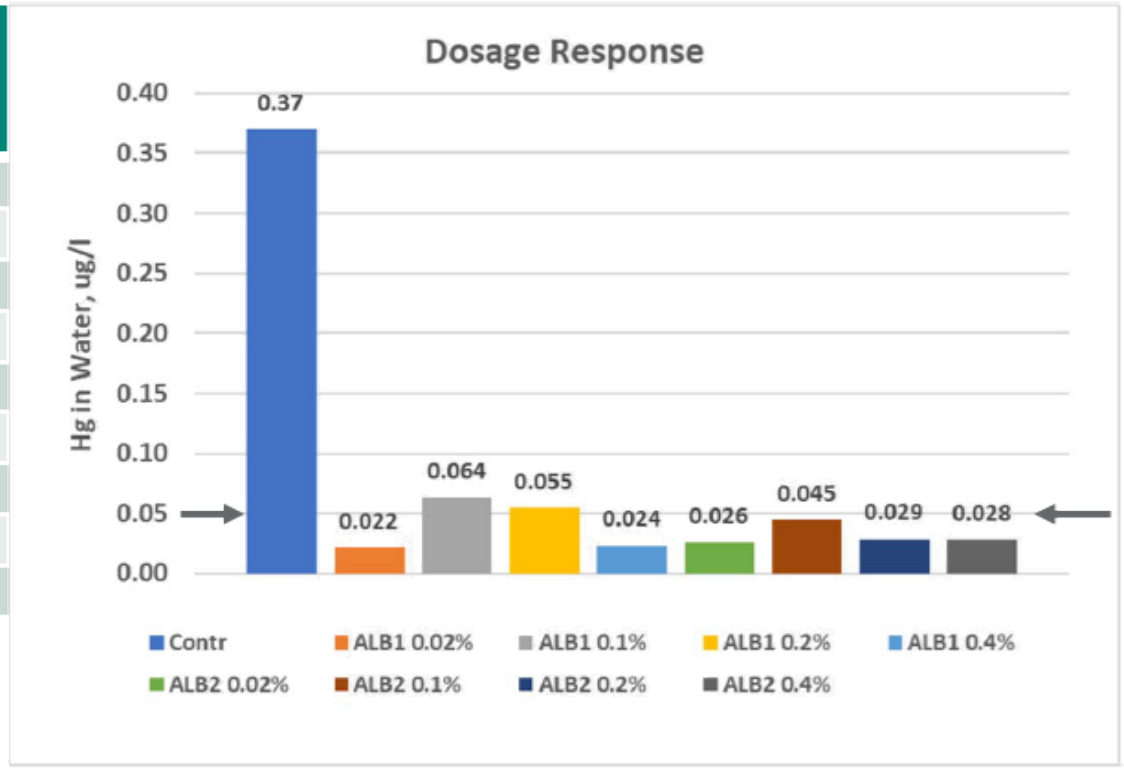
It *reduces* **leachable** *mercury* **and** *methylmercury* **by** *up to 99%*.

Bench Testing

Dosage Response Study – <0.05 µg/l Target

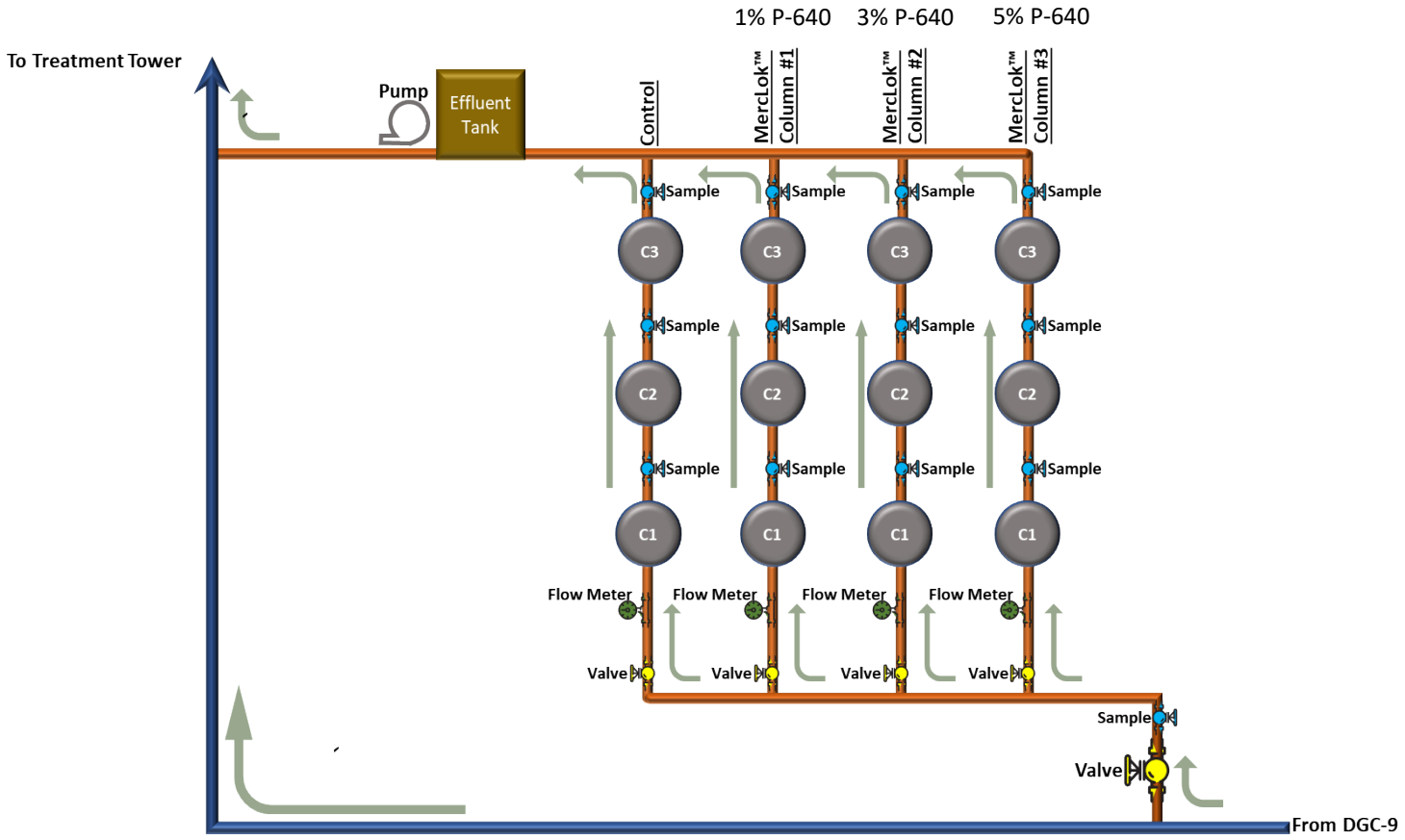
Amendment	Dosage (wt%) *	Hg concentration (ug/L) after treatment **
Control	0	0.371
MercLok™ ALB 1	0.02	0.0215
	0.10	0.0635
	0.20	0.0545
	0.40	0.0235
MercLok™ ALB 2	0.02	0.026
	0.10	0.045
	0.20	0.029
	0.40	0.028

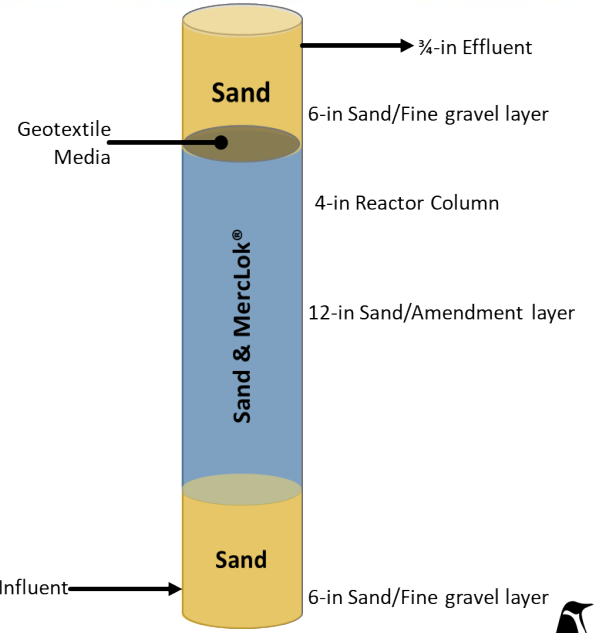
* Batch reactor test, agitated for 24 hours
** Average of two runs



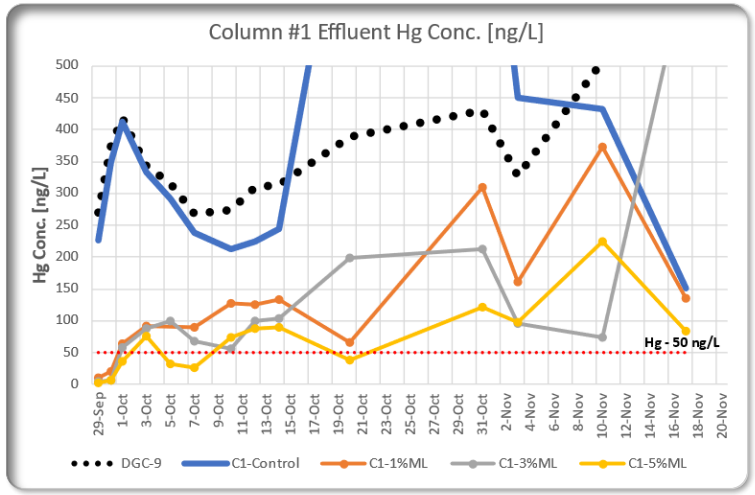
Note: P-640 formerly referred to as ALB-1

Phase I Pilot Test

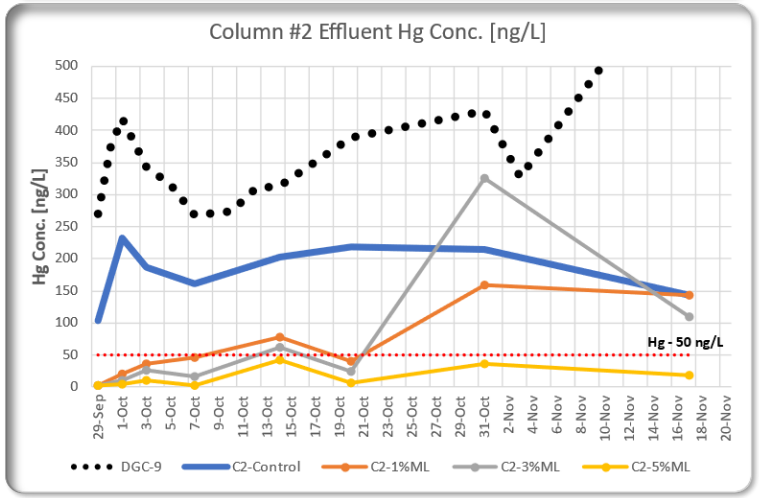


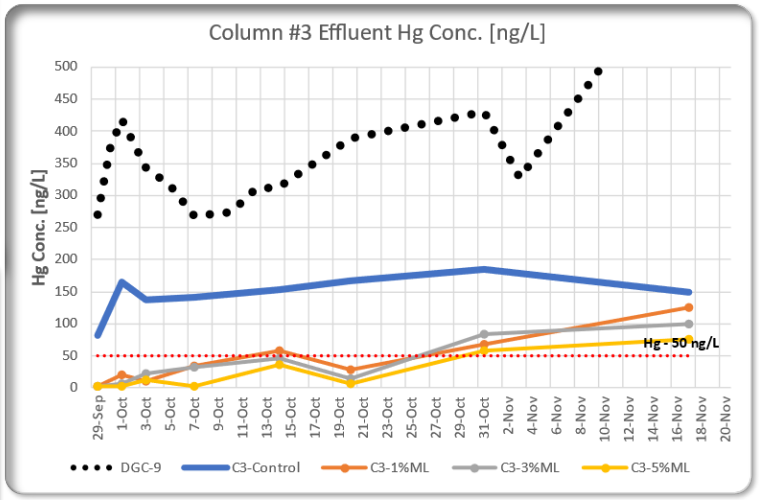


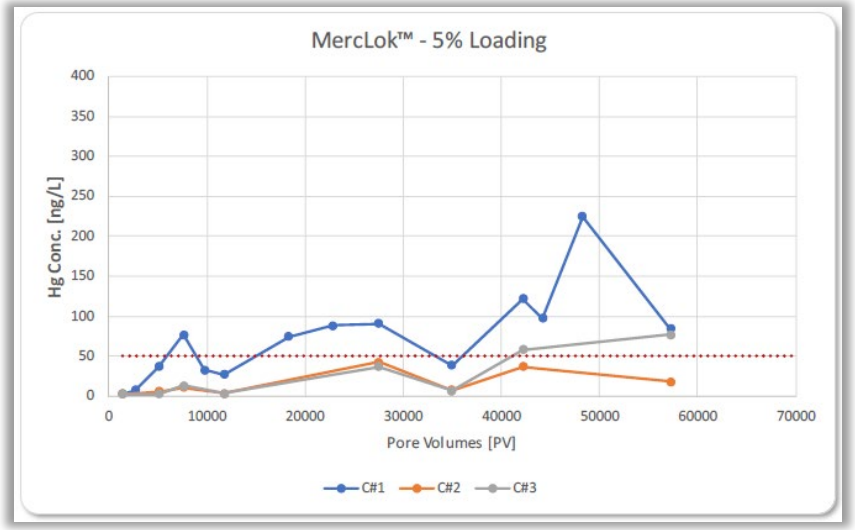
Phase I Pilot Results



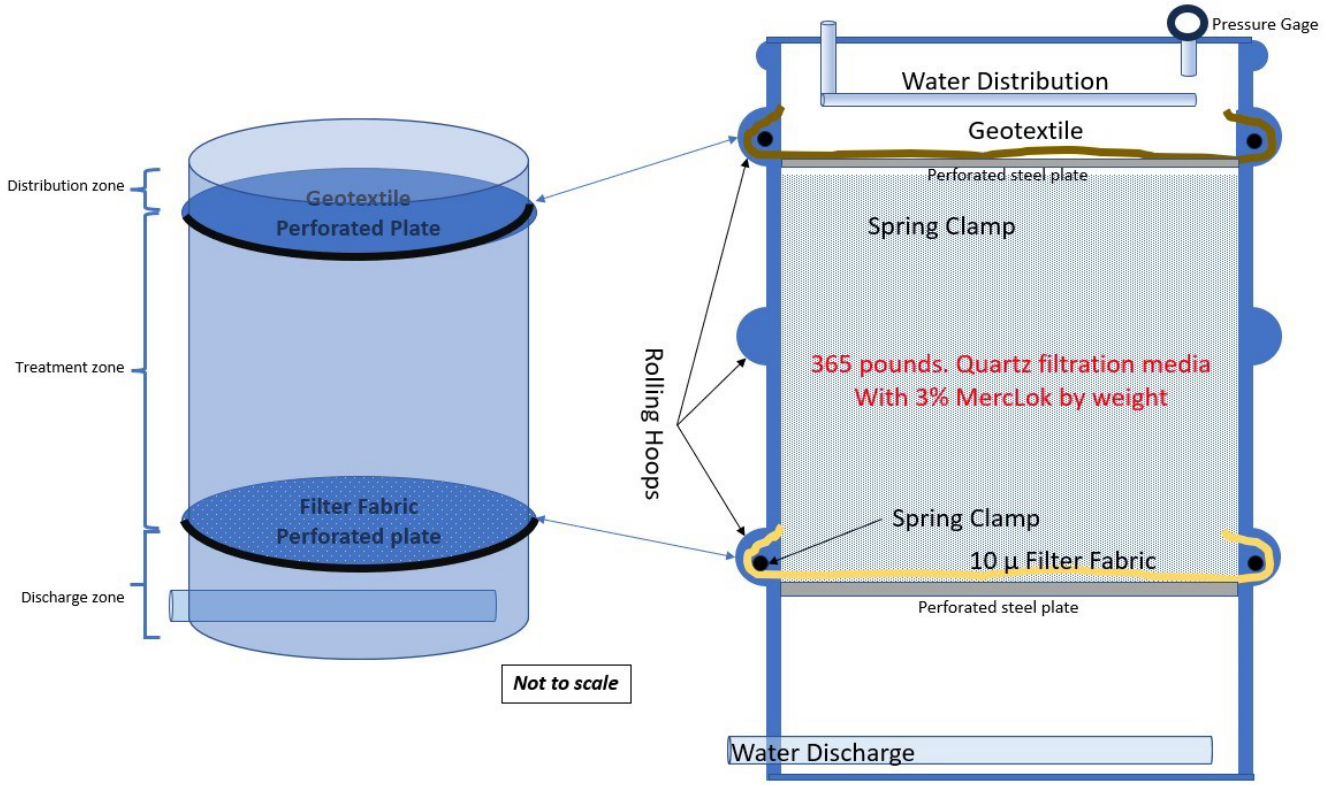
Control Column1
Hg conc >500 ng/L
(anomalous)





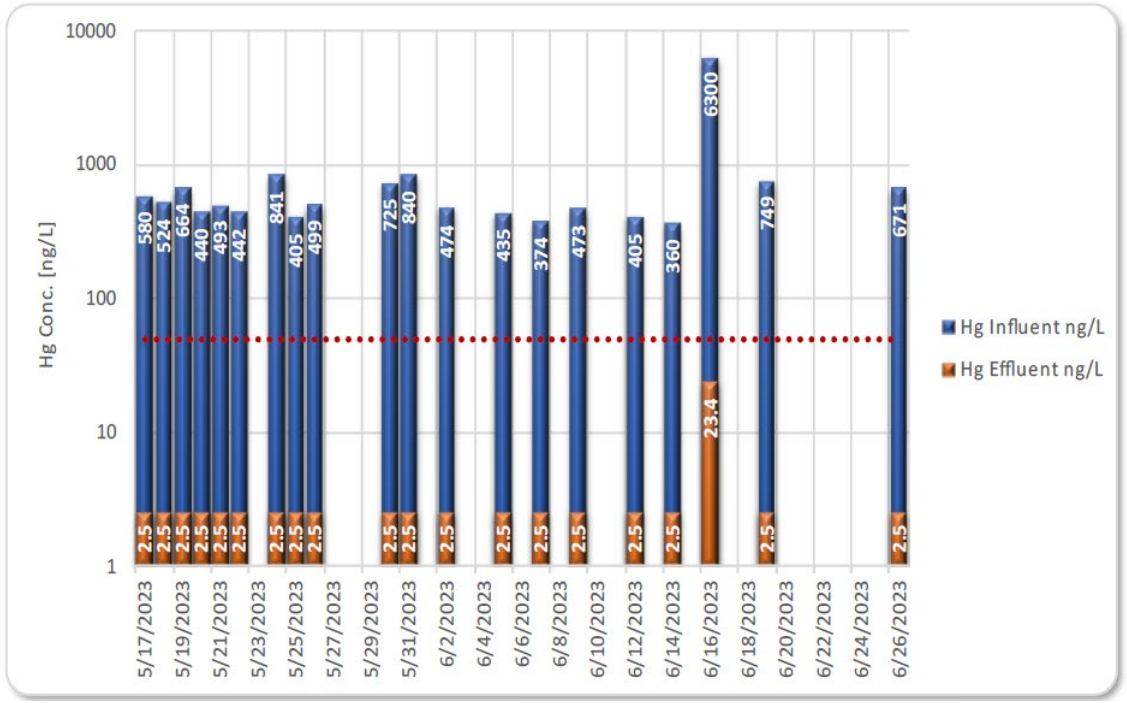


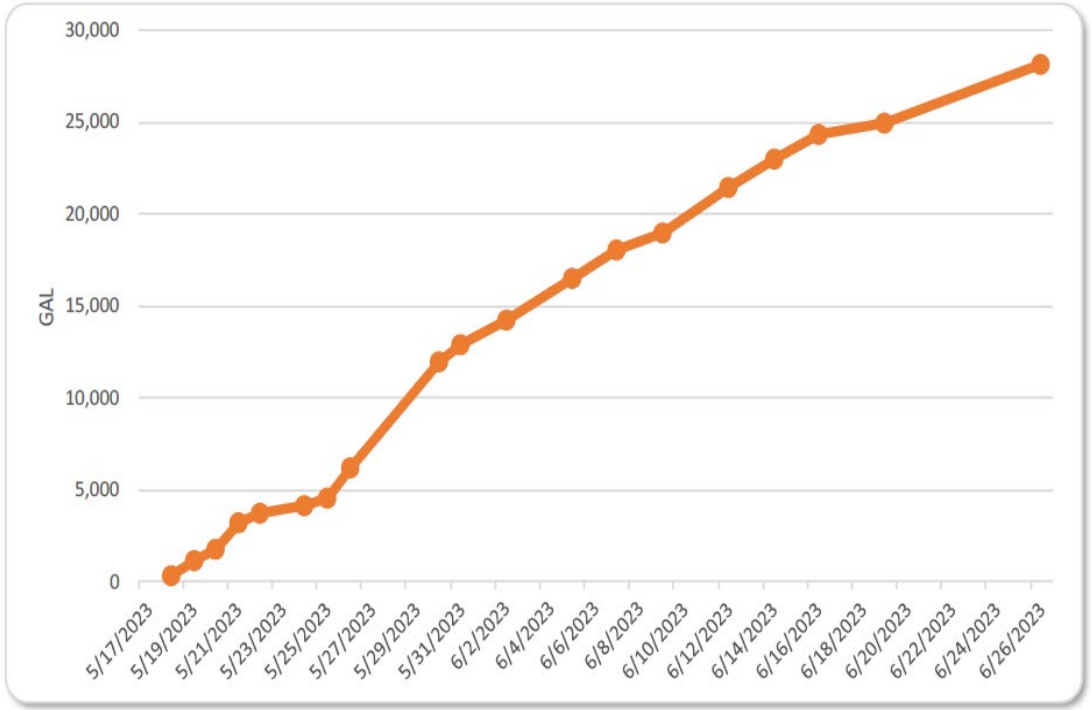
Phase 2 Pilot Test



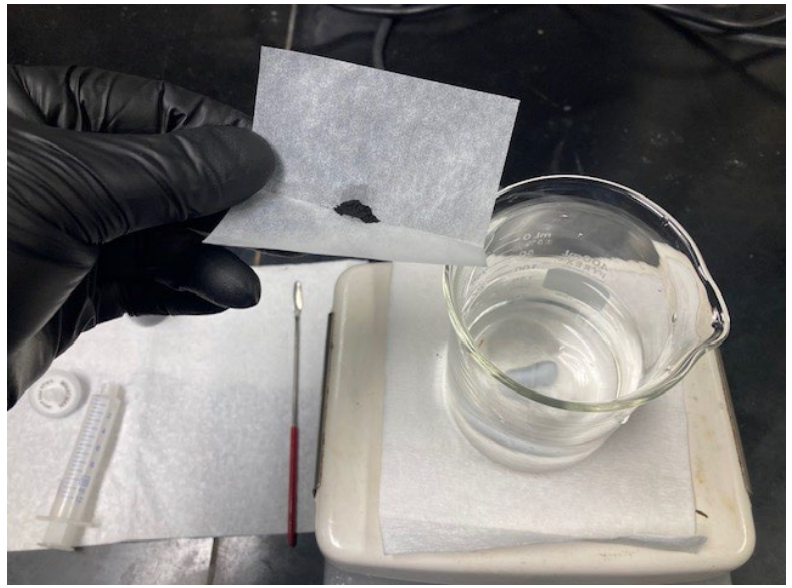
Phase 2 Pilot Results

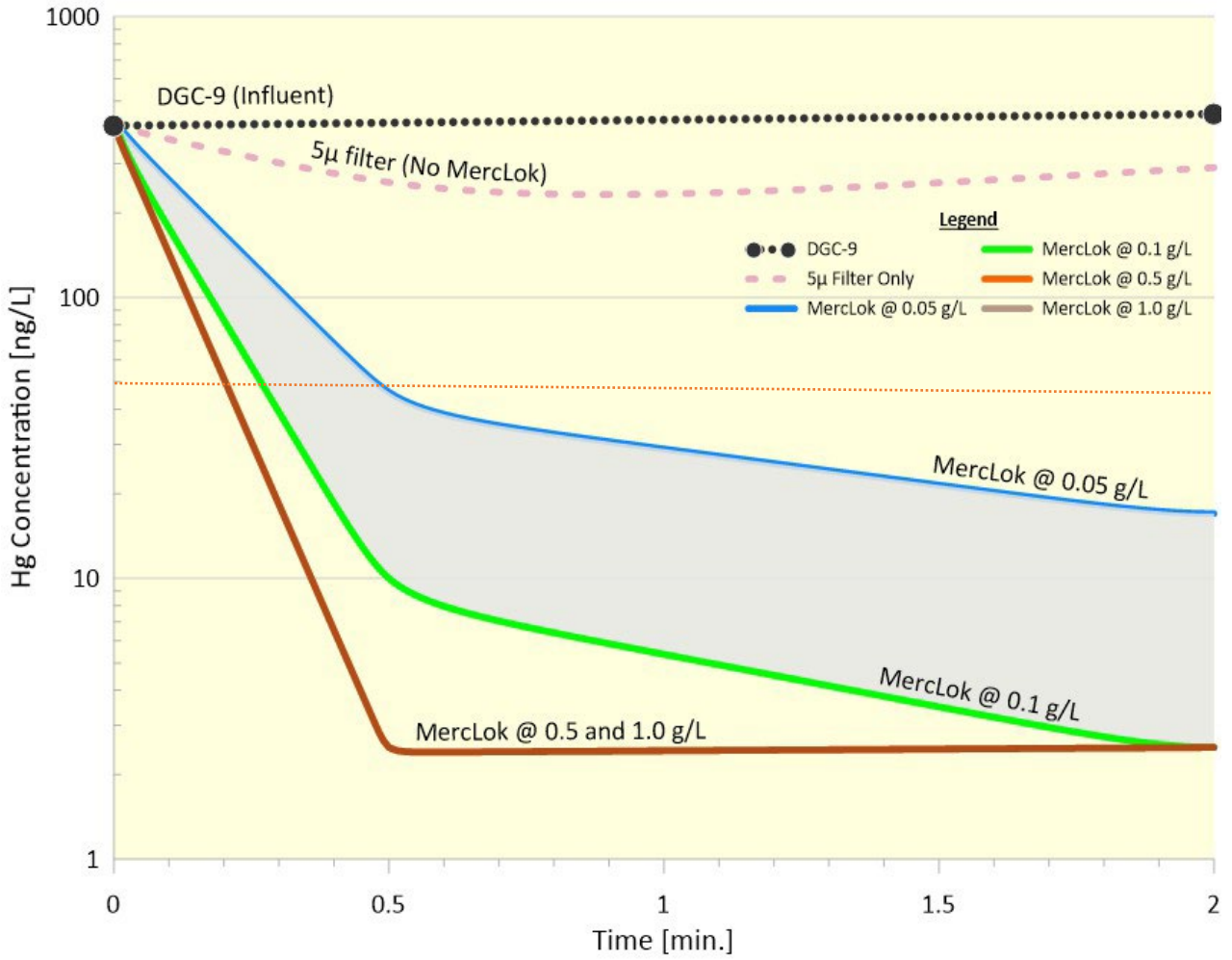
Date	5/17/2023	5/18/2023	5/19/2023	5/20/2023	5/21/2023	5/22/2023	5/24/2023	5/25/2023	5/26/2023	5/30/2023	5/31/2023	6/2/2023	6/5/2023	6/7/2023	6/9/2023	6/12/2023	6/14/2023	6/16/2023	6/19/2023	6/26/2023
% Reduction Effluent	99.6%	99.5%	99.6%	99.4%	99.5%	99.4%	99.7%	99.4%	99.5%	99.7%	99.7%	99.5%	99.4%	99.3%	99.5%	99.4%	99.3%	99.6%	99.7%	99.6%



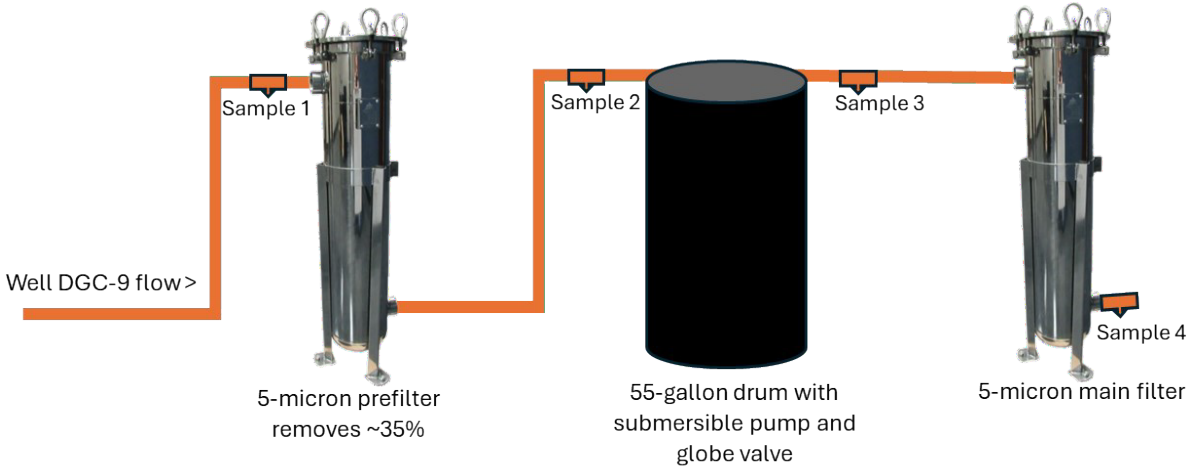


Phase 3 Pilot Test – Bench Design

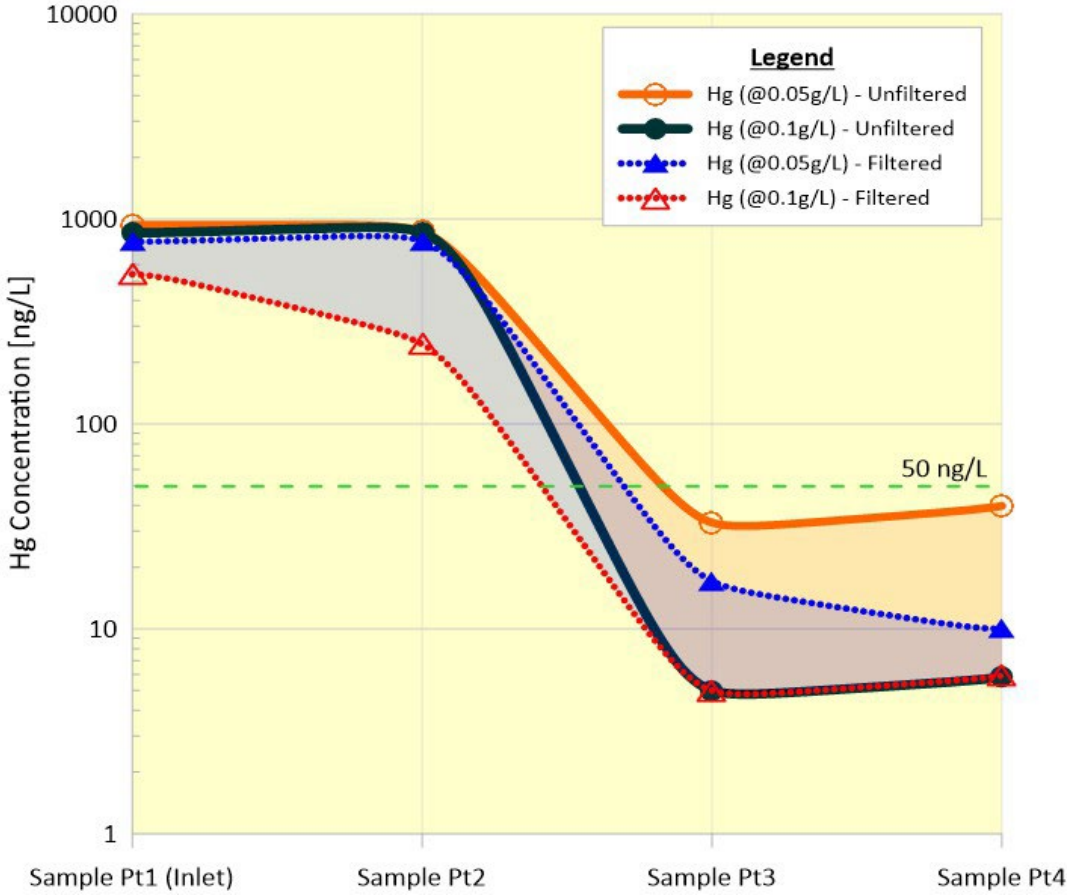




Phase 3 Pilot Test



Phase 3 Pilot Test Results



Pilot Test Summary

- MercLok P-640 was effective in reducing the concentration in recovered groundwater/leachate to below the discharge criteria of 50 ng/L in each test configuration.
- Low loading rates of the amendment were required in the fixed bed application to treat effluent from a single well.
- The tests indicated that pressure drop during operation of fixed beds would require backflushing/bed maintenance when employed at scale to reach the full lifespan of the media.
- Stirred reactor bench testing demonstrated very quick reaction times of less than 2 minutes to reduce concentrations to below the discharge criteria.
- Pilot scale demonstration of a stirred tank application yielded compliant post-treatment concentrations at a very low dosage of 0.05g/L at higher flow rates than the fixed bed application.
- The test program provided validation of a treatment design which satisfied the objectives of the facility (efficient Hg removal, low operation and maintenance requirements, cost efficacy).

Questions?

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For More Information About MercLok™ P640

Acknowledgements: